



**Providence Redevelopment Agency**

Jorge O. Elorza, Mayor | Bonnie Nickerson AICP, Executive Director

**CITY OF PROVIDENCE  
PROVIDENCE REDEVELOPMENT AGENCY**

**REQUEST FOR PROPOSALS:**

**FOR CONSTRUCTION SERVICES RELATED TO THE  
ROGER WILLIAMS PARK GATEWAY PROJECT  
LOCATED AT 1197 BROAD STREET**

**PROVIDENCE REDEVELOPMENT AGENCY**

444 Westminster Street Providence, Rhode Island 02903

401 680 8400 OFFICE | 401 680 8492 FAX

[www.providenceri.gov](http://www.providenceri.gov)



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The Providence Redevelopment Agency (“Agency”), in an effort to develop a new gateway and welcome center for the Roger Williams Park located at 1197 Broad Street in the Broad Street Corridor in the City of Providence, invites proposals from qualified construction firms for construction services related to the Roger Williams Park Gateway Project (“Project”). All proposals shall include the required information enumerated in this information package, however, no proposals will be accepted unless they are developed in accordance with the Agency’s funding requirements, as set forth herein.

**SCOPE OF WORK:** This project entails the development of a 1700 SF (GROSS) visitor center and gateway canopy structure to a 32,000 SF recreational plaza and park. The building will be used as a ticketing and information center for the Roger Williams Park and Zoo. The plaza and park will include recreational landscapes and inclusive plazas for gatherings and leisure in all seasons. Project includes demolition of some existing structures in accordance with drawings, plans, and specifications appended hereto.

**Proposals shall be submitted in writing and electronically and be to the Providence Redevelopment Agency, 444 Westminster Street, Suite 3A, Providence, Rhode Island, 02903, to the attention of Bonnie Nickerson, Executive Director, by 12:00pm on Friday, April 16, 2021. No consideration will be given to proposals submitted after this date and time. The Agency takes no responsibility for packages sent by mail or other means that cannot meet the deadline. Hand delivery is acceptable. The Agency may request additional documentation to assist in making its selection.**

**Proposed Schedule**

March 16, 2021	Request for Proposals issued
March 25, 2021	Pre-bid conference at 10:00a.m. On-Site – 1197 Broad Street
April 2, 2021	Questions & Comments Due (Submit electronically to: <a href="mailto:SBudway@providenceri.gov">SBudway@providenceri.gov</a> )
April 16, 2021	Deadline for Submission of Bid/Proposal
April 30, 2021	Bid/Proposal Awarded

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**BIDDING INSTRUCTIONS**

1. The Agency will select the successful bidder based on the **responsive bidder with the lowest responsible bid**, inter alia, on the following criteria: (i) cost of work to be performed; (ii) bidder qualifications and experience; (iii) time to complete work; (iv) claims history for construction work; and (v) completed bid package.
2. No proposal will be accepted if made in collusion with any other bidder.
3. A bidder or any of its subcontractors who are out-of-state corporations shall qualify or register to transact business in this State, in accordance with R.I. General Laws (as amended) §§ 7-1.1-99, 7-1.1-105, and 7-1.1-106, and shall also register with the Rhode Island Board of Contractors Registration prior to submission of a bid.
4. The Agency reserves the right to reject any and all bid(s).
5. As the City of Providence is exempt from the payment of Federal Excise Taxes and Rhode Island Sales Tax, prices quoted are not to include these taxes.
6. In case of error in the extension of prices quoted, time and materials price will govern.
7. The contractor will not be permitted to either assign or underlet the contract, nor assign either legally or equitably any moneys hereunder, or its claim thereto without the previous written consent of the Agency.
8. Commencement and Completion Dates must be shown in your bid. Subject to the provisions of paragraph 22, substantial completion must occur no later than **November 15, 2021**, and final completion must occur no later than **December 1, 2021**.
9. Successful bidder and Agency will enter into a Contract. The terms thereof will be finalized based upon the bids received, and shall be non-negotiable except for ancillary items.
10. Appropriate certificates of insurance, as specified below, will be required from the successful bidder naming the Agency and the City of Providence as additional insureds.
11. No work shall commence without a prior written authorization from PRA to proceed.
12. Before submitting any Bid, each Bidder shall have examined the site for the proposed work and shall have observed its conditions.

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13. Please submit one original physical copy and electronic copy of your bid to the Agency.
14. Bids must meet the attached specifications. Any exceptions or modifications must be noted and fully explained.
15. Bidder's responses must be in ink or typewritten, and all blanks on the bid form should be completed.
16. The price or prices proposed, including unit prices and allowances, where applicable, shall be stated both in WRITING and in FIGURES, and any proposal not so stated may be rejected.
17. Bids SHOULD BE TOTALED. Do not group items: price each item individually, unless express stated to do so by the Agency. Awards will be made on the basis of *total* bid.
18. Each bidder is required to state in his proposal the bidding firm's name and business location; and must state the names of all persons or firms with whom the bidder is submitting a joint bid. All bids SHOULD BE SIGNED IN INK.
19. The Agency will not accept a bid without a bid bond with surety in the amount of **five per centum (5%)** of the proposed total bid price and will require the successful bidder to obtain a payment and performance bond with surety in the amount of **one hundred per centum (100%)** of the proposed total bid price, both to be deposited with the Agency as a guarantee that the contract will be signed, delivered, and performed in full by the bidder; and in default thereof, the amount of both the bid bond and the performance bond shall be retained for the use of the Agency as liquidated damages on account of each such default. A minimum requirement for acceptability of surety shall be that the surety company chosen by the bidder is currently listed on U.S. Department of the Treasury Circular #570 as holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as hold a Surety License in the State of Rhode Island. An appropriate Certificate of Corporate Authority shall accompany the required bid bond and performance bond.
20. It is hereby mutually understood and agreed that no payment for extra work shall or will be claimed or made unless ordered in writing by the Agency.
21. Bids will be received sealed and opened publicly on April 16, 2021 at 3:00pm. Awards may be made to other than the low bidder in accordance with federal and state standards and regulations. All bid prices will be considered firm, unless qualified otherwise. Requests for price increases will not be honored.
22. Failure to deliver within the time quoted or failure to meet specifications may result in the Agency's exercise of any and all available legal and/or equitable remedies. It is agreed that timely completion is subject to strikes, lockouts, accidents, pandemics, and Acts of God which

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events shall extended the period of completion for a period equal to that suffered in the strikes, lockouts, accidents, pandemics, and Acts of God.

- 23. The successful bidder shall, prior to commencing performance under the contract, attach and submit evidence that they have complied with the provisions of the Rhode Island Worker’s Compensation Act, Title 28, Chapter 29, Section 1, et seq., of the Rhode Island General Laws. If the successful bidder is exempt from compliance under the Worker’s Compensation Act, an officer of the successful bidder shall so state by way of sworn Affidavit, which shall accompany the signed contract.
  
- 24. The successful bidder shall, prior to commencing performance under the contract, attach and submit appropriate certificates of insurance, naming the Agency and the City of Providence as additional insureds, to include:
  - a. General Commercial Liability coverage with limits of \$1,000,000 per each occurrence and \$5,000,000 in the Aggregate (for the Project). Such coverage shall protect the Firm and any of its Subcontractors from any and all claims which may arise out of the Firm’s operations and completed operations under the Contract for which the Firm, its Subcontractors or any persons employed by them shall be liable, including but not limited to any such claims for bodily injury, death, disability, sickness, and damage or destruction to equipment, to property, or to the Work.
  
  - b. Workers Compensation – Statutory coverage.
  
  - c. Automobile Liability – owned, non-owned, and hired automobile coverage with a combined single limit of \$1,000,000.
  
  - d. Umbrella – with limit of \$5,000,000 over General Liability and Automobile Liability.
  
  - e. Property Coverage – The Contractor shall purchase and maintain during the life of this contract “All Risk” insurance coverage for their own equipment and property, with provision for Waiver of Subrogation against the Agency and the City.

The above-listed coverage must be provided on policies and on ACORD certificates from insurance companies that are financially rated A-VI or better by A.N. Best, by which the successful bidder will indemnify and hold harmless the Agency from and against all loss or damages arising from the performance under the Contract, including all claims for personal injury or damage to property sustained by third persons, or their agents, servants and/or those

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claimed under them, as specified above. The Firm shall provide a waiver of subrogation in favor of the Agency on a primary noncontributory basis.

25. The successful bidder will be required to execute a contract agreement in substantially the same form as can be found in **Appendix A**. Bidders shall submit all edits, suggestions, and comments to **Appendix A** when submitting their Bid. This will allow for an expedited period of negotiation with the awarded bidder. A contract as envisioned in **Appendix A** must be fully executed before the bid and award thereof are considered binding. All contracts stemming from any award made hereunder are subject annual appropriations.
26. This project may be partially funded with federal funds from the United States Department of Housing and Urban Development, state funds from the Rhode Island Housing and Mortgage Finance Corporation, and municipal funds from the City of Providence and therefore is subject to the federal, state, and local laws and regulations associated with those programs. Any Award stemming from this request for proposals is contingent upon successful completion of the United States Department of Housing and Urban Development environmental review, successful contracting for all funding sources, and compliance with all relevant federal, state, and local requirements.
27. Any federal Contracting Provisions for Construction Projects herein referenced and incorporated as if fully reproduced may be attached hereto as **Appendix B**. Should any terms in the Request for Proposals or **Appendix A** differ and conflict with terms found in **Appendix B**, the terms in **Appendix B** shall control. BIDS WILL NOT BE ACCEPTED WITHOUT A FULLY EXECUTED CERTIFICATE FOUND AT THE TOP OF **APPENDIX B**.
28. A cover letter must be submitted and addressed to the Agency that identifies the bidder and contains the name, title, and telephone number of the person who will be the primary contact for the bidder and to whom the Agency may direct questions regarding the bid.
29. A summary describing the bidder’s firm, its business services and experience in the area of construction. Identify all subcontractors used in preparation to submit the bid responsive to this request shall also be submitted herewith. In addition, please fill out, execute, and submit with bid a copy of the Contractor’s Qualification Statement attached hereto as **Appendix C**.
30. An overview of local project staff including their relevant experience and resumes, an organizational chart, including the names of the project leaders that will be working on the project; relevant experience working collaboratively with local, state and federal regulatory agencies; relevant experience working with the City of Providence, including the Department of Planning and Development, or other City departments. Relevant experience with relevant State and Federal agencies shall be submitted with the proposal.
31. A proposal in narrative form must be submitted along with the proforma/statement of the total

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cost for all construction services to be provided by the bidder and/or its subcontractors, including an itemized cost for each category of work to be performed, with unit prices and/or allowances, where applicable to complete the scope of services as contained in the plans and technical specifications found in **Appendix D**. Excluded items must also be identified.

32. A list of litigation, including agency or municipal departmental violations, if any, for the past five (5) years in which the bidder was involved, describing the outcome, regarding prior construction work performed by the bidder.
33. An executed original “Lobbying Certification and Restriction Form” as required by 31 U.S.C. § 1352 as implemented at 15 CFR Part 28, attached as **Appendix E** and a statement certifying that the bidder will ensure each subcontract made in relation to the project is subject to this requirement.
34. Fully executed originals of the forms contained in **Appendix F** must accompany the bidder’s submission.
35. The successful bidder shall provide as part of the bid the contaminated and hazardous soil removal quantities. Specifically, provide the quantity of contaminated soil to be disposed of at the RI Resource Recovery Landfill in Johnston, RI and provide the quantity of hazardous soil to be disposed of at the Wayne Disposal, Inc in Belleville, MI, or similar disposal facility licensed to accept said hazardous soil and approved by the Owner.
36. **Appendix G** is hereby reserved for any future potential addenda.
37. The provisions of The Davis-Bacon Act apply by way of Paragraph (D) found in Appendix II to Part 200 as referenced in 2 CFR 200.326 entitled “Contract Provisions” as adopted by 2 CFR 1327. The most recent Wage Determination guidance is attached in **Appendix H**.
38. A **Proposed Schedule** showing commencement, Substantial Completion, and Final Completion dates must be prepared and submitted. Completion of construction should be no later than December 1, 2021. The time for construction shall be no more than 270 days.
39. A **Bid Form**, as contained in **Appendix I** must be completed and submitted with your bid package submission. Attach additional pages as necessary.
40. A copy of the General Conditions, Special Conditions, and General Contract Provisions as contained in **Appendix J** are incorporated and referenced herein to the Bidding Instructions as if fully reproduced and shall be considered fully incorporated and reproduced in **Appendix A**.

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**TERMS AND REQUIREMENTS FOR BIDDING**

**Project Name Description:** Construction services related to the Roger Williams Park Gateway Project located at 1197 Broad Street.

**Date and Time to be submitted: Friday, April 16, 2021 @ 12:00 P.M.**

Bids are to be submitted by the above date to the attention of Bonnie Nickerson at the Providence Redevelopment Agency, 444 Westminster Street, Providence, R.I. 02903.

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# APPENDIX A

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**A G R E E M E N T**  
**CONSTRUCTION SERVICES FOR**  
**ROGER WILLIAMS PARK GATEWAY PROJECT**  
P R O V I D E N C E , R H O D E I S L A N D

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THIS AGREEMENT made this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_ and expiring  
on \_\_\_\_\_, 20\_\_\_\_, by and between \_\_\_\_\_

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a corporation organized and existing under the laws of the State of Rhode Island, hereinafter called the "Contractor", and the Providence Redevelopment Agency hereinafter called the "Agency".

WITNESSETH, that the Contractor and the Agency for the considerations stated herein mutually agree as follows:

**ARTICLE 1. STATEMENT OF WORK:** The Contractor shall furnish all supervision, technical personnel, labor, material, machinery, tools, equipment and services, including utility and transportation services, and perform and complete in an efficient and workmanlike manner all work required for CONSTRUCTION SERVICES FOR THE ROGER WILLIAMS PARK GATEWAY PROEJCT all in strict accordance with the Contract Documents for CONSTRUCTION SERVICES FOR THE ROGER WILLIAMS PARK GATEWAY PROJECT, including all Addenda thereto, all as prepared by the Providence Redevelopment Agency, 444 Westminster Street, Suite 3A, Providence, RI 02903.

**ARTICLE 2. THE CONTRACT PRICE:** The Agency will pay the Contractor for the performance of the Contract, in current funds, subject to additions and deductions as provided in the Section - Changes in the Work under General Conditions, the sum of - \_\_\_\_\_/100 - - - Dollars (\$\_\_\_\_\_).

**ARTICLE 3. CONTRACT:** The executed Contract Documents shall consist of the following:

- a. This Agreement
  - b. Addenda, if any
  - c. Invitation for Bids
  - d. Instructions to Bidders w/ Supplement and Appendicies
  - e. Signed Copy of Bid
  - f. General Conditions
  - g. Special Conditions
  - h. Technical Specifications
  - i. Drawings
  - j. Performance and Labor and Material Payment Bond or Bonds
-

THIS AGREEMENT, together with the other documents enumerated in this Article 3, which said other documents are as fully a part of the Contract as if hereto attached or herein repeated, forms the Contract between the parties hereto. In the event that any provision in any component part of this Contract conflicts with any provision of any other component part, the provision of the component part first enumerated in this Article 3 shall govern, except as otherwise specifically stated.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed in four (4) original copies on the day and year first above written.

Attest:

Contractor:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

By:

\_\_\_\_\_  
(Name / Title)

Address:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Providence Redevelopment Agency:

By:

\_\_\_\_\_  
(Bonnie Nickerson, Executive Director)

**CERTIFICATE**

I, \_\_\_\_\_, certify that I am the  
\_\_\_\_\_ of the Corporation named as  
Contractor herein, that \_\_\_\_\_ who signed this  
Agreement on behalf of the Contractor, was the \_\_\_\_\_  
of said corporation; that said Agreement was duly signed for and in behalf of said corporation by authority of  
its governing body, and is within the scope of its corporate powers.

Corporate

\_\_\_\_\_

Seal

\_\_\_\_\_

\_\_\_\_\_

# APPENDIX B

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**CERTIFICATE OF CONSENT  
CONSTRUCTION SERVICES FOR  
ROGER WILLIAMS PARK GATEWAY PROJECT**

P R O V I D E N C E, R H O D E I S L A N D

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CERTIFICATE OF CONSENT

I, \_\_\_\_\_, certify that I am the \_\_\_\_\_ of the Corporation named as Contractor in the attached response to the request for proposals for construction services related to the Roger Williams Park Gateway Project; that I have read in full the attached Specifications and Contracting Provisions, as well as any federal contracting provisions for construction projects (“Controlling Instruments”), that I or my subcontractors (as applicable) have filled out all of the required forms contained within this Appendix B; and that I hereby certify on behalf of the Corporation that it consents to said Controlling Instruments and understands that said documents control over all conflicts of terms which may arise in the contractual relationship borne out of this submission. I further consent to monitoring to ensure compliance with the federal requirements and certifications herein.

Signature \_\_\_\_\_

Title \_\_\_\_\_

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## APPENDIX B CHECKLIST

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To ensure compliance, kindly complete this checklist at the time of *bid submittal* with the required documentation listed below.

\_\_\_\_\_ Prime & any Subcontractors: all forms included within the following *Federal Construction Contract Provisions*

\_\_\_\_\_ Completed applicable MBE/WBE forms

\_\_\_\_\_ DUNS number (to obtain a free DUNS number; follow instructions included within the following *Federal Construction Contract Provisions*)

\_\_\_\_\_ Employer Identification Number (EIN)-(known as Federal Tax Identification Number)

\_\_\_\_\_ Register-System for Award Management (SAM.Gov)  
(All Prime and Subcontractors must be registered in the System for Award Management and registration must be up to date-*Follow instructions in Federal Construction Provisions*)- proof of registration/renewal must be provided

\_\_\_\_\_ Listing of Trade Classifications (utilized on project)

\_\_\_\_\_ Are you a sole proprietor of your business? Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, please provide a letter on your company stationary stating that you are a sole proprietor (*owner-insert name*) of said business (*insert name and address of business*) and are entitled to all profits, debts, losses and liability etcetera. The letter must be dated and signed by the owner of business.

\*\*\*\*\**IMPORTANT*\*\*\*\*\*

In order for your *Bid* to be considered *Responsive*, all Prime/Subcontractors on federally funded projects must submit all applicable forms in the *FEDERAL CONSTRUCTION CONTRACT PROVISIONS* that follow.

Please submit applicable forms for *each subcontractor utilized* for your project.



**CITY OF PROVIDENCE CDBG PROGRAM  
FEDERAL CONSTRUCTION CONTRACT PROVISIONS  
FOR CONTRACTS EXCEEDING \$100,000**

**MONITORING AGENT:  
Department of Planning & Development  
Division of Housing & Community Development  
444 Westminister Street, Suite 3A  
Providence, Rhode Island 02903**



**DEPARTMENT OF PLANNING & DEVELOPMENT  
DIVISION OF HOUSING & COMMUNITY DEVELOPMENT**

**INFORMATION FOR BIDDERS  
PLEASE READ CAREFULLY!**

**TO BE CONSIDERED A RESPONSIVE BIDDER  
YOUR BID SUBMISSION MUST CONTAIN A BID GUARANTEE EQUIVALENT TO  
FIVE PERCENT OF THE BID PRICE AND THE FOLLOWING SIGNED AND  
COMPLETED CERTIFICATIONS:**

**For Contracts Between \$10,000 and \$100,000**

- 1. CERTIFICATION OF CONTRACTOR REGARDING SEGREGATED FACILITIES**
- 2. CERTIFICATION OF BIDDER REGARDING EQUAL EMPLOYMENT OPPORTUNITY**
- 3. MBE/WBE FORMS**

**For Contracts Exceeding \$100,000**

- 1. CERTIFICATION OF CONTRACTOR REGARDING SEGREGATED FACILITIES**
- 2. CERTIFICATION OF BIDDER REGARDING EQUAL EMPLOYMENT OPPORTUNITY**
- 3. SECTION 3 AFFIRMATIVE ACTION PLAN**
- 4. CONTRACTOR'S DBE/SUBCONTRACTOR UTILIZATION FORM**

**Additional certifications by subcontractors prior to the start of work date**

1. For all subcontracts exceeding \$10,000; Certification of Subcontractor Regarding Segregated Facilities and Certification of Subcontractor Regarding Equal Employment Opportunity
2. For all subcontracts exceeding \$100,000; Section 3 Affirmative Action Plan, and Contractor's DBE/Subcontractor Utilization Form.
3. MBE/WBE Subcontractor Disclosure Form
4. MBE/WBE Waiver Request Form

**Submission of Section 3 Utilization Report for Contracts Exceeding \$100,000**

Prime Contractors must submit a Section 3 Utilization Report to the CDBG grantee or their designee prior to final payment of CDBG funds for the project. This Report must include all Section 3 Employees of both the Contractor and all Subcontractors according to the terms of the Section 3 Affirmative Action Plan.

# **CERTIFICATIONS FOR PRIME BIDDER**

*Must be submitted with Bid*

All **Prime Contractors/Subcontractors** on federally funded projects must have a **Dun & Bradstreet (D-U-N-S Number)**, an **Employer Identification Number (EIN)** is also known as **Federal Tax Identification Number** and must be registered with the **System for Award Management**.

Below are the corresponding links to register:

**STEP: 1.**



To obtain a **free DUNS number** if your business is not registered go to: <https://www.dnb.com/duns-number/get-a-duns.html>

**Upon receipt of a DUNS number**

**STEP: 2.**

If your business is not registered on **Systems for Award Management** go to: <https://www.sam.gov/SAM/pages/public/index.jsf>



The System for Award Management (SAM) is an official website of the U.S. government. There is no cost to use SAM. You can use this site for FREE to:

- Register to do business with the U.S. government
- Update or renew your entity registration
- Check status of an entity registration
- Search for entity registration and exclusion records



**STEP 3:**

**Complete form. (Must be submitted with Bid)**



**DEPARTMENT OF PLANNING & DEVELOPMENT  
DIVISION OF HOUSING & COMMUNITY DEVELOPMENT**

**Additional Submission by Prime Contractor prior to the start of work date**

**Name of Bidder (Prime Contractor)** \_\_\_\_\_

**Dun & Bradstreet (D-U-N-S Number)** \_\_\_\_\_

**Employer Identification Number (EIN)** \_\_\_\_\_  
(Is also known as Federal Tax Identification Number)

**Is your business registered with System for Award Management? Yes \_\_\_ No \_\_\_**

**If NO, please register your business with System for Award Management.**

**Date of Registration** \_\_\_\_\_

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**Name of Subcontractor** \_\_\_\_\_

**Dun & Bradstreet (D-U-N-S Number)** \_\_\_\_\_

**Employer Identification Number (EIN)** \_\_\_\_\_  
(Is also known as Federal Tax Identification Number)

**Is your business registered with System for Award Management? Yes \_\_\_ No \_\_\_**

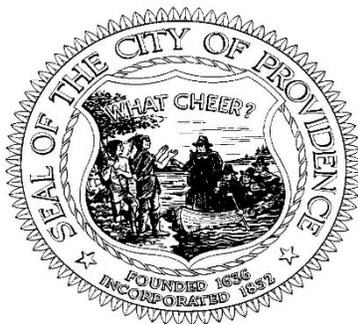
**If NO, please register your business with System for Award Management.**

**Date of Registration** \_\_\_\_\_

\_\_\_\_\_  
**Name and Title of Authorized Representative (print or type)**

\_\_\_\_\_  
**Signature of Authorized Representative**

\_\_\_\_\_  
**Date**



**DEPARTMENT OF PLANNING & DEVELOPMENT  
DIVISION OF HOUSING & COMMUNITY DEVELOPMENT  
CERTIFICATION OF CONTRACTOR REGARDING  
EQUAL EMPLOYMENT OPPORTUNITY  
(For Prime Contracts Exceeding \$100,000)  
INSTRUCTIONS**

This certification is required pursuant to Executive Order 11246 (30 F.R. 12319-25). The implementing rules and regulations provide that any bidder or prospective contractor, or any other of their proposed subcontractors, shall state as an initial part of the bid or negotiations of the contract whether it has participated in any previous contract or subcontract subject to the equal opportunity clause, and if so, whether it has filed all compliance reports due under applicable instructions.

Where the certification indicates that the bidder has not filed a compliance report due under applicable instructions, such bidder shall be required to submit a compliance report within seven (7) calendar days after bid opening. No contract shall be awarded unless such report is submitted.

**CERTIFICATION BY BIDDER**

Name and address of bidder

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

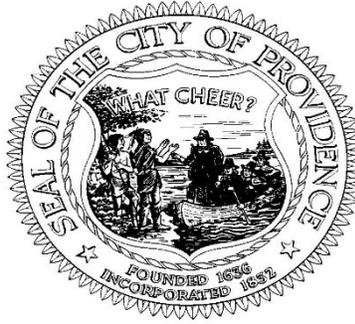
1. Bidder has participated in a previous contract or subcontract subject to the EEO Clause.  
 Yes                       No
2. Compliance reports were required to be filed in connection with such contract or subcontract.  
 Yes                       No
3. Bidder has filed all compliance reports due under applicable instructions, including SF-100.  
 Yes                       No
4. Have you ever been or are you being considered for sanction due to violation of Executive Order 11246, as amended?  
 Yes                       No

\_\_\_\_\_  
Name and Title of Authorized Representative (print or type)

\_\_\_\_\_  
Signature of Authorized Representative

\_\_\_\_\_  
Date





**DEPARTMENT OF PLANNING & DEVELOPMENT  
DIVISION OF HOUSING & COMMUNITY DEVELOPMENT**

**SECTION 3 REQUIREMENTS**

Each year the U.S. Department of Housing and Urban Development (HUD) invests billions of federal dollars into distressed communities for projects designed to build and rehabilitate housing, improve roads, develop community centers, and otherwise assist families achieve the American Dream.

The Section 3 regulation recognizes that HUD funding typically results in projects/activities that generate new employment, training and contracting opportunities. These economic opportunities can also positively impact the lives of local residents who live in the neighborhoods being redeveloped.

Section 3 of the Housing and Urban Development Act of 1968 [12 U.S.C. 1701u and 24 CFR Part 135] is HUD's legislative directive for providing preference to low- and very low-income residents of the local community (regardless of race or gender), and the businesses that substantially employ these persons, for new employment, training, and contracting opportunities resulting from HUD-funded projects.

As a condition of receiving HUD assistance recipients certify that they will comply with the requirements of Section 3 annually pursuant to 24 CFR 570.607(b).

**Applicability of Section 3 to Community Planning & Development Assistance**

**Contractors** or subcontractors that receive contracts in excess of **\$100,000** for Section 3 covered projects/activities are **required to comply** with the Section 3. Accordingly, the recipient must attempt to reach the **Section 3 minimum numerical goals** found at 24 CFR Part 135.30 by:

- 1) Awarding 10 percent of the total dollar amount of all covered construction contracts to Section 3 businesses; and
- 2) Offering 30 percent of new employment opportunities to Section 3 businesses.

**Recipients that fail to meet the minimum numerical goals above bear the burden of demonstrating why it was not possible to do so.**

Such justifications should describe the efforts that were taken, barriers encountered, and other relevant information that will enable the Department to make a compliance determination.

### **Triggering the Requirements of Section 3**

Section 3 is triggered when the normal completion of construction and rehabilitation projects creates the need for **new** employment, contracting, or training opportunities.

The Section 3 regulations should not be construed to mean that recipients are required to hire Section 3 residents or award contracts to Section 3 businesses other than what is needed to complete covered projects/activities. If the expenditure of covered funding does not result in new employment, contracting, or training opportunities, the requirements of Section 3 have not been triggered. However, each agency must still submit Section 3 annual reports indicating this information.

### **Recipient Responsibilities Pursuant to Section 3**

Each recipient (and their covered contractors, subcontractors, or subrecipients) are required to comply with the requirements of Section 3 for employment, training, or contracting opportunities resulting from the expenditure of covered funding. This responsibility includes:

1. Implementing procedures to notify Section 3 residents and business concerns about training, employment, and contracting opportunities generated by Section 3 covered assistance;
2. Notifying potential contractors working on Section 3 covered projects of their responsibilities;
3. Incorporating the Section 3 Clause into all covered solicitations and contracts [see 24 CFR Part 135.38];
4. Facilitating the training and employment of Section 3 residents and the award of contracts to Section 3 business concerns;
5. Assisting and actively cooperating with the Department in making contractors and subcontractors comply;
6. Refraining from entering into contracts with contractors that are in violation of Section 3 regulations;
7. Documenting actions taken to comply with Section 3.

### **Section 3 Residents and Business Concerns**

#### **Section 3 Residents Are:**

1. Residents of Public and Indian Housing; or

2. Individuals that reside in the metropolitan area or nonmetropolitan county in which the Section 3 covered assistance is expended and whose income do not exceed the local HUD income limits set forth for low- or very low-income households.

**Section 3 Business Concerns Are One of the Following:**

1. Businesses that are 51 percent or more owned by Section 3 residents; the business meets the definition of a resident-owned business, as set forth in HUD’s regulations at 24 CFR 963.5.
2. The business demonstrates that at least 20 percent of its permanent full-time employees are Section 3 residents and the business either: (i) sponsored a minimum of 10 percent of its current Section 3 employees to attend a DOL or DOL-recognized, State Apprenticeship Agency-approved, registered apprenticeship or pre-apprenticeship training program that meets the requirements outlined in DOL’s Employment Training Administration (ETA) Training and Employment Notice 13-121; or (ii) 10 percent of the employees of the business are participants or graduates of a DOL YouthBuild program.<sup>2</sup>

In accordance with the regulation, residents and businesses concerns seeking Section 3 preference shall certify, or submit evidence to the recipient, contractor, subcontractor or subrecipient (if requested) verifying that they meet the definitions provided above. Some examples include: proof of residency in a public housing authority; proof of federal subsidies for housing, food stamps, or unemployment benefits; and payroll data or other relevant business information.

For additional information, please visit the Section 3 website at: [www.hud.gov/section3](http://www.hud.gov/section3).

<sup>1</sup> See [http://wdr.doleta.gov/directives/corr\\_doc.cfm?DOCN=5842](http://wdr.doleta.gov/directives/corr_doc.cfm?DOCN=5842).

<sup>2</sup> See [http://www.doleta.gov/youth\\_services/youthbuild.cfm](http://www.doleta.gov/youth_services/youthbuild.cfm).

**Section 3 Clause**

A. The work to be performed under this contract, subcontract, memorandum of understanding, cooperative agreement or similar legally binding agreement, is subject to the requirements of section 3 of the Housing and Urban Development Act of 196 (Section 3). The purpose of Section 3 is to ensure, to the greatest extent feasible, that training, employment, contracting, and other economic opportunities generated by Section 3 covered financial assistance shall be directed to low- and very low-income residents of the neighborhood where the financial assistance is spent, particularly to those who are recipients of government assistance for housing, and to businesses that are either owned by low- or very low-income residents of the neighborhood where the financial assistance is spent, or substantially employ these persons.

B. The parties to this contract, subcontract, memorandum of understanding, cooperative agreement, or similar legally binding agreement agree to comply with HUD’s regulations in 24 CFR part 135, which implement Section 3. As evidenced by their execution of this contract or subcontract memorandum of understanding, cooperative agreement or similar legally binding

agreement the parties certify that they are under no contractual or other impediment that would prevent them from complying with the requirements of 24 CFR part 135.

C. The contractor agrees to identify current employees on its payroll when the contract or subcontract was awarded who will be working on the Section 3 covered project or activity and certify that any vacant employment opportunities, including training positions, that are filled:

1. After the contractor is selected; and
2. With persons other than those that meet the definition of a Section 3 resident, were not filled to circumvent the contractor's Section 3 obligations.

D. The contractor agrees to maintain records documenting Section 3 residents that were hired to work on previous Section 3 covered projects or activities that were retained by the contractor for subsequent Section 3 covered projects or activities.

E. The contractor agrees to post signs advertising new employment, training, or Sub-contracting opportunities that will be available as a result of the Section 3 covered projects and activities in conspicuous places at the work site where potential applicants can review them.

F. The contractor agrees to hire, to the greatest extent feasible, Section 3 residents as 30 percent of new hires, or provide written justification to the recipient that is consistent with § 135.7(b)(4), describing why it was unable to meet minimum numerical hiring goals, despite its efforts to comply with the provisions of this clause.

G. The contractor agrees that in order for a Section 3 resident to be counted as a new hire, the resident must work a minimum of 50 percent of the average staff hours worked for the category of work for which they were hired throughout the duration of time that the category of work is performed on the covered project.

H. The contractor agrees to award, to the greatest extent feasible, 10 percent of the total dollar amount of subsequent subcontracts awarded in connection with the Section 3 covered project or activity to Section 3 businesses, or provide written justification that is consistent with § 135.7(b)(4) describing why it was unable to meet that goal, despite their efforts to comply with the provisions of this clause.

I. The contractor agrees to notify Section 3 residents and businesses about the availability of new employment, training, or contracting opportunities created as a result of the receipt of Section 3 covered financial assistance, as stipulated by the awarding agency.

J. The contractor agrees to verify the eligibility of prospective Section 3 residents and businesses for employment, training, or subcontracting opportunities, in accordance with the recipient's policies and procedures.

K. The contractor agrees to provide priority consideration to eligible residents and businesses in accordance with 24 CFR 135.37 or 24 CFR 135.57, as applicable.

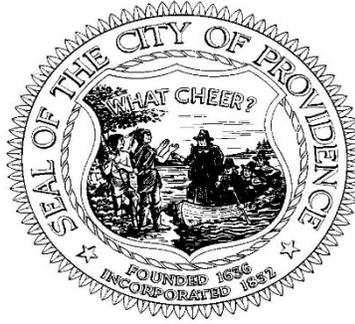
L. The contractor agrees to notify potential bidders on subcontracts that are associated with Section 3 covered projects and activities about the requirements of Section 3, and include this Section 3 clause in its entirety into every subcontract awarded.

M. The contractor agrees to impose sanctions upon any subcontractor that has violated the requirements of this clause in accordance with the awarding agency's Section 3 policies and procedures.

N. The contractor agrees to comply with all monitoring, reporting, recordkeeping, and other procedures specified by the awarding agency.

O. If applicable, the contractor agrees to notify each labor organization or representative of workers with which the recipient, sub-recipient, or contractor has a collective bargaining or similar labor agreement or other understanding, if any, about its obligation to comply with the requirements of Section 3 and ensure that new collective bargaining or similar labor agreements provide employment, registered apprenticeship, training, subcontracting, or other economic opportunities to Section 3 residents and businesses, and to post notices in conspicuous places at the work site advising the labor union, organization, or workers' representative of the contractor's commitments under this part.

P. Failure to comply with this clause shall result in the imposition of sanctions. Appropriate sanctions for noncompliance may include: Requiring additional certifications or assurances of compliance; termination or cancelation of the contract, subcontract, memorandum of understanding, cooperative agreement, or similar legally binding arrangement for default; refraining from entering into subsequent contracts, subcontracts, memoranda of understanding, cooperative agreements, or similar legally binding arrangement; repayment of funds, and withholding a portion of contract awards, subcontracts, memoranda of understanding, cooperative agreements, or similar legally binding arrangements.



**DEPARTMENT OF PLANNING & DEVELOPMENT  
DIVISION OF HOUSING & COMMUNITY DEVELOPMENT  
SECTION 3 AFFIRMATIVE ACTION PLAN**

**(Prime Contractor)  
[For Prime Contracts that exceed \$100,000]**

\_\_\_\_\_, Contractor, agrees to implement the following specific affirmative action steps directed at increasing the utilization of Section 3 Residents' and Section 3 Business Concerns within the Town/City/County of \_\_\_\_\_.

- A. To ascertain from the locality's CDBG Program official the exact boundaries of the Section 3 Covered Project Area and where advantageous, seek the assistance of local officials in preparing and implementing the affirmative action plan.
- B. To attempt to recruit from within the Town/City/County the necessary individuals to fill employment opportunities generated by Section 3 covered assistance through: local advertising media, signs placed at the proposed site for the project, and community organizations and public or private institutions operating within or serving the project area such as Service Employment and Redevelopment (SER), Opportunities Industrialization Center (OIC), Urban League, Concentrated Employment Program, Hometown Plan, or the U.S. Employment Service and providing preference for these opportunities in the following order:
- (i) Section 3 Residents residing in the service area or neighborhood in which the Section 3 covered project is located;
  - (ii) Participants in HLJD Youthbuild Programs, and
  - (iii) Other Section 3 Residents.
- C. To maintain a list of all lower income area residents who have applied either on their own or on referral from any source, and to employ such persons, if otherwise eligible and a vacancy exists.
- D. To insert this Section 3 Affirmative Action Plan in all bid documents for contracts over \$100,000, and to require all bidders on subcontracts over \$100,000 to submit a Section 3

Affirmative Action Plan, including utilization goals and the specific steps planned to accomplish these goals.

- E. To insure that subcontracts over \$100,000 which are typically let on a negotiated rather than bid basis in areas other than Section 3 covered project areas, are also let on a negotiated basis, whenever feasible, when let in a Section 3 covered project area.
- F. To formally contact unions, subcontractors and trade associations to secure their cooperation for this program.
- G. To notify Section 3 residents and Section 3 business concerns about economic opportunities generated by Section 3 covered assistance and to award Section 3 covered contracts, to the greatest extent feasible, to Section 3 business concerns in the following order of preference:
  - (i) Section 3 business concerns that provide economic opportunities for Section 3 residents in the service area or neighborhood in which the Section 3 covered project is located;
  - (ii) Applicants selected to carry out HUD Youthbuild projects;
  - (iii) Other Section 3 business concerns.
- H. To notify potential contractors about Section 3 requirements of this part, and incorporating the Section 3 clause in all solicitations and contracts.
- I. To facilitate the training and employment of Section 3 residents and the award of contracts to Section 3 business concerns undertaking activities to reach the numerical goal established by HLJD.
- J. To cooperate in obtaining the compliance of contractors and subcontractors with the requirements of Section 3.
- K. To submit reports to DECD and HUD on the results of actions taken to provide training, jobs and contracts to Section 3 residents and Section 3 business concerns.
- L. To appoint an executive official of the company or agency as Equal Employment Opportunity Officer to coordinate the implementation of this Section 3 Affirmative Action Plan.
- M. To document utilization of Section 3 Employees on the covered project by having new employees, (including those of all subcontractors) from the Section 3 Area, complete the Section 3 Income Worksheet as provided by DECD
- N. To complete a Section 3 Utilization Report and submit said report to DECD, HUD, or their designee prior to final payment for the covered project; This report will list all Section 3 Employees documented on the Section 3 Income Worksheets and be in the format provided by DECD.
- O. To maintain records, including copies of correspondence, income verification memoranda, etc., which document that all levels of the above affirmative action steps have been taken.



**CERTIFICATION FOR BUSINESS CONCERNS SEEKING SECTION 3  
PREFERENCE IN CONTRACTING AND DEMONSTRATION OF  
CAPABILITY**

Name of Business \_\_\_\_\_

Address of Business \_\_\_\_\_

Type of Business:                     Corporation                     Partnership  
    Sole Proprietorship    Joint Venture

Attached is the following documentation as evidence of status:

**For Business claiming status as a Section 3 resident-owned enterprise:**

- Copy of resident lease
- Copy of receipt of public assistance
- Copy of evidence of participation in a public assistance program
- Other evidence

**For business entity as applicable:**

- Copy of Articles of Incorporation
- Certificate of Good Standing
- Assumed Business Name Certificate
- Partnership Agreement
- List of owners/stockholders and % ownership of each
- Corporation Annual Report
- Organization chart with names and titles and brief function statement
- Latest Board minutes appointing officers
- Additional documentation

**For business claiming Section 3 status by subcontracting 25 percent of the dollar awarded to qualified Section 3 business:**

- List of subcontracted Section 3 business(es) and subcontract amount

**For business claiming Section 3 status, claiming at least 30 percent of their workforce are currently Section 3 residents or were Section 3 eligible residents within 3 years of date of first employment with the business:**

- List of all current full-time employees
- List of employees claiming Section 3 status
- PHA/IHA Residential lease less than 3 years from day of employment
- Other evidence of Section 3 status less than 3 years from date of employment

Evidence of ability to perform successfully under the terms and conditions of the proposed contract:

- Current financial statement
- Statement of ability to comply with public policy
- List of owned equipment
- List of all contracts for the past two years

\_\_\_\_\_  
Authorizing Name and Signature (Corporate Seal)

Attested by: \_\_\_\_\_

\_\_\_\_ **Original Submission**



**For a complete list of certified firms and company designation (WBE/DBE) go to <http://www.providenceri.gov>**

## **SECTION 3 UTILIZATION REPORT**

*Must be submitted by Prime Contractor  
Prior to receiving final payment of CDBG funds*



**DEPARTMENT OF PLANNING & DEVELOPMENT  
DIVISION OF HOUSING & COMMUNITY DEVELOPMENT  
SECTION 3 UTILIZATION REPORT  
(To be Completed for all Prime Contracts Exceeding \$100,000)**

**A. SECTION 3 EMPLOYEE INFORMATION**

Name of CDBG Grantee: \_\_\_\_\_

Name of Project: \_\_\_\_\_

CDBG Project Number: \_\_\_\_\_ Wage Decision Number: \_\_\_\_\_

Number of Section 3 Employees Utilized on Project by Prime Contractor: \_\_\_\_\_

Number of Section 3 Employees Utilized on Project by Subcontractors: \_\_\_\_\_

Total Number of Section 3 Employees Utilized on Project: \_\_\_\_\_

**B. CERTIFICATION OF PRIME CONTRACTOR**

As officer and representative of: \_\_\_\_\_

Name of Prime Contractor

Address: \_\_\_\_\_

\_\_\_\_\_

Telephone Number: \_\_\_\_\_

On behalf of the Company, I hereby certify that the above information is true and accurate and is reported fully as required by the Section 3 Affirmative Action Plan as part of the contract for this CDBG assisted construction project. It is further understood that final payment from the City of Providence CDBG Program for this project cannot be made until this Report is submitted to the CDBG Grantee or authorized designee.

\_\_\_\_\_  
Name and Title of Authorized Representative (print or type)

\_\_\_\_\_  
Signature of Authorized Representative

\_\_\_\_\_  
Date



**DEPARTMENT OF PLANNING & DEVELOPMENT  
DIVISION OF HOUSING & COMMUNITY DEVELOPMENT  
DIRECTIONS FOR COMPLETION OF  
SECTION 3 UTILIZATION REPORT  
(For Prime Contracts Exceeding \$100,000)**

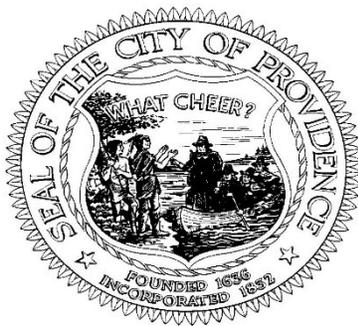
1. Determine if there has been Section 3 participation in the construction project.
  - a. If you hire new employees who reside in the county where the construction is taking place to work on the CDBG project, have them complete the one page Section 3 Income Worksheet and return it to you. Compare the Worksheet to the Section 3 Income Schedule provided you at the pre-construction conference to determine if they are Section 3 eligible.
  - b. Distribute copies of the Section 3 Income Worksheet to all subcontractors you engage for the project. Instruct them to have any new employees they hire who reside in the county where the construction is taking place complete the worksheet and have the subcontractors return the forms to you. Compare as in (a.), above to determine Section 3 eligibility.
2. Retain all Section 3 Income Worksheets with your project records.
3. Complete (A) Section 3 Employee Information area of the report.
  - a. Enter name of the community where the project is located.
  - b. Enter project name.
  - c. Enter CDBG Project Number & Federal Wage Decision Number. (Located in wage decision documents)
  - d. Enter number of Section 3 Employees you utilized on project.
  - e. Enter number of Section 3 Employees utilized by subcontractors on project
  - f. Enter total number (d + e) of Section 3 Employees utilized on project
4. Complete (B) Certification by Prime Contractor area of Report
  - a. List your name, address and telephone number of your company.
  - b. Print or type name and title of authorized company representative.
  - c. Have authorized representative sign and date Report.

**IMPORTANT REMINDER!**

*Final payment of CDBG funds will not be made until Section 3 Utilization Report is submitted to CDBG grantee or designee*

# **CERTIFICATIONS FOR SUBCONTRACTORS**

*Must be submitted by Prime Contractor  
For each applicable Subcontractor prior to start of work*



**DEPARTMENT OF PLANNING & DEVELOPMENT  
DIVISION OF HOUSING & COMMUNITY DEVELOPMENT  
CERTIFICATION OF SUBCONTRACTOR REGARDING  
EQUAL EMPLOYMENT OPPORTUNITY  
(For Subcontracts Exceeding \$10,000)  
INSTRUCTIONS**

This certification is required pursuant to Executive Order 11246 (30 F.R. 12319-25). The implementing rules and regulations provide that any bidder or prospective contractor, or any other of their proposed subcontractors, shall state as an initial part of the bid or negotiations of the contract whether it has participated in any previous contract or subcontract subject to the equal opportunity clause, and if so, whether it has filed all compliance reports due under applicable instructions.

Where the certification indicates that the bidder has not filed a compliance report due under applicable instructions, such bidder shall be required to submit a compliance report within seven (7) calendar days after bid opening. No contract shall be awarded unless such report is submitted.

**CERTIFICATION BY SUBCONTRACTOR**

Name and address of subcontractor

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1. Bidder has participated in a previous contract or subcontract subject to the EEO Clause.  
 Yes       No
2. Compliance reports were required to be filed in connection with such contract or subcontract.  
 Yes       No
3. Bidder has filed all compliance reports due under applicable instructions, including SF-100.  
 Yes       No
4. Have you ever been or are you being considered for sanction due to violation of Executive Order 11246, as amended?  
 Yes       No

\_\_\_\_\_  
Name and Title of Authorized Representative (print or type)

\_\_\_\_\_  
Signature of Authorized Representative

\_\_\_\_\_  
Date



**DEPARTMENT OF PLANNING & DEVELOPMENT  
DIVISION OF HOUSING & COMMUNITY DEVELOPMENT  
CERTIFICATION OF SUBCONTRACTOR REGARDING  
SEGREGATED FACILITIES  
(For Subcontracts exceeding \$10,000)**

**Name of Subcontractor:** \_\_\_\_\_

**Project Name and Number:** \_\_\_\_\_

**The undersigned hereby certifies that:**

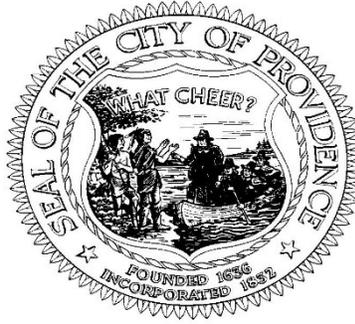
**No segregated facilities will be maintained as required by Title VI of the Civil Rights Act of 1964.**



\_\_\_\_\_  
**Name and Title of Authorized Representative (print or type)**

\_\_\_\_\_  
**Signature of Authorized Representative**

\_\_\_\_\_  
**Date**



**DEPARTMENT OF PLANNING & DEVELOPMENT  
DIVISION OF HOUSING & COMMUNITY DEVELOPMENT  
SECTION 3 AFFIRMATIVE ACTION PLAN**

**(Subcontractor)**

**[For Subcontracts that exceed \$100,000]**

\_\_\_\_\_, Subcontractor, agrees to implement the following specific affirmative action steps directed at increasing the utilization of Section 3 Residents' and Section 3 Business Concerns within the Town/City/County of \_\_\_\_\_.

- A.** To ascertain from the locality's CDBG Program official the exact boundaries of the Section 3 Covered Project Area and where advantageous, seek the assistance of local officials in preparing and implementing the affirmative action plan.
  
- B.** To attempt to recruit from within the Town/City/County the necessary individuals to fill employment opportunities generated by Section 3 covered assistance through: local advertising media, signs placed at the proposed site for the project, and community organizations and public or private institutions operating within or serving the project area such as Service Employment and Redevelopment (SER), Opportunities Industrialization Center (OIC), Urban League, Concentrated Employment Program, Hometown Plan, or the U.S. Employment Service and providing preference for these opportunities in the following order:
  - (i) Section 3 Residents residing in the service area or neighborhood in which the Section 3 covered project is located;
  - (ii) Participants in HLJD Youthbuild Programs, and
  - (iii) Other Section 3 Residents.
  
- C.** To maintain a list of all lower income area residents who have applied either on their own or on referral from any source, and to employ such persons, if otherwise eligible and a vacancy exists.
  
- D.** To insert this Section 3 Affirmative Action Plan in all bid documents for contracts over \$100,000, and to require all bidders on subcontracts over \$100,000 to submit a Section 3

Affirmative Action Plan, including utilization goals and the specific steps planned to accomplish these goals.

- E.** To insure that subcontracts over \$100,000 which are typically let on a negotiated rather than bid basis in areas other than Section 3 covered project areas, are also let on a negotiated basis, whenever feasible, when let in a Section 3 covered project area.
- F.** To formally contact unions, subcontractors and trade associations to secure their cooperation for this program.
- G.** To notify Section 3 residents and Section 3 business concerns about economic opportunities generated by Section 3 covered assistance and to award Section 3 covered contracts, to the greatest extent feasible, to Section 3 business concerns in the following order of preference:
  - (i) Section 3 business concerns that provide economic opportunities for Section 3 residents in the service area or neighborhood in which the Section 3 covered project is located;
  - (ii) Applicants selected to carry out HUD Youthbuild projects;
  - (iii) Other Section 3 business concerns.
- H.** To notify potential contractors about Section 3 requirements of this part, and incorporating the Section 3 clause in all solicitations and contracts.
- I.** To facilitate the training and employment of Section 3 residents and the award of contracts to Section 3 business concerns undertaking activities to reach the numerical goal established by HLJD.
- J.** To cooperate in obtaining the compliance of contractors and subcontractors with the requirements of Section 3.
- K.** To submit reports to DECD and HUD on the results of actions taken to provide training, jobs and contracts to Section 3 residents and Section 3 business concerns.
- L.** To appoint an executive official of the company or agency as Equal Employment Opportunity Officer to coordinate the implementation of this Section 3 Affirmative Action Plan.
- M.** To document utilization of Section 3 Employees on the covered project by obtaining income information from new project area employees on the Section 3 Income Worksheet.
- N.** To provide all Section 3 Income Worksheets to the prime contractor for inclusion in the Section 3 Utilization Report prior to receipt of final payment of CDBG funds.
- O.** To maintain records, including copies of correspondence, income verification memoranda, etc., which document that all levels of the above affirmative action steps have been taken.

**SUBCONTRACTOR CERTIFICATION**

As officers and representative of: \_\_\_\_\_  
(Name of Subcontractor)

On behalf of the Company, I have read and fully agree to the Section 3 Affirmative Action Plan, and become a party to the full implementation of this program.

\_\_\_\_\_  
Name and Title of the Authorized Representative (print or type)

\_\_\_\_\_  
Signature of Authorized Representative

\_\_\_\_\_  
Date

## **FEDERAL REQUIREMENTS**

### **1. TITLE VI OF THE CIVIL RIGHTS ACT OF 1964**

(P.L. 88-352), as amended, (42 USC 2000d) and the requirements imposed by the Regulations of the Department of Commerce (15 CFR Part 8) issued pursuant to that Title. In accordance therewith no person in the United States shall, on the grounds of race, handicap, color, sex, national origin or familial status be excluded from participation in, be denied the benefits or be otherwise subjected to discrimination under any program or activity which is paid for with federal funds. The Owner further adds that there shall not be any form of discrimination by any party in any CDBG contract on the basis of familial status, sexual orientation or sex.

### **2. REHABILITATION ACT OF 1973**

29 USC 794, Executive Order 11914, Section 504. No otherwise qualified handicapped individual shall, solely by reason of his/her handicap, be denied the benefits of, be excluded from participation in, or be subjected to discrimination under any program or activity receiving federal financial assistance.

### **3. SECTION 202 OF EXECUTIVE ORDER 11246**

#### **A. Activities and contracts not subject to Section 202**

**(Applicable to Federally assisted construction contracts  
and related subcontracts of \$10,000 and under.)**

During the performance of this contract, the contractor agrees as follows:

1. The contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor shall take affirmative action to ensure that applicants for employment are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: employment upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of Compensation; and selection for training, including apprenticeship.
2. The contractor shall post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Contracting Officer setting forth the provisions of this non-discrimination clause. The Contractor shall state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.
3. Contractors shall incorporate foregoing requirements in all subcontracts.

**B. Activities and contracts subject to Section 202**

**Applicable to Federally assisted construction contracts  
and related subcontracts exceeding \$10,000**

During the performance of this contract, the contractor agrees as follows:

- 1.a) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: employment upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
- b) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration without regard to race, color, religion, sex, or national origin.
- c) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided by the Contract Compliance Officer advising the said labor union or workers' representative of the contractor's commitment under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- d) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- e) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules regulations and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the Department and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- f) In the event of the contractor's noncompliance with the non-discrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

- g) The contractor will include the provisions of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the Department may direct as a means of enforcing such provision, including sanctions for non-compliance. Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Department the contractor may request the United States to enter into such litigation to protect the interest of the United States.
2. The applicant hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained from the Federal Government or borrowed on -the credit of the Federal Government pursuant to a grant, contract, loan insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee, the following equal opportunity clause:

During the performance of this contract, the contractor agrees as follows:

- a) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin, such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment notices to be provided setting forth the provisions of this nondiscrimination clause.
- b) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor; state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.
- c) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract of understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and- applicants for employment.
- d) The contractor will comply with all provisions of Executive, Order 11246 of September 24, 1965, and the rules, regulations, and relevant orders of the Secretary of Labor.

- e) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for 'purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- f) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- g) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into -such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: Provided, that the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance

The applicant further agrees that it will refrain from entering into any contract. Or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive order

and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of labor pursuant to Part II Subpart D of the Executive order. In addition, the applicant agrees that if it fails or refuses to comply within these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

**3. CERTIFICATION OF NONSEGREGATED FACILITIES AS REQUIRED BY THE MAY 19, 1967, ORDER (32 F.R. 74390 ON ELIMINATION OF SEGREGATED FACILITIES, BY THE SECRETARY OF LABOR**

Prior to the award of any construction contract or subcontract exceeding \$10,000, the Contractor shall submit signed Certification of Nonsegregated Facilities Forms for him/herself and all subcontractors.

**4. THE AGE DISCRIMINATION ACT OF 1975**

No person in the United States shall, on the basis of age, be excluded from participation or be denied the benefits of, or be subjected to discrimination under, any program or activity undertaken with federal funds.

**5. SECTION 109 OF THE HOUSING AND COMMUNITY DEVELOPMENT ACT OF 1974**

No person in the United States shall on the ground of race, color, national origin, or sex be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity funded in whole or in part with funds made available under Title I of the Housing and Community Development Act of 1974.

**6. SECTION 3 OF THE HOUSING AND URBAN DEVELOPMENT ACT OF 1968**

In connection with the planning and carrying out of any project assisted with CDBG funds, and to the greatest extent feasible, opportunities for training and employment should be given to lower-income persons residing within the unit of local government in which the project is located, and contracts for work in connection with the project should be awarded to eligible business concerns which are located in, or owned in substantial part by persons residing -in, the same unit of local government in which the project is located. And that this contract, or any subcontracts, must adhere to and contain what is referred to as the Section 3 Clause, and which follows in its entirety:

**Section 3 Clause:**

- a) The work to be performed under this contracts subject to the requirements of section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by section 3, shall, to the greatest extent feasible, be directed to low-and very low-income persons, particularly persons who are recipients of HUD assistance for housing.
- b) The parties to this contract agree to comply with HUD's regulations in 24 CFR part 135, which implement section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 135 regulations.
- c) The contract agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.
- d) The contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 135.
- e) The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.
- f) Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default and debarment or suspension from future HUD assisted contracts.
- g) With respect to work performed in connection with section 3 covered Indian housing assistance, section 7(b) of the Indian Self-Determination and Education assistance Act (25 U.S.C 450e) also applies to the work to be performed under this contract. Section 7(b) requires that to the greatest extent feasible (i) preference and opportunities for

training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this contract that are subject to the provisions of sections 3 and 7(b) agree to comply with section 3 to the maximum extent feasible, but not in derogation of compliance with sec 7(b).

## **7. LABOR STANDARDS**

- a) Davis-Bacon Act as amended (40 U.S.C 276a - 276a-5.) All laborers and mechanics employed by contractors or subcontractors, including employees of other governments, on construction work assisted under this contract, and subject to the provisions of the federal acts and regulations listed in this paragraph, shall be paid wages at rates not less than those prevailing on similar construction in the locality as determined by the Secretary of Labor in accordance with the Davis-Bacon Act.
- b) Contract Work Hours and Safety Standards Act (40 U.S.C. 327-333). All laborers and mechanics employed by contractors or subcontractors shall receive overtime compensation in accordance with and subject to the provisions of the Contract Work Hours and Safety Standards Act, and the contractors and subcontractors shall comply with all regulations issued pursuant to these acts and with other applicable Federal laws and regulations pertaining to labor standards.
- c) Copeland Anti-Kickback Act requires that workers be paid at least once a week, and without any deductions or rebates except permissible deductions.

## **8. TITLE IV OF THE LEAD BASED PAINT POISONING PREVENTION ACT**

**LEAD-BASED PAINT HAZARDS** -The use of lead-based paint, that is any paint containing more than 1%- lead by weight, is strictly prohibited from use on any interior surface or exterior surface in any building being rehabilitated with funding from the Community Development program. Additionally, any evidence of a health hazard, which is, defined as cracking, scaling, peeling and loose lead-based paint must be treated to prevent the ingestion of the contaminated paint. It is further necessary to assume that any of the above conditions constitute an immediate or potential hazard and must be corrected using appropriate methods.

## **9. THE UNIFORM RELOCATION ASSISTANCE AND REAL PROPERTY ACQUISITION POLICIES ACT OF 1970**

(P.L. 91-646 as amended), 15 CFR Part 916 including amendments thereto and regulations there under, as provided by 1. M.R.SA 901 et seq. The Contractor and Grantee will ensure that all work performed under this Agreement will be done in accordance with this act.

## **10. THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (P.L. 90-190); THE NATIONAL HISTORIC PRESERVATION ACT OF 1966 (80 Stat 915, 16 USC 470); AND EXECUTIVE ORDER NO. 11593 OF MAY 31, 1971.**

The chief executive officer of the Grantee consents to assume the status of a responsible Federal official under the National Environmental Policy Act of 1969 (NEPA) and other provisions of Federal law, as specified in 24 CTR 58, which further the purposes of NEPA in

the areas of historic preservation, noise control floodplains, coastal zones and wetlands, air quality, water quality, wildlife, endangered species, solid waste disposal, and environmental effects abroad.

The chief executive officer is authorized and consents on behalf of the Grantee and himself to accept the jurisdiction of the federal courts for the purpose of enforcement of his responsibilities as such an official.

**11. THE FLOOD DISASTER PROTECTION ACT OF 1963 (P.L 93-234), AS AMENDED.**

The Grantee will fulfill any flood insurance requirements under this Act and any regulations issued there under which NOAA may issue.

**12. ARCHITECTURAL BARRIERS ACT (P.L 90-480), 42 USC 4151, AS AMENDED, and the regulations issued or to be issued there under, prescribing standards for the design and construction of any building or facility intended to be accessible to the public or which may result in the employment of handicapped persons therein.**

**13. THE CLEAN AIR ACT AS AMENDED, 42 USC 1857 ED SEQ.9 THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED, 33 USC 1251 et seq. and the regulations of the Environmental Protection Agency with respect thereto, at 40 CFR Part 15, as amended from time to time.**

In no event shall any amount of the assistance provided under this Agreement be utilized with respect to a facility, which has given rise to a conviction under section 113(c) (1) of the Clean Air Act or section 309(c) of the Federal Water Pollution Control Act.

**14. MINORITY BUSINESS ENTERPRISES**

Referenced in Executive Order #11625, OMEB Circular A-102 Attachment 0 Procurement Standards. Grantees are to give priority to Minority Business Enterprises in purchase of supplies, equipment, construction, and services.

**15. CDBG CERTIFICATION**

Grantee shall provide any certification required under Sections 104(b), 106(d)(5) or under any other provision of Title I of the Housing and Community Development Act of 1974 as amended through 1983, including Amendments made by the Housing and Urban Rural Recovery Act of 1983, and shall comply with the terms of such certifications.

**16. SECTION 319 OF PUBLIC LAW 101-121**

The grantee shall comply with the requirements of Section 319 of Public Law 101-121 regarding government wide restrictions on lobbying.

## **SPECIAL CONDITIONS PERTAINING TO HAZARDS, SAFETY STANDARDS AND ACCIDENT PREVENTION**

### **A. Lead-Based Paint Hazards**

(Applicable to contracts for construction or rehabilitation of residential structures) The construction or rehabilitation of residential structures is subject to the HUD Lead-Based Paint regulations, 24 CFR Part 35. The contractor and Subcontractors shall comply with the provisions for the elimination of lead-based paint hazards under sub-part B of said regulations. The Owner will be responsible for the inspections and certifications required under Section 35.14(f) thereof.

### **B. Use of Explosives**

When the use of explosives is necessary for the prosecution of the work, the Contractor shall observe all local, state and federal laws in purchasing and handling explosives. The Contractor shall take all necessary precautions to protect completed work, neighboring property, water lines, or other underground structures. Where there is danger to structures or property from blasting, the charges shall be reduced and the material shall be covered with suitable timber, steel or rope mats. The Contractor shall notify all owners of public utility property of intention to use explosives at least eight hours before blasting is done, close to such property. Any supervision or direction of use of explosives by the Engineer does not in any way reduce the responsibility of the Contractor or his Surety for damages that may be caused by such use.

### **C. Danger Signals and Safely Devices**

The Contractor shall make all necessary precautions to guard against damages to property and injury to persons. He shall put up and maintain in good condition, sufficient red or warning lights at night, suitable barricades and other devices necessary to protect the public. In case the Contractor fails or neglects to take such precautions, the Owner may have such lights and barricades installed and charge the cost of this work to the Contractor. Such action by the Owner does not relieve the Contractor of any liability incurred under these specifications or contract.

**Federal Labor Standards Provisions (HUD 4010)**  
**U.S. Department of Housing and Urban Development**

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**Applicability**

The Project of Program to which the Construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

A.1. (i) Minimum Wages. All laborers and mechanics employed or working up on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction of development of the project) will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such

weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification or work actually performed, without regard to skill, excepts as provided in 29 CFR Part 5.5 (a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFT part 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii) (a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contact shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their

representatives, and HUD or its designee on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215-0140.)

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1) (b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

2. Withholding. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much that the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or

under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract. HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

3. (i) Payrolls and basic records. Payrolls and basic record relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b) (2) (B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonable anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) or the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan

or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

(ii) (a) The contractor shall submit weekly for each in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR Part 5.5(a) (3) (i). except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide

them upon request to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this subparagraph for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to HUD or its designee. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5 (a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable

wage determination incorporated into the contract.

(c) The weekly submission of a property executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph AA.3. (ii)(b) of this section.

(d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor of subcontractor shall make the records required under paragraph A.3. (i) of this section available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR Part 5.12.

4. (i) Apprentices and Trainees. Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in

his or her first 90 days of probationary employment as an apprentice in such an apprentice program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable

classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and

participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirement of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor will insert in any subcontract the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as HUD or its designee may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all contract clauses in 29 CFR Part 5.5

7. Contracts termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor as provided in 29 CFR 5.12

8. Compliance with Davis-Bacon and Related Act Requirements. All ruling and interpretations of the Davis-Bacon and Related Act contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

10. (i) Certification of Eligibility. By entering in to this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR part 24.

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act of 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty to making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1010, Title 18, U.S.C., "Federal Housing Administration transaction", provides in part: "Whoever, for the purpose of ...influencing in any way the action of such

Administration...makes, utter of publishes any statement, knowing the same to be false...shall be fined not more than \$5,000 or imprisoned not more than two years, or both.”

11. Complaints, Proceedings, or Testimony by Employees. No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. Contract Work Hours and Safety Standards Act. As used in this paragraph, the terms “laborers” and “mechanics” include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph (1) or this paragraph, the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in case of work done under contract for the District of Columbia or a

territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of \$25 for each calendar day on which such individual was required or permitted to work in excess of forty hours without payment of the overtime wages required by the clause set forth in subparagraph (1) of this paragraph.

(3) Withholding for unpaid wages for liquidated damages. HUD or its designees shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold of cause to be withheld from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

C. Health and Safety

(1) No laborer or mechanic shall be required to work in surrounding or under working conditions that are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 (formerly Part 1518) and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act (Public Law 91-54, 83 Stat. 96). 40 USC 3701 et seq.

(3) The Contractor shall include the provisions of this Article in every subcontract so that such provisions will be binding on each subcontractor. The Contractor shall take such action with respect to any subcontract as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.









# APPENDIX C



**Providence Redevelopment Agency**

Jorge O. Elorza, Mayor | Bonnie Nickerson AICP, Executive Director

**CONTRACTOR’S QUALIFICATION STATEMENT**

The undersigned certifies under oath to the truth and correctness of all statements and of all answer to questions made hereinafter.

SUBMITTED TO:

ADDRESS:

SUBMITTED BY:

NAME:

DUNS NUMBER:

TAXPAYER/EMPLOYER ID NUMBER:

ADDRESS:

PRINCIPAL OFFICE:

Corporation

Partnership

Individual

Joint Venture

Other

1. How many years has your organization been in business as a general contractor?

2. How many years has your organization been in business under its present business name?

a. Under what other or former names has your organization operated?



**Providence Redevelopment Agency**

Jorge O. Elorza, Mayor | Bonnie Nickerson AICP, Executive Director

3. If a corporation, answer the following:
  - a. Date of incorporation
  - b. State of incorporation
  - c. President's name
  - d. Vice-president's name(s)
  - e. Secretary's name
  - f. Treasurer's name
  
4. If an individual or a partnership, answer the following:
  - a. Date of organization
  - b. Name and address of all partners (state whether general or limited partnership)
  
5. If other than a corporation or partnership, describe organization and name principals.
  
6. List states and categories in which your organization is legally qualified to do business. Indicate registration or license numbers. List states in which partnership or trade name is filed.
  
7. We normally perform the following work with our own forces.



**Providence Redevelopment Agency**

Jorge O. Elorza, Mayor | Bonnie Nickerson AICP, Executive Director

- 8. Have you ever failed to complete any work awarded to you? If so, note when, where and why.
  
- 9. Within the last five (5) years, has any officer or partner of your organization ever been an officer or partner of another organization when it failed to complete a construction contract? If so, attach a separate sheet of explanation.
  
- 10. On a separate sheet, list major construction projects your organization has in process, giving the name of project, owner, architect, contract amount, percent complete and scheduled completion date.
  
- 11. On a separate sheet, list the major projects your organization has completed in the past five (5) years, giving the name of project, owner, architect, contract amount, date of completion and percentage of the cost of the work performed with your own forces.
  
- 12. On a separate sheet, list the construction experience of the key individuals of your organization.
  
- 13. Trade references.



**Providence Redevelopment Agency**

Jorge O. Elorza, Mayor | Bonnie Nickerson AICP, Executive Director

14. Bank references.
  
15. Name of bonding company and name and address of agent.
  
16. Attach a financial statement, audited if available, including contractor's latest balance sheet and income statement showing the following items:
  - a. Current assets (i.e. cash, joint venture accounts, accounts receivable, notes receivable, accrued income, deposits, materials inventory and prepaid expenses).
  - b. Net fixed assets.
  - c. Other assets.
  - d. Current liabilities (i.e. accounts payable, notes payable, accrued expenses, provision for income taxes, advances, accrued salaries and accrued payroll taxes).
  - e. Other liabilities (i.e. capital, capital stock, authorized and outstanding shares par values, earned surplus and retained earnings).
  - f. Name of firm preparing financial statement and date thereof.
  - g. Is this financial statement for the identical organization named on Page One (1)?
  - h. If not, explain the relationship and financial responsibility of the organization whose financial statement is provided (i.e. parent-subsidiary).
  - i. Will this organization act as guarantor of the contract for construction?



**Providence Redevelopment Agency**

Jorge O. Elorza, Mayor | Bonnie Nickerson AICP, Executive Director

17. Dated at \_\_\_\_\_ this \_\_\_\_\_  
day of \_\_\_\_\_, 20\_\_\_\_\_.

Name of organization: \_\_\_\_\_

\_\_\_\_\_  
By

\_\_\_\_\_  
Title

18. \_\_\_\_\_ being duly sworn deposes and says that he/she is  
the \_\_\_\_\_ of \_\_\_\_\_  
contractor(s) and that answers to the foregoing questions and all statements therein contained  
are true and correct.

Subscribed and sworn before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

\_\_\_\_\_  
Notary Public

My commission expires: \_\_\_\_\_

# APPENDIX D

## RWP GATEWAY & VISITOR CENTER

1197 BROAD ST.  
PROVIDENCE, RI 02905

Project Owner

**CITY OF PROVIDENCE REDEVELOPMENT AGENCY**  
444 WESTMINSTER ST., SUITE 3A  
PROVIDENCE, RI 02903-3215



PROJECT LOCATION MAP - NOT TO SCALE



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3/11/2021 12:32:18 PM

RWP GATEWAY & VISITOR CENTER

## CONTACT SCHEDULE

**ALTERNATE NO. 1:**  
BASE BID ITEM:  
PER PLANS - PROVIDE NANAWALL W/ ALUMINUM 940 WITH INTEGRATED SWING DOOR (SECTION 08 43 33 THERMALLY BROKEN ALUMINUM FRAMED FOLDING GLASS STOREFRONT), INCLUDING ALL ASSOCIATED HARDWARE AND MATERIALS REQUIRED FOR INSTALLATION, AT SW ELEVATION OF GALLERY 100 AS INDICATED ON DRAWINGS.  
ALTERNATE NO. 1 BID ITEM:  
PROVIDE ALTERNATE PRICING FOR SUBSTITUTION OF A TUBELITE TU24650 SERIES STOREFRONT SYSTEM (SECTION 08 43 13 - ALUMINUM FRAMED STOREFRONTS) WITH A PAIR OF (2) 3'-0" W X 7'-0" H TUBELITE THERMABLOCK ENTRANCES (SECTION 08 42 11 - ALUMINUM FRAMED ENTRANCES), INCLUDING ALL SYSTEM COMPONENTS AND INSTALLATION ACCESSORIES, IN LIEU OF A NANAWALL W/ ALUMINUM 940 SYSTEM WITH INTEGRATED SWING DOOR (SECTION 08 43 33 THERMALLY BROKEN ALUMINUM FRAMED FOLDING GLASS STOREFRONT) AT THE SW ELEVATION OF GALLERY 100 AS INDICATED ON DRAWINGS.

**ALTERNATE NO. 2:**  
BASE BID ITEM:  
PER PLANS - PROVIDE PHOTOVOLTAIC PANELS, INCLUDING ALL ASSOCIATED MOUNTING HARDWARE ALONG TOP OF GATEWAY CANOPY, GATEWAY CENTER BUILDING AND REAR OUTBUILDING INCLUDING, BUT NOT LIMITED TO, ELECTRICAL, WIRING, CONNECTIONS, INVERTERS AND COMBINER BOXES  
ALTERNATE NO. 2 BID ITEM:  
PROVIDE PRODUCT ALTERNATE FOR REMOVAL OF THE PHOTOVOLTAIC PANELS, COMBINER BOXES, INVERTERS AND ALL WIRING AND CONNECTIONS PERTAINING TO THE PHOTOVOLTAIC SYSTEM INCLUDING ALL MOUNTING HARDWARE TO STRUCTURAL BEAM AND THRU-ROOF CONNECTIONS.

**ALTERNATE NO. 3:**  
BASE BID ITEM:  
PLANS - PROVIDE TRANSLUCENT GLASS PANELS (CARVART GLAZING 02 W/ 25 TW) MOUNTED IN GLASSWALLS FRAMING SYSTEM, INCLUSIVE OF ALUMINUM ANGLE JAMB CONDITIONS AND CONTINUOUS LED LUMINAIR LIGHT SHEET AT INTERIOR WALL CAVITY ALONG SOUTH ELEVATION OF SALES COUNTER 101 AS INDICATED IN THE DRAWINGS.  
ALTERNATE NO. 3 BID ITEM:  
DELETE TRANSLUCENT GLASS PANELS, GLASSWALLS FRAMING SYSTEM, ALUMINUM ANGLE JAMBS AND CONTINUOUS LED LUMINAIR LIGHT SHEET INDICATED ON PLANS AT SALES COUNTER 101 AND PAINT GYPSUM BOARD P-1 WITH BASE RB-1 AT THIS LOCATION.

**ALTERNATE NO. 4:**  
BASE BID ITEM:  
PER PLANS - PROVIDE SPECIFIED FINISH AND LIGHTING FOR REFLECTED CEILING PLAN AS INDICATED ON THE DRAWINGS.  
ALTERNATE NO. 4 BID ITEM:  
PROVIDE ADD ALTERNATE FOR VECO CONCAVE & CONVEX SUSPENDED ACOUSTIC PANELS BY SPORN AS INDICATED ON THE DRAWINGS. SUBSTITUTE SPECIFIED LINEAR RECESSED TRACK LIGHT FIXTURE (FLOS LIGHTING) WITH A SUSPENDED LINEAR TRACK LIGHT FIXTURE (FLOS LIGHTING) AT THE LOCATION OF THE SUSPENDED ACOUSTIC PANELS ONLY.

ISSUED FOR:	DATE	DRAWN	CHECKED
SCHEMATIC DESIGN REVIEW	05.08.2020	PG/AA	PG
CD 20%	06.10.2020	PG	PG
CD 60%	07.23.2020	PG	PG
CD 90%	08.25.2020	EK	PG
CD 100% - FOR REVIEW	09.09.2020	EK	PG
ISSUED FOR BIDS	03.16.2021	EK	CL

OWNER	STRUCTURAL
CITY OF PROVIDENCE REDEVELOPMENT AGENCY ATTN: BONNIE NICKERSON 444 WESTMINSTER STREET PROVIDENCE RI 02903 PHONE: 401.865.8534 EMAIL: BNICKERSON@PROVIDENCERI.GOV	ATLANDES DESIGN LLC ATTN: ERIC MAJCHER S.E., P.E. 2350 NEWPORT ROAD ANN ARBOR, MI 48103 PHONE: EMAIL: EMAJCHER@ATLANDESDESIGN.COM
ARCHITECT	MECHANICAL
INFORM STUDIO ATTN: CORY LAVIGNE, AIA 235 E MAIN STREET, SUITE 102B NORTHVILLE, MI 48167 PHONE: 248.449.3564 EMAIL: PGAD@IN-FORMSTUDIO.COM	GREENPATH DESIGN ATTN: KELLY SUGG P.E. 235 E MAIN STREET, SUITE 102B NORTHVILLE, MI 48167 PHONE: 248.310.7286 EMAIL: KSUGG@GREENPATH.DESIGN
CIVIL	ELECTRICAL
GREEN INTERNATIONAL AFFILIATES, INC. ATTN: KYLE SHANNIN P.E. 236 LITTLETON ROAD, SUITE 3 WESTFORD, MA 01886 PHONE: 978.923.0400 x. 226 EMAIL: ASHANNIN@GREENINTL.COM	INFORM STUDIO ATTN: STEPHEN KELLEY P.E. 235 E MAIN STREET, SUITE 102B NORTHVILLE, MI 48167 PHONE: 248.449.3564 EMAIL: SKELLEY@IN-FORMSTUDIO.COM
LANDSCAPE	BUILDING DEPARTMENT
DESIGN UNDER SKY ATTN: ADAM ANDERSON, RLA LEED AP 57 HUDSON ST PROVIDENCE, RI 02909 PHONE: 401.339.4122 EMAIL: ADAM@DESIGNUNDERSKY.COM	BUILDING OFFICIAL FOR INSPECTIONS AND STANDARDS JOSEPH ATCHUE 444 WESTMINSTER STREET PROVIDENCE, RI 02903 PHONE: 401.860.5365 EMAIL: JATCHUE@PROVIDENCERI.GOV
CANOPY FABRICATOR	FIRE DEPARTMENT
SITU ATTN: ALEX ITO BROOKLYN NAVY YARD, 141 FLUSHING AVE BLDG 77, SUITE 508, BROOKLYN, NY 11205 PHONE: 718.285.0290 EMAIL: ALEX@SITU.NYC	SCOTT DERRY 444 WESTMINSTER STREET PROVIDENCE, RI 02903 PHONE: 401.860.5584 EMAIL: SDERRY@PROVIDENCERI.GOV

## SHEET INDEX

GENERAL	ELECTRICAL	LANDSCAPE	STRUCTURAL	ARCHITECTURAL	MECHANICAL
G-100 COVER SHEET G-101 CODE COMPLIANCE & LIFE SAFETY PLAN	E-001 NOTES, SYMBOLS & ABBREVIATIONS E-101 ELECTRICAL SITE LIGHTING PLAN E-102 ELECTRICAL SITE POWER PLAN E-103 LIGHTING PLAN E-104 PHOTOMETRICS PLAN E-201 POWER & TELECOM PLAN E-202 ELECTRICAL ROOF PLAN E-301 SYSTEMS PLAN E-401 ELECTRICAL HVAC PLAN E-501 SCHEDULES AND DIAGRAMS E-601 LIGHTING DETAILS AND DIAGRAMS	L-0.00 SITE DEMOLITION PLAN L-1.00 LANDSCAPE PLAN L-2.00 MATERIAL PLAN L-3.00 LAYOUT PLAN L-4.00 GRADING PLAN L-5.00 PLANTING PLAN L-6.00 SITE SECTION L-7.00 SITE DETAILS L-7.10 SITE DETAILS L-7.20 SITE DETAILS	S-1001 GENERAL INFORMATION S-1003 SPECIAL INSPECTIONS S-1-011 AXONOMETRICS S-1-021 TYPICAL DETAILS S-1-100 FOUNDATION PLANS S-1-102 ROOF FRAMING PLANS S-1-401 SECTIONS S-1-501 DETAILS S-1-602 DETAILS S-1-603 DETAILS S-1-504 DETAILS S-9-301 FRAMING ELEVATIONS	A-001 TYP. MOUNTING HEIGHTS, NOTES & ABBREVIATIONS A-002 PARTITION TYPES & DETAILS A-111 OVERALL FLOOR PLAN A-131 OVERALL REFLECTED CEILING PLAN A-141 OVERALL ROOF PLAN A-201 EXTERIOR ELEVATIONS A-203 EXTERIOR ELEVATIONS - EXISTING BUILDING A-301 BUILDING SECTIONS A-311 WALL SECTIONS A-312 WALL SECTIONS A-313 WALL SECTIONS A-421 INTERIOR ELEVATIONS & ENLARGED PLANS A-401 GLAZING ELEVATIONS, DOOR SCHEDULE, NOTES AND DETAILS A-800 3D VISUALIZATION	M-0 INDEX, SYMBOLS & ABBREVIATIONS M-1 STANDARD MATERIALS SCHEDULES M-2 SPECIFICATIONS M-3 SPECIFICATIONS M-4 PLUMBING PLANS M-5 MECHANICAL PLANS & ROOF PLAN M-6 DETAILS AND SCHEDULES

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## DESIGN NO. U425

Revised 08/2020  
Bearing Wall Ratings — 1 Hr., 1-1/2 or 2 Hr.  
(See Items 2, 4 and 5)

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load reduction factor shall be used — See Guide BXLVJ or BXLV7

\* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.



- STEEL FLOOR AND CEILING TRACKS** — (NOT SHOWN) — TOP AND BOTTOM TRACKS OF WALL ASSEMBLIES SHALL CONSIST OF STEEL MEMBERS, MIN NO. 20 MSG (0.029 IN. MIN BARE METAL THICKNESS) STEEL OR MIN NO. 20 MSG (0.036 IN. THICK GALV. STEEL OR NO. 20 MSG (0.033 IN. THICK PRIMED STEEL), THAT PROVIDE A SOUND STRUCTURAL CONNECTION BETWEEN STEEL STUDS, AND TO ADJACENT ASSEMBLIES SUCH AS A FLOOR, CEILING, AND/OR OTHER WALLS, ATTACHED TO FLOOR AND CEILING ASSEMBLIES WITH STEEL FASTENERS SPACED NOT GREATER THAN 24 IN. OC.
- STEEL STUDS** — MIN 3-1/2 IN. WIDE, NO. 30 MSG (0.029 IN. MIN BARE METAL THICKNESS) CORROSION PROTECTED COLD FORMED STEEL STUDS DESIGNED IN ACCORDANCE WITH THE CURRENT EDITION OF THE SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS BY THE AMERICAN IRON AND STEEL INSTITUTE. ALL DESIGN DETAILS ENHANCING THE STRUCTURAL INTEGRITY OF THE WALL ASSEMBLY, INCLUDING THE ANAL DESIGN LOADS OF THE STUDS, SHALL BE AS SPECIFIED BY THE STEEL STUD DESIGNER AND/OR PRODUCER, AND SHALL MEET THE REQUIREMENTS OF ALL APPLICABLE LOCAL CODES. THE WALL STUD SPACING OF ALL WALL ASSEMBLIES SHALL NOT EXCEED 24 IN. OC OR 16 IN. OC, WHEN ITEM #6 IS USED. STUDS ATTACHED TO FLOOR AND CEILING TRACKS WITH 1/2 IN. LONG TYPE S-12 STEEL SCREWS ON BOTH SIDES OF STUDS OR BY WELDED OR BOLTED CONNECTIONS DESIGNED IN ACCORDANCE WITH THE AISI SPECIFICATIONS.

- LATERAL SUPPORT MEMBERS** — (NOT SHOWN) — WHERE REQUIRED FOR LATERAL SUPPORT OF STUDS, SUPPORT MAY BE PROVIDED BY MEANS OF STEEL STRIPS, CHANNELS OR OTHER SIMILAR MEANS AS SPECIFIED IN THE DESIGN OF A PARTICULAR STEEL STUD WALL SYSTEM.
- GYPSUM BOARD** — ANY 1/2 IN. THICK UL CLASSIFIED GYPSUM BOARD THAT IS ELIGIBLE FOR USE IN DESIGN NO. X515, ANY 5/8 IN. THICK UL CLASSIFIED GYPSUM BOARD THAT IS ELIGIBLE FOR USE IN DESIGN NOS. L091, G12 OR U305. GYPSUM BOARD BEARING THE UL CLASSIFICATION MARKING AS TO FIRE RESISTANCE, APPLIED VERTICALLY WITH JOINTS BETWEEN LAYERS STAGGERED. OUTER LAYERS OF 3 LAYER CONSTRUCTION MAY BE APPLIED HORIZONTALLY UNLESS SPECIFIED BELOW. THE THICKNESS AND NUMBER OF LAYERS AND PERCENT OF DESIGN LOAD FOR THE 45 MIN, 1-HR., 1-1/2 HR. AND 2-HR. RATINGS ARE AS FOLLOWS:

Rating	TABLE I Interior or Exterior Walls (Fire From Either Side)		% of Design Load
	Wallboard Protection Both Sides of Wall - No. of Layers & Thickness of Board in Each Layer		
45 min	1 layer, 1/2 in. thick	100	
1 hr	1 layer, 5/8 in. thick	100	
1-1/2 hr	2 layers, 1/2 in. thick	100	
2 hr	2 layers, 1/2 in. thick or 3 layers, 1/2 in. thick	80	
2 hr	2 layers, 3/4 in. thick	100	
2 hr	2 layers, 3/4 in. thick	100	

- GYPSUM BOARDS** — FOR EXTERIOR WALLS, RATING FROM INTERIOR SIDE ONLY - 1/2 OR 5/8 IN. THICK CLASSIFIED OR UNCLASSIFIED GYPSUM BOARDS ATTACHED TO STUDS AND RUNNER TRACKS WITH 1 IN. LONG TYPE S-12 BULGE HEAD SCREWS SPACED 12 IN. OC. ALONG STUDS AND TRACKS. ONE OF THE FOLLOWING EXTERIOR FACINGS ARE TO BE APPLIED OVER THE GYPSUM BOARD:

- BRICK, BRICK OR STUCCO** — ALUMINUM SIDING, STEEL SIDING, BRICK VENEER, OR STUCCO ATTACHED TO STUDS OVER GYPSUM SHEATHING AND MEETING THE REQUIREMENTS OF LOCAL CODE AGENCIES. WHEN A MIN. 3-3/4 IN. THICK BRICK VENEER FACING IS USED, THE EXTERIOR WALL RATING IS APPLICABLE WITH EXPOSURE ON EITHER FACE. BRICK VENEER WALL ATTACHED TO STUDS WITH CORRUGATED METAL WALL TIES ATTACHED TO EACH STUD WITH STEEL SCREWS, NOT MORE THAN EACH SIXTH COURSE OF BRICK, WHEN A MIN. 3-3/4 IN. THICK BRICK VENEER FACING IS USED, FOAMED PLASTIC (ITEM 10) MAY BE USED.

- CEMENTITIOUS BACKER UNITS** — 1/2 OR 5/8 IN. THICK, ATTACHED VERTICALLY OR HORIZONTALLY TO STEEL STUDS OVER GYPSUM SHEATHING WITH 5/8 IN. LONG, TYPE S-12, CORROSION RESISTANT, WAGON HEAD STEEL SCREWS, SPACED 8 IN. OC. STUDS SPACED A MAX. OF 16 IN. OC. JOINTS COVERED WITH GLASS FIBER MESH TAPE.

- FASTENERS** — (NOT SHOWN) — SCREWS USED TO ATTACH WALLBOARD TO STUDS: SELF-TAPPING BUGLE HEAD SHEET STEEL TYPE, SPACED 12 IN. OC. FIRST LAYER TYPE S-12 BY 1/2 IN. LONG FOR 1/2 OR 5/8 IN. THICK WALLBOARD AND 1-1/4 IN. LONG FOR 3/4 IN. THICK WALLBOARD. SECOND LAYER TYPE S-12 BY 1/2 IN. LONG FOR 1/2 OR 5/8 IN. THICK WALLBOARDS AND 2-1/4 IN. LONG FOR 3/4 IN. THICK WALLBOARD. THIRD LAYER TYPE S-12 BY 1/2 IN. LONG. FASTENERS WHEN ITEM #8 IS USED: FIRST LAYER #6 X 2 IN. LONG DRYWALL SCREW SPACED 8 IN. OC. ALONG THE PERIMETER AND 12 IN. OC. IN THE FIELD. SECOND LAYER #6 X 4 IN. LONG DRYWALL SCREW SPACED 8 IN. OC. ALONG THE PERIMETER AND 12 IN. OC. IN THE FIELD. HORIZONTAL JOINTS TO BE STAGGERED 12 IN. BETWEEN LAYERS.

- NAILS AND BLANKETS** — PLACED IN STUD CAVITIES OF ALL EXTERIOR WALLS. MAY OR MAY NOT BE USED IN INTERIOR WALLS. ANY GLASS FIBER OR MINERAL WOOL BATT MATERIAL BEARING THE UL CLASSIFICATION MARKING AS TO FIRE RESISTANCE, OF A THICKNESS TO COMPLETELY FILL STUD CAVITY. SEE BATS AND BLANKETS (B22) CATEGORY FOR NAMES OF CLASSIFIED COMPANIES.

- JOINT TAPE AND COMPOUND** — (NOT SHOWN) — VINYL OR CASEIN, DRY OR PREMIXED JOINT COMPOUND APPLIED IN TWO COATS TO JOINTS AND SCREW HEADS OF OUTER LAYER. PERFORATED PAPER TAPE, 2 IN. WIDE, EMBEDDED IN FIRST LAYER OF COMPOUND OVER ALL JOINTS OF OUTER LAYER.
- FOAMED PLASTIC** — POLYISOCYANURATE FOAMED PLASTIC INSULATION BOARDS, ANY THICKNESS, CLASSIFIED IN ACCORDANCE WITH B7X(AND) OR CQV. MAY BE USED WITH ANY EXTERIOR FINISH SHOWING UNDER ITEMS 9A, 9C, 9D AND SE.

- CEMENTITIOUS BACKER UNITS** — (OPTIONAL, NOT SHOWN) — FOR USE AS AN ADDITIONAL LAYER OVER REQUIRED GYPSUM BOARDS: 7/16 IN., 1/2 IN., 3/8 IN., 3/4 IN. OR 1 IN. THICK, MIN. 3/8 IN. WIDE, APPLIED VERTICALLY OR HORIZONTALLY WITH VERTICAL JOINTS CENTERED OVER STUDS. FASTENED TO STUDS AND RUNNERS WITH CEMENT BOARD SCREWS OF ADEQUATE LENGTH TO PENETRATE STUD BY A MINIMUM OF 3/8 IN. SPACED A MAX. OF 8 IN. OC. WHEN 4 FT. WIDE BOARDS ARE USED, HORIZONTAL JOINTS NEED NOT BE BACKED BY FRAMING.
- INSULATED SYSTEM WITH METAL CHANNELS** — INSTALL MOISTURE BARRIER OVER THE GYPSUM BOARD ITEM 4. INSTALL GALVANIZED ZIRT CHANNELS SPECIFIED BY THE MANUFACTURER OVER THE MOISTURE BARRIER AND THE GYPSUM BOARD ITEM 4. ZIRT CHANNELS TO BE INSTALLED HORIZONTALLY AT A MAX. SPACING OF 24" OC. ZIRT CHANNELS ATTACHED THROUGH THE GYPSUM BOARD AND THE MOISTURE BARRIER TO THE STEEL STUDS ITEM 2 WITH SCREWS PROVIDED BY THE MANUFACTURER AT A MAX SPACING OF 24 INCHES OC. INSTALL MINERAL WOOL INSULATION BETWEEN THE ZIRTS. MAXIMUM THICKNESS OF MINERAL WOOL INSULATION NOT EXCEED 6 IN. AS PER MANUFACTURER'S INSTRUCTIONS. INSTALL ACRYL METAL CHANNELS VERTICALLY OVER THE ZIRTS AT A MAX HORIZONTAL SPACING OF 24 IN. OC. ACRYL PANELS INSTALLED ON ACRYL CHANNEL WITH 1 1/4" LONG CORROSION COATED STAINLESS STEEL SCREWS AT A MAX SPACING OF 24 IN. OC. ALONG WITH MANUFACTURER'S APPROVED ADHESIVE (3M 540 OR TREMCO ULCLUM 110). ADHESIVE TO BE APPLIED IN A ZIGZAG PATTERN ALONG EVERY CHANNEL JOINT TREATMENT IN BETWEEN PANELS TO BE TREMCO ULMO 600 PRE COMPRESSED POLYURETHANE FOAM SEALANT.

\*INDICATES SUCH PRODUCTS SHALL BEAR THE UL OR cUL CERTIFICATION MARK FOR JURISDICTIONS EMPLOYING THE UL OR cUL CERTIFICATION (SUCH AS CANADA), RESPECTIVELY.

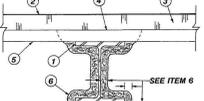
## DESIGN NO. S801

May 08, 2018

Restrained Beam Ratings — 1, 1-1/2, 2 or 3 Hr. (See Item 6)  
Unrestrained Beam Ratings — 1, 1-1/2, 2 or 3 Hr. (See Item 6)

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load reduction factor shall be used — See Guide BXLVJ or BXLV7

\* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.



- STEEL BEAM** — W8X28 MIN. SIZE
- ROOF COVERING** — CONSISTING OF HOT MOPPED, COLD APPLICATION OR SINGLE-PLY MATERIALS, COMPATIBLE WITH INSULATION(S) DESCRIBED HEREIN WHICH PROVIDE CLASS A, B OR C COVERINGS. SEE ROOFING MATERIALS AND SYSTEMS DIRECTORY-ROOF COVERING MATERIALS (REV1).
- ROOF INSULATION** — MINERAL AND FIBER BOARDS, APPLIED IN ONE OR MORE LAYERS, WHEN MULTIPLE LAYERS ARE USED, END AND SIDE JOINTS SHALL BE OFFSET A MIN. OF 12 IN. IN BOTH DIRECTIONS IN ORDER TO LAP ALL JOINTS. SEE MINERAL AND FIBER BOARDS (CERZ) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS. ROOF INSULATION SHALL BE COMPATIBLE WITH ROOF COVERINGS (ITEM 2). SEE ROOFING MATERIALS AND SYSTEMS DIRECTORY-ROOF COVERING MATERIALS (REV1).
- ADHESIVE** — APPLIED TO CRESTS OF ROOF DECK UNITS AND/OR INSULATION IN 1/2 IN. WIDE REBONS AT 0.4 GAL PER 100 SQ FT. SEE ADHESIVES (BYVR) CATEGORY FOR NAMES OF COMPANIES WHICH CAN SUPPLY ADHESIVE.
- STEEL ROOF DECK** — (UNCLASSIFIED) — FLUTED, NO. 22 MSG, GALV., 1-1/2 IN. DEEP WITH 3-1/2 IN. WIDE FLUTES SPACED 8 IN. OC. ENDS OVERLAPPED 1-1/2 MIN. AT SUPPORTS AND WELDED 12 IN. OC TO SUPPORTS. ADJACENT UNITS WELDED OR BUTON PUNCHED TOGETHER 16 IN. OC MAX.
- SPRAY-APPLIED FIRE RESISTIVE MATERIALS** — APPLIED BY SPRAYING WITH WATER IN ONE OR MORE COATS TO THE FINAL THICKNESSES SHOWN BELOW. BEAM SURFACES SHALL BE CLEAN AND FREE OF DIRT, OIL AND LOOSE SCALE. AREAS BETWEEN THE UNDERSIDE OF THE ROOF UNITS AND THE BEAM SHALL BE FILLED WITH MATERIAL. THE USE OF ADHESIVE PRIOR TO APPLICATION OF THE MATERIAL IS OPTIONAL. TAMPING IS OPTIONAL.

- STEEL ROOF DECK** — (UNCLASSIFIED) — FLUTED, NO. 22 MSG, GALV., 1-1/2 IN. DEEP WITH 3-1/2 IN. WIDE FLUTES SPACED 8 IN. OC. ENDS OVERLAPPED 1-1/2 MIN. AT SUPPORTS AND WELDED 12 IN. OC TO SUPPORTS. ADJACENT UNITS WELDED OR BUTON PUNCHED TOGETHER 16 IN. OC MAX.
- SPRAY-APPLIED FIRE RESISTIVE MATERIALS** — APPLIED BY SPRAYING WITH WATER IN ONE OR MORE COATS TO THE FINAL THICKNESSES SHOWN BELOW. BEAM SURFACES SHALL BE CLEAN AND FREE OF DIRT, OIL AND LOOSE SCALE. AREAS BETWEEN THE UNDERSIDE OF THE ROOF UNITS AND THE BEAM SHALL BE FILLED WITH MATERIAL. THE USE OF ADHESIVE PRIOR TO APPLICATION OF THE MATERIAL IS OPTIONAL. TAMPING IS OPTIONAL.

\*INDICATES SUCH PRODUCTS SHALL BEAR THE UL OR cUL CERTIFICATION MARK FOR JURISDICTIONS EMPLOYING THE UL OR cUL CERTIFICATION (SUCH AS CANADA), RESPECTIVELY.

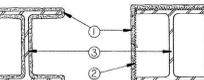
Restrained & Unrestrained Beam Rating Hr	Min. Thickness In.
1	5/8
1-1/2	15/16
2	1-5/8
3	2-9/16

## DESIGN NO. X829

May 03, 2018

Ratings — 1/2, 1, 1-1/2, 2, 3, 4 Hr

\* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.



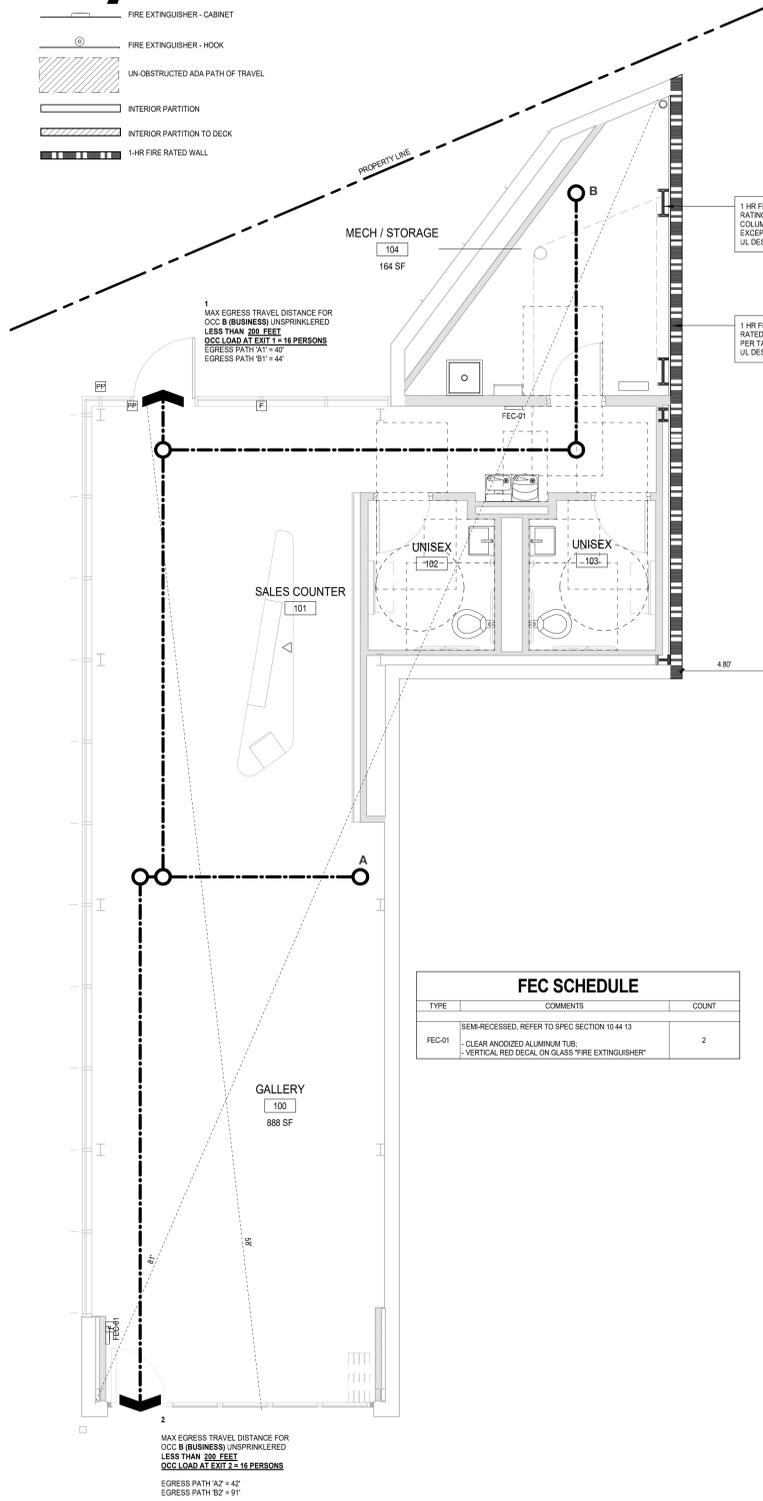
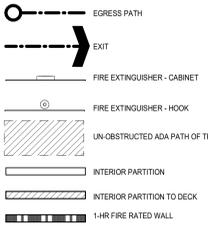
- SPRAY-APPLIED FIRE RESISTIVE MATERIALS** — APPLIED BY SPRAYING WITH WATER, IN ONE OR MORE UNTAMPED COATS AT THE THICKNESS SHOWN IN THE TABLE BELOW TO STEEL SURFACES WHICH ARE FREE OF DIRT, OIL OR SCALE. USE OF ADHESIVE IS OPTIONAL. MINIMUM AVERAGE UNTAMPED DENSITY IS 13 PCF WITH MINIMUM AND UNTAMPED DENSITY OF 11 PCF FOR TYPES II, II HS, AND D-CF. MIN AVG AND MIN UND UNTAMPED DENSITIES OF 22 AND 19 PCF, RESPECTIVELY, FOR TYPE HP. TAMPING IS OPTIONAL. FOR METHOD OF DENSITY DETERMINATION REFER TO DESIGN INFORMATION SECTION. THE THICKNESS OF SPRAY-APPLIED FIRE RESISTIVE MATERIALS (ITEM 1) REQUIRED FOR RATING PERIODS OF 1 H., 1-1/2 H., 2 H., 3 H., 4 H. OF CONTOUR SPRAYED COLUMNS MAY BE DETERMINED BY THE EQUATION:  
 $H = R \cdot 1.01 \cdot (WD) \cdot 0.66$

WHERE:  
H = PROTECTION MATERIAL THICKNESS IN THE RANGE OF 0.375-3.75 IN.  
R = FIRE RESISTANCE RATINGS IN HOURS (1-4 H.)  
D = HEATED PERIMETER OF STEEL COLUMN IN INCHES.  
W = WEIGHT OF STEEL COLUMN IN LBS PER FOOT.  
WD = 0.55 TO 0.7  
THE THICKNESS OF SPRAY-APPLIED FIRE RESISTIVE MATERIALS IN THE RANGE OF 0.375-3.75 IN. REQUIRED FOR RATING PERIODS OF 1 H., 1-1/2 H., 2 H., 3 H., 4 H. OF CONTOUR SPRAYED COLUMNS WITH WD=0.30 TO 0.50 MAY BE DETERMINED BY THE EQUATION:  
 $H = R \cdot 0.95 \cdot (WD) \cdot 0.45$

- METAL LATH** — (OPTIONAL, FOR CONTOUR APPLICATION) — 3-1/4 BSIQ V GALVANIZED OR PAINTED EXPANDED STEEL LATH. LATH SHALL BE LAPPED 1 IN. AND TIED TOGETHER WITH NO. 13 WDG GALVANIZED STEEL WIRE SPACED VERTICALLY 6 IN. OC. OR ALTERNATELY, ATTACHED WITH NO. 24 MSG SPRING CLIPS, 1/2 IN. WIDE, PUSHED ONTO COLUMN FLANGES, VERTICALLY SPACED 8 IN. OC.
- STEEL COLUMN** — MIN. SIZES AS SHOWN ABOVE IN ITEM 1.

\*INDICATES SUCH PRODUCTS SHALL BEAR THE UL OR cUL CERTIFICATION MARK FOR JURISDICTIONS EMPLOYING THE UL OR cUL CERTIFICATION (SUCH AS CANADA), RESPECTIVELY.

## LIFE SAFETY PLAN LEGEND



## FEC SCHEDULE

TYPE	COMMENTS	COUNT
FEC-01	SEMI-RECESSED, REFER TO SPEC SECTION 10-41.13 CLEAR ANODIZED ALUMINUM TUB, VERTICAL, RED DECAL ON GLASS "FIRE EXTINGUISHER"	2

## PROJECT SUMMARY & CODE COMPLIANCE

THIS PROJECT ENTAILS THE DEVELOPMENT OF A 1700 SF (GROSS) VISITOR CENTER AND GATEWAY CANOPY STRUCTURE TO A 32,000 SF RECREATIONAL PLAZA AND PARK. THE BUILDING WILL BE USED AS A TICKETING AND INFORMATION CENTER FOR ROGER WILLIAMS PARK, THE PLAZA AND PARK WILL INCLUDE RECREATIONAL LANDSCAPES AND INCLUSIVE PLAZAS FOR GATHERINGS AND LEISURE IN ALL SEASONS.

## LEGAL DESCRIPTION

LOCATION: 1197 BROAD ST. PROVIDENCE, RI 02905  
AUTHORITY HAVING JURISDICTION: CITY OF PROVIDENCE  
LAND USE DESIGNATION: COMMERCIAL  
ZONE: C-2, LEGAL DESCRIPTION: PLAT S3 LOTS 511, 513, 525

## EXISTING CONDITIONS BUILDING INFORMATION

THE EXISTING BUILDING ON SITE IS A ONE STORY BUILDING WITH A LARGER SITE DEVELOPMENT. SCOPE INCLUDES DEMOLITION OF EXISTING BUILDING, LITE POLES, ALL PAVED SURFACES AND CURBS AND CAPPING UTILITIES AT THE SOURCE AT OWNERS REQUEST.

PERMIT INFORMATION ON BUILDING DEMOLITION INDICATED BELOW:

PERMIT:	(NOT YET AVAILABLE)
TOTAL BASE BUILDING OCCUPANCY:	RESTAURANT ASSEMBLY (A-2)
BASE BUILDING AREA:	2000 SF GROSS FLOOR AREA
BASE BUILDING HEIGHT:	1 STORY, 27'
TYPE OF CONSTRUCTION:	IB, SPRINKLERED

## BUILDING INFORMATION

OCCUPANCY:	(BUSINESS B)
AREA:	1469 SF GROSS FLOOR AREA (BUILDING)
HEIGHT:	2.5 STORY, 27 FT
TYPE OF CONSTRUCTION:	IB, NON-SPRINKLERED

## GOVERNING CODES

SBC-8 RHODE ISLAND STATE BUILDING CODE  
INCORPORATES THE INTERNATIONAL BUILDING CODE, 2015 EDITION, BY REFERENCE  
SBC-8 RHODE ISLAND STATE PLUMBING CODE  
INCORPORATES THE INTERNATIONAL PLUMBING CODE, 2015 EDITION, BY REFERENCE  
SBC-4 RHODE ISLAND STATE MECHANICAL CODE  
INCORPORATES THE INTERNATIONAL MECHANICAL CODE, 2015 EDITION, BY REFERENCE  
SBC-8 RHODE ISLAND STATE ELECTRICAL CODE  
INCORPORATES THE NATIONAL ELECTRICAL CODE, 2017 EDITION, BY REFERENCE  
SBC-8 RHODE ISLAND STATE ENERGY CONSERVATION CODE  
INCORPORATES THE INTERNATIONAL ENERGY CONSERVATION CODE, 2015 EDITION, BY REFERENCE  
NFPA 1, FIRE CODE, 2015 EDITION  
NFPA 101, LIFE SAFETY CODE, 2015 EDITION

## USE AND OCCUPANCY CLASSIFICATION (CH3)

SECTION 303.4  
BUSINESS B (CIVIC ADMINISTRATION)  
THE USE OF A BUILDING OR STRUCTURE, OR A PORTION THEREOF, FOR THE GATHERING OF PERSONS FOR PURPOSES SUCH AS CIVIC, SOCIAL OR RELIGIOUS FUNCTIONS, RECREATION, FOOD OR DRINK CONSUMPTION OR AWAITING TRANSPORTATION.

## USE AND OCCUPANCY CLASSIFICATION (CH3)

SECTION 303.4  
A-3 (CIVIC ADMINISTRATION)  
THE USE OF A BUILDING OR STRUCTURE, OR A PORTION THEREOF, FOR THE GATHERING OF PERSONS FOR PURPOSES SUCH AS CIVIC, SOCIAL OR RELIGIOUS FUNCTIONS, RECREATION, FOOD OR DRINK CONSUMPTION OR AWAITING TRANSPORTATION.

## USE AND OCCUPANCY CLASSIFICATION (CH3)

SECTION 303.4  
B (BUSINESS)  
THE USE OF A BUILDING OR STRUCTURE, OR A PORTION THEREOF, FOR THE GATHERING OF PERSONS FOR PURPOSES SUCH AS CIVIC, SOCIAL OR RELIGIOUS FUNCTIONS, RECREATION, FOOD OR DRINK CONSUMPTION OR AWAITING TRANSPORTATION.

## GENERAL BUILDING HEIGHTS AND AREAS (CH5)

TABLE 604.3 ALLOWABLE BUILDING HEIGHT IN FEET ABOVE GRADE PLANE	ALLOWABLE HEIGHT TYPE III CONSTRUCTION (NS) NON-SPRINKLERED
OCCUPANCY CLASSIFICATION	50'
A, B, F, E, S, U	COMPLIES - ACTUAL BUILDING HEIGHT 22'-6" ABOVE GRADE

TABLE 604.4 ALLOWABLE NUMBER OF STORES ABOVE GRADE PLANE	ALLOWABLE HEIGHT TYPE III CONSTRUCTION (NS) NON-SPRINKLERED
OCCUPANCY CLASSIFICATION	COMPLIES - 2 STORY (2ND LEVEL - UNOCCUPIED MECHANICAL, ATTIC OR MECHANICAL ROOM// LADDER ACCESS)
B	

THE USE OF A BUILDING OR STRUCTURE, OR A PORTION THEREOF, FOR THE GATHERING OF PERSONS FOR PURPOSES SUCH AS CIVIC, SOCIAL OR RELIGIOUS FUNCTIONS, RECREATION, FOOD OR DRINK CONSUMPTION OR AWAITING TRANSPORTATION.

## TYPES OF CONSTRUCTION (CH6)

TABLE 601-1 FIRE RATING, TYPE III CONSTRUCTION	
0 HOUR - PRIMARY STRUCTURAL FRAME	
0 HOUR - BEARING WALLS	EXTERIOR
0 HOUR - INTERIOR	
0 HOUR - NON-BEARING WALLS	EXTERIOR
0 HOUR - INTERIOR	
0 HOUR - FLOOR CONSTRUCTION AND ASSOCIATED SECONDARY MEMBERS	
0 HOUR - ROOF CONSTRUCTION AND ASSOCIATED SECONDARY MEMBERS	

COMBUSTIBLE FINISHES AND FIRE RETARDANT TREATMENT  
ALL COMBUSTIBLE FINISHES WILL BE FIRE RESISTANT TREATED OR ON FIRE RETARDANT TREATED SUBSTRATE AND WILL COMPLY WITH USES OUTLINED IN SECTION 603.1, RISEC. 2015.  
USES OF COMBUSTIBLE MATERIALS ARE LIMITED TO THE FOLLOWING:  
• 603.1.5 - INTERIOR FLOOR FINISHES AND FLOOR COVERING MATERIALS INSTALLED IN ACCORDANCE WITH SECTION 804  
• 603.1.6 - MILLWORK  
• 603.1.7 - INTERIOR WALL AND CEILING FINISHES INSTALLED IN ACCORDANCE WITH SECTIONS 601 AND 603  
• 603.1.8 - TRIM INSTALLED IN ACCORDANCE WITH SECTION 806  
• 603.1.10 - FINISH FLOORING INSTALLED IN ACCORDANCE WITH SECTION 805

## TYPES OF CONSTRUCTION (CH7)

TABLE 705.8 MAXIMUM AREA OF EXTERIOR WALL OPENINGS BASED ON FIRE SEPARATION DISTANCE AND DEGREE OF OPENING PROTECTION			
FIRE SEPARATION DISTANCE (ft)	DEGREE OF OPENING PROTECTION	ALLOWABLE AREA <sup>a</sup>	
5 TO LESS THAN 10	NON-SPRINKLERED/UNPROTECTED	10%	
ACTUAL	6'	UPNS	TOTAL WALL AREA 640 SQFT TOTAL WALL OPENINGS AREA <1 SQFT
COMPLIES			1640 ± 53%

SECTION 705.11 PARAPETS  
COMPLIES - REFER TO DRAWING 210-101 FOR PARAPET REQUIREMENT EXCEPTION 4.  
SECTION 716 OPENINGS PROTECTIVES  
COMPLIES - FIRE DAMPERS PROVIDED ON ALL VENTS ON 1-HR FIRE RATED EXTERIOR WALLS PER SECTION 705.10 DUCTS AND AIR TRANSFER OPENINGS.  
INTERIOR FINISHES (CH8)  
TABLE 803.11 INTERIOR WALL AND CEILING FINISHES BY OCCUPANCY (NON-SPRINKLERED)

## FIRE PROTECTION SYSTEMS (CH9)

SECTION 903.1 NON-SPRINKLERED  
NOT REQUIRED - FIRE AREA AND OCCUPANT LOAD DOES NOT EXCEEDS MINIMUM THRESHOLD  
GROUP B BUSINESS (ASSEMBLY A-3 WITH OCCUPANT LOAD UNDER 50 PERSONS SHALL BE CLASSIFIED AS GROUP B) - TICKETING AND WELCOME CENTER  
[F] 903.2.1.1 GROUP A-3  
AN AUTOMATIC SPRINKLER SYSTEM SHALL BE PROVIDED FOR FIRE AREAS CONTAINING GROUP A-3 OCCUPANCIES AND INTERVENING FLOORS OF THE BUILDING WHERE ONE OF THE FOLLOWING CONDITIONS EXISTS:  
THE FIRE AREA EXCEEDS 12,000 SQUARE FEET (1115 M<sup>2</sup>)  
THE FIRE AREA HAS AN OCCUPANT LOAD OF 500 OR MORE.  
THE FIRE AREA IS LOCATED ON A FLOOR OTHER THAN A LEVEL OF EXIT DISCHARGE SERVING SUCH OCCUPANCIES.  
THE FIRE AREA CONTAINS A MULTITHEATER COMPLEX.  
FIRE ALARM FIRE ALARM SYSTEM WITH VOICE COMMUNICATION HAS BEEN PROVIDED

## MEANS OF EGRESS (CH10)

FUNCTION OF SPACE	OCCUPANT LOAD FACTOR
ASSEMBLY	1 PERSON / 30 NET (SQFT)
EXHIBIT GALLERY AND MUSEUM	
GALLERY AREA	900 SQFT
OCCUPANT LOAD	900 / 30 = 30 PERSONS
1006 NUMBER OF EXITS AND EXIT ACCESS DOORWAY	COMPLIES - 2 PROVIDED
1006.1.2 COMMON PATH OF EGRESS	COMPLIES - 75 FEET MAX FROM ROOM OR SPACE (NON-SPRINKLERED)
1007.1.1 EXIT WIDTH	COMPLIES - WIDTHNESS OF FIRST FLOOR EXITS EXCEEDS 12"
1007.1.2 EXIT WIDTH	COMPLIES - OVERALL DIAGONAL LENGTH (UN-SPRINKLERED) 58/8" = 412"
1017.2 TRAVEL DISTANCE	COMPLIES - 250 FEET MAX TO EXIT FOR ASSEMBLY, NON-SPRINKLERED
1020.2 CORRIDOR WIDTH	COMPLIES - 44" MINIMUM
1020.4 DEAD END CORRIDOR	COMPLIES - DEAD END CORRIDOR SHALL NOT EXCEED 20' (ACTUAL 17')

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NOTE:  
HIGHLIGHTED ELEMENTS TO RECEIVE MINERAL FIBER SPRAY-APPLIED FIRE RESISTANT MATERIALS IN THICKNESSES AS REQUIRED TO BY CHAPTER 7 - FIRE + SMOKE PROTECTION FEATURES AS DESCRIBED BELOW -

- SECTION 705.11 PARAPETS  
EXCEPTIONS:  
4. ONE HOUR FIRE RESISTANCE-RATED EXTERIOR WALLS THAT TERMINATE AT THE UNDERSIDE OF THE ROOF SHEATHING, DECK, OR SLAB, PROVIDED:  
1. WHERE THE ROOF CEILING FRAMING ELEMENTS ARE PARALLEL TO THE WALLS, SUCH FRAMING AND ELEMENTS SUPPORTING SUCH FRAMING SHALL NOT BE OF LESS THAN 1-HOUR FIRE-RESISTANCE-RATED CONSTRUCTION FOR A WIDTH OF 4 FEET FOR GROUPS R AND U AND 10 FEET FOR OTHER OCCUPANCIES, MEASURED FROM THE INTERIOR SIDE OF THE WALL.  
2. WHERE ROOF CEILING FRAMING ELEMENTS ARE NOT PARALLEL TO THE WALL, THE ENTIRE SPAN OF SUCH FRAMING AND ELEMENTS SUPPORTING SUCH FRAMING SHALL NOT BE OF LESS THAN 1-HOUR FIRE-RESISTANCE-RATED CONSTRUCTION.  
3. OPENINGS IN THE ROOF SHALL NOT BE LOCATED WITHIN 5 FEET OF THE 1-HOUR FIRE-RESISTANCE-RATED EXTERIOR WALL FOR GROUPS R AND U AND 10 FEET FOR OTHER OCCUPANCIES, MEASURED FROM THE INTERIOR SIDE OF THE WALL.  
4. THE ENTIRE BUILDING SHALL BE PROVIDED WITH NOT LESS THAN A CLASS B ROOF COVERING.  
\* LARGE DOUBLE-TUBE BEAMS THAT EXTEND TO THE EXTERIOR SHALL RECEIVE 3" OF FIRE-RESISTANT MATERIALS TO PROVIDE THERMAL INSULATION AS WELL AS FIREPROOFING.

## 2 STRUCTURE FIREPROOFING DIAGRAM

## 1 LIFE SAFETY PLAN

1/4" = 1'-0"

REF: 1/A-201

PROJECT: RWP GATEWAY & VISITOR CENTER  
 CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02905-3215  
 OWNER: RWP GATEWAY & VISITOR CENTER  
 1197 BROAD ST.  
 PROVIDENCE, RI 02905  
 CONSULTANTS:  
 DATE: 03/11/2021  
 DESIGNED BY: EDWIN  
 CHECKED BY: EDWIN  
 DATE: 03/11/2021  
 DESIGNED BY: EDWIN  
 CHECKED BY: EDWIN  
 DATE: 03/11/2021  
 DESIGNED BY: EDWIN  
 CHECKED BY: EDWIN  
 DATE: 03/11/2021  
 DESIGNED BY: EDWIN  
 CHECKED

## GENERAL CONSTRUCTION NOTES

- ALL CONSTRUCTION DEBRIS SHALL BE DISPOSED OF LEGALLY OFF SITE.
- CONTRACTOR IS RESPONSIBLE FOR DUST CONTROL. DUST CONTROL SHALL INCLUDE THE WATERING OF UNPAVED ROAD SURFACES AND STREET SWEEPING OF PAVED SURFACES. STREET SWEEPING SHALL OCCUR ON THE PAVED SURFACES WITHIN THE SITE AND OFF THE SITE WHERE VEHICLE TRACKING OF SEDIMENTS HAS OCCURRED.
- ALL SITE WORK SHALL BE SECURED AT THE END OF THE WORK DAY TO REDUCE EROSION AND SEDIMENT PROBLEMS. THIS INCLUDES AS APPLICABLE, COVERING STOCKPILES OF SOIL, INSTALLING TEMPORARY VEGETATION OR BY USING GEOTEXTILES TO COVER DISTURBED AREAS WITH STEEPER SLOPES.
- DEWATERING OPERATION SHALL COMPLY WITH THE DEWATERING REQUIREMENTS PER RIDEM FOR CONSTRUCTION SITES THAT ARE LESS THAN 1 ACRE.
- THE PROJECT SITE IS LESS THAN 1 ACRE, THEREFORE, THE RIDEM RIPDES CONSTRUCTION GENERAL PERMIT IS NOT APPLICABLE. HOWEVER, A SMALL SITE SWPPP IS REQUIRED FOR SITES LESS THAN 1 ACRE. THE SMALL SITE SWPPP SHALL BE PREPARED BY THE CONTRACTOR.
- CONSTRUCTION FENCING SHALL BE SET TO PREVENT UNCONTROLLED ACCESS TO THE SITE AT ALL TIMES AND ADJUSTED AS NECESSARY THROUGHOUT CONSTRUCTION AT NO ADDITIONAL COST TO THE OWNER DEPENDING ON PHASING.
- EXISTING CONDITIONS SURVEY WAS PREPARED BY GREEN INTERNATIONAL AFFILIATES, INC. (GREEN) DATED MAY 1, 2020.
- THE CONTRACTOR SHALL NOTIFY THE OWNER AND ENGINEER IMMEDIATELY WITH ANY DISCREPANCIES BETWEEN FIELD CONDITIONS AND THE EXISTING CONDITIONS PLAN PREPARED BY GREEN.
- ALL AREAS DISTURBED WITHIN THE LIMIT OF WORK SHALL BE RESTORED TO EXISTING CONDITIONS OR BETTER.
- AREA OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION, AT NO ADDITIONAL COST TO THE OWNER.
- AT SUBSTANTIAL COMPLETION OF THE PROJECT, THE CONTRACTOR SHALL SUBMIT AS-BUILT DRAWINGS OF THE ENTIRE PROJECT WHICH SHALL INCLUDE, BUT ARE NOT LIMITED TO, A FULL TOPOGRAPHIC SURVEY OF THE LANDSCAPE AREA CONSISTING OF MOUNDS AND BIORETENTION BASINS, HARDSCAPED SITE FEATURES, AND RIMS AND INVERTS OF UTILITIES.

## UTILITY NOTES

- ALL UTILITY COMPANIES, PUBLIC AND PRIVATE, MUST BE NOTIFIED, INCLUDING THOSE IN CONTROL OF UTILITIES NOT SHOWN ON THIS PLAN. (SEE CHAPTER 39-1.2 OF THE R.I. GENERAL LAWS ENTITLED "EXCAVATION NEAR UNDERGROUND UTILITY FACILITIES", WITH AMENDMENTS EFFECTIVE AS OF NOVEMBER 1, 2009) PRIOR TO DESIGNING, EXCAVATING, BLASTING, INSTALLING, BACKFILLING, GRADING, PAVEMENT RESTORING OR REPAIRING. EXCAVATION SHALL BE IN ACCORDANCE WITH ALL STATUTES, ORDINANCES, RULES AND REGULATIONS OF ANY APPLICABLE CITY, TOWN, STATE OR FEDERAL AGENCY.
- THE LOCATION OF EXISTING PIPES OR OTHER UNDERGROUND STRUCTURES OR PROPERTY LINES ARE NOT WARRANTED TO BE EXACT, NOR IS IT WARRANTED THAT ALL UNDERGROUND PIPES OR STRUCTURES ARE SHOWN. THE CONTRACTOR SHALL CALL "DIG SAFE" (1-888-344-7233) 72 HOURS (EXCLUDING SATURDAYS, SUNDAYS AND HOLIDAYS) PRIOR TO ANY EXCAVATION TO OBTAIN ACCURATE UTILITY LOCATIONS.
- CONTRACTOR TO ADJUST UTILITY ELEMENT MEANT TO BE FLUSH WITH GRADE (CLEAN-OUTS, UTILITY MANHOLES, CATCH BASINS, INLETS, ECT.) THAT ARE AFFECTED BY SITE WORK OR GRADE CHANGES, WHETHER SPECIFICALLY NOTED ON THE PLANS OR NOT.
- THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE TAKEN FROM RECORD INFORMATION SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MAY BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ALL UNDERGROUND UTILITIES.
- WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION, AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR RESOLUTION OF THE CONFLICT.
- THE CONTRACTOR SHALL ALTER THE MASONRY OF THE TOP SECTION OF ALL EXISTING DRAINAGE STRUCTURES AS NECESSARY FOR CHANGES IN GRADE, AND RESET ALL WATER AND DRAINAGE FRAMES, GRATES, AND BOXES TO THE PROPOSED FINISH SURFACE GRADE.
- SITE LIGHT POLES ARE SHOWN ON THIS PLAN FOR COORDINATION PURPOSES ONLY. REFER TO ELECTRICAL PLANS FOR EXACT TYPE AND LOCATION.
- THE LOCATION, SIZE, DEPTH, AND SPECIFICATIONS FOR CONSTRUCTION OF PRIVATE UTILITY SERVICES SHALL BE INSTALLED ACCORDING TO THE REQUIREMENTS PROVIDED BY, AND APPROVED BY, THE RESPECTIVE UTILITY COMPANY (GAS, TELEPHONE, ELECTRICAL). FINAL DESIGN AND LOCATIONS AT THE BUILDINGS WILL BE PROVIDED BY THE ARCHITECT. THE CONTRACTOR SHALL COORDINATE THE INSTALLATION OF THE UTILITY CONNECTION WITH THE RESPECTIVE COMPANIES PRIOR TO ANY UTILITY CONSTRUCTION.
- ALL WORK MUST COMPLY WITH STATE AND LOCAL PERMITS, AS WELL AS THE CITY OF PROVIDENCE REQUIREMENTS.
- ALL PIPES LABELED AS (REC) ARE BASED ON RECORD INFORMATION ONLY AND NOT OBSERVED IN THE FIELD.
- EXISTING UTILITY RECORD INDICATE THAT THE BUILDING IN THE NORTH SECTION OF THE PROJECT AREA WAS CONNECTED TO THE MUNICIPAL SEWER SYSTEM IN 1935. RECORDS OF THIS CONNECTION WERE NOT FOUND AND THE LOCATION OF THE PIPES ARE UNKNOWN.
- A SITE RECONNAISSANCE IN JUNE 2019 IDENTIFIED A NATURAL GAS CONNECTION EXTENDING FROM BROAD STREET INTO THE PROPERTY.
- EXISTING UTILITY RECORD INDICATE THAT THERE MAY BE UNDERGROUND STORAGE TANKS CONTAINING GAS AND OIL WITHIN THE SITE, LOCATIONS UNKNOWN.
- UTILITY WORK WITHIN THE ZONE 10 FT OUTSIDE OF FOUNDATION WALL OF THE BUILDING SHALL CONFORM TO EFFECTIVE BUILDING CODE REQUIREMENTS, AND THE MECHANICAL, ELECTRICAL AND PLUMBING SPECIFICATIONS. UTILITIES WITHIN THIS AREA (10 FT FROM THE FOUNDATION WALL) ARE SHOWN ON THIS DRAWING FOR COORDINATION PURPOSES, REFER TO THE MECHANICAL, ELECTRICAL, AND PLUMBING DRAWINGS AND SPECIFICATIONS FOR PIPE SIZES AND MATERIALS.

## SITE PREPARATION NOTES

- THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES AND PROCEDURES; AND FOR THE SAFETY PRECAUTIONS AND PROGRAMS REQUIRED FOR THE WORK UNDER THIS CONTRACT. THE CONTRACT DOCUMENTS DO NOT INCLUDE THE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY AND THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR PROVIDING ALL SAFETY BARRIERS, WARNING FLASHERS, AND THE LIKE AS REQUIRED FOR THE PROTECTION OF WORKERS AND THE PUBLIC. COMPLY WITH OSHA REQUIREMENTS.
- PRIOR TO THE START OF WORK, INSTALL WOVEN POLYPROPYLENE GEOTEXTILE FILTER BAGS IN CATCH BASINS AND/OR DRYWELL STRUCTURES ON AND NEAR THE SITE. WHEN INSTALLING FILTER BAGS, HOLD APPROXIMATELY SIX INCHES OUTSIDE THE FRAME AND REPLACE THE GRATE, USING THE WEIGHT OF THE GRATE TO HOLD THE FILTER BAG IN PLACE.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING ALL NECESSARY CONSTRUCTION PERMITS REQUIRED FOR THIS PROJECT.
- THE CONTRACTOR SHALL PROTECT ALL UTILITIES WITHIN THE PROJECT AREA, IN THE STREET, AND ON ADJACENT PROPERTIES FROM DAMAGE AND UNDERMINING DURING EXCAVATION.
- REMOVE ALL EXISTING SURFACE FEATURES SUCH AS BIT. CONC., CURBING AND ASSOCIATED UNDERGROUND ELECTRICAL CONDUITS, MANHOLE, MANHOLE FRAME AND COVERS, AND THE LIKE TO ALLOW FOR THE CONSTRUCTION OF THE PROPOSED SITE IMPROVEMENTS.
- REMNANTS OF PREVIOUS BUILDING FOUNDATIONS, UTILITY STRUCTURES AND UNDERGROUND UTILITIES MAY BE ENCOUNTERED DURING EXCAVATION AND SHALL BE REMOVED AND DISPOSED OF LEGALLY OFF SITE, UNLESS SPECIFIED TO BE PROTECTED AND RETAINED.
- THE CONTRACTOR SHALL PERFORM ALL WORK WITHIN THE PUBLIC RIGHT-OF-WAY IN CONFORMANCE WITH THE CITY OF PROVIDENCE STANDARD SPECIFICATIONS.
- ALL EXISTING WATER AND GAS SERVICES DESIGNATED TO BE REMOVED OR ABANDONED SHALL BE CUT AND CAPPED AT THE MAIN IN THE STREET.
- ALL EXISTING SEWER AND DRAIN LINES DESIGNATED TO BE REMOVED OR ABANDONED SHALL BE CUT AND CAPPED AT THE MAIN IN THE STREET.
- ALL EXISTING UTILITY FRAMES, COVERS AND/OR GRATES WITHIN PROJECT LIMITS ARE TO BE ADJUSTED TO PROPOSED FINISHED GRADE UNLESS OTHERWISE NOTED.
- TEMPORARY CONSTRUCTION ENTRANCES SHALL BE INSTALLED AS SHOWN ON PLANS.
- CONTRACTOR SHALL INSTALL TEMPORARY CONSTRUCTION FENCE AS NOTED ON PLANS.
- CONTRACTOR SHALL DIG TEST PITS FOR UTILITY INFO AS SHOWN ON PLANS PRIOR TO ANY SITE WORK BEING PERFORMED OR ORDERING ANY MATERIAL.
- DUE TO ON-SITE CONTAMINATION, ANY MOVEMENT OF SOIL AND EXCAVATION MUST FOLLOW THE "REMEDIAL ACTION WORK PLAN" PREPARED BY THE GEOTECHNICAL ENGINEER.

## SITE GRADING NOTES

- PROPOSED GRADING SHALL MATCH EXISTING GRADES AT THE LIMIT OF WORK, WHERE PROPOSED GRADES MEET EXISTING GRADES. CONTRACTOR SHALL BLEND GRADES TO PROVIDE A SMOOTH TRANSITION BETWEEN EXISTING AND NEW WORK AND ENSURE NO PONDING AREAS ARE CREATED.
- GRADE ALL AREAS TO DRAIN.
- PROPOSED WALKWAYS SHALL BE CONSTRUCTED WITH A CROSS SLOPE OF NO MORE THAN 1.5% AND A LONGITUDINAL SLOPE OF NO MORE THAN 4.5%.
- LANDINGS AT BUILDING ENTRANCES SHALL BE CONSTRUCTED WITH SLOPES NO MORE THAN 1.5% IN ANY DIRECTION.
- HANDICAP PARKING SPACES SHALL BE CONSTRUCTED WITH SLOPES NO MORE THAN 1.5% IN ANY DIRECTION.
- CONTRACTORS SHALL MAINTAIN POSITIVE DRAINAGE AWAY FROM ALL BUILDING FOUNDATIONS AND STRUCTURES.

## PLANTING NOTES:

- ALL PLANT MATERIALS SHALL BE TAGGED IN THE NURSERY BY THE LANDSCAPE ARCHITECT AS PER THE SPECIFICATION.
- THE LANDSCAPE ARCHITECT OR THE OWNER'S REPRESENTATIVE MAY REJECT DAMAGED PLANT MATERIAL UPON DELIVERY TO THE SITE.
- FINAL LIST OF PLANT MATERIALS AND SEED MIXES SHALL BE SUBMITTED FOR APPROVAL, PRIOR TO DELIVERY TO THE SITE.
- SEE SPECIFICATION FOR SEED MIXES.

## EROSION AND SEDIMENT CONTROLS

- THE PROJECT WILL DISTURB LESS THAN 1 ACRE; THEREFORE, A RIPDES PERMIT WITH RIDEM IS NOT REQUIRED. HOWEVER, THE CONTRACTOR SHALL PREPARE A SMALL SITE SWPPP FOR THE PROJECT TO BE KEPT ON-SITE DURING CONSTRUCTION.
- THE CONTRACTOR IS RESPONSIBLE FOR CONTROLLING THE EROSION AND SEDIMENT DURING THE CONSTRUCTION PROCESS. SITE SPECIFIC CONDITIONS MAY REQUIRE MODIFICATIONS IN THE FIELD, BUT THE CONTRACTOR MUST ENSURE THAT THE PROJECT SPECIFICATIONS THAT ARE DEVELOPED IN THE FIELD MEET THE MINIMUM REQUIREMENTS OF THIS PLAN.
- DURING CONSTRUCTION, TRENCH EXCAVATIONS SHALL BE BACKFILLED AS SOON AS POSSIBLE AND SHOULD NOT DIRECT RUNOFF AROUND TREATMENT AND DETENTION FACILITIES.
- IN ORDER TO MINIMIZE EROSION AND SEDIMENT RUNOFF FROM THE SITE, THE CONTRACTOR SHOULD MAINTAIN EXISTING VEGETATION WHERE POSSIBLE AND STABILIZE THE DISTURBED PORTIONS OF THE SITE AS QUICKLY AS POSSIBLE. THIS MAY INCLUDE PHASING THE PROJECT AS NEEDED TO MINIMIZE THE SIZE OF THE DISTURBED AREAS ON THE SITE.
- THE CONTRACTOR MUST ALSO ANTICIPATE INCREASED RUNOFF FROM STEEPER SLOPES AND DURING HIGH GROUNDWATER CONDITIONS. THIS MAY OCCUR DURING THE WET SEASON (TYPICALLY MARCH THROUGH APRIL) OR AFTER SIGNIFICANT PRECIPITATION EVENTS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION OF SILT FENCES, DRAINAGE SWALES, EARTH DIKES, TEMPORARY SETTLING BASINS, CHECK DAMS AND TEMPORARY OR PERMANENT SEDIMENT BASINS. THESE PRACTICES DIVERT FLOWS FROM EXPOSED SOILS, LIMIT RUNOFF AND THE DISCHARGE OF POLLUTANTS FROM EXPOSED AREAS OF THE SITE TO THE DEGREE ATTAINABLE.
- THE CONTRACTOR SHALL, AT ALL TIMES, HAVE A STOCKPILE OF STRAW WATTLES AND SILT FENCE ADEQUATE TO REINFORCE/REPLACE EROSION AND SEDIMENT CONTROL AS NEEDED.
- ALL AREAS OF DISTURBANCE MUST HAVE TEMPORARY OR FINAL STABILIZATION WITHIN 14 DAYS OF THE INITIAL DISTURBANCE. AFTER THIS TIME, ANY DISTURBANCE IN THE AREA MUST BE STABILIZED AT THE END OF EACH WORK DAY. THE FOLLOWING EXCEPTIONS APPLY:
  - STABILIZATION IS NOT REQUIRED IF WORK IS TO CONTINUE IN THE AREA WITHIN THE NEXT 24 HOURS AND THERE IS NO PRECIPITATION FORECAST FOR THE NEXT 24 HOURS.
  - STABILIZATION IS NOT REQUIRED IF THE WORK IS OCCURRING IN A SELF-CONTAINED EXCAVATION WITH A DEPTH OF 2 FEET OR GREATER.

## LEGEND

□ SB/DH	STONE BOUND	⊙ TMH	TELEPHONE MANHOLE
DH	DRILL HOLE	⊙ EMH	ELECTRIC MANHOLE
H/T	HUB & TACK	⊙ THH	TELEPHONE HANDHOLE
PK	PARKER KALON	⊙ SMH	SEWER MANHOLE
FND	FOUND	⊙ SCO	SEWER CLEANOUT
N/F	NOW OR FORMERLY	⊙ WMH	WATER MANHOLE
W/	WITH	○ WG	WATER GATE
~~~~~	TREE LINE	○ WS	WATER SERVICE
⊙	DECIDUOUS TREE	⊙ HYD	HYDRANT
⊙	SHRUB	○ PVI	POST INDICATOR VALVE
⊙	FENCE	⊙ MW	MONITORING WELL
⊙	CHAIN LINK FENCE	● GP	GUARD POST (BOLLARD)
⊙	BARBED WIRE	○ WP	WOOD POST
⊙	STOCKADE FENCE	● MP	METAL POST
⊙	PICKET FENCE	R=	RIM
⊙	CURBING(TYPE)	I=	INVERT
⊙	CONCRETE RETAINING WALL	NPV	NO PIPE VISIBLE
⊙	STONE RETAINING WALL	NA	NO ACCESS
⊙	LANDSCAPE TIMBER RETAINING WALL	UC	UNKNOWN CONNECTION
⊙	BITUMINOUS CONCRETE	RCP	REINFORCED CONCRETE PIPE
⊙	CONCRETE	CIP	CAST IRON PIPE
⊙	BITUMINOUS CONCRETE PATCH	DIP	DUCTILE IRON PIPE
⊙	GRANITE CURB	PVC	POLYVINYL CHLORIDE
⊙	SLOPED GRANITE CURB	VCP	VITREOUS CLAY PIPE
⊙	CONCRETE CURB	OPP	CORRUGATED PLASTIC PIPE
⊙	BIT CONC DRIVE	PL	PLASTIC
⊙	CONCRETE WALK	CS G	COATED STEEL (GAS)
⊙	BIT CONC WALK	TOW	TOP OF HOOD
⊙	BRICK WALK	TOS	TOP OF SILT
⊙	COBBLESTONE WALK	TEL	TELEPHONE
⊙	PLANTED	ELEC	ELECTRIC
⊙	THRESHOLD	EM	ELECTRIC METER
⊙	HANDICAP RAMP	RSR	RISER
⊙	HORIZONTAL DIRECTIONAL DRILL	(M)	MARKED
⊙	LANDSCAPE TIMBER	— W —	WATER LINE
○ S	SIGN	— S —	SEWER LINE
□ HH	HANDHOLE	— CS —	COMBINED SEWER LINE
—	GUY WIRE	— T —	TELEPHONE LINE
—	UTILITY POLE	— E —	ELECTRIC LINE
—	UTILITY POLE/LIGHT POLE	— D —	DRAIN LINE
—	LIGHT POLE	— G —	GAS LINE
—	FLOOD LIGHT	— OHW —	OVERHEAD WIRE
—	LIGHT POLE BASE	— CATV —	CABLE TELEVISION LINE
⊙ DMH	DRAIN MANHOLE	— 20 —	INDEX CONTOUR
○ DCO	DRAIN CLEANOUT	+ 31.79	SPOT ELEVATION
□ CB	CATCH BASIN	E-1	PERMANENT EASEMENT E-1 (TYP.)
□ CBDI	CATCH BASIN/DROP INLET	TE-1	TEMPORARY EASEMENT TE-1 (TYP.)
○ GG	GAS GATE	↔	"TEE HOOK"
○ GS	GAS SERVICE	MTA	(INDICATES COMMON OWNERSHIP)
			METROPOLITAN TRANSIT AUTHORITY

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LANDSCAPE ARCHITECT:  
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861.334.0122

ON-SITE ENGINEERING:  
**GREEN INTERNATIONAL AFFILIATES, INC.**  
Civil and Structural Engineers

238 LITTLETON RD #3  
WESTFIELD, RI 02891  
TEL: 401.853.6888

NO.	DATE	REVISION	BY	CHKD
1	09/10/2018	ISSUED FOR PERMITS		
2	09/10/2018	ISSUED FOR PERMITS		
3	09/10/2018	ISSUED FOR PERMITS		
4	09/10/2018	ISSUED FOR PERMITS		
5	09/10/2018	ISSUED FOR PERMITS		
6	09/10/2018	ISSUED FOR PERMITS		
7	09/10/2018	ISSUED FOR PERMITS		
8	09/10/2018	ISSUED FOR PERMITS		
9	09/10/2018	ISSUED FOR PERMITS		
10	09/10/2018	ISSUED FOR PERMITS		
11	09/10/2018	ISSUED FOR PERMITS		
12	09/10/2018	ISSUED FOR PERMITS		
13	09/10/2018	ISSUED FOR PERMITS		
14	09/10/2018	ISSUED FOR PERMITS		

PROJECT:  
**CITY OF PROVIDENCE REDEVELOPMENT AGENCY**  
444 WESTMINSTER ST., SUITE 3A  
PROVIDENCE, RI 02903-3215

OWNER:  
**RWP GATEWAY & VISITOR CENTER**  
1197 BROAD ST.  
PROVIDENCE, RI 02905

PROJECT:  
**NOTES AND ABBREVIATIONS**

PROJECT:  
**NOT FOR CONSTRUCTION**





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**GREEN INTERNATIONAL AFFILIATES, INC.**  
 Civil and Structural Engineers

238 LITTLETON RD #3  
 WESTFIELD, RI 02891  
 401.923.8486

DATE: 08.15.2020  
 TIME: 10:00 AM  
 DRAWN BY: J. BROWN  
 CHECKED BY: M. BROWN  
 SCALE: 1"=20'

NO.	DATE	DESCRIPTION
1	08.15.2020	ISSUED FOR PERMITS
2	08.15.2020	ISSUED FOR PERMITS
3	08.15.2020	ISSUED FOR PERMITS
4	08.15.2020	ISSUED FOR PERMITS
5	08.15.2020	ISSUED FOR PERMITS
6	08.15.2020	ISSUED FOR PERMITS
7	08.15.2020	ISSUED FOR PERMITS
8	08.15.2020	ISSUED FOR PERMITS
9	08.15.2020	ISSUED FOR PERMITS
10	08.15.2020	ISSUED FOR PERMITS

PROJECT:  
**CITY OF PROVIDENCE REDEVELOPMENT AGENCY**  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-3215

CLIENT:  
**RWP GATEWAY & VISITOR CENTER**  
 1197 BROAD ST.  
 PROVIDENCE, RI 02905

DATE:  
**LAYOUT PLAN**

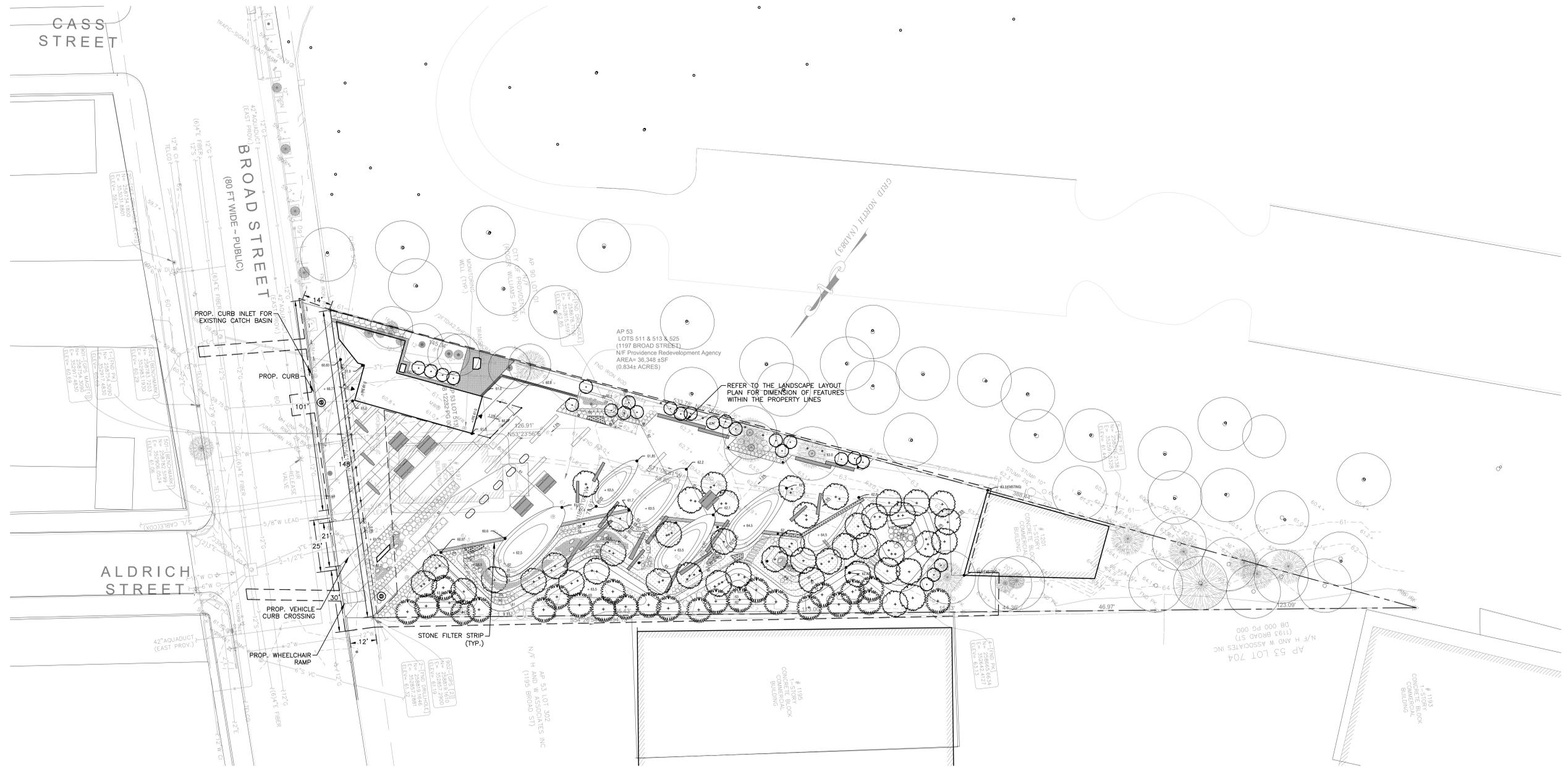
STATUS:  
**NOT FOR CONSTRUCTION**

PROJECT #  
**2717.00**  
**C-4.00**

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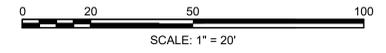
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**1** LAYOUT PLAN  
 SCALE: 1"=20'

**NOTES:**  
 1) REFER TO LANDSCAPING PLANS FOR PROPOSED MATERIALS AND PLANTS

PLAN SYMBOLS - SITE LAYOUT	
	EXISTING CONTOUR
	PROPOSED CONTOUR
	LIMIT OF WORK (L.O.W.)
	HISTORIC BORING
	STONE FILTER STRIP





DATE	REVISION	BY	CHKD
07/15/2020	ISSUE FOR PERMIT	MM	MM
07/15/2020	FOR REVIEW	MM	MM
07/15/2020	FOR REVIEW	MM	MM
07/15/2020	FOR REVIEW	MM	MM
07/15/2020	FOR REVIEW	MM	MM
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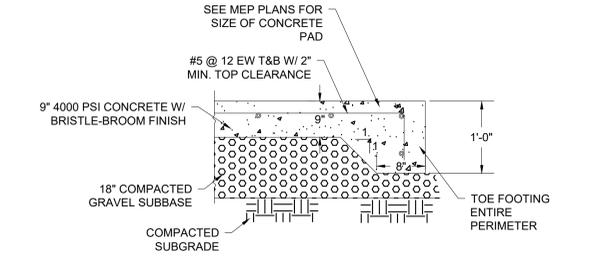
**CITY OF PROVIDENCE REDEVELOPMENT AGENCY**  
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PROVIDENCE, RI 02905

**DETAILS SHEET 1**

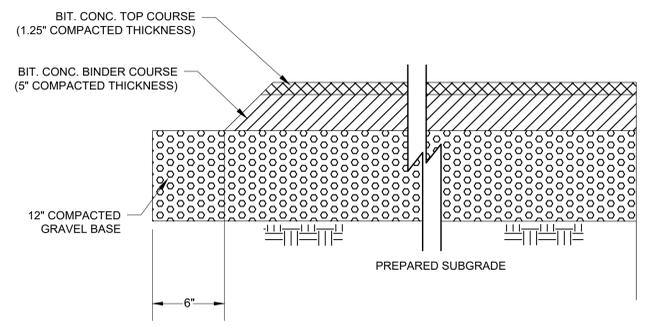
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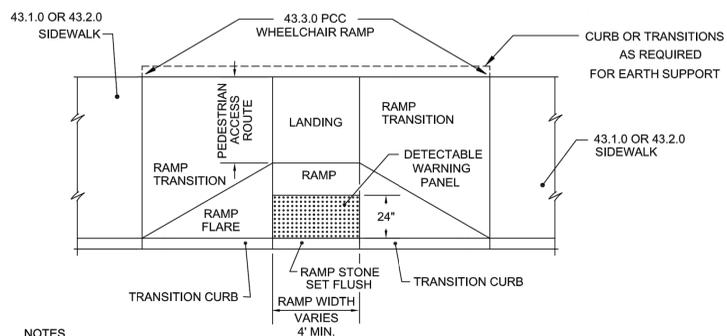


- CEMENT CONCRETE PAD NOTES**
1. CEMENT CONCRETE FOR PAD SHALL HAVE A 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI WITH 6% AIR-ENTRAINMENT AND MINIMUM CEMENT CONTENT OF 610 LBS/C.Y.
  2. CONCRETE SHALL BE PLACED IN ALTERNATE SLABS 8.75 FEET IN LENGTH. THE SLABS SHALL BE SEPARATED BY TRANSVERSE PREFORMED EXPANSION JOINT FILLER (AASHTO M-213-65) 1/2" IN THICKNESS.
  3. PREFORMED EXPANSION JOINT FILLER SHALL BE PLACED ADJACENT TO OR AROUND EXISTING STRUCTURES AND WALKWAYS.
  4. AFTER CONSOLIDATION, CONCRETE DEPTH SHALL BE 9 INCHES IN DEPTH.
  5. ENSURE THAT NO BLEED WATER OR WATER SHEEN EXISTS ON THE SURFACE OF THE CONCRETE AND THAT CONCRETE HAS STARTED TO STIFFEN BEFORE ANY FINISHING OPERATIONS ARE PERFORMED.
  6. AFTER TROWELING, SURFACE SHALL BE BRUSHED BY DRAWING A SOFT-BRISTLED PUSHBROOM WITH A LONG HANDLE OVER THE SURFACE OF THE CONCRETE TO PRODUCE A NON-SLIP SURFACE.
  7. THE FINISHING OF CONCRETE SURFACE SHALL BE DONE BY EXPERIENCED AND COMPETENT CEMENT CONCRETE FINISHERS.
  8. WHEN COMPLETED, PAD SHALL BE KEPT MOIST AND PROTECTED FROM TRAFFIC AND WEATHER FOR AT LEAST 3 DAYS.
  9. REINFORCEMENT SHALL BE #5 REBAR. REINFORCEMENT SHALL REST ON CONCRETE BLOCKS.

**1 CONCRETE PAD FOR CONDENSER UNIT**  
NOT TO SCALE

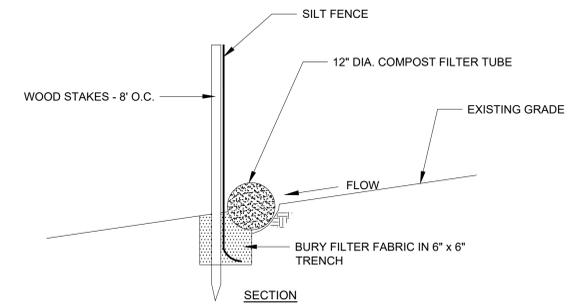


**4 HOT-MIX ASPHALT PAVEMENT**  
NOT TO SCALE

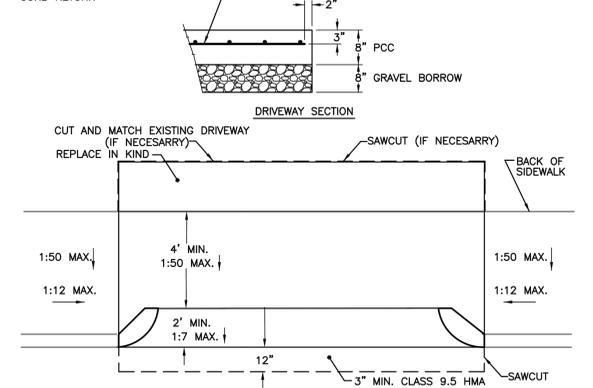
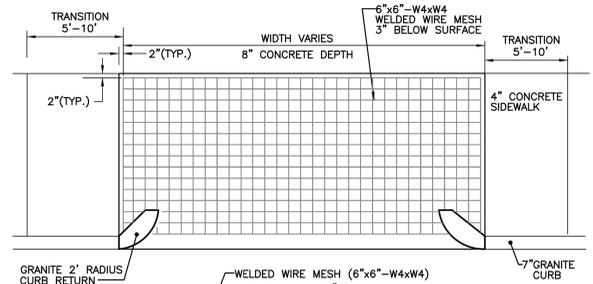


- NOTES**
1. DETECTABLE WARNING PANEL SHALL BE IN ACCORDANCE WITH SECTION 942 OF THE RHODE ISLAND STANDARD SPECIFICATIONS. PANEL TO MATCH RAMP WIDTH.

**6 DETECTABLE WARNING PANEL PLACEMENT**  
NOT TO SCALE

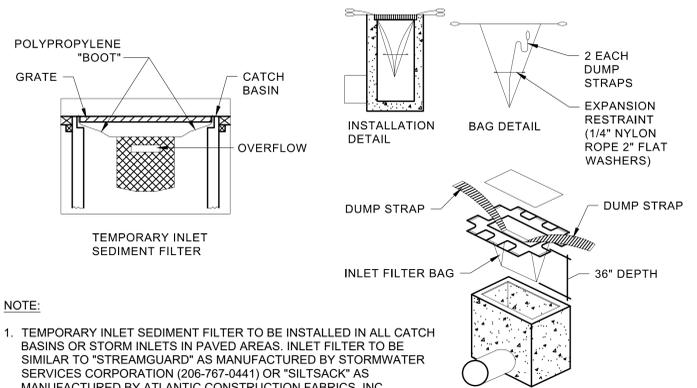


**9 COMPOST FILTER TUBE/SILT FENCE**  
NOT TO SCALE



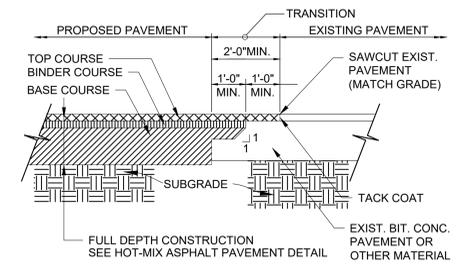
- NOTES**
1. SHALL BE IN ACCORDANCE WITH SECTION 905 OF THE RIDOT STANDARD SPECIFICATIONS.
  2. RUNNING SLOPE OF SIDEWALK/DRIVEWAY SHALL NOT EXCEED 8.3% (1:12)
  3. 4' MINIMUM ACCESSIBLE PATH SHALL BE INSTALLED WITH CROSS SLOPE NOT EXCEEDING 2% (1:50)
  4. RESIDENTIAL CURB CUTS SHALL BE NO WIDER THAN 12' FROM INSIDE OF CURB RETURNS.

**2 CEMENT CONCRETE DRIVEWAYS**  
NOT TO SCALE

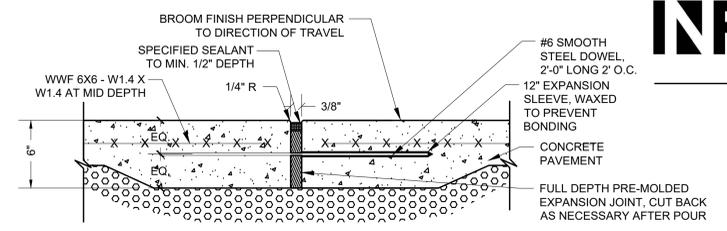


- NOTE:**
1. TEMPORARY INLET SEDIMENT FILTER TO BE INSTALLED IN ALL CATCH BASINS OR STORM INLETS IN PAVED AREAS. INLET FILTER TO BE SIMILAR TO "STREAMGUARD" AS MANUFACTURED BY STORMWATER SERVICES CORPORATION (206-767-0441) OR "SILTSAK" AS MANUFACTURED BY ATLANTIC CONSTRUCTION FABRICS, INC. (800-448-3636). CLEAN FILTER AS RECOMMENDED BY MANUFACTURER.
  2. FILTER SHALL BE MODIFIED TO COVER CURB INLET OPENINGS.

**7 TEMPORARY INLET SEDIMENT FILTER**  
NOT TO SCALE



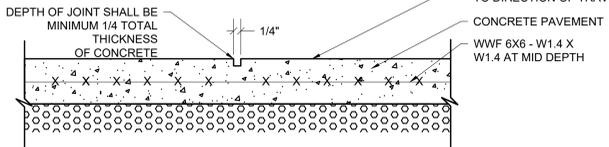
**10 TYPICAL SAWCUT**  
NOT TO SCALE



- EXPANSION JOINT REQUIRED FOR EVERY +/- 225 SF OF PAVING OR EVERY 30 FT ALONG WALKWAYS**

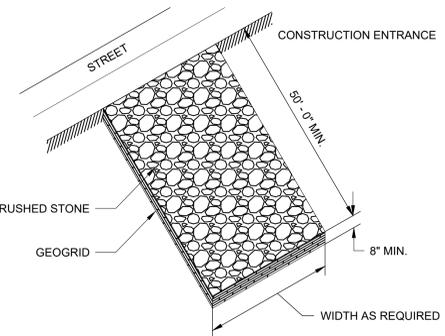
**EXPANSION JOINT NOTES:**

1. DOWEL IS TYPICAL AT ALL EXPANSION JOINTS EXCEPT AGAINST VERTICAL JOINTS WITH WALLS, CURBS OR SITE IMPROVEMENTS.



- SAWCUT CONTROL JOINT REQUIRED FOR EVERY 36 SF OF PAVING.**

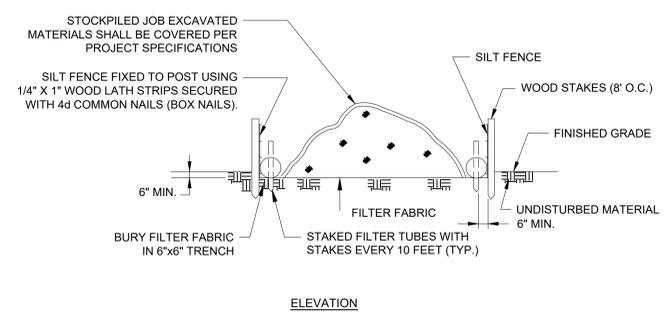
**3 CONCRETE PAVEMENT JOINTS**  
NOT TO SCALE



**5 TEMPORARY CONSTRUCTION ENTRANCE**  
NOT TO SCALE

- NOTES**
1. SHALL BE IN ACCORDANCE WITH SECTION 905 OF THE R.I. STANDARD SPECIFICATIONS.
  2. SEE CURB SETTING DETAIL WHERE APPLICABLE.
  3. RUNNING SLOPE OF SIDEWALK SHALL NOT EXCEED 8.3% (1:12). Typically, running slope shall match road slope.
  4. CROSS SLOPE OF SIDEWALK SHALL NOT EXCEED 2% (1:50).
  5. SIDEWALK MAY BE SUBJECT TO GRASS STRIP INSTALLATION. CONSULT WITH DPW ENGINEERING.
  6. GRAVEL BORROW BASE SHALL COMPACT TO ACHIEVE SOIL DENSITY VALUES OF 95% MODIFIED PROCTOR DENSITY (AASHTO T180)
  7. SIDEWALK REPAIRS TWENTY FEET OR LONGER ARE SUBJECT TO REQUIREMENTS HEREIN.
  8. SIDEWALK REPAIRS SHORTER THAN TWENTY FEET SHALL MAKE EVERY EFFORT TO MEET REQUIRED SLOPES.
  9. CONTROL JOINTS SHALL BE INSTALLED EVERY 5 FEET IN EACH DIRECTION.
  10. EXPANSION JOINTS SHALL BE INSTALLED EVERY 20 FEET IN EACH DIRECTION AT FOUNDATIONS AND WALLS AND IN A SQUARE PATTERN AROUND MANHOLE COVERS, HYDRANTS, SIGN POSTS AND UTILITY POLES. THE EXPANSION JOINT SHALL BE THE FULL DEPTH OF THE SIDEWALK AND FILLED WITH AN APPROVED TYPE OF PREFORMED EXPANSION JOINT FILLER.

**8 CEMENT CONCRETE SIDEWALK**  
NOT TO SCALE

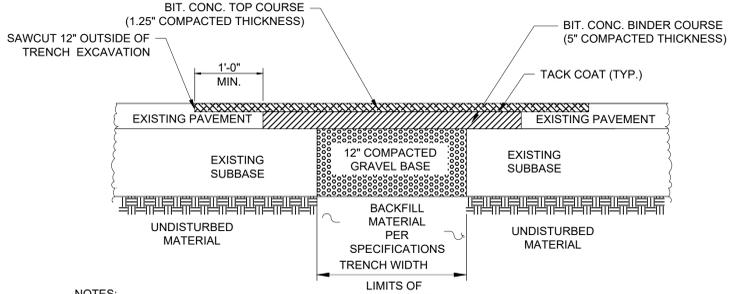


**11 STOCKPILED MATERIAL**  
NOT TO SCALE

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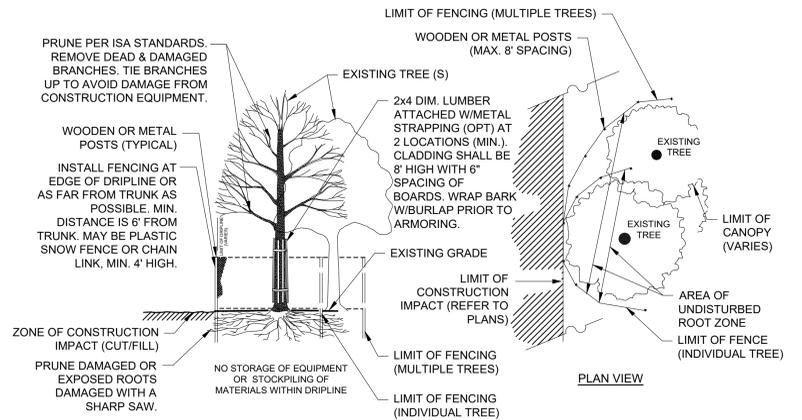
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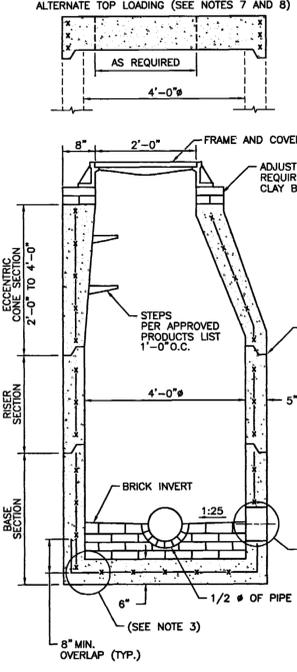
- NOTES:
- NO PERMANENT TRENCH REPAIR SHALL BE PLACED UNTIL PATCHED AREA HAS BEEN A SUBJECT TO TRAFFIC FOR A MINIMUM OF SIXTY (60) DAYS.
  - PERMANENT PAVEMENT SHALL BE PLACED BETWEEN APRIL 15 AND DECEMBER 1 OF EACH CALENDAR YEAR.
  - THE CONTRACTOR SHALL SAWCUT 12-INCHES OUTSIDE OF TRENCH EXCAVATION. TEMPORARY PAVEMENT SHALL BE REMOVED AND DISPOSED OF. THE GRAVEL BASE SHALL BE FINE GRADED, TACK COAT PLACED ON ALL JOINTS, AND PERMANENT PAVEMENT PLACED IN TWO COURSES.
  - CONTRACTOR SHALL MATCH EXISTING ROADWAY GRADES.
  - THE ABOVE DETAIL DOES NOT APPLY FOR AREAS IN MASSDOT RIGHT-OF-WAY. FOR AREAS IN MASSDOT RIGHT-OF-WAY, TRENCH AND TRENCH PAVEMENT SHALL COMPLY WITH MASSDOT REQUIREMENTS.

**1 PERMANENT TRENCH PAVEMENT**  
NOT TO SCALE



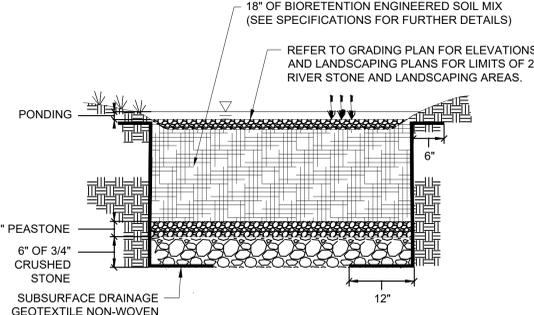
- PRUNE PER ISA STANDARDS. REMOVE DEAD & DAMAGED BRANCHES. THE BRANCHES UP TO AVOID DAMAGE FROM CONSTRUCTION EQUIPMENT.
- INSTALL FENCING AT EDGE OF DRIPLINE OR AS FAR FROM TRUNK AS POSSIBLE. MIN. DISTANCE IS 6' FROM TRUNK. MAY BE PLASTIC SNOW FENCE OR CHAIN LINK. MIN. 4' HIGH.
- NO STORAGE OF EQUIPMENT OR STOCKPILING OF MATERIALS WITHIN DRIPLINE
- PRUNE DAMAGED OR EXPOSED ROOTS DAMAGED WITH A SHARP SAW.

**2 TREE PROTECTION OF EXISTING TREES**  
NOT TO SCALE



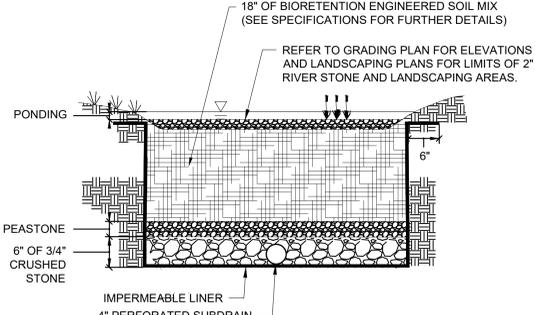
- NOTES:
- SHALL BE IN ACCORDANCE WITH SECTION 702 OF THE R.I. STANDARD SPECIFICATIONS.
  - CIRCUMFERENTIAL STEEL REINFORCEMENT REQUIRED = 0.12 IN./LIN. FT. MINIMUM.
  - STEEL REINFORCEMENT FOR BASE SECTION BOTTOM SHALL BE A MINIMUM OF 0.12 SQ. IN./LIN. FT. (BOTH WAYS).
  - ONE POUR MONOLITHIC BASE SECTION.
  - ANY NECESSARY ADJUSTMENTS DURING CONSTRUCTION WILL BE DONE BY SAW-CUTTING AND/OR CORING ONLY. NO JACKHAMMERS, HAMMERS AND CHISELS OR PNEUMATIC TOOLS WILL BE ALLOWED.
  - STEPS SHALL CONFORM TO STD. 5.3.0 AND SHALL BE INSTALLED AT THE CASTING PLANT.
  - ALTERNATE TOP SLAB IS STEEL REINFORCED TO MEET OR EXCEED H-25 LOADING (SEE STD. 4.7.2).
  - ALTERNATE TOP SLAB IS ONLY FOR USE WHEN REDUCING SECTION DOES NOT FIT BECAUSE OF STRUCTURE DEPTH.
  - REFER TO STD. 5.2.0 FOR MAXIMUM PIPE SIZES.

**3 TYPICAL PRECAST CONCRETE SEWER MANHOLE**  
NOT TO SCALE



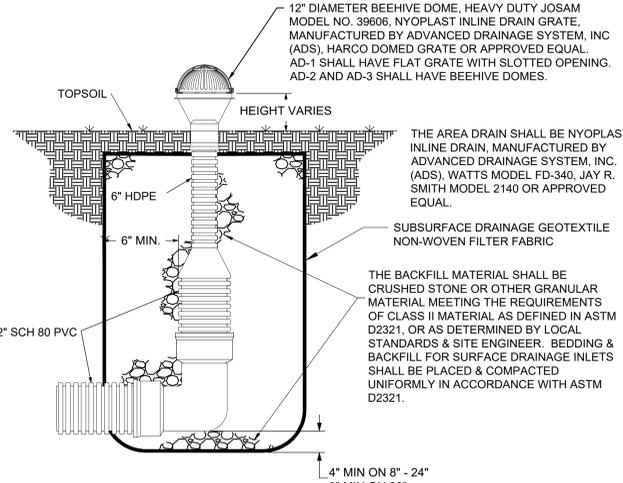
NOTE: SEE DRAINAGE PLAN C-5.00 FOR LIMITS OF FILTERING BASIN WHERE INFILTRATION IS NOT ALLOWED.

**4 INFILTRATING BIORETENTION BASIN SECTION BASINS #2, #3, AND #4**  
NOT TO SCALE

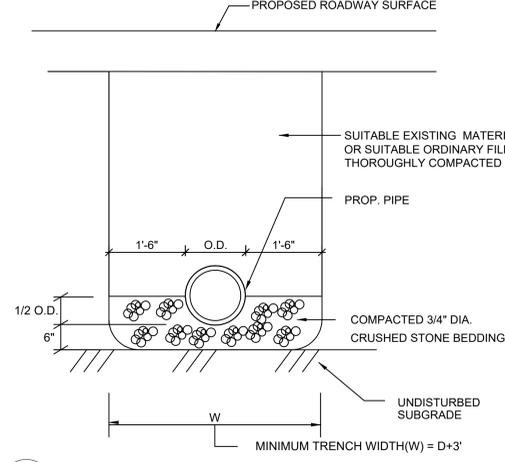


NOTE: SEE DRAINAGE PLAN C-5.00 FOR LIMITS OF FILTERING BASIN WHERE INFILTRATION IS NOT ALLOWED.

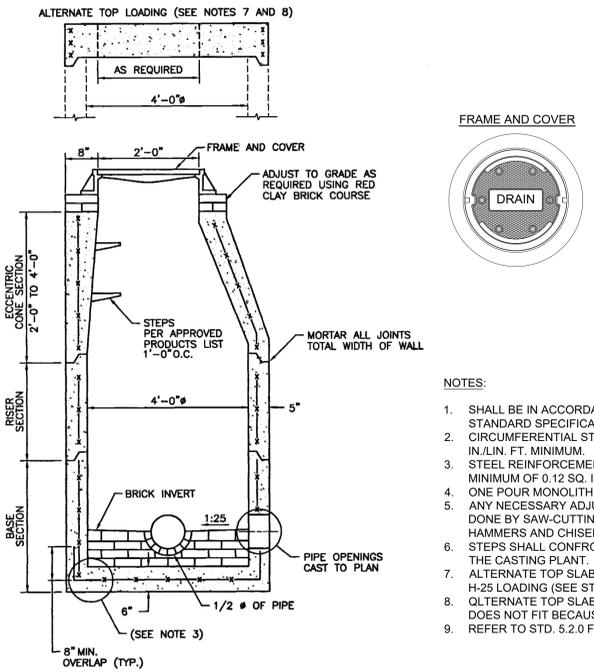
**5 FILTERING BIORETENTION BASIN SECTION BASIN #1**  
NOT TO SCALE



**5 TYPICAL AREA DRAIN**  
NOT TO SCALE

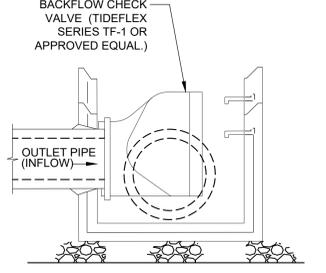


**6 TYPICAL DRAIN TRENCH**  
NOT TO SCALE

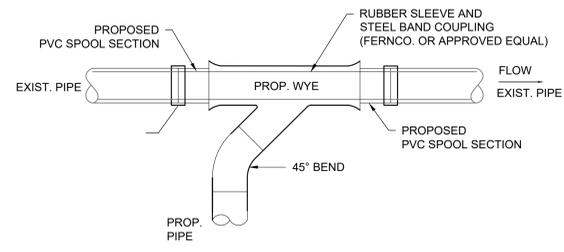


- NOTES:
- SHALL BE IN ACCORDANCE WITH SECTION 702 OF THE R.I. STANDARD SPECIFICATIONS.
  - CIRCUMFERENTIAL STEEL REINFORCEMENT REQUIRED = 0.12 IN./LIN. FT. MINIMUM.
  - STEEL REINFORCEMENT FOR BASE SECTION BOTTOM SHALL BE A MINIMUM OF 0.12 SQ. IN./LIN. FT. (BOTH WAYS).
  - ONE POUR MONOLITHIC BASE SECTION.
  - ANY NECESSARY ADJUSTMENTS DURING CONSTRUCTION WILL BE DONE BY SAW-CUTTING AND/OR CORING ONLY. NO JACKHAMMERS, HAMMERS AND CHISELS OR PNEUMATIC TOOLS WILL BE ALLOWED.
  - STEPS SHALL CONFORM TO STD. 5.3.0 AND SHALL BE INSTALLED AT THE CASTING PLANT.
  - ALTERNATE TOP SLAB IS STEEL REINFORCED TO MEET OR EXCEED H-25 LOADING (SEE STD. 4.7.2).
  - ALTERNATE TOP SLAB IS ONLY FOR USE WHEN REDUCING SECTION DOES NOT FIT BECAUSE OF STRUCTURE DEPTH.
  - REFER TO STD. 5.2.0 FOR MAXIMUM PIPE SIZES.

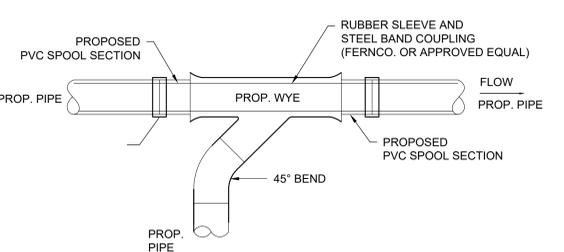
**7 TYPICAL PRECAST CONCRETE DRAIN MANHOLE**  
NOT TO SCALE



**8 BACKFLOW CHECK VALVE**  
NOT TO SCALE



**9 TYPICAL CUT-IN WYE CONNECTION TO EXISTING PIPE**  
NOT TO SCALE



**10 TYPICAL WYE CONNECTION**  
NOT TO SCALE

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9/20/2018 4:59 AM

F:\Projects\2018\02\08\DWG\C-6.00-00-DETAILS.dwg

CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
444 WESTMINSTER ST., SUITE 3A  
PROVIDENCE, RI 02903-3215

RWP GATEWAY & VISITOR CENTER  
1197 BROAD ST.  
PROVIDENCE, RI 02905

DETAILS SHEET 2

NOT FOR CONSTRUCTION



### DEMOLITION LEGEND

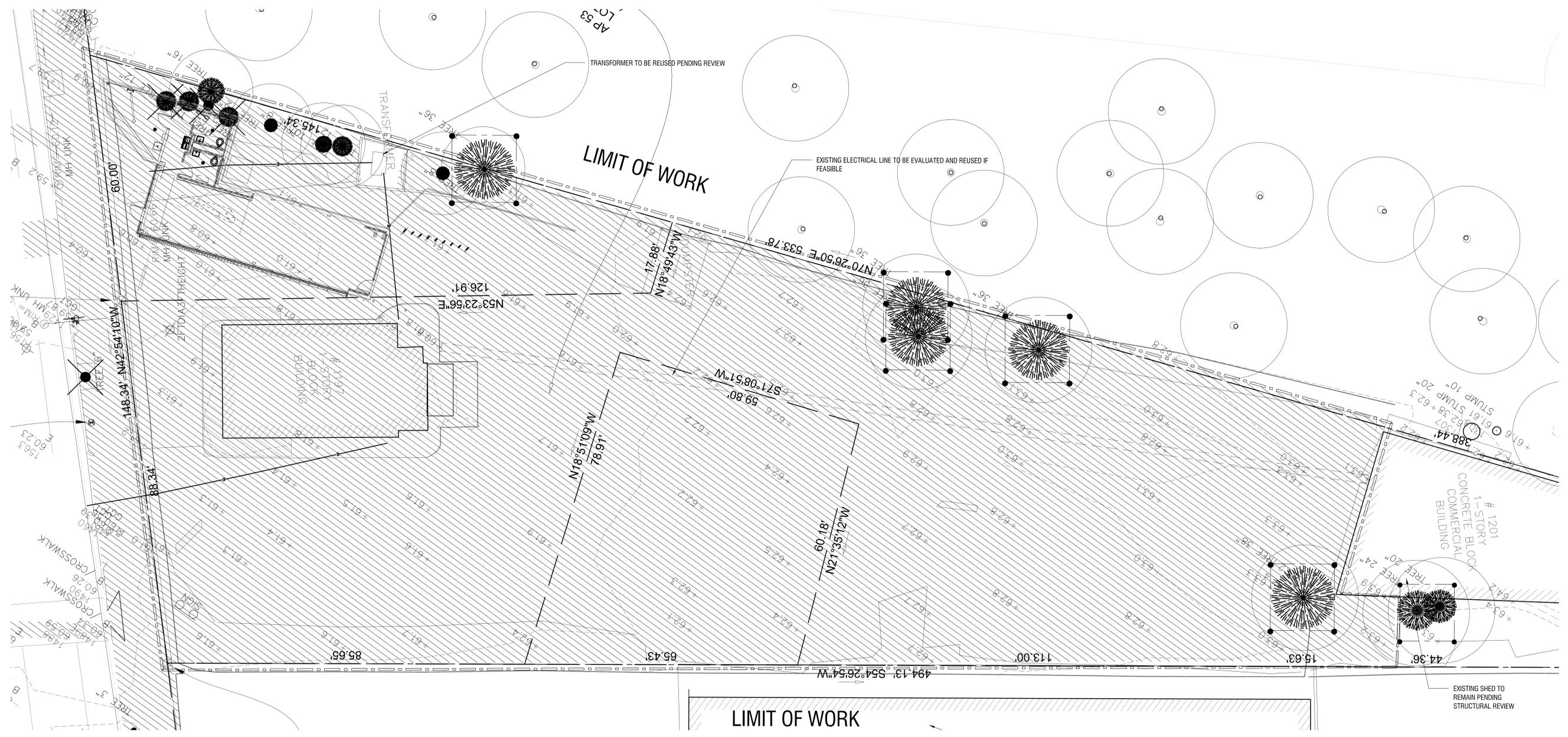
-  PAVING AND HARDSCAPE TO REMOVE
-  REMOVE (CLEAR & GRUB) PLANTINGS
-  TREE AND STUMP TO REMOVE AND DISPOSE
-  TREE PROTECTION FENCING

NOTES:

1. DISPOSAL OF MATERIALS OFF SITE SHALL BE DONE IN A LEGAL MANNER.
2. ALL SALVAGED MATERIALS SHALL BE KEPT IN A SECURE LOCATION ON THE COLLEGE'S PREMISES. ALL MATERIALS REMAIN THE PROPERTY OF THE OWNER UNLESS SPECIFICALLY RELEASED TO THE CONTRACTOR IN WRITING.
3. CONFIRM LOCATION OF UTILITIES AND SUBSURFACE MATERIALS.
4. REFER TO CM DRAWING FOR STAGING AND LOGISTICS.

DATE	REVISION	DESCRIPTION
07-29-2023	01	ISSUE FOR PERMITS
08-28-2023	02	ISSUE FOR PERMITS
09-18-2023	03	ISSUE FOR PERMITS
10-18-2023	04	ISSUE FOR PERMITS

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1 DEMOLITION PLAN  
 SCALE: 1"=10'

OWNER  
 CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-3215

PROJECT  
 RWP GATEWAY & VISITOR CENTER  
 1401 BROAD ST.  
 PROVIDENCE, RI 02905

DATE FILED  
**SITE DEMOLITION PLAN**

-  LINEAR IN-GROUND LED PAVER LIGHT
-  POLE LIGHT LIGHT
-  TREE UP LIGHT
-  FIXED BOLLARD
-  REMOVABLE BOLLARD
-  MOVEABLE TABLE AND CHAIR
-  ROUND METAL CORRUGATED PLANTER
-  INSECT HOTEL
-  METAL EDGING
-  FENCE
-  BOULDER
-  RIVER GRAVEL

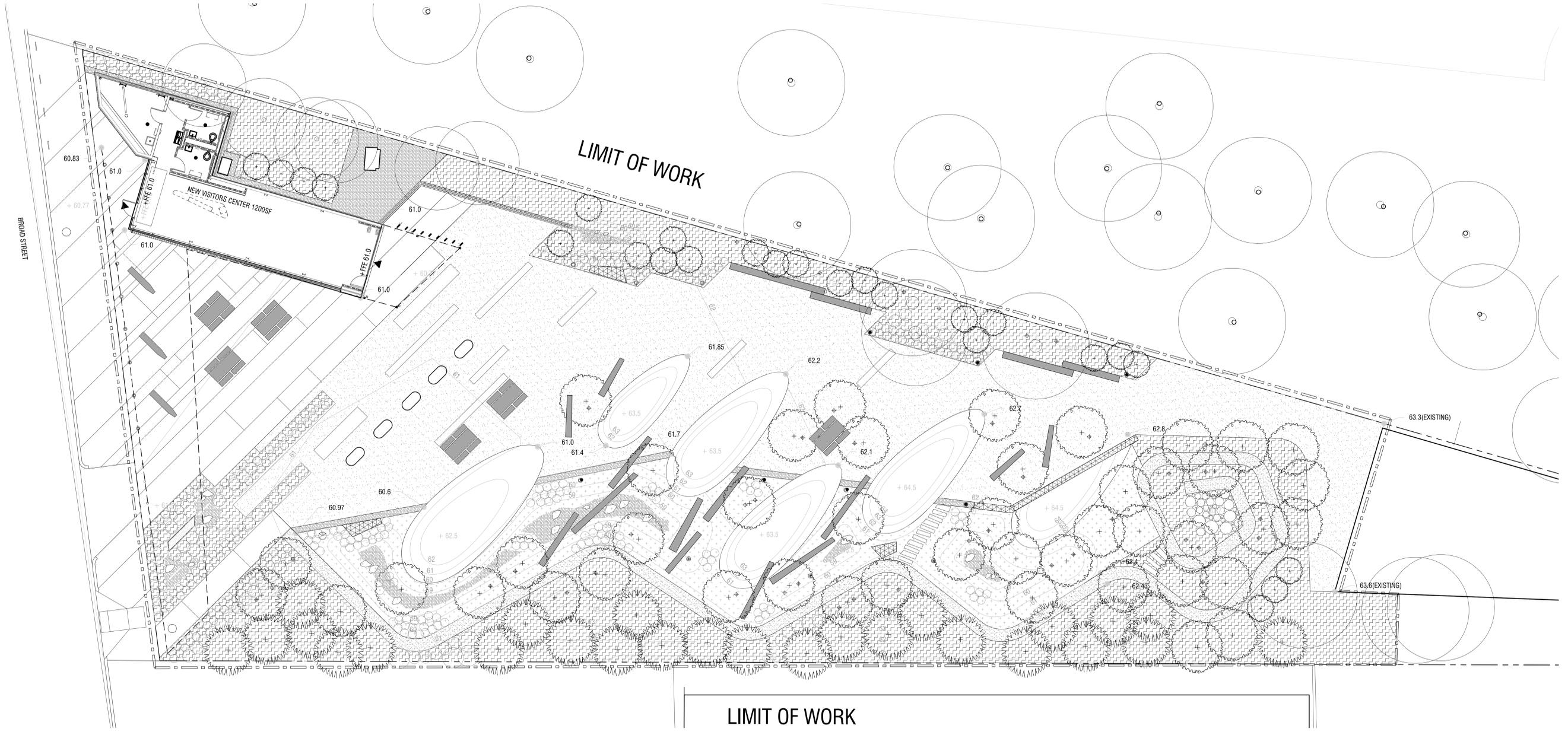
DATE	DESCRIPTION
07-29-2023	AVA
08-29-2023	AVA
09-19-2023	AVA
10-19-2023	AVA
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10-19-2030	AVA
11-19-2030	AVA
12-19-2030	AVA

OWNER  
 CITY OF PROVIDENCE REDEVELOPMENT  
 AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-3215

PROJECT  
 RWP GATEWAY & VISITOR  
 CENTER  
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 PROVIDENCE, RI 02905

DATE PLOTTED  
**LANDSCAPE PLAN**

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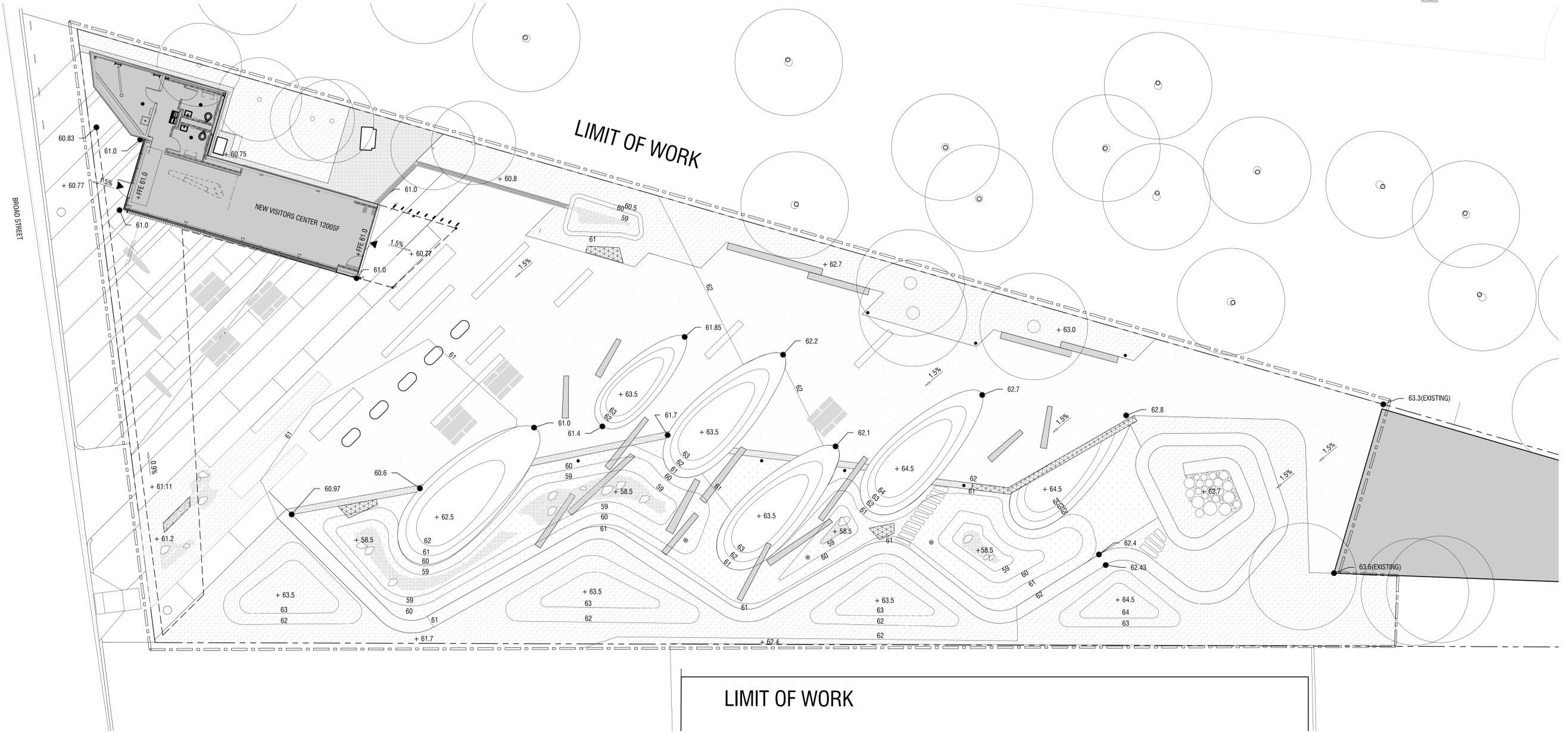


SITE LIGHTING AND FURNISHING LEGEND:

-  LINEAR IN-GROUND LED PAVER LIGHT
-  POLE LIGHT LIGHT
-  TREE UP LIGHT
-  FIXED BOLLARD
-  REMOVABLE BOLLARD
-  MOVEABLE TABLE AND CHAIR
-  ROUND METAL CORRUGATED PLANTER
-  INSECT HOTEL
-  METAL EDGING
-  FENCE
-  BOULDER
-  RIVER GRAVEL

DATE	DESCRIPTION	BY	CHECKED
07-29-2020	AVA		
08-25-2020	AVA		
09-18-2020	AVA		
10-19-2020	AVA		
10-19-2021	AVA		

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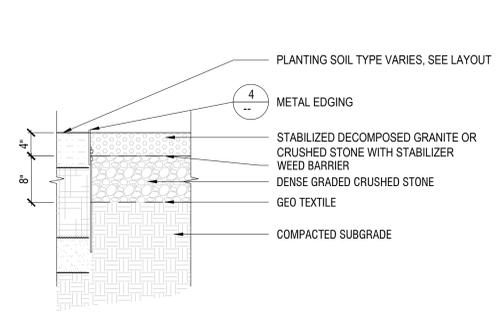
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 DATE: [ ] DESCRIPTION: [ ] BY: [ ] CHECKED: [ ]  
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 08-25-2020 AVA [ ] [ ]  
 09-18-2020 AVA [ ] [ ]  
 10-19-2020 AVA [ ] [ ]  
 10-19-2021 AVA [ ] [ ]  
 PROJECT: RWP GATEWAY & VISITOR CENTER  
 CLIENT: CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-3215  
 1437 BROAD ST.  
 PROVIDENCE, RI 02905  
 SHEET TITLE: GRADING PLAN  
 SHEET NO: L-4.00

1 GRADING PLAN  
 SCALE: 1"=10'

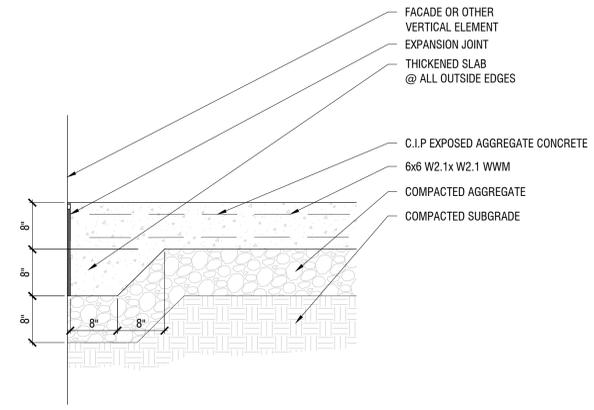




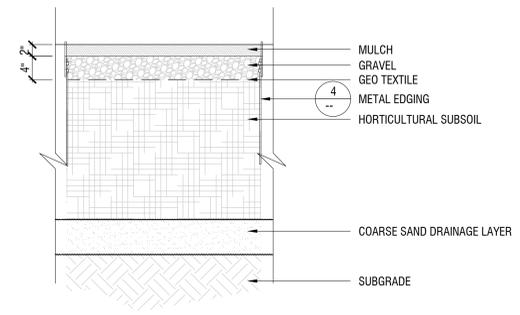
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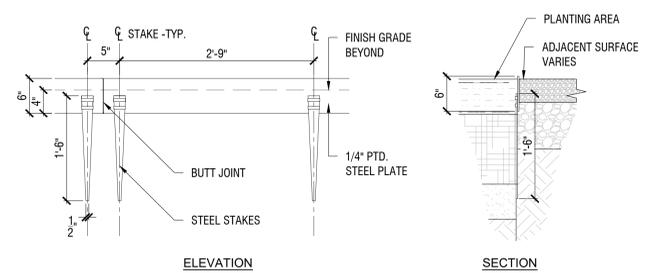
**1** STABILIZED STONE DUST  
 SCALE: 1"=1'-0"



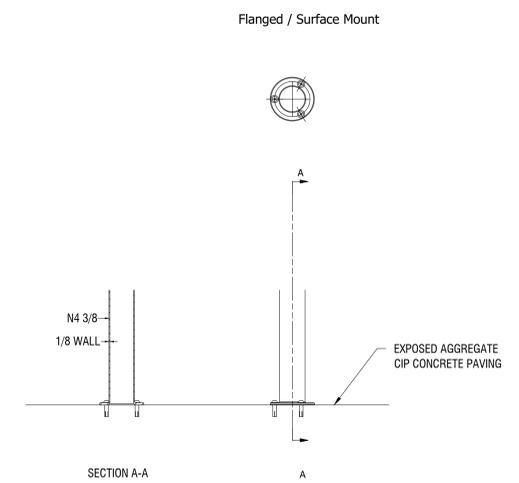
**2** C.I.P. VEHICULAR CONCRETE PAVING  
 SCALE: 1/4"=1'



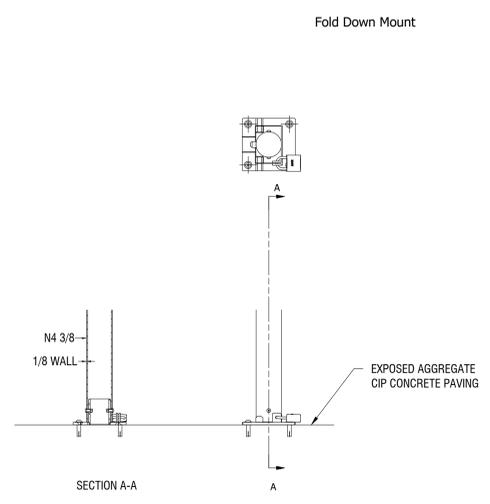
**3** STABILIZED WOOD MULCH PATH WITH METAL EDGING  
 SCALE: 1"=1'-0"



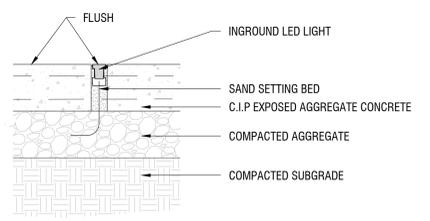
**4** METAL EDGING  
 SCALE: 1"=1'-0"



**6** BOLLARD MOUNTING DETAIL  
 SCALE: 1"=1'-0"



**7** REMOVABLE BOLLARDS MOUNTING DETAIL  
 SCALE: 1"=1'-0"



**8** INGROUND LED LIGHTING @ CIP CONCRETE PAVING  
 SCALE: 1"=1'-0"

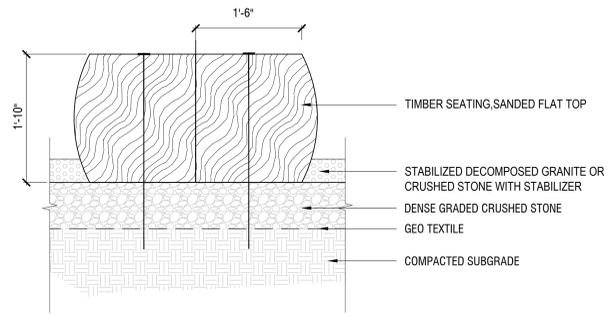
NO.	DATE	DESCRIPTION
1	07-29-2020	AVA
2	08-25-2020	AVA
3	09-08-2020	AVA
4	09-18-2020	AVA
5	09-28-2021	AVA

OWNER  
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 PROVIDENCE, RI 02903-3215

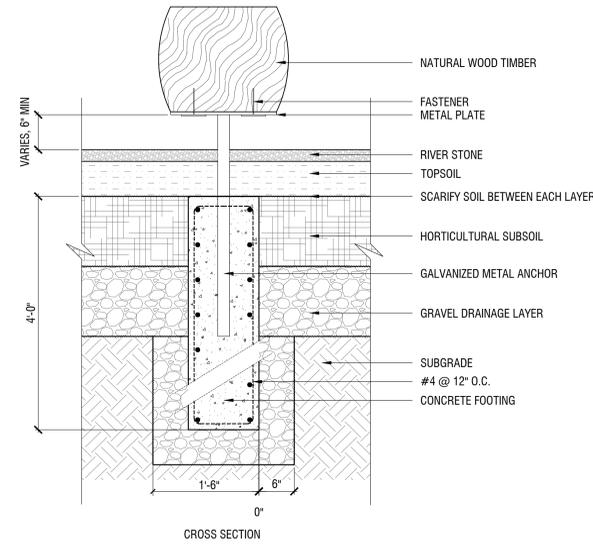
PROJECT  
 RWP GATEWAY & VISITOR CENTER  
 1107 BROAD ST.  
 PROVIDENCE, RI 02905

PHASE TITLE  
**SITE DETAILS**

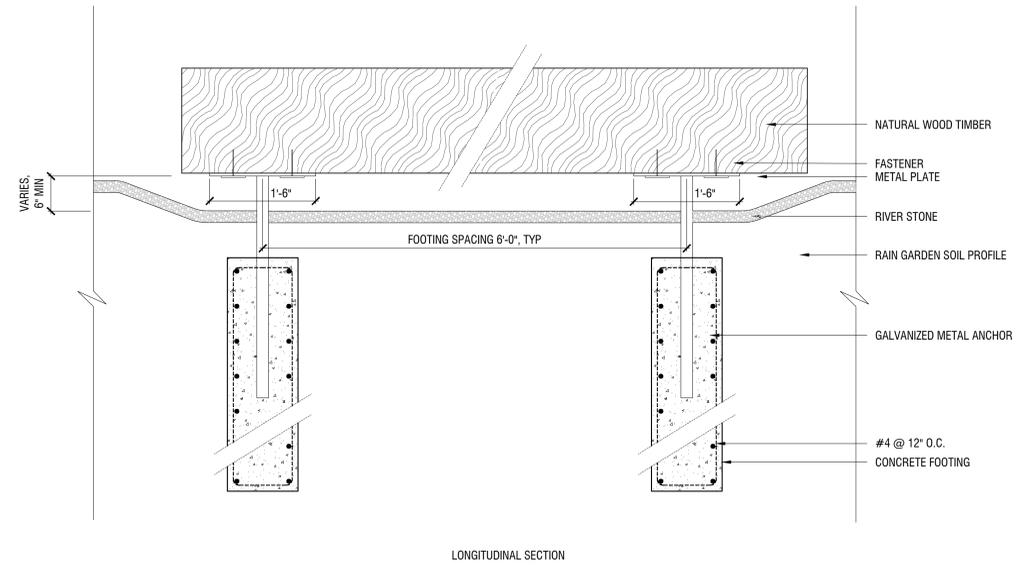
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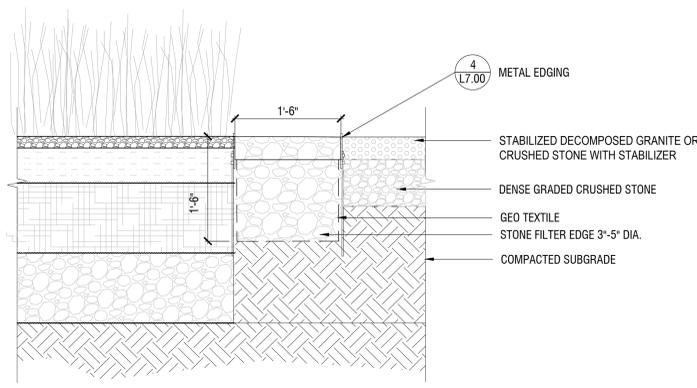
1 CLEAR CEDAR LARGE TIMBER SEATING  
 SCALE: 1"=1'-0"



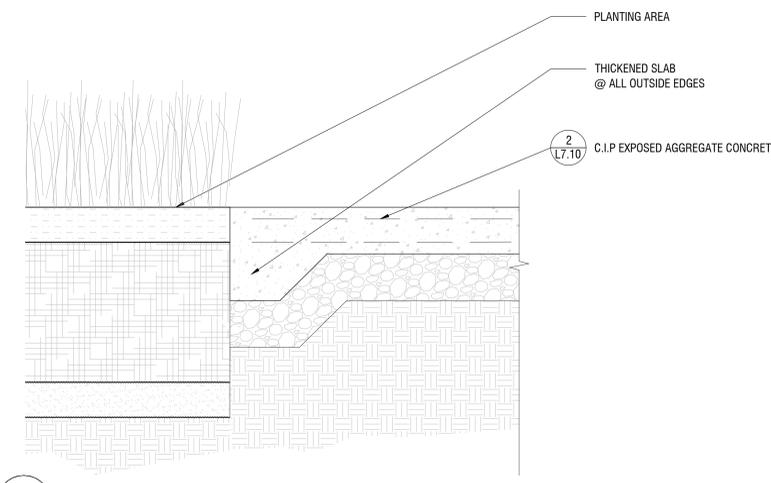
2 NATURAL WOOD FOOTING @ RAIN GARDEN  
 SCALE: 1"=1'-0"



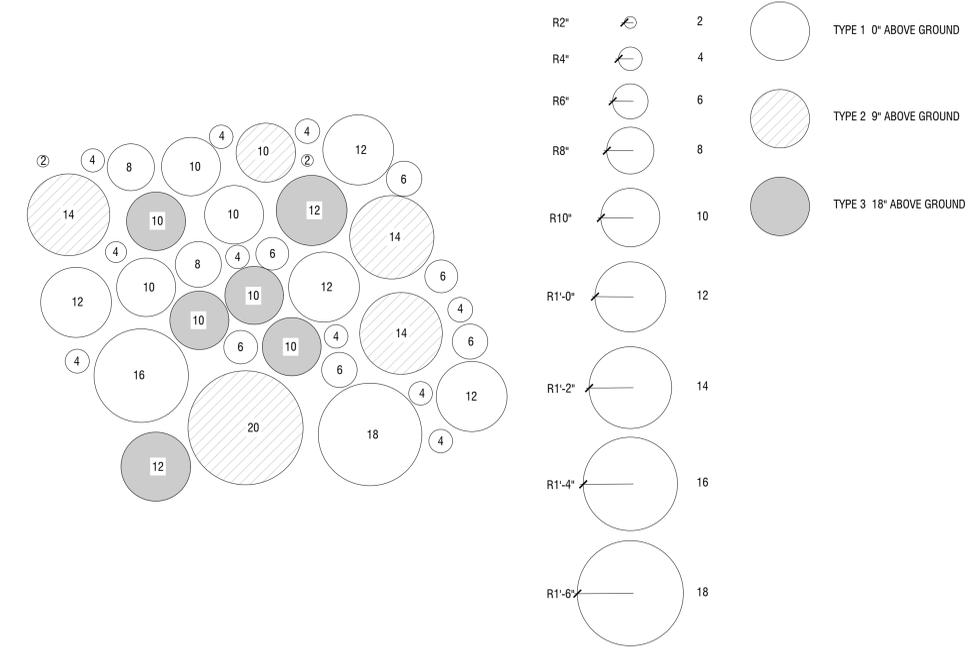
LONGITUDINAL SECTION



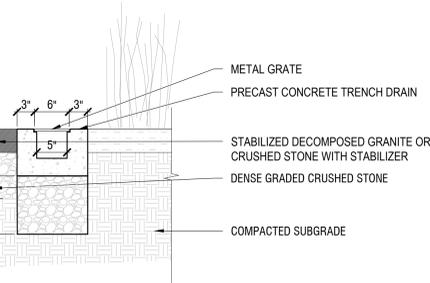
3 STONE FILTER @ RAIN GARDEN  
 SCALE: 1"=1'-0"



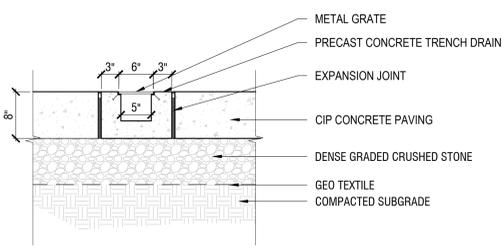
4 PLANTING AREA @ CIP AGGREGATE CONCRETE PAVING  
 SCALE: 1"=1'-0"



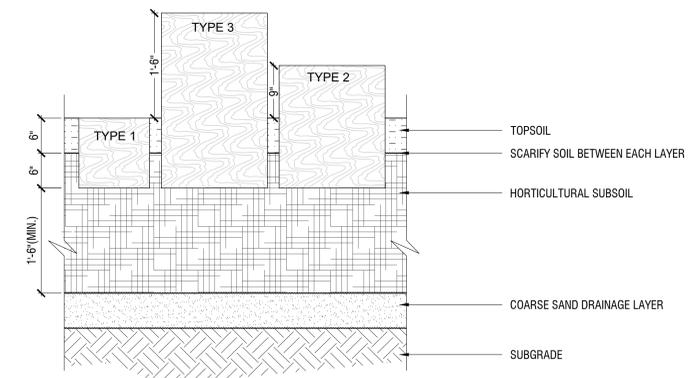
7 NATURAL PLAY GROUND SLABS AND TRUNKS  
 SCALE: 1/2"=1'-0"



5 PRECAST CONCRETE TRENCH DRAIN @ STONE DUST PAVING  
 SCALE: 1"=1'-0"



6 PRECAST CONCRETE TRENCH DRAIN @ CIP CONCRETE PAVING  
 SCALE: 1"=1'-0"



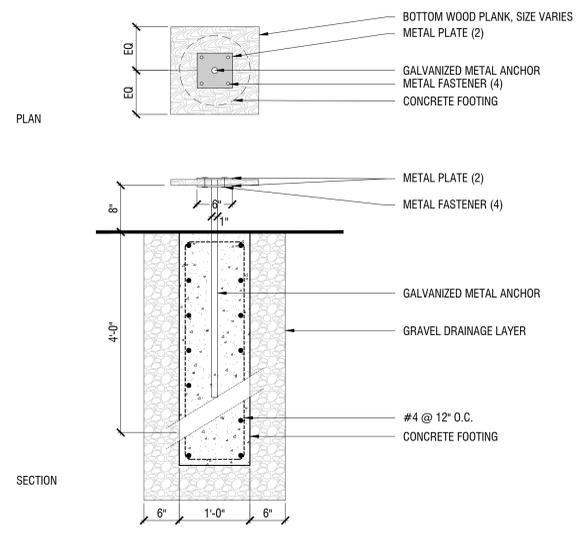
NO.	DATE	DESCRIPTION
1	07-29-2020	PLAN
2	08-25-2020	PLAN
3	09-16-2020	PLAN
4	10-19-2020	PLAN
5	10-19-2021	PLAN

OWNER  
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 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-3215

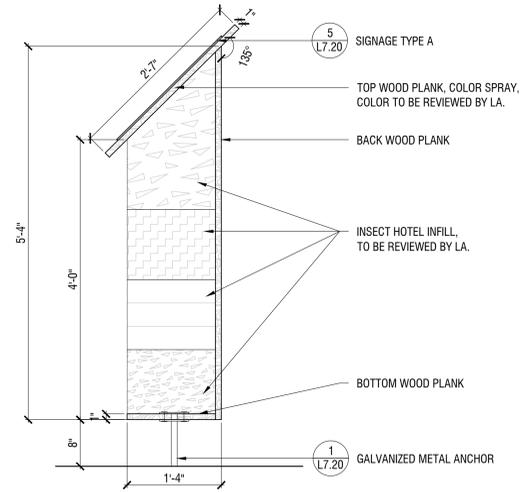
PROJECT  
 RWP GATEWAY & VISITOR CENTER  
 1407 BROAD ST.  
 PROVIDENCE, RI 02905

DATE PLOTTED  
**SITE DETAILS**

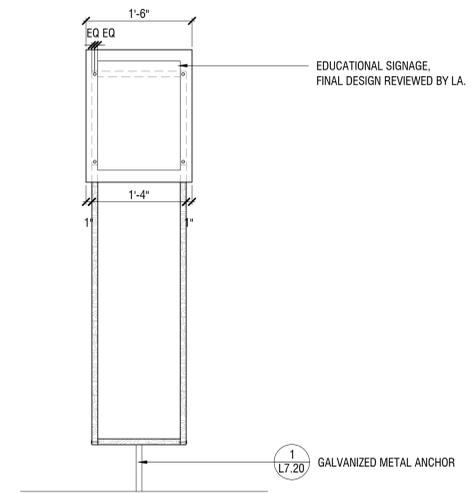
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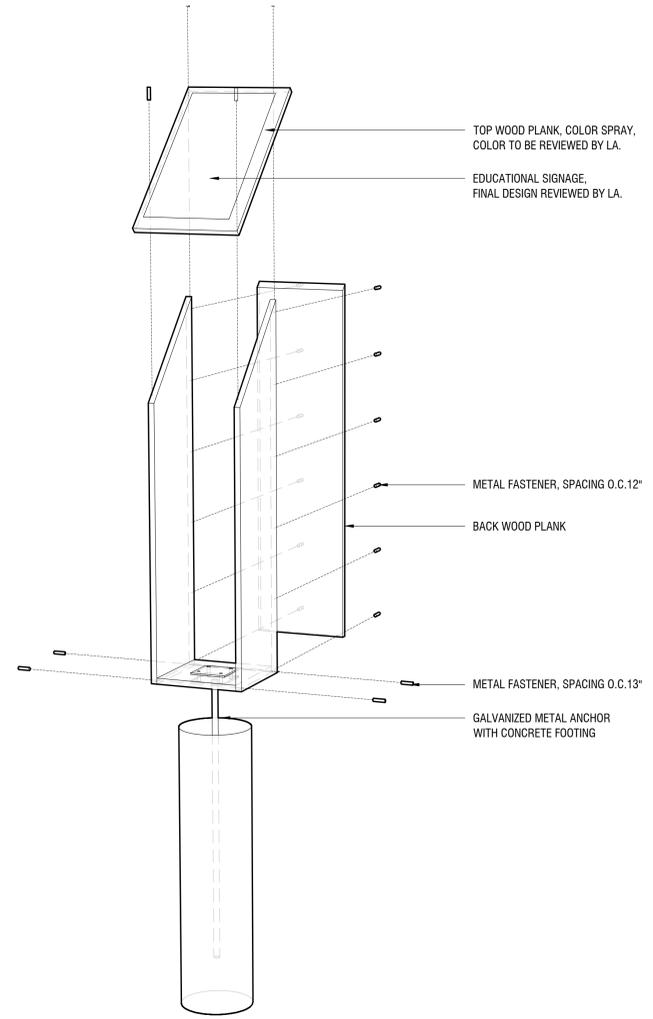
1 INSECT HOTEL - METAL ANCHOR WITH CONC FOOTING  
 SCALE: 1"=1'-0"



2 INSECT HOTEL TYPE A - SIGNAGE DETAIL  
 SCALE: 1"=1'-0"



3 INSECT HOTEL TYPE A - SECTION DETAIL  
 SCALE: 1"=1'-0"



4 INSECT HOTEL TYPE A AXON  
 SCALE: N.T.S.

REVISIONS

NO.	DATE	DESCRIPTION
1	07-29-2020	ISSUE FOR PERMITS
2	08-25-2020	ISSUE FOR PERMITS
3	09-18-2020	ISSUE FOR PERMITS
4	10-15-2021	ISSUE FOR PERMITS
5	11-18-2021	ISSUE FOR PERMITS

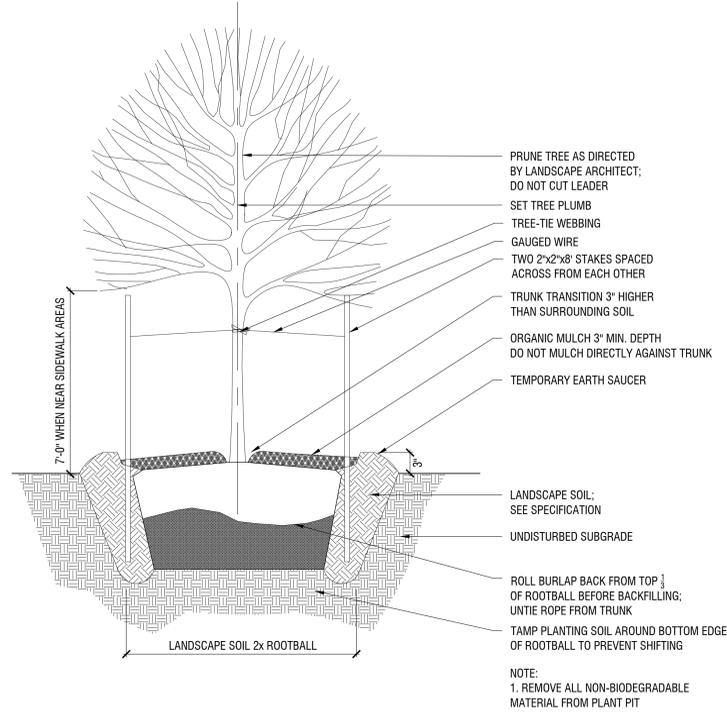
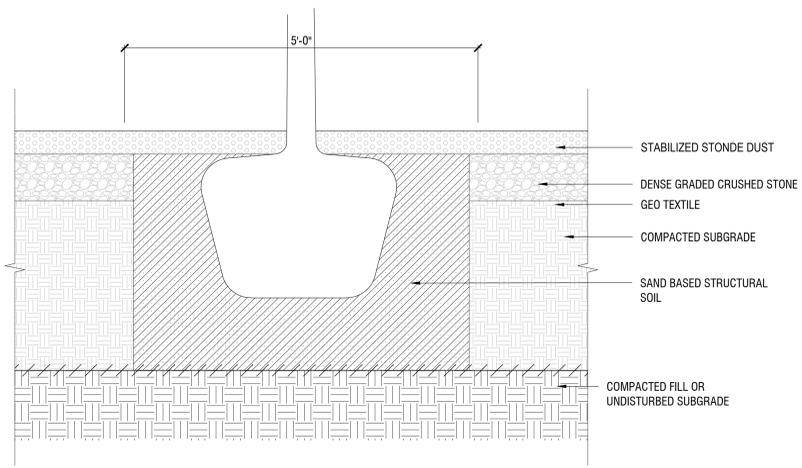
OWNER  
**CITY OF PROVIDENCE REDEVELOPMENT AGENCY**  
 444 WESTMINSTER ST. SUITE 3A  
 PROVIDENCE, RI 02903-3215

PROJECT  
**RWP GATEWAY & VISITOR CENTER**  
 1107 BROAD ST.  
 PROVIDENCE, RI 02905

DATE PLOTTED  
**SITE DETAILS**



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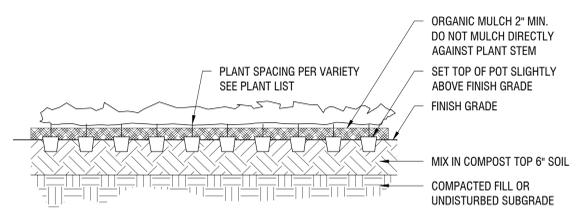
1 TREE @ STONE DUST PLAZA  
 SCALE: 1"=1'-0"

2 TREE IN PLANTING BED  
 SCALE: 1/2"=1'-0"

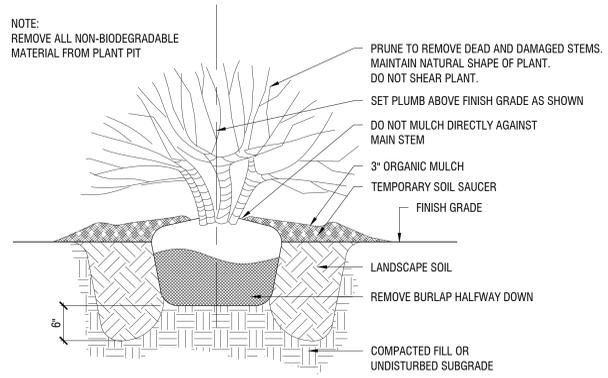
PLANT LOCATION

SPACING "D"	ROW "A"	# PLANTS	AREA UNIT
6" O.C.	5.2"	4.61	
10" O.C.	8.66"	1.66	1 SQ. FT.
12" O.C.	10.40"	1.15	
18" O.C.	15.60"	5.12	10 SQ. FT.
24" O.C.	20.80"	2.91	

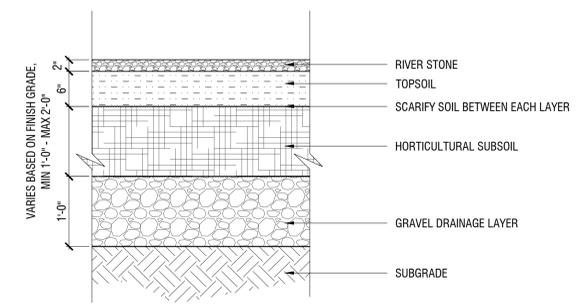
NOTE:  
 FOR USE ONLY WHEN PLANTS ARE SPACED  
 EQUIDISTANT FROM EACH OTHER AS SHOWN.



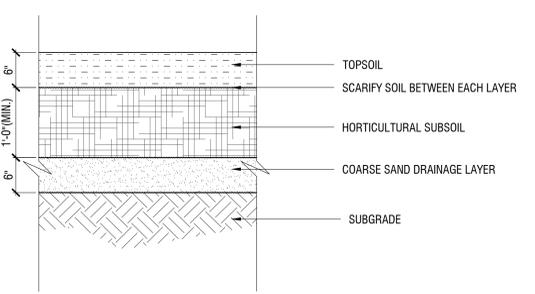
3 GROUNDCOVER PLANTING  
 SCALE: 1"=1'-0"



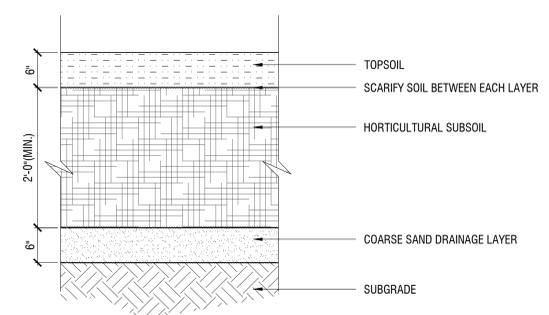
4 SHRUB PLANTING  
 SCALE: 1"=1'-0"



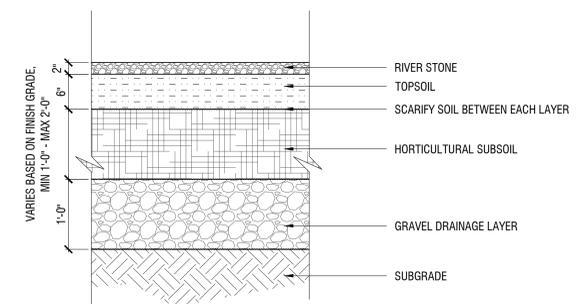
5 SOIL PROFILE - RAIN GARDEN SOIL  
 SCALE: 1"=1'-0"



6 SOIL PROFILE - FESCUE LANDSCAPE SOIL  
 SCALE: 1/4"=1'



7 SOIL PROFILE - TREE/SHRUB SOIL  
 SCALE: 1"=1'-0"



8 RIVER STONE  
 SCALE: 1"=1'-0"

CONTRACT

DATE	ISSUE	DESCRIPTION
07-29-2023	01	ISSUE FOR PERMITS
08-28-2023	02	ISSUE FOR PERMITS
09-18-2023	03	ISSUE FOR PERMITS
10-18-2023	04	ISSUE FOR PERMITS

CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-3215

RWP GATEWAY & VISITOR CENTER  
 1481 BROAD ST.  
 PROVIDENCE, RI 02905

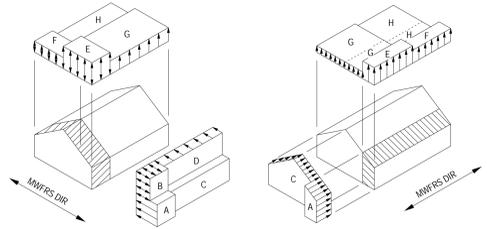
SITE DETAILS

## DESIGN LOADS

1. GENERAL	
A. OCCUPANCY CATEGORY	II
B. STEEL DESIGN	LRFD
1. DEAD LOADS - SUPERIMPOSED	
A. ROOF	25 PSF
1. LIVE LOADS	
A. ROOF	30 PSF
1. SNOW LOAD	
A. GROUND SNOW LOAD	30 PSF
B. LOAD FACTORS:	
a. EXPOSURE	1.0
b. IMPORTANCE	1.0
c. THERMAL	1.0
A. FLAT ROOF SNOW LOAD	30 PSF
1. WIND LOAD	
A. BASIC WIND SPEED	133 MPH
B. EXPOSURE CATEGORY	B
C. IMPORTANCE FACTOR	1.0
2. SEISMIC LOAD	
A. IMPORTANCE FACTOR	1.0
B. RISK CATEGORY	II
C. SITE CLASS	D
D. MCEr GROUND MOTION (0.25) - Ss	0.176
E. MCEr GROUND MOTION (1.0S) - S1	0.062
F. SEISMIC DESIGN CATEGORY	B
G. SITE AMPLIFICATION FACTOR (0.25) - (Fa)	1.6
H. SITE AMPLIFICATION FACTOR (1.0S) - (Fv)	2.4
I. RESPONSE MODIFICATION COEFFICIENT	
a. STEEL ORDINARY CONCENTRICALLY BRACED FRAMES	3.25

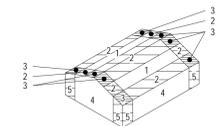
## MAIN WINDFORCE RESISTING SYSTEM

HORIZONTAL PRESSURES				VERTICAL PRESSURES				OVERHANG PRESSURES	
A	B	C	D	E	F	G	H	E <sub>wh</sub>	G <sub>wh</sub>
± 26.9	NA	± 17.7	NA	± 22.9	± 9.0	± 13.1	± 4.9	NA	NA



## COMPONENTS AND CLADDING (130)

ZONE	LOAD (psf)							
	10 SF		20 SF		50 SF		100 SF	
1	12.4	-30.4	11.6	-29.6	10.8	-28.6	9.8	-27.8
2	12.4	-51.0	11.6	-45.6	10.6	-38.4	9.8	-33.0
3	12.4	-76.8	11.6	-63.6	10.6	-46.2	9.8	-33.0
4	30.4	-33.0	29.0	-31.6	27.2	-29.8	25.9	-28.4
5	30.4	-40.7	29.0	-38.0	27.2	-34.3	25.9	-31.6
2 ROH	-	-43.8	-	-43.0	-	-42.0	-	-41.2
3 ROH	-	-72.1	-	-56.6	-	-36.1	-	-20.6



## STRUCTURAL NOTES

- GENERAL**
- The design of the structure is in accordance with the Rhode Island Building Code, which incorporates the 2015 International Building Code, including the latest edition of the referenced standards given in the Code.
  - Construction shall be in accordance with the soil report by Paul B. Aldinger & Associates, Inc., 860A Wileman Avenue, Suite 9, East Providence, Rhode Island 02914 (PBA No. 20204). The Contractors shall obtain a copy of the soil report and become familiar with the requirements and recommendations therein.
  - The wind pressure in terms of pounds per square foot to be used for the design of exterior components and cladding materials shall be indicated on the shop drawings submitted by the supplier and certified by a registered engineer in the state of the project.
  - The Construction Documents include the written specifications, these notes and the drawings. In the event of conflict between the information on the Construction Documents, the contractor shall contact the structural engineer for clarification and follow the more stringent requirements until clarification is received.
  - A Testing and Inspection Agency is required to complete tests and inspections as part of the Work. The Contractor shall coordinate the responsibility of, and requirements for testing and inspection, including special inspections, required in the Construction Documents with the Owner and Architect.
  - The Contractors are responsible for coordinating the work shown in the Construction Documents with the other design professionals and contractors work, including but not limited to Architectural, Civil, Mechanical, Plumbing and Electrical professions.
  - The Contractors are to provide a coordinated drawing showing all sleeves, conduits, boxes, duct openings, and similar items which could impact the structure for the Structural Engineer's approval. This shall be done a minimum of two weeks prior to constructing affected slabs, beams, walls, columns or footings.
  - Contractors shall take field measurements, verify all dimensions and existing conditions before beginning work. Discrepancies shall be reported to the architect immediately.
  - It is the contractor's responsibility to provide adequate shoring and bracing during construction to account for all forces, including but not limited to gravity, earth, wind, and unbalanced forces due to construction sequence.
  - The structural integrity of the building shown on these plans is dependent upon completion according to the Construction Documents. Structural members are not self-erecting and shall be shored and/or braced by the contractor as necessary until stabilized by a series of completed conditions.
  - No openings shall be made in any structural member unless specifically shown on the structural drawings, or approved in writing by the Structural Engineer.
  - For conditions not expressly shown use details shown for similar conditions.
  - Support details for Architectural, Mechanical, Electrical, and Plumbing equipment is based upon available information of manufacturer. Contractors shall coordinate requirements of actual equipment supplied with details and shall provide any additional framing required.
  - Saw cutting of new openings in existing concrete and/or masonry walls shall be done without extending beyond the boundaries of the intended opening. Any structural member shall be shored and/or braced by the contractor as necessary until stabilized by a series of completed conditions. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  - Contractors shall allow ten (10) working days, not including weekends or holidays, for each submittal and resubmittal review. Time for review shall commence upon the Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

- FIELD DRILLED FASTENERS**
- Only one diameter bolt shall be present on the job site for a given bolt type, unless otherwise specified on the drawings.
  - The contractor shall create a template at each bolt connection location prior to drilling holes in a structural member. Templates shall be made by first locating existing reinforcing steel with a pachometer and then drilling bolt holes such that no conflict exists with the existing reinforcing. Bolt locations in the field may be indicated a maximum of 1/2" from the dimensions shown on the drawings to avoid conflicts with the existing reinforcing steel. However, do not exceed minimum or maximum bolt spacings or edge distances required by manufacturer to achieve full anchor capacity.
  - Clean existing surface to solid structural material. Grind smooth for full steel contact and to prevent gaps between steel and concrete. Alternatively, provide non-shrink grout in all voids between steel and base material.
  - Use only code-approved anchors with valid ICC-ESR evaluation report for use in the base material shown on the Construction Documents. Submit ICC-ESR evaluation report to Structural Engineer and Special Inspection Agency for approval. Do not install anchors until submittal is returned "approved".
  - Anchor of the diameter and embedment shown on the drawings shall be installed in strict accordance with manufacturer's recommendations under the continuous supervision of an independent testing agency. Where the provisions of the above referenced documents are in conflict, the most restrictive requirement shall govern. Minimum 3/4" diameter adhesive anchors, or 1/2" diameter expansion anchors, with standard embedment at locations not indicated.
  - All abandoned holes drilled in concrete or masonry shall be completely filled with structural grade epoxy.
  - Holes drilled in the concrete or masonry shall be the diameter as recommended by the manufacturer. The hole diameter shall not exceed the maximum diameter at any location along the length of the bolt.
  - Holes in connection plates shall be no more than 1/16" larger than the bolt diameter. If larger diameter holes are used for erection purposes the contractor must provide plate washers. Plate washers must be welded to the connection plate to transfer the load. Welding must take place after holes are drilled, but prior to adhesive installation to avoid burning the adhesive.
  - Field drilled bolts shall be installed perpendicular to the face of the material being drilled. The maximum tolerance for deviation from perpendicular shall be 10 degrees. All bolts installed outside of the specified tolerance shall be considered unacceptable.
  - Foreign material shall not be placed in the holes that receive bolts.
  - Follow manufacturer's requirements for minimum edge distance and spacing to obtain full anchor capacity.
  - Installation of field drilled bolts shall be monitored by the Testing and Inspection Agency to ensure bolts are installed correctly and that manufacturer's required installation torques are obtained.
  - Basis of design for field drilled adhesive anchors is Hilti HIT-HY200 (HIT-HY270 in Masonry) Adhesive Anchors as manufactured by Hilti, or equivalent product by ITW Rammed/Robcast, Powers Fasteners, or Simpson Strong-Tie Anchor Systems. For substitution purposes, signed and sealed calculations shall be provided, indicating the substituted anchor meets the capacity requirements of the detailed anchor.
  - All post-installed adhesive anchors shall conform to AC-308. Installer of post-installed adhesive anchors shall be trained by anchor manufacturer.
  - Basis of design for field drilled expansion bolts is Hilti HIT KWIK Bolt 3 anchor bolts as manufactured by the Hilti Corp., or ITW Powers Fasteners, Simpson Tie Anchor Systems equivalents. Submit I.C.C. ES report or similar data for each type of anchor proposed for use. Do not install anchors until submittal is returned "approved".

- STOREFRONT AND CURTAIN WALL**
- The manufacturer shall design the storefront or curtain wall system for the appropriate wind loads as specified in the applicable Building Code. The manufacturer shall also supply non-conducting isolation barriers at any connection between all aluminum or non-ferrous members and steel elements to prevent galvanic corrosion. This insulation material shall also be submitted to the Architect for approval. Curtain wall supplier to coordinate the anchorage devices required with the location of all structural steel.

- CONCRETE**
- All concrete work shall conform to the requirements of the American Concrete Institute ACI 301, 318, and SP-66 (315 included as a chapter), latest editions. Provide accessories and bar supports in accordance with "ACI Detailing Manual -2004" ACI SP-66, latest edition.
  - All concrete shall be normal weight concrete having a minimum compressive strength at 28 days as follows:
 

A. Foundations & Underpinning	4,500 psi
B. Cuts	4,500 psi
C. Interior Slab on Grade	4,000 psi
D. Exterior Slab on Grade	4,500 psi
  - No concrete shall be placed until concrete design mixes and previous tests have been submitted for each class of concrete noted above and have been approved by the engineer. Concrete proportions shall be based upon field experience and/or trial batches per ACI 301 and ACI 318. The concrete to be used shall conform to the approved design mix. The use of any additives not indicated in the design mix is prohibited.
  - Representative test cylinders will be taken from the concrete placed each day in accordance with concrete specifications.
  - Reinforcing steel shall be deformed bars of intermediate grade new billet steel conforming to current requirements of ASTM A 615 Grade 60 or ASTM A 706, Grade 60. All hooks shall be standard hooks, unless otherwise noted. All laps shall be class 9 laps except the minimum lap length shall be 24" unless noted otherwise.
  - Welded wire reinforcement (WWR) shall conform to ASTM A 1064.
  - All reinforcement shall be securely fixed in place prior to concrete placement. Tie wire, metal or plastic fixtures, or concrete obsoles which prevent movement of the reinforcement are acceptable. Wet setting of reinforcement or embedded items is not acceptable unless specifically authorized in writing by the structural engineer.
  - Minimum concrete cover over reinforcing, unless otherwise shown, shall be 1" for interior face of walls, 2" for exterior face of walls, 3" for footings and other structural concrete deposited against ground, 2" for concrete permanently exposed to earth or weather, 1 1/2" for pier ties and beam slimpes.
  - All concrete structural members shall be placed for their full depths in one operation. Construction joints, such as days end placement joints, shall be located in the middle third of the span, reinforcing to be through the joint, bulkhead, key and roughen joints. Remove lumps prior to next pour.
  - Concrete shall not be placed until preparations have been approved by the Testing and Inspection Agency, including formwork, reinforcement, embedments, and accessories.
  - The Contractor is responsible for providing drawings for review of all joints in the concrete work, including construction, expansion, contraction and movement joints. Drawings shall be submitted at least two weeks prior to expected start of work. Joint locations shall comply with recommendations and requirements described in ACI 224, latest edition.
  - The Contractor shall safeguard and protect all excavations, and adjacent structures, pavements, and utilities. All excavations shall be kept free of water. The Contractor is responsible for the design, installation, maintenance, and removal of all shoring, bracing, and dewatering required to properly construct the foundations and to protect adjacent structures, pavements and utilities. Do not remove shoring such as sheet piling if it will cause settlement or damage to existing or new structures, pavement, and/or utilities.
  - All concrete walls with brick veneer provide continuous vertical dovetail slots anchors at 24" on center horizontal spacing with triangular wire ties into the veneer at 16" on center vertical spacing.
  - For additional concrete work not shown on structural drawings, see Architectural, Mechanical and Electrical drawings.

- Foundations**
- All foundations shall bear on undisturbed soil, with a minimum safe bearing capacity of 2,000 psf. The Testing and Inspection Agency shall verify soil bearing capacity at each footing prior to placement of concrete. Notify structural engineer of any variation from the anticipated bearing capacity for appropriate redesign or lowering of footing.
  - Isolated foundations shall be lowered, and piles shall be added or increased in height as approved by the architect, where soil of the specified bearing capacity is found at a higher or higher elevation than shown on drawings. Contact the Structural Engineer for additional requirements.
  - The bottom of all exterior foundations shall be a minimum of 3'-6" below finished grade. If the building is under construction during freezing weather, all interior foundations shall be lowered 3'-6" below construction grade for frost protection. If such additional foundation depth will cause undermining of adjacent existing foundations or structures, provide shoring, bracing or underpinning as required or leave foundation elevation as designed and provide continued protection and heat to prevent formation of frost below foundation and adjacent to foundation.
  - Edges of foundations shall not be placed at a greater than 1 vertical to 2 horizontal slope with respect to any adjacent foundation or excavation, unless underpinning or shoring and bracing of existing foundation or excavation is provided. Underpinning shall be done so as not to cause settlements of existing structure and shall be such that complete contact is achieved between new underpinning and existing concrete.
  - Backfilling against basement walls shall not be done until the floor slabs at top and bottom of walls have been placed and cured, or walls are properly shored and braced.
  - Backfilling against foundation walls shall not be done until concrete has been cured to attain sufficient strength. 7 days minimum, and walls are properly shored and braced. Backfill foundation walls with earth on both sides of the wall by alternately placing backfill on each side so that height of backfill does not differ by more than 1'-0" from other side.
  - All backfill within building lines shall be engineered granular fill placed under the full time supervision of the Testing and Inspection Agency and shall be compacted to achieve 95% Modified Proctor Density. Fill shall be placed in 9" maximum lifts.
  - The maximum length of foundation walls placed in one operation shall not exceed 60 feet. Contractor shall coordinate the location of construction joints with the structural engineer prior to placing concrete.
- Slab on Grade**
- The slab on grade shall rest on a minimum of twelve (12) inches granular fill, compacted to at least 95% of the maximum density (as defined by the ASTM D 1557 Modified Proctor Test). Use R1 DOT Filter Stone per Column V, Table as recommended by RIDEM Approval Letter and Work Plan.
    - M.O.I.07 FILTER STONE. Filler stone for underdrains shall conform to the gradation requirements of Column V, Table 1, Subsection M.O.I.11.
  - All WWR shall be spliced so that the overlap of the outermost cross wires of each adjoining sheet is not less than the spacing of the cross wires plus two inches, unless noted otherwise.
  - For all slabs on grade where not otherwise specified, use 6 x 6 - W2.9 x W2.9 WWR.

- METALS**
- No penetrations are permitted through members unless indicated on structural drawings or approved by Engineer.
  - The use of a cutting torch in the field is not allowed unless approved by the structural engineer.
  - For miscellaneous steel and metal construction not shown on structural drawings, see Architectural, Mechanical and Electrical drawings.
  - The contractor may substitute heavier sections in place of the sections shown on the drawings to achieve economy of repetition, for availability or to take advantage of production schedules so long as the changes are made known to the architect and engineer and are acceptable to both.
- Structural Steel**
- All structural steel work shall conform to the AISC "Steel Construction Manual" 13th edition which includes the AISC 333 "Code of Standard Practice for Steel Buildings and Bridges"; the "Specification for Structural Steel Buildings"; and the "RCS: Specification for Structural Joints Using ASTM A 325 or A 490 bolts".
  - Structural steel shall conform to the latest edition of the following ASTM designations:
    - Structural steel shapes, except channels, bars, angles, and plates: A992 Grade 50 having a minimum yield strength of 50 ksi or A572, Grade 50 having a minimum yield strength of 50 ksi unless noted otherwise in the plans.
    - Steel channels, bars, angles, and plates: A36 having a minimum yield strength of 36 ksi unless noted 50 ksi on the drawings in which case they shall be ASTM A572 Grade 50.
    - Steel Pipe: A501 having a minimum yield strength of 36 ksi or A53 Grade B, type E or S having a minimum yield strength of 35 ksi.
    - Square, round, and rectangular tubing: A500, Grade B, having a minimum yield strength of 46 ksi.
  - Bolts shall conform to the following ASTM designation, latest edition: High strength bolts - A 325- anchor rods - F 1554, Grade 36 unless noted otherwise on the drawings. All bolts shall be snug tight unless noted slip critical or S. C. on plans unless otherwise noted. All bolts that carry loads in tension shall be fully pretensioned.
  - All bolts shall be 3/4" diameter, open holes 13/16" diameter, unless otherwise shown or noted. Use high strength bolts for steel framing connections.
  - All welding electrodes shall conform to the E 70 series of the specification for mild steel arc welding electrodes, including ASTM A 233.
  - All welding shall be done by certified, licensed welders and shall be in conformance with the structural welding code of the American Welding Society AWS/A5.1 D 1, latest edition.
  - Mild or butt-welded stiffeners shall be provided on girders supporting a column and over all columns.
  - All girders under steel plates shall be non-shrink "pro-mix" type and shall have a minimum compressive strength of 5,000 psi, tested in accordance with concrete specifications. Use non-staining grout at exposed locations.
  - All structural steel shall be painted with one shop-applied coat of rust inhibiting primer after surface preparation by the Society for Protective Coatings (SSPC) SP3 "power tool cleaning", unless noted otherwise. Do not paint portions of steel members that are to receive spray-on fireproofing, nor surfaces to receive welded shear studs. Steel structure that is permanently exposed on the exterior shall be hot dip galvanized according to ASTM A 123.
  - All structural steel exposed to view in the finished work including beams, columns, girts, trusses, bridging, bracing, and connections shall be classified as "Architecturally Exposed Structural Steel" (AESS) and shall meet the additional requirement given in AISC "Steel Construction Manual" 13th edition - Section 10.10 the "Code of Standard Practice for Steel Buildings and Bridges" AISC 303. See Architectural drawings and specs for locations and finish requirements of AESS.
- Metal Decking**
- Composite floor decking shall have a protective zinc coating conforming to ASTM A 653, Grade 60. Corrugated metal roof deck shall have a protective zinc coating conforming to ASTM A 653, Grade 90. Gauge and depth of decking is indicated on the framing plans.
  - Unless otherwise noted, all metal deck has been designed to be continuous over 3 spans minimum, and shall bear on at least 2" of steel supports and 4" on other supports. For one or two span conditions, the contractor shall provide shoring as required, or furnish higher gage deck as required to support the applicable loads. Contractor shall submit alternate for approval.
  - Deck shall be welded to supporting steel at ends of units and at all intermediate supports in accordance with "Factory Mutual" requirements and the manufacturer's recommendations.
  - Roof deck side lips shall be screwed at 24" o.c. maximum with #10 self-drilling, self-tapping screws.
  - Typically roof deck shall be attached to support steel with 3/4-inch diameter paddle welds at 12" o.c. spacing along all supports except 6-inch o.c. spacing must be used at perimeter including perimeter of roof openings, ridges, valleys, and etc.
  - Floor deck side lips shall be screwed at 24" o.c. with #10 self-drilling screws.
  - Floor deck shall be welded to all supports at 12" o.c. with 5/8" diameter paddle welds.
  - Isolated unframed openings shall be suitably reinforced with structural contractor. Follow recommendations given in "Deck Damage and Penetrations" by Richard B. Hoeger, published by the Steel Deck Institute.
  - Provide reinforcing channels, standard closures, cant strips, sump pans, finish strips, pour stops and other accessories as required for a properly finished job, even though not specifically shown on the drawings.
  - Unless otherwise indicated, all conduits and/or piping shall be hung from the steel beams and joists on conduit supports and trapezes. Do not locate horizontal runs of conduit and/or piping within slabs on metal deck.
  - Shop drawings shall indicate all information necessary for the complete fabrication and erection of metal deck.
- Design-Build Cold Formed Metal Framing by Others**
- Fabrication and assembly of Cold Formed Metal Framing (CFMF) shall be in accordance with AISI Standards, 2012 editions and the 2015 International Building Code.
    - M.O.I.07 FILTER STONE. Filler stone for underdrains shall conform to the gradation requirements of Column V, Table 1, Subsection M.O.I.11.
  - All WWR shall be spliced so that the overlap of the outermost cross wires of each adjoining sheet is not less than the spacing of the cross wires plus two inches, unless noted otherwise.
  - Material for metal studs shall be cold-formed sheet steel conforming to ASTM 1003. The yield strength Fy shall be as follows: 18 - 20 gage - 33 ksi and 12 - 16 gage - 50 ksi
  - Screw fasteners for steel connections shall be in compliance with ASTM C 1513 or approved alternative. Use of screw size larger than specified is permitted as long as spacing and edge distance requirements are met. The following are approved fasteners:
    - Hilti Kwik-Pro Screws
    - Simpson Self-Drilling X-Screw
    - Eco Drill-Fix
  - Framing clips, ties, deflection tracks, and miscellaneous accessories shall be per the following approved suppliers or approved equal:
    - The Steel Network
    - Simpson Strong-Tie
    - Clark-Dietrich
  - All studs shall engage track flanges and be provided with a minimum #10 screw through each flange.
  - Wall studs must have square cut ends and must sit tight against the track with a maximum gap tolerance of 1/8" between the end of the stud and the web of the track.
  - The cold formed metal framing contractor shall submit calculations and shop drawings for all exterior metal stud work including walls, fascias and soffits. The calculations and drawings shall be prepared under the direct supervision of a P.E. registered in the State of Rhode Island, and shall be sealed. The calculations shall take into account the effects of openings and shall show required reinforcement at joints, heads, and sills. Fasteners for metal studs shall be calculated and detailed on the shop drawings. Fabricators shall not proceed until Architect-approved shop drawings have been received by the steel stud contractor.
  - All metal studs in exterior walls fascias and soffits shall be 18 gage minimum galvanized studs, except where noted on the plans. The steel stud contractor shall design all steel studs for the appropriate loads as specified in the Michigan Building Code and for a maximum deflection due to lateral loads of 1/600 span at walls with brick veneer or girted, and 1/500 span for walls with metal skin.

## SHEET NUMBERING

S1-101

INDICATES DIVISION		INDICATES SHEET TYPE	
1 - COMPREHENSIVE	0 - GENERAL	1 - GENERAL	1 - PLANS
2 - DEMOLITION	1 - PLANS	2 - ENLARGED PLANS	3 - FRAMING ELEVATIONS
3 - CONCRETE	2 - ENLARGED PLANS	4 - MASSCONRY	5 - STEEL
4 - MASSCONRY	3 - FRAMING ELEVATIONS	6 - DETAILS	7 - SPECIAL ASSEMBLIES
5 - STEEL	4 - MASSCONRY	7 - SCHEDULES	
6 - WOOD	5 - STEEL		
	6 - WOOD		

## ABBREVIATIONS

ADDITIONAL AGGREGATE	ADD	LADDER	LAD
ALTERNATE	AGG	LIVE LOAD	LL
ALUMINUM ANCHOR BOLT	ALT	LONG LEG HORIZONTAL	LLH
	AL	LONG LEG VERTICAL	LLV
	AB		
APPROXIMATE ARCHITECTURAL AVERAGE	APP	LONG SLOTTED HOLE	LSH
	ARCH		
	AVG		
BACK TO BACK BASE PLATE BEAM	BTB	MAINTENANCE MANUFACTURER MASONRY OPENING	MAINT
BETWEEN BLOCKING	BP	MATERIAL MAXIMUM	MFR
	BTWN		MO
BOARD	BLKG	MECHANICAL METAL	MATL
BOTTOM	BD	MINIMUM MISCELLANEOUS	MAX
BOTTOM OF CONCRETE	BOT		MECH
	BC	NEAR SIDE	MTL
CEILING	BS	NEGATIVE	MIN
CENTER CENTERLINE	BLDG	NON-COMPOSITE FLOOR DECK	MISC
CHANNEL CHORD	CLG	NORTH	NEG
	CTR	NOT TO SCALE	NCFD
	CHN		NTS
	CHD	ON CENTER	OC
CLEAR	CLR	OPENING	OPEN
COLUMN	COL	OPPOSITE	OPP
COMPOSITE FLOOR DECK	CFD	OUTSIDE DIAMETER	OD
CONCRETE CONNECTION	CONC	OVER	OA
	CONN		OVERALL
CONSTRUCTION CONSTRUCTION JOINT	CONST	PAINTED	PTD
CONTINUOUS	CJ	PARALLEL	PAR
CONTRACTOR COORDINATE	CONT	PENE TRATION	PER
	COORD	PERPENDICULAR	PERP
COUNTERSINK OVER	CSK	PLATE	PLT
	CVR	POINT	PT
		POUNDS PER SQUARE INCH	PSI
DEAD LOAD DECK	DL	PREFABRICATED	PREFAB
DEPT	DK	PRESSURE PRESERVATIVE TREATED	PPT
DETAIL	DET		
DIAGONAL	DIAG	RADIUS	R
		REFERENCE	REF
		REINFORCE	REINF
		REQUIRED	REQ
		RIGHT HAND	RHD
DIAMETER DIMENSION	DR DIA		
DIRECTION	DIR		
DISTANCE	DIST	ROOF	RF
DOWEL	DWL	ROOF DECK	RFD
DOWN	DN	ROOF DRAIN	RDR
DRAIN DRAWING	DRW	ROUGH OPENING	RO
		SCHEDULE	SCHED
		SCREW	SCR
		SEPARATE	SEP
EACH	EA	SHEDDING	SHT
EACH FACE	EF	SHORT SLOTTED HOLE	SSH
EACH WAY EAST	EW		
ELECTRICAL	ELEC	SIMILAR	SIM
		SLOPE	S
ELEVATION	EL	SOUTH	SO
ELEVATOR ENGINEER	ELEV	SPECIFICATION	SPEC
EQUAL	EQ	SQUARE FEET	SQ FT
EXISTING	EX	SQUARE INCH	SQ IN
EXPANSION JOINT	EXP	STAINLESS STEEL	SS
EXTERIOR	EXT	STANDARD	STD
		STEEL	STL
FARSIDE	FS	STIFFENER	STIF
FEET	FT	STONE	STN
FINISH	FIN	STRUCTURAL	STR
FLANGE	FLG	SYMETRICAL	SYM
FLOOR	FLR		
FLOOR DRAIN	FD	THICK	THK
FLUSH	FL	THREAD	THD
FOOT	FT	TONGUE AND GROOVE	T&G
FOUNDATION	FDN	TOP AND BOTTOM	T&B
FRAME	FR		
		TOP OF CONCRETE	TC
		MASONRY	TM
		STEEL	TS
		GRADE	TW
		TYPICAL	TYP
		UNLESS OTHERWISE NOTED	UN
HORIZONTAL	HORIZ		
		VARIABLES	VAR
		VERTICAL	VERT
INCH	IN		
INFORMATION	INFO		
INSIDE FACE	IF		
INSULATION	INS	WATERPROOF	WP
INTERIOR	INT	WEST	W
		WITH	W
		WITHOUT	W/O
		WOOD	WD
		WORK POINT	WP
KIP (1,000 LB)	K		
KIPS PER SQUARE FOOT	KSF		
KIPS PER SQUARE INCH	KSI	YARD	YD

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AISC 340 MINIMUM REQUIREMENTS REQUIRED VERIFICATION AND INSPECTION OF STRUCTURAL STEEL - SPECIAL INSPECTION FOR SEISMIC RESISTANCE - STRUCTURAL STEEL			
QUALITY CONTROL INSPECTIONS BY THE FABRICATOR'S OR ERECTOR'S QUALITY CONTROL INSPECTOR (QC) AND QUALITY ASSURANCE INSPECTIONS OF FABRICATED ITEMS AND THE ERECTED STEEL SYSTEM BY THE SPECIAL INSPECTOR (SI), SHALL CONFORM TO AISC-341, AND THE TABLES FOR WELDING AND BOLTING SHOWN ON THE SHEET. SEE THE TASK LEGEND BELOW FOR THESE TABLES.			
QC	QUALITY CONTROL		
QA	QUALITY ASSURANCE		
O	THE INSPECTOR SHALL OBSERVE THESE FUNCTIONS ON A RANDOM, DAILY BASIS. WELDING OPERATIONS NEED NOT BE DELAYED PENDING OBSERVATIONS.		
P	THESE INSPECTIONS SHALL BE PERFORMED PRIOR TO THE FINAL ACCEPTANCE OF THE ITEM.		
D	THE INSPECTOR SHALL PREPARE REPORTS INDICATING THAT THE WORK HAS BEEN PERFORMED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE REPORT NEED NOT PROVIDE DETAILED MEASUREMENTS FOR JOINT FIT-UPS, WPS SETTINGS, COMPLETED WELDS, OR OTHER INDIVIDUAL ITEMS LISTED IN THE TABLES. FOR SHOP FABRICATION, THE REPORT SHALL INDICATE PIECE MARK OF THE PIECE INSPECTED. FOR FIELD WORK, THE REPORT SHALL INDICATE THE REFERENCE GRID LINES AND FLOOR OR ELEVATION INSPECTED. WORK NOT IN COMPLIANCE WITH THE CONTRACT DOCUMENTS AND WHETHER THE NONCOMPLIANCE HAS BEEN SATISFACTORILY REPAIRED SHALL BE NOTED IN THE INSPECTION REPORT.		

INSPECTION TASKS PRIOR TO WELDING			
TASK	QC	QA	REFERENCED STANDARD
Welding procedure specifications (WPS) available	P	P	
Manufacturer certifications for welding consumables available	P	P	
Material identification (type/grade)	O	O	
Fit-up of groove welds (including joint geometry): <ul style="list-style-type: none"> <li>Joint penetration</li> <li>Dimensions (alignment, root opening, root face, bevel)</li> <li>Cleanliness (condition of steel surfaces)</li> <li>Tacking (back weld quality and location)</li> <li>Backing type and fit (if applicable)</li> </ul>	O	O	
Configuration and finish of access holes	O	O	
Fit-up of fillet welds: <ul style="list-style-type: none"> <li>Dimensions (alignment, gaps at root)</li> <li>Cleanliness (condition of steel surfaces)</li> <li>Tacking (back weld quality and location)</li> </ul>	O	O	
Check welding equipment	O	--	

INSPECTION TASKS DURING WELDING			
TASK	QC	QA	REFERENCED STANDARD
Use qualified welders	O	O	
Control and handling of welding consumables: <ul style="list-style-type: none"> <li>Packaging</li> <li>Exposure Control</li> </ul>	O	O	
No welding over cracked tack welds	O	O	
Environmental conditions: <ul style="list-style-type: none"> <li>Wind speed within limits</li> <li>Precipitation and temperature</li> </ul>	O	O	
WPS followed: <ul style="list-style-type: none"> <li>Settings on welding equipment</li> <li>Trawl speed</li> <li>Selected welding materials</li> <li>Shielding gas type/flow rate</li> <li>Preheat applied</li> <li>Interpass temperature maintained (min/max)</li> <li>Proper position (F, V, H, OH)</li> </ul>	O	O	
Welding techniques: <ul style="list-style-type: none"> <li>Interpass and final clearing</li> <li>Each pass within profile limitation</li> <li>Each pass meets quality requirements</li> </ul>	O	O	

INSPECTION TASKS AFTER WELDING			
TASK	QC	QA	REFERENCED STANDARD
Welds cleaned	O	O	
Size, length, and location of welds	P	P	
Welds meet visual acceptance criteria: <ul style="list-style-type: none"> <li>Crack prohibition</li> <li>Weld-toe-metal fusion</li> <li>Crater cross-section</li> <li>Weld profiles</li> <li>Weld size</li> <li>Under cut</li> <li>Porosity</li> </ul>	P	P	
Arc strikes	P	P	
A-area	P	P	
Backing removed and weld tabs removed (if required)	P	P	
Repair activities	P	P	
Document acceptance or rejection of welded joint or member	P	P	

INSPECTION TASKS PRIOR TO BOLTING			
TASK	QC	QA	REFERENCED STANDARD
Manufacturer's certifications available for fastener materials	O	P	
Fasteners marked in accordance with ASTM requirements	O	O	
Proper fasteners selected for the joint detail (grade, type, bolt length if threads are to be excluded from shear plane)	O	O	
Proper bolting procedure selected for joint detail	O	O	
Connecting elements, including the appropriate faying surface condition and hole preparation, if specified, meet applicable requirements	O	O	
Pre-installation verification testing by installation personnel observed and documented for fastener assemblies and methods used	P	O	
Proper storage provided for bolts, nuts, washers, and other fastener components	O	O	

INSPECTION TASKS DURING BOLTING			
TASK	QC	QA	REFERENCED STANDARD
Fastener assemblies, of suitable condition, placed in all holes and washers (if required) are positioned as required	O	O	
Joint brought to the snug-tight condition prior to pretensioning operation	O	O	
Fastener component not turned by the wrench prevented from rotating	O	O	
Fasteners are pretensioned in accordance with RSCS Specification, progressing systematically from the rigid joint toward the free edges	O	O	

INSPECTION TASKS AFTER BOLTING			
TASK	QC	QA	REFERENCED STANDARD
Document acceptance or rejection of welded joint or member	P	P	

INSPECTION OF STEEL ELEMENTS OF COMPOSITE CONSTRUCTION PRIOR TO CONCRETE PLACEMENT			
TASK	QC	QA	REFERENCED STANDARD
Placement and installation of steel deck	P	P	
Placement and installation of steel headed stud anchors	P	P	
Document acceptance or rejection of steel elements	P	P	

IBC SPECIAL INSPECTIONS - MINIMUM REQUIREMENTS			
THE SPECIAL INSPECTOR SHALL VERIFY THAT THE FABRICATOR MAINTAINS DETAILED FABRICATION AND QUALITY CONTROL PROCEDURES THAT PROVIDE A BASIS FOR INSPECTION CONTROL OF THE WORKMANSHIP AND THE FABRICATOR'S ABILITY TO CONFORM TO APPROVED CONSTRUCTION DOCUMENTS AND REFERENCED STANDARDS. THE SPECIAL INSPECTOR SHALL REVIEW THE PROCEDURES FOR COMPLETENESS AND ADEQUACY RELATIVE TO THE CODE REQUIREMENTS FOR THE FABRICATOR'S SCOPE OF WORK.			
SPECIAL INSPECTIONS REQUIRED BY SECTION 1705 SHALL NOT BE REQUIRED WHERE THE WORK IS DONE ON THE PREMISES OF A FABRICATOR REGISTERED AND APPROVED TO PERFORM SUCH WORK WITHOUT SPECIAL INVESTIGATION. APPROVAL SHALL BE BASED UPON REVIEW OF THE FABRICATOR'S WRITTEN PROCEDURAL AND QUALITY CONTROL MANUALS AND PERIODIC AUDITING OF FABRICATION PRACTICES BY AN APPROVED SPECIAL INSPECTION AGENCY. AT COMPLETION OF FABRICATION, THE APPROVED FABRICATOR SHALL SUBMIT A CERTIFICATE OF COMPLIANCE TO THE BUILDING OFFICIAL STATING THAT THE WORK WAS PERFORMED IN ACCORDANCE WITH THE APPROVED CONSTRUCTION DOCUMENTS.			

SPECIAL INSPECTIONS FOR WIND RESISTANCE			
TASK	CONTINUOUS	PERIODIC	REFERENCED STANDARD
FASTENINGS OF THE FOLLOWING SYSTEMS AND COMPONENTS:	--	X	
1. ROOF COVERING, ROOF DECK AND ROOF FRAMING CONNECTIONS.	--	X	
2. EXTERIOR WALL COVERINGS AND WALL CONNECTIONS TO ROOF AND FLOOR DIAPHRAGMS AND FRAMING.	--	X	

REQUIRED VERIFICATION AND INSPECTION OF STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL			
VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC	REFERENCED STANDARD
Material verification of cold-formed steel deck: <ul style="list-style-type: none"> <li>Identification markings to conform to ASTM standards specified in the approved construction documents.</li> <li>Manufacturer's certified test reports.</li> </ul>	--	X	Applicable ASTM material standards
Inspection of welding: <ul style="list-style-type: none"> <li>Cold-formed steel deck: <ul style="list-style-type: none"> <li>Floor and roof deck welds.</li> </ul> </li> <li>Reinforcing steel: <ul style="list-style-type: none"> <li>Verification of weldability of reinforcing steel other than ASTM A 706.</li> <li>Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames, and boundary elements of special structural walls of concrete and shear reinforcement.</li> <li>Shear reinforcement.</li> <li>Other reinforcing steel.</li> </ul> </li> </ul>	--	X	AWS D1.3  AWS D1.4 ACI 318, Section 3.5.2

REQUIRED VERIFICATION AND INSPECTION OF CONCRETE CONSTRUCTION				
VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC	REFERENCED STANDARD	IBC REFERENCE
Inspection of reinforcing steel, including prestressing tendons, and placement.	--	X	ACI 318: 3.5, 7.1-7.7	1910.4
Inspection of reinforcing steel welding in accordance with Table 1705.2.2, Item 2b.	--	--	AWS D1.4 ACI 318: 3.5.2	--
Inspection of anchors cast in concrete where allowable loads have been increased or where strength design is used.	--	X	ACI 318: 8.1.3, 21.2.9	1908.5, 1909.1
Inspection of anchors post-installed in hardened concrete members.	--	X	ACI 318: 3.8.6, 8.1.3, 21.2.8	1909.1
Verify use of required design mix.	--	X	ACI 318: Ch. 4, 5.2.5.4	1904.2, 1910.2, 1910.3
At the time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	X	--	ASTM C 172 ASTM C 31 ACI 318: 5.6, 5.8	1910.10
Inspection of concrete and shotcrete placement for proper application techniques.	X	--	ACI 318: 5.9, 5.10	1910.6, 1910.7, 1910.8
Inspection for maintenance of specified curing temperature and techniques.	--	X	ACI 318: 5.11-5.13	1910.9

REQUIRED VERIFICATION AND INSPECTION OF SOILS				
MINIMUM REQUIREMENTS				
VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC	REFERENCED STANDARD	
Verify materials below shallow foundations are adequate to achieve the design bearing capacity.	--	X		
Verify excavations are extended to proper depth and have reached proper material.	--	X		
Perform classification and testing of compacted fill materials	--	X		
Verify use of proper materials, densities, and lift thicknesses during placement and compaction of compacted fill.	X	--		
Prior to placement of compacted fill, observe subgrade and verify that the site has been prepared properly.	--	X		

ANSI: SDI	
QC	QUALITY CONTROL
QA	QUALITY ASSURANCE
O	OBSERVE: INSPECT THESE ITEMS ON AN INTERMITTENT BASIS. OPERATIONS NEED NOT BE DELAYED PENDING THESE INSPECTIONS. FREQUENCY OF OBSERVATIONS SHALL BE ADEQUATE TO CONFIRM THAT THE WORK HAD BEEN PERFORMED IN ACCORDANCE WITH THE APPLICABLE DOCUMENTS. IN THE EVENT OBSERVATIONS DETERMINE MATERIALS AND/OR WORKMANSHIP ARE NOT IN CONFORMANCE, ADDITIONAL INSPECTIONS SHALL BE PERFORMED TO DETERMINE THE EXTENT OF NON-COMFORMANCE.
P	PERFORM: THESE INSPECTIONS SHALL BE COMPLETED PRIOR TO THE FINAL ACCEPTANCE OF THE ITEM.
D	DOCUMENT: THE INSPECTOR SHALL PREPARE REPORTS OR OTHER APPROPRIATE WRITTEN DOCUMENTATION INDICATING THAT THE WORK HAS OR HAS NOT BEEN PERFORMED IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS.

INSPECTION TASKS PRIOR TO DECK PLACEMENT		
TASK	QC	QA
Verify compliance of materials (deck and all accessories) with construction documents including profiles, material properties, and base metal thickness.	P	P
Document acceptance or rejection of deck and deck accessories.	P	P

INSPECTION TASKS AFTER DECK PLACEMENT		
TASK	QC	QA
Verify compliance of deck and all deck accessories installation with construction documents.	P	P
Verify deck materials are represented by the mill certifications that comply with the construction documents.	--	P
Document acceptance or rejection of installation of deck and deck accessories.	P	P

INSPECTION TASKS PRIOR TO WELDING		
TASK	QC	QA
Welding procedure specifications (WPS) available.	O	O
Manufacturer certifications for welding consumables available.	O	O
Material identifications (type/grade).	O	O
Check welding equipment.	O	O

INSPECTION TASKS DURING WELDING		
TASK	QC	QA
Use of qualified welders.	O	O
Control and handling of welding consumables.	O	O
Environmental conditions (wind speed, moisture, temperature).	O	O
WPS followed.	O	O

INSPECTION TASKS AFTER WELDING		
TASK	QC	QA
Verify size and location of welds including support, overlap, and perimeter welds.	P	P
Welds meet visual acceptance criteria.	P	P
Verify repair activities.	P	P
Document acceptance or rejection of welds.	P	P

INSPECTION TASKS PRIOR TO MECHANICAL FASTENING		
TASK	QC	QA
Manufacturer installation instruction available for mechanical fasteners.	O	O
Proper tools available for fastener installation.	O	O
Proper storage for mechanical fasteners.	O	O

INSPECTION TASKS DURING MECHANICAL FASTENING		
TASK	QC	QA
Fasteners are positioned as required.	O	O
Fasteners are installed in accordance with manufacturer's instructions.	O	O

INSPECTION TASKS AFTER MECHANICAL FASTENING		
TASK	QC	QA
Check spacing, type, and installation of support fasteners.	P	P
Check spacing, type, and installation of sidelap fasteners.	P	P
Check spacing, type, and installation of perimeter fasteners.	P	P
Verify repair activities.	P	P
Document acceptance or rejection of mechanical fasteners.	P	P

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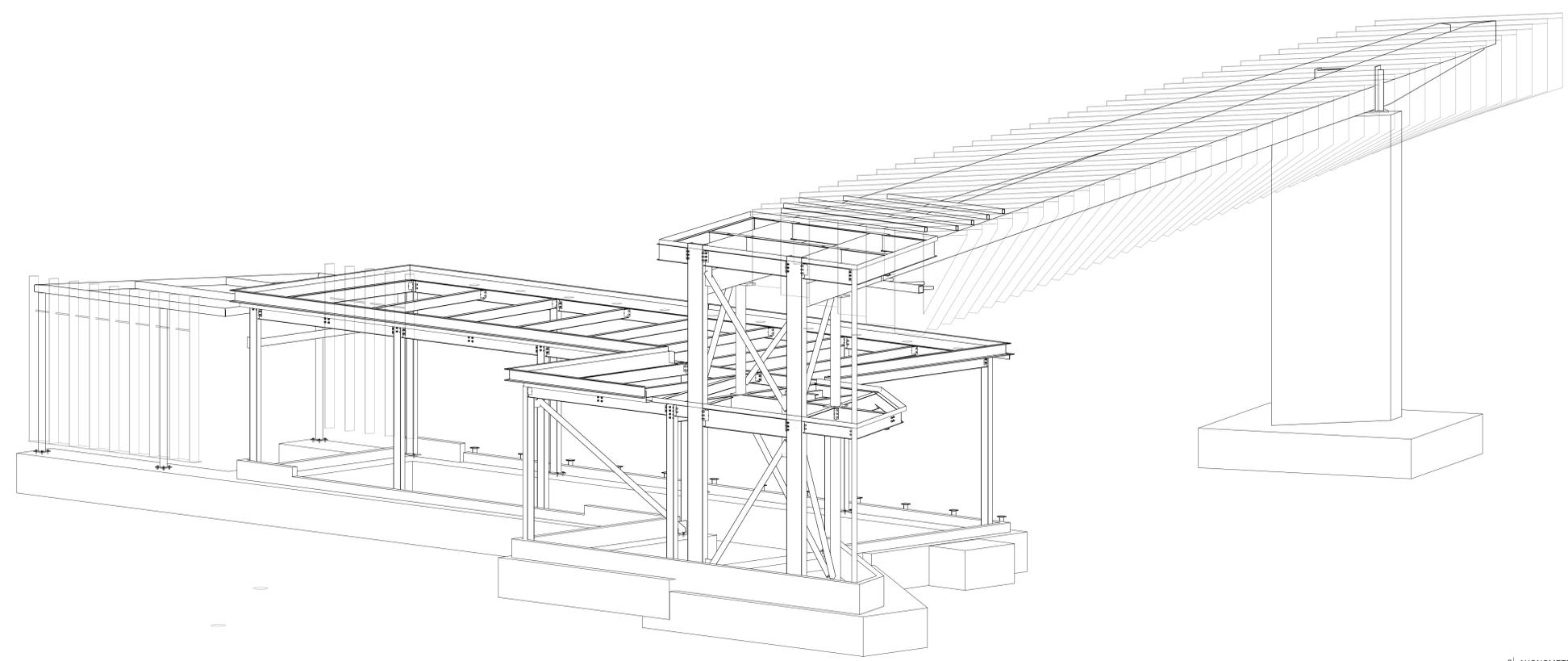
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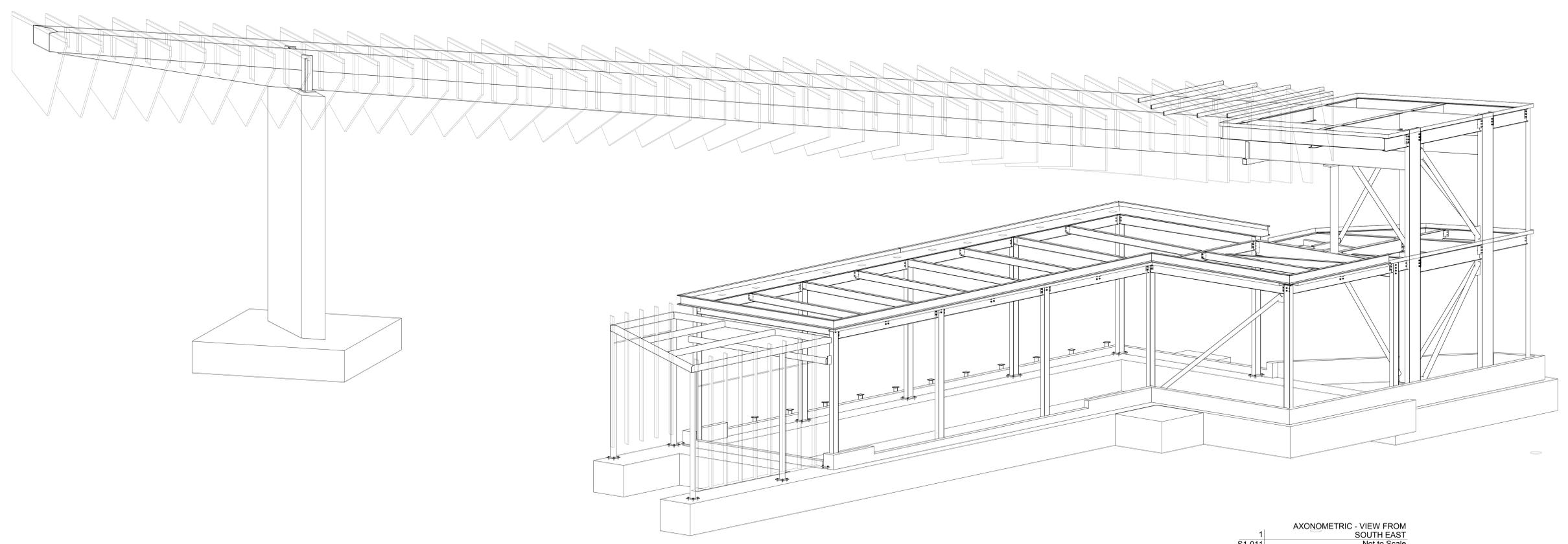
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2 | AXONOMETRIC - VIEW FROM NORTH EAST  
S1-011 | Not to Scale



1 | AXONOMETRIC - VIEW FROM  
SOUTH EAST  
S1-011 | Not to Scale

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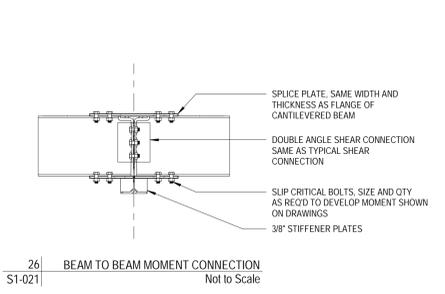
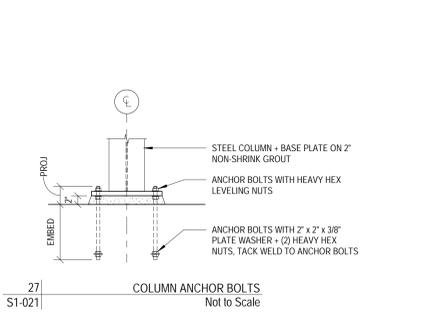
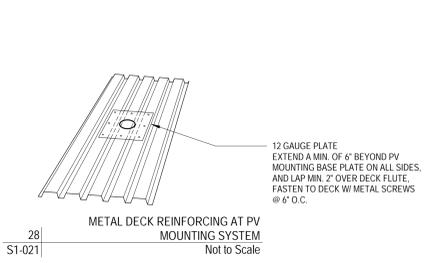
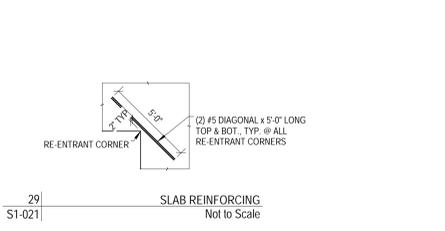
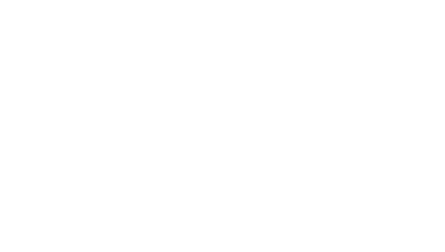
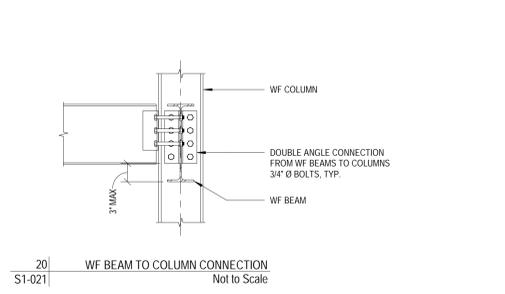
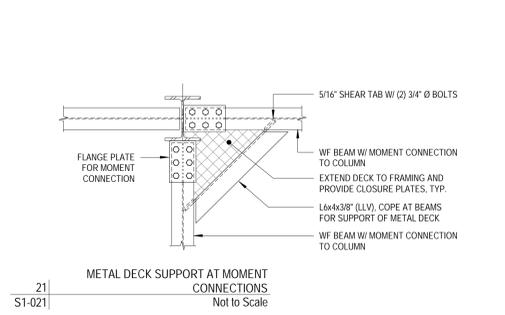
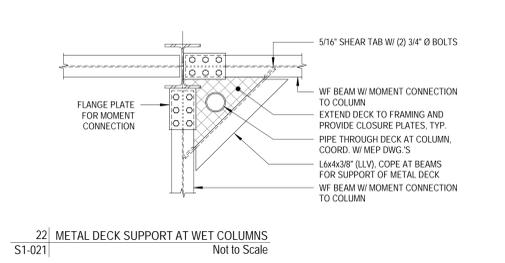
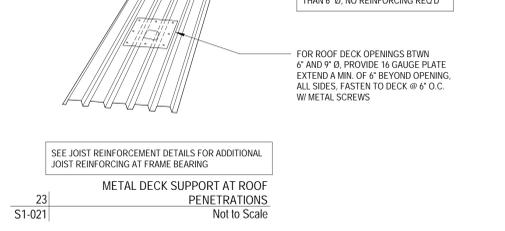
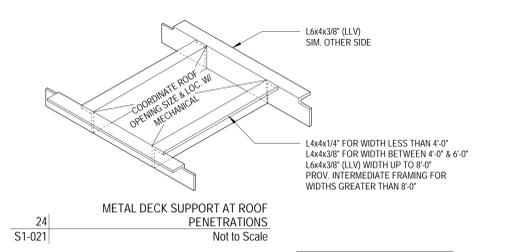
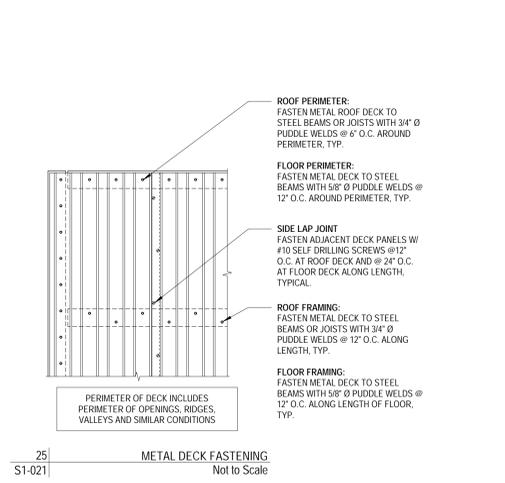
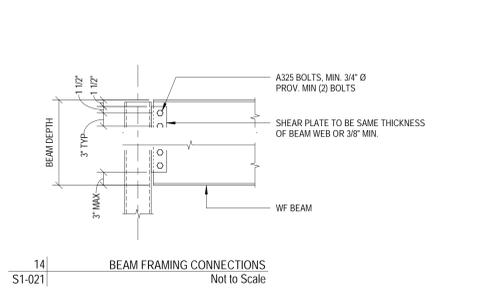
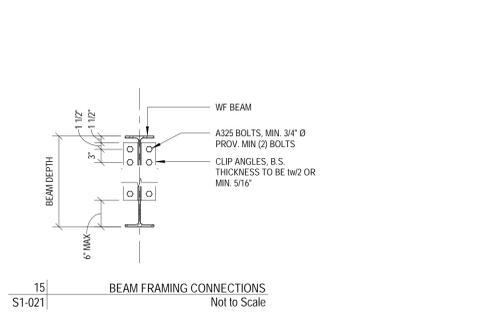
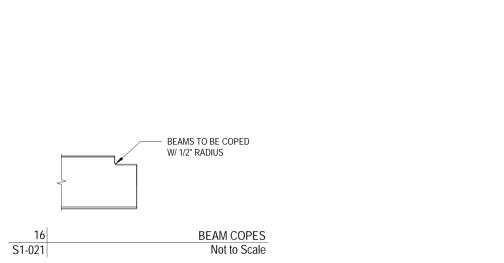
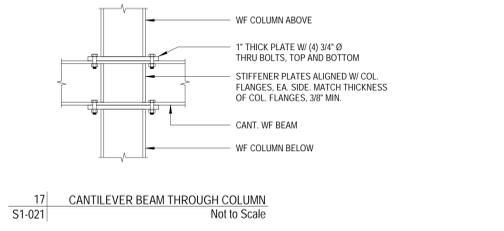
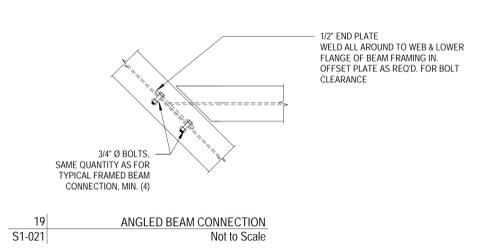
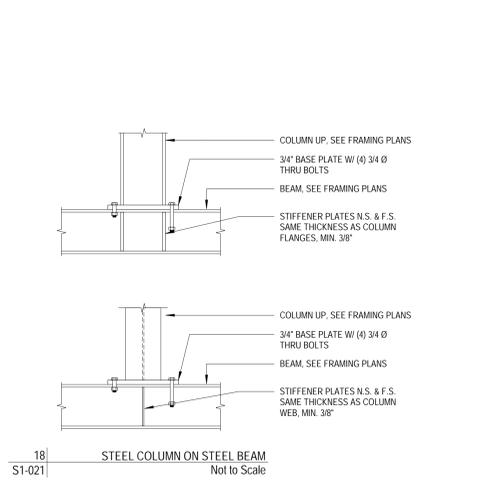
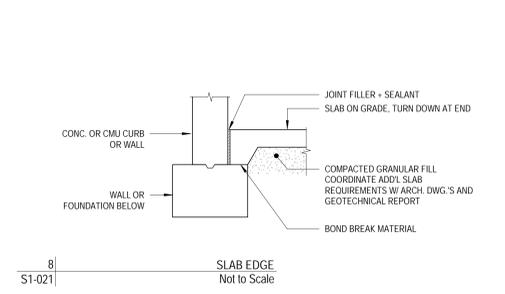
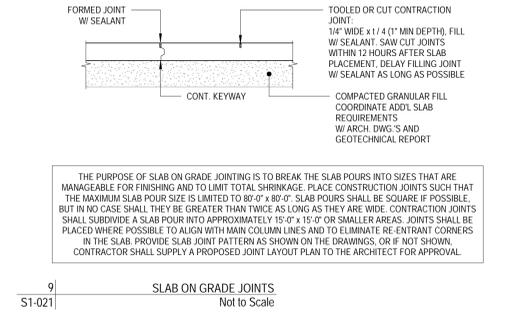
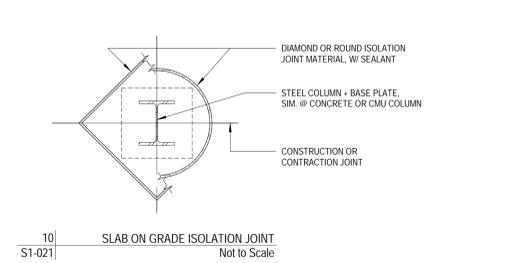
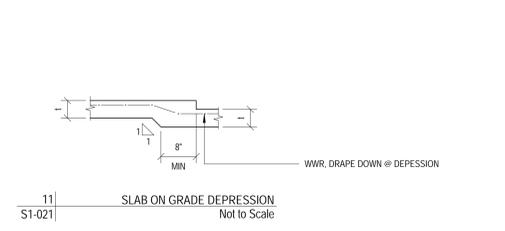
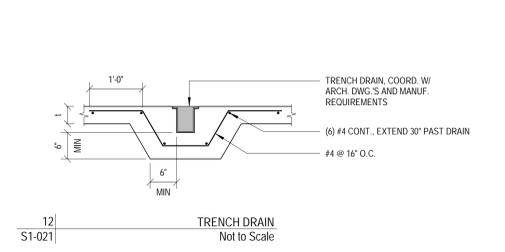
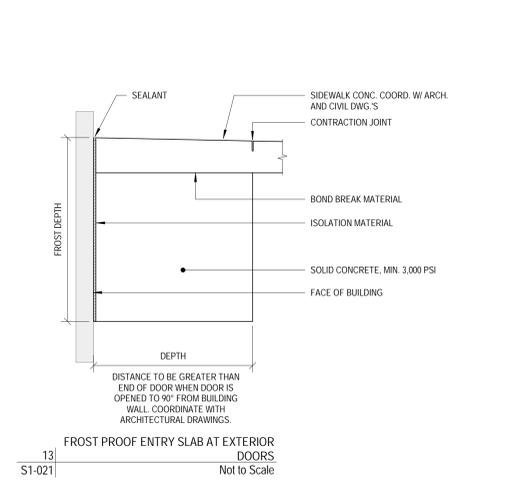
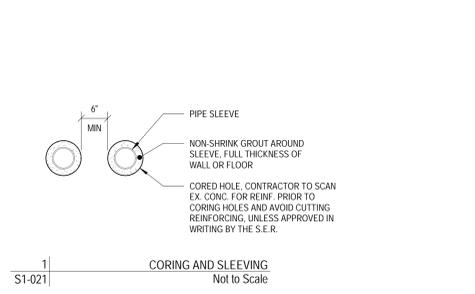
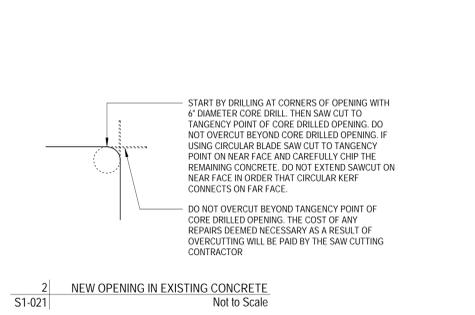
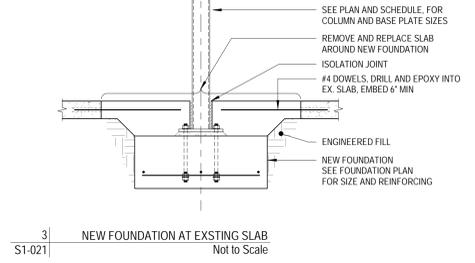
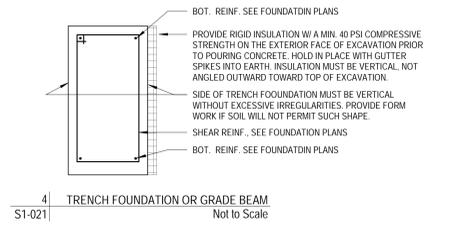
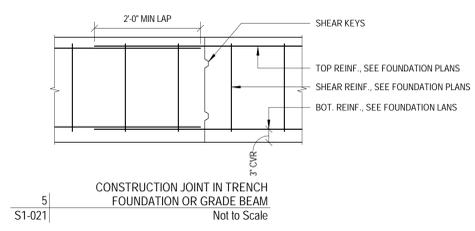
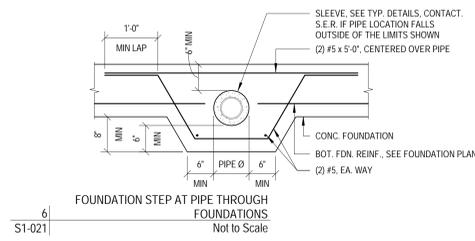
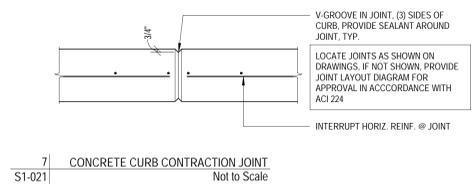
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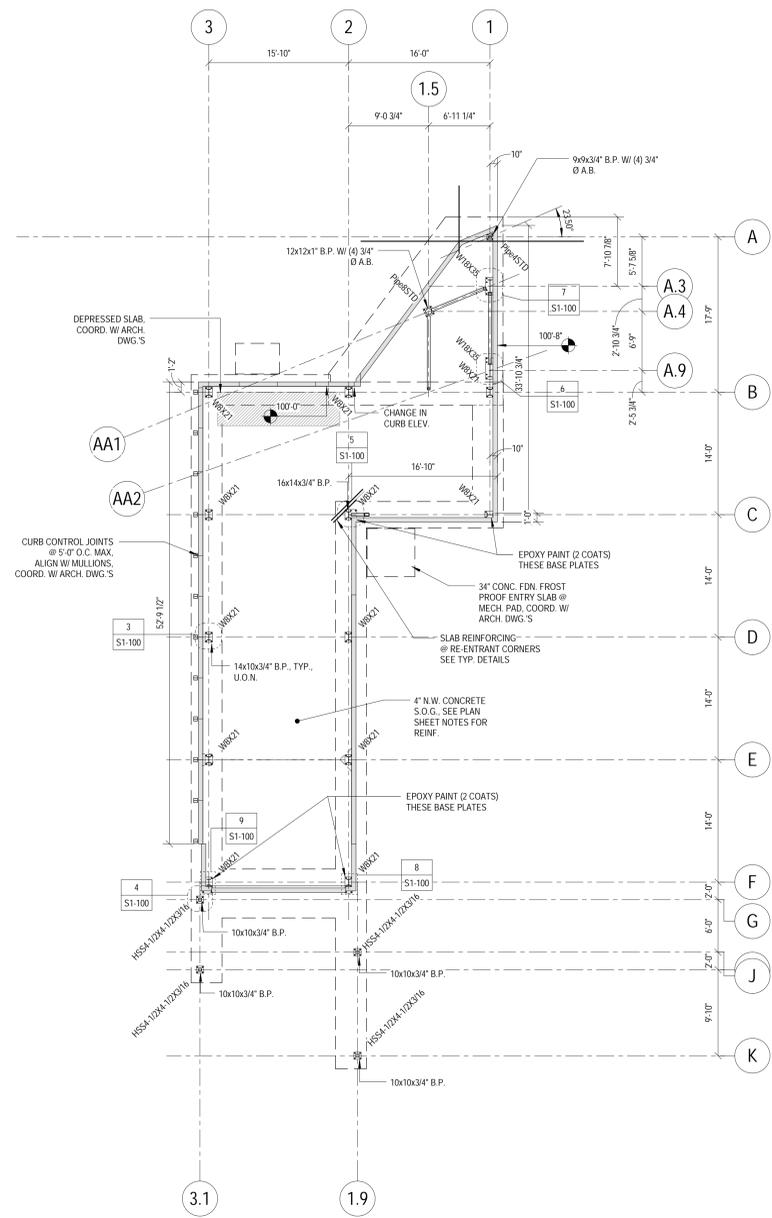
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**TYPICAL DETAILS**

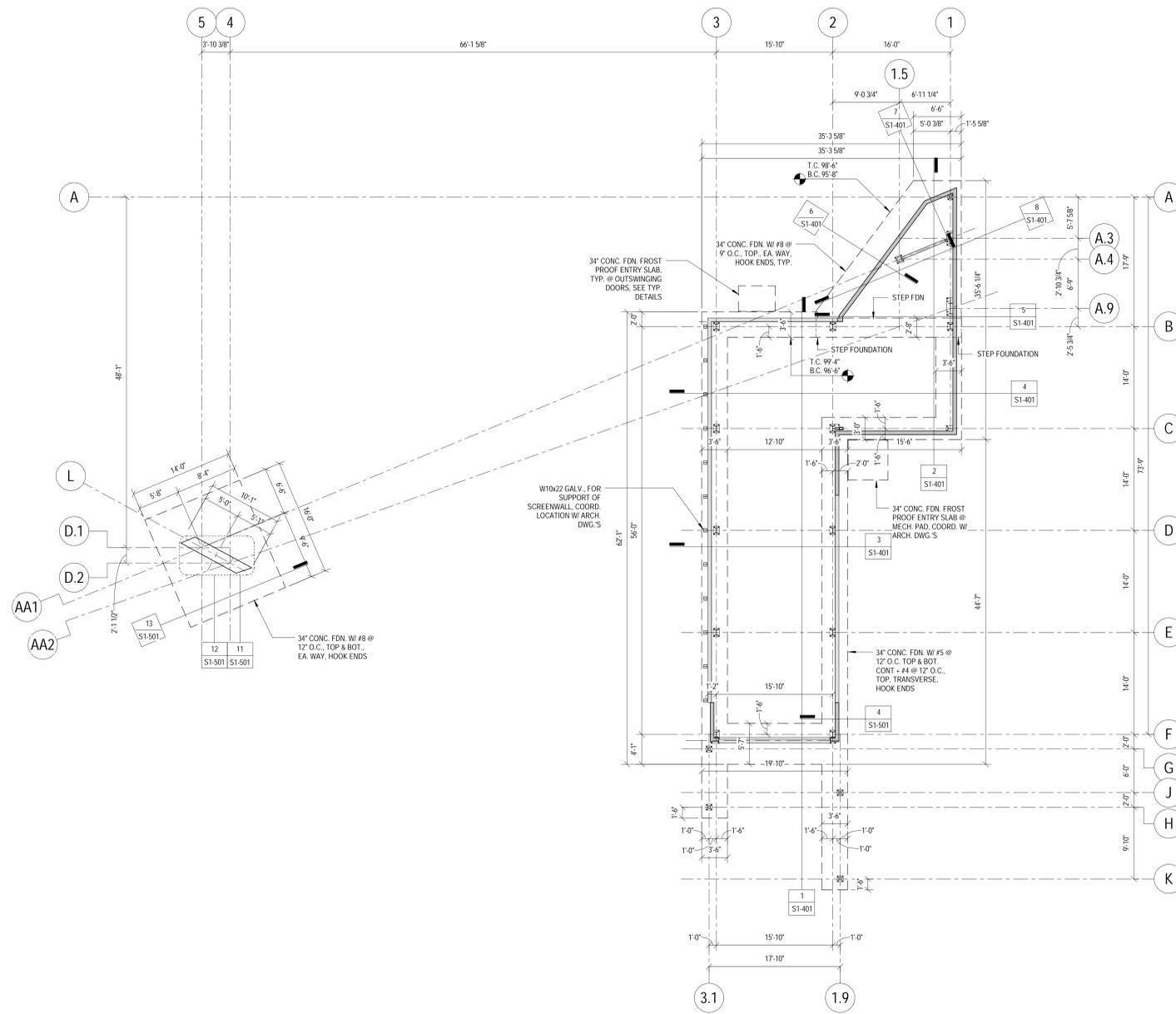
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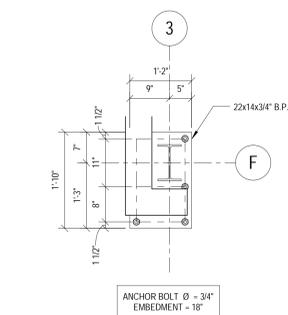




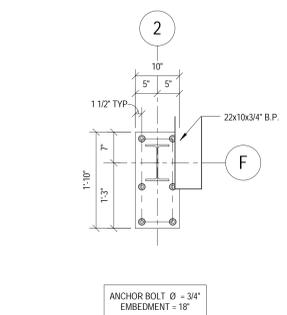
2 | SLAB ON GRADE AND CURB PLAN  
S1-100 | Scale: 1/8" = 1'-0"



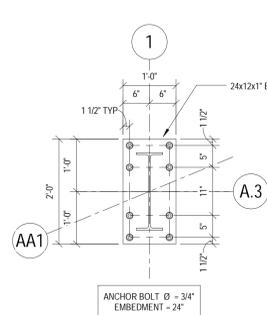
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S1-100 | Scale: 1/8" = 1'-0"



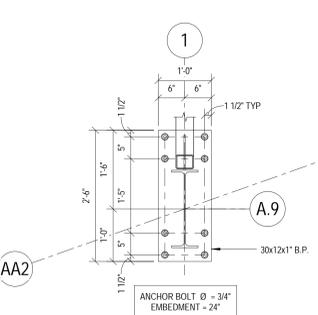
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S1-100 | Scale: 3/4" = 1'-0"



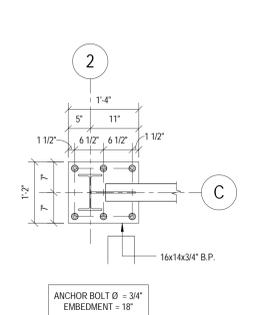
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S1-100 | Scale: 3/4" = 1'-0"



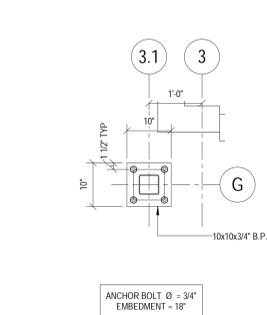
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S1-100 | Scale: 3/4" = 1'-0"



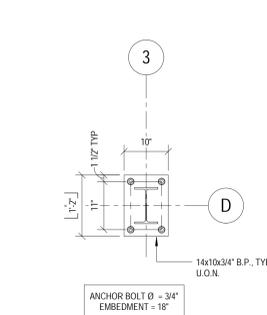
6 | BASE PLATE D  
S1-100 | Scale: 3/4" = 1'-0"



5 | BASE PLATE C  
S1-100 | Scale: 3/4" = 1'-0"



4 | BASE PLATE B  
S1-100 | Scale: 3/4" = 1'-0"



3 | BASE PLATE A  
S1-100 | Scale: 3/4" = 1'-0"

SHEET NOTES

- 01 GENERAL
- 03 CONCRETE
  1. T.C. @ S.O.G. = USGS ELEVATION 61'-0", U.O.N.
  2. T.C. @ FOUNDATIONS = 8" FROM T.C. @ S.O.G., U.O.N.
  3. FOUNDATIONS ARE CENTERED ON COLUMN LINES, U.O.N.
  4. REINFORCE SLAB ON GRADE W/ 6x6 W2-9xW2 S WELDED WIRE REINFORCING PLACED IN THE TOP 1/3rd OF SLAB, OR
    - 1 1/2" LONG FIBRILLATED MICROFIBERS AT 150 POUNDS PER CUBIC YARD OF CONCRETE.
  5. SEE TYPICAL DETAILS FOR ADDITIONAL REINFORCING REQUIRED.
  6. COORDINATE LOCATION OF EMBEDDED FLOOR BOXES FLOOR DRAINS AND SLOPED SLAB WITH ARCHITETURAL DRAWINGS.
- 05 METALS
  1. COORDINATE STEEL FINISH REQUIREMENTS WITH ARCHITETURAL DRAWINGS AND SPECIFICATIONS. ALL STEEL FRAMING LOCATED IN EXTERIOR WALLS TO BE HOT-DIP GALVANIZED, UNLESS OTHERWISE SPECIFIED.
  2. M AT BEAM ENDS DENOTES FACTORED DESIGN BEAM REACTION. BEAM END AND SHEAR CONNECTION SHALL BE DESIGNED FOR THAT FORCE. MIN REACTION = 25 KIPS
  3. ▷ INDICATES MOMENT CONNECTION. BEAM END AND CONNECTION SHALL BE DESIGNED FOR THE FACTORED MOMENT DESCRIBED (MIN 50 KIP-FIT).
  4. TOP OF STEEL (T.S.) AT LOW ROOF = 73'-0", UNLESS OTHERWISE NOTED (+/- XX'), COORD. W/ SECTIONS
  5. ROOF DECK SHALL BE 1 1/2" x 18 GA. TYPE B METAL ROOF DECK, 2-SPAN MIN.
  6. COORDINATE FIRE PROOFING REQUIREMENTS OF STEEL FRAMING WITH ARCHITETURAL DRAWINGS. DO NOT PAINT STEEL TO BE FIREPROOFED.
  7. EMBED ANCHOR BOLTS 18", U.O.N.

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2562 NEWPORT ROAD  
ANN ARBOR, MI 48103  
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JOB NAME  
**RWP GATEWAY & VISITOR CENTER**

ADDRESS  
**1197 BROAD ST.  
PROVIDENCE, RI  
02905**

ISSUE DATE AND NAME
1   06.10.2020   CD 30%
2   07.31.2020   CD 60%
3   08.25.2020   CD 90%
4   09.09.2020   CD 100% - FOR REVIEW
5   10.16.2020   PERMITS
6   03.16.2021   BIDS

DWG NAME  
**FOUNDATION PLANS**

JOB NO.  
**20\_037**  
PRINTED DATE  
**3/11/2021 11:34:10 AM**  
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**ERM**

**PLAN NORTH**

DWG NO.  
**S1-100**

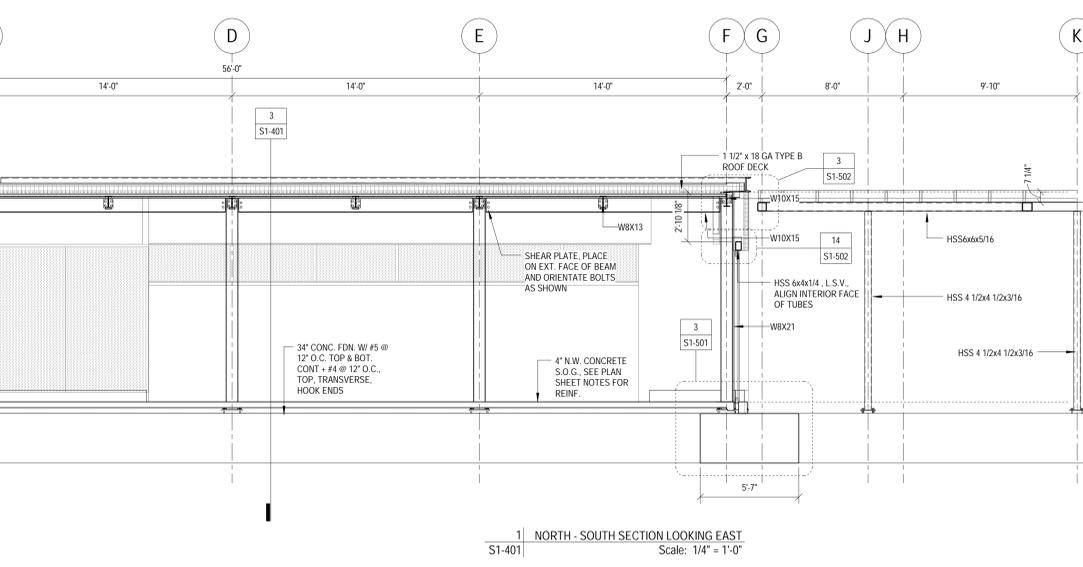
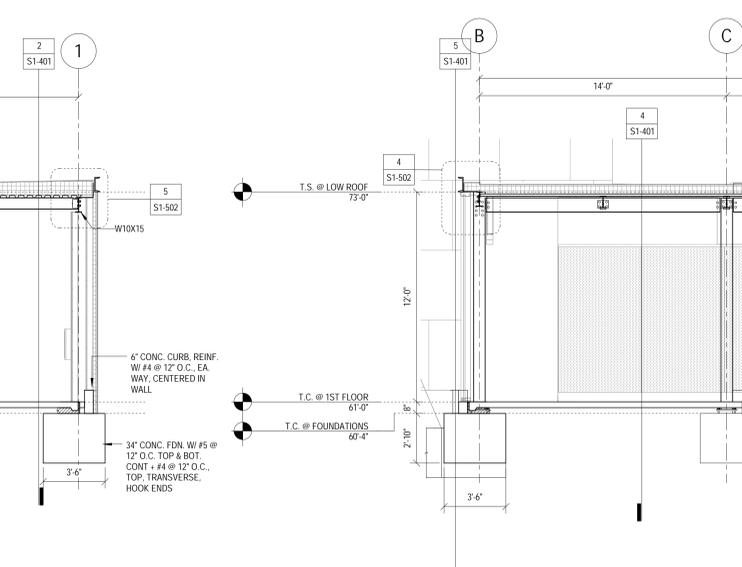
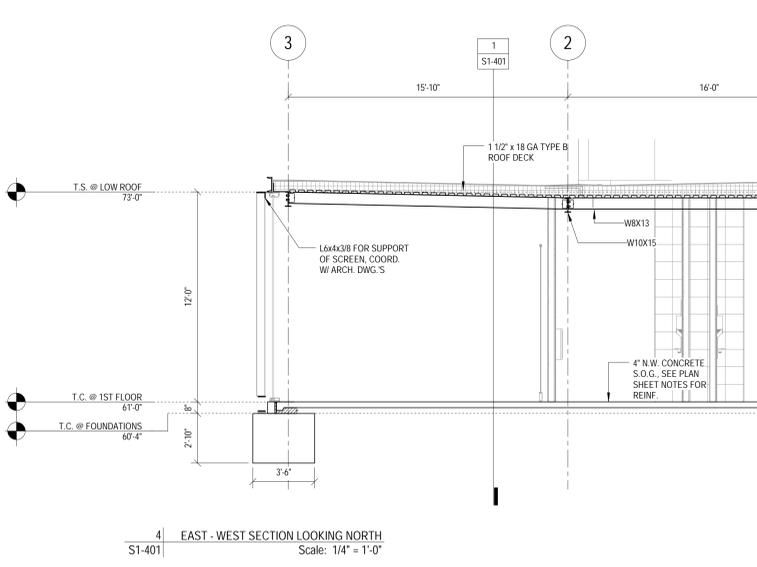
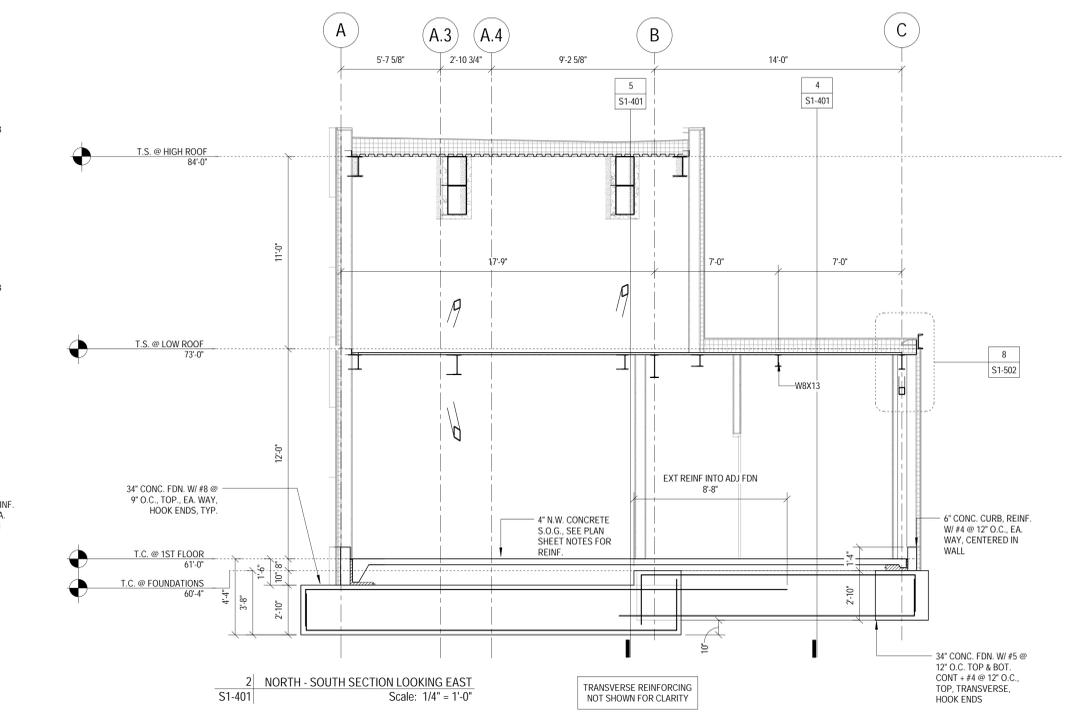
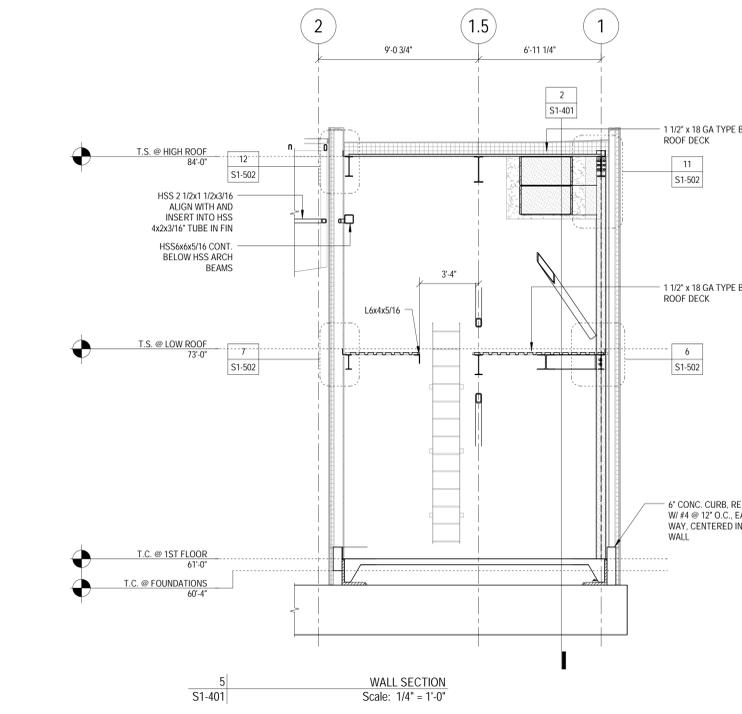
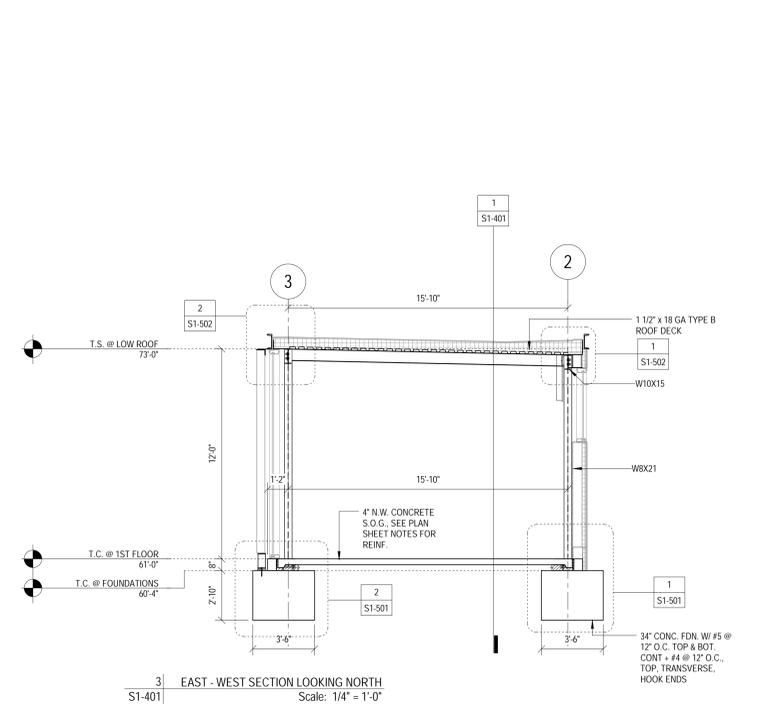
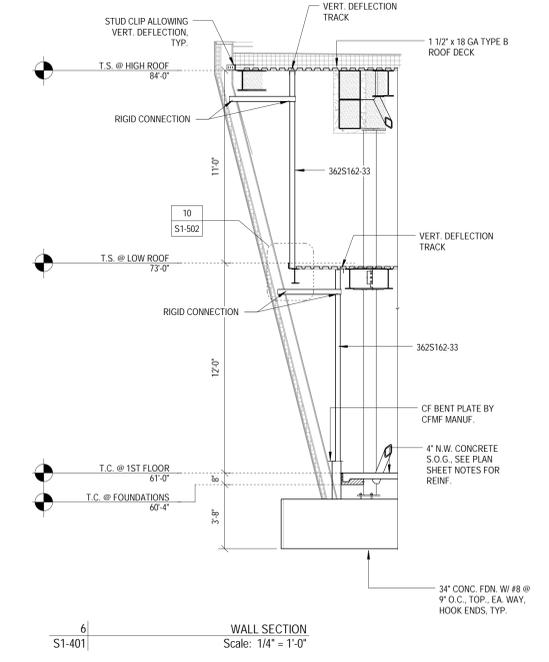
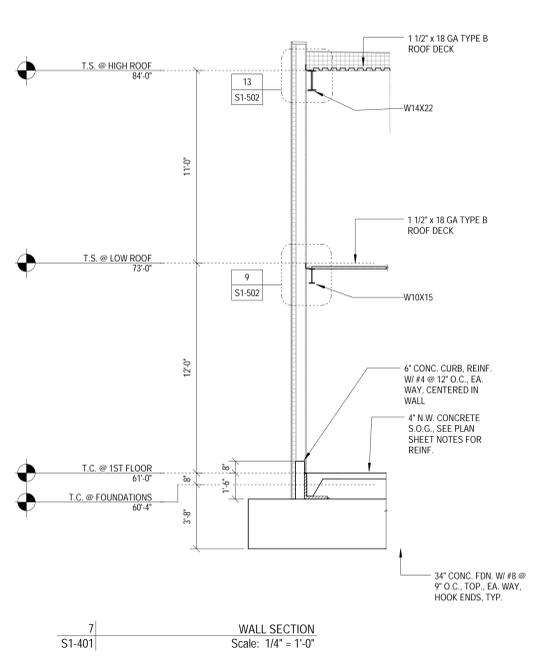
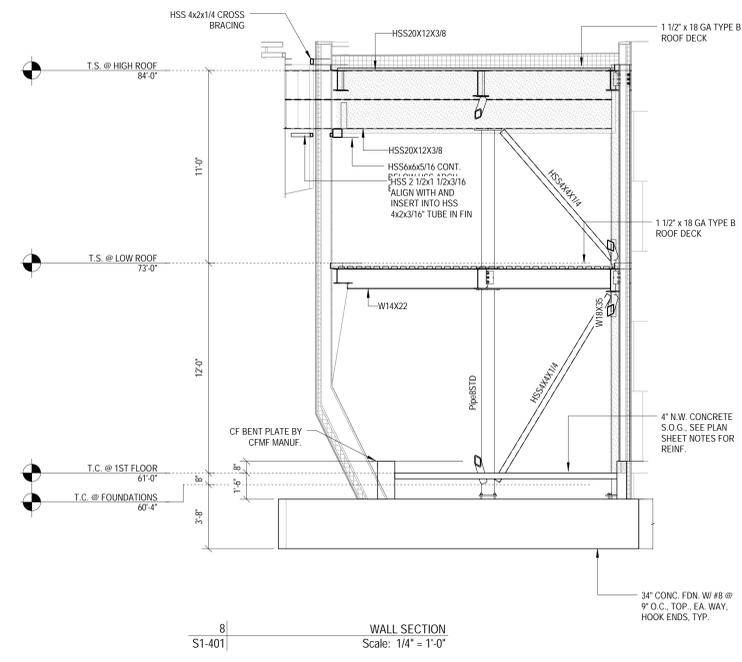


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DWG. NAME  
**SECTIONS**

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**20\_037**  
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**S1-401**

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JOB NAME  
**RWP GATEWAY & VISITOR CENTER**

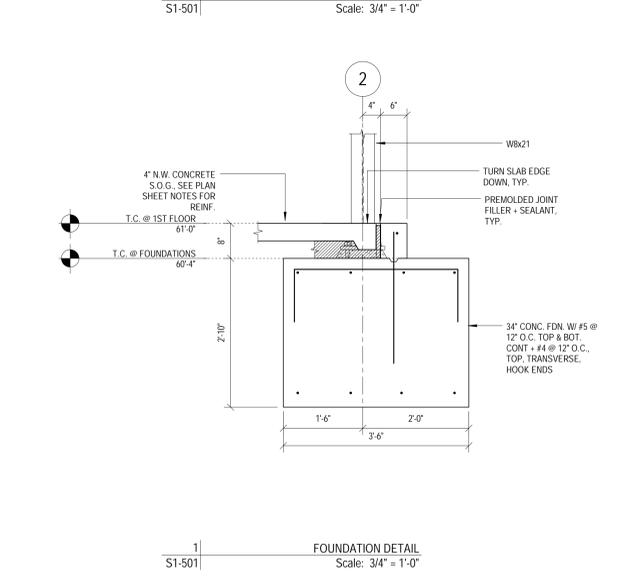
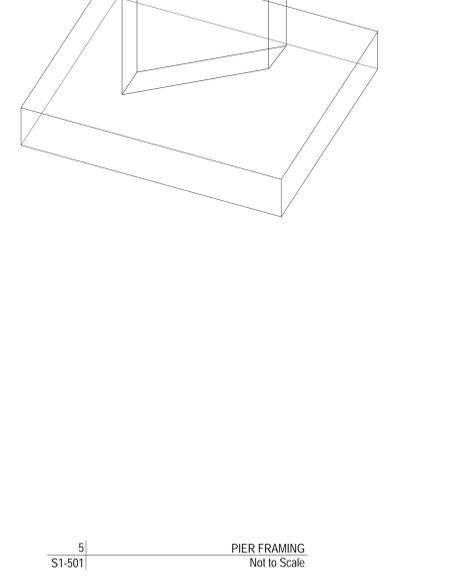
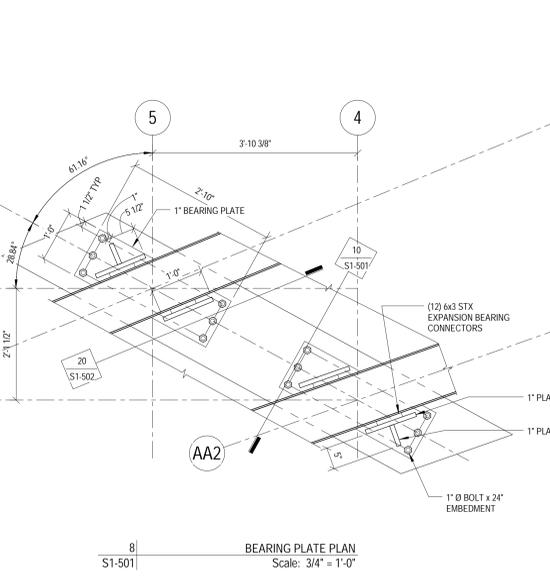
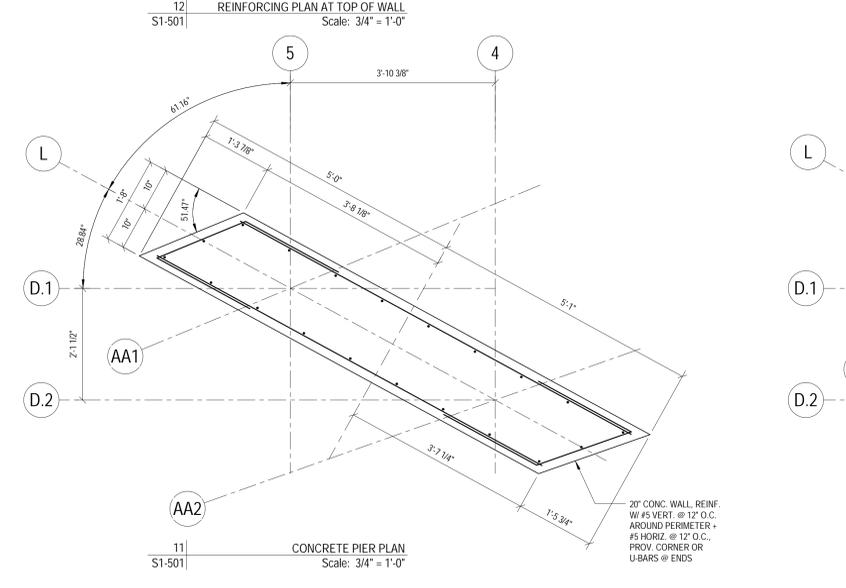
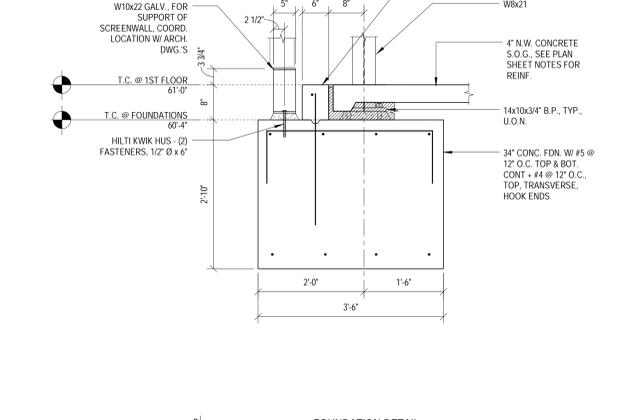
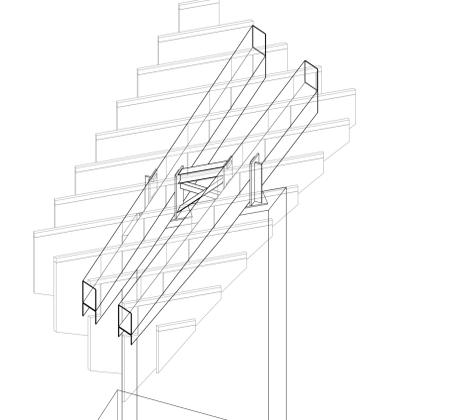
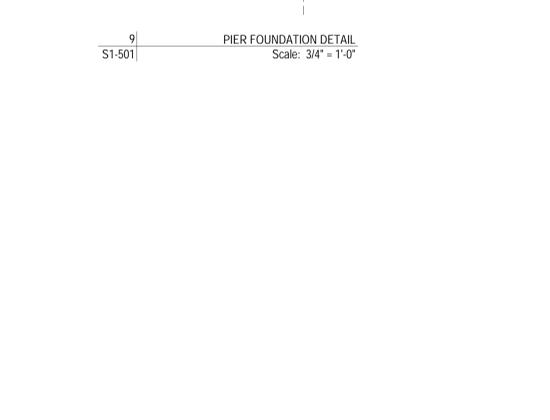
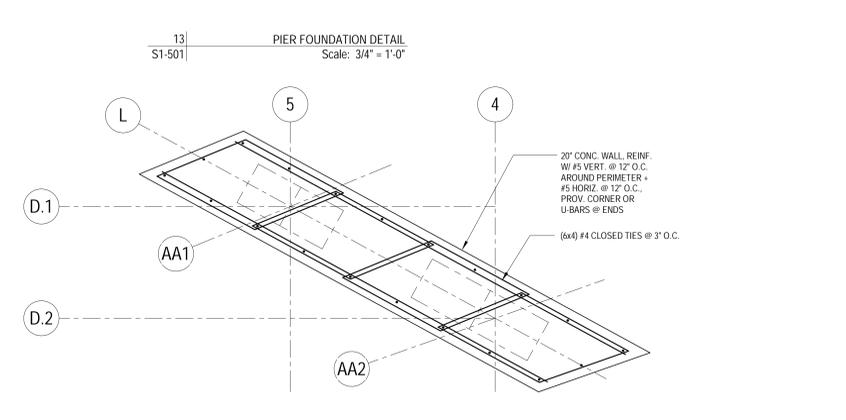
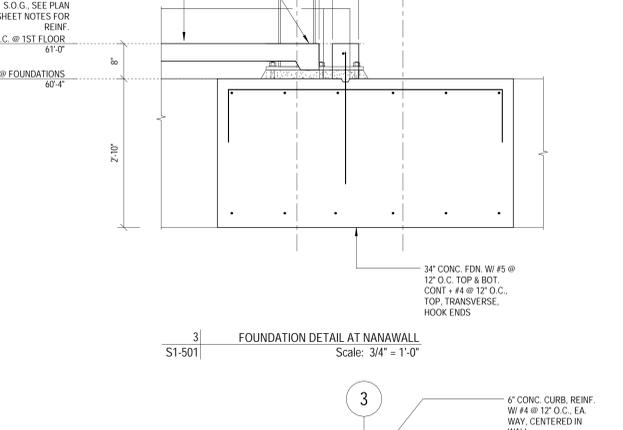
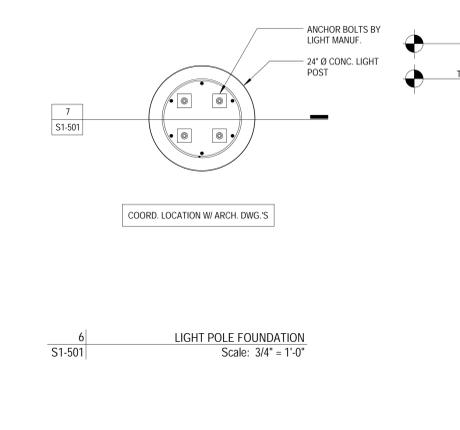
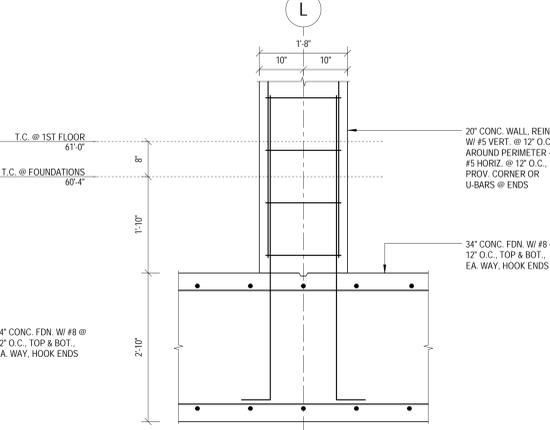
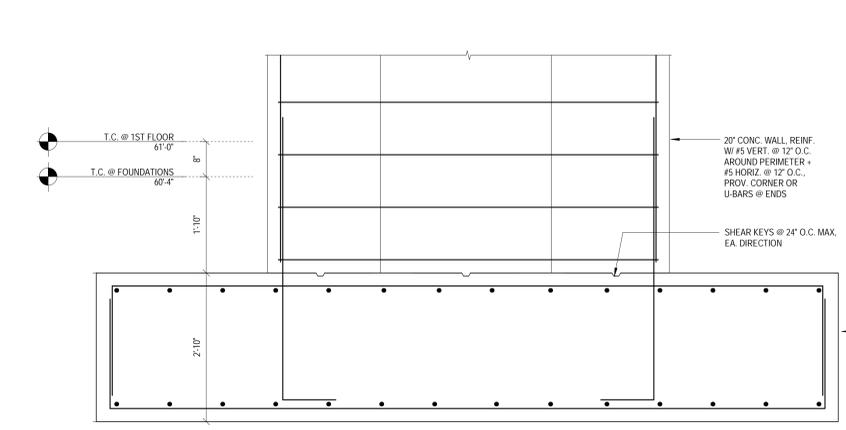
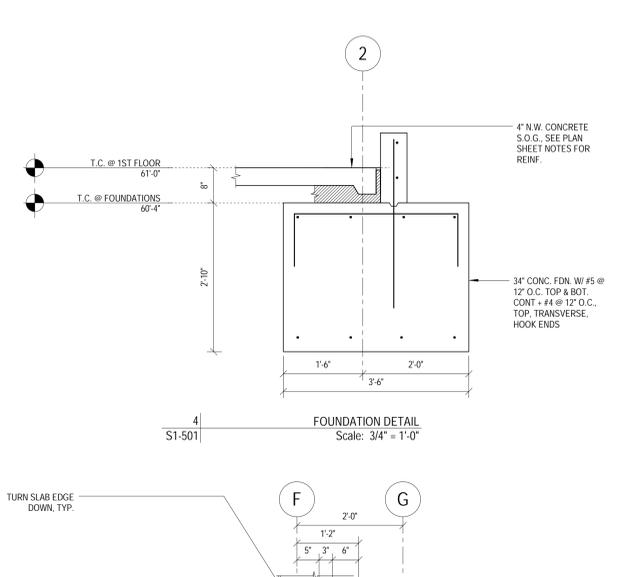
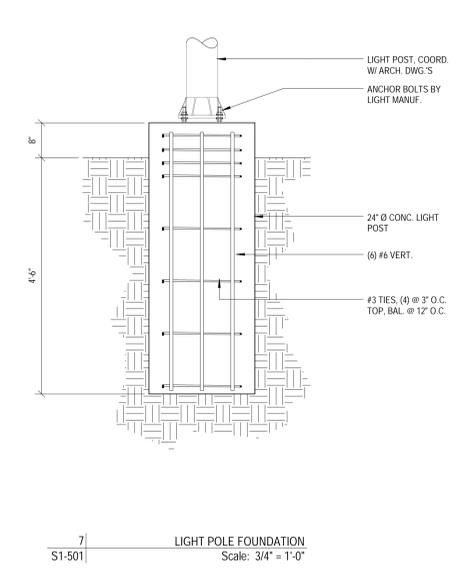
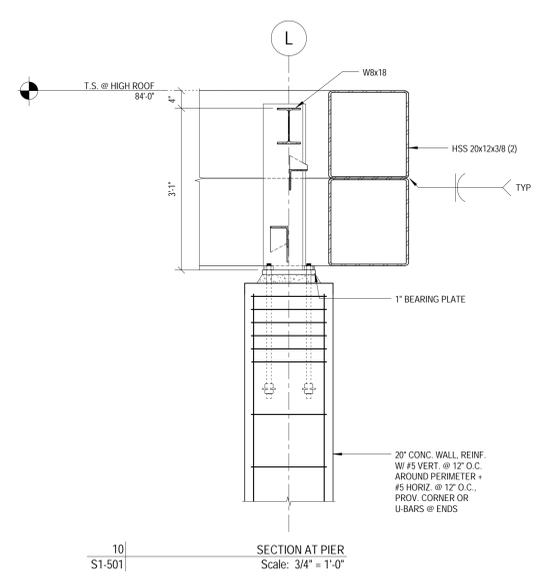
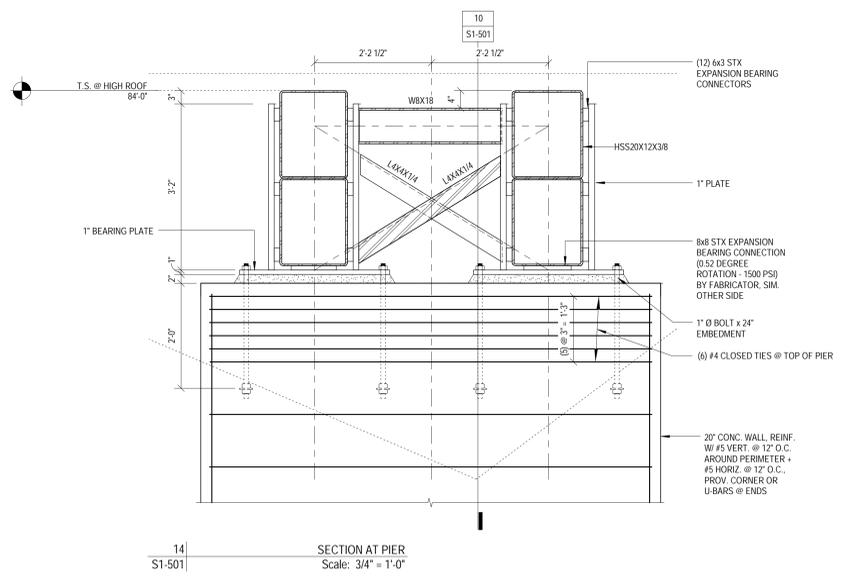
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PROVIDENCE, RI  
02905**

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DWG. NAME  
**DETAILS**

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**20\_037**  
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DWG. NO.  
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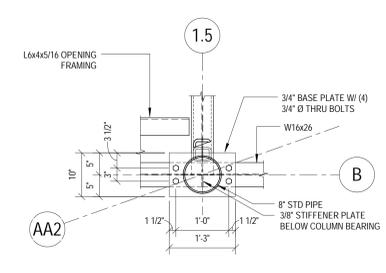


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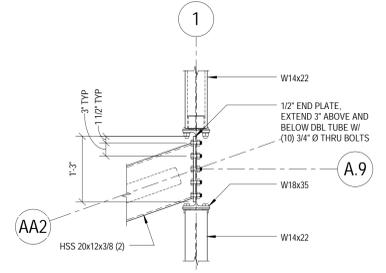
JOB NAME  
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ADDRESS  
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PROVIDENCE, RI  
02905**

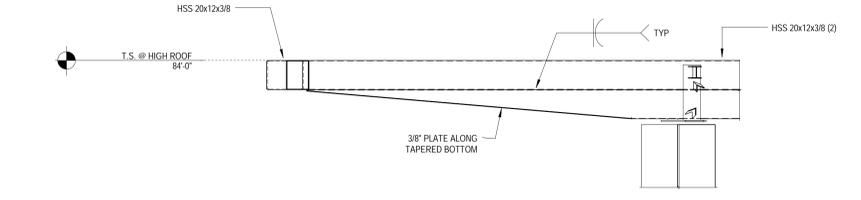
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6   03.16.2021   BIDS



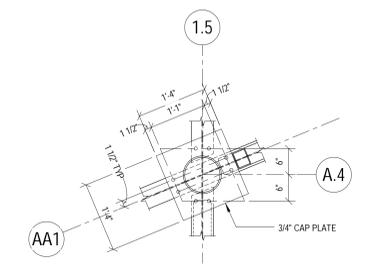
23 | FRAMING PLAN DETAIL  
S1-502 | S1-102  
Scale: 3/4" = 1'-0"



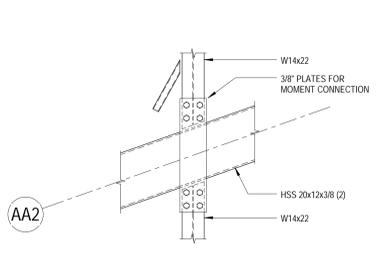
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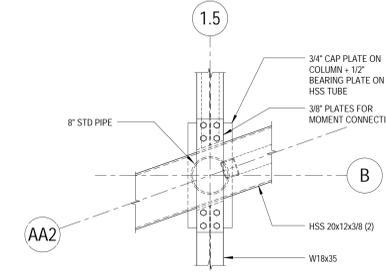
20 | TAPERED BEAM  
S1-502 |  
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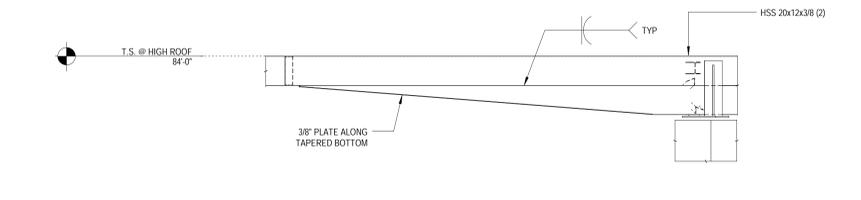
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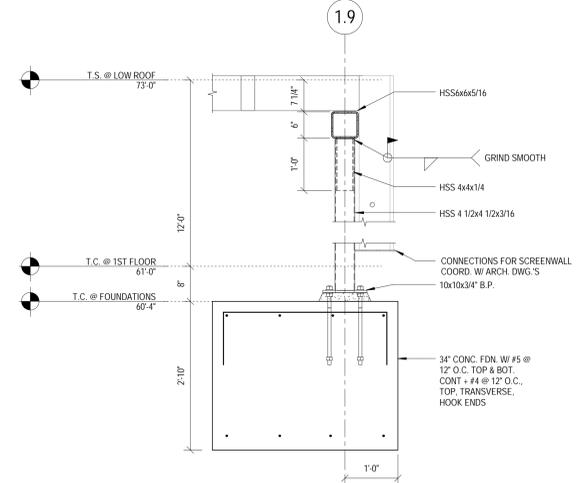
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S1-502 | S1-102  
Scale: 3/4" = 1'-0"



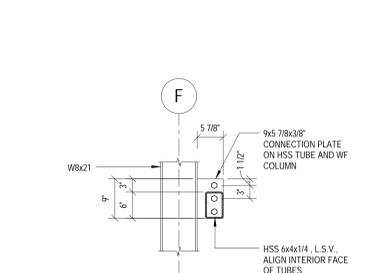
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S1-502 | S1-102  
Scale: 3/4" = 1'-0"



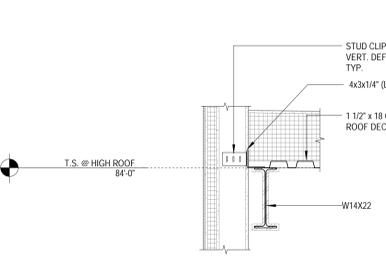
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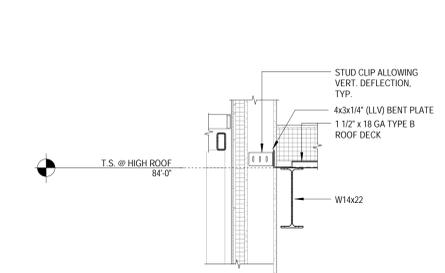
15 | CANOPY SECTION  
S1-502 |  
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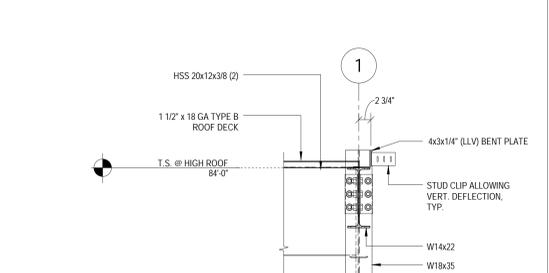
14 | GIRT CONNECTION  
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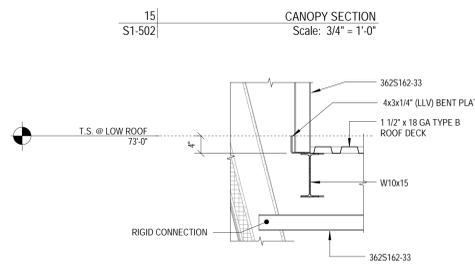
13 | HIGH ROOF  
S1-502 | S1-401  
Scale: 3/4" = 1'-0"



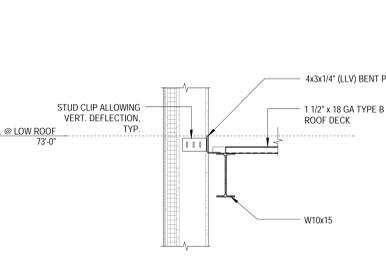
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Scale: 3/4" = 1'-0"



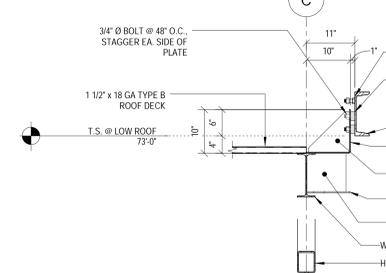
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Scale: 3/4" = 1'-0"



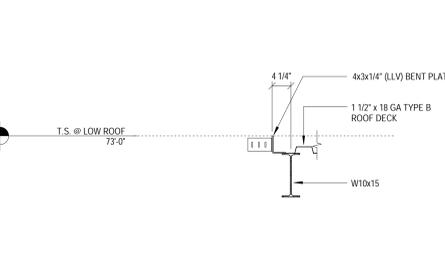
10 | LOW ROOF AT CANTED WALL  
S1-502 |  
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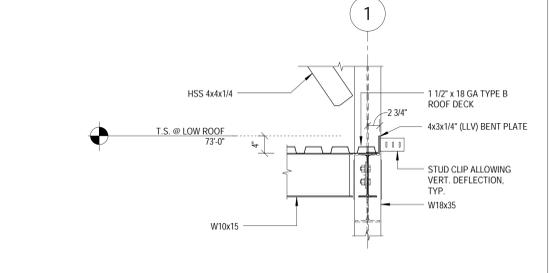
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Scale: 3/4" = 1'-0"



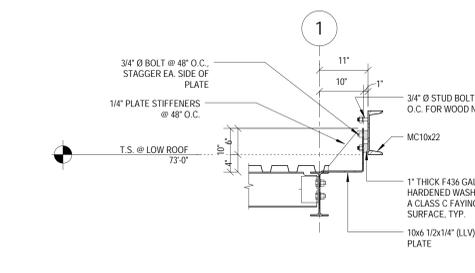
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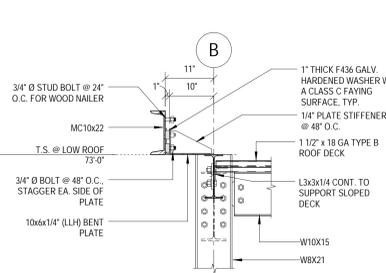
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Scale: 3/4" = 1'-0"



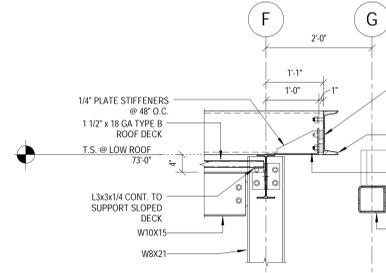
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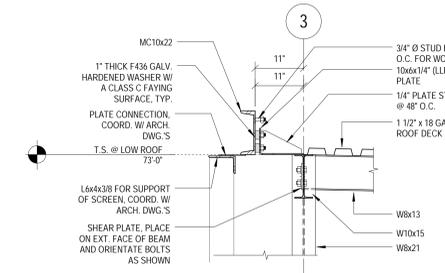
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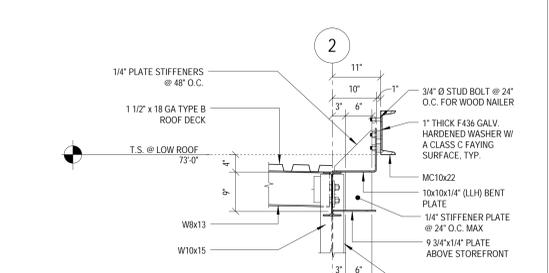
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S1-502 | S1-401  
Scale: 3/4" = 1'-0"



3 | LOW ROOF  
S1-502 | S1-401  
Scale: 3/4" = 1'-0"



2 | LOW ROOF  
S1-502 | S1-401  
Scale: 3/4" = 1'-0"



1 | LOW ROOF  
S1-502 | S1-401  
Scale: 3/4" = 1'-0"

DWG NAME  
**DETAILS**

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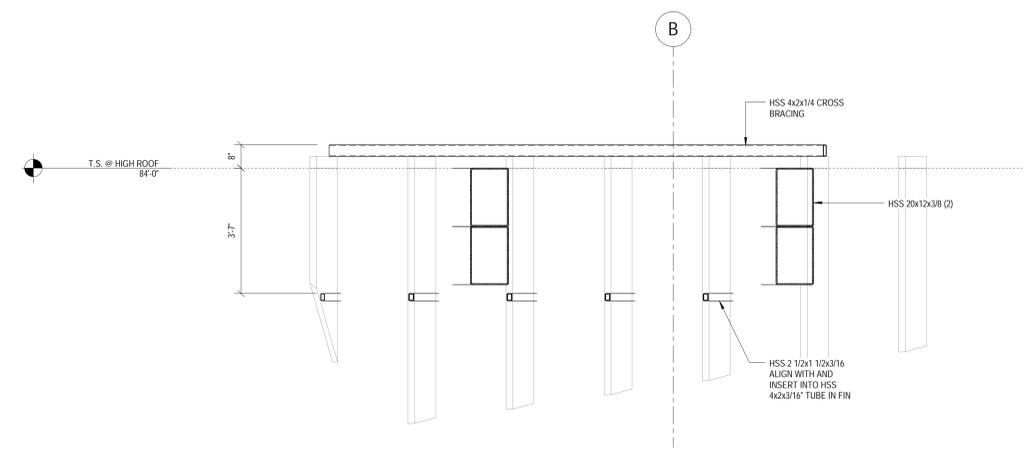
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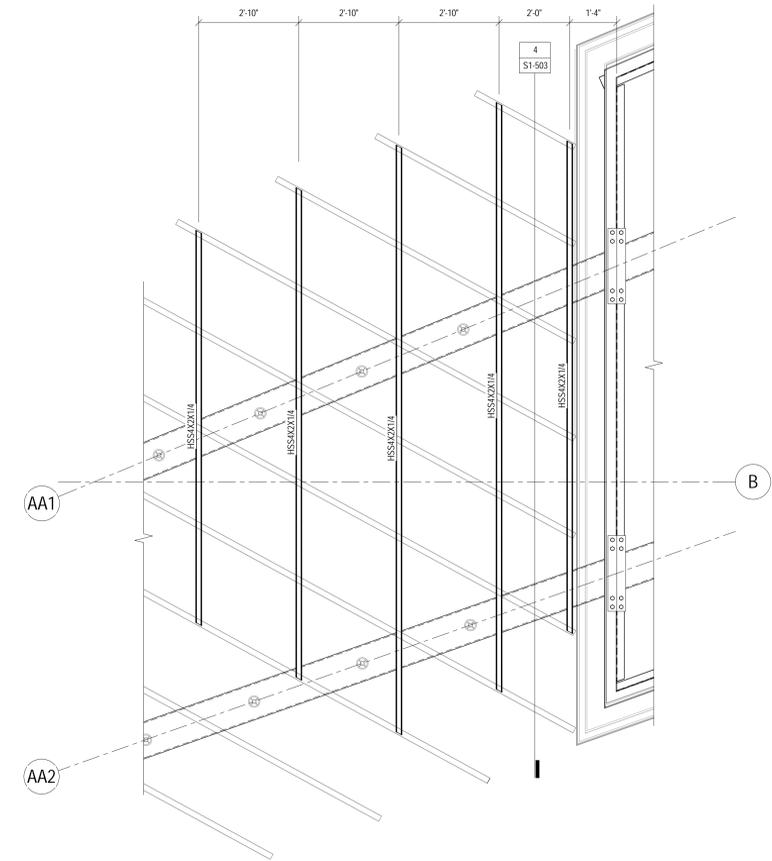
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02905**

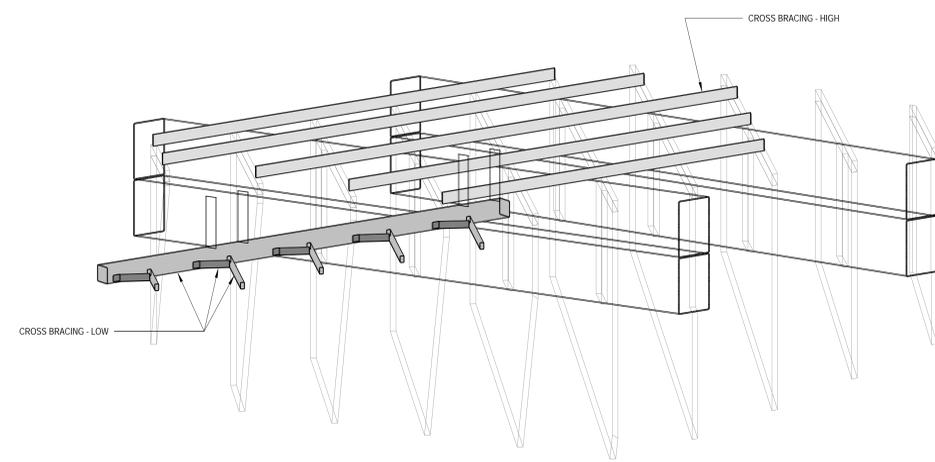
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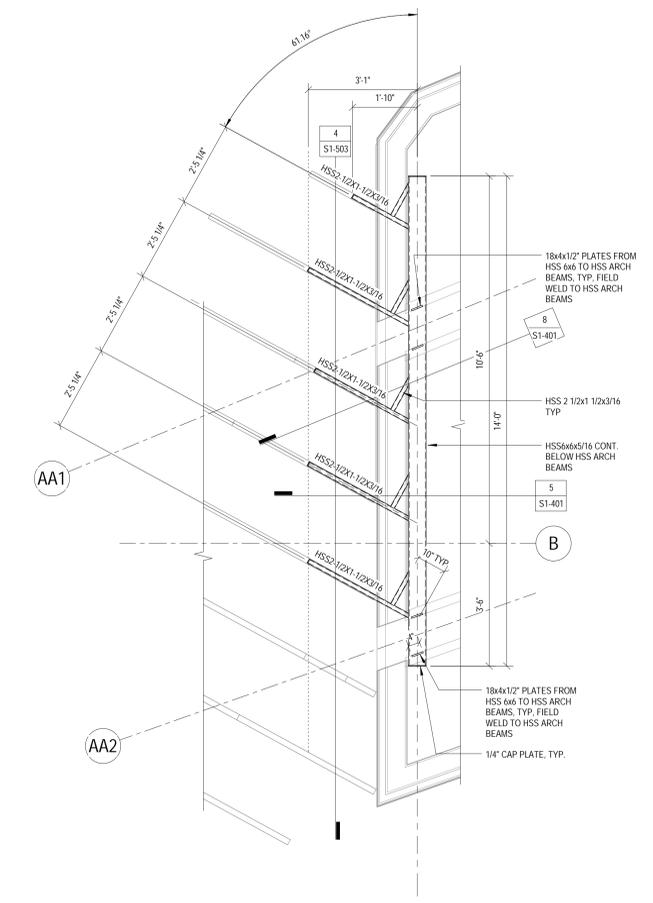
4 | SECTION THROUGH CROSS BRACING  
S1-503/S1-503  
Scale: 1/2" = 1'-0"



2 | CROSS BRACING PLAN - HIGH  
S1-503/S1-102  
Scale: 1/2" = 1'-0"



3 | 3D - BRACING  
S1-503  
Not to Scale



1 | CROSS BRACING PLAN - LOW  
S1-503/S1-102  
Scale: 1/2" = 1'-0"

DWG. NAME  
**DETAILS**

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**20\_037**  
PRINTED DATE  
**3/11/2021 11:34:34 AM**  
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**Author**

DWG. NO.  
**S1-503**

# SHEET NOTES

## METAL FINES:

- FINAL INTERNAL REINFORCING LAYOUT TO BE COMPLETED BY FABRICATOR AND SUBMITTED FOR APPROVAL BASED ON DIAGRAMS PROVIDED.
- DIMENSIONS PROVIDED ARE FOR A GENERAL UNDERSTANDING OF THE FIN GEOMETRIES AND ARE BASED ON THE DIMENSIONS AT THE CENTER OF THE FIN. THE ACTUAL PROFILE OF THE METAL PLATES MAY DIFFER SLIGHTLY. ELECTRONIC DRAWINGS OF THE FIN PROFILES WILL BE PROVIDED FOR THE FABRICATORS USE.
- SITUE FABRICATION HAS BEEN PRE-QUALIFIED TO PROVIDE DIGITAL FABRICATION, ENGINEERING, CONSTRUCTION AND INSTALLATION SERVICES FOR THE GATEWAY CANOPY FIN COMPONENTS. THE GENERAL CONTRACTOR SHALL COORDINATE ALL CROSS TRADE COORDINATION REQUIRED.
- CONTRACTOR TO PROVIDE EITHER SHEET METAL IN ACCORDANCE WITH ASTM A505 OR APPROVED ALTERNATE SHEET METAL MATERIAL, OR ALLOY A3003 ALUMINUM SHEET METAL. IN THE EVENT ALUMINUM ALLOY IS USED CONTRACTOR TO PROVIDE APPROPRIATE FASTENERS TO AVOID CORROSION DUE TO GALVANIC REACTION FOR DISSIMILAR METALS.

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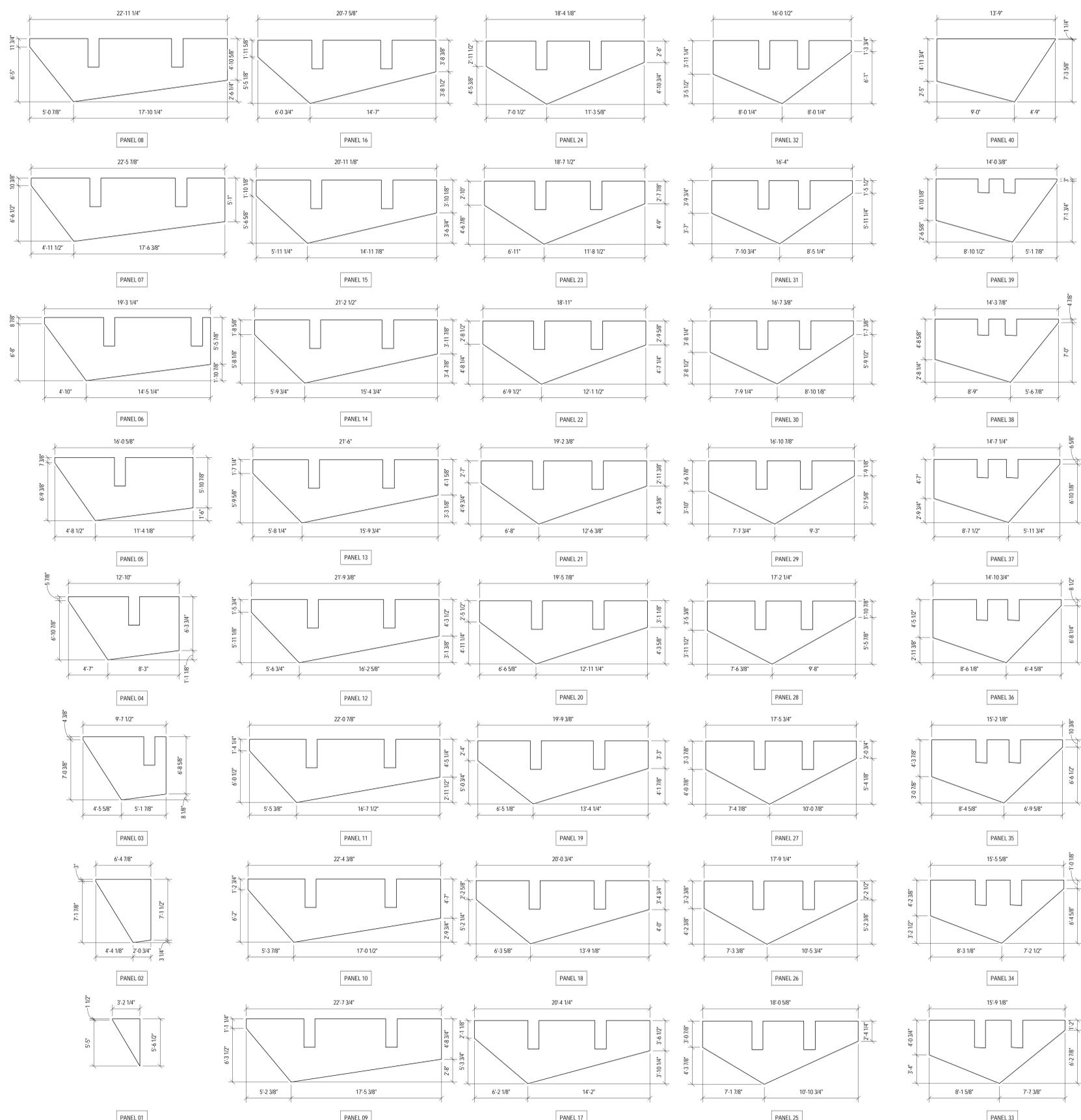
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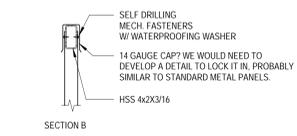
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02905

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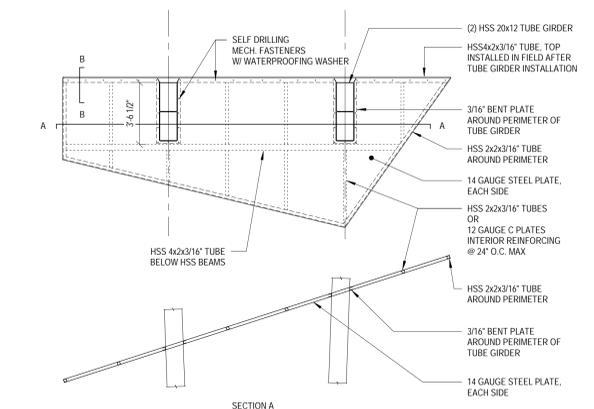
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6	03.16.2021	BIDS



3 FIN PROFILES  
S1-504 Scale: 3/16" = 1'-0"



2 FIN CAP  
S1-504 Scale: 1" = 1'-0"



1 FIN FRAMING DIAGRAM  
S1-504 Scale: 1/4" = 1'-0"

DWG. NAME

DETAILS

JOB NO.

20\_037

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DWG. NAME

**FRAMING ELEVATIONS**

JOB. NO.

20\_037

PRINTED DATE

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DWG. NO.

**S5-301**

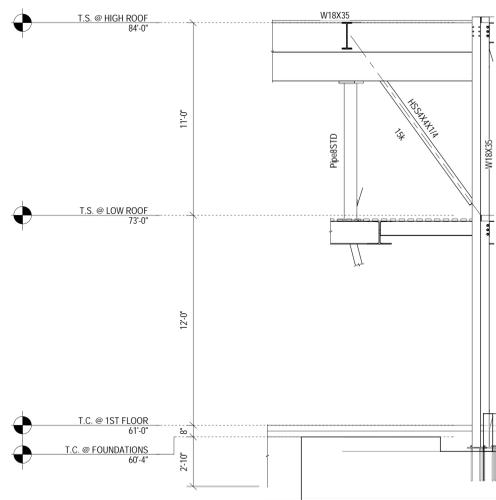
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### 03 CONCRETE

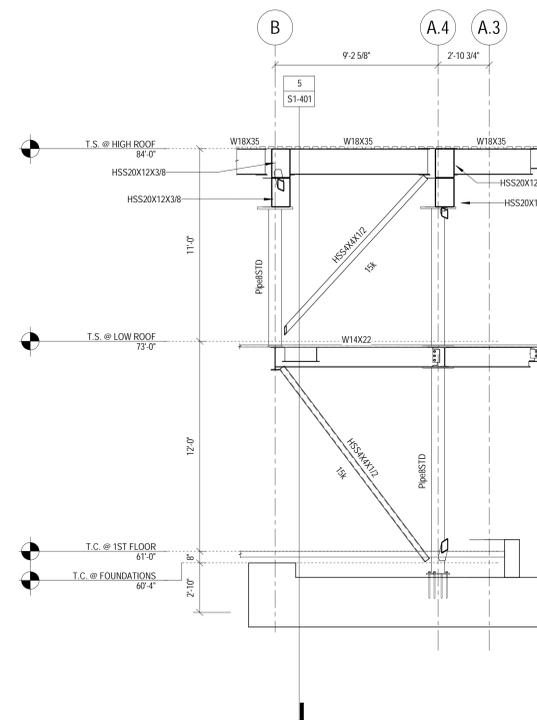
- T.C. @ S.O.G. - USGS ELEVATION 61'-0", U.O.N.
- T.C. @ FOUNDATIONS - 8" FROM T.C. @ S.O.G., U.O.N.
- FOUNDATIONS ARE CENTERED ON COLUMN LINES, U.O.N.
- REINFORCE SLAB ON GRADE W/ 6# W2.9W2.9 WELDED WIRE REINFORCING PLACED IN THE TOP 13#4 OF SLAB, OR  
1 1/2" LONG FIBRILLATED MICROFIBERS AT 1.50 POUNDS PER CUBIC YARD OF CONCRETE.
- SEE TYPICAL DETAILS FOR ADDITIONAL REINFORCING REQUIRED.
- COORDINATE LOCATION OF EMBEDDED FLOOR BOXES FLOOR DRAINS AND SLOPED SLAB WITH ARCHITECTURAL DRAWINGS.

### 05 METALS

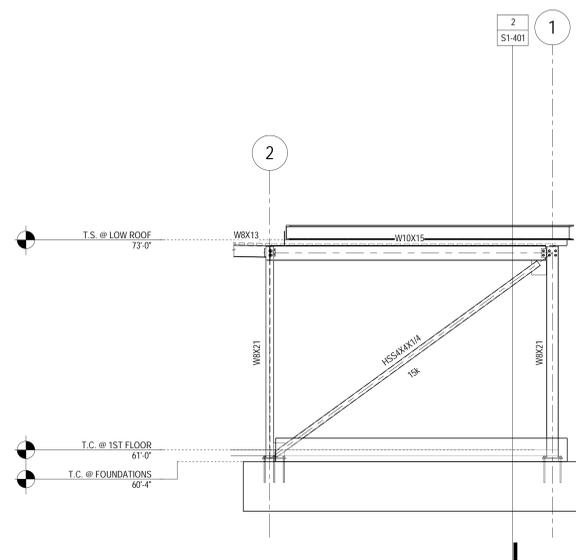
- COORDINATE STEEL FINISH REQUIREMENTS WITH ARCHITECTURAL DRAWINGS AND SPECIFICATIONS. ALL STEEL FRAMING LOCATED IN EXTERIOR WALLS TO BE HOT-DIP GALVANIZED, UNLESS OTHERWISE SPECIFIED.
- W AT BEAM ENDS DENOTES FACTORED DESIGN BEAM REACTION. BEAM END AND SHEAR CONNECTION SHALL BE DESIGNED FOR THAT FORCE. MIN REACTION - 25 KIPS
- M INDICATES MOMENT CONNECTION. BEAM END AND CONNECTION SHALL BE DESIGNED FOR THE FACTORED MOMENT DESCRIBED (MIN 50 KIP-FT).
- TOP OF STEEL (T.S.) AT LOW ROOF - 73'-0", UNLESS OTHERWISE NOTED (+/- XX"). COORD. W/ SECTIONS
- ROOF DECK SHALL BE 1 1/2" x 18 GA. TYPE B METAL ROOF DECK, 2-SPAN MIN.
- COORDINATE FIRE PROOFING REQUIREMENTS OF STEEL FRAMING WITH ARCHITECTURAL DRAWINGS. DO NOT PAINT STEEL TO BE FIREPROOFED.
- EMBED ANCHOR BOLTS 18", U.O.N.



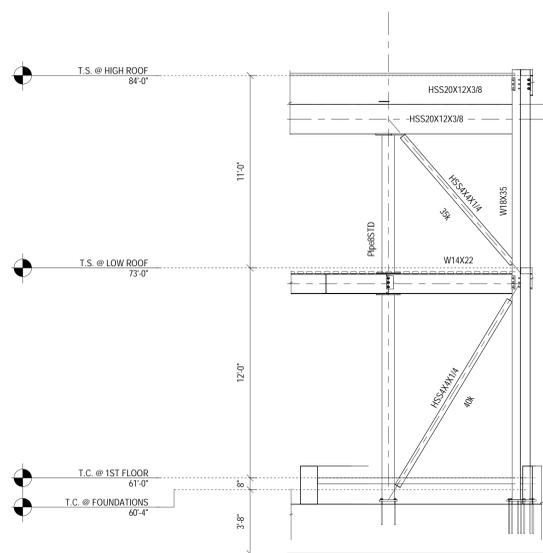
4 FRAMING ELEVATION - SOUTH  
S5-301 Scale: 1/4" = 1'-0"



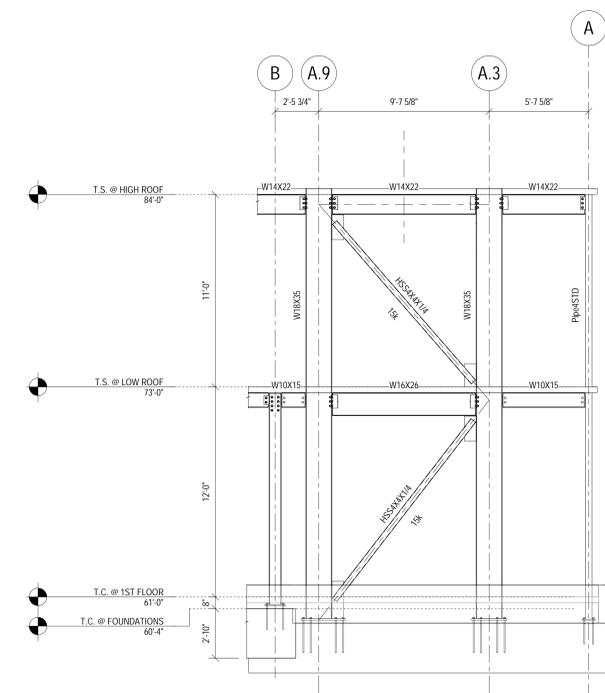
2 FRAMING ELEVATION - WEST  
S5-301 Scale: 1/4" = 1'-0"



5 FRAMING ELEVATION - LINE C  
S5-301 Scale: 1/4" = 1'-0"



3 FRAMING ELEVATION - NORTH  
S5-301 Scale: 1/4" = 1'-0"



1 FRAMING ELEVATION - EAST  
S5-301 Scale: 1/4" = 1'-0"



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### PARTITION TYPE NOTES

- NON-STRUCTURAL METAL STUD FRAMING TO HAVE A MINIMUM BASE METAL THICKNESS OF 8029 INCHES (UNLESS NOTED OTHERWISE) - 20 GA EQUIVALENT STUDS WILL NOT BE ACCEPTED.
- STC RATING IS ONLY LISTED WHERE MINIMUM STC RATINGS ARE REQUIRED BY CODE.
- SEAL ALL PENETRATIONS, ELECTRICAL BOXES, ETC. W/ ACOUSTICAL SEALANT PER SPECIFICATION IN PARTITIONS INDICATED TO RECEIVE ACOUSTICAL INSULATION.
- SEE FINISH PLANS FOR LOCATIONS OF APPLIED FINISH INCLUDING WALL TILE AND FRP TILES.

### SPECIALTY GYPSUM BOARD NOTES

- USE TYPE X GYPSUM BOARD AT FIRE RATED ASSEMBLIES. REFER TO SPECIFIED UL LISTING FOR GYPSUM BOARD REQUIREMENTS IN RATED ASSEMBLIES.
- USE MOLD AND MOISTURE RESISTANT GYP BOARD AT TOILET ROOMS, JANITORS CLOSETS, AND OTHER ROOMS INDICATED WITHIN SPECS AND FLOOR PLANS.
- USE PAINTABLE GLASS MAT GYPSUM BOARD WHEN INSTALLING GYPSUM BOARD BEFORE BUILDING IS ENCLOSED AND WEATHER TIGHT.
- USE CEMENT BACKER OR GLASS MAT FACED GYPSUM TILE BACKER AS DEFINED IN ASTM C1183/1183M IN WET AREAS RECEIVING TILE FINISH SUCH AS SHOWERS, POOLS, AND WHERE INDICATED WITHIN SPECS AND FLOOR PLANS.
- USE ACOUSTIC GYPSUM BOARD FOR WALLS REQUIRING AN STC VALUE HIGHER THAN 35 - REFER TO SPECS AND FLOOR PLANS.
- USE ABUSE RESISTANT GYPSUM BOARD WHERE INDICATED WITHIN SPECS AND FLOOR PLANS.
- USE IMPACT RESISTANT GYPSUM BOARD WHERE INDICATED WITHIN SPECS AND FLOOR PLANS.
- REFER TO SPECIFICATIONS AND FLOOR PLANS FOR ADDITIONAL INFORMATION.

### PARTITION LEGEND

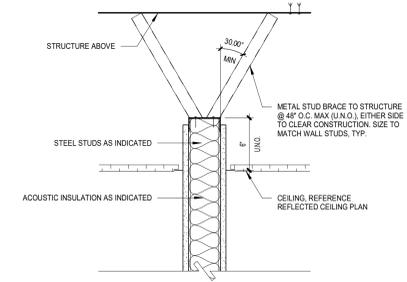
WALL STRUCTURE	PARTITION TYPE
(S) = STEEL STUDS	SEE DETAILS
(M) = MASONRY	SEE DETAILS
(C) = CONCRETE	SEE DETAILS
(W) = WOOD STUDS	SEE DETAILS
(E) = EXISTING	SEE DETAILS

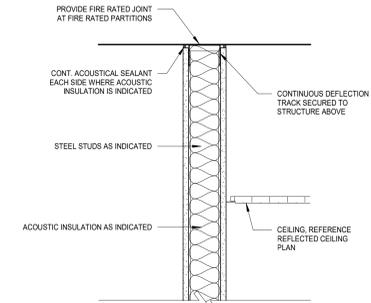
TOP OF WALL	FIRE RATING
(B) = BRACED	(S) = 5/8" KNOKE
(D) = US OF DECK	(1) = 1 HR RATING
(F) = PARTIAL FINISH	(2) = 2 HR RATING
(F) = FRAMED	(3) = 3 HR RATING
	(4) = 4 HR RATING
	(U) = UNRATED

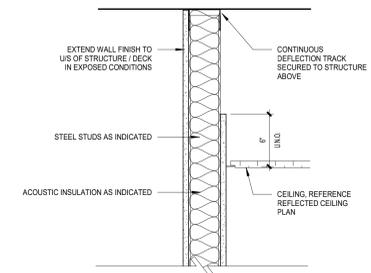
CAVITY	ACoustic INSULATION
(A) = ACOUSTIC INSULATION	
(U) = UNINSULATED CORE	



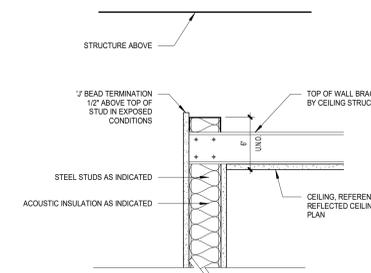
**B T.O. WALL DETAIL - BRACED (B)**  
 1 1/2" = 1'-0"



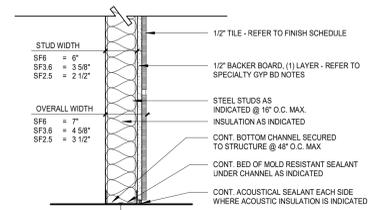
**D T.O. WALL DETAIL - UNDERSIDE OF DECK (D)**  
 1 1/2" = 1'-0"



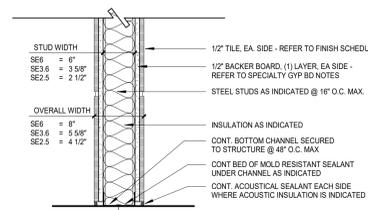
**P T.O. WALL DETAIL - PARTIAL FINISH (P)**  
 1 1/2" = 1'-0"



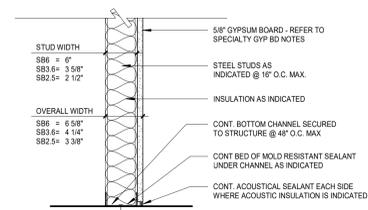
**F T.O. WALL DETAIL - BRACED FRAME (F)**  
 1 1/2" = 1'-0"



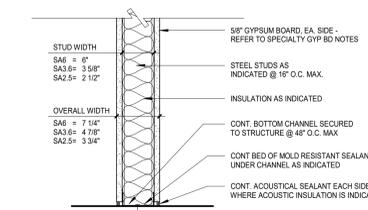
**SF PARTITION TYPE SF(X) - TILE ONE SIDE**  
 1 1/2" = 1'-0" REF:



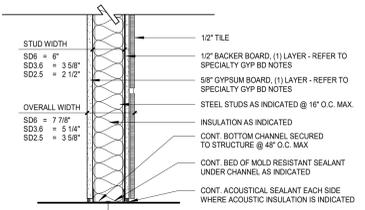
**SE PARTITION TYPE SE(X) - TILE BOTH SIDES**  
 1 1/2" = 1'-0" REF:



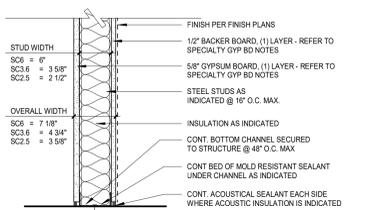
**SB PARTITION TYPE SB(X)**  
 1 1/2" = 1'-0"



**SA PARTITION TYPE SA(X)**  
 1 1/2" = 1'-0"



**SD PARTITION TYPE SD(X) - TILE**  
 1 1/2" = 1'-0" REF:



**SC PARTITION TYPE SC(X)**  
 1 1/2" = 1'-0" REF:

DATE	DESCRIPTION	BY	CHK
05.10.2020	REV		
05.25.2020	REV		
06.09.2020	REV		
06.25.2020	REV		
07.09.2020	REV		
07.25.2020	REV		
08.09.2020	REV		
08.25.2020	REV		
09.09.2020	REV		
09.25.2020	REV		
10.09.2020	REV		
10.25.2020	REV		
11.09.2020	REV		
11.25.2020	REV		
12.09.2020	REV		
12.25.2020	REV		

OWNER  
 CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02905-3215

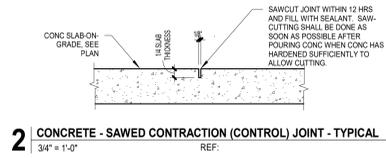
PROJECT  
 RWP GATEWAY & VISITOR CENTER  
 1187 BRADDOCK ST.  
 PROVIDENCE, RI 02905

PARTITION TYPES & DETAILS

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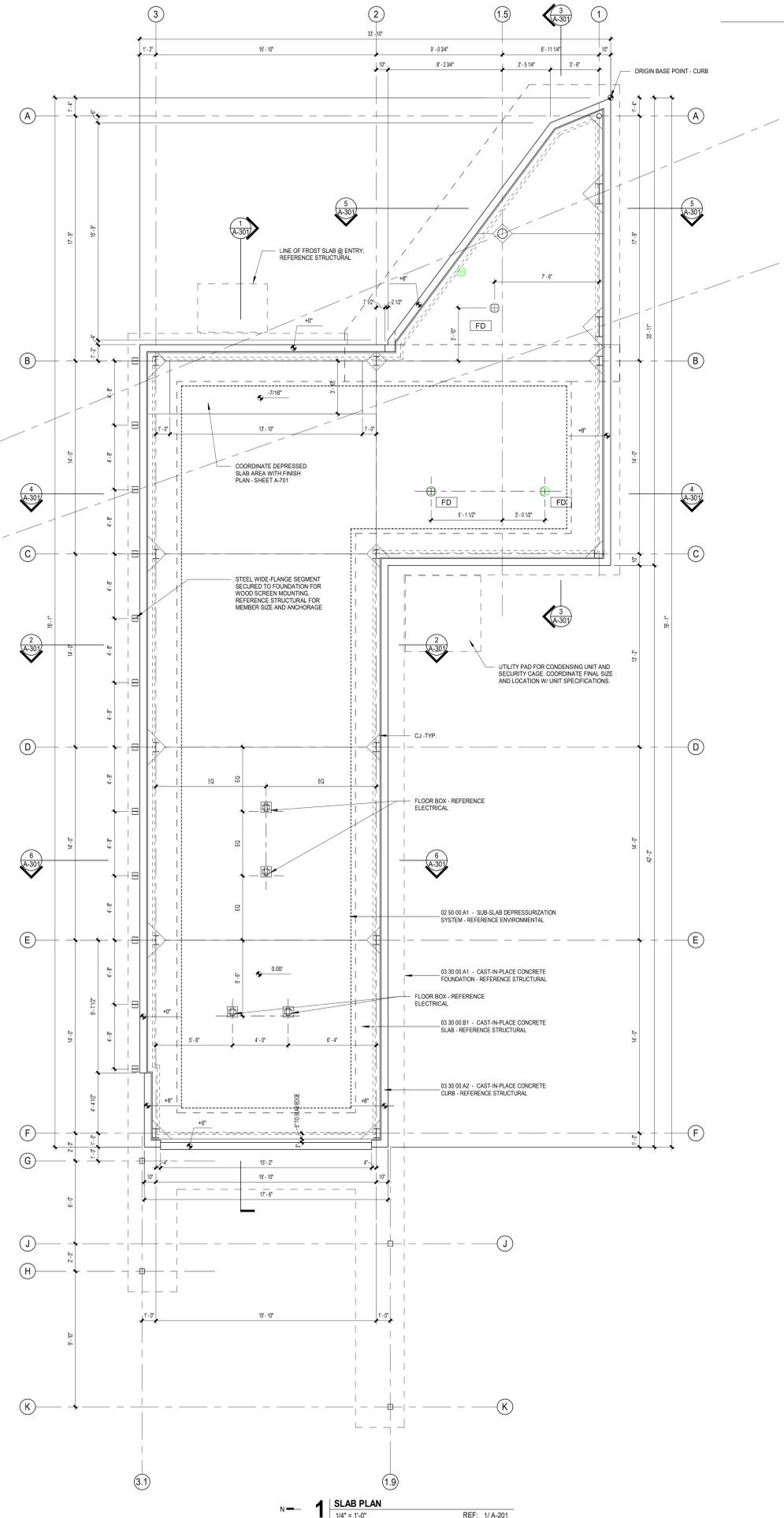
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**SUB SLAB DEPRESSURIZATION SYSTEM**

THE SSDS SYSTEM WILL CONSIST OF APPROXIMATELY 160 FEET OF 4\"/>



1 SLAB PLAN  
 1/4" = 1'-0" REF: 1/A-201

DATE: 08.19.2020  
 DATE: 09.09.2020  
 DATE: 03.18.2021

ISSUED FOR	DATE	BY	REVISION
CD 100%	08.19.2020	EDM	1
CD 100%	09.09.2020	EDM	2
CD 100%	03.18.2021	EDM	3

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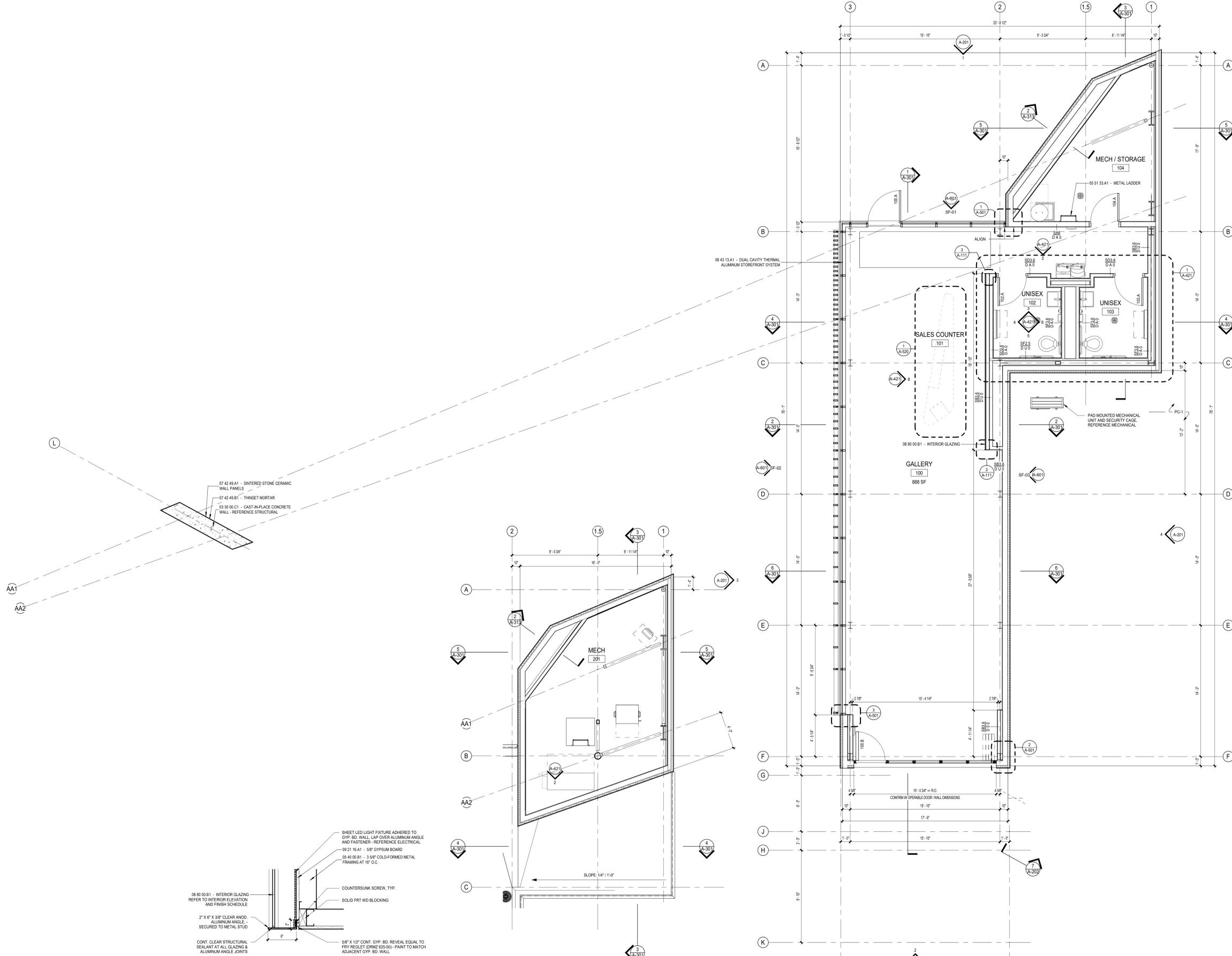
PROJECT: RWP GATEWAY & VISITOR CENTER  
 1107 BRAD ST.  
 PROVIDENCE, RI 02905

SHEET TITLE: OVERALL SLAB PLAN

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- ### GENERAL NOTES
- DO NOT SCALE DRAWINGS. USE FIGURED DIMENSIONS ONLY.
  - ALL DIMENSIONS ARE TO FACE OF STUD, UNLESS NOTED OTHERWISE.
  - DIMENSIONS INDICATING 'CLEAR' ARE DIMENSIONED TO THE FACES OF THE MOST NARROW SECTION WHERE DIMENSION IS SHOWN. SHOULD ANY CONDITIONS NOT PERMIT CONSTRUCTION OF DESIGN AS INTENDED, G.C./C.M. IS TO NOTIFY ARCHITECT IMMEDIATELY.
  - ALL DIMENSIONS NOTED 'AFF' ARE ABOVE FINISH SURFACE OF SLAB.
  - CONTRACTOR SHALL PROVIDE ANY AND ALL ANGLARY MATERIALS, INCLUDING UNSPECIFIED PARTS, TRIMS AND ACCESSORIES, REQUIRED TO COMPLETE THE WORK INDICATED IN THE DRAWINGS.
  - STUDS SHALL BE INSTALLED HEATED SQUARELY (WITHIN 1/4") AGAINST THE WEB PORTION OF THE TOP AND BOTTOM TRACKS. TRACKS SHALL REST ON A CONTINUOUS, UNIFORM BEARING SURFACE.
  - DO NOT FASTEN DRYWALL TO TOP AND BOTTOM TRACKS. FASTEN DRYWALL TO STUDS ONLY.
  - TEMPORARY BRACING MAY BE PROVIDED AND LEFT IN PLACE UNTIL THE WORK IS PERMANENTLY STABILIZED.
  - ALL PARTITIONS THAT APPEAR TO SHARE THE SAME CENTERLINE WITH COLLARS, WINDOW MULLIONS, OR PLASTER SHALL BE CONSTRUCTED CENTERED ON THESE RESPECTIVE CENTERLINES UNLESS NOTED OTHERWISE.
  - PROVIDE 20 GAUGE MINIMUM 1" HIGH, FIRE RETARDANT PLYWOOD, OR 20-GAUGE HORIZONTAL STRAPPING ON STUDS AT ALL WALLS WITH MILLWORK.
  - ANY DRYWALL FINISH WHICH IS EXISTING TO REMAIN SHALL BE PATCHED, PRIMED AND PAINTED TO LIKE NEW CONDITION AND TO ACCEPT NEW FINISHES. CONTRACTOR SHALL DETERMINE BEST METHODS FOR PATCHING. OR IF DRYWALL WILL NEED TO BE REMOVED AND REPLACED TO ACHIEVE DESIRED FINISH.
  - THERMOSTATS, FIRE EXTINGUISHERS, CABINETS, OR ANY OTHER WALL MOUNTED ARCHITECTURAL ACCESSORY SHALL NOT BE INSTALLED ON ANY WALL WITH GRAPHIC STRETCHINGS OR SPECIALTY FINISHING.
  - ALL WOOD BLOCKING SHALL BE FIRE RETARDANT AS REQUIRED BY LOCAL BUILDING CODE.
  - COORDINATE WITH MECHANICAL DRAWINGS, ENGINEERS AND CONTRACTOR FOR OPENINGS REQUIRED IN ALL FULL HEIGHT PARTITIONS (SLAB TO SLAB).
  - USE CALVANIZED CORNER BRADS AND EDGE TRIM IN ALL EXPOSED WORK.
  - COMPLETELY SEAL ALL HEADS, BASES, ENDS AND PENETRATIONS, INCLUDING BUT NOT LIMITED TO MECHANICAL, ELECTRICAL AND PLUMBING PENETRATIONS, WITH ACOUSTICAL SEALANT.
  - G.C./C.M. IS RESPONSIBLE TO LOCATE ALL FIRE ALARM COMPONENTS AS REQUIRED. COORDINATE WITH OWNER AND FIRE MARSHAL.
  - FIRE RATING FOR WALL TYPES ALSO INDICATED ON LIFE SAFETY AND REFLECTED CEILING PLANS.

- ### SPECIALTY GYPSUM BOARD NOTES
- USE TYPE X GYPSUM BOARD AT FIRE RATED ASSEMBLIES. REFER TO SPECIFIED UL LISTING FOR GYPSUM BOARD REQUIREMENTS IN RATED ASSEMBLIES.
  - USE MOLD AND MOISTURE RESISTANT GYP BOARD AT TOILET ROOMS, JANITORS CLOSETS, AND OTHER ROOMS INDICATED WITHIN SPECS AND FLOOR PLANS.
  - USE PAINTABLE GLASS MAT GYPSUM BOARD WHEN INSTALLING GYPSUM BOARD BEFORE BUILDING IS ENCLOSED AND WEATHER TIGHT.
  - USE CEMENT BACKER OR GLASS MAT FACED GYPSUM TILE BACKER AS DEFINED IN ASTM C1137/TM IN WET AREAS RECEIVING TILE FINISH SUCH AS SHOWERS, POOLS, AND WHERE INDICATED WITHIN SPECS AND FLOOR PLANS.
  - USE ACOUSTIC GYPSUM BOARD FOR WALLS REQUIRING AN STC VALUE HIGHER THAN 30 - REFER TO SPECS AND FLOOR PLANS.
  - USE ABUSE RESISTANT GYPSUM BOARD WHERE INDICATED WITHIN SPECS AND FLOOR PLANS.
  - USE IMPACT RESISTANT GYPSUM BOARD WHERE INDICATED WITHIN SPECS AND FLOOR PLANS.
  - REFER TO SPECIFICATIONS AND FLOOR PLANS FOR ADDITIONAL INFORMATION.

- ### GENERAL FLOOR PLAN LEGEND
- PROPOSED NEW WALL
  - PROPOSED WALL TO DECK
  - PROPOSED PARTIAL HEIGHT WALL
  - WALL TYPE TAG

**3 PLAN DETAIL - FEATURE WALL CORNER TRANSITION**  
 1/12" = 1'-0" REF: 1/A-111

**2 FLOOR PLAN - ATTIC LEVEL**  
 1/4" = 1'-0" REF: 2/A-202

**1 FLOOR PLAN - LEVEL 1**  
 1/4" = 1'-0" REF: 1/A-201

DATE	DESCRIPTION	BY	CHK
05.10.2020	REV	PK	PK
05.25.2020	REV	PK	PK
06.09.2020	REV	PK	PK
06.23.2020	REV	PK	PK
07.06.2020	REV	PK	PK
07.13.2020	REV	PK	PK

**OWNER**  
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 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02905-3275

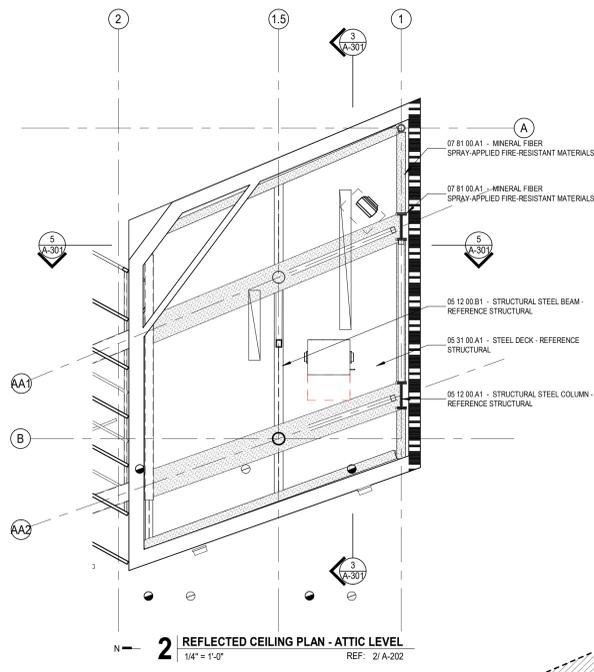
**PROJECT**  
 RWP GATEWAY & VISITOR CENTER  
 1107 BRADDOCK ST.  
 PROVIDENCE, RI 02905

**OVERALL FLOOR PLAN**

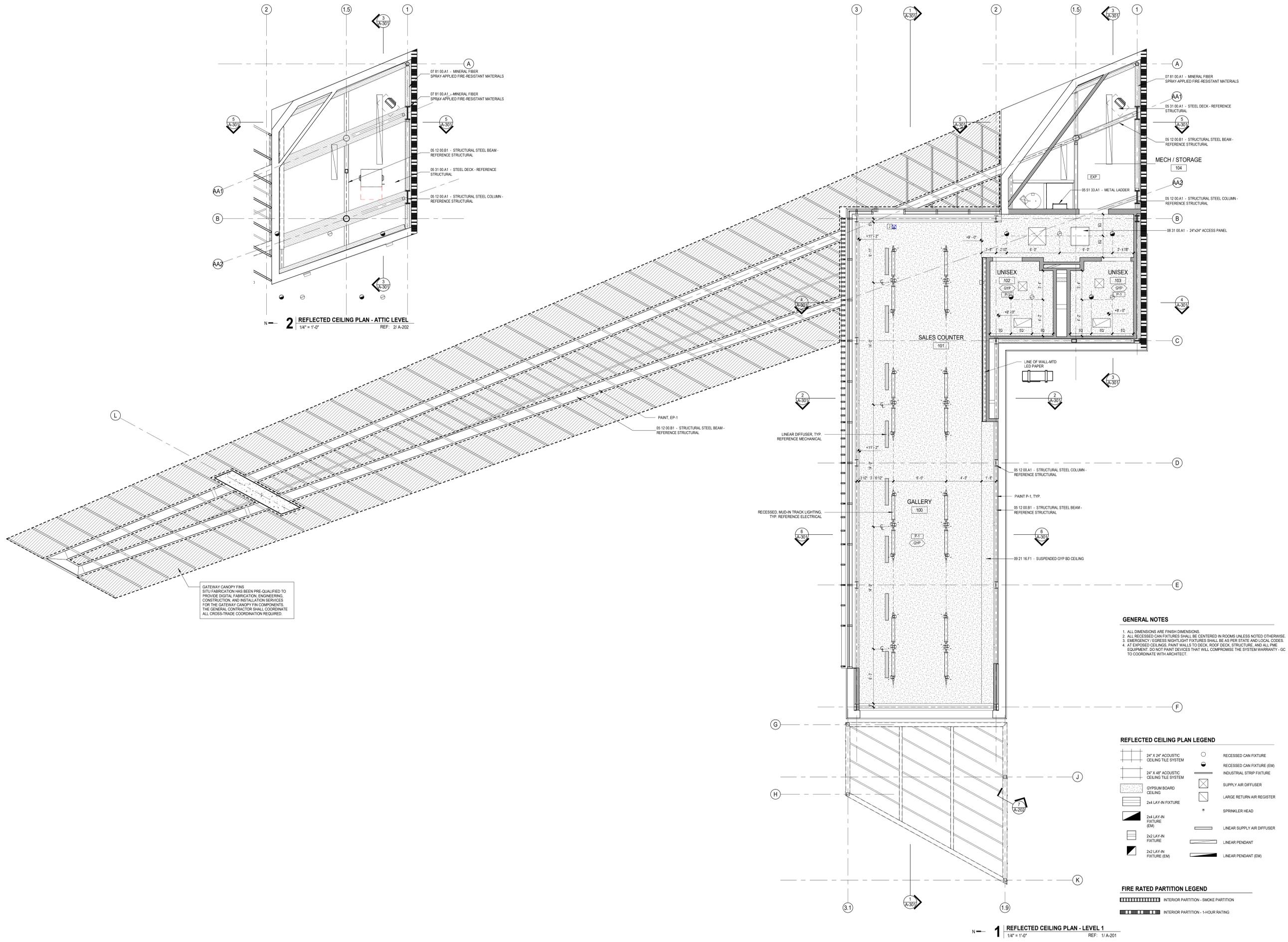
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**2 REFLECTED CEILING PLAN - ATTIC LEVEL**  
 1/4" = 1'-0" REF: 2/A-202



**1 REFLECTED CEILING PLAN - LEVEL 1**  
 1/4" = 1'-0" REF: 1/A-201

GATEWAY CANOPY FINIS  
 SITU FABRICATION HAS BEEN PRE-QUALIFIED TO  
 PROVIDE DIGITAL FABRICATION, ENGINEERING,  
 CONSTRUCTION, AND INSTALLATION SERVICES.  
 FOR THE GATEWAY CANOPY FIN COMPONENTS.  
 THE GENERAL CONTRACTOR SHALL COORDINATE  
 ALL CROSS-TRADE COORDINATION REQUIRED.

- GENERAL NOTES**
1. ALL DIMENSIONS ARE FINISH DIMENSIONS.
  2. ALL RECESSED CAN FIXTURES SHALL BE CENTERED IN ROOMS UNLESS NOTED OTHERWISE.
  3. EMERGENCY EGRESS HIGHLIGHT FIXTURES SHALL BE AS PER STATE AND LOCAL CODES.
  4. AT EXPOSED CEILING, PAINT WALLS TO DECK, ROOF DECK, STRUCTURE, AND ALL PAE EQUIPMENT. DO NOT PAINT DEVICES THAT WILL COMPROMISE THE SYSTEM WARRANTY - GC TO COORDINATE WITH ARCHITECT.

- REFLECTED CEILING PLAN LEGEND**
- 24" X 24" ACOUSTIC CEILING TILE SYSTEM
  - 24" X 48" ACOUSTIC CEILING TILE SYSTEM
  - GYPSUM BOARD CEILING
  - 2x4 LAY-IN FIXTURE
  - 2x4 LAY-IN FIXTURE (EM)
  - 2x2 LAY-IN FIXTURE
  - 2x2 LAY-IN FIXTURE (EM)
  - RECESSED CAN FIXTURE
  - RECESSED CAN FIXTURE (EM)
  - INDUSTRIAL STRIP FIXTURE
  - SUPPLY AIR DIFFUSER
  - LARGE RETURN AIR REGISTER
  - SPRINKLER HEAD
  - LINEAR SUPPLY AIR DIFFUSER
  - LINEAR PENDANT
  - LINEAR PENDANT (EM)

- FIRE RATED PARTITION LEGEND**
- INTERIOR PARTITION - SMOKE PARTITION
  - INTERIOR PARTITION - 1-HOUR RATING

DATE: 05/10/2020  
 DATE: 05/25/2020  
 DATE: 09/09/2020  
 DATE: 09/09/2020  
 DATE: 09/09/2020

DESIGNED BY	DATE	DATE	DATE	DATE
CD 80%	05/10/2020	05/25/2020	09/09/2020	09/09/2020
CD 80%	05/10/2020	05/25/2020	09/09/2020	09/09/2020
CD 80%	05/10/2020	05/25/2020	09/09/2020	09/09/2020
CD 80%	05/10/2020	05/25/2020	09/09/2020	09/09/2020

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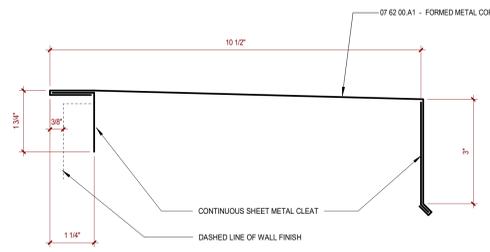
PROJECT: RWP GATEWAY & VISITOR CENTER  
 1107 BRADDOCK ST.  
 PROVIDENCE, RI 02905

OVERALL REFLECTED CEILING PLAN

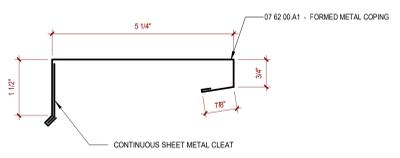
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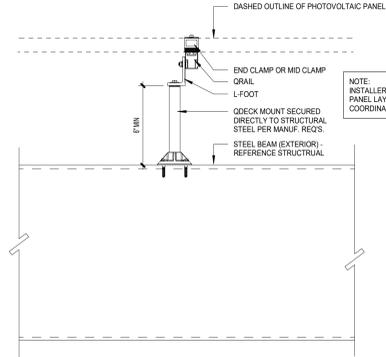
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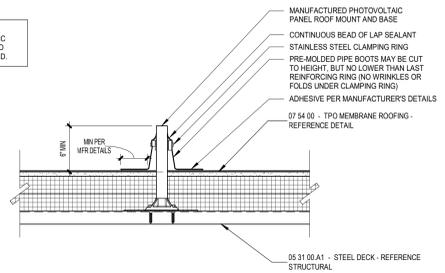
**9 SHEET METAL COPING PROFILE @ HIGH ROOF**  
 6" = 1'-0"



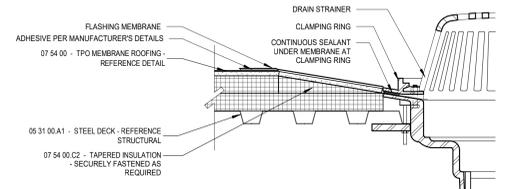
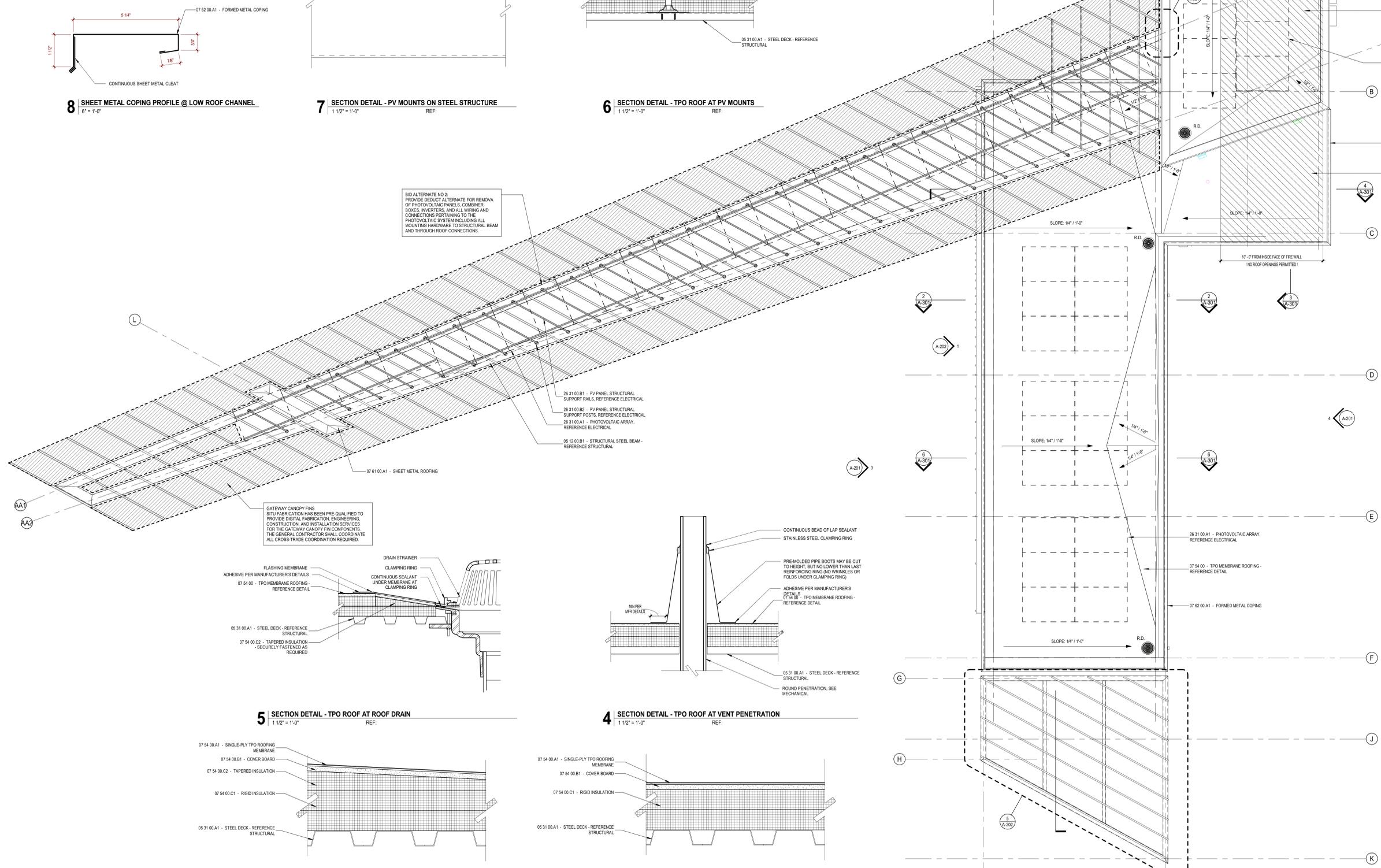
**8 SHEET METAL COPING PROFILE @ LOW ROOF CHANNEL**  
 6" = 1'-0"



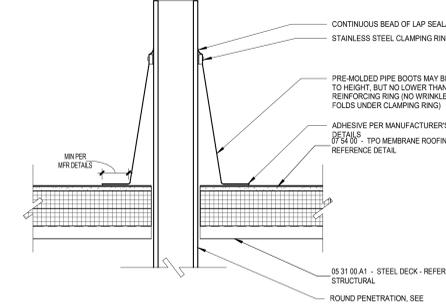
**7 SECTION DETAIL - PV MOUNTS ON STEEL STRUCTURE**  
 1 1/2" = 1'-0"



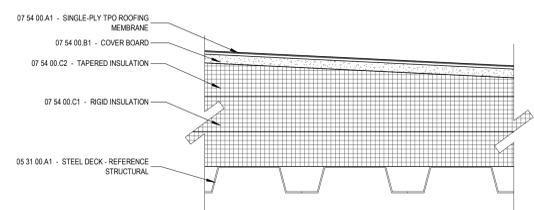
**6 SECTION DETAIL - TPO ROOF AT PV MOUNTS**  
 1 1/2" = 1'-0"



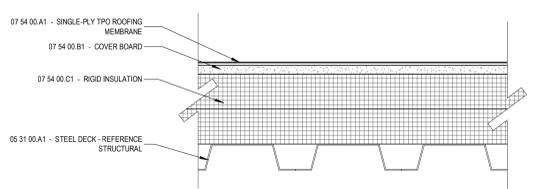
**5 SECTION DETAIL - TPO ROOF AT ROOF DRAIN**  
 1 1/2" = 1'-0"



**4 SECTION DETAIL - TPO ROOF AT VENT PENETRATION**  
 1 1/2" = 1'-0"



**3 SECTION DETAIL - TYPICAL TPO ROOF ASSEMBLY ON TAPERED INSULATION**  
 3" = 1'-0"



**2 SECTION DETAIL - TYPICAL TPO ROOF ASSEMBLY ON SLOPED STRUCTURE**  
 3" = 1'-0"

- GENERAL NOTES**
- REFER TO MECH./PLUMBING DWGS FOR ADDITIONAL NOTES AND DETAILS.
  - PROVIDE ROOF MANUFACTURER STANDARD VENT TERMINAL AND PIPE PENETRATION FLASHING DETAILS FOR ROOF TYPE AND WARRANTY SPECIFIED. VERIFY AND COORDINATE ALL LOCATIONS OF ROOF PENETRATIONS WITH STRUCTURAL, MECHANICAL, AND PLUMBING DRAWINGS.
  - ALL EQUIPMENT ON ROOF TO BE MOUNTED ON CURBS.
  - MECHANICAL EQUIPMENT LOCATIONS ARE APPROXIMATE. ALL ROOF TOP MECHANICAL EQUIPMENT SHALL BE LOCATED MINIMUM 12'-0" FROM ROOF EDGE. COORDINATE FINAL LOCATIONS WITH MECHANICAL TRADES. ALL VENT LOCATIONS SHOULD BE VERIFIED WITH MECHANICAL AND PLUMBING DWGS.
  - EXHAUST FANS AND VENTS TO BE LOCATED A MINIMUM OF 15'-0" FROM AC INTAKE. VERIFY ALL LOCATIONS WITH MECHANICAL AND PLUMBING DWGS.
  - ALL ROOF SLOPES HAVE A 1/4" PER FOOT FALL UNLESS NOTED OTHERWISE. SADDLES AND CRICKETS SHALL BE 1/2" PER FOOT U.N.O.
  - ROOF SLOPES ACHIEVED THROUGH A SLOPED STRUCTURE (TAPERED INSULATION) ROOF SYSTEM.
  - CIVIL ENGINEER TO COORDINATE STORM SEWER CONNECTION WITH SITE PLANS.
  - MECH SUB-CONTRACTOR TO COORDINATE INSTALLATION AND ACCEPTANCE OF PRE-FABRICATED CURBS AND PENETRATIONS WITH ROOF MEMBRANE SUB-CONTRACTOR. GC TO PROVIDE ALL NECESSARY BLOCKING, WALLERS, ETC. AS NECESSARY FOR A WATERIGHT AND WATERPROOF ROOF.
  - IT IS THE GENERAL CONTRACTOR'S RESPONSIBILITY TO VERIFY, COORDINATE AND/OR INSTALL ALL ADJACENT AND/OR RELATED FLASHINGS, BLOCKINGS, WALLERS, INSULATION STOPS, CRICKETS, ETC NECESSARY FOR THE COMPLETE INSTALLATION OF THE ROOF MEMBRANE WHICH ARE REQUIRED FOR A COMPLETE, WARRANTED, WATERIGHT, WATERPROOF INSTALLATION.
  - REVIEW POWER REQUIREMENTS FOR ANY EXTERIOR SIGNAGE PRIOR TO ROOF INSTALLATION FOR ANY CONDUIT/CONDUIT PENETRATIONS IF REQUIRED.
  - ALL GAS PIPING TO BE PAINTED SAFETY YELLOW.
  - MINIMUM ROOF R-VALUE: 30

DATE	DESCRIPTION	BY	CHK
05.10.2020	ISSUE FOR PERMIT	EDIN	EDIN
05.25.2020	ISSUE FOR REVIEW	EDIN	EDIN
06.09.2020	ISSUE FOR PERMIT	EDIN	EDIN

**OWNER**  
 CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-3215

**PROJECT**  
 RWP GATEWAY & VISITOR CENTER  
 1107 BRADDOCK ST.  
 PROVIDENCE, RI 02905

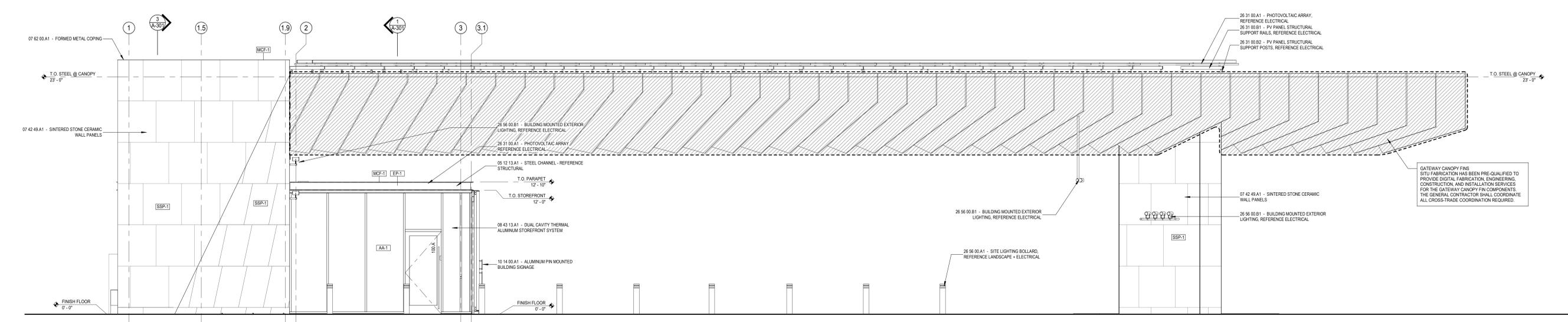
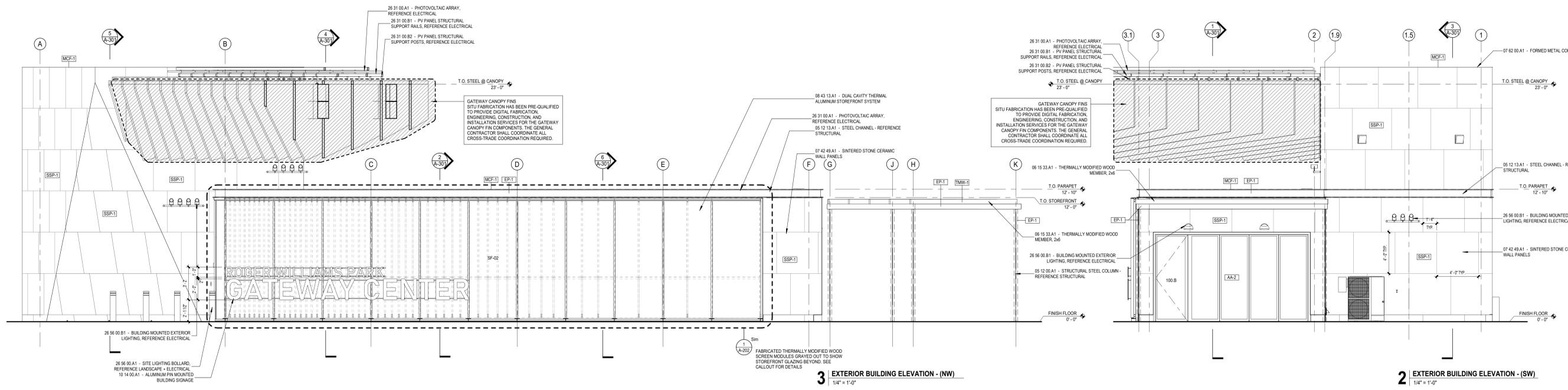
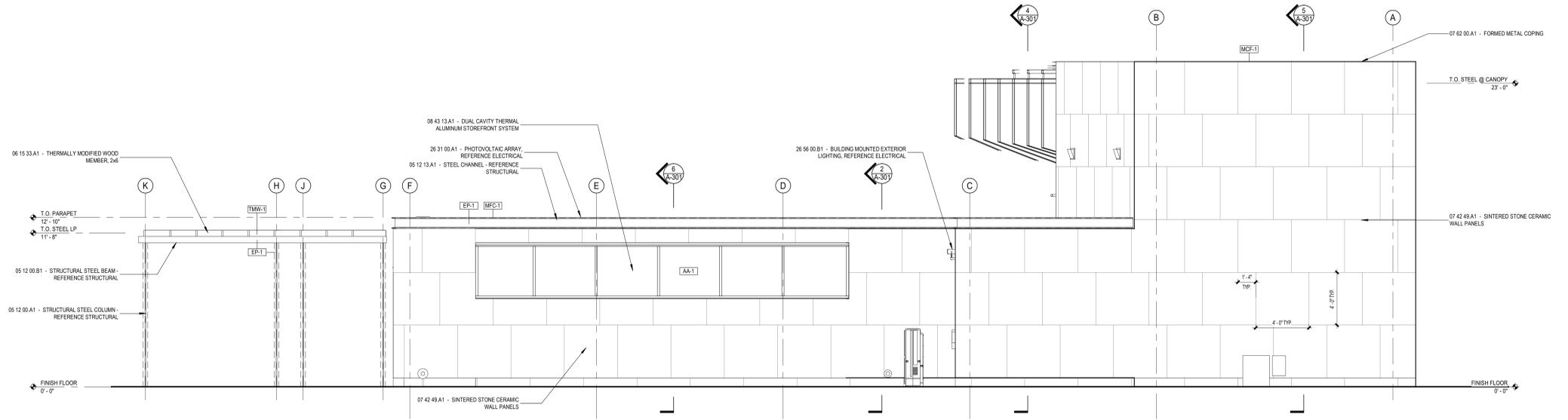
**PROJECT #**  
 2717.00

**1 ROOF PLAN**  
 1/4" = 1'-0"  
 REF: 1/A-201

**A-141**

### EXTERIOR FINISH SCHEDULE (BASIS-OF-DESIGN)

<b>SINTERED STONE CLADDING</b>
MANUF: NEOLITH
STYLE: COLORFEE
SSP-1 SIZE: REFER TO DRAWINGS
COLOR: NIEVE
LOCATION: REFER TO DRAWINGS
FINISH: SATIN
<b>LOUVER SCREEN</b>
MANUF: THERMORY USA
STYLE: BENCHMARK WHITE ASH DECKING
MODEL: 2X6 PREFINISHED BOARDS
COLOR: WHITE ASH
LOCATION: REFER TO DRAWINGS
NOTES: FINISH - NATURAL
<b>METAL FLASHING AND TRIM</b>
MANUF: ALUMINUM
MCF-1 SIZE: REFER TO DRAWINGS
COLOR: CLEAR ANODIZED
LOCATION: REFER TO DRAWINGS
NOTES: INCLUDES BREAK METAL, COPINGS, COUNTER FLASHING, AND DRIP EDGES
<b>EXTERIOR STOREFRONT GLAZING SYSTEM</b>
MANUF: TUBELITE
STYLE: TU24850 SERIES STOREFRONT
AA-1 SIZE: REFER TO DRAWINGS
COLOR: CLEAR ANODIZED
LOCATION: REFER TO DRAWINGS
NOTES: REFER TO 08 80 00 FOR INSULATED GLAZING CRITERIA
MANUF: NANAWALL
STYLE: NW ALUMINUM 840 OPERABLE ALUMINUM INSULATED GLAZING SYSTEM
AA-2 SIZE: REFER TO DRAWINGS
COLOR: CLEAR ANODIZED
LOCATION: REFER TO DRAWINGS
NOTES:
<b>EXTERIOR PAINT</b>
MANUF: BENJAMIN MOORE OR APPROVED EQUAL
EP-1 COLOR: TBD - ARCHITECT TO PROVIDE COLOR CARD
LOCATION: REFER TO DRAWINGS
NOTES:
<b>EXTERIOR PAINT</b>
MANUF: BENJAMIN MOORE OR APPROVED EQUAL
EP-2 COLOR: 2136-20 DEEP CAVIR
LOCATION: REFER TO DRAWINGS
NOTES: COORDINATE PAINTING OF ADJACENT BUILDING WITH OWNERS REPRESENTATIVE PRIOR TO PROCEEDING WITH WORK



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3/1/2023 5:13:23PM

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DATE: 06/20/2023  
 DESIGNED BY: BJK  
 CHECKED BY: BJK  
 DRAWN BY: BJK  
 PROJECT NO: 2717.00  
 SHEET NO: 1  
 TOTAL SHEETS: 1

PROJECT: RWP GATEWAY & VISITOR CENTER  
 1437 BROAD ST  
 PROVIDENCE, RI 02905

CLIENT: CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02905-3215

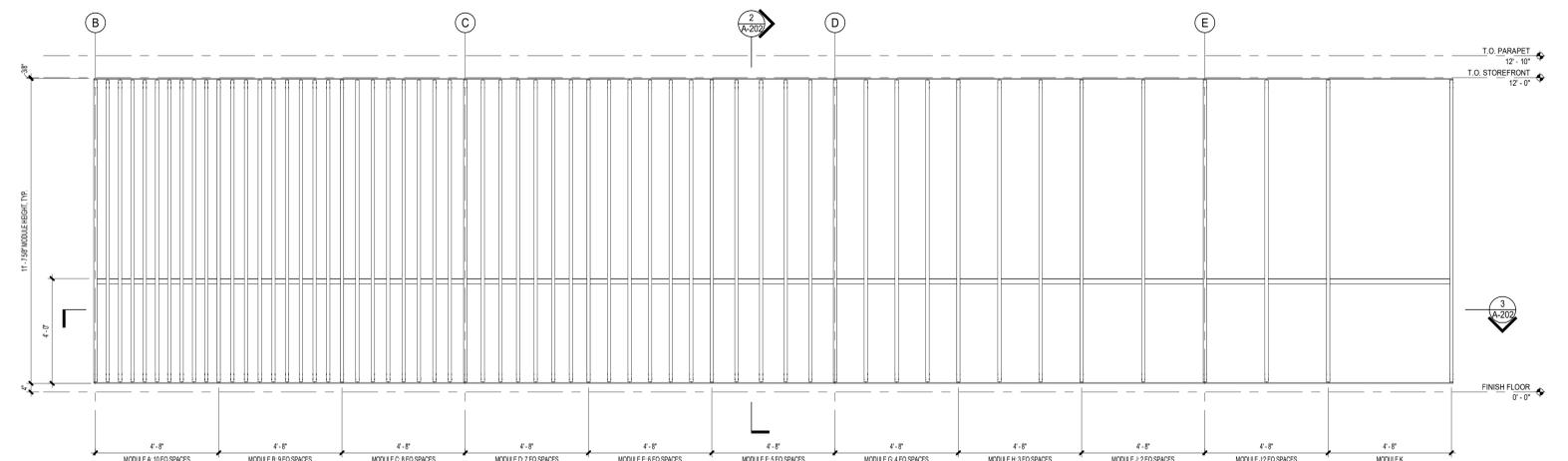
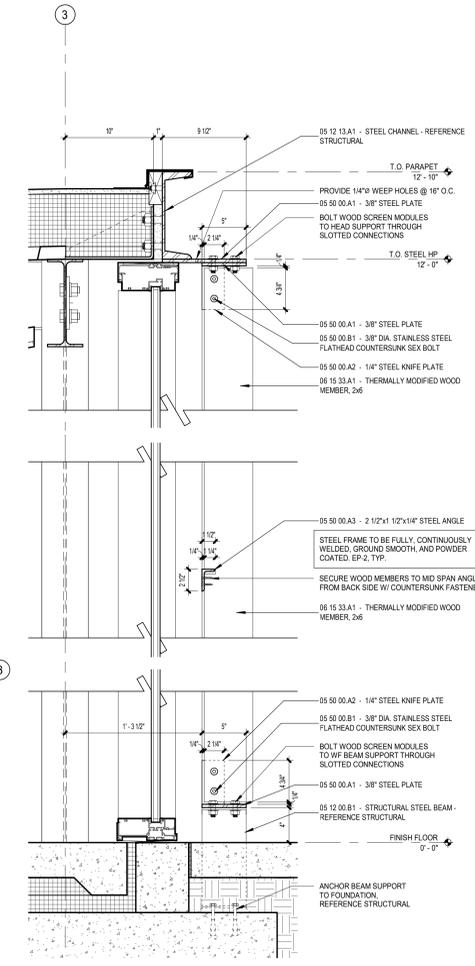
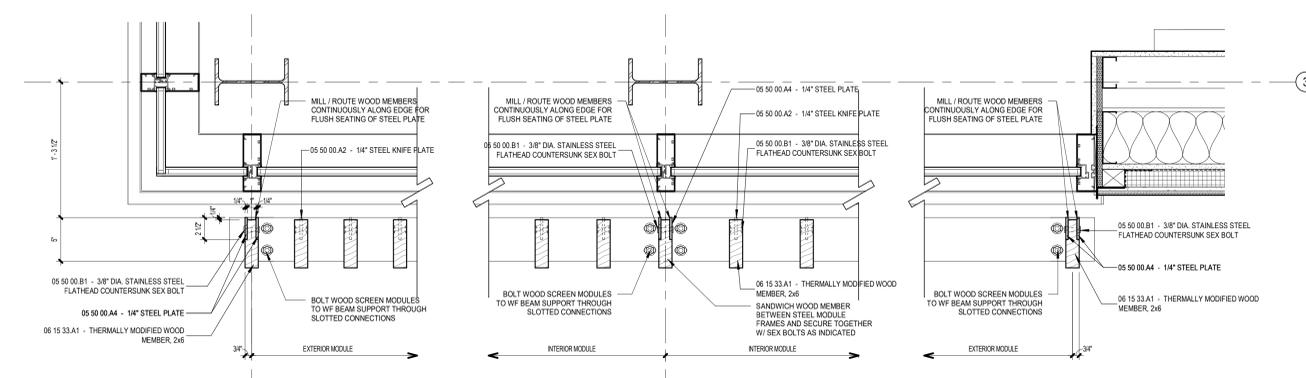
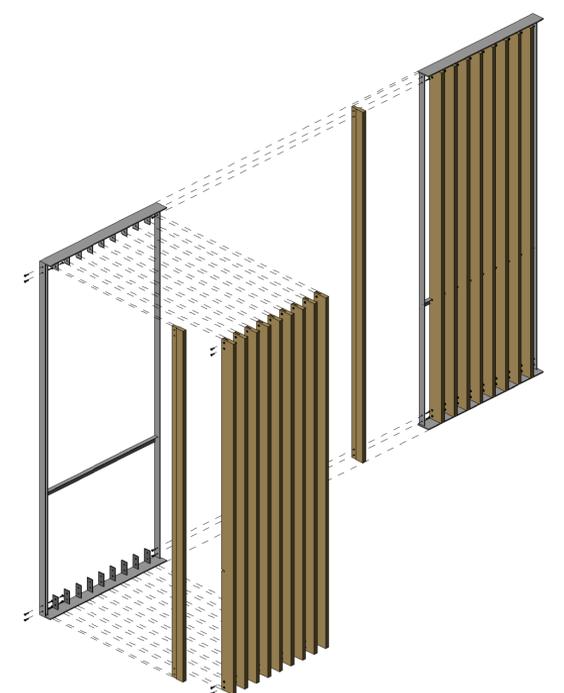
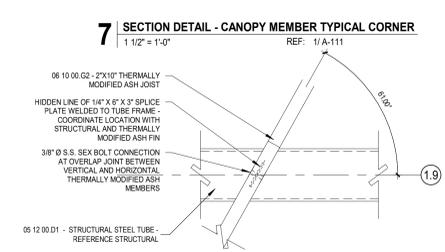
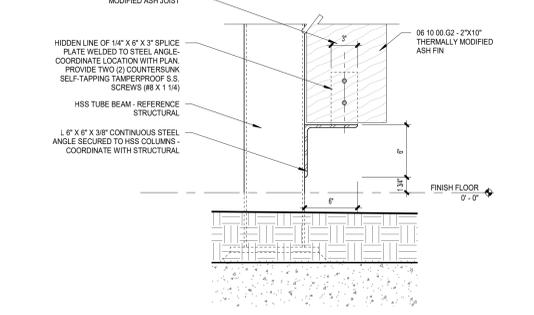
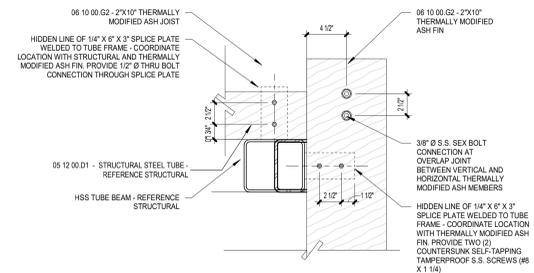
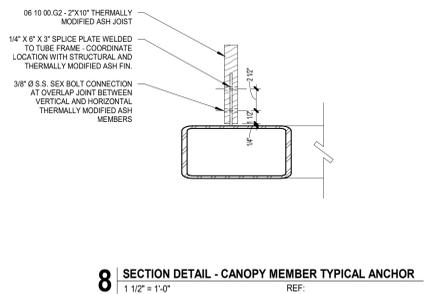
PROJECT TITLE: EXTERIOR ELEVATIONS

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STAMPS

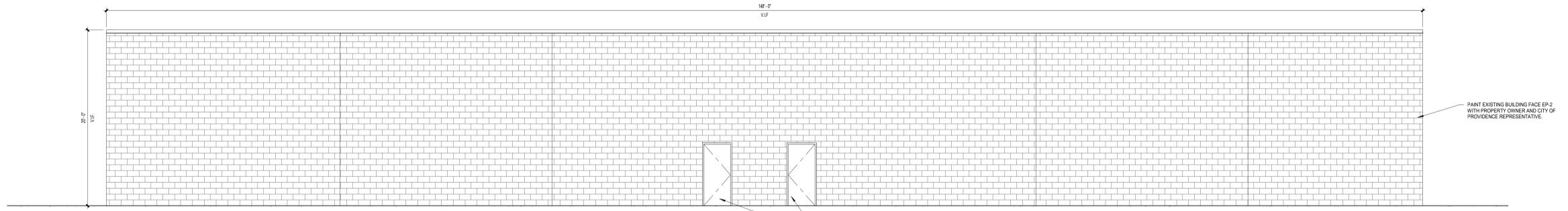


DATE	DESCRIPTION	BY	CHK	APP
08/25/2020	ISSUED FOR PERMITS	ED	ED	ED
03/16/2021	ISSUED FOR BIDS	ED	ED	ED

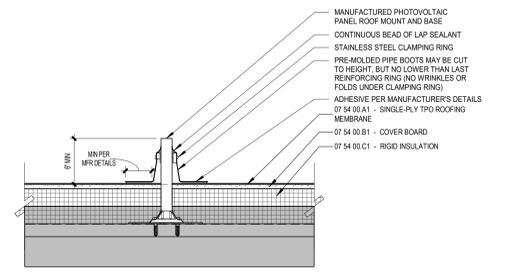
OWNER  
 CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02905-3215

PROJECT  
 RWP GATEWAY & VISITOR CENTER  
 1107 BRADDOCK ST.  
 PROVIDENCE, RI 02905

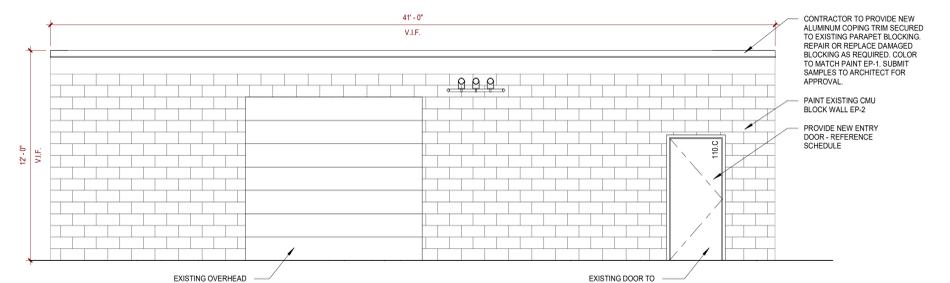
CLADDING ELEVATIONS, DIAGRAMS & DETAILS



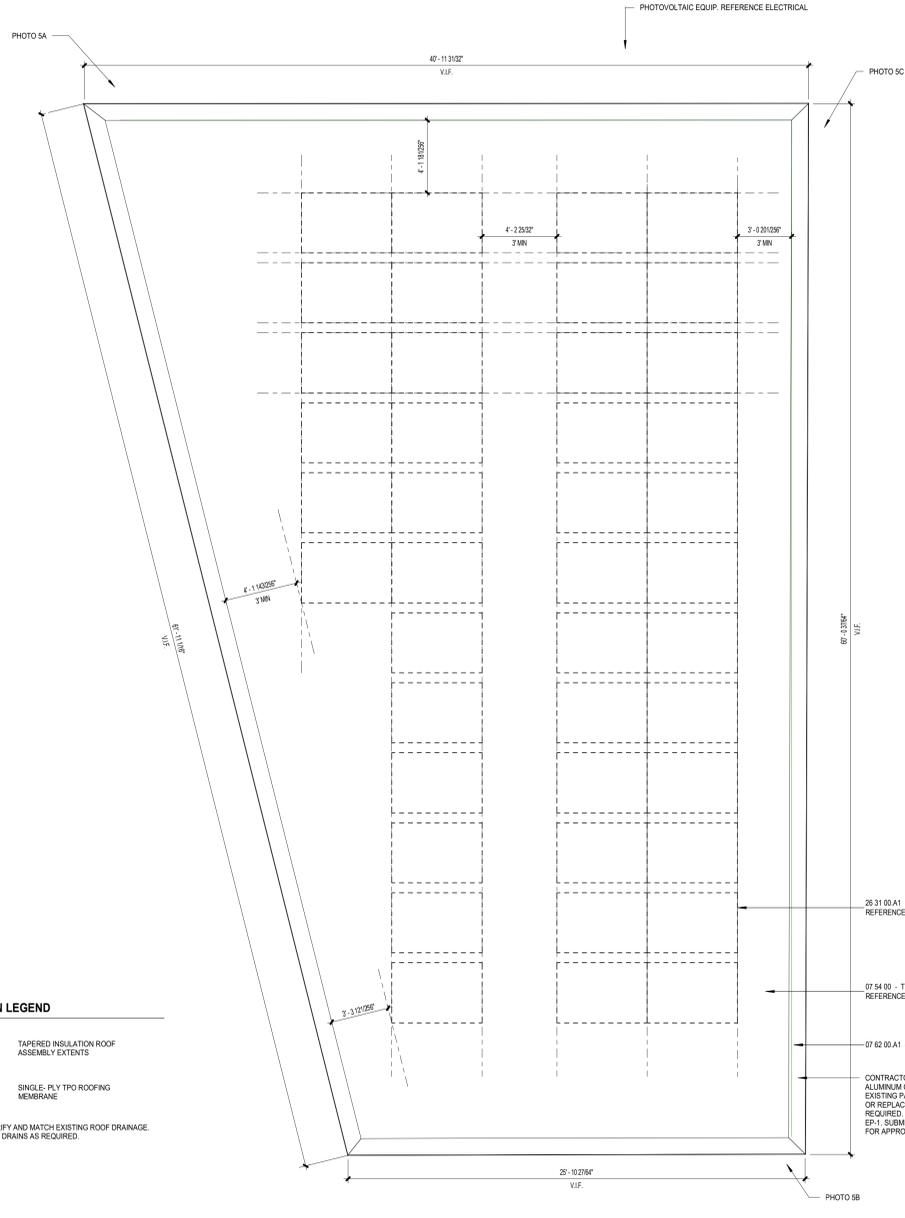
**3 EXISTING ADJACENT BUILDING**  
 3/16" = 1'-0" REF: 1/A-203



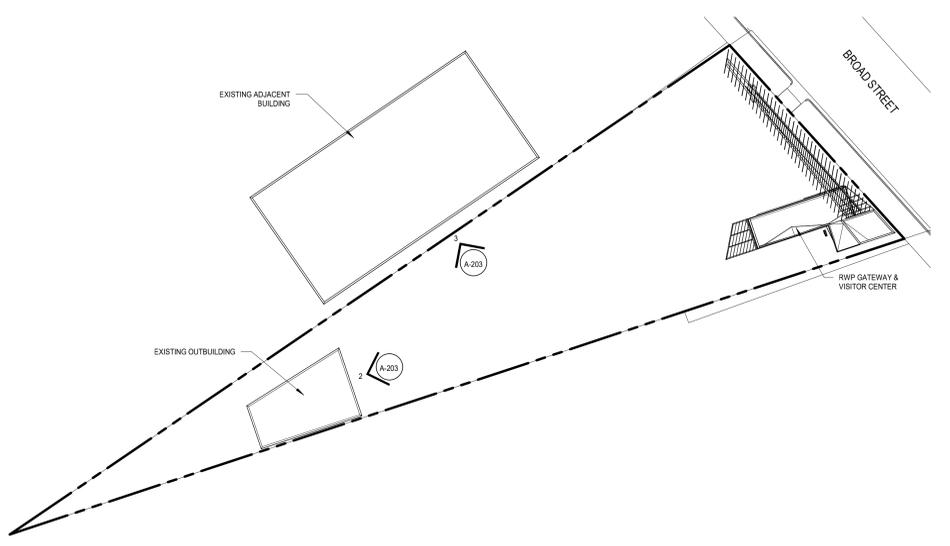
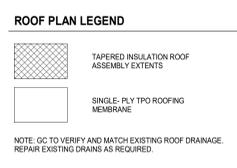
**6 SECTION DETAIL - TPO ROOF AT PV MOUNTS EXISTING BUILDINGS**  
 1 1/2" = 1'-0" REF:



**2 EXISTING OUTBUILDING ELEVATION**  
 1/4" = 1'-0" REF: 1/A-203



**4 ROOF PLAN - EXISTING BUILDING**  
 1/4" = 1'-0" REF: 1/A-201



**1 SITE KEY PLAN**  
 1" = 40'-0" REF: 1/A-201



**5 EXISTING BUILDING PHOTOS**  
 1/4" = 1'-0"

DATE	REVISION	BY	CHK	APP
08/25/2020	1	JK	JK	JK
03/15/2021	2	JK	JK	JK

**CITY OF PROVIDENCE REDEVELOPMENT AGENCY**  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-3215

**RWP GATEWAY & VISITOR CENTER**  
 1107 BROAD ST.  
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**EXTERIOR ELEVATIONS - EXISTING BUILDING**

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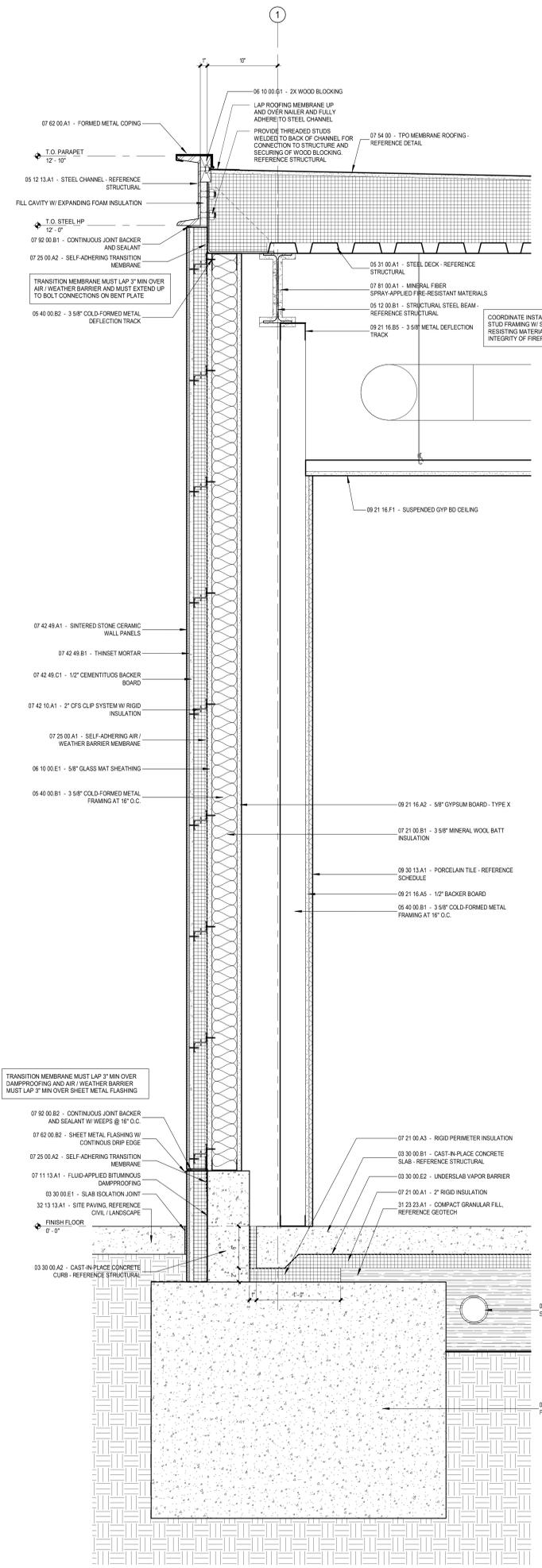
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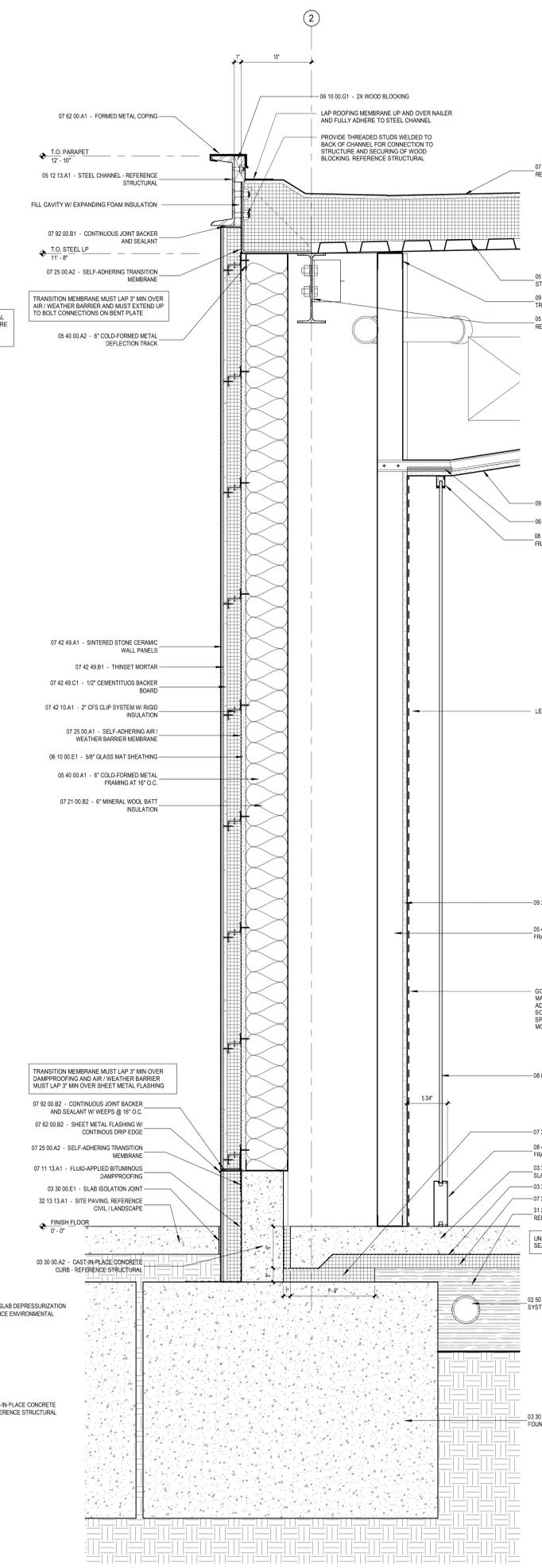


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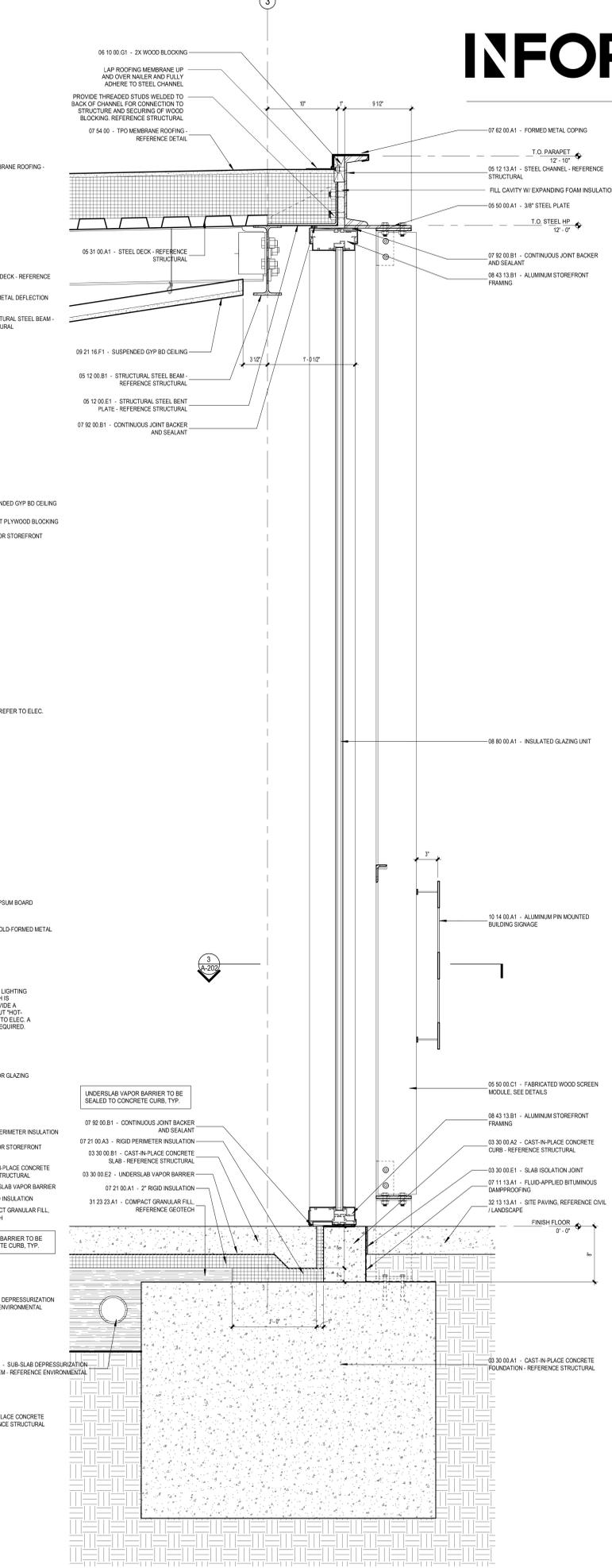
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**3 WALL SECTION - 'BA'**  
1 1/2" = 1'-0" REF: 4/ A-301



**2 WALL SECTION - 'AA'**  
1 1/2" = 1'-0" REF: 2/ A-301



**1 WALL SECTION - 'AB'**  
1 1/2" = 1'-0" REF: 2/ A-301

DATE	DESCRIPTION
08.10.2020	ISSUE FOR PERMIT
08.25.2020	ISSUE FOR REVIEW
09.09.2020	ISSUE FOR REVIEW
10.05.2020	ISSUE FOR REVIEW

OWNER  
**CITY OF PROVIDENCE REDEVELOPMENT AGENCY**  
444 WESTMINSTER ST., SUITE 3A  
PROVIDENCE, RI 02905-3215

PROJECT  
**RWP GATEWAY & VISITOR CENTER**  
1107 BRADDOCK ST.  
PROVIDENCE, RI 02905

SHEET TITLE  
**WALL SECTIONS**

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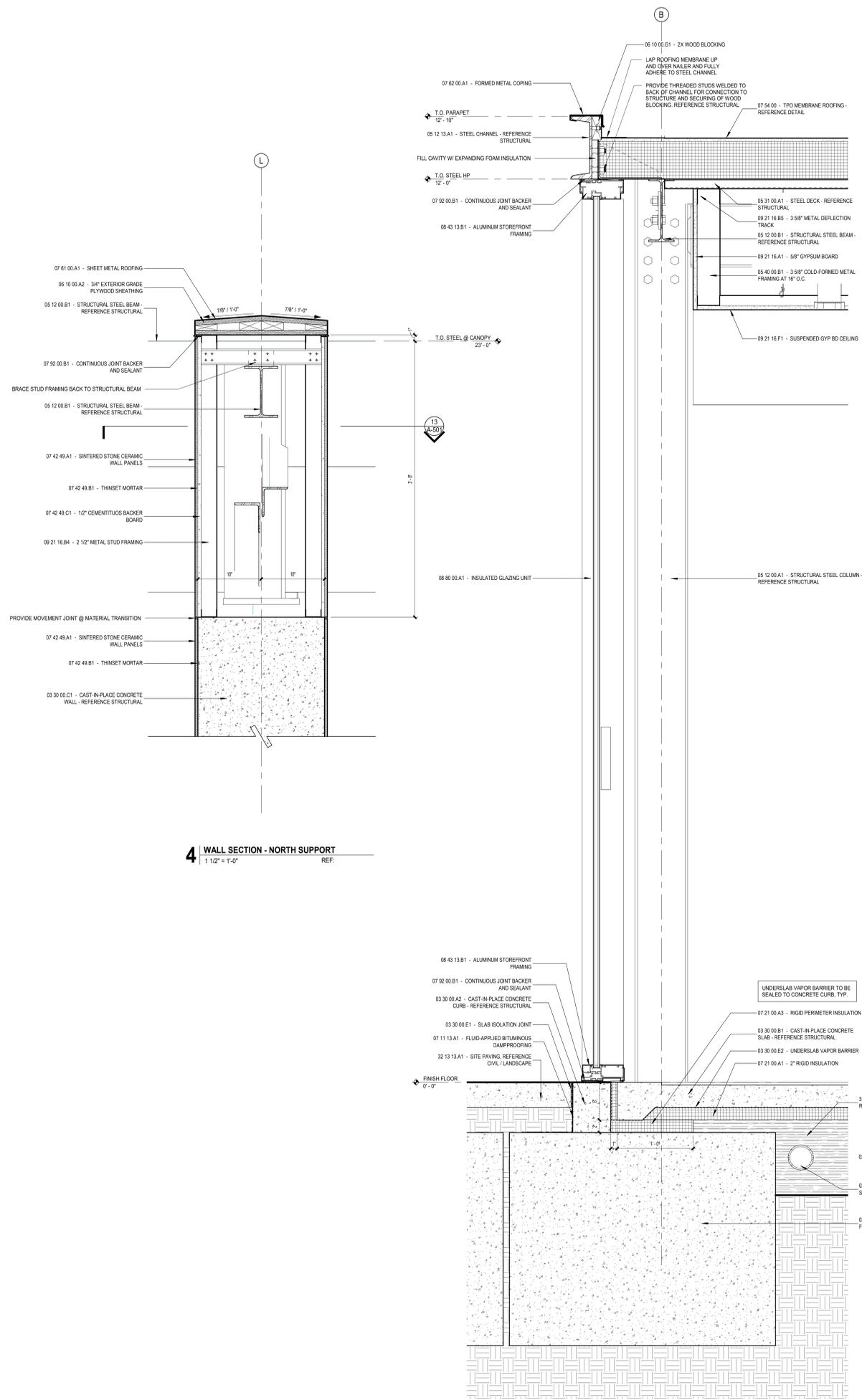
DATE	DESCRIPTION	BY	CHK
05/10/2020	ISSUE FOR PERMIT	EDW	EDW
05/25/2020	ISSUE FOR REVIEW	EDW	EDW
06/09/2020	ISSUE FOR PERMIT	EDW	EDW
06/23/2020	ISSUE FOR PERMIT	EDW	EDW

OWNER  
**CITY OF PROVIDENCE REDEVELOPMENT AGENCY**  
444 WESTMINSTER ST., SUITE 3A  
PROVIDENCE, RI 02905-3215

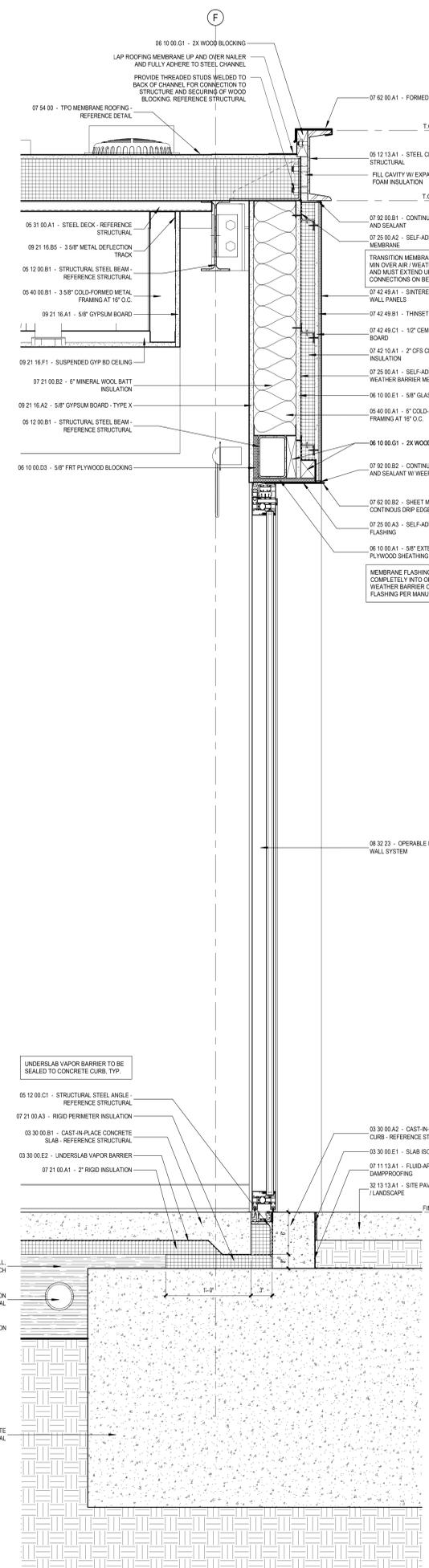
PROJECT  
**RWP GATEWAY & VISITOR CENTER**  
1187 BRADDOCK ST.  
PROVIDENCE, RI 02905

SHEET TITLE  
**WALL SECTIONS**

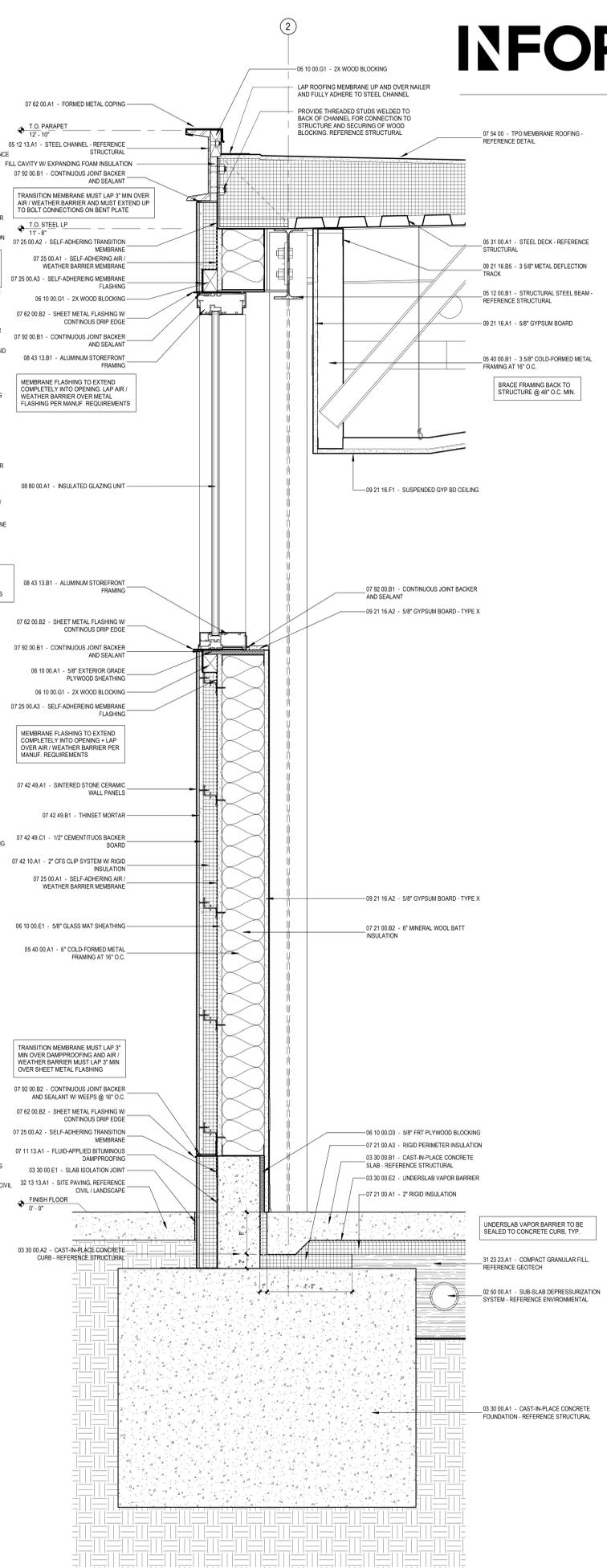
PROJECT # 2717.00  
**A-312**



**4 WALL SECTION - NORTH SUPPORT**  
1 1/2" = 1'-0"  
REF:



**2 WALL SECTION - 'CB'**  
1 1/2" = 1'-0"  
REF: 1/A-301



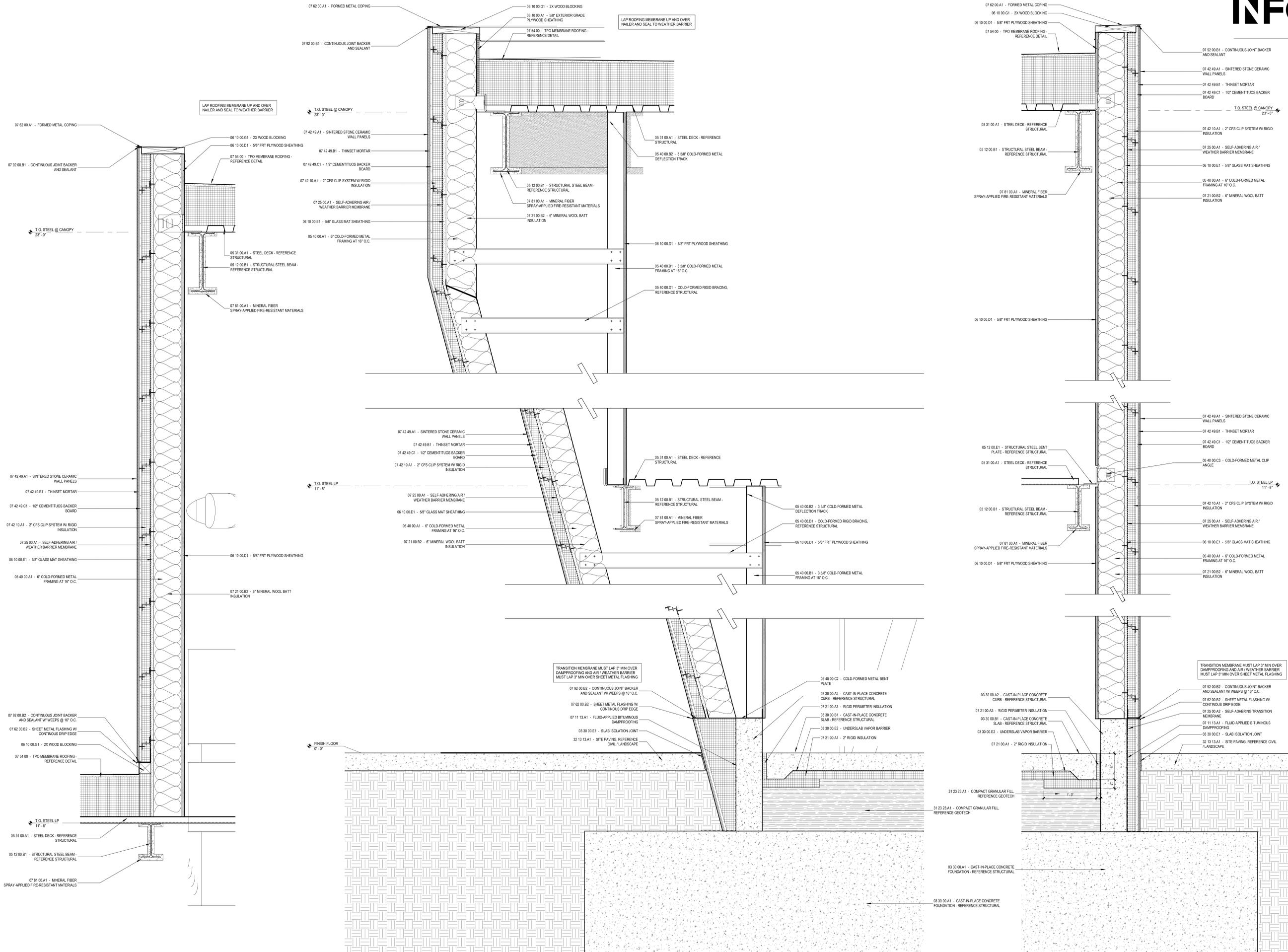
**1 WALL SECTION - 'FA'**  
1 1/2" = 1'-0"  
REF: 6/A-301

**3 WALL SECTION - 'CA'**  
1 1/2" = 1'-0"  
REF: 1/A-301

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3/15/2021 8:12:54AM

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DATE	DESCRIPTION	BY	CHK	APP
08/25/2020	ISSUED FOR REVIEW	EDW	EDW	EDW
03/15/2021	ISSUED FOR BIDS	EDW	EDW	EDW

**CLIENT:** CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-3215

**PROJECT:** RWP GATEWAY & VISITOR CENTER  
 1107 BRADDOCK ST.  
 PROVIDENCE, RI 02905

**WALL SECTIONS**

TOILET ACCESSORY SCHEDULE					
MARK	QTY	DESCRIPTION	MFR	MODEL	NOTES
TA-1	2	42" STRAIGHT GRAB BAR FOR SIDE	BRADLEY	832001-42	
TA-2	2	36" STRAIGHT GRAB BAR FOR BEHIND TOILET	BRADLEY	832001-36	
TA-3	2	18" STRAIGHT GRAB BAR FOR SIDE	BRADLEY	832001-18	
TA-4	2	WALL MTD. HAND DRYER	Dyson	AIRBLADE V AB12 - 101714-01	FINISH: NICKEL
TA-5	2	MIRROR	BOBRICK	B-2006 WH	24" x 36"
TA-6	2	CLASSIC SERIES SURFACE MOUNTED SOAP DISPENSER	Bohrck	B-2111	
TA-7	2	SSR MTD SANITARY NAPKIN DISPOSAL	BRADLEY	B-270	
TA-8	2	STAINLESS STEEL TOILET SINGLE ROLL DISPENSER	BRADLEY	5412	
TA-9	2	BABY CHANGING STATION	BRADLEY	962-11	Baby Changing Station

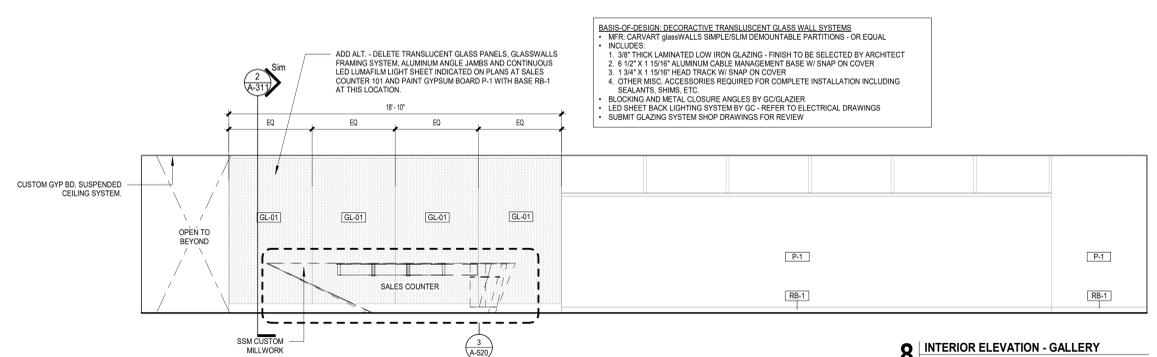
**NOTE:**  
 REFER TO SHEET A-001 FOR ALL TYPICAL MOUNTING HEIGHTS.  
 GC TO PROVIDE AND INSTALL ALL TOILET ACCESSORIES.

DATE	DESCRIPTION
08.10.2020	REVISED FOR
08.25.2020	REVISED FOR
09.09.2020	REVISED FOR
09.25.2020	REVISED FOR
10.15.2020	REVISED FOR

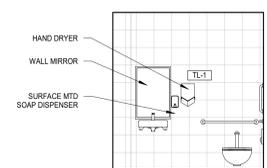
OWNER  
**CITY OF PROVIDENCE REDEVELOPMENT AGENCY**  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-3215

PROJECT  
**RWP GATEWAY & VISITOR CENTER**  
 1107 BRADDOCK ST.  
 PROVIDENCE, RI 02905

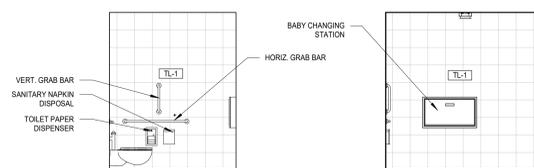
SHEET TITLE  
**INTERIOR ELEVATIONS & ENLARGED PLANS**



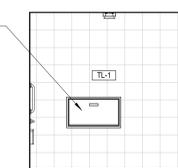
**8 INTERIOR ELEVATION - GALLERY**  
 1/4" = 1'-0" REF: 1/A-111



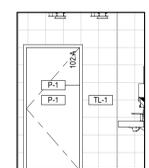
**6 INTERIOR ELEVATION - RESTROOM EAST**  
 1/4" = 1'-0" REF: 1/A-111



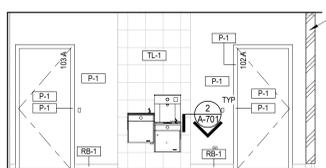
**5 INTERIOR ELEVATION - RESTROOM SOUTH**  
 1/4" = 1'-0" REF: 1/A-111



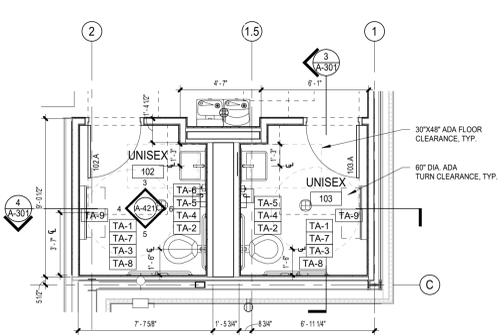
**4 INTERIOR ELEVATION - RESTROOM WEST**  
 1/4" = 1'-0" REF: 1/A-111



**3 INTERIOR ELEVATION - RESTROOM NORTH**  
 1/4" = 1'-0" REF: 1/A-111



**2 INTERIOR ELEVATION - CORRIDOR AT RESTROOMS**  
 1/4" = 1'-0" REF: 1/A-111



**1 ENLARGED PLAN - RESTROOMS**  
 1/4" = 1'-0" REF: 1/A-111



### MILLWORK NOTES

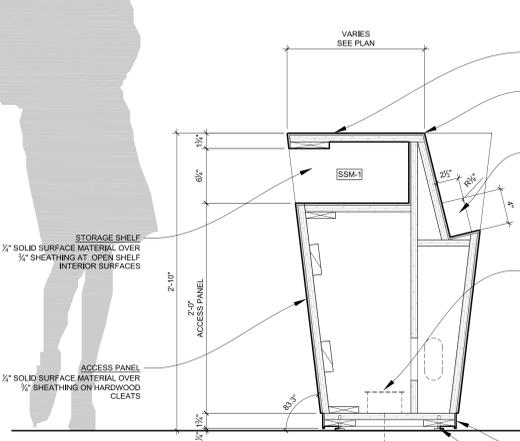
- MILLWORK CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS REQUIRED FOR INSTALLATION PRIOR TO FABRICATION OF CABINERY.
- MILLWORK CONTRACTOR / GC TO PROVIDE SHOP DRAWINGS FOR ARCHITECT APPROVAL.
- ALL CLOSED-CABINET INTERIOR IS TO BE 1/2" MELAMINE U.N.O.
- ALL BLOCKING AND WALLERS TO BE FIRE RETARDANT WOOD.
- INSTALLED MILLWORK SHALL HAVE NO HIDDEN LEDGES OR OTHER SURFACES WHERE DUST MAY COLLECT. ANY UNFINISHED SURFACES SHALL BE COMPLETELY SEALED FROM EXPOSURE.
- ALL SHELVES SHALL BE A MINIMUM OF 7" THICK WITH 1/2" SOLID SURFACE FINISH.
- ALL SOLID SURFACE EDGES TO BE EASED U.N.O.
- ALL JOINTS BETWEEN CABINET DOORS AND PANELS TO BE 1/16" MAXIMUM

### MILLWORK HARDWARE NOTES

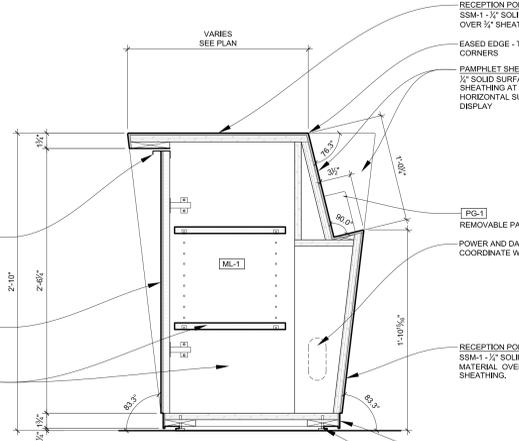
- HINGES: PROVIDE RICHELIEU HINGES WITH BILUMOTION, MOUNTING PLATE & WHITE TRIM CAP #329 1/8, 700. HINGES SHALL BE FULL OVERLAY WITH 110° OPENING. HINGES SHALL NOT BE EXPOSED ON DOOR FACE. MILLWORK CONTRACTOR TO CONFIRM COMPATIBILITY WITH OPENING CLEARANCES AND NOTIFY ARCHITECT OF ANY DISCREPANCIES.
- DOOR PULLS: RICHELIEU - CONTEMPORARY EDGE PULL - STAINLESS STEEL 6" MODEL NO. 576685SV
- ADJUSTABLE SHELF SUPPORT: RICHELIEU - ZINC UNCO WOODEN SHELF SUPPORT MODEL NO. CP197020180
- DESK TOP GROMMET: RICHELIEU - RECTANGULAR GROMMET WITH BRUSH MODEL NO. 2341212100 - SILVER
- MISCELLANEOUS ACCESSORIES, LEVELERS & OTHER REQUIRED HARDWARE AS RECOMMENDED BY FABRICATOR FOR INTENDED USE. SUBMIT TO ARCHITECT FOR APPROVAL.

### MILLWORK FINISH NOTES

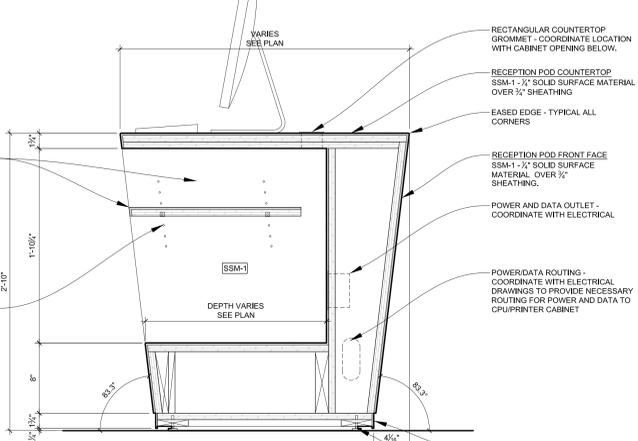
- SSM-1 SOLID SURFACE MATERIAL - REFERENCE FINISH PLAN ON SHEET A-701 FOR MATERIAL SPEC.
- SSB-1 1/2" THICK STAINLESS STEEL BASE PLATE WITH COUNTER-SUNK FLATHEAD SCREWS.
- PG-1 0.220" THICK FLEXIGLASS REMOVABLE DIVIDER (WHITE TRANSLUCENT / SATIN FINISH)
- ML-1 1/2" MELAMINE - WHITE



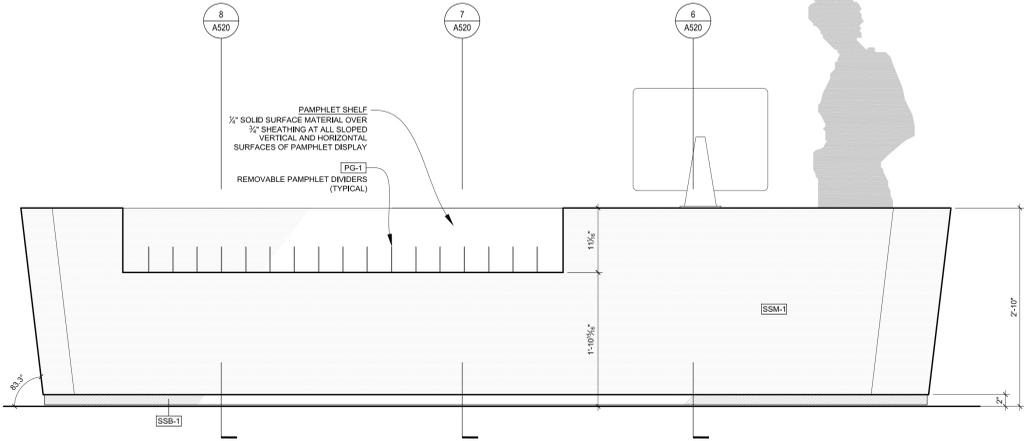
**8 SECTION - RECEPTION DESK**  
 1 1/2" = 1'-0" REF: 1/A-111



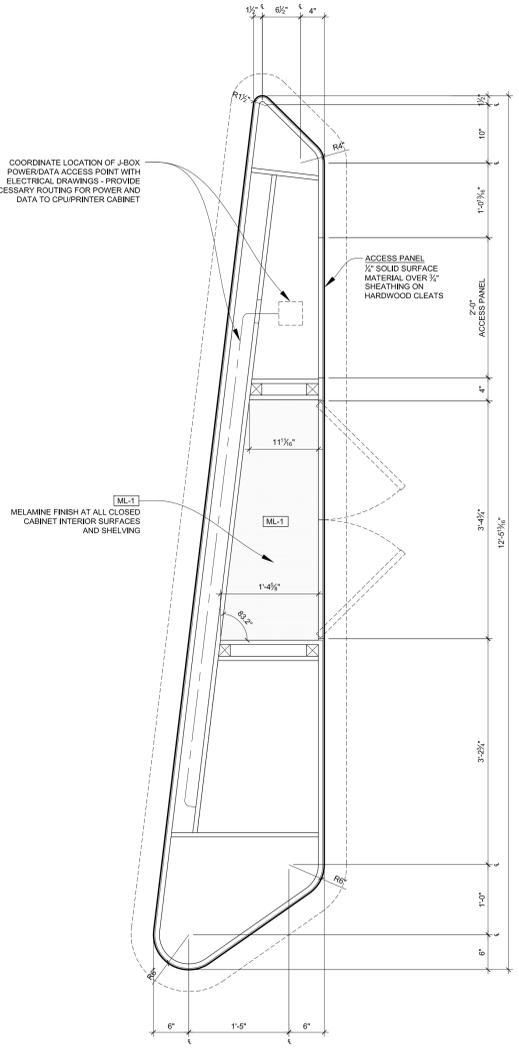
**7 SECTION - RECEPTION DESK**  
 1 1/2" = 1'-0" REF: 1/A-111



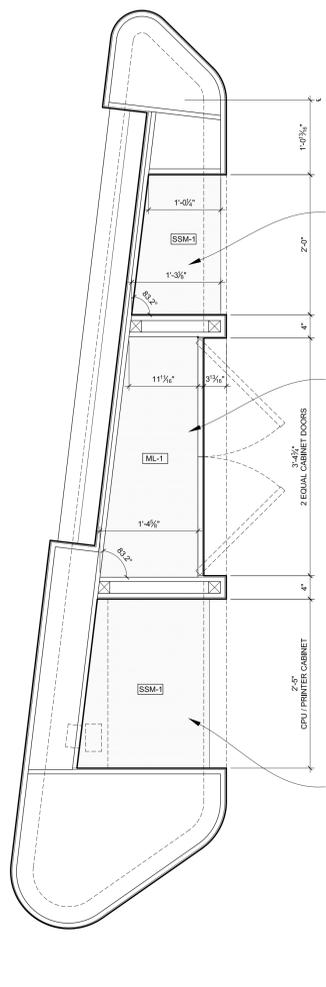
**6 SECTION - RECEPTION DESK**  
 1 1/2" = 1'-0" REF: 1/A-111



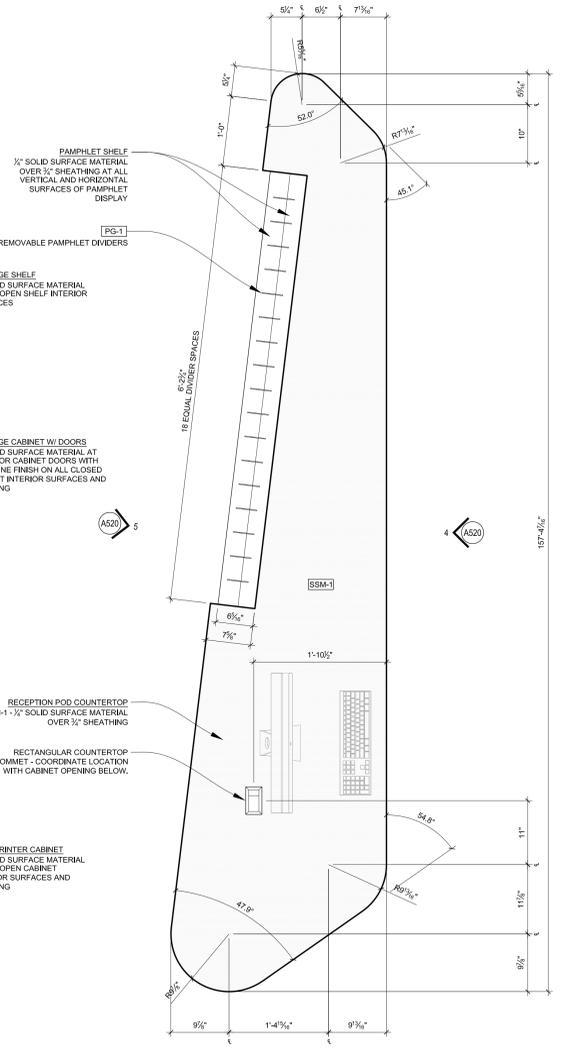
**5 ELEVATION - RECEPTION POD**  
 1" = 1'-0" REF: 1/A-111



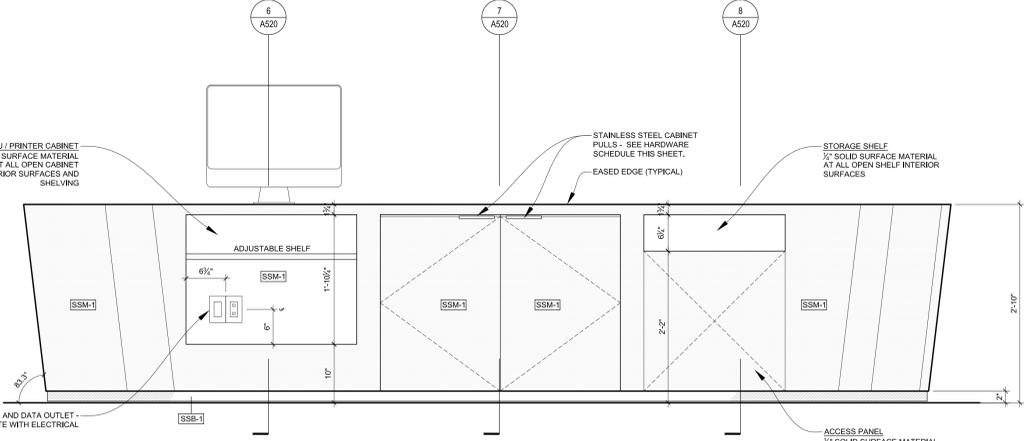
**3 LOWER PLAN SECTION - RECEPTION POD**  
 1" = 1'-0" REF: 1/A-111



**2 UPPER PLAN SECTION - RECEPTION POD**  
 1" = 1'-0" REF: 1/A-111



**1 ENLARGED PLAN - RECEPTION POD TOP**  
 1" = 1'-0" REF: 1/A-111



**4 ELEVATION - RECEPTION POD**  
 1" = 1'-0" REF: 1/A-111

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NO.	DATE	DESCRIPTION	BY	CHK	PK	CL
1	03/09/2021	ISSUED FOR REVIEW	EDW			
2	03/16/2021	ISSUED FOR BIDS	EDW			

OWNER: CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-2715

PROJECT: RWP GATEWAY & VISITOR CENTER  
 1487 BROAD ST.  
 PROVIDENCE, RI 02905

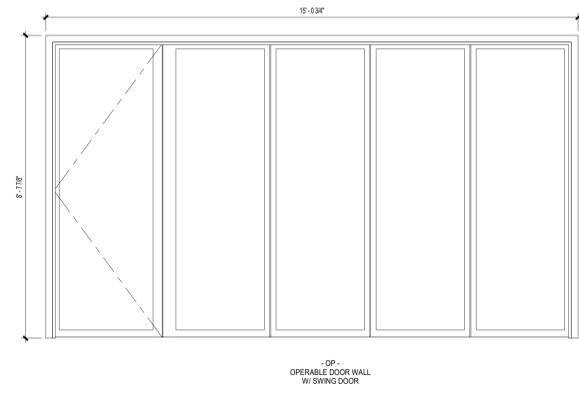
SHEET TITLE: MILLWORK DETAILS

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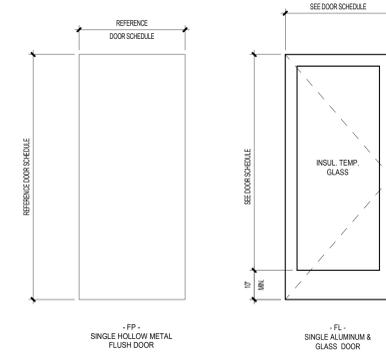
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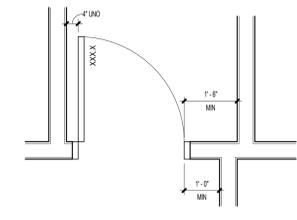
DOOR NO	ROOM	PANEL										FRAME				HARDWARE SET NO.	HARDWARE SET NO.	FIRE RATING	COMMENTS
		W	H	T	TYPE	MATERIAL	FINISH		GLAZING	TYPE	HEAD	JAMB	MATERIAL	FINISH					
							PUSH	PULL											
100 A	100 GALLERY	3'-5 5/8"	8'-0"	0'-1 3/4"	FL-1	ALUM	CLEAR ANOD.	CLEAR ANOD.	GL-1	SEE ELEV	SEE ELEV	SEE ELEV	ALUM	CLEAR ANOD.	2.0				
100 B	100 GALLERY	SEE ELEV	SEE ELEV	SEE ELEV	OP	ALUM	CLEAR ANOD.	CLEAR ANOD.	IGU-01										
102 A		3'-0"	7'-0"	0'-1 3/4"	FP-1	H.M.	PAINT - P-1	PAINT - P-1	-	SR-SOLID WOOD-1	0'-2"	0'-2"	H.M.	PAINT - P-1	5.0				
103 A	103 UNISEX	3'-0"	7'-0"	0'-1 3/4"	FP-1	H.M.	PAINT - P-1	PAINT - P-1	-	SR-SOLID WOOD-1	0'-2"	0'-2"	H.M.	PAINT - P-1	5.0				
104 A	104 MECH/STORAGE	3'-0"	7'-0"	0'-1 3/4"	FP-1	H.M.	PAINT - P-1	PAINT - P-1	-	SR-SOLID WOOD-1	0'-2"	0'-2"	H.M.	PAINT - P-1	4.0				



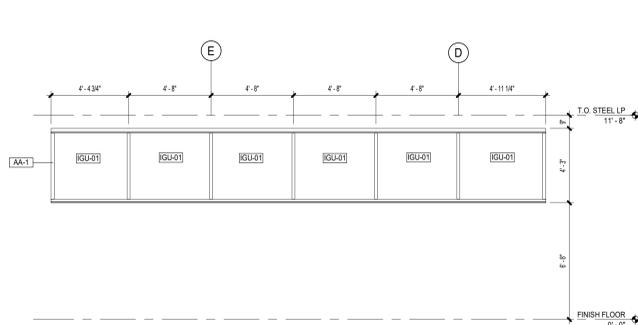
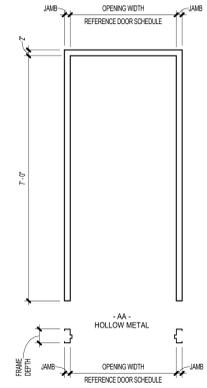
DOOR PANEL ELEVATION AND TYPES



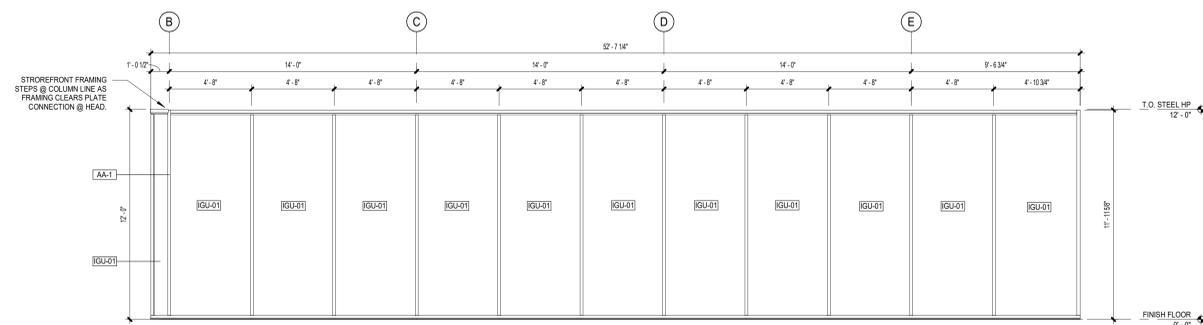
DOOR FRAME ELEVATION AND TYPES  
SEE SCHEDULE FOR ALL DIMENSIONS



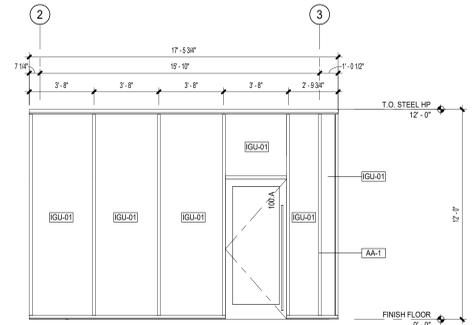
DOOR LOCATION - TYPICAL



SF-03 GLAZING ELEVATION - 'SF-03'  
1/4\"/>



SF-02 GLAZING ELEVATION - 'SF-02'  
1/4\"/>



SF-01 GLAZING ELEVATION - 'SF-01'  
1/4\"/>

CONSULTANTS

DATE	ISSUED FOR	DESCRIPTION
08-10-2020	CD 80%	CD
08-25-2020	CD 80%	CD
09-09-2020	CD 80%	CD
09-16-2020	CD 80%	CD

OWNER

CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02905-3215

PROJECT

RWP GATEWAY & VISITOR CENTER  
 1107 BRADDOCK ST.  
 PROVIDENCE, RI 02905

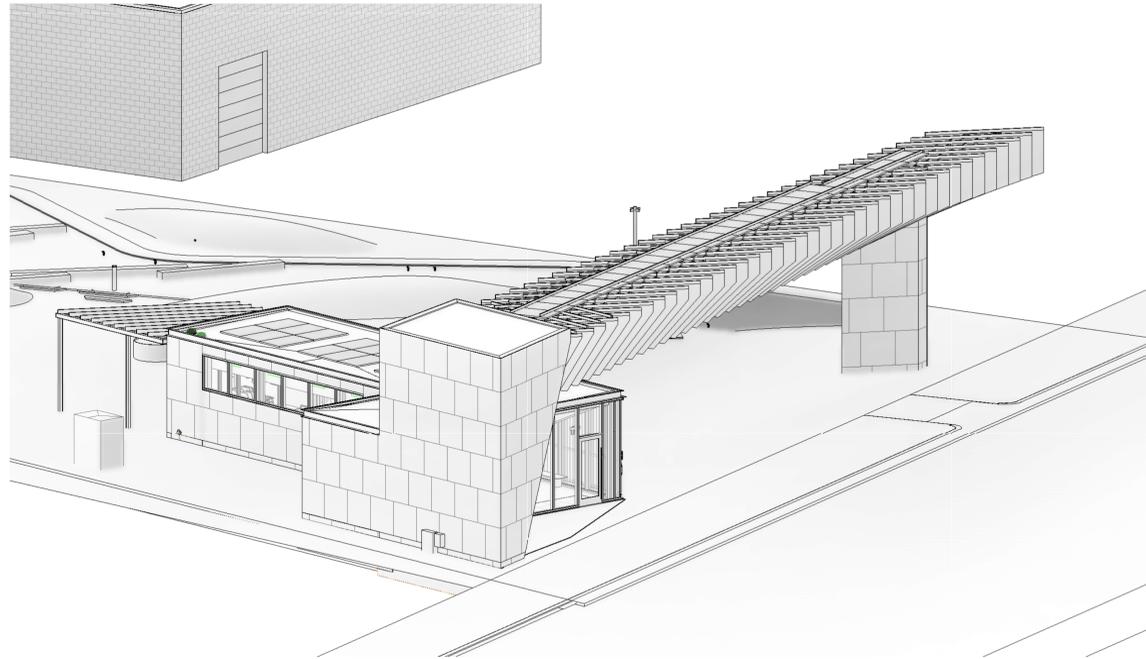
SHEET TITLE

GLAZING ELEVATIONS, DOOR SCHEDULE, NOTES AND DETAILS

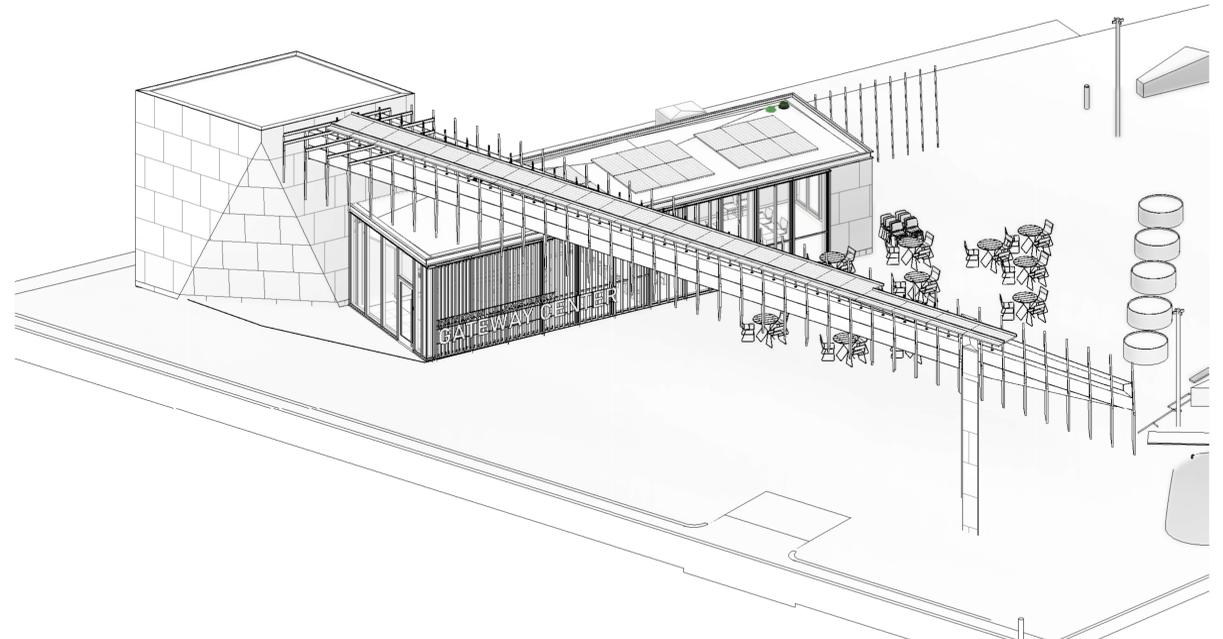
SHEET NO.

2717.00  
A-601

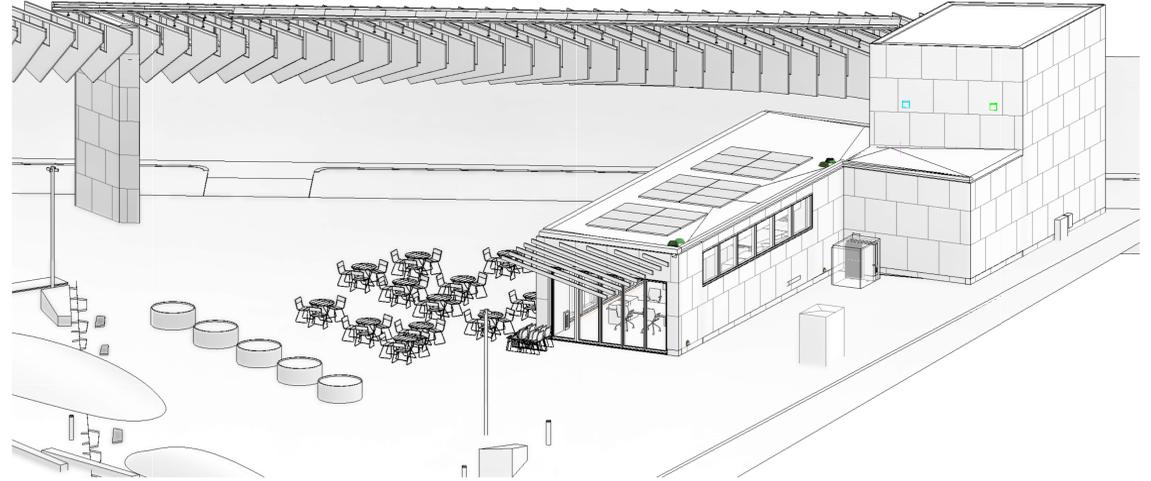




**2** AXONOMETRIC MODEL B



**1** AXONOMETRIC MODEL



**3** AXONOMETRIC MODEL C

ISSUED FOR: CONSULTANTS

DATE	DRAWN (CREATED)	CHECKED	SCALE
06/20/2020	EDWIN	EDWIN	1/8" = 1'-0"
07/29/2020	EDWIN	EDWIN	1/8" = 1'-0"
08/26/2020	EDWIN	EDWIN	1/8" = 1'-0"
09/22/2020	EDWIN	EDWIN	1/8" = 1'-0"
03/16/2021	EDWIN	EDWIN	1/8" = 1'-0"

REVISIONS FOR DESIGN STANDARD WAIVER  
 CD 80%  
 CD 80%  
 CD 80% FOR REVIEW  
 CD 80% FOR BIDS

OWNER  
 CITY OF PROVIDENCE REDEVELOPMENT  
 AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-3215

PROJECT  
 RWP GATEWAY & VISITOR  
 CENTER  
 1187 BROAD ST.  
 PROVIDENCE, RI 02905

PROJECT TITLE  
**3D VISUALIZATION**





SECTION 20 60-00 MECHANICAL AND PLUMBING GENERAL REQUIREMENTS

- 1.01 WORK INCLUDED
A. THE WORK INCLUDED BY THIS DIVISION OF THE SPECIFICATIONS INCLUDES FURNISHING ALL LABOR, MATERIALS, EQUIPMENT, AND SERVICES, INCLUDING MINOR ITEMS OMITTED BUT NECESSARY TO CONSTRUCT AND INSTALL THE COMPLETE SYSTEMS DESCRIBED BY THE CONTRACT DOCUMENTS AND SPECIFIED BELOW. "CONTRACTOR" REFERS TO THE MECHANICAL CONTRACTOR UNLESS OTHERWISE SPECIFIED. THE GENERAL CONDITIONS OF THE SPECIFICATIONS APPLY AND ARE INCLUDED IN THIS PART OF THIS SECTION.
1.02 CODES AND REGULATIONS
A. COMPLY WITH STATE AND LOCAL CODES, AND UTILITY COMPANY REGULATIONS. FINAL INTERPRETATIONS WILL BE THE SOLE AUTHORITY OF THE AGENCIES OR AGENCIES HAVING JURISDICTION. THE FOLLOWING CODES, INCLUDING ANY LOCAL AMENDMENTS AND SUPPLEMENTARY CODES SUCH AS THE CODES OF THE NATIONAL FIRE PROTECTION ASSOCIATION:
1. 2015 INTERNATIONAL BUILDING CODE
2. PLUMBING CODE: 2016 RHODE ISLAND PLUMBING CODE
3. MECHANICAL CODE: 2016 RHODE ISLAND MECHANICAL CODE
4. FIRE CODE: 2015 INTERNATIONAL FIRE CODE
5. GAS CODE: 2016 RHODE ISLAND FUEL GAS CODE
6. ENERGY CODE: 2016 RHODE ISLAND ENERGY CONSERVATION CODE
7. ELECTRICAL CODE: 2016 RHODE ISLAND ELECTRICAL CODE

- 1.03 QUALITY ASSURANCE
A. PERFORM WORK TO AVOID INTERFERENCE WITH THE WORK OF OTHER TRADES. REMOVE AND RELOCATE WORK WHICH IN THE OPINION OF THE OWNER'S REPRESENTATIVE CAUSES INTERFERENCE.
B. EQUIPMENT AND MATERIALS SHALL BE NEW, UNLISTED FOR THE USE INTENDED, AND FREE FROM DAMAGE OR DEFECT. THEY SHALL COMPLY WITH THE LATEST U.S. INDUSTRY STANDARDS.
C. PACKAGED EQUIPMENT SHALL BEAR ALL LABELS BY RECOGNIZED NATIONAL TESTING LABORATORY.
D. PERFORM ALL TESTS AND INSPECTIONS REQUIRED BY AUTHORITIES HAVING JURISDICTION.
1.04 CONTRACT DOCUMENTS
A. ILLUSTRATE THE GENERAL DESIGN AND EXTENT OF PERFORMANCE REQUIRED, ALL DIMENSIONS AND LOCATIONS SHOWN ON THE ARCHITECTURAL DRAWINGS, CONSULT WITH ARCHITECTURAL PLANS AND LOCATE ALL CEILING EQUIPMENT WHERE INDICATED ON REFLECTED CEILING PLANS.
B. DEVIATIONS FROM THE DRAWINGS, WITH THE EXCEPTION OF MINOR CHANGES IN ROUTING AND OTHER SUCH INCIDENTAL CHANGES THAT DO NOT AFFECT THE FUNCTIONING OR SERVICEABILITY OF THE SYSTEMS, SHALL NOT BE MADE WITHOUT THE WRITTEN APPROVAL OF THE ARCHITECT/ENGINEER.
C. THE ARCHITECT/ENGINEER SHALL BE RESPONSIBLE FOR CORRECTING ALL MATTERS PERTAINING TO THE BUILDING STRUCTURE, MECHANICAL DRAWINGS IN ALL MATTERS PERTAINING TO MECHANICAL TRADES AND ELECTRICAL DRAWINGS IN ALL MATTERS PERTAINING TO ELECTRICAL TRADES, WHERE THERE ARE CONFLICTS OR DISCREPANCIES BETWEEN THE DRAWINGS, REFLECT FIELD CONDITIONS, OR DIFFERENCES TO THE ARCHITECT/ENGINEER FOR RESOLUTION.
D. DRAWINGS ARE NOT INTENDED TO SERVE AS SHOP DRAWINGS. TAKE ALL FIELD MEASUREMENTS REQUIRED TO CONSTRUCT THE CONTRACT WORK PRIOR TO SUBMITTING SHOP DRAWINGS.

- 1.05 SHOP DRAWINGS
A. SUBMIT PROJECT SPECIFIC SUBMITTALS FOR REVIEW IN COMPLIANCE WITH DIVISION 01.
B. PREPARE SHOP DRAWINGS TO SCALE FOR THE ARCHITECT/ENGINEER FOR REVIEW, EQUIPMENT AND MATERIAL SUBSTITUTIONS, AND MATERIALS.
C. ALL SUBSTITUTIONS SHALL BE SUBMITTED IN GROUPINGS OF SIMILAR AND/OR RELATED ITEMS.
D. SHOP DRAWINGS SHALL BE REVIEWED BY THE MECHANICAL CONTRACTOR FOR COMPLETENESS AND ACCURACY PRIOR TO SUBMITTING TO THE ARCHITECT/ENGINEER FOR REVIEW. THE SHOP DRAWINGS SHALL BE DATED AND SIGNED BY THE MECHANICAL CONTRACTOR PRIOR TO SUBMISSION.
E. NO EQUIPMENT SHALL BE SHIPPED FROM STOCK OR FABRICATED UNTIL SHOP DRAWINGS FOR THEM HAVE BEEN REVIEWED BY THE ARCHITECT/ENGINEER.
F. IN THE REVIEW OF SHOP DRAWINGS, THE ARCHITECT/ENGINEER DOES NOT ASSUME RESPONSIBILITY FOR ACTUAL DIMENSIONS OR FOR THE FIT OF COMPLETED WORK IN POSITION, NOR DOES SUCH REVIEW REVEAL MECHANICAL TRADES OF FULL RESPONSIBILITY FOR THE PROPER AND CORRECT EXECUTION OF THE WORK.

- 1.06 CONTRACTOR RESPONSIBILITY
A. CONTRACTOR SHALL BE INFORMED AND CORRELATED AT THE JOB SITE.
B. FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION.
C. QUANTITIES.
D. COORDINATION OF CONTRACTOR'S WORK WITH ALL OTHER TRADES.
E. SATISFACTORY PERFORMANCE OF CONTRACTOR'S WORK.
F. TEMPORARY PROTECTIVE COVERING OF WORK.
G. SUBMIT DETAILED SHOP DRAWINGS OF PIPING SYSTEMS SHOWING PIPE ROUTING AND TYPES AND LOCATIONS OF ALL FITS AND HANGERS.
H. IF DEVIATIONS FROM SUBSTITUTIONS FROM CONTRACT DOCUMENTS ARE DEMONSTRATED BY THE CONTRACTOR, DETAILS OF SUCH DEVIATIONS, INCLUDING CHANGES IN RELATED PORTIONS OF THE PROJECT AND THE REASONS THEREFOR, SHALL BE SUBMITTED WITH THE SUBMITTAL FOR APPROVAL.
I. MANUFACTURER'S APPROVED EQUIPMENT SHALL BE SUBMITTED WITH MANUFACTURER'S "REQUESTS FOR AN EQUIVALENT" MEANS "APPROVED EQUIVALENT". FOUR COPIES OF SUCH SUBMITTAL MUST BE RECEIVED BY THE ENGINEER SEVEN (7) WORKING DAYS PRIOR TO THE DATE OF THE MEETING.
J. THE TERMS "APPROVED", "APPROVED EQUAL", AND "EQUAL" REFER TO APPROVAL BY THE ARCHITECT OR ENGINEER AS AN ACCEPTABLE ALTERNATE BID. NO SUBSTITUTIONS WILL BE CONSIDERED THAT ARE NOT BID OR IDENTIFIED AS ALTERNATE BIDS. NO MATERIAL SUBSTITUTIONS WILL BE CONSIDERED PRIOR TO AWARD OF CONTRACT.
K. COORDINATE AND VERIFY WITH OTHER TRADES WHETHER OR NOT THE SUBSTITUTED EQUIPMENT CAN BE INSTALLED AS SHOWN ON THE CONSTRUCTION DRAWINGS WITHOUT MODIFICATION TO ASSOCIATED SYSTEMS OR ARCHITECTURAL OR ENGINEERING DESIGN. INCLUDE ADDITIONAL COSTS FOR ARCHITECTURAL AND ENGINEERING DESIGN FEES IN BID IF DRAWING MODIFICATIONS ARE REQUIRED BECAUSE OF SUBSTITUTED EQUIPMENT.

- 1.07 WARRANTY
A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SUCCESSFUL OPERATION OF MECHANICAL SYSTEMS, EQUIPMENT AND MATERIALS FOR A PERIOD OF ONE YEAR FROM THE DATE OF COMPLETION OF THE DATE OF FINAL ACCEPTANCE UNLESS SPECIFIC ITEMS ARE NOTED TO CARRY A LONGER WARRANTY IN THE CONSTRUCTION DOCUMENTS OR MANUFACTURER'S STANDARD WARRANTY EXCEEDS ONE YEAR. WARRANTY FOR EACH SYSTEM AND EACH ELEMENT THEREOF AGAINST ALL DEFECTS DUE TO FAULTY WORKMANSHIP, DESIGN OR MATERIAL. DEFECTIVE EQUIPMENT OR MATERIALS SHALL BE REPAIRED OR REPLACED AT NO EXPENSE TO THE OWNER. PROVIDE FOUR COMPLETE SERVICE AND MAINTENANCE CALLS SPACED AT EQUAL INTERVALS DURING THE WARRANTY PERIOD.
B. WARRANTIES SHALL INCLUDE LABOR AND MATERIAL. MAKE REPAIRS OR REPLACE EQUIPMENTS WITHOUT ANY ADDITIONAL COSTS TO THE OWNER.
C. AT THE TIME OF FINAL ACCEPTANCE, DELIVER TO THE OWNER ALL WARRANTIES, IN WRITING AND PROPERLY EXECUTED, INCLUDING TERM LIMITS FOR WARRANTIES EXTENDING BEYOND THE ONE YEAR PERIOD. EACH WARRANTY INSTRUMENT BEING FORWARDED TO THE OWNER. BEGIN STATING THE COMMENCEMENT DATE AND TERM.

- 1.08 OPERATING AND MAINTENANCE DATA
A. PROVIDE THE OWNER WITH OPERATING AND MAINTENANCE INSTRUCTIONS (FOUR COPIES) REQUIRED FOR OPERATION OF ALL MECHANICAL SYSTEMS. SEND THE WRITTEN INSTRUCTIONS IN A WORKBOOK. THE GENERAL CONDITIONS TAKE PRECEDENCE. THE MANUALS SHALL INCLUDE THE FOLLOWING ITEMS:
1. OPERATING MANUAL, AND SPARE PARTS LIST FOR EACH PIECE OF EQUIPMENT.
2. PREVENTIVE MAINTENANCE AND CHECKING SCHEDULE FOR EACH PIECE OF EQUIPMENT.
3. INSTRUCTIONS ON WHO TO CALL FOR SERVICE DURING THE WARRANTY PERIOD.
1.09 PERMITS
A. THE CONTRACTOR SHALL PAY FOR ALL FEES, TAXES, SECURE PERMITS, LICENSES, AND INSPECTIONS REQUIRED BY ANY AGENCIES HAVING JURISDICTION.
B. RULES OF LOCAL UTILITY COMPANIES SHALL BE COMPLIED WITH CHECK WITH EACH UTILITY COMPANY SUPPLYING SERVICE TO THE INSTALLATION AND DETERMINE ALL FEES INCLUDING, BUT NOT LIMITED TO, ALL VALVES, METER BOXES, AND METERS WHICH WILL BE REQUIRED AND INCLUDE THE COST OF ALL SUCH ITEMS IN PROPOSAL.

- 1.10 TEMPORARY SERVICES
A. PROVIDE TEMPORARY WATER SERVICE FOR CONSTRUCTION, AS REQUIRED BY THE GENERAL CONTRACTOR.
1.11 COORDINATION
A. COORDINATE OUTLET DEPTH AND EQUIPMENT LOCATIONS WITH THE ARCHITECTURAL PLANS AND WORK OF OTHER TRADES. LOCATE ON HORIZONTAL AND VERTICAL, AND TO PROVIDE FUNCTIONAL USE OF ALL EQUIPMENT. VERIFY ELECTRICAL POWER CHARACTERISTICS BEFORE ORDERING EQUIPMENT.
B. THE GENERAL GUIDELINE FOR THE DIVISION BETWEEN CONTROL (BY MC) WIRING AND POWER WIRING (BY EC) IS THAT POWER WIRING CARRIES THE CURRENT WHICH ENERGIZES A MOTOR. CONTROL WIRING DOES NOT CARRY CURRENT. THE RESPONSIBILITY OF THE MC CONTROL MOTORS ARE WIRED BY THE MC.
C. FURNISH WIRING DIAGRAMS TO THE ELECTRICAL CONTRACTOR AS REQUIRED FOR PROPER EQUIPMENT HOOKUP. COORDINATE WITH THE ELECTRICAL CONTRACTOR THE ACTUAL WIRE SIZING AND FOR MECHANICAL EQUIPMENT (FROM THE EQUIPMENT NAMEPLATE) TO ENSURE PROPER INSTALLATION.
D. EXAMINE THE SITE AND BECOME AWARE OF EXISTING CONDITIONS, UTILITIES, AND OTHER ISSUES AFFECTING THE SATISFACTORY COMPLETION OF THE PROJECT.
E. ELECTRICAL WORK PERFORMED BY THIS CONTRACTOR WILL CONFORM TO THE STANDARDS OF DIVISION 26-28. MECHANICAL EQUIPMENT MOTORS AND CONTROLS SHALL BE FURNISHED, SET IN PLACE, AND WIRED ACCORDING WITH THE FOLLOWING SCHEDULE UNLESS OTHERWISE NOTED OR SPECIFIED. MC - DIVISION 21-23 EC - DIVISION 26-28

Table with columns: ITEM, FURN, SET, POWER, CONTROL, BY MC, BY EC, BY EC, BY MC. Rows include COMBINATION STARTERS, MOTOR STARTERS, THERMAL OVERLOAD HEATERS, CONTROL RELAYS/TRANSFORMERS, TEMPERATURE CONTROL PANELS, PUMP/BLOWER PULSTOILS, ROOM THERMOSTATS, LUGS, LOGS FOR WIRING CONNECTIONS, ELECTRIC MOTORS, LOW VOLTAGE CONTROL WIRING, DELIVERY STORAGE HANDLING, AS-BUILT DRAWINGS, PROJECT/SITE CONDITIONS, PLAIN VERIFICATION, and PROJECT/SITE CONDITIONS.

- 1.12 ELECTRICAL
A. LUGS, LOGS FOR WIRING CONNECTIONS SHALL BE RATED FOR COPPER AND ALUMINUM. NO SHALL HAVE A MINIMUM RATING OF 100%
B. ELECTRIC MOTORS SHALL BE RATED FOR THE APPROPRIATE APPLICATION. WIND LOCATION (TECH); SUBMERGIBLE; UNDERWATER; UNDERSEA; ETC.
C. ALL LOW VOLTAGE CONTROL WIRING (24-240V) SHALL BE IN CONDUIT AND IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND ALL STATE AND LOCAL CODES AND ORDINANCES AND SHALL BE DONE BY THIS HVAC CONTRACTOR.
1.13 DELIVERY, STORAGE, HANDLING
A. PROVIDE NECESSARY HAULING AND HOISTING EQUIPMENT. PROTECT THE MATERIALS OF THIS DIVISION BEFORE, DURING, AND AFTER INSTALLATION.
1.14 AS-BUILT DRAWINGS
A. KEEP A CURRENT SET OF "AS-BUILT" DRAWINGS ON SITE. UPON COMPLETION OF THE WORK, FURNISH ENGINEER WITH 4 REPRODUCIBLE PRINTS SHOWING THE AS-BUILT INSTALLATION.
1.15 PROJECT/SITE CONDITIONS
A. VISIT THE SITE, EXAMINE AND VERIFY THE CONDITIONS UNDER WHICH THE WORK MUST BE CONDUCTED BEFORE SUBMITTING PROPOSAL. THE SUBMITTING OF A PROPOSAL IMPLIES THAT THE CONTRACTOR HAS VISITED THE SITE AND UNDERSTANDS THAT THE WORK AS SPECIFIED AND SHOWN ON THE DRAWINGS, EXCEPT FOR THE EXCEPTIONS CHARGES OR TIME EXTENSIONS WILL BE ALLOWED BECAUSE OF FAILURE TO MAKE THIS EXAMINATION OR TO INCLUDE ALL MATERIALS AND LABOR TO COMPLETE THE WORK.
1.16 PLAN VERIFICATION
A. AFTER COMPLETION OF THE BIDDING AND SELECTION PROCESS, PRIOR TO AWARDING THE CONTRACT, THE CONTRACTOR MUST REVIEW AND VERIFY THE CONTRACT DOCUMENTS IN THEIR ENTIRETY, INCLUDING THOSE OF OTHER TRADES AT THIS TIME. DISCREPANCIES, CONFLICTS, OMISSIONS, ETC. IN THE CONTRACT DOCUMENTS MUST BE DOCUMENTED. ALTERATIONS TO THE CONTRACT WILL BE MADE AT THAT TIME TO INCLUDE SUCH ITEMS, AS WELL AS OTHER MODIFICATIONS WHICH MIGHT BE MADE BY THE OWNER. AFTER AWARD OF THE CONTRACT, CHANGE ORDERS CAUSED BY DISCREPANCIES, CONFLICTS, OMISSIONS IN THE CONTRACT DOCUMENTS WILL NOT BE ALLOWED.

- 1.17 INSTRUCTION OF OWNER PERSONNEL
A. AT A TIME MUTUALLY AGREED UPON BETWEEN THE OWNER AND CONTRACTOR, PROVIDE THE SERVICES OF A FACTORY TRAINED AND AUTHORIZED REPRESENTATIVE TO TRAIN OWNER'S DESIGNATED PERSONNEL ON THE OPERATION AND MAINTENANCE OF THE EQUIPMENT PROVIDED FOR THIS PROJECT. PROVIDE TRAINING TO INCLUDE, BUT NOT BE LIMITED TO, AN OVERVIEW OF THE SYSTEM AND/OR EQUIPMENT AS IT RELATES TO THE FACILITY AS A WHOLE, OPERATION AND MAINTENANCE PROCEDURES AND SCHEDULES RELATIVE TO STARTUP AND SHUTDOWN, TROUBLESHOOTING, SERVICING, PREVENTIVE MAINTENANCE AND APPROPRIATE OPERATOR INTERVENTION, AND RECORD OF DATA INCLUDED IN THE OPERATION AND MAINTENANCE MANUALS.
B. SUBMIT A CERTIFICATION LETTER TO THE ARCHITECT STATING THAT THE OWNER'S DESIGNATED REPRESENTATIVE HAS BEEN TRAINED AS DESCRIBED HEREIN. LETTERS OF CERTIFICATION DATE, TIME, LENGTH, AND SUBJECT OF TRAINING. THE ARCHITECT/ENGINEER AND THE OWNER'S REPRESENTATIVE SHALL SIGN THE CERTIFICATION LETTER INDICATING AGREEMENT THAT THE TRAINING HAS BEEN PROVIDED.
C. OWNER TRAINING WITHIN AT LEAST 7 DAYS ADVANCE NOTICE.
D. PROVIDE TWO (2) COMPLETE SETS OF OPERATING AND MAINTENANCE INSTRUCTION BOOKLETS.
1.18 HVAC USE DURING CONSTRUCTION
A. HVAC EQUIPMENT SHALL NOT BE USED DURING CONSTRUCTION AS A MEANS TO HEAT OR COOL THE SPACE, UNLESS SPECIFIC APPROVAL IS GIVEN BY THE OWNER. SUCH EQUIPMENT IS USED, IT MUST BE COMPLETELY CLEANED AND REPAIRED AS NECESSARY. CLEANING INCLUDES REPLACING ALL FILTERS, CLEANING ALL COILS AND HEAT EXCHANGERS, INSPECTING FANS, PLENUMS, AND DUCTWORK, AND CLEANING AS DIRECTED BY THE OWNER.
B. IF HVAC EQUIPMENT IS USED DURING THE CONSTRUCTION PERIOD, THIS CONTRACTOR SHALL PROVIDE MINIMUM MERVA FILTERS OR FILTRATION MEDIA OVER ANY RETURN AIR GRILLES AND OPEN RETURN AIR DUCT WORK. FOR THE DURATION OF THE CONSTRUCTION PERIOD, CONTRACTOR SHALL REMOVE AND REPLACE ALL SUCH FILTERS WHEN THE UNIT IS STARTED AND REPLACE FILTERS AS NEEDED, BUT NOT LESS THAN EVERY FOUR WEEKS.
C. ON THE DAY OF SUBSTANTIAL COMPLETION, THE CONTRACTOR SHALL CLEAN THE UNIT AND PROVIDE A NEW SET OF FILTERS IN THE UNIT.

- 1.19 REFRIGERANT AND OIL
A. PROVIDE FULL REFRIGERANT AND OIL CHARGE IN NEW AIR CONDITIONING REFRIGERATION SYSTEMS, AND MAINTAIN IT FOR FULL TERM OF THE GUARANTEE.
B. NEW MECHANICAL EQUIPMENT SHALL UTILIZE 410A.
C. DISPOSE OF RECOVERED REFRIGERANT LEGALLY, IN ACCORDANCE WITH APPLICABLE RULES AND REGULATIONS.
2.07 MATERIALS AND EQUIPMENT
A. PROVIDE NECESSARY EQUIPMENT, PIPING, DUCTWORK, AND ACCESSORIES THAT ARE NOT PROVIDED BY THE EQUIPMENT SUPPLIER OR OWNER TO COMPLETE INSTALLATION OF EQUIPMENT. FURNISHING TO BE PROVIDED BY THE CONTRACTOR, INCLUDING BUT NOT LIMITED TO THE DRAWINGS AND/OR DESCRIBED IN THE GENERAL NOTES TO THIS CONTRACTOR, EQUIPMENT AND ACCESSORIES NOT PROVIDED BY THE EQUIPMENT SUPPLIER MAY INCLUDE CONDENSATE DRAINS, FLUES, VENTS, INTAKES, ASSOCIATED ROOF JACKS AND CAPS TO EXTERIOR, CONTRACTORS, HANGERS, HANGING AND SUPPORTS, CIRCUIT BREAKERS, AND CONDUIT SIZES ARE TO BE PROVIDED BY THE COMPLETE SYSTEM IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
B. CONTRACTOR SHALL BE RESPONSIBLE FOR CORRECTING ROUGH-IN DIMENSIONS AND SHALL VERIFY SAME WITH ARCHITECT AND/OR EQUIPMENT SUPPLIER PRIOR TO OTHER INSTALLATIONS.
C. IF AN APPROVED MANUFACTURER IS OTHER THAN THE MANUFACTURER USED AS THE BASIS FOR DESIGN, THE EQUIPMENT OR EQUIPMENT PARTS MUST BE DURABLE AND OF EQUAL OR SUPERIOR QUALITY. APPEARANCE, CAPACITY, AND EFFICIENCY THROUGH ALL RANGES OF OPERATION, SHALL CONFORM WITH ARRANGEMENTS AND SPACE LIMITATIONS OF THE EQUIPMENT SHOWN ON THE PLANS AND/OR SPECIFIED, SHALL BE COMPATIBLE WITH THE OTHER COMPONENTS OF THE SYSTEM AND SHALL COMPLY WITH THE REQUIREMENTS OF THE SPECIFICATIONS. ALL COSTS TO MAKE THESE ITEMS OF EQUIPMENT COMPLY WITH THESE REQUIREMENTS INCLUDING, BUT NOT LIMITED TO, PIPING, SHEET METAL, ELECTRICAL WORK, AND EQUIPMENT SHALL BE THE CONTRACTOR'S RESPONSIBILITY.
D. CHANGES INVOLVING ELECTRICAL WORK: THE DESIGN OF THE MECHANICALS SYSTEM IS BASED ON THE EQUIPMENT SCHEDULED ON THE DRAWINGS. EQUIPMENT OF HIGHER ELECTRICAL CHARACTERISTICS MAY BE FURNISHED PROVIDED SUCH PROPOSED EQUIPMENT IS APPROVED IN WRITING AND CONNECTING ELECTRICAL WIRING TO THE EQUIPMENT. ALL COSTS TO MAKE THESE ITEMS OF EQUIPMENT MODIFIED WITH NO ADDITIONAL COST TO PROJECT. IF MINIMUM ENERGY RATINGS OR EFFICIENCIES ARE SPECIFIED, EQUIPMENT SHALL COMPLY WITH REQUIREMENTS.
E. WHEN EQUIPMENT CHANGES ARE MADE THAT INVOLVE ADDITIONAL ELECTRICAL WORK (LARGER SIZE MOTOR, ADDITIONAL WIRING OF EQUIPMENT, ETC.) THE MECHANICAL TRADES INVOLVED SHALL COMPENSATE THE ELECTRICAL TRADES FOR THE COST OF THE ADDITIONAL WORK REQUIRED.

- SECTION 20 60-10 MECHANICAL AND PLUMBING BASIC MATERIALS AND METHODS
1.01 GENERAL
A. COMPLY WITH REQUIREMENTS IN PUBLIC LAW 111-398, "REDUCTION OF LEAD IN DRINKING WATER ACT"; ABOUT LEAD CONTENT IN MATERIALS THAT WILL BE IN CONTACT WITH POTABLE WATER FOR HUMAN CONSUMPTION.
B. COMPLY WITH NSF 14, "PLASTICS PIPING SYSTEM COMPONENTS AND RELATED MATERIALS"; FOR PLASTIC, POTABLE DOMESTIC WATER SYSTEM COMPONENTS. INCLUDE MARKING "NSF-PW" ON COMPONENTS.
C. COMPLY WITH NSF 61, "DRINKING WATER SYSTEM COMPONENTS - HEALTH EFFECTS, SECTIONS 1 THROUGH 8"; FOR POTABLE DOMESTIC WATER PIPING AND COMPONENTS.
D. COMPLY WITH NSF 372, "DRINKING WATER SYSTEM COMPONENTS - LEAD CONTENT"; FOR POTABLE DOMESTIC WATER PIPING AND COMPONENTS.
E. STEEL SUPPORT WELDING: QUALIFY PROCESSES AND OPERATORS ACCORDING TO AWS D1.1, "STRUCTURAL WELDING CODE - STEEL".
F. STEEL PIPE WELDING: QUALIFY PROCESSES AND OPERATORS ACCORDING TO ASME B31.10 AND PRESURE VESSEL CODE. CERTIFY ALL WELDING AND BRAZING QUALIFICATIONS; COMPLY WITH PROVISIONS IN ASME B31.10 SERIES, "CODE FOR PRESSURE PIPING"; SECTION IX.
G. BRAZING: QUALIFY PROCESSES AND OPERATORS ACCORDING TO ASME B31.10 AND PRESURE VESSEL CODE. SECTION IX. WELDING AND BRAZING QUALIFICATIONS; OR AWS B2.2, "STANDARD FOR BRAZING PROCEDURE AND PERFORMANCE QUALIFICATION".
H. SOLDERING: QUALIFY PROCESSES AND OPERATORS ACCORDING TO AWS B2.2.3.2M, "SPECIFICATION FOR SOLDERING PROCEDURE AND PERFORMANCE QUALIFICATION".
2.01 JOINING MATERIALS
A. FERROUS PIPE: SIZE 2 INCHES AND SMALLER.
B. FERROUS PIPE: MALLEABLE IRON GROUND JOINT TYPE UNIONS.
C. UNIONS IN EXHAUSTING PIPING SHALL BE GALVANIZED.
D. COPPER TUBE AND PIPE: BRONZE UNIONS WITH SOLDERED JOINTS.
E. FLANGES: PIPE SIZES 2 1/2 INCH AND LARGER.
F. PIPE MARKER PRE-TREATMENT: REFRIGERANT PIPING: USE WELDING PROCESSES INVOLVED AND THAT CERTIFICATION B. COPPER TUBE AND PIPE: SLIP-ON FLOW FLANGES.
G. PIPE-FLANGE GASKETS: MATERIALS SUITABLE FOR CHEMICAL AND THERMAL CONDITIONS OF PIPING SYSTEMS.
H. PIPE STANDARD WELD END: STANDARD WELD END UNLESS OTHERWISE SPECIFIED. SQUARE HOLE BOLTS AND NUTS ARE NOT ACCEPTABLE.
I. FLANGE FILLER METALS: ASTM B 32, LEAD-FREE, ANTIMONY-FREE, SILVER-BEARING ALLOYS, INCLUDE WATER-FLUSHABLE FLUX ACCORDING TO ASTM B 813.
J. BRAZING FILLER METALS: AUSTENITIC MEETING AWS A5.8.
K. WELDING FILLER METALS: SILVER-BEARING SILVER ALLOYS FOR JOINING COPPER OR BRONZE SOCKET FITTINGS WITH COPPER PIPE. FLUX IS PROHIBITED UNLESS USED WITH STAINLESS STEEL, STAINLESS STEEL, OR OTHER FERROUS METALS. USE TYPE BAGES, CADMIUM-FREE SOLDER AND FLUX FOR JOINING COPPER WITH STEEL, STAINLESS STEEL, OR OTHER FERROUS METALS.
L. WELDING FILLER METALS: COPPER-FREE SILVER D10, D12/D11/D12M FOR WELDING MATERIALS APPROPRIATE FOR WALL THICKNESS AND SERVICE CONDITIONS.
M. SOLVENT CEMENTS FOR JOINING CPVC PIPING AND TUBING ASTM F 493.
N. SOLVENT CEMENTS FOR JOINING ABS PIPING: ASTM D 2235.
O. SOLVENT CEMENTS FOR JOINING PVC TO ABS PIPING: TRANSITION: ASTM D 3138.
L. TUBE THREAD COMPOND FOR NATURAL GAS, USE TETRAFLUOROETHYLENE (TFE) TAPES 2 TO 3 MILS THICK WITH 1/8 INCH GROOVE FOR SEALING. USE PTFE, INORGANIC ZINC-RICH COATINGS OR CORROSION INHIBITING PROPRIETARY COMPOUND.
M. NIPS: THE USE OF COMPOND FOR SEALING. USE PTFE, INORGANIC ZINC-RICH COATINGS OR CORROSION INHIBITING PROPRIETARY COMPOUND.

- 2.02 MOTORS AND STARTERS
A. PROVIDE MOTORS AND STARTING EQUIPMENT WHERE NOT FURNISHED WITH THE EQUIPMENT PACKAGE. MOTORS SHALL HAVE COPPER WINDINGS, CLASS B INSULATION, AND STANDARD SQUARE CASE WITH STARTING TORQUE CHARACTERISTICS SUITABLE FOR THE OPERATED SERVICE. MOTORS FOR AIR HANDLING EQUIPMENT SHALL BE SELECTED FOR QUIET OPERATION. EACH MOTOR SHALL BE CHECKED FOR PROPER ROTATION AFTER ELECTRICAL CONNECTION HAS BEEN COMPLETED. PROVIDE Drip-PROOF ENCLOSURE FOR LOCATIONS PROTECTED FROM WEATHER AND NOT IN AIR STREAM OF FAN, AND TOTALLY ENCLOSED FAN-COOLED ENCLOSURE FOR MOTOR ENCLOSURES. PROVIDE WEATHER RESISTANT PROTECTIVE COVERING FOR EXTERIOR LOCATIONS. WEATHERING COULDS, LOURALS OR APPROVED EQUAL.
B. PROVIDE EVERY MOTOR, EXCEPT FRACTIONAL HORSERPOWER SINGLE PHASE MOTORS WITH AN APPROVED TYPE OF BUILT-IN THERMAL OVERLOAD PROTECTION, WITH A MOTOR STARTER. EACH STARTER SHALL BE PROVIDED WITH OVERLOAD HEATERS SIZED TO THE MOTOR RATING, AND EVERY THREE-PHASE MOTOR STARTER SHALL HAVE OVERLOAD HEATERS IN EACH PHASE. AMBIENT COMPENSATED HEATERS SHALL BE INSTALLED WHERE NECESSARY.
C. MOTOR STARTERS SHALL BE FURNISHED BY THE DIVISION 26 CONTRACTOR. FOR INSTALLATION AND CONNECTION BY THE DIVISION 16 CONTRACTOR, STARTERS SHALL BE ALLEN-BRADLEY, CLARK, FURNAS, SQUARE D, OR APPROVED EQUAL.
2.03 ACCESS PANELS
A. THE MECHANICAL CONTRACTOR SHALL FURNISH AND GENERAL CONTRACTOR SHALL INSTALL ACCESS PANELS WHERE REQUIRED FOR ACCESS TO EQUIPMENT. THE MECHANICAL CONTRACTOR SHALL INCLUDE THE COST OF INSTALLATION IN HIS BID. ACCESS PANELS SHALL BE ADEQUATELY SIZED, OF A TYPE APPROVED BY THE ARCHITECT AND SHALL BE FIRE OR SMOKE-RATED AS REQUIRED. ACCESS PANELS SHALL BE MINIMUM 18"x18".
2.04 STRUCTURAL STEEL
A. STRUCTURAL STEEL USED FOR SUPPORT OF EQUIPMENT, DUCTWORK AND PIPING SHALL BE NEW, CLEAN AND CONFORM TO ASTM DESIGNATION A-36.
B. SUPPORT MEMBERS, MECHANICAL COMPONENTS FROM THE BUILDING STRUCTURE, DO NOT SUPPORT MECHANICAL COMPONENTS FROM CEILING, OTHER MECHANICAL OR ELECTRICAL CONSTRUCTIONS, NOR OTHER NON-STRUCTURAL ELEMENTS.
2.05 PENETRATIONS AND SLEEVES
A. SLEEVE-SEAL SYSTEMS SHALL INCLUDE MODULAR SEALING ELEMENT DESIGNED FOR FIELD ASSEMBLY FOR FILLING AN ANNUAL DUCT BRACE BETWEEN PIPE AND SLEEVE. SEAL SHALL BE DESIGNED FOR HYDROSTATIC PRESSURE OF 20 PSIG. SEAL SHALL BE MADE OF EPDM RUBBER WITH INTERLOCKING FLANGES. PREPARED SURFACE OF PIPE, PRESURE FLANGES SHALL BE MADE OF STAINLESS STEEL WITH STAINLESS STEEL CONNECTING BOLTS AND NUTS. APPROVED MANUFACTURER ARE METRAFLAX, CALPOLP, INCEAL, PIPE AND INSULATOR.
B. PIPE SLEEVES SHALL BE STEEL PIPE IN ACCORDANCE WITH ASTM A 53, TYPE E, GRADE B, SCHEDULE 40 WITH PLAIN ENDS AND INTEGRAL WELDED WENTHOUT COLLAR.
C. SEAL ELEVATED FLOOR, EXTERIOR WALL AND ROOF PENETRATIONS WATERIGHT AND WEATHERTIGHT WITH NON-SHRINK, NON-HARDENING COMMERCIAL SEALANT. PACK WITH MINERAL WOOL AND SEAL BOTH ENDS WITH MINIMUM OF 1/2" OF STAINLESS SEAL AROUND PENETRATIONS OF FIRE RATED ASSEMBLIES. COORDINATE FIRE RATINGS AND LOCATIONS WITH THE ARCHITECTURAL DRAWINGS. REFER TO STANDARD PENETRATION DETAILS.
D. INSTALL SLEEVES IN CONCRETE FLOORS, WALLS, ROOFS AS THEY ARE CONSTRUCTED. CUT SLEEVES TO LENGTH FOR MOUNTING FLUSH. EXTEND SLEEVES IN MECHANICAL ROOMS, FLOORS OR AREAS PIPE IS SUBJECT TO DAMAGE 2 INCHES ABOVE FINISHED FLOORING.
2.06 FIRE STOPPING
A. SEAL OPENINGS OF FIRE RATED CONSTRUCTION WITH A MATERIAL OR PRODUCT THAT HAS BEEN TESTED AT AN INDEPENDENT TESTING LABORATORY SUCH AS UL OR IFRC. FIRE STOPPING SHALL CONFORM TO ASTM E 814, UL 1479, OR UL 2078. PRODUCTS SHALL BE SIMILAR TO RETORSCAL MASTIC TAUCAUK, 38 BRAND FIRE BARRIER PENETRATION SEALING SYSTEMS, OR MILT.
2.08 SPARE PARTS
A. CONTRACTOR SHALL PROVIDE THE OWNER, WITH RECEIPT, THE FOLLOWING SPARE PARTS FOR THE EQUIPMENT INSTALLED FOR THIS PROJECT:
1. ONE SET OF SPARE PARTS FOR EACH TYPE OF EQUIPMENT FOR EACH UNIT. IN ADDITION TO THE SPARE SET OF PARTS, INSTALL NEW FILTERS PRIOR TO TESTING, ADJUSTING AND BALANCING WORK AND BEFORE TURNING SYSTEM OVER TO OWNER.
2. ONE COMPLETE SET OF BELTS FOR EACH FAN.
3. THREE OPERATING KITS FOR EACH TYPE OF AIR OUTLET AND INLET THAT REQUIRE THEM.
2.09 LOW EMITTING MATERIALS
A. ALL SEALANTS & ADHESIVES REQUIRED FOR THE INSTALLATION OF MECHANICAL & PLUMBING SYSTEMS WITH THE BUILDING ENVELOPE SHALL MEET THE REQUIREMENTS FOR LOW EMITTING MATERIALS AS SET FORTH IN THE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD) RULE #118 OR LEED NEW CONSTRUCTION REQUIREMENTS, WHICH INCLUDES BUT IS NOT LIMITED TO:
a. METAL TO METAL ADHESIVE: VOC LIMIT OF 300/L.
b. FIRE/RESISTANT ADHESIVE: VOC LIMIT OF 100/L.
c. MULTIPURPOSE CONSTRUCTION ADHESIVE: VOC LIMIT OF 70/G/L.
3.01 UTILITIES AND PROTECTION OF SERVICES
A. DO NOT INTERRUPT AND UTILITY OR SERVICE WITHOUT ADEQUATE NOTICE AND SCHEDULE. CONTRACTOR SHALL AT OWN EXPENSE REPAIR, REPLACE, AND MAINTAIN UTILITIES OR SERVICE WHICH ARE DAMAGED OR BROKEN OR OTHERWISE RENDERED INOPERATIVE DURING THE COURSE OF CONSTRUCTION.
3.02 PROTECTION DURING CONSTRUCTION
A. PLUMBING FIXTURES, TRIM AND OTHER EQUIPMENT SHALL BE PROTECTED AGAINST DAMAGE OR INJURY. ALL FIXTURES AND EQUIPMENT DAMAGED BY ANY CAUSE AND ANY TRIM WITH MARRED OR SCRATCHED FINISH SHALL BE REPLACED AT NO ADDITIONAL COST TO THE OWNER. THE FUTURE PROTECTION SHALL BE REMOVED AT THE COMPLETION OF THE WORK OR FOR FINAL INSPECTION.
3.03 EXCAVATION AND BACKFILLING
A. PERFORM EXCAVATION AND BACKFILL REQUIRED FOR INSTALLATION OF UNDERGROUND WORK UNDER THIS CONTRACT. TRENCHES SHALL BE OF SUFFICIENT WIDTH, CRIB OR BRACE TRENCHES TO PREVENT CAVE IN OR SETTLEMENT. DO NOT EXCAVATE TRENCHES CLOSE TO COLUMNS AND WALLS OF NEW BUILDING WITHOUT PRIOR CONSULTATION WITH THE ARCHITECT. USE PUMPING EQUIPMENT IF REQUIRED TO KEEP TRENCHES FREE OF WATER. BACKFILL TRENCHES IN MAXIMUM 6" LAYERS OF WELL-TAMPED EARTH IN A MANNER TO PREVENT FUTURE SETTLEMENT.
B. EXCAVATION AS HEREIN SPECIFIED SHALL BE UNCLASSIFIED. COMMON EXCAVATION SHALL COMPRISE THE SATISFACTORY REMOVAL AND DISPOSITION OF MATERIAL OF WHATEVER SUBSTANCES AND OF EVERY DESCRIPTION ENCOUNTERED, INCLUDING ROCK, IF ANY. WITHIN THE LIMITS OF THE WORK AS SPECIFIED AND SHOWN ON THE DRAWINGS, EXCEPT FOR THE EXCEPTIONS CHARGES AND GRADES INDICATED ON THE DRAWINGS. EXCAVATED MATERIALS WHICH ARE CONSIDERED UNSUITABLE FOR BACKFILL, AND SURPLUS OF EXCAVATED MATERIAL WHICH IS NOT REQUIRED FOR BACKFILL, SHALL BE DISPOSED OF BY THE CONTRACTOR AT HIS OWN EXPENSE AND RESPONSIBILITY, AND TO THE SATISFACTION OF THE ARCHITECT.

- 3.04 CUTTING AND REPAIRING
A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING, DRILLING, WELDING, AND REPAIR OF WALLS, FLOORS, CEILINGS, ETC. AS REQUIRED FOR TO INSTALL WORK UNDER THIS SECTION. OBTAIN PERMISSION FROM THE ARCHITECT PRIOR TO CUTTING. DO NOT CUT THROUGH STRUCTURAL MEMBERS WITHOUT THE ARCHITECT. CUT HOLES AS SMALL AS POSSIBLE. GENERAL CONTRACTOR SHALL PATCH WALLS, FLOORS, ETC. AS REQUIRED BY WORK UNDER THIS SECTION. PATCHING SHALL MATCH THE ORIGINAL MATERIAL AND FINISH. CONTRACTOR SHALL MATCH THE ORIGINAL MATERIAL AND FINISH UNDER THE ARCHITECT'S SUPERVISION. CONTRACTOR SHALL MATCH THE ORIGINAL MATERIAL AND FINISH UNDER THE ARCHITECT'S SUPERVISION. CONTRACTOR SHALL MATCH THE ORIGINAL MATERIAL AND FINISH UNDER THE ARCHITECT'S SUPERVISION. CONTRACTOR SHALL MATCH THE ORIGINAL MATERIAL AND FINISH UNDER THE ARCHITECT'S SUPERVISION.
3.05 CONCRETE WORK
A. NEW FLOOR MOUNTED EQUIPMENT/ FIXTURES SHALL BE CONNECTED TO THE EXISTING SANITARY DRAINAGE SYSTEM AS SHOWN ON THE DRAWINGS OR AS REQUIRED. SAW-CUT EXISTING CONCRETE FLOOR AS REQUIRED TO INSTALL NEW UNDERFLOOR PIPES, AND PATCH TO MATCH EXISTING CONCRETE FLOOR INCLUDING ANY FIRE RESISTANT OR ARCHITECTURAL FINISHES AND FINISH FLOOR PATCH REQUIREMENTS.
B. CONTRACTOR SHALL PROVIDE COMPLETE EQUIPMENT BASES AS SHOWN ON PLANS.
3.06 START-UP PROCEDURES
A. FOLLOW MANUFACTURER'S RECOMMENDED PROCEDURES IN STARTING UP THE EQUIPMENT. DAMAGE CAUSED DURING START-UP SHALL BE REPLACED AT NO EXPENSE TO THE OWNER.
SECTION 20 60-19 - METERS AND GAUGES
2.01 THERMOMETERS
A. IN 90CH LONG-DIE CAST ALUMINUM OR CHROME PLATED BRASS WITH GLASS WINDOW. RED, BLUE, OR GREEN INDICATORS. ADJUSTABLE CONNECTOR WITH 180 DEGREE VERTICAL PLANE AND 360 DEGREE HORIZONTAL ORIENTATION. ACCURACY SHALL BE PLUS OR MINUS 1 PERCENT. APPROVED MANUFACTURER ARE AMETEK, MILJUDO, THERICE, OR WESS INSTRUMENTS.
B. THERMOWELLS SHALL BE PRESSURE-TIGHT, SOCKET-TYPE METAL FITTING MADE FOR INSERTION INTO PIPING AND IN TYPE, DIAMETER, AND LENGTH REQUIRED TO HOLD THERMOMETER BRASS FOR CONVEYABLE SERVICES LESS THAN 200 DEGREES F. STAINLESS STEEL FOR ALL OTHERS TO SUIT SERVICE. PROVIDE AN EXTENSION NECK TO ACCOMMODATE INSULATION WHERE APPLICABLE. SAME MANUFACTURER OF THERMOMETER BEING USED.
2.02 PRESSURE GAUGES
A. PRESSURE GAUGES SHALL BE DIRECT MOUNTING, DIAL-TYPE WITH STAINLESS STEEL CASE OR ALUMINUM. PRESSURE GAUGES SHALL BE ROUND-TYPE WITH BRASS CONNECTION TUBE WITH BRASS CONNECTION. GAUGES SHALL BE NONREFLECTIVE WITH PERMANENT SCALE MARKINGS. ACCURACY SHALL BE PLUS OR MINUS 1 PERCENT.
B. SECTION 20 60-23 - HANGERS AND SUPPORTS

- 1.01 GENERAL
A. REFER TO DUCT AND PIPING APPLICATION SCHEDULE FOR HANGER, ROD, SPACING, AND TYPES APPROVED FOR USE.
B. SUPPORT EQUIPMENT, PIPING, DUCTWORK FROM THE STRUCTURE TO PREVENT SAGGING, POCKETING, SWAYING, AND VIBRATIONS, AND ARRANGED TO PROVIDE FOR EXPANSION AND CONTRACTION. HANGERS SUPPORTING PIPING REQUIRING PRIOR APPROVAL SPECIFIED IN THIS SECTION OF THE SPECIFICATIONS. ALL COSTS TO MAKE THESE ITEMS OF EQUIPMENT COMPLY WITH THESE REQUIREMENTS INCLUDING, BUT NOT LIMITED TO, PIPING, SHEET METAL, ELECTRICAL WORK, AND EQUIPMENT SHALL BE THE CONTRACTOR'S RESPONSIBILITY.
C. DUCT HANGER SPACING: COMPLY WITH SMACNA'S HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE, TABLE 5-1 (TABLE 6-1M), "RECTANGULAR DUCT HANGERS MINIMUM SIZE;" AND TABLE 5-2, "MINIMUM SPACING IN WRITING AND CONNECTING ELECTRICAL WIRING TO THE EQUIPMENT. ALL COSTS TO MAKE THESE ITEMS OF EQUIPMENT MODIFIED WITH NO ADDITIONAL COST TO PROJECT. IF MINIMUM ENERGY RATINGS OR EFFICIENCIES ARE SPECIFIED, EQUIPMENT SHALL COMPLY WITH REQUIREMENTS.
D. THROUGH-ROOF HANGERS SHALL BE USED WITH COPPER PIPE, WET AND CORROSIVE ENVIRONMENT SHALL USE STAINLESS STEEL.
E. HANGER RODS SHALL BE CONTINUOUS THREAD WITH NUTS AND WASHERS MADE OF CARBON STEEL UNLESS LOCATED IN WET OR CORROSIVE ENVIRONMENT, WHICH SHALL BE STAINLESS STEEL. USE COPPER COATED STEEL ROD FOR COPPER PIPING.
2.02 METAL FRAMING SYSTEMS
A. SHOP OR FIELD FABRICATED ASSEMBLY OF STEEL CHANNELS AND COMPONENTS WITH GALVANIZED COATING.
B. LOCATED IN WET OR CORROSIVE ENVIRONMENT. APPROVED MANUFACTURERS ARE ANVIL, EATON, UNISTRUT.
2.03 SHIELDS, SADDLES, AND INSERTS
A. PROVIDE MSP 99 TYPE 40 METAL SHIELDS, MSP 99 TYPE 391 AND TYPE 398 SADDLES, AND THERMAL PIPE SHIELDS AS REQUIRED. APPROVED MANUFACTURERS ARE ENRICO, PICO PIPE SHIELDS INC.
2.04 STAINLESS STEEL LOAD RATION SUSPENSION CABLES
A. APPROVED MANUFACTURERS: DUCMATE, DURDYDINE CORP, GRIFFIN INC.
B. AIRPLANE QUALITY STAINLESS STEEL 7X7 AND 7X19 WIRE COPPLYING WITH ASTM A 492, ONE PIECE STAINLESS STEEL FASTENER AND LOCK END, STUD END, OR PLAN ENDS. CABLE SHALL BE USED FOR DUCTWORK ONLY.
C. INSTALL IDENTIFICATIONS ON DUCTS, PIPES, EQUIPMENT IN VISIBLE LOCATIONS IN FINISHED SPACES, SHAFTS, MECHANICAL ROOMS, PLENUMS, CONCEALED LOCATIONS AND ON BOTH SIDES OF PENETRATIONS.

- SECTION 20 60-33 - MECHANICAL IDENTIFICATION
2.01 IDENTIFICATION
A. APPROVED MANUFACTURERS: BRADY, STENO NAMEPLATE COMPANY, EMMET, BRIMAR INDUSTRIES, AND KOLBI
B. TYPES LISTED BELOW SHALL BE IN ACCORDANCE ASME A1.1:
1. EQUIPMENT MANUFACTURER IDENTIFICATION TAGS FOR PERMANENT ATTACHMENT WITH FASTENER
2. EQUIPMENT MARKER: ENGRAVED, COLOR-CODED LAMINATED PLASTIC WITH ADHESIVE
3. ACCESS PANEL DOOR: MARKER ENGRAVED LAMINATED PLASTIC WITH CENTER HOLE FOR FASTENER
4. PIPE MARKER: PRE-TREATED REINFORCED PLASTIC FORMER TO COVER PIPE OR SHARED REFORCED SEMIRIGID PLASTIC FORMER TO PARTIALLY COVER PIPE
5. DUCT MARKERS: ENGRAVED PLASTIC WITH ADHESIVE OR VINYL WITH ADHESIVE INCLUDE DIRECTION AND IDENTIFICATION INFORMATION
C. INSTALL IDENTIFICATIONS ON DUCTS, PIPES, EQUIPMENT IN VISIBLE LOCATIONS IN FINISHED SPACES, SHAFTS, MECHANICAL ROOMS, PLENUMS, CONCEALED LOCATIONS AND ON BOTH SIDES OF PENETRATIONS.
SECTION 20 60-39 - INSULATION
2.01 PIPE INSULATION
A. FLEXIBLE ELASTOMERIC
1. APPROVED MANUFACTURERS: ARMANCOL, OR KIL INSULATION GROUP
2. INSULATION SHALL BE CLOSED-CELL, EXPANDED RUBBER MATERIAL HAVING A CONDUCTIVITY OF 0.26 AT 75 F MEAN, IN ACCORDANCE WITH ASTM D 564.
3. EXTERIOR PIPING INSULATION WILL BE PAINTED WITH A WHITE SOLVENT BASED ALKYL FINISH/AMFLX AB OR EQUIVALENT, INCLUDING ALL FITTINGS, VALVES, ETC. JACKET AND INSULATION WILL BE SEALED WEATHERTIGHT AND INSTALLED PER MANUFACTURER'S INSTRUCTIONS. WHERE EXPOSED TO PHYSICAL DAMAGE, EXTERIOR PIPING INSULATION WILL BE COVERED WITH ALUMINUM JACKET, INCLUDING ALL FITTINGS, VALVES, ETC. JACKET AND INSULATION WILL BE SEALED WEATHERTIGHT AND INSTALLED PER MANUFACTURER'S INSTRUCTIONS.
B. GLASS FIBER
1. APPROVED MANUFACTURERS: JOHNS MANVILLE, KNAUF, MANSION, AND OWENS CORNING.
2. INSULATION SHALL BE FIBERGLASS BLENDED FIBERGLASS FIBER WITH THERMOSETTING RESIN, COMPLY ASTM C 547, GRADE A, WITH FACTORY APPLIED ALL SERVICE JACKET. CONDUCTIVITY OF 0.26 AT 75 F MEAN.
2.02 DUCT LINER
A. APPROVED MANUFACTURERS: JOHNS MANVILLE, OWENS-CORNING, CERTAINED OR KNAUF.
B. DUCT LINER SHALL BE 1 1/2 IN DENSITY DUCT FOR EXTERIOR DUCTS; CONSTRUCTION OF GLASS FIBER LINER AIR STREAM SURFACE IS COATED WITH BLACK-COATED MAT SURFACE. LINER SHALL HAVE A K-FRAC OF .25 AT 75 F MEAN.
C. DUCT LINER SHALL BE INSTALLED AS FOLLOWS OR AS SHOWN ON THE PLANS:
1. RETURN AIR DUCTS (WITHIN 18" OF FAN)
2. LINER SHALL BE SECURED TO ALL DUCT SURFACES BY PRESSING INTO WET ADHESIVE, APPLIED TO 100% OF THE DUCT SURFACE. IN ADDITION, LINER SHALL BE HELD IN PLACE WITH INSULPINS WELDED TO DUCT. SAME MATERIALS AND WITH CLIPS SUPPLIED OVER THE PINS. INSULPINS SHALL BE LOCATED PER SMACNA STANDARDS. LINER SHALL BE LAPPED AND COMPRESSED IN ALL FOUR CORNERS OF THE DUCT. BOTH UPSTREAM AND DOWNSTREAM TRANSVERSE EDGES SHALL BE COATED WITH ADHESIVE. COATED A MINIMUM OF 1" OVER THE EDGE IN ALL PLACES.
2.03 DUCT INSULATION
A. FIBERGLASS
1. APPROVED MANUFACTURERS: JOHNS MANVILLE, KNAUF, OWENS-CORNING, AND CERTAINEED
2. DUCT BLANKET INSULATION SHALL BE FLEXIBLE FIBERGLASS INSULATION, 1.5 PCF, WITH FACTORY APPLIED, ENGRAVED, FIBERGLASS IDENTIFICATION MARKING. INSULATION SHALL HAVE A K-FRAC OF .25 AT 75 F MEAN. SHALL BE IN ACCORDANCE WITH ASTM C 563, TYPE 1.
3. DUCT BRACE INSULATION SHALL BE RIGID FIBERGLASS INSULATION, 1.5 PCF, WITH FACTORY APPLIED, ALUMINUM FIBER BARRIER/PACKET. INSULATION SHALL HAVE A K-FRAC OF .25 AT 75 F MEAN. SHALL BE IN ACCORDANCE WITH ASTM C 563.
4. INSTALL THE FIBERGLASS BARRIER WITH HEAVY DUTY FOL SCROLL FACING AROUND THE DUCTWORK WITH OVERLAPPING FLANGES STAPLED AT 4" ON CENTER, STRIP THE LAP OF INSULATION AND TAPES THE FACING DIRECTLY TO THE OVERLAPPED FOL, SECURE THE INSULATION TO THE DUCTWORK WITH 18-GAUGE GALVANIZED BRASS NAILS AT 12" ON CENTER ON DUCTS AND MANIFOLD HANGERS. USE MECHANICAL FASTENERS ON THE BOTTOM OF DUCT.
5. TAPES AND JOINTS WITH 3" WIDE FOL REINFORCED KRAFT TAPE. TAPE ALL PIN PENETRATIONS OR PUNCTURES IN THE FACING.
2.04 INSULATING SEALANTS, ADHESIVES, AND MASTICS
A. SEALANTS
1. POLY-SURM KRAFT AND METAL JACKET FLASHING SEALANT SHALL BE FIRE AND WEATHER RESISTANT, FLEXIBLE, ELASTOMERIC SEALANT WITH TEMP RANGE AND ALUMINUM COLOR. APPROVED MANUFACTURE: MARATHON INDUSTRIES, FOSTER PRODUCTS, MON-ECO INC.
2. ALL SERVICE JACKET FLASHING SEALANTS: PVC, PVP, AND VINYL SEALANTS SHALL BE FIRE AND WEATHER RESISTANT, FLEXIBLE, ELASTOMERIC SEALANT WITH TEMP RANGE AND ALUMINUM WHITE. APPROVED MANUFACTURE: CHLOMERS PRODUCTS
3. FLEXIBLE ELASTOMERIC ADHESIVE: COMPLY WITH MIL-A-24179A, TYPE I, CLASS 1 APPROVED MANUFACTURE: ARMANCOL, FOSTER PRODUCTS, RES CORP.
4. MINERAL FIBER ADHESIVE: COMPLY WITH MIL-A-3316C, CLASS 2, GRADE A. APPROVED MANUFACTURE: MARATHON INDUSTRIES, FOSTER PRODUCTS, MON-ECO INC.
5. POLYURETHANE ADHESIVE: COMPLY WITH MIL-A-3316C, CLASS 2, GRADE A. APPROVED MANUFACTURE: MARATHON INDUSTRIES, FOSTER PRODUCTS, MON-ECO INC.
6. VAPOR BARRIER MASTIC: COMPLY WITH ASTM E 96 WITH 0.01 PERM AND SHALL BE WHITE. APPROVED MANUFACTURE: MARATHON INDUSTRIES, FOSTER PRODUCTS, MON-ECO INC.
7. BREATHER MASTIC: COMPLY WITH ASTM F 1249 WITH 0.2 PERM AND SHALL BE WHITE. APPROVED MANUFACTURE: MARATHON INDUSTRIES, FOSTER PRODUCTS, MON-ECO INC.
2.05 FACTORY APPLIED JACKETS
A. INSULATION SYSTEMS INDICATE FACTORY-APPLIED JACKETS ON VARIOUS APPLICATIONS, WHEN FACTORY-APPLIED JACKETS ARE INDICATED, COMPLY WITH THE FOLLOWING:
1. ALL SERVICE JACKET WHITE, KRAFT PAPER, FIBERGLASS-REINFORCED SCRIM WITH ALUMINUM-FOL BACKING. REPAIR, REPLACE, AND MAINTAIN JACKETS AS REQUIRED.
2. ALL SERVICE JACKET SELF SEALING LAP: ASI WITH SELF-SEALING, PRESSURE-SENSITIVE, ACRYLIC-BASED ADHESIVE COVERED BY A REMOVABLE PROTECTIVE STRIP; COMPLY WITH ASTM C 1136, TYPE I.
3. FOL SCRIM KRAFT JACKET: ALUMINUM-FOL, FIBERGLASS-REINFORCED SCRIM WITH KRAFT PAPER BACKING; COMPLYING WITH ASTM C 1136, TYPE II.
2.06 FIELD APPLIED JACKETS
A. PVC JACKETS SHALL BE HIGH IMPACT RESISTANT, UV RESISTANT, COMPLY WITH ASTM D 1784 ROLL STOCK FOR FIELD APPLICATIONS.
B. METAL JACKETS SHALL BE ALUMINUM AND COMPLY WITH ASTM B 209 3005, 3006, 3015 OR 9006 TEMP-H 14. SHALL BE ROLL STOCK READY FOR FIELD CUTTING WITH STANDARD FINISH. INDOOR/OUTDOOR APPLICATION SHALL BE HELL BONDDED POLYETHYLENE AND KRAFT PAPER 1 MIL AND 3 MIL THICK RESPECTIVELY.
2.07 TAPES
A. ALL SERVICE JACKET TAPE SHALL BE WHITE, 3 INCHES WIDE AND 1.5 MILS THICK WITH MATCHING FACTORY APPLIED JACKET WITH ACRYLIC ADHESIVE. APPROVED MANUFACTURERS: AVERY DENISON CORP, VENTURE, COMPACT CORP.
B. FOL SCRIM KRAFT TAPE SHALL BE FOL FACE, 3 INCHES WIDE AND 6.5 MILS THICK WITH MATCHING FACTORY APPLIED JACKET VAPOR RETARDER WITH ACRYLIC ADHESIVE. APPROVED MANUFACTURERS: AVERY DENISON CORP, VENTURE, COMPACT CORP.
C. PVC TAPE SHALL BE WHITE AND SUITABLE FOR INDOOR AND OUTDOOR APPLICATION, 2 INCHES WIDE AND 6 MILS THICK WITH MATCHING FACTORY APPLIED JACKET VAPOR RETARDER WITH ACRYLIC ADHESIVE. APPROVED MANUFACTURERS: AVERY DENISON CORP, VENTURE, COMPACT CORP.
D. COVER JOINTS AND ALL SEAMS WITH TAPE RECOMMENDED BY MANUFACTURE TO MAINTAIN VAPOR SEAL.

SECTION 22 05 23 AND 23 05 23 GENERAL VALVES FOR PLUMBING AND HVAC

- 2.01 VALVES, GENERAL
A. REFER TO PIPING APPLICATION SCHEDULES FOR SIZE, TYPE, AND CONNECTIONS.
B. VALVE PRESSURE RATING SHALL NOT BE LESS THAN INDICATED AS REQUIRED FOR SYSTEM TEMPERATURE AND PRESSURE RATINGS.
C. LEAKAGE SHALL BE AS SPECIFIED IN THE PIPING APPLICATION SCHEDULES.
D. REGULATORY REQUIREMENTS: COMPLY WITH REQUIREMENTS IN PUBLIC LAW 111-398, "REDUCTION OF LEAD IN DRINKING WATER ACT"; ABOUT LEAD CONTENT IN MATERIALS THAT WILL BE IN CONTACT WITH POTABLE WATER FOR HUMAN CONSUMPTION.
E. REFER TO PIPING APPLICATION SCHEDULES FOR SIZE, TYPE, AND CONNECTIONS.
F. BRONZE BALL VALVES SHALL BE MADE WITH DEZINCIFICATION RESISTANT MATERIALS. BRONZE VALVES MADE WITH COPPER ALLOY (BRASS) CONTAINING MORE THAN 16 PERCENT ZINC ARE NOT PERMITTED UNLESS OTHERWISE NOTED. WETTED SURFACES OF VALVES COVERED BY CONTACTABLE WATER SHALL CONTAIN NOT MORE THAN 0.2% PERCENT WEIGHTED AVERAGE LEAD CONTENT.
D. HYDRONIC WATER VALVES SHALL BE MADE WITH DEZINCIFICATION RESISTANT MATERIALS. BRONZE VALVES MADE WITH COPPER ALLOY (BRASS) CONTAINING MORE THAN 16 PERCENT ZINC ARE NOT PERMITTED UNLESS OTHERWISE NOTED.
E. VALVE ACTUATORS:
1. BALL VALVES SHALL BE PROVIDED WITH ATTACHMENT TO ACCEPT:
a. LEVER DRIVE OPERATOR FOR QUARTER-TURN VALVES 1/2 INCH AND LARGER.
b. HANDHELD OPERATOR FOR QUARTER-TURN

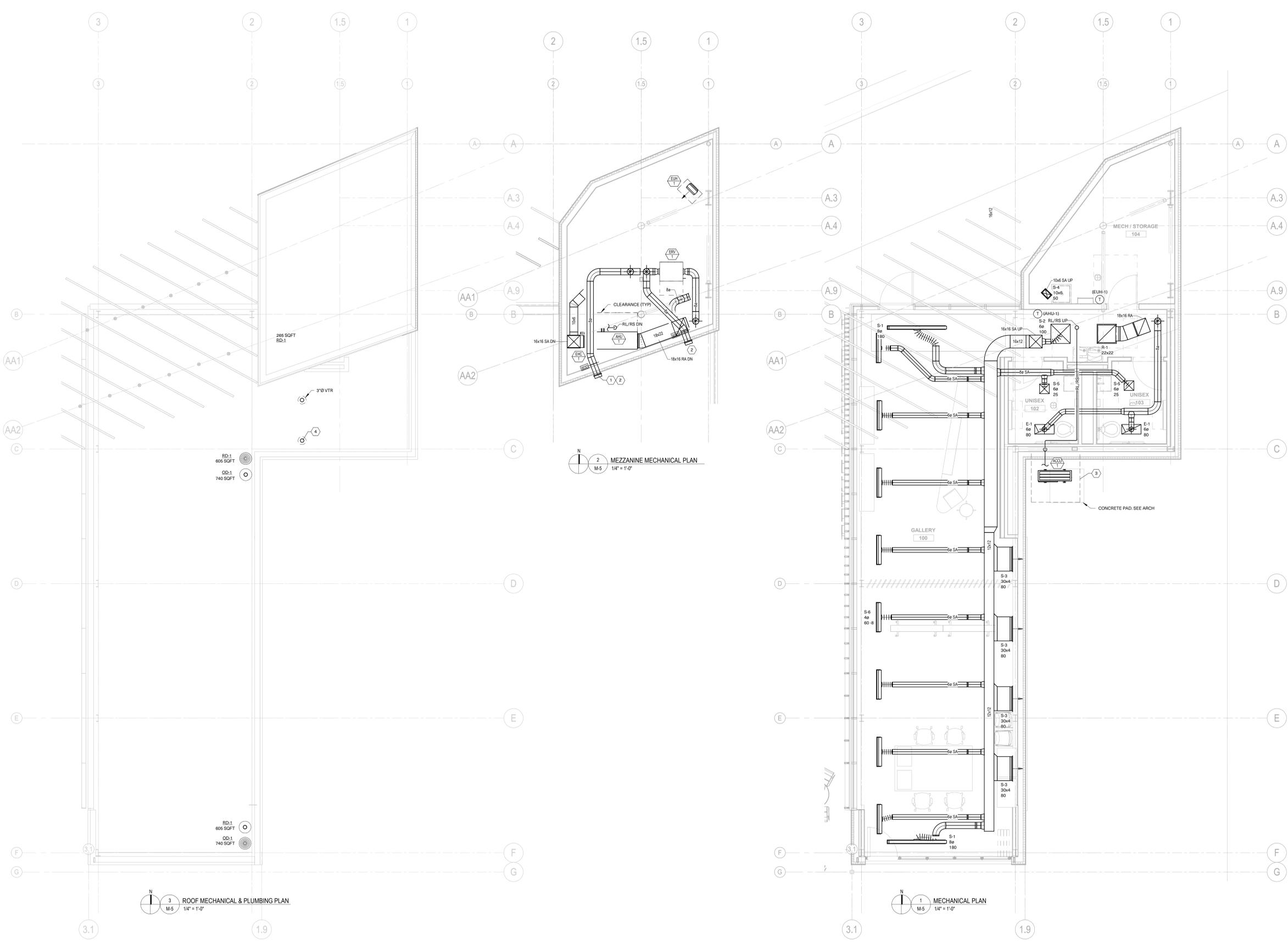




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**MECHANICAL - GENERAL NOTES**

1. THESE DRAWINGS ARE INTENDED TO BE DIAGRAMMATIC AND ARE NOT TO BE CONSIDERED FABRICATION OR SHOP DRAWINGS. COORDINATE PIPING AND DUCTWORK AMONGST OTHER TRADES AS REQUIRED.
2. PROVIDE ALL NECESSARY CLEARANCES AROUND MECHANICAL AND ELECTRICAL EQUIPMENT, DEVICES, VALVES, AND ANY COMPONENTS REQUIRING MAINTENANCE PER MANUFACTURER RECOMMENDATIONS AND CODE REQUIREMENTS.
3. COORDINATE ROUTING OF PIPING AND SHEET METAL WITH ARCHITECTURAL, STRUCTURAL, AND ELECTRICAL TRADES TO AVOID INTERFERENCES. PROVIDE ADDITIONAL FITTINGS, OFFSETS, AND EXPOSURE WHICH ARE REQUIRED DUE TO SPACE CONSTRAINTS OR OTHER FIELD CONDITIONS AND ARE NECESSARY TO AVOID CONFLICTS.
4. MOUNT THERMOSTATS 48" ABOVE FINISH FLOOR UNLESS NOTED OTHERWISE.
5. PROVIDE ACCESS DOORS IN DUCTWORK TO PROVIDE ACCESS FOR ALL SMOKE DETECTORS, FIRE DAMPERS, SMOKE DAMPERS, VOLUME DAMPERS, HUMIDIFIERS, COILS, AND OTHER ITEMS LOCATED IN THE DUCTWORK THAT REQUIRE SERVICE AND/OR INSPECTION.
6. PROVIDE ACCESS DOORS IN HARD CEILINGS FOR THE OPERATION, ADJUSTMENT, AND MAINTENANCE OF ALL FANS, VALVES, AND MECHANICAL EQUIPMENT.
7. DUCTWORK AND PIPING SHALL NOT BE LOCATED OVER ANY ELECTRICAL EQUIPMENT OR PANELS. PROVIDE REQUIRED N.E.C. CLEARANCE IN FRONT AND ABOVE ELECTRICAL EQUIPMENT.
8. CONTRACTOR SHALL PROVIDE ALL MISCELLANEOUS SUPPORTING STEEL FOR THE PROPER INSTALLATION AND SUPPORT OF MECHANICAL SYSTEMS.
9. CONTRACTOR SHALL VERIFY THERE ARE NO COMBUSTIBLES IN ANY RETURN AIR PLENUM. IF COMBUSTIBLES ARE PRESENT CONTRACTOR SHALL COORDINATE WITH ARCHITECT/ENGINEER FOR COURSE OF ACTION. DUCTED RETURN SYSTEM OR ELIMINATE COMBUSTIBLES WITH FIREPROOF, WRAP, OR BY OTHER MEANS.
10. ALL EQUIPMENT SHALL BE INSTALLED PER MANUFACTURER RECOMMENDATIONS AND REQUIREMENTS.
11. MECHANICAL AIR HANDLING EQUIPMENT SHALL HAVE DUCT DETECTOR IN RETURN AND/OR SUPPLY DUCT. SMOKE DETECTION WILL SHUT OFF HVAC UNIT UPON ACTIVATION. THE ACTIVATION OF THE SMOKE DETECTOR SHALL ACTIVATE A VISIBLE AND AUDIBLE SUPERVISORY SIGNAL AT A CONSTANTLY ATTENDED LOCATION OR TIE INTO FIRE ALARM PANEL IF ONE EXISTS. SMOKE DETECTION DEVICES THAT ARE NOT VISIBLE SHALL BE PROVIDED WITH A REMOTE INDICATION DEVICE PER CODE.

**MECHANICAL CONSTRUCTION NOTES**

1. EXHAUST SHALL BE LOCATED MINIMUM OF 10' FROM INTAKE. REFER TO ARCHITECTURAL FOR VERTICAL LOCATION. CONTRACTOR SHALL SUBMIT SAMPLES OF COLORS 01-SNOW WHITE, 20-DARK GREY, AND 31-LIGHT GREY FOR FINAL SELECTION.
2. PRIMEX W/CL WALL CAP OR EQUIVALENT WITH BIRDSCREEN AND BACKDRAFT DAMPER REFER TO ARCHITECTURAL FOR VERTICAL LOCATION. CONTRACTOR SHALL SUBMIT SAMPLES OF COLORS 01-SNOW WHITE, 20-DARK GREY, AND 31-LIGHT GREY FOR FINAL SELECTION.
3. PROVIDE 8"x8" GORILLA MANUFACTURING BOLT DOWN SECURITY CAPS WITH ADDRESS DOOR.
4. 4" SCHEDULE 40 PVC PIPE FROM SUB SLAB DEPRESSURIZATION SYSTEM VENT. COORDINATE UNDERGROUND PIPING WITH ARCHITECTURAL/GEOTECH PLANS. TERMINATE ABOVE ROOF WITH A TURBINE STYLE CAP.

DATE	DESCRIPTION	BY	CHKD
06/09/2020	AMF	KRS	
07/29/2020	AMF	KRS	
09/09/2020	AMF	KRS	
03/16/2021	AMF	KRS	

**OWNER**  
 CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-3215

**PROJECT**  
 RWP GATEWAY & VISITOR CENTER  
 1107 BRADDOCK ST.  
 PROVIDENCE, RI 02905

**SHEET TITLE**  
 MECHANICAL PLANS & ROOF PLAN



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POWER	RECEPTACLES	LIGHTING
DISTRIBUTION PANELBOARD	SINGLE 125V/20A RECEPTACLE	LIGHTING FIXTURE - SEE FIXTURE SCHEDULE FOR MORE INFORMATION
NEW PANELBOARD - SURFACE	DUPLEX 125V/20A RECEPTACLE	LIGHTING FIXTURE - SEE FIXTURE SCHEDULE FOR MORE INFORMATION
NEW PANELBOARD - RECESSED	QUADPLEX 125V/20A RECEPTACLE	LIGHTING FIXTURE - SEE FIXTURE SCHEDULE FOR MORE INFORMATION
EXISTING PANELBOARD	250V 2-POLE 3-WIRE RECEPTACLE (X) INDICATES AMPERE	LIGHTING FIXTURE - SEE FIXTURE SCHEDULE FOR MORE INFORMATION
TRANSFORMER (DRAWN TO SIZE)	DUPLEX RECEPTACLE TOP HALF SWITCHED - SEE PLANS FOR SWITCH LOCATION	LIGHTING FIXTURE - SEE FIXTURE SCHEDULE FOR MORE INFORMATION
POWER SUPPLY	DUPLEX RECEPTACLE GROUND FAULT INTERRUPTER TYPE	LIGHTING FIXTURE - SEE FIXTURE SCHEDULE FOR MORE INFORMATION
CONTROL PANEL	DUPLEX RECEPTACLE ON DEDICATED CIRCUIT FOR COMPUTER LOADS	LIGHTING FIXTURE - SEE FIXTURE SCHEDULE FOR MORE INFORMATION
RELAY WITH RATING AND NUMBER OF POLES AS NOTED ON DRAWINGS - "SEE SPEC."	DUPLEX RECEPTACLE GROUND FAULT INTERRUPTER TYPE, INSTALL IN WEATHERPROOF HOUSING	LIGHTING FIXTURE - SEE FIXTURE SCHEDULE FOR MORE INFORMATION
JUNCTION BOX - WALL MOUNTED	RECEPTACLE ELECTRIC WATER COOLER	LIGHTING FIXTURE - SEE FIXTURE SCHEDULE FOR MORE INFORMATION
JUNCTION BOX - CEILING MOUNTED	250V 2-POLE 3 WIRE 30A SINGLE RECEPTACLE	LIGHTING FIXTURE - SEE FIXTURE SCHEDULE FOR MORE INFORMATION
NON-FUSIBLE SAFETY SWITCH	QUADPLEX RECEPTACLE HALF SWITCHED - SEE PLANS FOR SWITCH LOCATION	LIGHTING FIXTURE - SEE FIXTURE SCHEDULE FOR MORE INFORMATION
FUSIBLE SAFETY SWITCH		LIGHTING FIXTURE - SEE FIXTURE SCHEDULE FOR MORE INFORMATION
ENCLOSED CIRCUIT BREAKER		LIGHTING FIXTURE - SEE FIXTURE SCHEDULE FOR MORE INFORMATION
TELEVISION OUTLET		LIGHTING FIXTURE - SEE FIXTURE SCHEDULE FOR MORE INFORMATION
MOTOR		LIGHTING FIXTURE - SEE FIXTURE SCHEDULE FOR MORE INFORMATION
MOTOR STARTING SWITCH		LIGHTING FIXTURE - SEE FIXTURE SCHEDULE FOR MORE INFORMATION
KEY SWITCH		LIGHTING FIXTURE - SEE FIXTURE SCHEDULE FOR MORE INFORMATION
		LIGHTING FIXTURE ON EMERGENCY ONLY
		CEILING MOUNTED EXIT SIGN - DIRECTIONAL ARROWS AS INDICATED ON DRAWINGS
		WALL MOUNTED EXIT SIGN - DIRECTIONAL ARROWS AS INDICATED ON DRAWINGS
		BATTERY PACK WITH HEADS AS INDICATED ON DRAWINGS
		REMOTE HEAD FOR BATTERY PACK
		SINGLE POLE SWITCH
		3-WAY SWITCH
		4-WAY SWITCH
		DIGITAL TIMER WALL SWITCH WATT STOPPER MODEL #TS-400
		DIMMER SWITCH
		CEILING MOUNTED OCCUPANCY SENSOR
		2-POLE CEILING MOUNTED OCCUPANCY SENSOR
		CEILING MOUNTED DAYLIGHT SENSOR
		CEILING MOUNTED PHOTOCELL - VOLTAGE TO MATCH CIRCUIT
		WALL MOUNTED OCCUPANCY SENSOR
		2-POLE WALL MOUNTED OCCUPANCY SENSOR
		WALL MOUNTED OCCUPANCY SENSOR WITH DIMMING
		LIGHTING CONTACTOR
		LIGHTING SYSTEM CONTROLLER

TELECOMMUNICATIONS
TELEPHONE OUTLET(S) @ 18" AFF. U.N.O. WITH 3/4" RACEWAY TERMINATED ABOVE NEAREST ACCESSIBLE CEILING OR TO TELEPHONE TERMINAL BOARD IF NO ACCESSIBLE CEILING AVAILABLE.
DATA OUTLET(S) @ 18" AFF. U.N.O. WITH 3/4" RACEWAY TERMINATED ABOVE NEAREST ACCESSIBLE CEILING OR TO DATA EQUIPMENT RACK IF NO ACCESSIBLE CEILING AVAILABLE.
COMBINATION TELEPHONE/DATA OUTLET(S) @ 18" AFF. U.N.O. WITH 1" RACEWAY TERMINATED ABOVE NEAREST ACCESSIBLE CEILING OR THE TELEDATA TERMINAL IF NO ACCESSIBLE CEILING AVAILABLE.
DATA OUTLET FOR WIRELESS ACCESS POINT
TELECOM OUTLET FOR WIRELESS ACCESS POINT WIRELESS PHONE SYSTEM
SINGLE GANG WALL BOX WITH DATA OUTLET AND COAX TV CONNECTION

SECURITY & DOOR CONTROL
SECURITY SYSTEM CONTROL PANEL
AUTOMATED DIALER COMMUNICATOR
SECURITY CAMERA
SECURITY CAMERA IN BUBBLE
SECURITY MONITOR
MOTION SENSOR
GLASS BREAK
SOUND SENSOR
DOOR/SECURITY ANNUNCIATOR
QUAD PID MODULE
CARD READER
KEYPAD
AUTOMATIC DOOR PUSH-BUTTON STATION
REQUEST FOR EXIT
DOOR CONTACT
ELECTRIC STRIKE
ELECTROMAGNETIC DOOR LOCK
ELECTROMAGNETIC DOOR HOLDER
LOCK DOWN
PUSH BUTTON DOOR RELEASE

MISCELLANEOUS
BRANCH CIRCUIT WIRING CONCEALED IN WALLS OR ABOVE CEILING
HOME RUN BACK TO PANEL
FIRE ALARM
FIRE ALARM CONTROL PANEL WITH BATTERY BACKUP
AUTOMATED DIALER COMMUNICATOR
ZONE ADDRESSABLE MODULE
CONTROL MODULE RELAY
FIRE ALARM POWER SUPPLY
FIRE ALARM PULL STATION
FIRE ALARM STROBE - WALL MOUNTED
FIRE ALARM HORN/STROBE - WALL MOUNTED
SMOKE DETECTOR
HEAT DETECTOR CEILING MOUNTED
DUCT DETECTOR - PROVIDED BY EC, INSTALLED BY MC AND CONNECTED BY EC - PROVIDE FIRE ALARM CONNECTION TO BUILDING FIRE ALARM SYSTEM
FLOW SWITCH - PROVIDED BY OTHERS, AND CONNECTED BY EC
TAMPER SWITCH - PROVIDED BY OTHERS, AND CONNECTED BY EC
FIREMAN'S TELEPHONE JACK
FIRE ALARM REMOTE INDICATOR LAMP
END OF LINE DEVICE
REMOTE INDICATOR / TEST STATION
DAMPER MOTOR

DENOTATIONS & ABBREVIATIONS	
ADM	ADMINISTRATOR
AFF	ABOVE FINISHED FLOOR
C	CEILING MOUNTED
CATV	COMMUNITY ANTENNA TELEVISION
CCTV	CLOSED CIRCUIT TELEVISION
CF	COFFEE MAKER
CH	CHIME
CO	CENTER OFF
DD	DOUBLE DEVICE
DF	DOUBLE FACED DEVICE
DO	DOOR OPEN
E	EMERGENCY
EC	ELECTRICAL CONTRACTOR
EPO	EMERGENCY POWER OFF
EXP	ELECTRIC WATER COOLER
EXC	EXPLOSION PROOF
F	FIRE ALARM
FF	FLUSH FLOOR MOUNTED
FL	FLUORESCENT
FO	FIBER OPTIC
FSS	FUSED SAFETY SWITCH
GC	GROUND FAULT INTERRUPTER
GG	GENERAL CONTRACTOR
HOA	HAND-OFF AUTO
I	INFRARED
ICD	INCANDESCENT
IG	ISOLATED GROUND
K	KEY
LV	LOW VOLTAGE
M	MOTOR
MC	MECHANICAL CONTRACTOR
ML	MULTILINE
MW	MICROWAVE
N	NURSE CALL
NE	NORMAL/EMERGENCY
NFSS	NON-FUSED SAFETY SWITCH
P	PANIC ("CODE BLUE")
PAY	PAGING SYSTEM
PAY	PAY TELEPHONE
PL	PILOT LIGHT
PLC	PLUMBING CONTRACTOR
PR	PRESENT TO REMAIN
PRN	PRESENT LOCATION/REPLACED WITH NEW
REF	REFRIGERATOR
REL	RELOCATE
REL	RELOCATED
S	SOUND SYSTEM
SEC	SECURITY SYSTEM
SL	SINGLE LINE
SS	SURGE SUPPRESSION
T	TELEPHONE
TL	TWIST LOCK
TP	TAMPER PROOF
U	ULTRASONIC
UGC	UNDERGROUND COMMUNICATIONS
UG	UNDERGROUND ELECTRIC
UF	UNDERGROUND FIBER
UT	UNDERGROUND TELEPHONE
W	WALL MOUNTED
WG	WIRE GUARD
WP	WEATHERPROOF
WPT	WEATHERPROOF/GROUND FAULT INTERRUPTER
WT	WATER TIGHT
XR	EXISTING TO BE REMOVED

GENERAL PROJECT NOTES
1. THE TERM CONTRACTOR AS USED IN THESE SPECIFICATIONS SHALL MEAN THE ELECTRICAL SUBCONTRACTOR.
2. THESE NOTES ARE TO BE READ IN CONJUNCTION WITH THE WRITTEN SPECIFICATIONS AND THESE DRAWINGS. IN THE EVENT OF CONFLICT BETWEEN THE INFORMATION ON THE DRAWINGS, THESE NOTES, AND THE SPECIFICATIONS, THE MORE STRINGENT REQUIREMENTS SHALL GOVERN.
3. UNLESS OTHERWISE NOTED, INCLUDE ALL ELECTRICAL WORK REQUIRED FOR A COMPLETE NEW INSTALLATION AS INDICATED ON THE PLANS AND SPECIFIED HEREIN.
4. ALL EQUIPMENT SHALL BE NEW AND SHALL CONFORM WITH ALL RESPECTS TO THE LATEST APPROVED STANDARDS OF THE IEEE, ANSI AND THE ILL. LABEL OR LISTING.
5. ALL ELECTRICAL WORK SHALL COMPLY WITH THE LATEST EDITION OF NEC, LOCAL AND STATE CODES, ORDINANCES, REGULATIONS, INCLUDING THE OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA), THE AMERICANS WITH DISABILITIES ACT (ADA), AND THE NATIONAL ENERGY ACT (NEA), WHERE PLANS AND SPECIFICATIONS CONFLICT WITH SUCH LAWS AND ORDINANCES, NOTIFY THE ARCHITECT BEFORE SUBMISSION OF THE BID.
6. WIRING METHODS FOR PATIENT CARE AREAS SHALL APPLY TO ARTICLE 617 OF THE NATIONAL ELECTRICAL CODE. REFER TO SPECIFICATION SECTION 90033 FOR ADDITIONAL INFORMATION.
7. THE CONTRACTOR SHALL OBTAIN ALL PERMITS, PAY ALL FEES, INCLUDING ALL COSTS ASSESSED BY THE ELECTRIC UTILITY COMPANY, AND ARRANGE FOR ALL INSPECTIONS FOR HIS WORK. AT THE COMPLETION OF THE ELECTRICAL WORK, THE CONTRACTOR SHALL FURNISH THE OWNER WITH ALL CERTIFICATES OF FINAL INSPECTION AND APPROVALS.
8. THE CONTRACTOR SHALL VERIFY THE EXACT ELECTRIC AND TELEPHONE UTILITY COMPANY SERVICE POINTS AND COORDINATE THE ELECTRIC UTILITIES PRIMARY AND SECONDARY CONDUIT ROUTINGS AND LENGTH OF RUN WITH THE UTILITY COMPANIES SERVICE PLANNERS PRIOR TO SUBMITTING A BID FOR THE ELECTRICAL WORK FOR THIS PROJECT.
9. THE CONTRACTOR SHALL VISIT THE SITE AND VERIFY THE CONDITIONS UNDER WHICH HIS WORK MUST BE CONDUCTED BEFORE SUBMITTING THEIR PROPOSAL. THE SUBMITTING OF A PROPOSAL IMPLIES THAT THE CONTRACTOR HAS VISITED THE SITE, IS COVERSANT WITH ALL SITE CONDITIONS, INCLUDING EXISTING SERVICES AND EQUIPMENT, OBSTRUCTIONS AND ALL CONDITIONS, WHICH WILL BE ENCOUNTERED IN THE REMOVAL AND/OR RELOCATION OF PRESENT MATERIALS AND EQUIPMENT, INSTALLATION OF NEW MATERIALS AND CUTTING AND PATCHING, ETC. FOR A COMPLETE ELECTRICAL INSTALLATION. IF ANY INTERFERENCES OR CONFLICTS APPEAR AND DEPARTURE FROM THE DESIGN INTENT OF THE BID DOCUMENTS IS REQUIRED, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IN WRITING PRIOR TO ENTERING INTO CONTRACT WITH THE OWNER. FAILURE TO PROVIDE THE ARCHITECT WITH THE AFORESAID NOTIFICATION WILL RESULT IN THE CONTRACTOR BEING HELD RESPONSIBLE TO COMPLETE ALL WORK TO MEET THE DESIGN INTENT OF THE BID DOCUMENTS WITH NO ADDITIONAL EXPENSES ("EXTRAS") BEING INCURRED BY THE OWNER, ARCHITECT, OR ENGINEER.
10. THREE DAYS (72 HOURS) BEFORE ANY EXCAVATION WORK IS STARTED, RELATIVE TO ELECTRICAL WORK, THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES WITHIN THE CONSTRUCTION AREA, NOTIFY THE LOCAL OR STATE AUTHORITY HAVING JURISDICTION AND WAIT THE REQUIRED TIME BEFORE COMMENCING TO DIG.
11. SHOULD ANY STRUCTURAL DIFFICULTIES PREVENT SETTING OF CABINETS, RUNNING CONDUITS, ETC. AT POINTS SHOWN ON THE PLANS, THE NECESSARY MINOR DEVIATIONS THEREFROM AS DETERMINED BY THE ARCHITECT, MAY BE PERMITTED AND MUST BE MADE WITHOUT ADDITIONAL COST.
12. ANY ITEM APPEARING ON THE DRAWINGS AND NOT IN THE SPECIFICATION OR VICE VERSA, AND ANY ITEMS APPEARING IN NEITHER BUT NECESSARY TO ACCOMPLISH THE INTENT OF THESE SPECIFICATIONS, SHALL BE FURNISHED BY THE CONTRACTOR.
13. THE CONTRACTOR SHALL SUBMIT EQUIPMENT SHOP DRAWINGS TO THE ARCHITECT FOR REVIEW PRIOR TO INSTALLATION OF LIGHTING FIXTURES AND ELECTRICAL DISTRIBUTION PANELS. NOTE: REVIEW OF CONTRACTORS SHOP DRAWINGS DOES NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY TO CONFORM TO THE CONTRACT DOCUMENTS AND APPLICABLE CODES.
14. CONTRACTOR SHALL GUARANTEE ALL WORK INSTALLED BY HIS WORKMEN UNDER THIS CONTRACT TO BE FREE FROM ALL DEFECTIVE WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE YEAR AFTER THE ACCEPTANCE OF THE BUILDING BY THE OWNER, AND SHOULD DEFECTS OCCUR WITHIN THIS PERIOD, REPAIR AND/OR REPLACE DEFECTIVE ITEMS, AT NO EXPENSE TO THE OWNER.
15. NO POWDER ACTUATED FASTENING DEVICE SHALL BE USED WITHOUT WRITTEN APPROVAL OF THE ENGINEER.
16. THE CONTRACTOR SHALL KEEP THE PREMISES FREE FROM THE ACCUMULATION OF WASTE MATERIAL AT THE END OF EACH DAY THE WORK AREA SHALL BE LEFT IN A CLEAN CONDITION AS DEFINED BY THE ARCHITECT.
17. DURING ANY DRILLING OPERATION, AN INDUSTRIAL TYPE VACUUM MUST BE USED TO ELIMINATE DUST. IN ADDITION, A PLUNGER HEAD OR EQUIVALENT MUST BE USED WITH THE DRILL AND VACUUM WHEN DRILING OVERHEAD.
18. ALL CIRCUITS AND EQUIPMENT SHALL BE TESTED UPON COMPLETION OF WORK AND FINAL TESTS, WHEN REQUESTED, SHALL BE DONE IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE. ANY CIRCUITS OR EQUIPMENT FOUND TO BE DEFECTIVE SHALL BE REPLACED OR REPAIRED, AS NECESSARY, AND THEN RE-TESTED WITHOUT ADDITIONAL EXPENSE TO THE OWNER.
19. UPON COMPLETION OF THE PROJECT, ALL ENCLOSURES SHALL BE LEFT FREE OF REFUSE AND THE EXTERIOR FREE OF DIRT AND PAINT SPLATTERS.
20. THE CONTRACTOR SHALL SUPPLY THE ARCHITECT WITH RED-LINE AS-BUILT MARKUPS (PROJECT RECORD DOCUMENTS) OF THE INSTALLATION UPON COMPLETION OF THE WORK AND BEFORE FINAL PAYMENT IS MADE.

COORDINATION WITH OTHER CONTRACTORS:
a. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL PARTS OF HIS WORK IN PROPER RELATION TO THE WORK OF OTHERS (ARCHITECTURAL, MECHANICAL, AND STRUCTURAL) AND TO THE ARCHITECTURAL FINISH, WHERE INTERFERENCES OCCUR, THE CONTRACTOR SHALL, BEFORE INSTALLING THE WORK INVOLVED, CONSULT WITH THE ARCHITECT AS TO THE EXACT LOCATION AND LEVEL OF HIS WORK. THE ARCHITECT'S DECISION SHALL BE FINAL.
b. COORDINATE THE FINAL LOCATIONS OF ALL LIGHT FIXTURES WITH THE ARCHITECT'S REFLECTED CEILING PLANS. REPORT ANY DISCREPANCIES TO THE ARCHITECT PRIOR TO INSTALLATION.
c. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ARRANGEMENT OF HIS WORK AND EQUIPMENT AND MAINTENANCE OF PROPER HEADROOM UNDER THIS WORK SHOULD WORK INSTALLED BY THE CONTRACTOR REQUIRE MODIFICATION TO AVOID INTERFERENCE WITH OTHER WORK, AS DETERMINED BY THE ARCHITECT. SUCH CHANGES SHALL BE MADE WITHOUT ADDITIONAL COST.
d. THE CONTRACTOR SHALL COORDINATE WITH GENERAL CONTRACTOR TO DETERMINE IF THE WORK AND/OR REQUIREMENTS OF OTHER TRADES AFFECT THIS CONTRACTOR.
e. IN GENERAL, ALL CONTROL WIRING, CONDUIT, AND RELATED ITEMS FOR ALL ARCHITECTURAL AND MECHANICAL SYSTEMS WILL BE FURNISHED AND INSTALLED BY THOSE RESPECTIVE TRADES, UNLESS SPECIFICALLY NOTED OTHERWISE.

DEMOLITION AND REMOVAL WORK:
a. PROVIDE DEMOLITION AND REMOVAL WORK AS INDICATED. ITEMS FOR REUSE OR TO BE TURNED OVER TO THE OWNER SHALL BE CAREFULLY REMOVED, DISMANTLED, AND STORED TO PREVENT DAMAGE TO SAME, WHERE EQUIPMENT IS TO BE REMOVED, ASSOCIATED CIRCUIT INCLUDING BOXES, CONDUIT AND WIRE SHALL ALSO BE REMOVED BACK TO THE SOURCE. ITEMS NOT NOTED TO BE REUSED OR TURNED OVER TO THE OWNER SHALL BECOME PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE SITE AND LEGALLY DISPOSED.
b. WHEN RELOCATING OR REMOVING A LIGHTING FIXTURE, RECEPTACLE, OR OTHER ELECTRICAL DEVICE, BUT NOT OTHER DEVICES ON THE SAME CIRCUIT, THE CIRCUIT SHALL BE RECONNECTED FOR CONTROL SERVICE TO REMAINING ITEMS ON THE CIRCUIT.
c. ELECTRICAL WORK INTERFERING WITH AND REQUIRING RELOCATION OR MODIFICATION FOR NEW REQUIREMENTS SHALL BE DISCONNECTED, REMOVED, OR REROUTED TO SUIT FINAL INSTALLATION.
d. CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARILY FEEDING AND BACKFEEDING ELECTRICAL DISTRIBUTION EQUIPMENT, PANELBOARDS, BRANCH CIRCUITS, SYSTEMS, AND ANY OTHER ELECTRICAL EQUIPMENT TO MAINTAIN CONTINUITY DURING VARIOUS PHASES OF CONSTRUCTION. COORDINATE WORK WITH NEW WORK DRAWINGS.
e. CONDUIT WIRING THAT MAY BE CONCEALED IN WALLS THAT ARE BEING REMOVED SHALL BE CAPPED AT THE APPROPRIATE LOCATION UNLESS SUCH CONDUIT WIRING MUST REMAIN AS PART OF AN ACTIVE SYSTEM. THE STATUS OF SUCH CONDUIT WIRING AS TO BE ACTIVE OR INACTIVE SHALL BE VERIFIED BY THIS CONTRACTOR BEFORE ANY DISCONNECTION, CAPPING, OR RELOCATION WORK IS PERFORMED. EXISTING CONDUIT WIRING THAT MUST REMAIN AS A PART OF AN ACTIVE SYSTEM SHALL BE RELOCATED AND REARRANGED AS REQUIRED TO MAINTAIN CONTINUITY OF THAT CIRCUIT, UNLESS NOTED OTHERWISE. ALL SUCH CONDUIT WIRING SHALL BE CONCEALED.
f. CUT, PATCH, AND RESTORE ALL OPENINGS IN EXISTING STRUCTURE REQUIRED FOR ELECTRICAL WORK. CONTRACTOR SHALL ALSO REMOVE PORTIONS OF EXISTING CEILING, WALLS, AND FLOORS NECESSARY FOR REMODELING AND RESTORING SUCH CEILING, WALLS, AND FLOORS AFTER ELECTRICAL WORK INSTALLATION IS COMPLETE.
g. MAINTAIN CONTINUITY OF FIRE ALARM, SECURITY, AND ALL SYSTEMS AS REQUIRED DURING VARIOUS PHASES OF THE WORK.
h. REMOVE ABANDONED CONDUIT, WIRE, JUNCTION BOXES, WORK LIGHTS, ETC WITHIN DEMOLITION AREA EVEN THOUGH THEY ARE NOT SHOWN ON PLAN.

SHEET INDEX - ELECTRICAL	
DRAWING NUMBER	DRAWING NAME
E-001	NOTES, SYMBOLS & ABBREVIATIONS
E-101	ELECTRICAL SITE LIGHTING PLAN
E-102	ELECTRICAL SITE POWER PLAN
E-103	LIGHTING PLAN
E-104	PHOTOMETRICS PLAN
E-201	POWER & TELECOM PLAN
E-202	ELECTRICAL ROOM PLAN
E-301	SYSTEMS PLAN
E-401	ELECTRICAL HVAC PLAN
E-501	SCHEDULES AND DIAGRAMS
E-601	LIGHTING DETAILS AND DIAGRAMS

DATE	DESCRIPTION	CREATED BY	CHECKED BY
06/18/20	AW	MB	
06/18/20	AW	MB	
06/09/20	AW	MB	
06/18/20	AW	MB	
06/18/20	AW	MB	

OWNER  
 CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02905-3015

PROJECT  
 ROGER WILLIAMS PARK GATEWAY & VISITOR CENTER  
 1197 BROAD ST.  
 PROVIDENCE, RI 02905

PROJECT TITLE  
 NOTES, SYMBOLS & ABBREVIATIONS

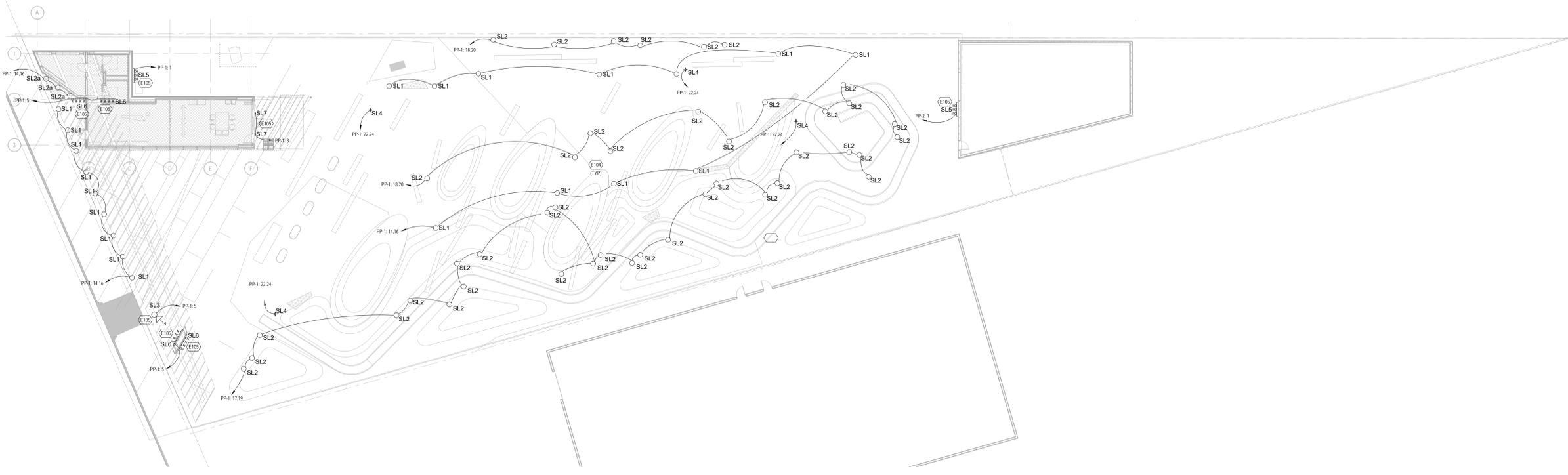
### GENERAL ELECTRICAL NOTES

- COORDINATE ALL EQUIPMENT LOCATIONS, MOUNTING HEIGHTS, POWER REQUIREMENTS, ETC. WITH OWNER AND ARCHITECTURE DRAWINGS PRIOR TO ROUGH-IN.
- ALL EXIT SIGNAGE TO BE CONNECTED AHEAD OF LOCAL SWITCHING RELAYS.
- ALL EMERGENCY LIGHT FIXTURES MUST HAVE AN UNSWITCHED HOT LEAD.
- REFER TO DRAWING E-601 FOR LIGHTING CONTROL DETAILS AND ADDITIONAL INFORMATION.
- REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR CEILING GRID LAYOUT.
- WIRING RECEPTACLES AND EQUIPMENT LOCATIONS ARE DIAGRAMMATIC. COORDINATE ALL EQUIPMENT LOCATIONS, MOUNTING HEIGHTS, POWER REQUIREMENTS, ETC. WITH OWNER AND ARCHITECTURE DRAWINGS PRIOR TO ROUGH-IN.
- PROVIDE WIRING DEVICE FINISHES TO COORDINATE WITH ADJACENT WALL FINISH AS APPROVED BY THE ARCHITECT.
- SWITCH AND RECEPTACLE SYMBOL LOCATIONS ARE DIAGRAMMATIC. GANG TOGETHER ADJACENT SWITCHES AND ADJACENT RECEPTACLES DURING ROUGH-IN.

### ELECTRICAL CONSTRUCTION NOTES

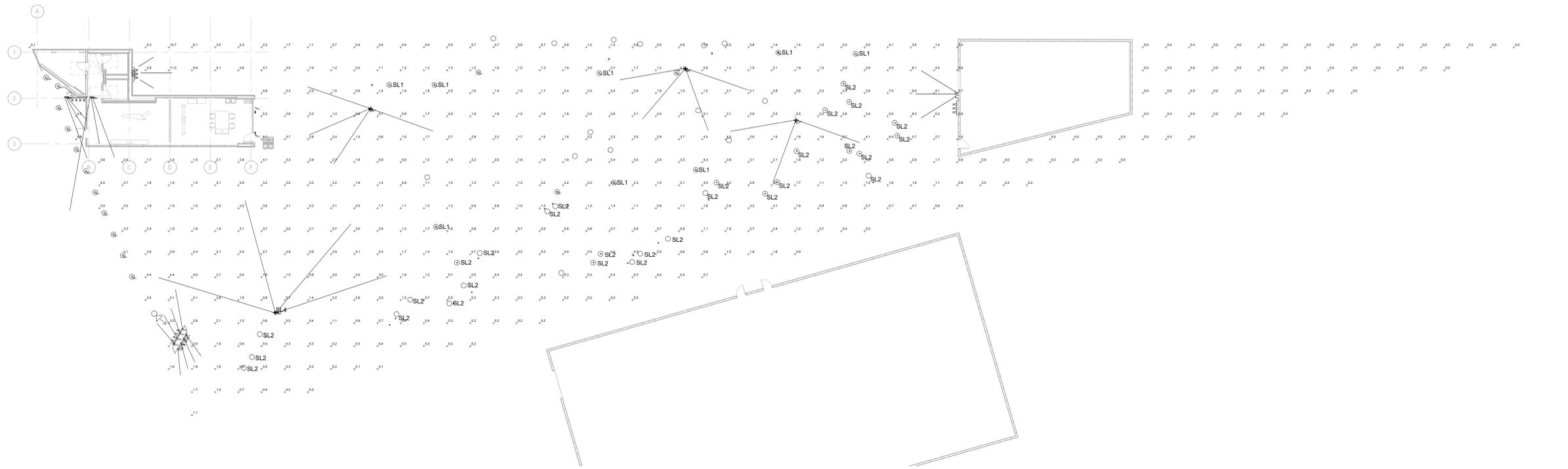
- REFER TO LANDSCAPE DRAWINGS FOR EXACT LOCATIONS OF LIGHTING FIXTURES.
- REFER TO ARCHITECTURAL DRAWINGS FOR MOUNTING HEIGHTS AND ELEVATIONS.

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**SITE LIGHTING PLAN**  
 E-101 / 1/16" = 1'-0"

3/10/2021 11:28:59



**SITE LIGHTING PLAN - PHOTOMETRICS**  
 E-101 / 1/16" = 1'-0"

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LIGHTING FIXTURE SCHEDULE						
MARK	LIGHTING TYPE	MANUFACTURER	CATALOG NUMBER	VOLTAGE	MOUNTING	REMARKS
SL1	LED	LIGMAN	LUW-19874	208V	SURFACE	BOLLARD
SL2	LED	VISTA	1185-B-30-A-MV-CX	208V	SURFACE	LANDSCAPE UPLIGHT PROVIDE BLACK FINISH
SL2a	LED	VISTA	1185-B-4F-30-A-MV-CX	208V	SURFACE	IN-GRADE WALL WASH FIXTURE
SL3	LED	LIGMAN	UOD-50021-45W-M-W85-01-12027V	120V	SURFACE	PROJECTOR LIGHT
SL4	LED	LIGMAN	UOD-70311-405W-W-103-BLACK-KAL-00	208V	POLE	SITE LIGHTING
SL5	LED	LIGMAN	UOD-30001-3X11W-WV-W80-01-120	120V	WALL	WALL SPOT LIGHTING
SL6	LED	LIGMAN	UOD-50011-M-W40	208V	SURFACE	EXTERIOR SPOT LIGHTING
SL7	LED	LIGMAN	UGS-31601	120V	WALL	WALL LIGHTING

DATE	DESIGNED	CHECKED
06/10/20	NA	SK
09/09/20	NA	SK
01/16/20	NA	SK
03/02/21	NA	SK

OWNER  
 CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-3215

PROJECT  
 ROGER WILLIAMS PARK  
 GATEWAY & VISITOR CENTER  
 1197 BROAD ST.  
 PROVIDENCE, RI 02905

MARKET TITLE  
**ELECTRICAL SITE LIGHTING PLAN**

### GENERAL ELECTRICAL NOTES

- COORDINATE ALL EQUIPMENT LOCATIONS, MOUNTING HEIGHTS, POWER REQUIREMENTS, ETC. WITH OWNER AND ARCHITECTURE DRAWINGS PRIOR TO ROUGH-IN.
- ALL EXIT SIGNAGE TO BE CONNECTED AHEAD OF LOCAL SWITCHING/RELAYS.
- ALL EMERGENCY LIGHT FIXTURES MUST HAVE AN UNSWITCHED HOT LEAD.
- REFER TO DRAWING E-101 FOR LIGHTING CONTROL DETAILS AND ADDITIONAL INFORMATION.
- REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR CEILING GRID LAYOUT.
- WIRING, RECEPTACLES, AND EQUIPMENT LOCATIONS ARE DIAGRAMMATIC. COORDINATE ALL EQUIPMENT LOCATIONS, MOUNTING HEIGHTS, POWER REQUIREMENTS, ETC. WITH OWNER AND ARCHITECTURE DRAWINGS PRIOR TO ROUGH-IN.
- PROVIDE WIRING DEVICE FINISHES TO COORDINATE WITH ADJACENT WALL FINISH AS APPROVED BY THE ARCHITECT.
- SWITCH AND RECEPTACLE SYMBOL LOCATIONS ARE DIAGRAMMATIC. GANG TOGETHER ADJACENT SWITCHES AND ADJACENT RECEPTACLES DURING ROUGH-IN.

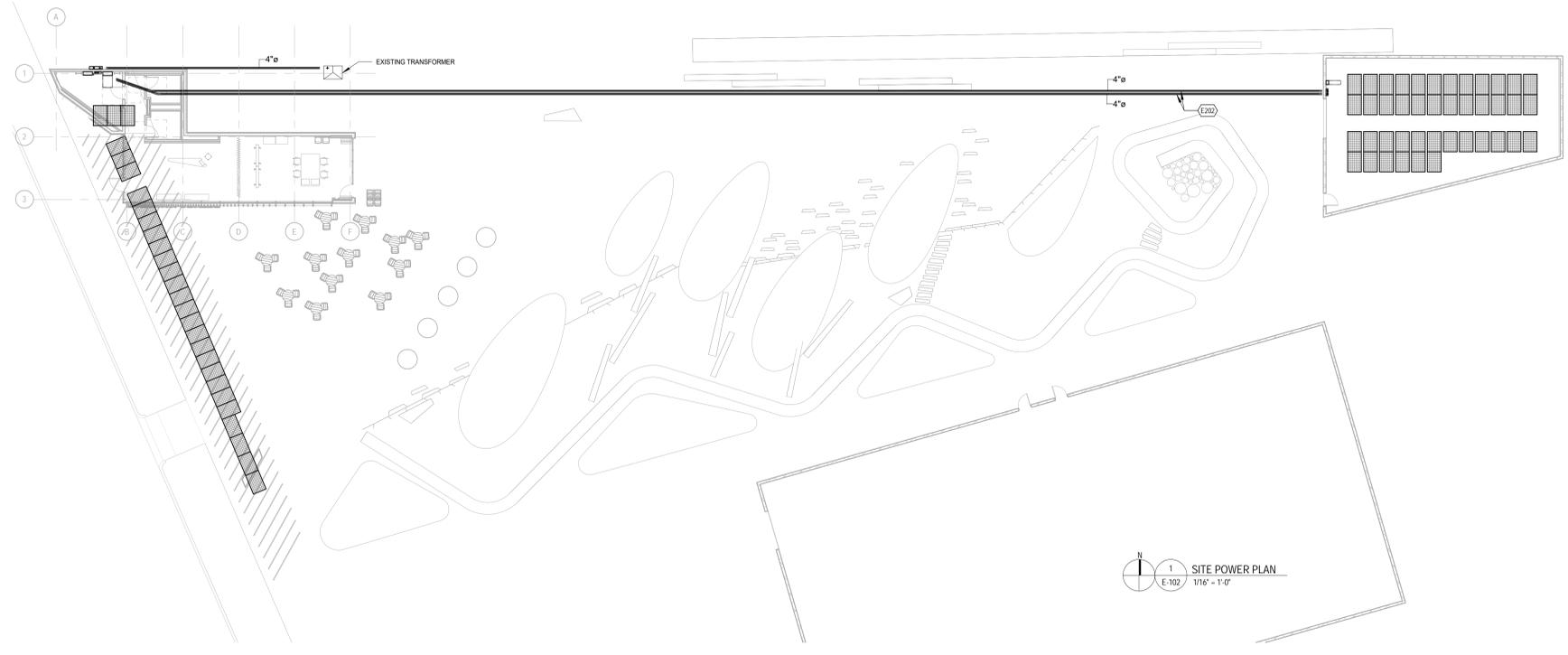
### ELECTRICAL CONSTRUCTION NOTES

- E202 PROVIDE PVC CONDUIT SIZED AS INDICATED FOR COMMUNICATIONS AND POWER.

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DATE	DESCRIPTION	BY	CHK
05/10/20	ISSUED FOR PERMITS	NA	SK
05/10/20	REVISED	NA	SK
05/09/20	ISSUED FOR PERMITS	NA	SK
05/16/20	ISSUED FOR PERMITS	NA	SK
05/16/20	ISSUED FOR PERMITS	NA	SK

OWNER: CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02905

PROJECT: ROGER WILLIAMS PARK GATEWAY & VISITOR CENTER  
 1197 BROAD ST.  
 PROVIDENCE, RI 02905

MARKET TITLE: ELECTRICAL SITE POWER PLAN

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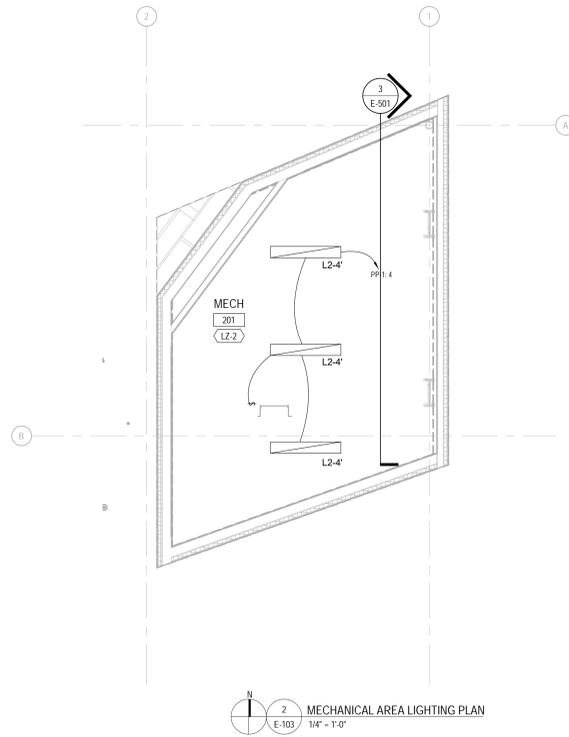
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LIGHTING SEQUENCE OF OPERATION	
ZONE	CONTROL SEQUENCE
LZ-1	SEQUENCE: Dimmed luminaires are controlled in this space. ON: All luminaires shall be manually turned on via local switch. ADJUST: Luminaires output shall be manually adjusted via dimmer switch. OFF: After the space has been vacated for 20 minutes all luminaires shall automatically turn off via occupancy sensor. ADDITIONAL CONTROL: Switches shall be low voltage type which communicate with the occupancy sensor. Lighting controls may be wired or wireless type. DAYLIGHT: Any lights contained partially or fully in daylighting zone shall be photo controlled. Lights shall dim to three levels at 70%, 40% and 10% based on daylight levels present.
LZ-2	SEQUENCE: Switched luminaires are controlled in this space. ON: All luminaires shall be manually turned on via local switch. OFF: All luminaires shall be manually turned off via local switch.
LZ-3	SEQUENCE: Switched luminaires are controlled in this space. ON: All luminaires shall be automatically turned on via occupancy sensor upon detection of movement. OFF: After the space has been vacated for 20 minutes all luminaires shall automatically turn off via vacancy sensor.

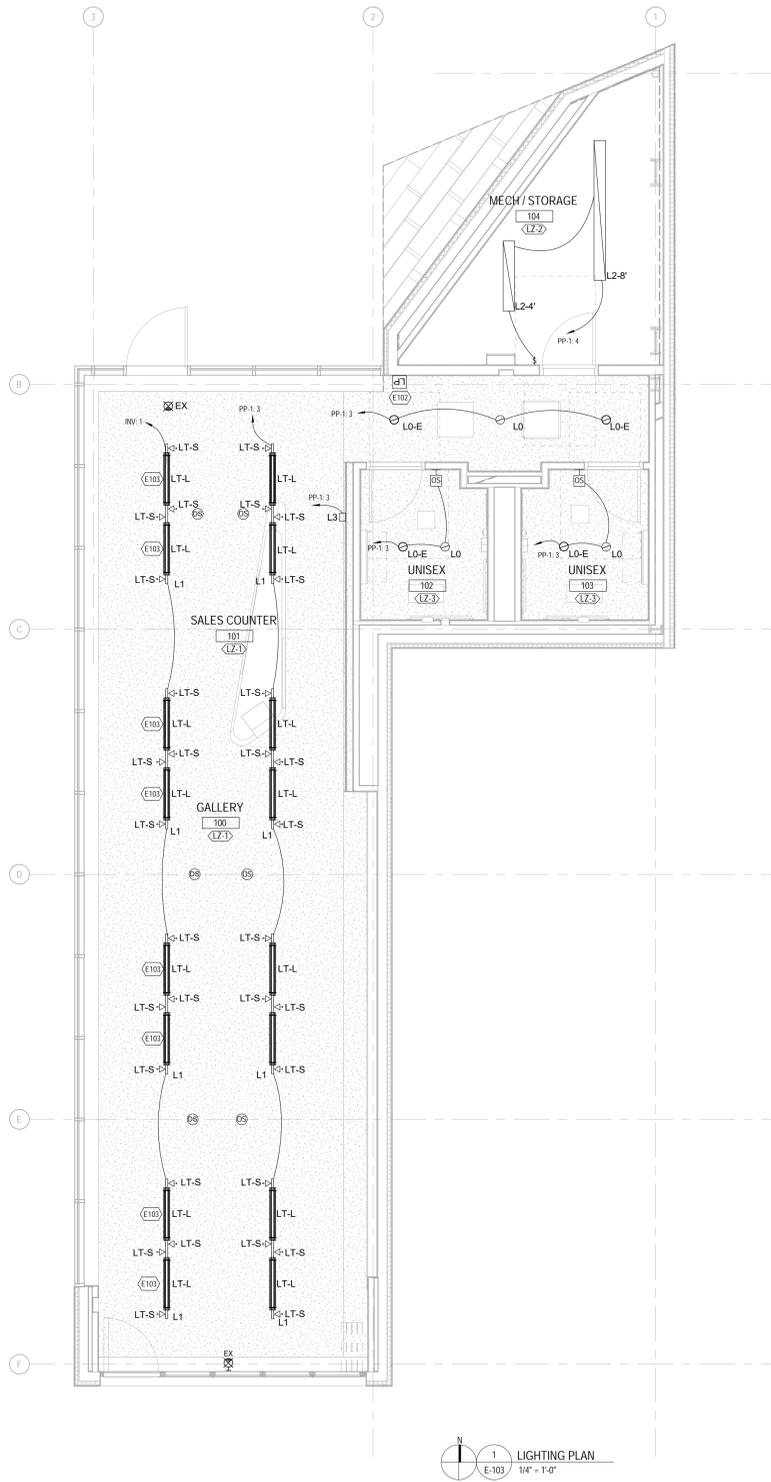
LIGHTING SEQUENCE OF OPERATION BY SPACE		
SPACE NAME	SPACE NUMBER	SPACE QUANTITY
LZ-1		
GALLERY	100	1
SALES COUNTER	101	1
LZ-2		
MECH STORAGE	104	1
LZ-3		
UNISEX	103	1
UNISEX	102	1

LIGHTING FIXTURE SCHEDULE							
FIXTURE	LIGHTING TYPE	MANUFACTURER	CATALOG NUMBER	VOLTAGE	MOUNTING	REMARKS	APPROVED ALTERNATES
EX	LED	COOPER	ELKTR	120V	SURFACE/STEM	PROVIDE ONE BACK MOUNT AND ONE STEM MOUNT	--
L1	LED	COOPER	HC4-16-D010	120V	RECESSED	4" LED DOWNLIGHT FIXTURE	--
L1-E	LED	COOPER	HC4-16-D010-REM14	120V	RECESSED	4" LED EMERGENCY DOWNLIGHT FIXTURE	--
L1	LED	FLOS	RUNNING MAGNET 2.0	120V	RECESSED	LED TRACK LIGHTING	--
L2-4	LED	COOPER LIGHTING	8WSL30	120V	SUSPENDED	4" LED SUSPENDED DIRECT/INDIRECT LINEAR FIXTURE	--
L2-8	LED	COOPER LIGHTING	8WSL30	120V	SUSPENDED	4" LED SUSPENDED DIRECT/INDIRECT LINEAR FIXTURE	--
L3	LED	HELIX	WL00012R06B/W40	120V	SURFACE	RGBW LED FILM LIGHTING. CONTRACTOR SHALL PROVIDE DIM CONTROLLER.	EOS LED LIGHTPAPER
L1-L	LED	FLOS	03.7005.14.9V	LV	TRACK	TRACK LINEAR. PROVIDE FIXTURE WITH DRIVER.	--
L1-S	LED	FLOS	03.6284.14.9V	LV	TRACK	TRACK SPOT. PROVIDE FIXTURE WITH DRIVER.	--

NOTES:  
 1. COORDINATE COLOR SELECTION WITH ARCHITECT PRIOR TO ORDERING FIXTURES.



2 MECHANICAL AREA LIGHTING PLAN  
 E-103  
 1/4" = 1'-0"



1 LIGHTING PLAN  
 E-103  
 1/4" = 1'-0"

### GENERAL ELECTRICAL NOTES

- COORDINATE ALL EQUIPMENT LOCATIONS, MOUNTING HEIGHTS, POWER REQUIREMENTS, ETC. WITH OWNER AND ARCHITECTURE DRAWINGS PRIOR TO ROUGH-IN.
- ALL EXIT SIGNAGE TO BE CONNECTED AHEAD OF LOCAL SWITCHING RELAYS.
- ALL EMERGENCY LIGHT FIXTURES MUST HAVE AN UNSWITCHED HOT LEAD.
- REFER TO DRAWING E-101 FOR LIGHTING CONTROL DETAILS AND ADDITIONAL INFORMATION.
- REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR CEILING GRID LAYOUT.
- WIRING, RECEPTACLES, AND EQUIPMENT LOCATIONS ARE DIAGRAMMATIC. COORDINATE ALL EQUIPMENT LOCATIONS, MOUNTING HEIGHTS, POWER REQUIREMENTS, ETC. WITH OWNER AND ARCHITECTURE DRAWINGS PRIOR TO ROUGH-IN.
- PROVIDE WIRING DEVICE FINISHES TO COORDINATE WITH ADJACENT WALL FINISH AS APPROVED BY THE ARCHITECT.
- SWITCH AND RECEPTACLE SYMBOL LOCATIONS ARE DIAGRAMMATIC. GANG TOGETHER ADJACENT SWITCHES AND ADJACENT RECEPTACLES DURING ROUGH-IN.

### ELECTRICAL CONSTRUCTION NOTES

- E102 PROVIDE DALI TYPE CONTROLLER WITH DIGITAL DISPLAY AND ALL NECESSARY COMPONENTS. SPOT LIGHTING SHALL BE CONTROLLED SEPARATELY FROM PENDANTS AND LINEAR FIXTURES.
- E103 FIXTURE SHALL BE DESIGNATED AN EMERGENCY FIXTURE ON DALI CONTROLLER. CONTRACTOR TO PROGRAM DALI CONTROLLER TO HAVE EMERGENCY SYSTEM CAPABILITY. CONTRACTOR TO VERIFY SYSTEM IS CODE COMPLIANT.

CORRELATIONS

DATE	ISSUED FOR	BY	CHECKED
05/10/20	NA	SK	
06/09/20	NA	SK	
08/09/20	NA	SK	
09/16/20	NA	SK	
10/16/20	NA	SK	
11/16/20	NA	SK	
12/16/20	NA	SK	

OWNER

CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-3275

PROJECT

ROGER WILLIAMS PARK GATEWAY & VISITOR CENTER  
 1197 BROAD ST.  
 PROVIDENCE, RI 02905

SHEET TITLE

LIGHTING PLAN

STAMPS

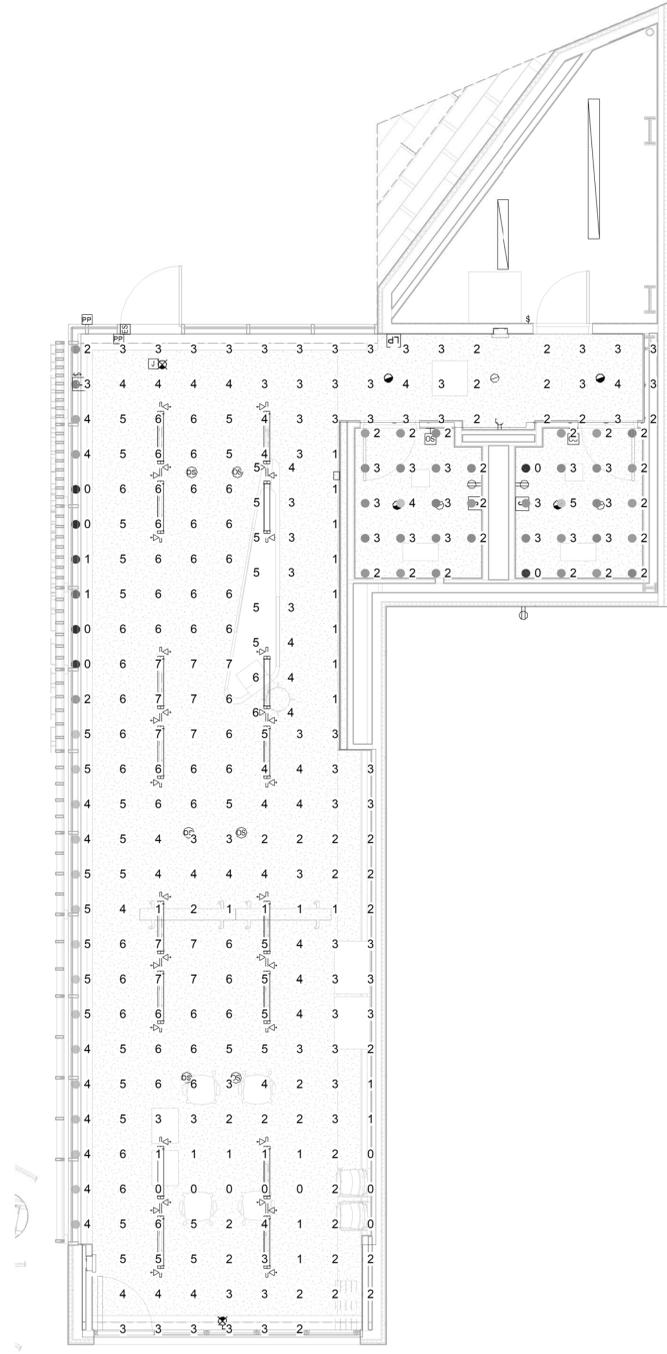
PROJECT # 2717.00

E-103

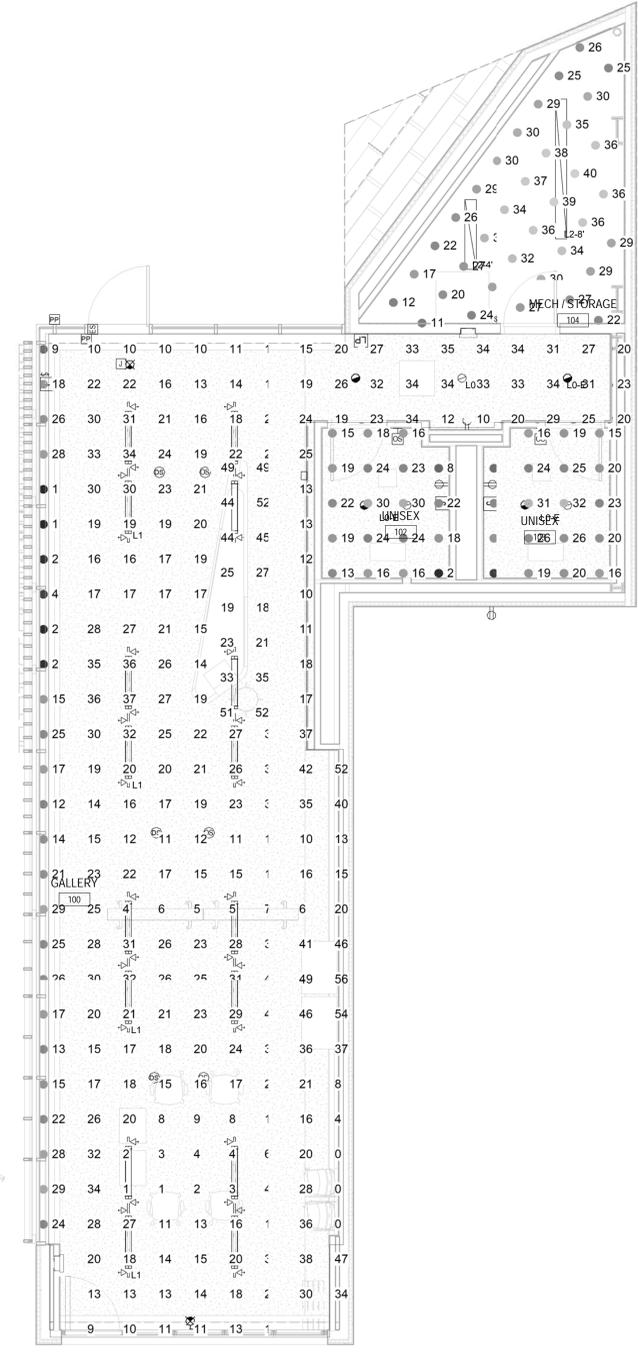
SHEET NO.

EGRESS LIGHTING CALCULATIONS			
Space	Emergency Illuminance Average	Emergency Illuminance Maximum	Emergency Illuminance Minimum
GALLERY 102	3.63 fc	7.15 fc	0.90 fc
SALES COUNTER 101	4.43 fc	6.13 fc	3.26 fc
UNISEX 102	2.40 fc	4.40 fc	0.17 fc
UNISEX 103	2.38 fc	4.90 fc	0.33 fc

ILLUMINANCE SCHEDULE - NORMAL			
Space	Illuminance Average	Illuminance Maximum	Illuminance Minimum
UNISEX 102	18.91 fc	30.38 fc	1.62 fc
UNISEX 103	20.27 fc	31.70 fc	3.65 fc
MESH STORAGE 104	28.91 fc	39.68 fc	17.48 fc
GALLERY 100	20.77 fc	58.23 fc	0.00 fc
SALES COUNTER 101	30.67 fc	52.33 fc	18.12 fc



EMERGENCY PHOTOMETRIC PLAN  
 1/4" = 1'-0"



NORMAL PHOTOMETRIC PLAN  
 1/4" = 1'-0"

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DATE

06/10/20  
 09/09/20  
 01/16/20  
 03/02/21

DESIGNED BY  
 CHECKED BY  
 DRAWN BY  
 PROJECT NO.

PROJECT TITLE

OWNER  
 CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-3215

PROJECT  
 ROGER WILLIAMS PARK  
 GATEWAY & VISITOR CENTER  
 1197 BROAD ST.  
 PROVIDENCE, RI 02905

SHEET TITLE  
 PHOTOMETRICS PLAN

PROJECT #

2717.00

SHEET NO.

E-104

### GENERAL ELECTRICAL NOTES

- COORDINATE ALL EQUIPMENT LOCATIONS, MOUNTING HEIGHTS, POWER REQUIREMENTS, ETC. WITH OWNER AND ARCHITECTURE DRAWINGS PRIOR TO ROUGH-IN.
- ALL EXIT SIGNAGE TO BE CONNECTED AHEAD OF LOCAL SWITCHING/RELAYS.
- ALL EMERGENCY LIGHT FIXTURES MUST HAVE AN UNSWITCHED HOT LEAD.
- REFER TO DRAWING E-601 FOR LIGHTING CONTROL DETAILS AND ADDITIONAL INFORMATION.
- REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR CEILING GRID LAYOUT.
- WIRING, RECEPTACLES, AND EQUIPMENT LOCATIONS ARE DIAGRAMMATIC. COORDINATE ALL EQUIPMENT LOCATIONS, MOUNTING HEIGHTS, POWER REQUIREMENTS, ETC. WITH OWNER AND ARCHITECTURE DRAWINGS PRIOR TO ROUGH-IN.
- PROVIDE WIRING DEVICE FINISHES TO COORDINATE WITH ADJACENT WALL FINISH AS APPROVED BY THE ARCHITECT.
- SWITCH AND RECEPTACLE SYMBOL LOCATIONS ARE DIAGRAMMATIC. GANG TOGETHER ADJACENT SWITCHES AND ADJACENT RECEPTACLES DURING ROUGH-IN.

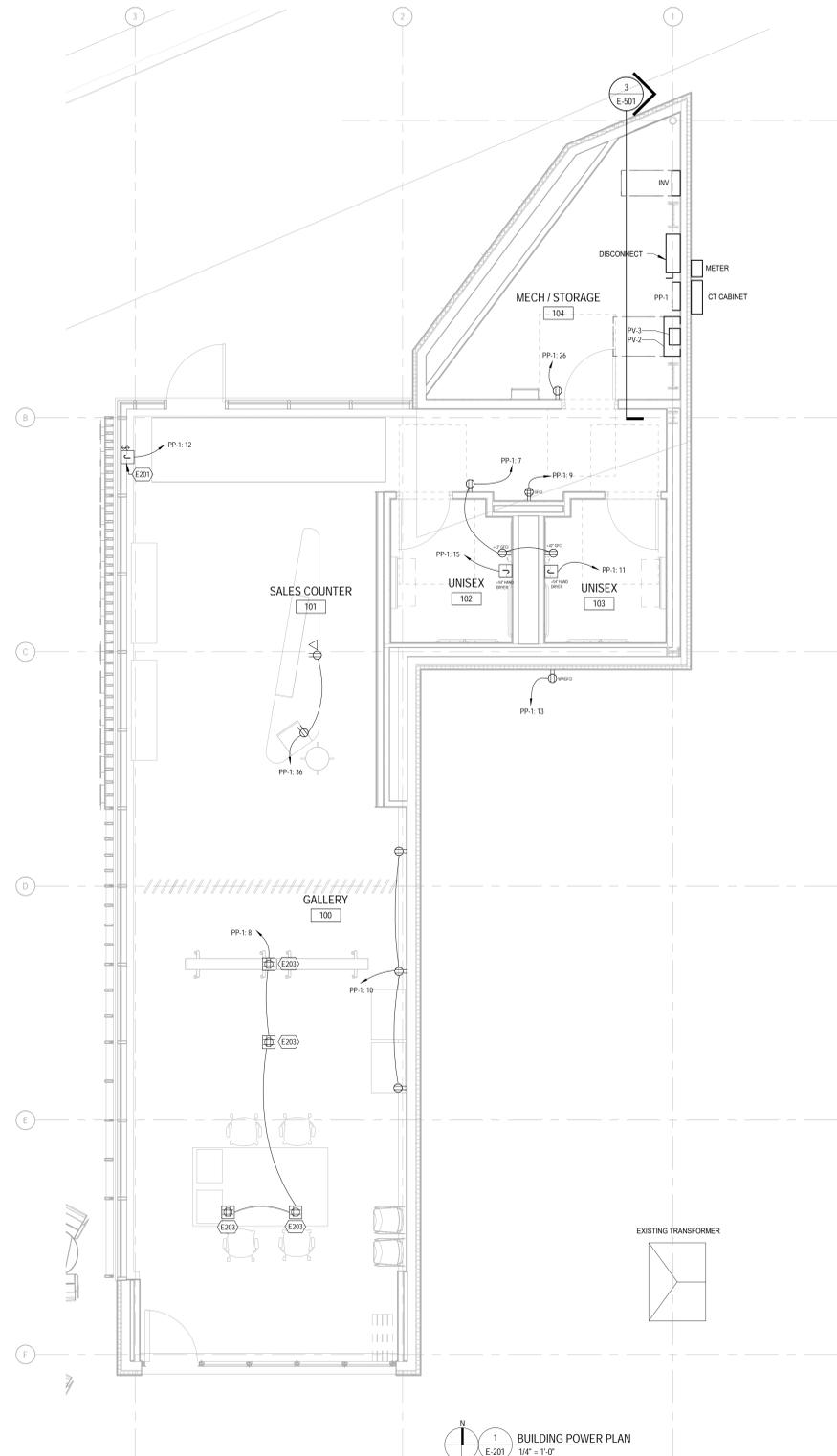
### ELECTRICAL CONSTRUCTION NOTES

- E201 PROVIDE JUNCTION BOX AND NECESSARY CONDUIT AND WIRING TO PROVIDE POWER TO BUILDING SIGNAGE. COORDINATE LOCATION WITH ARCHITECTURAL DRAWINGS. COORDINATE SIGNAGE REQUIREMENTS WITH SIGN MANUFACTURER.
- E203 PROVIDE LEGRAND BATTERY PRO SERIES RECESSED FLOOR BOX. PROVIDE GFCI BREAKER FOR FLOOR BOX CIRCUIT INDICATED ON PLAN. FUTURE MUST BE APPROVED BY ARCHITECT AND OWNER.

PHOTOVOLTAIC EQUIPMENT SCHEDULE					
MARK	QUANTITY	DESCRIPTION	WATTAGE	CATALOG NUMBER	REMARKS
PV-1	82	RIGID MOUNT PV PANEL	325W	SUNPOWER X SERIES	PANELS TO BE MOUNTED FLAT
PV-2	2	INVERTER	22.5KW	SOLAR EDGE 1214-KRUS	
PV-3	2	COMBINER BOX	N/A	SOLECTRIA XGI 1500	



2  
 E-201  
 1/4" = 1'-0"



1  
 E-201  
 1/4" = 1'-0"

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CORRELATIONS

DATE	ISSUED FOR	BY	CHECKED
05/10/20	NA	NA	NA
06/09/20	100% CD	NA	NA
07/16/20	100% CD	NA	NA
08/12/21	PERMITS FOR BIDS	NA	NA

OWNER

CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02905-3275

PROJECT

ROGER WILLIAMS PARK  
 GATEWAY & VISITOR CENTER  
 1197 BROAD ST.  
 PROVIDENCE, RI 02905

SHEET TITLE

POWER & TELECOM PLAN

STAMPS

PROJECT # 2717.00

E-201

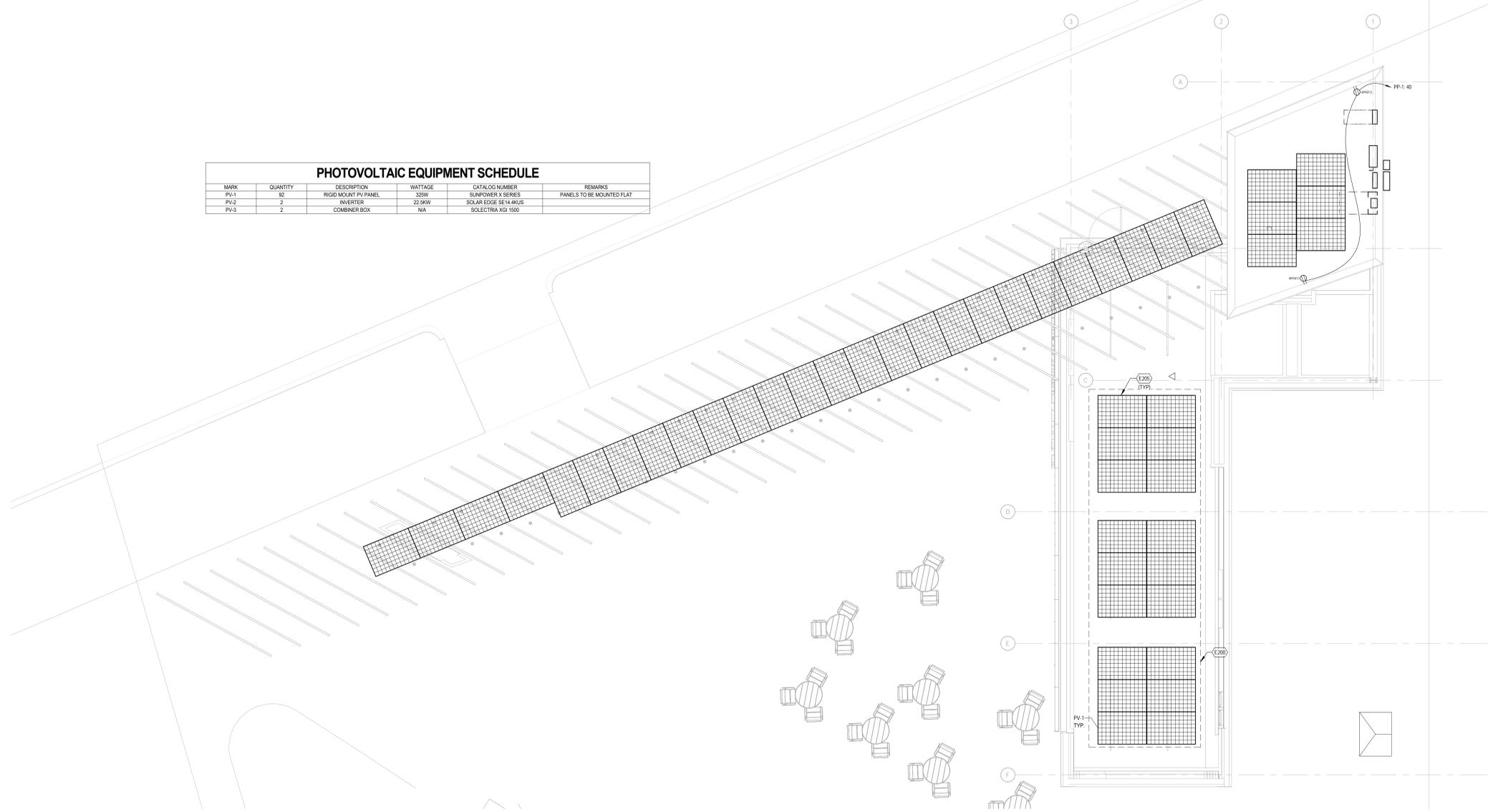
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PHOTOVOLTAIC EQUIPMENT SCHEDULE					
MARK	QUANTITY	DESCRIPTION	WATTAGE	CATALOG NUMBER	REMARKS
PV-1	82	RIGID MOUNT PV PANEL	325W	SUNPOWER X SERIES	PANELS TO BE MOUNTED FLAT
PV-2	2	INVERTER	22.5KW	SOLAR EDGE SE14 4RUS	
PV-3	2	COMBINER BOX	N/A	SOLETRIX KCB 1500	



ROOF POWER PLAN  
 316' - 1'-0"

### GENERAL ELECTRICAL NOTES

- COORDINATE ALL EQUIPMENT LOCATIONS, MOUNTING HEIGHTS, POWER REQUIREMENTS, ETC. WITH OWNER AND ARCHITECTURE DRAWINGS PRIOR TO ROUGH-IN.
- ALL EXIT SIGNAGE TO BE CONNECTED AHEAD OF LOCAL SWITCHING/RELAYS.
- ALL EMERGENCY LIGHT FIXTURES MUST HAVE AN UNSWITCHED HOT LEAD.
- REFER TO DRAWING E-601 FOR LIGHTING CONTROL DETAILS AND ADDITIONAL INFORMATION.
- REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR CEILING GRID LAYOUT.
- WIRING, RECEPTACLES, AND EQUIPMENT LOCATIONS ARE DIAGRAMMATIC. COORDINATE ALL EQUIPMENT LOCATIONS, MOUNTING HEIGHTS, POWER REQUIREMENTS, ETC. WITH OWNER AND ARCHITECTURE DRAWINGS PRIOR TO ROUGH-IN.
- PROVIDE WIRING DEVICE FINISHES TO COORDINATE WITH ADJACENT WALL FINISH AS APPROVED BY THE ARCHITECT.
- SWITCH AND RECEPTACLE SYMBOL LOCATIONS ARE DIAGRAMMATIC. GANG TOGETHER ADJACENT SWITCHES AND ADJACENT RECEPTACLES DURING ROUGH-IN.

### ELECTRICAL CONSTRUCTION NOTES

- E200 COORDINATE ROOF PENETRATIONS WITH ARCHITECTURAL DRAWINGS.
- E204 COORDINATE REQUIREMENTS, MOUNTING LOCATIONS AND BUILDING LOADING CONDITIONS WITH STRUCTURAL ENGINEER PRIOR TO INSTALLATION.
- E205 PV SYSTEM SHOWN FOR GENERAL LAYOUT AND BIDDING PURPOSES. FINAL LAYOUT SHALL BE DESIGNED BY THE PV SYSTEM MANUFACTURER. SUBMIT PV SYSTEM DRAWINGS FOR COORDINATION WITH ARCHITECT AND ENGINEERS.

CORRECTIONS

NO.	DATE	DESCRIPTION
1	06/10/20	ISSUED FOR PERMITS
2	06/10/20	ISSUED FOR PERMITS
3	06/10/20	ISSUED FOR PERMITS
4	06/10/20	ISSUED FOR PERMITS
5	06/10/20	ISSUED FOR PERMITS
6	06/10/20	ISSUED FOR PERMITS
7	06/10/20	ISSUED FOR PERMITS
8	06/10/20	ISSUED FOR PERMITS
9	06/10/20	ISSUED FOR PERMITS
10	06/10/20	ISSUED FOR PERMITS

OWNER

CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-3215

PROJECT

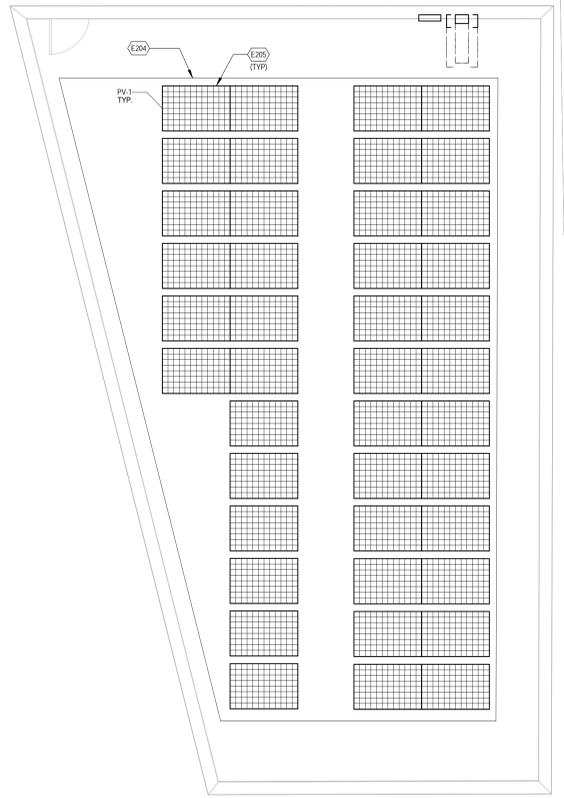
ROGER WILLIAMS PARK GATEWAY & VISITOR CENTER  
 1197 BROAD ST.  
 PROVIDENCE, RI 02905

SHEET TITLE

ELECTRICAL ROOF PLAN

STAMPS

PROJECT # 2717.00  
 E-202



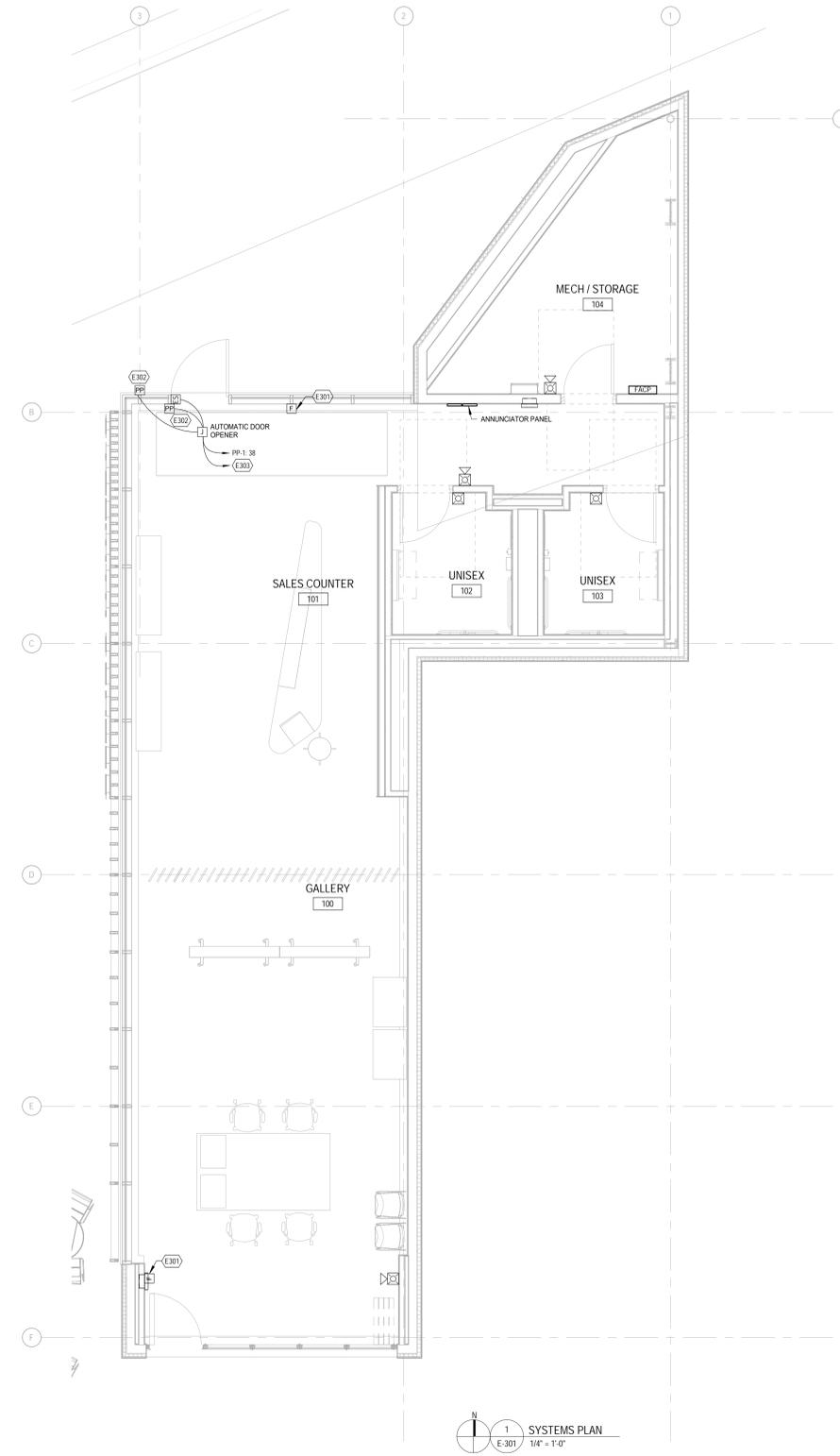
ROOF POWER PLAN  
 316' - 1'-0"

## GENERAL ELECTRICAL NOTES

- COORDINATE ALL EQUIPMENT LOCATIONS, MOUNTING HEIGHTS, POWER REQUIREMENTS, ETC. WITH OWNER AND ARCHITECTURE DRAWINGS PRIOR TO ROUGH-IN.
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## ELECTRICAL CONSTRUCTION NOTES

- E301 COORDINATE FINAL MOUNTING LOCATION WITH ARCHITECT/OWNER. DEVICE MUST BE INSTALLED WITHIN FIVE FEET OF DOOR AND CONFORM TO NEC AND ADA MOUNTING REQUIREMENTS.
- E302 COORDINATE FINAL MOUNTING LOCATION OF DOOR OPERATOR PUSH PLATES WITH ARCHITECT/OWNER PRIOR TO ROUGH-IN.
- E303 PROVIDE CONNECTION TO FIRE ALARM SYSTEM. DOOR DEVICES SHALL FAIL IN THE SAFE POSITION UPON FIRE ALARM SYSTEM ACTIVATION.



1 SYSTEMS PLAN  
 E-301 1/4" = 1'-0"

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DATE	DESCRIPTION	BY	CHK
05/10/20	ISSUED FOR PERMITS	MA	SK
05/10/20	ISSUED FOR PERMITS	MA	SK
05/10/20	ISSUED FOR PERMITS	MA	SK
05/10/20	ISSUED FOR PERMITS	MA	SK
05/10/20	ISSUED FOR PERMITS	MA	SK

OWNER: CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02903-3275

PROJECT: ROGER WILLIAMS PARK GATEWAY & VISITOR CENTER  
 1197 BROAD ST.  
 PROVIDENCE, RI 02905

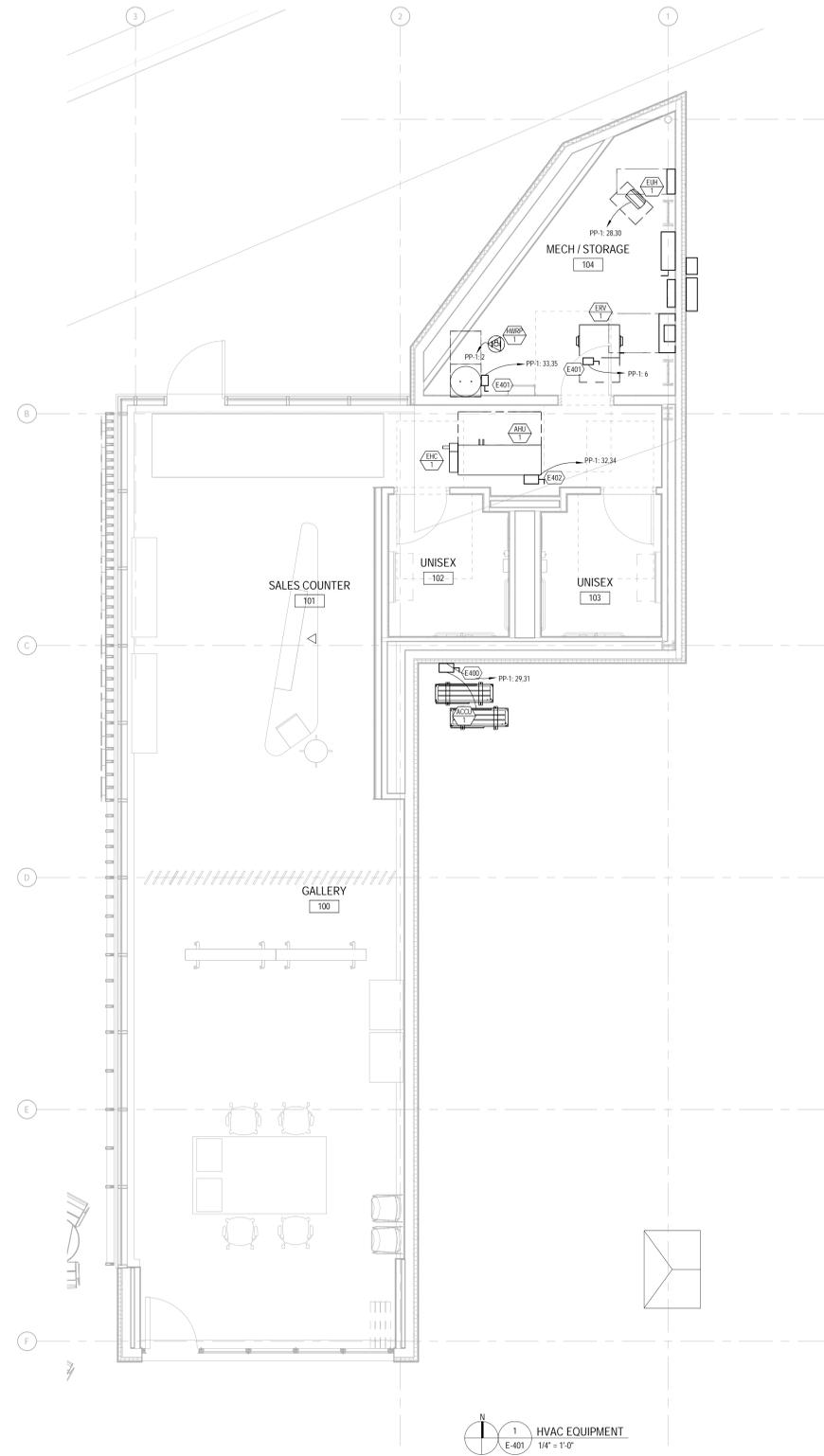
SYSTEMS PLAN

### GENERAL ELECTRICAL NOTES

- COORDINATE ALL EQUIPMENT LOCATIONS, MOUNTING HEIGHTS, POWER REQUIREMENTS, ETC. WITH OWNER AND ARCHITECTURE DRAWINGS PRIOR TO ROUGH-IN.
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### ELECTRICAL CONSTRUCTION NOTES

- E400 PROVIDE NON-FUSIBLE 60A NEMA 3R RATED DISCONNECT.  
 E401 PROVIDE NON-FUSIBLE 30A NEMA 1 RATED DISCONNECT.  
 E402 PROVIDE NON-FUSIBLE 100A NEMA 1 RATED DISCONNECT.



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DATE	DESCRIPTION	BY	CHK
05/18/20	ISSUED FOR PERMITS	MA	SR
09/09/20	REVISED FOR BIDS	MA	SR
09/16/20		MA	SR
09/16/21		MA	SR

OWNER: CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 PROJECT: ROGER WILLIAMS PARK GATEWAY & VISITOR CENTER  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02905-3275

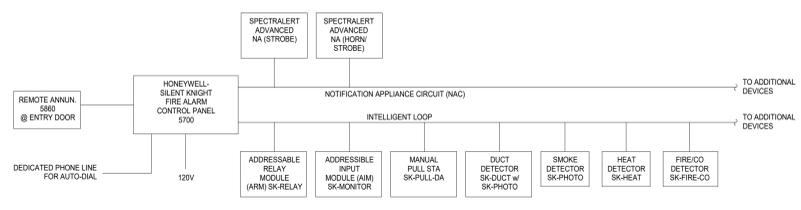
PROJECT TITLE: ELECTRICAL HVAC PLAN



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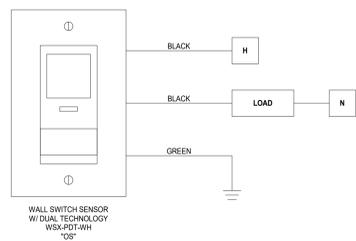
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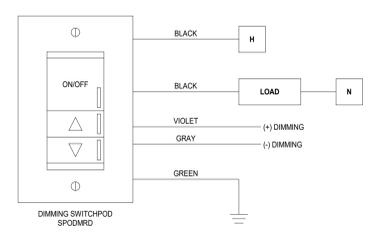


**FIRE ALARM GENERAL NOTES:**  
 1. PROVIDE ALL FIRE ALARM SYSTEM EQUIPMENT, DEVICES, COMPONENTS, WIRING TESTING, TERMINATIONS, ETC. REQUIRED FOR A COMPLETE OPERATIONAL SYSTEM AS DIRECTED BY THE SYSTEM MANUFACTURER.  
 2. PROVIDE A COMPLETE RACEWAY SYSTEM, BACKBOXES, ETC. AS REQUIRED FOR A COMPLETE INSTALLATION.  
 3. COORDINATE DEVICE LOCATIONS WITH ARCHITECTURAL ELEVATION AND GASWORK DRAWINGS PRIOR TO ROUGH-IN.  
 4. HEAT DETECTORS AND CARBON MONOXIDE DETECTORS SHALL BE INSTALLED PER NFPA REQUIREMENTS IF REQUIRED.  
 5. REFER TO SPECIFICATION SECTION 281101 - FIRE ALARM SYSTEM FOR ADDITIONAL INFORMATION.

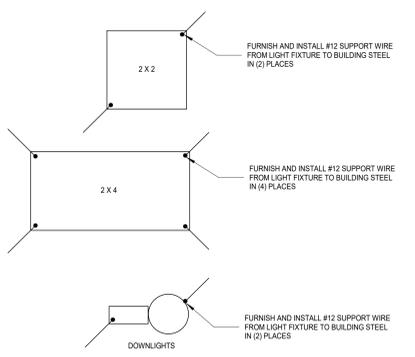
**RISER DIAGRAM - FIRE ALARM**  
 NOT TO SCALE



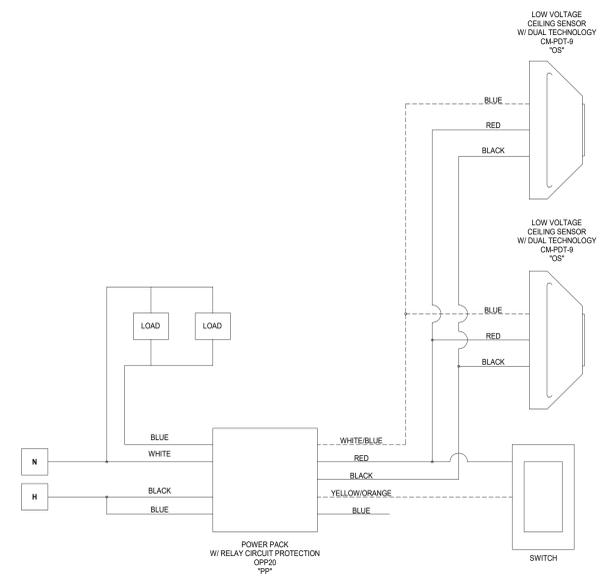
**WALL SWITCH SENSOR DETAIL**  
 NOT TO SCALE



**0-10V WALL DIMMER DETAIL**  
 NOT TO SCALE



**LAY-IN LIGHTING SUPPORT DETAIL**  
 NOT TO SCALE



**CEILING OCCUPANCY SENSOR WIRING DIAGRAM**  
 NOT TO SCALE

CORONA LINES

DATE	DESCRIPTION	BY	CHK
05/10/20	NA	SK	

OWNER

CITY OF PROVIDENCE REDEVELOPMENT AGENCY  
 444 WESTMINSTER ST., SUITE 3A  
 PROVIDENCE, RI 02905-3275

PROJECT

ROGER WILLIAMS PARK GATEWAY & VISITOR CENTER  
 1197 BROAD ST.  
 PROVIDENCE, RI 02905

SHEET TITLE

LIGHTING DETAILS AND DIAGRAMS

STAMPS

# SPECIFICATION MANUAL FOR:

## Roger Williams Park Gateway and Visitor Center

1197 BROAD STREET  
PROVIDENCE, RI 02905

**ISSUED FOR BID: Monday, March 16, 2021**  
**Project No. 2717.00**



### Project Design Team

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#### **Owner:**

City Of Providence Redevelopment Agency  
444 Westminster St., Suite 3a  
Providence, RI 02903-3215  
Ph: 401.680.8534

#### **Structural Engineers:**

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Plymouth, MI 48170  
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## **SECTION 00 21 13 - INSTRUCTIONS TO BIDDERS**

### **OWNER WILL RECEIVE PROPOSALS ONLY AS SET FORTH IN THE INVITATION TO BID AND COMPLYING WITH ALL REQUIREMENTS AS CONTAINED IN THESE INSTRUCTIONS TO BIDDERS.**

#### **1.1 DOCUMENTS:**

- A. All Bid Documents are the property of the Architect.
  - 1. The Architect will provide a complete electronic set in PDF format of the Bid Documents for the use of the prospective bidders, subject to the requirements stated in the Invitation to Bid.
  - 2. Electronic Contract Documents are provided to the General Contractors bidding. Physical copies of the Contract Documents may be reproduced at the General Contractor's own expense.
  - 3. The Contract Documents communicate information regarding size, location, relationship, configuration, quantity, and similar items of the Work to be performed. The Contract Documents do not contain explicit information on every detail of the construction.
  - 4. The Bid Documents consist of the drawings as enumerated in the Index of Drawings.
  - 5. Specifications for this Project are provided in Book format. All required information is within the Contract Documents, consisting of the drawings and specifications.

#### **1.2 CONTRACT:**

- A. The work shall be bid complete as a General Contract with the General Contractor assuming direct responsibility for work and coordination of all trades in complete accordance with the Plans and Specifications. Contractors shall determine prior to submitting a Bid, whether they are capable of providing the financial responsibility, technical requirements, and workforce sufficiency required to properly perform and coordinate all phases of the Work.
- B. In their bids, Contractors shall assume all responsibility for Supervision and Completion of Work for a stipulated cost to the Owner.

#### **1.3 PRE-BID MEETING & SITE VISIT:**

- A. Attendance at an optional Pre-Bid Telephone Conference or Site meeting is optional for all Bidders at the date and time indicated in the "Invitation to Bid".
- B. Each bidder is required to visit the site prior to submitting a final bid package to become familiar with the site and existing conditions.
- C. No allowances or extra considerations on behalf of any Bidder will be permitted subsequently by reason of error or oversight on the part of the Bidder, or on account of interferences by the activities of the Owner or other Contractors.

**1.4 EXAMINATION:**

- A. Each Bidder shall examine the Bid Documents and satisfy himself about the extent of the proposed work by personal examination of the site and surroundings, and make his own estimate therefrom of the facilities and difficulties attending the performance and completion of the work.
- B. Promptly notify architect of an ambiguity, inconsistency and/or errors discovered upon examination of the Contract Documents, Site and local conditions.
- C. No additional compensation will be allowed on account of conditions which could be determined by examining the Bid Documents or Site Conditions.

**1.5 INTERPRETATION:**

- A. If any person contemplating submitting a bid is in doubt as to the true meaning of any part of the Drawings, Specifications, or other Bid Documents, he must submit to the Architect a request for an interpretation thereof. If such an interpretation is not requested, the bids will be presumed to be based upon the interpretation and directions given by the Architect after Contract Award, in accordance with provisions of the Contract.
- B. Neither the Owner nor the Architect will be responsible for any verbal explanations or interpretations of the Bid Documents.
- C. Interpretations, corrections, or changes to the Contract Documents shall be made by Architect-provided written Addenda only.
- D. All requested interpretations shall be submitted to Architect in written form no later than the date indicated in the "Invitation to Bid". Architect will provide a written response prior to the Bid Due Date via an Addendum issued to all prime bidders on record.

**1.6 SUBSTITUTIONS:**

- A. To obtain approval to use unspecified products, bidders shall submit written requests at least seven (7) business days before the bid due date and time. Requests received after this time will not be considered. Request shall clearly describe the product for which approval is asked, including all data necessary to demonstrate acceptability. If the product is acceptable, the Architect will approve it in an Addendum issued to all prime bidders on record.

**1.7 ADDENDA:**

- A. Addenda, when and if required, shall be issued to all recorded holders of Bid Documents.
- B. Addenda will not be issued less than three (3) days prior to the Due Date and Time.

- C. Each Bidder shall acknowledge receipt of all Addenda prior to submitting Bid.

**1.8 SUBCONTRACTORS:**

- A. The Owner and Architect reserve the right to require of bidders tentatively selected for consideration in the awarding of the contract, a list of the subcontractors whom the contractor intends to employ.
- B. The Owner reserves the right to disapprove the use of any proposed major subcontractor and in such event the bidder submitting such subcontractor shall submit another such major subcontractor in like manner within the time specified by the Owner. The Owner reserves the right to reject any bid if such information required by the Owner is not submitted as above indicated.

**1.9 TAXES AND CONTRIBUTIONS:**

- A. Proposal price stated includes all taxes or contributions required by bidder's business.
- B. State Sales Tax are applicable to this work.

**1.10 BASIS OF BID:**

- A. Partial or segregated bids or assignments will not be considered.

**1.11 PREPARATION:**

- A. Bids shall include Lump Sum Proposals with Line Item Breakdowns, per the attached Bid Form, Scope of work for the Building Shell, Site, and Tenant Improvements Form for all Architectural, Structural, Plumbing, Mechanical and Electrical labor, equipment and materials necessary to complete the Work as applicable to this project and the Contract Documents.
- B. Proposals must be typewritten and all blank spaces in the proposals must be completed. Proposals with blank spaces or referenced to other lines may be disqualified at owners discretion.
- C. No changes shall be made to the phraseology of the proposal. Quotes shall be entered in written and numeric forms. In the case of a discrepancy between the written and the numeric form, the written form shall govern.
- D. All bids shall be digitally signed; or signed and dated in longhand and scanned into an electronic file.
- E. Bids which are not signed by the individual making them should have attached thereto a power of attorney, evidencing authority to act as agent for the person for whom it is signed.

- F. Bids which are signed for a partnership should be signed by one of the partners or by an attorney-in-fact. If signed by an attorney-in-fact, evidence of authority to sign the bids shall be attached.
- G. Bids which are signed for a corporation should have the correct corporate name thereon and the signature of the president or other officer legally able to contract in the name of the corporation. In addition, a signed Secretary's Certificate in the name of the corporation shall be included.

**1.12 BID SECURITY:**

- A. None will be required.

**1.13 CONTRACT SECURITY:**

- A. The awarded Bidder may be required to furnish satisfactory performance and labor bonds, each in an amount equal to a total of the Contract Sum, within five days after notification of intent to enter into Contract.
- B. Bidder shall furnish bonds in such a format that enables the Owner to prescribe and assure the company is acceptable to the Owner.
- C. Owner shall reimburse the awarded Bidder for the associated costs if required by Owner.

**1.14 SUBMITTAL:**

- A. Submit proposals via email to the recipient listed on the Invitation to Bid:
  - 1. Email in PDF format using the following file naming convention:
    - a. [Project Name]\_[GC CompanyName]\_BIDPROPOSAL.PDF>
  - 2. Include the following information in the SUBJECT line:
    - a. Project Name - [GC Company Name] - BID ENCLOSED
  - 3. Proposals shall be submitted on the format found in these specifications, "Bid Form", on the original form without erasures, interlineation or alterations. Any information unable to be included in the space provided shall be included via appendices at the end of the completed document in an organized manner.
  - 4. Verbal telephone proposals will not be accepted.

**1.15 OPENING:**

- A. Proposals will be opened publicly or privately as determined by the Owner.

**1.16 IRREGULARITIES & DISQUALIFICATION:**

- A. Bidders shall be disqualified for:

1. non-attendance at the Mandatory Pre-Bid Telephone Conference or Site meeting.
2. bids received later than the date and time designated on the bid invitation
3. bids received in any other format than the attached Bid Forms
4. Bidder initiated items of substitutions, qualifications or “value engineering” not approved prior to Bid submission.
5. Incomplete bid forms, consisting of any blank line items or lines referenced to other lines.
6. The Owner reserves the right to disqualify Bids before or after opening, upon evidence of collusion with intent to defraud, or other illegal practices upon the part of the Bidder.
7. Any error and/or omission in the proposal form or any other irregularity as a result of negligent preparation shall
8. not furnish cause for relief for any damages resulting therefrom, nor in any way relieve contractual obligations as provided for in the Contract Documents.

**1.17 PROPOSAL WITHDRAWAL:**

- A. Proposals for bids may not be withdrawn for a period of sixty (60) days after the time established for the receipt of proposals. Bidders may withdraw at any time prior to the time set for the receipt of proposals.

**1.18 PROPOSAL ACCEPTANCE:**

- A. The right to accept and/or reject any and all proposals, and to waive any and all informalities and/or irregularities in bid proposals submitted during the bidding process, or to award any contract to any other than the low bidder should it be deemed in his best interest to do so, is reserved by the Owner, which right may be exercised in the sole discretion of the Owner.
- B. The Owner reserves the right to negotiate Contract Terms with the various Bidders when such is deemed by the Owner to be in his best interest.

**1.19 EXECUTION OF CONTRACT:**

- A. Each Bidder shall be prepared, if so requested by the Owner, to present evidence of his experience, qualifications and financial ability to carry out the terms of the Contract.
- B. Notwithstanding any delay in the preparation and execution of the formal Contract Agreement, each Bidder shall be prepared, upon written notice of bid acceptance, to commence work within seven days following receipt of official written order of the Owner to proceed, or on date stipulated in such order.
- C. The accepted bidder shall assist and cooperate with the Owner in preparing the formal Contract Agreement, and within seven days following its presentation, shall execute same and return it the Owner.

**1.20 CHANGE ORDERS**

- A. Change orders shall not be accepted by the Owner, except under the following conditions:
1. Unforeseen pre-existing Project Site conditions
  2. Changes to the Scope of Work instituted by the Owner
  3. Owner-approved deviations in the work differing from the originally outlined Contract Documents allowing more efficient completion of the Work.

**END OF INSTRUCTIONS TO BIDDERS -**

## **SECTION 01 10 00 - SUMMARY**

### **PART 1 GENERAL**

#### **1.1 SUMMARY**

- A. Section includes:
  - 1. Project information
  - 2. Contract Description
  - 3. Description of Work
  - 4. Occupancy.
  - 5. Contractor use of site.

#### **1.2 PROJECT INFORMATION**

- A. Project Name: Roger Williams Park Gateway Center
- B. Owner's Name: City of Providence Redevelopment Agency.
- C. Architect's Name: inFORM studio, p.c..
- D. The Project consists of the construction of a new Public Park and Gateway Center, as well as a refresh to an existing outbuilding. The existing on-site building and site paving will be demolished to make way for the new construction.

#### **1.3 CONTRACT DESCRIPTION**

- A. Contract Type: Single prime contract at a stipulated price.
  - 1. Contract form: Current edition of AIA Contract AIA101 or Owner preferred form.

#### **1.4 DESCRIPTION OF WORK**

- A. Scope of demolition and removal work is indicated on Civil & Landscape drawings and specified in Section 02 41 00.
- B. Scope of site improvements and building construction is indicated on drawings. Building construction scope includes Civil, Landscaping, Architecture, Structure, Plumbing, Mechanical, and Electrical.
- C. Work under separate contracts:
  - 1. Site Remediation
- D. Delegated Design and deferred submittals:

1. Gateway Canopy Fin design, fabrication and installation (excludes primary structure).
    - a. Refer to appendix C for scope of work
  2. Fire protection systems.
  3. Cold Formed Metal Framing.
  4. Interior building signage.
  5. Exterior building signage – permitting and fabrication.
- E. Alternates
6. Schedule of alternates listed on cover sheet

### **1.5 OWNER OCCUPANCY**

- A. Owner intends to occupy the Project upon Substantial Completion.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

### **1.6 CONTRACTOR USE OF SITE**

- A. Construction Operations: Limited to areas noted on Drawings.
  1. Locate and conduct construction activities in ways that will limit disturbance to site.
- B. Provide access to and from site as required by law and by Owner:
  1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
  2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- C. Time Restrictions:
  1. Limit conduct of especially noisy, malodorous, and dusty exterior work to start and stop times coordinated with the Owner.
- D. Utility Outages and Shutdown:
  1. Prevent accidental disruption of utility services to other facilities.

### **1.7 WORK SEQUENCE**

- A. Construct Work in stages during the construction period:

### **PART 2 PRODUCTS - NOT USED**

### **PART 3 EXECUTION - NOT USED**

### **END OF SECTION**

## **SECTION 01 25 00 - SUBSTITUTION PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
  - 1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

#### **1.2 DEFINITIONS**

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

#### **1.3 ACTION SUBMITTALS**

- A. Substitution Requests: Submit one PDF electronic copy of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use CSI Form 13.1A .
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
    - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
    - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
    - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    - e. Samples, where applicable or requested.
    - f. Certificates and qualification data, where applicable or requested.
    - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
    - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

- i. Research reports evidencing compliance with building code in effect for Project, from IBC, current edition.
  - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - k. Cost information, including a proposal of change, if any, in the Contract Sum.
  - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
  - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven business days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
  - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

#### **1.4 QUALITY ASSURANCE**

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

### **PART 2 - PRODUCTS**

#### **2.1 SUBSTITUTIONS**

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Requested substitution provides sustainable design characteristics that specified product provided.

- c. Requested substitution will not adversely affect Contractor's construction schedule.
  - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
  - e. Requested substitution is compatible with other portions of the Work.
  - f. Requested substitution has been coordinated with other portions of the Work.
  - g. Requested substitution provides specified warranty.
  - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Not allowed.
- C. Substitutions for Owner Benefit: Architect will consider requests for substitution if received within 30 days after the Notice of Award.
- 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:
    - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
    - b. Requested substitution does not require extensive revisions to the Contract Documents.
    - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - d. Requested substitution provides sustainable design characteristics that specified product provided.
    - e. Requested substitution will not adversely affect Contractor's construction schedule.
    - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - g. Requested substitution is compatible with other portions of the Work.
    - h. Requested substitution has been coordinated with other portions of the Work.
    - i. Requested substitution provides specified warranty.
    - j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

## **SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

#### **1.2 MINOR CHANGES IN THE WORK**

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

#### **1.3 PROPOSAL REQUESTS**

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
  - 2. Within time specified in Proposal Request or 15 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include costs of labor and supervision directly attributable to the change.
    - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
    - e. Quotation Form: Use CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail" or forms acceptable to Architect.
- B. Contractor-Initiated Work Change Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
  - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Work Change Proposal Request Form: Use SI Form 13.6A, "Change Order Request (Proposal)," with attachments CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail" or form acceptable to Architect.

#### **1.4 ADMINISTRATIVE CHANGE ORDERS**

- A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Unit-Price Adjustment: See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

#### **1.5 CHANGE ORDER PROCEDURES**

- A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

#### **1.6 CONSTRUCTION CHANGE DIRECTIVE**

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
  1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
  1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

## **SECTION 01 29 00 - PAYMENT PROCEDURES**

### **PART 1 GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
  - 1. Section 012100 "Allowances" for procedural requirements governing the handling and processing of allowances.
  - 2. Section 012200 "Unit Prices" for administrative requirements governing the use of unit prices.
  - 3. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
  - 4. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

#### **1.2 SCHEDULE OF VALUES**

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
    - a. Application for Payment forms with continuation sheets.
    - b. Submittal schedule.
    - c. Items required to be indicated as separate activities in Contractor's construction schedule.
  - 2. Submit the schedule of values to Architect at earliest possible date but no later than fifteen (15) days before the date scheduled for submittal of initial Applications for Payment.
  - 3. Sub-schedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values coordinated with each phase of payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
  - 1. Identification: Include the following Project identification on the schedule of values:
    - a. Project name and location.
    - b. Name of Architect.
    - c. Architect's project number.
    - d. Contractor's name and address.
    - e. Date of submittal.
  - 2. Arrange schedule of values consistent with format of AIA Document G703.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of ten percent of the Contract Sum.
  - a. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling three percent of the Contract Sum and subcontract amount.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit.
  - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

### **1.3 APPLICATIONS FOR PAYMENT**

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
  1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit draft Application for Payment to Architect no later than seven days before the end of the month. Submit a final copy of the Application for Payment to the Architect no later two days before the end of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
- D. Application for Payment Forms: Contractor must use the excel version for payment application submittals developed and provided by DaVita, which are based on AIA Document G702 and AIA Document G703 forms for Applications for Payment. File naming protocol must also be used when submitting each pay application.

- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action. All signatures will be electronic.
1. Pay applications should be completed and submitted in a total of 4 applications in the amounts as follows:
    - a. Application #1: 25% of contract amount minus 10% retention
    - b. Application #2: 25% of contract amount minus 10% retention
    - c. Application #3: 25% of contract amount minus 10% retention
    - d. Application #4 25% of contract amount plus all retention at project completion.
  2. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- F. Transmittal: Submit one PDF copy signed and notarized original of each Application for Payment to Architect by means of electronic transmission. Include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  2. When an application shows completion of an item, submit conditional final or full waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of values.
  3. Contractor's construction schedule (preliminary if not final).
  4. Schedule of unit prices.
  5. Submittal schedule (preliminary if not final).
  6. Copies of building permits.
  7. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  8. Certificates of insurance and insurance policies.
- I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
- J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited to, the following:
1. Evidence of completion of Project closeout requirements.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  3. Updated final statement, accounting for final changes to the Contract Sum.
  4. AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
  5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."
  6. AIA Document G707-1994, "Consent of Surety to Final Payment."
  7. Evidence that claims have been settled.
  8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
  9. Final HVAC Equipment Operations Check report is received by the Owner which is free of any Contractor related deficiencies.

**1.4 P2 PRODUCTS (Not Used)**

**1.5 P3 EXECUTION (Not Used)**

**END OF SECTION**

## **SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. Coordination drawings.
  - 2. Requests for Information (RFIs).
  - 3. Project Web site.
  - 4. Project meetings.
  
- B. Related Requirements:
  - 1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

#### **1.2 DEFINITIONS**

- A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
  - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
  - 2. Number and title of related Specification Section(s) covered by subcontract.

#### **1.4 GENERAL COORDINATION PROCEDURES**

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.

- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
  - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
  
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of Contractor's construction schedule.
  - 2. Preparation of the schedule of values.
  - 3. Installation and removal of temporary facilities and controls.
  - 4. Delivery and processing of submittals.
  - 5. Progress meetings.
  - 6. Pre-installation conferences.
  - 7. Project closeout activities.
  - 8. Startup and adjustment of systems.

## **1.5 COORDINATION DRAWINGS**

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
  - 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
    - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    - b. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
  
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
  - 1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid.
  - 2. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings.

3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility.

#### **1.6 REQUESTS FOR INFORMATION (RFI's)**

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
  1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
  2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
  1. Project name.
  2. Project number.
  3. Date.
  4. Name of Contractor.
  5. Name of Architect.
  6. RFI number, numbered sequentially.
  7. RFI subject.
  8. Specification Section number and title and related paragraphs, as appropriate.
  9. Drawing number and detail references, as appropriate.
  10. Field dimensions and conditions, as appropriate.
  11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  12. Contractor's signature.
  13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
- C. RFI Forms: AIA Document G716 or Software-generated form with substantially the same content as indicated above, acceptable to Architect.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for coordination information already indicated in the Contract Documents.
    - d. Requests for adjustments in the Contract Time or the Contract Sum.
    - e. Requests for interpretation of Architect's actions on submittals.
    - f. Incomplete RFIs or inaccurately prepared RFIs.
  2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
  3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to
    - a. Section 012600 "Contract Modification Procedures."
    - b. a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within seven (7) days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number.
1. Submit log monthly. Use CSI Log Form 13.2B or Software-generated log with substantially the same content as follows, acceptable to Architect.
  2. Project name.
  3. Name and address of Contractor.
  4. Name and address of Architect.
  5. RFI number including RFIs that were dropped and not submitted.
  6. RFI description.
  7. Date the RFI was submitted.
  8. Date Architect's response was received.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
  2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

## **1.7 PROJECT WEB SITE**

- A. Use Owner's Project Web site for purposes of accessing project communications and documentation until Final Completion. Project Web site shall include but not be limited to the following functions:
1. Project directory.
  2. Meeting minutes.
  3. RFI forms and logs.
  4. Submittals forms and logs.
  5. Drawing and specification document hosting, viewing, and updating.

6. Archiving functions.
- B. On completion of Project, provide Architect with one complete PDF archive as-built copy of Project files for digital storage on project website.
- C. The following Project Web site software package to be utilized shall be as follows:
  1. Autodesk, Buzzsaw.

## **1.8 PROJECT MEETINGS**

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
  1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
  2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
  3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Pre-construction Conference: Contractor will schedule and conduct a pre-construction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
  1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work. Contractor shall provide means of Owner and Architect participation by means of video conference or telephone conference.
  2. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Tentative construction schedule.
    - b. Critical work sequencing and long-lead items.
    - c. Designation of key personnel and their duties.
    - d. Procedures for processing field decisions and Change Orders.
    - e. Procedures for RFIs.
    - f. Procedures for testing and inspecting.
    - g. Procedures for processing Applications for Payment.
    - h. Distribution of the Contract Documents.
    - i. Submittal procedures.
    - j. Preparation of record documents.
    - k. Use of the premises.
    - l. Work restrictions.
    - m. Working hours.
    - n. Responsibility for temporary facilities and controls.
    - o. Procedures for moisture and mold control.

- p. Procedures for disruptions and shutdowns.
  - q. Construction waste management and recycling.
  - r. Parking availability.
  - s. Office, work, and storage areas.
  - t. Equipment deliveries and priorities.
  - u. First aid.
  - v. Security.
  - w. Progress cleaning.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Pre-installation Conferences: Conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Owner's Representative of scheduled meeting dates.
  - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Sustainable design requirements.
    - i. Review of mockups.
    - j. Possible conflicts.
    - k. Compatibility problems.
    - l. Time schedules.
    - m. Weather limitations.
    - n. Manufacturer's written instructions.
    - o. Warranty requirements.
    - p. Compatibility of materials.
    - q. Acceptability of substrates.
    - r. Temporary facilities and controls.
    - s. Space and access limitations.
    - t. Regulations of authorities having jurisdiction.
    - u. Testing and inspecting requirements.
    - v. Installation procedures.
    - w. Coordination with other work.
    - x. Required performance results.
    - y. Protection of adjacent work.
    - z. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at regular intervals as necessary, but no less than monthly.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    - b. Review schedule for next period.
    - c. Review present and future needs of each entity present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Status of submittals.
      - 4) Status of sustainable design documentation.
      - 5) Deliveries.
      - 6) Off-site fabrication.
      - 7) Access.
      - 8) Site utilization.
      - 9) Temporary facilities and controls.
      - 10) Progress cleaning.
      - 11) Quality and work standards.
      - 12) Status of correction of deficient items.
      - 13) Field observations.
      - 14) Status of RFIs.
      - 15) Status of proposal requests.
      - 16) Pending changes.
      - 17) Status of Change Orders.
      - 18) Pending claims and disputes.
      - 19) Documentation of information for payment requests.

3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
  - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

## **SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION**

### **PART 1 GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Contractor's construction schedule.
  - 2. Construction schedule updating reports.
  - 3. Daily construction reports.
  - 4. Site condition reports.
  
- B. Within 7 calendar days of the executed Contract for Construction, provide a Construction Schedule for Work included in this Contract in accordance with requirements in this Section. Construction Schedule shall be created using Critical Path Method (CPM) computer software capable of mathematical analysis of Precedence Diagramming Method (PDM) schedules. Provide activity listings and bar charts in formats described in this Section.
  - 1. Construction schedule shall represent the work to be completed from construction start to Certificate of Occupancy based upon the contract duration as set forth in the contract documents.
  
- C. Combine activity listings from CPM/DPM Construction Schedule into a narrative report with photo record to form the Contractor's status report. Owner's standard report format shall be utilized for the Contractor's status report.

#### **1.2 DEFINITIONS**

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
  
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
  
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
  
- D. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

### **1.3 INFORMATIONAL SUBMITTALS**

- A. Format for Submittals: Submit required submittals in the following format:
  1. Working electronic copy of schedule file, where indicated.
  2. PDF electronic file.
- B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- C. Construction Schedule Updating Reports: Submit with Applications for Payment.
- D. Progress/ Status Report: submit weekly, combine activity listings from CPM/DPM Construction Schedule into a narrative report with photo record to form the Contractor's Progress/ Status report. Owner's standard report format shall be utilized for the Contractor's status report.
- E. Daily Construction Reports: Submit at bi-monthly intervals or as requested by Owner Representative.
- F. Site Condition Reports: Submit at time of discovery of differing conditions.

### **1.4 COORDINATION**

- A. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress/ status reports, payment requests, and other required schedules and reports.
  1. Secure time commitments for performing critical elements of the Work from entities involved.
  2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

## **PART 2 PRODUCTS**

### **2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL**

- A. Time Frame: Extend schedule from date established for the Notice of Award to date of final completion.
  1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

- B. Activities: Treat each story, phase or modality as a separate numbered activity for each main element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than thirty (30) days, unless specifically allowed by Architect.
  2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
    - a. Structural Steel.
    - b. Fiber Cement Board Panels.
    - c. Rooftop HVAC Units.
    - d. Electrical Entrance equipment.
    - e. Light Fixtures.
  3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
  4. Startup and Testing Time: Include no fewer than 10 days for startup and testing.
  5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
  6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in the schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
  2. Work under More Than One Contract: Include a separate activity for each contract.
  3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
  4. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Seasonal Conditions/ Weather). Contractor shall allocate days in the initial schedule for adverse weather conditions based on the available weather data from the National Oceanic and Atmospheric Administration to determine the Standard Baseline of the average climatic conditions for the anticipated project time period and the project location. Seasonal Conditions/ Weather is further defined in Section 013210 "Seasonal Conditions/ Weather"
    - b. Environmental control.
  5. Work Stages: Indicate important stages of construction for each major portion of the Work.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion. At a minimum, the Construction schedule timeline shall include the following project milestones:
1. Notice to proceed
  2. Construction start.

3. Certified pad complete
  4. Foundation systems complete
  5. Building structural system complete
  6. Roofing complete
  7. Permanent utilities complete
  8. Substantial completion
  9. Certificate of Occupancy
  10. Punch List complete
- E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
  2. Unanswered Requests for Information.
  3. Rejected or unreturned submittals.
  4. Notations on returned submittals.
  5. Pending modifications affecting the Work and Contract Time.
- F. Recovery Schedule: When periodic update indicates the Work is 10 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule.
- G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
1. Use Microsoft Project, Primavera, Prolog, or ProCore.
  2. The PDM scheduling software shall be capable of printing calendars using the mathematical analysis of the schedule, indicating the Contractor's standard work days of the week and scheduled holidays.
  3. Scheduling software shall be capable of printing an activity listing which indicates the Predecessors and Successors, Lag Factors and Lag Relationships used in creating the logic of the schedule.
  4. Scheduling software shall be capable of printing a bar chart of the entire schedule for the Work in Portable Document Format \*.pdf.

## **2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)**

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Startup Network Diagram: Submit diagram within 3 calendar days of date established for the Notice of Award. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.
1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 7 calendar days after date established for the Notice of Award.

- a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's or Owner's approval of the schedule.
  2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
  3. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
    - a. Preparation and processing of submittals.
    - b. Mobilization and demobilization.
    - c. Purchase of materials.
    - d. Delivery.
    - e. Fabrication.
    - f. Installation.
    - g. Work by Owner that may affect or be affected by Contractor's activities.
    - h. Testing.
    - i. Punch list and final completion.
    - j. Activities occurring following final completion.
  2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
  3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
  4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
    - a. Sub-networks on separate sheets are permissible for activities clearly off the critical path.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
  2. Description of activity.
  3. Main events of activity.
  4. Immediate preceding and succeeding activities.
  5. Early and late start dates.

6. Early and late finish dates.
  7. Activity duration in workdays.
  8. Total float or slack time.
  9. Average size of workforce.
  10. Dollar value of activity (coordinated with the schedule of values).
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
  2. Changes in early and late start dates.
  3. Changes in early and late finish dates.
  4. Changes in activity durations in workdays.
  5. Changes in the critical path.
  6. Changes in total float or slack time.
  7. Changes in the Contract Time.

### 2.3 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
  2. List of separate contractors at Project site.
  3. Approximate count of personnel at Project site.
  4. Equipment at Project site.
  5. Material deliveries.
  6. High and low temperatures and general weather conditions, including presence of rain or snow.
  7. Accidents.
  8. Meetings and significant decisions.
  9. Unusual events.
  10. Stoppages, delays, shortages, and losses.
  11. Meter readings and similar recordings.
  12. Emergency procedures.
  13. Orders and requests of authorities having jurisdiction.
  14. Change Orders received and implemented.
  15. Construction Change Directives received and implemented.
  16. Services connected and disconnected.
  17. Equipment or system tests and startups.
  18. Partial completions and occupancies.
  19. Substantial Completions authorized.
- B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

## **PART 3 EXECUTION**

### **3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE**

- A. Contractor's Construction Schedule Updating: At least bi-monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule 2 days before each regularly scheduled progress meeting.
  - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  - 3. As the Work progresses, indicate final completion percentage for each activity.
  
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
  - 1. Post copies in Project meeting rooms and temporary field offices.
  - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

### **END OF SECTION**

## **SECTION 01 32 10 - SEASONAL CONDITIONS/ WEATHER**

### **PART 1 GENERAL**

#### **1.1 SUMMARY**

- A. Section includes the contractor's responsibilities and scheduling requirements for inclusion of the anticipated seasonal conditions/ weather for the project location and anticipated time period, based on documented data from the National Oceanic and Atmospheric Administration.
- B. The Contractor shall review weather data available from the National Oceanic and Atmospheric Administration (NOAA) to determine the Standard Baseline of average climatic range for the project location.

#### **1.2 DEFINITIONS**

- A. Standard Baseline Days: is defined as the normal number of calendar days for each month during which construction activity, exposed to adverse seasonal conditions/ weather, is expected to be prevented and suspended by such adverse conditions. Suspension of construction activity for the number of days each month as listed in the Standard Baseline is to be included in the Work schedule and is not eligible for extension of Contract Time.
- B. Adverse Weather: is defined as the occurrence of one or more of the following conditions within a twenty-four (24) hour day that prevents construction activity exposed to weather conditions or access to the site:
  - 1. Precipitation (rain, snow, or ice) in excess of one-tenth inch (0.10") liquid measure.
  - 2. Temperatures that do not rise above that required for the day's construction activity, if such temperature requirement is specified or accepted as standard industry practice.
  - 3. Sustained wind in excess of twenty-five (25) miles per hour or as restricted by the Occupational Safety and Health Administration (OSHA) requirements for the scheduled work activity.
  - 4. Adverse Weather may include, if appropriate, "dry-out" or "mud" days:
    - a. resulting from precipitation days that occur beyond the standard baseline;
    - b. only if there is a hindrance to site access or site work and Contractor has taken all reasonable accommodations to avoid such hindrance; and,
    - c. at a rate no greater than 1 make-up day for each day or consecutive days of precipitation beyond the standard baseline that total 1.0 inch or more, liquid measure, unless specifically recommended otherwise by the Testing Soil Engineer.
- C. Seasonal Condition/ Weather Delay Day: is defined as a day where adverse seasonal conditions/ weather prevents work on the project for:
  - 1. fifty percent (50%) or more of the contractor's scheduled work day;
  - 2. and critical path construction activities were affected in the day's schedule, including a weekend day or holiday if Contractor has scheduled construction activity that day.

### **1.3 SUBMITTALS**

- A. Contractor shall submit documentation from the National Oceanic and Atmospheric Administration (NOAA) of the Standard Baseline of seasonal conditions/ weather delays for each month of the anticipated construction activity and project location to the Owner upon execution of contract.
- B. Submit daily jobsite work logs showing which and to what extent critical path construction activities have been affected by weather on a monthly basis.
- C. Submit actual weather data to support a claim for a time extension, obtained from nearest NOAA weather station or other independently verified source approved by Architect and Owner at beginning of project.

## **PART 2 PRODUCTS (NOT USED)**

## **PART 3 EXECUTION**

### **3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE**

- A. Contractor's Construction Schedule as defined in Section 013200 "Construction Progress Documentation" and shall take into account that certain construction activities are more affected by seasonal conditions and adverse weather than other activities. The construction schedule shall include an appropriate number of baseline delay days based upon published climatic historical data for the project location and time of year.
  - 1. "dry-out" or "mud" days are not eligible to be counted as a Weather Delay Day until the standard baseline is exceeded. Hence, Contractor should allocate an appropriate number of additional days associated with the Standard Baseline days in which such applicable construction activities are expected to be prevented and suspended.

### **3.2 EXTENSION OF CONTRACT TIME**

- A. Use Standard Baseline data provided in this Section to track and document actual work day delays due to adverse seasonal conditions/ weather.
- B. Should the basis exists for an extension of time in accordance with paragraph 15.1.5.2 of the AIA A201-2007 General Conditions, an extension of time on the basis of adverse seasonal conditions/ weather may be granted only for the number of Delay Days in excess of the number of days listed as the Standard Baseline for that month. The extension of time shall be calculated on a monthly basis as follows:
  - 1. Actual number of validated adverse delays days minus
  - 2. The standard baseline delay days

3. Equals the excess delay days.
- C. Organize claim and documentation to facilitate evaluation on a basis of calendar month periods, and submit in accordance with the procedures for Claims established in Article 15 of the AIA A201-2007 General Conditions of the Contract for Construction.
- D. If an extension of the Contract Time is appropriate, such extension shall be made in accordance with Article 7 of the AIA A201-2007 General Conditions.

**END OF SECTION**

## **SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for the following:
  - 1. Pre-construction photographs.
  - 2. Periodic construction photographs.
- B. Related Requirements:
  - 1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.

#### **1.2 INFORMATIONAL SUBMITTALS**

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit unaltered, original, full-size image files within five days of taking photographs.
  - 1. Digital Camera: Minimum sensor resolution of minimum 8 megapixels.
  - 2. Identification: Provide the following information with each image description in file metadata tag:
    - a. Name of Project.
    - b. Name and contact information for photographer.
    - c. Date photograph was taken.
    - d. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

#### **1.3 QUALITY ASSURANCE**

- A. Photographer Qualifications: An individual who has qualified experience as photographer of construction projects for not less than two years.

#### **1.4 USAGE RIGHTS**

- A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

## **PART 2 - PRODUCTS**

### **2.1 PHOTOGRAPHIC MEDIA**

- A. Digital Images: Provide images in JPG format, with minimum size of 8 megapixels.

## **PART 3 - EXECUTION**

### **3.1 CONSTRUCTION PHOTOGRAPHS**

- A. Photographer: Engage a qualified photographer to take construction photographs.
- B. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
  - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
  - 1. Date and Time: Include date and time in file name for each image.
  - 2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.
- D. Preconstruction Photographs: Before commencement of excavation and starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
  - 1. Flag construction limits before taking construction photographs.
  - 2. Take a minimum of 10 photographs or as required to show and document existing conditions adjacent to property before starting the Work.
  - 3. Take a minimum of 10 photographs or as required to show and document existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
- E. Periodic Construction Photographs: Take a minimum of 10 photographs bi-weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- F. Final Completion Construction Photographs: Take a minimum of 20 color photographs after date of Substantial Completion for submission as Project Record Documents. Architect will inform photographer of desired vantage points.

- G. Additional Photographs: Architect may request photographs in addition to periodic photographs specified.
1. Three days' notice will be given, where feasible.
  2. In emergency situations, take additional photographs within 24 hours of request.
  3. Circumstances that could require additional photographs include, but are not limited to, the following:
    - a. Immediate follow-up when on-site events result in construction damage or losses.
    - b. Substantial Completion of a major phase or component of the Work.
    - c. Extra record photographs at time of final acceptance.
  4. Circumstances that could require additional photographs that will be paid for by Change Order and are not included in the contract sum include, but are not limited to, the following:
    - a. Special events planned at Project site.
    - b. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
    - c. Owner's request for special publicity photographs.

**END OF SECTION**

## **SECTION 01 33 00 - SUBMITTAL PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals. B. Related Requirements:
1. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
  2. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
  3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
  4. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

#### **1.2 DEFINITIONS**

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

#### **1.3 ACTION SUBMITTALS**

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

#### **1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS**

- A. Architect's Digital Data Files: Electronic copies of Revit or AutoCAD digital data files of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  3. Resubmittal Review: Allow 10 days for review of each resubmittal.
- D. Electronic Submittals: ALL submittals shall be in electronic PDF format only. Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
  2. Name file with submittal number or other unique identifier, including revision identifier.
    - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
  3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
  4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
    - a. Project name.
    - b. Date.
    - c. Name and address of Architect.
    - d. Name of Contractor.
    - e. Name of firm or entity that prepared submittal.
    - f. Names of subcontractor, manufacturer, and supplier.
    - g. Category and type of submittal.
    - h. Submittal purpose and description.
    - i. Specification Section number and title.
    - j. Specification paragraph number or drawing designation and generic name for each of multiple items.
    - k. Drawing number and detail references, as appropriate.
    - l. Location(s) where product is to be installed, as appropriate.

- m. Related physical samples submitted directly.
  - n. Indication of full or partial submittal.
  - o. Transmittal number, numbered consecutively.
  - p. Submittal and transmittal distribution record.
  - q. Other necessary identification.
  - r. Remarks.
- 5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
  - a. Project name.
  - b. Number and title of appropriate Specification Section.
  - c. Manufacturer name.
  - d. Product name.
- E. Options: Identify options requiring selection by Architect.
- F. Deviations: Identify deviations from the Contract Documents on submittals.
- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
  - 1. Re-submissions shall use the original submittal number with suffix identifier (example: original number: 001.00, resubmittal number: 001.01)
  - 2. Note date and content of previous submittal.
  - 3. Note date and content of revision in label or title block and clearly indicate extent of revision.
  - 4. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installer's, authorities having jurisdiction as required, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

## **PART 2 - PRODUCTS**

### **2.1 SUBMITTAL PROCEDURES**

- A. General Submittal Procedure Requirements:
  - 1. Post electronic submittals as PDF electronic files directly to Architect's FTP site specifically established for Project.
    - a. Architect, will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  - 2. Submit electronic submittals via email as PDF electronic files.
    - a. Architect, will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

- B. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
  - 1. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated. or
  - 2. Provide a notarized statement on original paper copy certificates and certifications where indicated.
  
- C. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
  - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  - 2. Mark each submittal to show which products and options are applicable.
  - 3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  - 4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  - 5. Submit Product Data before or concurrent with Samples.
  - 6. Submit Product Data in the following format:
    - a. PDF electronic file.
  
- D. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
  - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Seal and signature of professional engineer if specified.
  - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 24 by 36 inches.

3. Submit Shop Drawings in the following format:
  - a. PDF electronic file.
  
- E. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
  1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of applicable Specification Section.
  3. Provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
  4. Disposition: Maintain sets of approved Samples at Project site, available for quality control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
  5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
    - a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return electronic PDF submittal with options selected.
  6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
    - a. Number of Samples: Submit one set of Samples. Architect will retain the one Sample set. Mark up and retain one returned electronic PDF copy of the sample submittal as a project record sample.
      - 1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
  
- F. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Submit product schedule in the following format:
  - a. PDF electronic file.
- G. Coordination Drawings Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."
- H. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
- I. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."
- J. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."
- K. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."
- L. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."
- M. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- N. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- O. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- P. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- Q. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- R. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- S. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

- T. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- U. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.
- V. Schedule of Tests and Inspections: Comply with requirements specified in Section 014000 "Quality Requirements."
- W. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- X. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- Y. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- Z. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

## **2.2 DELEGATED-DESIGN SERVICES**

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
  - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

## **PART 3 - EXECUTION**

### **3.1 CONTRACTOR'S REVIEW**

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

### **3.2 ARCHITECT'S ACTION**

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
  - 1. Appears to Conform
  - 2. Appears to Conform As Noted
  - 3. Rejected
  - 4. Revise & Resubmit
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

## **END OF SECTION**

## **SECTION 01 40 00 - QUALITY REQUIREMENTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
  - 2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
  - 3. Specific test and inspection requirements are not specified in this Section.

#### **1.2 DEFINITIONS**

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
  - 1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

### **1.3 CONFLICTING REQUIREMENTS**

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

### **1.4 INFORMATIONAL SUBMITTALS**

- A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
  2. Main wind-force-resisting system or a wind-resisting component listed in the windforce-resisting system quality-assurance plan prepared by Architect.
- B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

## **1.5 REPORTS AND DOCUMENTS**

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
  2. Project title and number.
  3. Name, address, and telephone number of testing agency.
  4. Dates and locations of samples and tests or inspections.
  5. Names of individuals making tests and inspections.
  6. Description of the Work and test and inspection method.
  7. Identification of product and Specification Section.
  8. Complete test or inspection data.
  9. Test and inspection results and an interpretation of test results.
  10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  12. Name and signature of laboratory inspector.
  13. Recommendations on retesting and re-inspecting.
- B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of representative making report.
  2. Statement on condition of substrates and their acceptability for installation of product.
  3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  5. Other required items indicated in individual Specification Sections.
- C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

## 1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
  - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
  - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
  - 1. Contractor responsibilities include the following:
    - a. Provide test specimens representative of proposed products and construction.

- b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
  - c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
  - d. When testing is complete, remove test specimens, assemblies, and mockups, and laboratory mockups; do not reuse products on Project.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
  2. Notify Architect 15 days in advance of dates and times when mockups will be constructed.
  3. Demonstrate the proposed range of aesthetic effects and workmanship.
  4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
  5. Allow seven days for initial review and each re-review of each mockup.
    - a. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
    - b. Demolish and remove mockups when directed unless otherwise indicated.
    - c. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.

## 1.7 QUALITY CONTROL

- A. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
    - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
  3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- B. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of

substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
  - 1. Notify Architect, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
  - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  - 6. Do not perform any duties of Contractor.
- E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
  - 1. Access to the Work.
  - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
  - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  - 4. Facilities for storage and field curing of test samples.
  - 5. Delivery of samples to testing agencies.
  - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  - 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
  - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.

## **1.8 SPECIAL TESTS AND INSPECTIONS**

- A. Special Tests and Inspections: Engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as follows:

- B. Special Tests and Inspections: Conducted by a qualified testing agency or special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
  - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
  - 2. Notifying Architect, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
  - 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect, with copy to Contractor and to authorities having jurisdiction.
  - 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
  - 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
  - 6. Retesting and re-inspecting corrected work.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.1 TEST AND INSPECTION LOG**

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
  - 1. Date test or inspection was conducted.
  - 2. Description of the Work tested or inspected.
  - 3. Date test or inspection results were transmitted to Architect.
  - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

### **3.2 REPAIR AND PROTECTION**

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.

- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

**END OF SECTION**

## SECTION 01 42 00 - REFERENCES

### PART 1 - GENERAL

#### 1.1 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

#### 1.2 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
  - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

### 1.3 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
  - 1. AABC - Associated Air Balance Council; [www.aabc.com](http://www.aabc.com).
  - 2. AAMA - American Architectural Manufacturers Association; [www.aamanet.org](http://www.aamanet.org).
  - 3. AAPFCO - Association of American Plant Food Control Officials; [www.aapfco.org](http://www.aapfco.org).
  - 4. AASHTO - American Association of State Highway and Transportation Officials; [www.transportation.org](http://www.transportation.org).
  - 5. AATCC - American Association of Textile Chemists and Colorists; [www.aatcc.org](http://www.aatcc.org).
  - 6. ABMA - American Bearing Manufacturers Association; [www.americanbearings.org](http://www.americanbearings.org).
  - 7. ACI - American Concrete Institute; (Formerly: ACI International); [www.concrete.org](http://www.concrete.org).
  - 8. ACPA - American Concrete Pipe Association; [www.concrete-pipe.org](http://www.concrete-pipe.org).
  - 9. AEIC - Association of Edison Illuminating Companies, Inc. (The); [www.aeic.org](http://www.aeic.org).
  - 10. AF&PA - American Forest & Paper Association; [www.afandpa.org](http://www.afandpa.org).
  - 11. AGA - American Gas Association; [www.aga.org](http://www.aga.org).
  - 12. AHAM - Association of Home Appliance Manufacturers; [www.aham.org](http://www.aham.org).
  - 13. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); [www.ahrinet.org](http://www.ahrinet.org).
  - 14. AI - Asphalt Institute; [www.asphaltinstitute.org](http://www.asphaltinstitute.org).
  - 15. AIA - American Institute of Architects (The); [www.aia.org](http://www.aia.org).
  - 16. AISC - American Institute of Steel Construction; [www.aisc.org](http://www.aisc.org).
  - 17. AISI - American Iron and Steel Institute; [www.steel.org](http://www.steel.org).
  - 18. AITC - American Institute of Timber Construction; [www.aitc-glulam.org](http://www.aitc-glulam.org).
  - 19. AMCA - Air Movement and Control Association International, Inc.; [www.amca.org](http://www.amca.org).
  - 20. ANSI - American National Standards Institute; [www.ansi.org](http://www.ansi.org).
  - 21. AOSA - Association of Official Seed Analysts, Inc.; [www.aosaseed.com](http://www.aosaseed.com).
  - 22. APA - APA - The Engineered Wood Association; [www.apawood.org](http://www.apawood.org).
  - 23. API - American Petroleum Institute; [www.api.org](http://www.api.org).
  - 24. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
  - 25. ARI - American Refrigeration Institute; (See AHRI).
  - 26. ARMA - Asphalt Roofing Manufacturers Association; [www.asphaltroofing.org](http://www.asphaltroofing.org).
  - 27. ASCE - American Society of Civil Engineers; [www.asce.org](http://www.asce.org).
  - 28. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).

29. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; [www.ashrae.org](http://www.ashrae.org).
30. ASME - ASME International; (American Society of Mechanical Engineers); [www.asme.org](http://www.asme.org).
31. ASSE - American Society of Safety Engineers (The); [www.asse.org](http://www.asse.org).
32. ASSE - American Society of Sanitary Engineering; [www.asse-plumbing.org](http://www.asse-plumbing.org).
33. ASTM - ASTM International; (American Society for Testing and Materials International); [www.astm.org](http://www.astm.org).
34. ATIS - Alliance for Telecommunications Industry Solutions; [www.atis.org](http://www.atis.org).
35. AWEA - American Wind Energy Association; [www.awea.org](http://www.awea.org).
36. AWI - Architectural Woodwork Institute; [www.awinet.org](http://www.awinet.org).
37. AWMAC - Architectural Woodwork Manufacturers Association of Canada; [www.awmac.com](http://www.awmac.com).
38. AWPA - American Wood Protection Association; (Formerly: American Wood-Preservers' Association); [www.awpa.com](http://www.awpa.com).
39. AWS - American Welding Society; [www.aws.org](http://www.aws.org).
40. AWWA - American Water Works Association; [www.awwa.org](http://www.awwa.org).
41. BHMA - Builders Hardware Manufacturers Association; [www.buildershardware.com](http://www.buildershardware.com).
42. BICSI - BICSI, Inc.; [www.bicsi.org](http://www.bicsi.org).
43. CDA - Copper Development Association; [www.copper.org](http://www.copper.org).
44. CEA - Consumer Electronics Association; [www.ce.org](http://www.ce.org).
45. CFFA - Chemical Fabrics & Film Association, Inc.; [www.chemicalfabricsandfilm.com](http://www.chemicalfabricsandfilm.com).
46. CFSEI - Cold-Formed Steel Engineers Institute; [www.cfsei.org](http://www.cfsei.org).
47. CIMA - Cellulose Insulation Manufacturers Association; [www.cellulose.org](http://www.cellulose.org).
48. CISCA - Ceilings & Interior Systems Construction Association; [www.cisca.org](http://www.cisca.org).
49. CISPI - Cast Iron Soil Pipe Institute; [www.cispi.org](http://www.cispi.org).
50. CLFMI - Chain Link Fence Manufacturers Institute; [www.chainlinkinfo.org](http://www.chainlinkinfo.org).
51. CPA - Composite Panel Association; [www.pbmdf.com](http://www.pbmdf.com).
52. CRI - Carpet and Rug Institute (The); [www.carpet-rug.org](http://www.carpet-rug.org).
53. CRRC - Cool Roof Rating Council; [www.coolroofs.org](http://www.coolroofs.org).
54. CRSI - Concrete Reinforcing Steel Institute; [www.crsi.org](http://www.crsi.org).
55. CSA - CSA International; (Formerly: IAS - International Approval Services); [www.csainternational.org](http://www.csainternational.org).
56. CSI - Construction Specifications Institute (The); [www.csinet.org](http://www.csinet.org).
57. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); [www.cti.org](http://www.cti.org).
58. CWC - Composite Wood Council; (See CPA).
59. DASMA - Door and Access Systems Manufacturers Association; [www.dasma.com](http://www.dasma.com).
60. DHI - Door and Hardware Institute; [www.dhi.org](http://www.dhi.org).
61. ECA - Electronic Components Association; (See ECIA).
62. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
63. ECIA - Electronic Components Industry Association; [www.eciaonline.org](http://www.eciaonline.org).
64. EIA - Electronic Industries Alliance; (See TIA).
65. EIMA - EIFS Industry Members Association; [www.eima.com](http://www.eima.com).
66. EJMA - Expansion Joint Manufacturers Association, Inc.; [www.ejma.org](http://www.ejma.org).
67. ESD - ESD Association; (Electrostatic Discharge Association); [www.esda.org](http://www.esda.org).
68. ESTA - Entertainment Services and Technology Association; (See PLASA).

69. EVO - Efficiency Valuation Organization; [www.evo-world.org](http://www.evo-world.org).
70. FM Approvals - FM Approvals LLC; [www.fmglobal.com](http://www.fmglobal.com).
71. FM Global - FM Global; (Formerly: FMG - FM Global); [www.fmglobal.com](http://www.fmglobal.com).
72. FSA - Fluid Sealing Association; [www.fluidsealing.com](http://www.fluidsealing.com).
73. FSC - Forest Stewardship Council U.S.; [www.fscus.org](http://www.fscus.org).
74. GA - Gypsum Association; [www.gypsum.org](http://www.gypsum.org).
75. GANA - Glass Association of North America; [www.glasswebsite.com](http://www.glasswebsite.com).
76. GS - Green Seal; [www.greenseal.org](http://www.greenseal.org).
77. HI - Hydraulic Institute; [www.pumps.org](http://www.pumps.org).
78. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
79. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
80. HPVA - Hardwood Plywood & Veneer Association; [www.hpva.org](http://www.hpva.org).
81. HPW - H. P. White Laboratory, Inc.; [www.hpwhite.com](http://www.hpwhite.com).
82. IAPSC - International Association of Professional Security Consultants; [www.iapsc.org](http://www.iapsc.org).
83. IAS - International Accreditation Service; [www.iasonline.org](http://www.iasonline.org).
84. IAS - International Approval Services; (See CSA).
85. ICBO - International Conference of Building Officials; (See ICC).
86. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
87. ICEA - Insulated Cable Engineers Association, Inc.; [www.icea.net](http://www.icea.net).
88. ICPA - International Cast Polymer Alliance; [www.icpa-hq.org](http://www.icpa-hq.org).
89. ICRI - International Concrete Repair Institute, Inc.; [www.icri.org](http://www.icri.org).
90. IEC - International Electrotechnical Commission; [www.iec.ch](http://www.iec.ch).
91. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); [www.ieee.org](http://www.ieee.org).
92. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); [www.ies.org](http://www.ies.org).
93. IESNA - Illuminating Engineering Society of North America; (See IES).
94. IEST - Institute of Environmental Sciences and Technology; [www.iest.org](http://www.iest.org).
95. IGMA - Insulating Glass Manufacturers Alliance; [www.igmaonline.org](http://www.igmaonline.org).
96. IGSHPA - International Ground Source Heat Pump Association; [www.igshpa.okstate.edu](http://www.igshpa.okstate.edu).
97. ILI - Indiana Limestone Institute of America, Inc.; [www.iliai.com](http://www.iliai.com).
98. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); [www.intertek.com](http://www.intertek.com).
99. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); [www.isa.org](http://www.isa.org).
100. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
101. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); [www.isfanow.org](http://www.isfanow.org).
102. ISO - International Organization for Standardization; [www.iso.org](http://www.iso.org).
103. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
104. ITU - International Telecommunication Union; [www.itu.int/home](http://www.itu.int/home).
105. KCMA - Kitchen Cabinet Manufacturers Association; [www.kcma.org](http://www.kcma.org).
106. LMA - Laminating Materials Association; (See CPA).
107. LPI - Lightning Protection Institute; [www.lightning.org](http://www.lightning.org).
108. MCA - Metal Construction Association; [www.metalconstruction.org](http://www.metalconstruction.org).
109. MFMA - Metal Framing Manufacturers Association, Inc.; [www.metalframingmfg.org](http://www.metalframingmfg.org).

110. MHIA - Material Handling Industry of America; [www.mhia.org](http://www.mhia.org).
111. MPI - Master Painters Institute; [www.paintinfo.com](http://www.paintinfo.com).
112. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; [www.mss-hq.org](http://www.mss-hq.org).
113. NAAMM - National Association of Architectural Metal Manufacturers; [www.naamm.org](http://www.naamm.org).
114. NACE - NACE International; (National Association of Corrosion Engineers International); [www.nace.org](http://www.nace.org).
115. NADCA - National Air Duct Cleaners Association; [www.nadca.com](http://www.nadca.com).
116. NAIMA - North American Insulation Manufacturers Association; [www.naima.org](http://www.naima.org).
117. NCMA - National Concrete Masonry Association; [www.ncma.org](http://www.ncma.org).
118. NEBB - National Environmental Balancing Bureau; [www.nebb.org](http://www.nebb.org).
119. NECA - National Electrical Contractors Association; [www.necanet.org](http://www.necanet.org).
120. NeLMA - Northeastern Lumber Manufacturers Association; [www.nelma.org](http://www.nelma.org).
121. NEMA - National Electrical Manufacturers Association; [www.nema.org](http://www.nema.org).
122. NFPA - NFPA; (National Fire Protection Association); [www.nfpa.org](http://www.nfpa.org).
123. NFPA - NFPA International; (See NFPA).
124. NFRC - National Fenestration Rating Council; [www.nfrc.org](http://www.nfrc.org).
125. NHLA - National Hardwood Lumber Association; [www.nhla.com](http://www.nhla.com).
126. NLGA - National Lumber Grades Authority; [www.nlga.org](http://www.nlga.org).
127. NOMMA - National Ornamental & Miscellaneous Metals Association; [www.nomma.org](http://www.nomma.org).
128. NRCA - National Roofing Contractors Association; [www.nrca.net](http://www.nrca.net).
129. NRMCA - National Ready Mixed Concrete Association; [www.nrmca.org](http://www.nrmca.org).
130. NSPE - National Society of Professional Engineers; [www.nspe.org](http://www.nspe.org).
131. NSSGA - National Stone, Sand & Gravel Association; [www.nssga.org](http://www.nssga.org).
132. PDI - Plumbing & Drainage Institute; [www.pdionline.org](http://www.pdionline.org).
133. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); [www.plasa.org](http://www.plasa.org).
134. RCSC - Research Council on Structural Connections; [www.boltcouncil.org](http://www.boltcouncil.org).
135. RFCI - Resilient Floor Covering Institute; [www.rfci.com](http://www.rfci.com).
136. SAE - SAE International; (Society of Automotive Engineers); [www.sae.org](http://www.sae.org).
137. SCTE - Society of Cable Telecommunications Engineers; [www.scte.org](http://www.scte.org).
138. SDI - Steel Deck Institute; [www.sdi.org](http://www.sdi.org).
139. SEFA - Scientific Equipment and Furniture Association; [www.sefalabs.com](http://www.sefalabs.com).
140. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
141. SIA - Security Industry Association; [www.siaonline.org](http://www.siaonline.org).
142. SJI - Steel Joist Institute; [www.steeljoist.org](http://www.steeljoist.org).
143. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; [www.smacna.org](http://www.smacna.org).
144. SPIB - Southern Pine Inspection Bureau; [www.spib.org](http://www.spib.org).
145. SPRI - Single Ply Roofing Industry; [www.spri.org](http://www.spri.org).
146. SRCC - Solar Rating and Certification Corporation; [www.solar-rating.org](http://www.solar-rating.org).
147. SSINA - Specialty Steel Industry of North America; [www.ssina.com](http://www.ssina.com).
148. SSPC - SSPC: The Society for Protective Coatings; [www.sspc.org](http://www.sspc.org).
149. TEMA - Tubular Exchanger Manufacturers Association, Inc.; [www.tema.org](http://www.tema.org).

150. TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); [www.tiaonline.org](http://www.tiaonline.org).
  151. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
  152. TMS - The Masonry Society; [www.masonrysociety.org](http://www.masonrysociety.org).
  153. TPI - Turfgrass Producers International; [www.turfgrasssod.org](http://www.turfgrasssod.org).
  154. UL - Underwriters Laboratories Inc.; [www.ul.com](http://www.ul.com).
  155. UNI - Uni-Bell PVC Pipe Association; [www.uni-bell.org](http://www.uni-bell.org).
  156. WASTEC - Waste Equipment Technology Association; [www.wastec.org](http://www.wastec.org).
  157. WCLIB - West Coast Lumber Inspection Bureau; [www.wclib.org](http://www.wclib.org).
  158. WCMA - Window Covering Manufacturers Association; [www.wcmanet.org](http://www.wcmanet.org).
  159. WDMA - Window & Door Manufacturers Association; [www.wdma.com](http://www.wdma.com).
  160. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); [www.wicnet.org](http://www.wicnet.org).
  161. WPA - Western Wood Products Association; [www.wwpa.org](http://www.wwpa.org).
- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
1. IAPMO - International Association of Plumbing and Mechanical Officials; [www.iapmo.org](http://www.iapmo.org).
  2. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
  3. ICC-ES - ICC Evaluation Service, LLC; [www.icc-es.org](http://www.icc-es.org).
- D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
1. CPSC - Consumer Product Safety Commission; [www.cpsc.gov](http://www.cpsc.gov).
  2. DOC - Department of Commerce; National Institute of Standards and Technology; [www.nist.gov](http://www.nist.gov).
  3. DOE - Department of Energy; [www.energy.gov](http://www.energy.gov).
  4. EPA - Environmental Protection Agency; [www.epa.gov](http://www.epa.gov).
  5. OSHA - Occupational Safety & Health Administration; [www.osha.gov](http://www.osha.gov).
  6. TRB - Transportation Research Board; National Cooperative Highway Research Program; [www.trb.org](http://www.trb.org).
  7. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; [www.ars.usda.gov](http://www.ars.usda.gov).
- E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.
1. CFR - Code of Federal Regulations; Available from Government Printing Office; [www.gpo.gov/fdsys](http://www.gpo.gov/fdsys).
  2. FED-STD - Federal Standard; (See FS).
  3. FS - Federal Specification; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
    - a. Available from National Institute of Building Sciences/Whole Building Design Guide; [www.wbdg.org/ccb](http://www.wbdg.org/ccb).
  4. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

- F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation; [www.bearhfti.ca.gov](http://www.bearhfti.ca.gov).
  2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; [www.calregs.com](http://www.calregs.com).
  3. CDHS; California Department of Health Services; (See CDPH).
  4. CDPH; California Department of Public Health; Indoor Air Quality Program; [www.caliaq.org](http://www.caliaq.org).
  5. CPUC; California Public Utilities Commission; [www.cpuc.ca.gov](http://www.cpuc.ca.gov).
  6. SCAQMD; South Coast Air Quality Management District; [www.aqmd.gov](http://www.aqmd.gov).

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

## **SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
  - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

#### **1.2 USE CHARGES**

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
- C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

#### **1.4 QUALITY ASSURANCE**

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

#### **1.5 PROJECT CONDITIONS**

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its

use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch thick, galvanized-steel, chain-link fabric fencing; minimum 8 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts with galvanized barbed-wire top strand.

### **2.2 TEMPORARY FACILITIES**

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

### **2.3 EQUIPMENT**

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
  - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
  - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 "Closeout Procedures".
  - 4.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION, GENERAL**

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

### **3.2 TEMPORARY UTILITY INSTALLATION**

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with utility company, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- D. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
  - 1. Install temporary electric power service overhead unless otherwise indicated.
- G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

- H. Telephone Service: Provide contact information in common-use facilities for use by all construction personnel.
  - 1. At each temporary facility, post a list of important telephone numbers.
    - a. Police and fire departments.
    - b. Ambulance service.
    - c. Contractor's home office.
    - d. Contractor's emergency after-hours telephone number.
    - e. Architect's office.
    - f. Engineers' offices.
    - g. Owner's office.
    - h. Principal subcontractors' field and home offices.
  - 2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
- I. Electronic Communication Service: Provide a desktop or laptop computer or tablet in the primary field office adequate for use to access project electronic documents and maintain electronic communications. Equip computer with not less than the following:
- J. Productivity Software:
  - 1. Microsoft Office Professional, XP or higher, including Word, Excel, and Outlook.
  - 2. Adobe Pro 10.0 or higher.
  - 3. Autodesk Buzzsaw.
- K. Printer: "All-in-one" unit equipped with printer server, combining, photocopying, scanning, and faxing, or separate units for each of these three functions.
- L. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum 1 Mbps upload and 3 Mbps download speeds at each computer.
  - 1. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.

### **3.3 SUPPORT FACILITIES INSTALLATION**

- A. General: Comply with the following:
- B. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
- C. Maintain support facilities until building shell is completely enclosed, weather tight and heating systems have been installed or Substantial Completion. Use of owner's new facility will be allowed only after obtaining written approval from the Owner. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

- D. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
  - 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
  - 2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 312000 "Earth Moving."
  - 3. Recondition base after temporary use, including removing contaminated material, regrading, proof rolling, compacting, and testing.
  - 4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 321216 "Asphalt Paving."
- E. Traffic Controls: Comply with requirements of authorities having jurisdiction.
  - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
  - 2. Maintain access for fire-fighting equipment and access to fire hydrants. D. Parking: Provide temporary parking areas for construction personnel.
- F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
  - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
  - 2. Remove snow and ice as required to minimize accumulations.
- G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
  - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
    - a. Provide an 8 foot wide x 4 foot high project sign of exterior grade plywood and wood frame construction, painted, with exhibit lettering by professional sign painter. Submit scaled drawing to architect for approval indicating composition and content of project sign.
    - b. List Title of Project, Names of Owner, Architect and Contractor.
    - c. Erect on site at prominent location established by Owner.
  - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
    - a. Provide temporary, directional signs for construction personnel and visitors.
      - 1) Maintain and touchup signs so they are legible at all times.
- H. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- I. Lifts and Hoists: Provide facilities necessary for hoisting materials.
  - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

### **3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION**

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Temporary Erosion Control: Provide measures to prevent soil erosion and discharge of soilbearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings, requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
  - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
- G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
  - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- J. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

### **3.5 MOISTURE AND MOLD CONTROL**

- A. Contractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
  1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
  2. Keep interior spaces reasonably clean and protected from water damage.
  3. Discard or replace water-damaged and wet material.
  4. Discard, replace, or clean stored or installed material that begins to grow mold.
  5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
  1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
  2. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

### **3.6 OPERATION, TERMINATION, AND REMOVAL**

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
  1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion, unless approval is granted by owner.

- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
  2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

**END OF SECTION**

## **SECTION 01 56 39 - TEMPORARY TREE AND PLANT PROTECTION**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Temporary protection of existing trees and plants from damage as a result of the Contractor's operations including, but not limited to:
  - 1. Marking of clearing limits.
  - 2. Vegetation protective signage.
  - 3. Tree protection fencing.
  - 4. Boxing of tree trunks.
  - 5. Selective pruning.

#### **1.3 RELATED REQUIREMENTS**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 2. Section 024113, SELECTIVE SITE DEMOLITION AND REMOVALS: Clearing and grubbing.
  - 3. Section 311200, SITE CLEARING.
  - 4. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Excavation and backfill.
  - 5. Section 329300, PLANTING: New plant material and mulch.

#### **1.4 REFERENCED STANDARDS**

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
  - 1. American National Standards Institute (ANSI):
    - Z133.1 Safety Requirements for Pruning, Trimming, Repairing, Maintaining and Removing Trees, and for Cutting Brush.

A300 Tree Care Operations - Tree, Shrub And Other  
Woody Plant Maintenance - Standard Practices (All  
Parts)

2. International Society of Arboriculture (ISA):

Guide Guide for Establishing Values of Trees and Other  
Plants

3. TCIA -- Tree Care Industry Association, Inc. (TCIA):

Ref. 1 Pruning Standards for Shade Trees

**1.5 SUBMITTALS**

- A. Prepare and submit drawings indicating the extent of tree protection fencing required.
- B. Proposed methods, and schedule for effecting tree and plant protection shall be submitted for approval.
- C. Proposed methods, materials, and schedule for root pruning, construction pruning, and tree fertilization, in accordance with ANSI A300 Tree Management standards specification writing guidelines, shall be submitted by Certified Arborist for approval.
- D. Hardwood Mulch: Refer to section 329300, PLANTING.

**1.6 QUALITY ASSURANCE**

- A. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed tree protection and trimming work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of tree protection and trimming.
- B. Work of this section shall be completed by a professional ISA Certified Arborist with a minimum five years experience, who has successfully completed an exam and education program equal to the International Society of Arboriculture (ISA) Certification Program, sponsored by the International Society of Arboriculture 2009, P.O. Box 3129, Champaign, IL 61826 (217) 355-9411; Email: [isa@isa-arbor.com](mailto:isa@isa-arbor.com).
- C. Arborist shall have the following minimum qualifications:
  - 1. Membership in:
    - a. TCIA -- Tree Care Industry Association, Inc.
    - b. ISA – International Society of Arborists
    - c. NAA – National Arborist Association
  - 2. Meet state requirements for insurance.

3. Licenses for application and use of pesticides.

## **1.7 DAMAGE PENALTIES**

- A. Certain specimen trees within the construction areas and in other key locations will be identified by the Owner and the Architect, and marked with red tags. Loss of any of these trees will result in fines assessed at \$10,000 per tree. Damage to all other trees on the property will be assessed at the rate of \$200 per inch caliper of the tree.
- B. A fine of \$1,000 will be levied against the Contractor for each incident of construction inside tree protection areas.
- C. Damages to trees will be assessed by the Architect and Owner in accordance with the ISA Guide.
- D. Trees or roots visibly damaged will cause the Owner to withhold from the Contractor an assessed amount conforming to the requirements stipulated above for a period of two years. After that period the impact of the damage to any tree will be assessed accordingly.
- E. If any trees designated to be saved are damaged and replacement is required, a number and diameter of trees of the same species and variety, unless invasive, as specified by the Owner and Architect, shall be furnished and planted by the Contractor. The total inch diameter of the replacement trees or shrubs shall equal the diameter of the tree to be replaced.

## **1.8 VEGETATION PROTECTIVE SIGNAGE**

- A. Two types of signs shall be posted throughout the property with respect to the care of vegetation. The signs are as follows:
  1. A sign at all access points to the construction areas, informing all personnel that they are entering "an environmentally protected area" and that any violations which occur in the protected areas will be fined. Exact sign and language will be developed by the Architect.
  2. Signs mounted on the vegetation protective fencing at 25 ft. intervals warning construction personnel to keep out of the protective zone and informing them that all violators will be fined.

## **PART 2 - PRODUCTS**

### **2.1 TREE PROTECTION FENCING**

- A. Tree protection fencing shall be the following:

1. Galvanized chain link fencing, 6 ft. high.
  2. Fabric shall be a good commercial quality of steel wire of 2 in. mesh and 11 gage.
  3. Fittings shall be malleable iron casting, wrought iron forgings, or pressed steel and provided with pin connections. Equipment shall be designed to carry 100% overload.
  4. Piping shall be steel conforming to ASTM A 120 except that pipe shall be unthreaded and untested for water pressure.
- B. Stakes for fencing shall be 9 ft. galvanized steel posts, driven a minimum of 3 ft. into the ground, except above steam tunnel and vault locations where surface anchors shall be used. Posts shall be spaced 10 ft. o.c. maximum.
- C. For fencing within the drip line of trees, surface mounted post anchors may be acceptable. Review with Architect and arborist and obtain written approval prior to installing. Post installation shall not damage tree root systems.
- D. Tree Armor:
1. Wood: SPFA utility grade, 2x4.
  2. Wire: Annealed steel wire, 16 gage minimum.

## **2.2 CRITICAL ROOT ZONE PROTECTION**

- A. Critical root zones shall be protected with AlturnaMats, 1/2" thick recycled polyethylene mats capable of supporting vehicles and equipment weighing up to 60 tons, manufactured by AlturnaMats, Inc., 701 E. Spring Street, Mailbox #9, Titusville, PA 16354 • Phone: 888.544.6287 • Fax: 866-723-2903 , or approved equal.

## **2.3 MULCH**

- A. Mulch shall be hardwood mulch; Refer to Section 329300, PLANTING.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION OF FENCING**

- A. Prior to start of demolition work and clearing and grubbing operations, tree protection fencing shall be installed in accordance with the following:
1. Fencing shall be installed at the tree protection areas indicated on the Drawings.
- B. Tree protection fencing to be installed over utility locations shall be installed using surface anchors. No poles or stakes shall be driven into the ground at these locations.

**3.2 PROTECTION FOR EXISTING TREES TO BE PRESERVED:**

- A. All trees to be preserved on the property shall be protected against damage from construction operations.
  - 1. Includes associated understory.
  
- B. Only those trees located within the limits of improvements to be constructed as indicated, shall be removed.
  - 1. All trees to remain shall be flagged for review after the location of improvements to be constructed are staked in the field.
  - 2. Any tree to be removed shall be reviewed by the Architect and Owner for approval prior to removal.
  - 3. Obtain approval of installation of tree barricade fencing from Owner and Architect prior to the initiation of any removal of vegetation and construction.
  
- C. Erect fencing and armor protection prior to beginning any clearing, demolition or construction activity, and unless otherwise instructed, maintain in place until construction is completed.
  - 1. Tree protection barricade shall be erected at the edge of the dripline where possible (unless otherwise indicated on the Drawings); in extreme circumstances and with the approval of the Architect, fencing may be located at the edge of the root protection zone.
    - a. For trees 10 inch caliper and less, the minimum distance the barrier shall be erected is eight (8) feet from the trunk of tree or clump of trees.
  - 2. Trees immediately adjacent to any construction activities are to be protected by barricade fencing; subject to approval of the Architect and Owner.
  - 3. Trees exposed to construction activity within the dripline or within twenty-five (25) feet of any construction activity are to have trunks protected with tree armor in addition to barricade fencing.
  - 4. The tree protection barricade shall be placed before any excavating or grading is begun and maintained in repair for the duration of the construction work unless otherwise directed.
  - 5. No material shall be stored or construction operation shall be carried on within the tree protection barricade.
  - 6. Tree protection barricade shall remain until all work is completed.
  - 7. Remove tree protection barricade at commencement of finish grading.
  - 8. Remove tree armor immediately prior to Substantial Completion.
  
- D. Protect tree trunk with tree armor to a height of 8' or to the limits of lower branching (when exposed to construction activity within the drip line) with 2x4's butted side to side completely around trunk.
  - 1. Wire wrap, do not nail, around trees.

- E. Protect trees that are to remain, whether within barricade fencing or not, from the following:
1. Compaction of root area by equipment or material storage; construction materials shall not be stored closer to trees than the farthest extension of their limbs (dripline).
  2. The proposed finished grade within the root protection zone of any preserved tree shall not be raised or lowered more than three (3) inches.
    - a. Retaining methods can be used to protect and/or provide lateral support to the area outside the root protection zone.
  3. Trunk damage by moving equipment, material storage, nailing or bolting.
  4. Strangling by tying ropes or guy wires to trunks or large branches.
  5. Poisoning by pouring solvents, gas, paint, etc., on or around trees and roots.
  6. Cutting on roots by excavating, ditching, etc.
    - a. Prior to excavation within the tree drip lines or the removal of trees adjacent to other trees that are to remain, make a clean cut between the disturbed and undisturbed root zones with a rock saw or similar equipment to minimize root damage.
    - b. Refer to EXCAVATION AROUND TREES paragraph for additional information.
  7. Damage of branches by improper pruning.
  8. Drought from failure to water or by cutting or changing normal drainage pattern past roots. Contractor shall provide means as necessary to ensure positive drainage.
  9. Changes of soil pH factor by disposal of lime base materials such as concrete, plaster, lime treatment at pavement subgrade, etc. When installing concrete adjacent to the root zone of a tree, use a minimum 6 mil. plastic vapor barrier behind the concrete to prohibit leaching of lime into the soil.
  10. Do not cut roots 3/4" in diameter or over without approval of Owner's Representative. All excavation and earthwork within the RPZ of trees shall be done by hand.
  11. No vehicular traffic shall occur within the drip line of any tree; including parking of vehicles.
  12. No soil shall be spread, spoiled or otherwise disposed of under any tree within the RPZ.
- F. Any damage done to existing tree crowns or root systems shall be repaired by the Arborist to the satisfaction of the Architect and Owner's Representative.
1. Broken branches shall be cut cleanly.
  2. Any roots cut shall be cut cleanly with a saw other means approved by the Architect and Owner's Representative.
- G. Damages to trees caused through negligence of Contractor or his employees will be assessed by Owner and Project Arborist as described in Paragraph 1.6.

### **3.3 ROOT PROTECTION ZONE**

- A. The root protection zone (RPZ) is measured with a radius equal to 12 in. for every 1 in. of caliper DBH.
  - 1. No disturbance shall occur closer to the tree than one-half the radius of the RPZ or within five (5) feet of the tree whichever is greater.

### **3.4 ROOT PROTECTION ZONE IMPACTS**

- A. Those trees to remain which have some encroachment on their root protection zone shall have the following maximum allowable impacts:
  - 1. Minimum Protection Criteria 'A': No disturbance of natural grade, e.g. trenching or excavation, can occur closer to the tree than one-half the radius of the RPZ or within five (5) feet of the tree whichever is greater.
  - 2. Minimum Protection Criteria 'B': No cut or fill greater than three (3) inches will be located closer to the tree trunk than  $\frac{1}{2}$  the RPZ radius distance.
- B. Trees impacted shall have a minimum eight (8) inch layer of mulch placed and maintained over the root protection zone and the undisturbed area within the dripline.
  - 1. Provide water in a slow drip manner to impacted trees as approved by the Architect and Owner's Representative.
  - 2. Provide water to apply equivalent to 1 inch once per week to deeply soak in over the area within the dripline of the tree during periods of hot, dry weather, as defined by the arborist.
  - 3. Spray tree crowns periodically to reduce dust accumulation on the leaves.

### **3.5 DESIGNATED PROJECT LIMITS**

- A. By law, acceptable disturbance and recommended actions vary according to the proximity to sensitive features. For site demolition and construction the project is divided into three zones with noted restrictions:
  - 1. Project Limit of Disturbance (Project LOD): Work within this zone will include earthwork and construction as described in the design documentation. The project LOD will be separated from the Planting LOD by silt fencing installed per specifications. All trees to existing trees to remain within the Project LOD shall be protected as described above. Plant removals and new planting shall be performed using mechanical equipment as needed.

2. **Planting Limit of Disturbance (Planting LOD):** Work within this zone will include removal of invasive species and planting as described in the design documentation. This shall be performed manually or using hand-held power equipment (e.g. chainsaws, brush cutters, power auger, etc.). Large mechanical equipment will be prohibited within this zone in order to minimize disturbance. Removal of existing groundcover (turf and native herbaceous growth) will be strictly limited to areas receiving new trees, shrubs, and plugs. Enrichment seeding shall be accomplished either by hand or using a slit/slice seeder, minimizing disturbance to the ground surface.
3. **Wetland & Stream Delineation:** Work within this zone will include limited removal of invasive species as needed. Handheld power equipment may be used for removal of individual plants, but no large mechanical equipment will be permitted within this zone. If invasive species will be removed from this zone and herbicide application is deemed necessary, required permit(s) from the Rhode Island Department of Environmental Management (DEM) will be obtained.

### **3.6 ROOT PRUNING**

- A. Where construction will be in close proximity to existing trees designated to remain, roots shall be pruned. Proximity shall be as determined in the field by the Architect.
- B. Root pruning is the physical cutting of tree roots to minimize root damage and promote healing. Suitable means for root pruning include trenching, vibrating plow, stump grinder. Any method which tears roots or disturbs the soil beyond the grading limit is unacceptable.
- C. Tree to be root pruned shall be root pruned to a depth of 600 mm by means of a trencher or other approved means.
- D. Backfill root pruning trench with existing soil mixed with peat moss or well-rotted sawdust to a mixture of approximately 75% soil and 25% humus. Tamp lightly to set soil
- E. Apply mulch to a depth of 100 mm to 150 mm. at minimum 3.05 m. to 4.57 m radius around tree to reduce compaction of roots.

### **3.7 GOVERNING STANDARDS FOR PRUNING**

- A. Work procedures will be guided by the current provisions of the American National Standard Institute. Complete detail of the provisions are to be found in the references listed. The two basic objectives of the pruning operation shall include:
  1. **Hazard Reduction Pruning:** Hazard reduction pruning shall be completed to remove visible hazards in a tree. Hazard pruning shall consist of one or more of the maintenance pruning types.

2. Maintenance Pruning: Maintenance pruning shall be completed to maintain and improve tree health and structure, aesthetics of the tree and hazard reduction pruning.

### **3.8 MAINTENANCE PRUNING TYPES**

- A. Both hazard reduction pruning and maintenance pruning shall consist of one or more of the following pruning types:
  1. Crown Cleaning: Crown cleaning shall consist of the selective removal of one or more of the following items: dead, dying, or diseased branches, weak branches, water sprouts and stubbed branches.
  2. Crown Thinning: Crown thinning shall consist of the selective removal of branches to increase light penetration, air movement, and reduce weight.
  3. Crown Raising: Crown raising shall consist of the removal of the lower branches of a tree to provide clearance.
  4. Crown Reduction, or Crown Shaping: Crown reduction shall consist of decreasing the height and/or spread of a tree.
  5. Vista Pruning: Vista pruning shall consist of selective thinning of framework limbs or specific areas of the crown.
  6. Crown Restoration: Crown restoration pruning shall improve the structure, form and appearance of a tree which has been severely headed, vandalized, storm damaged or improperly pruned.

### **3.9 UTILITY PRUNING**

- A. Utility pruning shall consist of one or more of the following items:
  1. Trees Underneath: Pruning trees growing directly under and growing into the facility/utility space.
  2. Trees Along Side: Pruning of trees growing directly along side and growing into or toward the facility/utility space.

### **3.10 EXCAVATING AROUND TREES**

- A. Excavate within the dripline of trees only where required and when absolutely necessary.
  1. Any excavation within the RPZ of trees shall be under the direction of the Arborist.
  2. Arborist shall be at site at all times while excavation is occurring within the RPZ.
  3. Air spade all removals within the RPZ.
  4. Refer to ROOT PROTECTION ZONE (RPZ).
- B. When excavating for new construction is required within the RPZ, air spade and hand excavate to minimize damage to root systems.
  1. Use narrow tine spading forks and comb soil to expose roots.

2. Relocate roots back into backfill areas wherever possible.
  3. If large main lateral roots are encountered, expose beyond excavation limits as required to bend and relocate without breaking.
  4. If root relocation is not practical, clean cut roots using sharp ax approximately three (3) inches back from new construction.
- C. Where existing grade is above new finish grade, carefully excavate within the dripline to the new finish grade.
1. Carefully hand excavate an additional six (6) inches below the finish grade.
  2. Use narrow tine spading forks to comb the soil to expose the roots, and prune the exposed root structure as recommended by the Arborist.
  3. Keep the exposed roots damp.
  4. Treat the cut roots as specified and as recommended by the Arborist.
  5. After pruning and treatment of the root structure is complete, backfill to finish grade with eight (8) inches of approved plant mix, or structural soil.
- D. Where noted on plan, use airspade to expose roots for required cutting to accommodate hardscape elements. Architect to verify all cuts prior to proceeding.
- E. Temporarily support and protect roots against damage until permanently relocated and covered with recommended landscape material.

### **3.11 APPROVAL**

- A. No major limbs or structure will be cut or removed without prior approval of the Architect and Owner's Representative.

### **3.12 STERILIZATION**

- A. All tools used will be sterilized with Clorox Bleach, or approved equal, prior to use and between each tree.
- B. Residue from sterilization operation shall be diluted so as not to damage any vegetation.
- C. At trees known to be diseased and where there is danger of transmitting that disease, tools are to be disinfected after each cut.

### **3.13 PAINT CUTS**

- A. Paint cuts more than 1 inch in diameter with an approved tree wound paint on trees.
1. Paint cuts within 30 minutes after cutting.

**3.14 MULCH**

- A. Mulch base of all existing trees four (4') feet radius with 3 " deep mulch layer.
  - 1. If existing trees are grouped, the entire area is to be mulched in between the trees.
- B. Mulch base of all existing trees impacted by construction activities within RPZ with 3" deep mulch layer.
  - 1. If existing trees are grouped, the entire area is to be mulched in between the trees.

**3.15 CLEANUP**

- A. Wood and debris shall become property of the Contractor and shall be removed from the site.

**3.16 REMOVAL OF PROTECTION**

- A. All protection shall remain in place throughout the construction period. Remove protection devices only after written permission has been granted by the Architect.

**END OF SECTION**

## **SECTION 01 60 00 - PRODUCT REQUIREMENTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
  - 1. Section 012500 "Substitution Procedures" for requests for substitutions.

#### **1.2 DEFINITIONS**

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, which is current as of date of the Contract Documents.
  - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
  - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

#### **1.3 ACTION SUBMITTALS**

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product

request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

- a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
- b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

#### **1.4 QUALITY ASSURANCE**

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

#### **1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
  1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
  1. Store products to allow for inspection and measurement of quantity or counting of units.
  2. Store materials in a manner that will not endanger Project structure.
  3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
  4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
  5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
  6. Protect stored products from damage and liquids from freezing.

## 1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
  3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

## PART 2 - PRODUCTS

### 2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  4. Where products are accompanied by the term "as selected," Architect will make selection.
  5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B. Product Selection Procedures:
1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  3. Products:
    - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
    - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
  4. Manufacturers:
    - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
    - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
  5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

## 2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
  2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
  3. Evidence that proposed product provides specified warranty.
  4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
  5. Samples, if requested.

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

## **SECTION 01 73 00 - EXECUTION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Field engineering and surveying.
  - 3. Installation of the Work.
  - 4. Cutting and patching.
  - 5. Coordination of Owner-installed products.
  - 6. Progress cleaning.
  - 7. Starting and adjusting.
  - 8. Protection of installed construction.
  
- B. Related Requirements:
  - 1. Section 011000 "Summary" for limits on use of Project site.
  - 2. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
  - 3. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

#### **1.2 INFORMATIONAL SUBMITTALS**

- A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- B. Certified Surveys: Submit two copies signed by land surveyor.
- C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

#### **1.3 QUALITY ASSURANCE**

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Engineer of locations and details of cutting and await directions from Engineer before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
2. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
  1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
  1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
  2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where

indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### **3.2 PREPARATION**

- A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

### **3.3 CONSTRUCTION LAYOUT**

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
1. Establish benchmarks and control points to set lines and levels of construction and elsewhere as needed to locate each element of Project.
  2. Establish limits on use of Project site.
  3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  4. Inform installers of lines and levels to which they must comply.

5. Check the location, level and plumb, of every major element as the Work progresses.
  6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
  7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

### **3.4 FIELD ENGINEERING**

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
- C. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
1. Recording: If required by authorities having jurisdiction, prepare a final property survey recorded with authorities having jurisdiction as the official "property survey" at Final Completion

### **3.5 INSTALLATION**

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
  2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
  1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
  2. Allow for building movement, including thermal expansion and contraction.
  3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### **3.6 CUTTING AND PATCHING**

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
  - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
  - 5. Proceed with patching after construction operations requiring cutting are complete.
- F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
  - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
  - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
  - 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
  - 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

### 3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
  - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
  - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- B. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
  - 1. Remove liquid spills promptly.
  - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- C. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- D. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- E. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- F. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.
- G. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- H. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- I. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### **3.8 STARTING AND ADJUSTING**

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements"

### **3.9 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

**END OF SECTION**

## **SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for the following:
  - 1. Salvaging nonhazardous demolition and construction waste.
  - 2. Recycling nonhazardous demolition and construction waste.
  - 3. Disposing of nonhazardous demolition and construction waste.
  
- B. Related Requirements:
  - 1. Section 024116 "Structure Demolition" for disposal of waste resulting from demolition of buildings, structures, and site improvements.
  - 2. Section 042000 "Unit Masonry" for disposal requirements for masonry waste.
  - 3. Section 311000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

#### **1.2 DEFINITIONS**

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the work.

#### **1.3 PERFORMANCE REQUIREMENTS**

- A. General: Achieve end-of-Project rates for recycling of 50 percent minimum with a desired goal of 75 percent by weight of total non-hazardous solid waste generated by the Work. Facilitate recycling and salvage of materials, including the following:
  - 1. Concrete and masonry products.

2. Wood.
3. Metals
4. Plastic
5. Gypsum products
6. Glass
7. Cardboard
8. Dead Batteries from Contractor's tools
9. Miscellaneous items available per local Facility Recycling Program

#### **1.4 ACTION SUBMITTALS**

- A. Waste Management Plan: Submit plan within 7 days of date established for commencement of the Work.

#### **1.5 INFORMATIONAL SUBMITTALS**

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:
  1. Material category.
  2. Generation point of waste.
  3. Total quantity of waste in tons.
  4. Quantity of waste salvaged, both estimated and actual in tons.
  5. Quantity of waste recycled, both estimated and actual in tons.
  6. Total quantity of waste recovered in tons.
  7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

## **1.6 QUALITY ASSURANCE**

- A. Waste Management Coordinator: Individual responsible for tracking and management of disposal of waste generated at project site by demolition and/or new construction.
- B. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

## **1.7 WASTE MANAGEMENT PLAN**

- A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
  - 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
  - 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
  - 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
  - 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
  - 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
  - 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.1 PLAN IMPLEMENTATION**

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. Waste Management Coordinator: Contractor shall be responsible for, or engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
  - 1. Distribute waste management plan to everyone concerned within three days of submittal return.
  - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
  - 2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

### **3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL**

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
  - 1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

2. Inspect containers and bins for contamination and remove contaminated materials if found.
3. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
4. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
5. Store components off the ground and protect from the weather.
6. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

### **3.3 RECYCLING CONSTRUCTION WASTE**

#### **A. Packaging:**

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
5. Wood Materials:
  - a. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
  - b. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
6. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

### **3.4 DISPOSAL OF WASTE**

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
  1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
  2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

### **END OF SECTION**

## **SECTION 01 77 00 - CLOSEOUT PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
  - 5. Repair of the Work.
  
- B. Related Requirements:
  - 1. Section 013233 "Photographic Documentation" for submitting final completion construction photographic documentation.
  - 2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
  - 4. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

#### **1.2 ACTION SUBMITTALS**

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

#### **1.3 CLOSEOUT SUBMITTALS**

- A. Certificates of Release (Occupancy): From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.

#### **1.4 MAINTENANCE MATERIAL SUBMITTALS**

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

## 1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 5 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
  - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner's Representative. Label with manufacturer's name and model number where applicable.
    - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain signature from Owner's Representative for receipt of submittals.
  - 5. Submit test/adjust/balance records.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Advise Owner of pending insurance changeover requirements.
  - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  - 3. Complete startup and testing of systems and equipment.
  - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
  - 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
  - 6. Advise Owner of changeover in heat and other utilities.
  - 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
  - 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

9. Complete final cleaning requirements, including touchup painting.
  10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
  2. Results of completed inspection will form the basis of requirements for final completion.

## **1.6 FINAL COMPLETION PROCEDURES**

- A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
  2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Owner's Representative will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

## **1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)**

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding through the building interior.
  2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  3. Submit list of incomplete items in the one of the following formats:

- a. MS Excel electronic file. Architect, will return annotated copy.
- b. PDF electronic file. Architect, will return annotated copy.

## **1.8 SUBMITTAL OF PROJECT WARRANTIES**

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
  1. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
  1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

## **PART 3 - EXECUTION**

### **3.1 FINAL CLEANING**

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  1. Complete the following cleaning operations before requesting Final Inspection for entire Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

- b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
- c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
- d. Remove tools, construction equipment, machinery, and surplus material from
- e. Project site.
  - 1) Remove snow and ice to provide safe access to building.
  - 2) Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
  - 3) Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
  - 4) Sweep concrete floors broom clean in unoccupied spaces.
  - 5) Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
  - 6) Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
  - 7) Remove labels that are not permanent.
  - 8) Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
  - 9) Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
  - 10) Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
  - 11) Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
  - 12) Leave Project clean and ready for occupancy.

### **3.2 REPAIR OF THE WORK**

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
  - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out LED, and defective fixtures to comply with requirements for new fixtures.

**END OF SECTION**

## **SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory.
  - 2. Emergency manuals.
  - 3. Operation manuals for systems, subsystems, and equipment.
  - 4. Product maintenance manuals.
  - 5. Systems and equipment maintenance manuals.

#### **1.2 CLOSEOUT SUBMITTALS**

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
  - 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
    - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    - b. Enable inserted reviewer comments on draft submittals.
- C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 10 days before commencing demonstration and training.
  - 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

## **PART 2 - PRODUCTS**

### **2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS**

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.
- B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  - 1. Title page.
  - 2. Table of contents.
  - 3. Manual contents.
- C. Title Page: Include the following information:
  - 1. Subject matter included in manual.
  - 2. Name and address of Project.
  - 3. Name and address of Owner.
  - 4. Date of submittal.
  - 5. Name and contact information for Contractor.
  - 6. Name and contact information for Architect.
  - 7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
  - 8. Cross-reference to related systems in other operation and maintenance manuals.
- D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
- E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- F. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
  - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  - 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so

that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

## 2.2 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
  - 1. Type of emergency.
  - 2. Emergency instructions.
  - 3. Emergency procedures.
  
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
  - 1. Fire.
  - 2. Gas leak.
  - 3. Power failure.
  - 4. Water outage.
  - 5. System, subsystem, or equipment failure.
  
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties. D. Emergency Procedures: Include the following, as applicable:
  - 1. Instructions on stopping.
  - 2. Shutdown instructions for each type of emergency.
  - 3. Operating instructions for conditions outside normal operating limits.
  - 4. Required sequences for electric or electronic systems.
  - 5. Special operating instructions and procedures.

## 2.3 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
  - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
  - 2. Performance and design criteria if Contractor is delegated design responsibility.
  - 3. Operating standards.
  - 4. Operating procedures.
  - 5. Operating logs.
  - 6. Wiring diagrams.
  - 7. Control diagrams.
  - 8. Piped system diagrams.
  - 9. Precautions against improper use.
  - 10. License requirements including inspection and renewal dates.
  
- B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
  2. Manufacturer's name.
  3. Equipment identification with serial number of each component.
  4. Equipment function.
  5. Operating characteristics.
  6. Limiting conditions.
  7. Performance curves.
  8. Engineering data and tests.
  9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
  2. Equipment or system break-in procedures.
  3. Routine and normal operating instructions.
  4. Regulation and control procedures.
  5. Instructions on stopping.
  6. Normal shutdown instructions.
  7. Seasonal and weekend operating instructions.
  8. Required sequences for electric or electronic systems.
  9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

## **2.4 PRODUCT MAINTENANCE MANUALS**

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
  2. Manufacturer's name.
  3. Color, pattern, and texture.
  4. Material and chemical composition.
  5. Reordering information for specially manufactured products.

- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
  - 1. Inspection procedures.
  - 2. Types of cleaning agents to be used and methods of cleaning.
  - 3. List of cleaning agents and methods of cleaning detrimental to product.
  - 4. Schedule for routine cleaning and maintenance.
  - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

## **2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS**

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
  - 1. Standard maintenance instructions and bulletins.
  - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  - 3. Identification and nomenclature of parts and components.
  - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
  - 1. Test and inspection instructions.
  - 2. Troubleshooting guide.
  - 3. Precautions against improper maintenance.
  - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - 5. Aligning, adjusting, and checking instructions.
  - 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

### **PART 3 - EXECUTION**

#### **3.1 MANUAL PREPARATION**

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
- E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
  - 1. Do not use original project record documents as part of operation and maintenance manuals.
- F. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

#### **END OF SECTION**

## **SECTION 01 78 39 - PROJECT RECORD DOCUMENTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for project record documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
- B. Related Requirements:
  - 1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

#### **1.2 CLOSEOUT SUBMITTALS**

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit copy of record Drawings as follows:
  - 2. Initial Submittal:
    - a. Submit PDF electronic files of scanned record prints and one set(s) of file prints.
    - b. Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
  - 3. Final Submittal:
    - a. Submit PDF electronic files of scanned record prints and two set(s) of prints.
    - b. Print each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

### **PART 2 - PRODUCTS**

#### **2.1 RECORD DRAWINGS**

- A. Record Drawings: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.
  - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether

individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

- a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
  - b. Record data as soon as possible after obtaining it.
  - c. Record and check the markup before enclosing concealed installations.
  - d. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  - e. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
2. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
- a. Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  - b. Format: Annotated PDF electronic file with comment function enabled.
  - c. Identification: As follows:
    - 1) Project name.
    - 2) Date.
    - 3) Designation "PROJECT RECORD DRAWINGS."
    - 4) Name of Architect.
    - 5) Name of Contractor.

## **2.2 RECORD SPECIFICATIONS**

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
- B. Format: Submit record Specifications as annotated PDF electronic file.

## **2.3 RECORD PRODUCT DATA**

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
- B. Format: Submit record Product Data as annotated PDF electronic file.

## **2.4 MISCELLANEOUS RECORD SUBMITTALS**

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file.

## **PART 3 - EXECUTION**

### **3.1 RECORDING AND MAINTENANCE**

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

### **END OF SECTION**

## **SECTION 01 79 00 - DEMONSTRATION AND TRAINING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
  - 1. Demonstration of operation of systems, subsystems, and equipment.
  - 2. Training in operation and maintenance of systems, subsystems, and equipment.
  - 3. Demonstration and training video recordings.

#### **1.2 INFORMATIONAL SUBMITTALS**

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
  - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

#### **1.3 CLOSEOUT SUBMITTALS**

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
  - 1. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format on compact disc.

#### **1.4 QUALITY ASSURANCE**

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training.

## **1.5 COORDINATION**

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

## **PART 2 - PRODUCTS**

### **2.1 INSTRUCTION PROGRAM**

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
  - 1. System, subsystem, and equipment descriptions.
  - 2. Performance and design criteria if Contractor is delegated design responsibility.
  - 3. Operating standards.
  - 4. Regulatory requirements.
  - 5. Equipment function.
  - 6. Operating characteristics.
  - 7. Limiting conditions.
  - 8. Performance curves.
- C. Basis of System Design, Operational Requirements, and Criteria: Include the following:
  - 1. System, subsystem, and equipment descriptions.
  - 2. Performance and design criteria if Contractor is delegated design responsibility.
  - 3. Operating standards.
  - 4. Regulatory requirements.
  - 5. Equipment function.
  - 6. Operating characteristics.
  - 7. Limiting conditions.
  - 8. Performance curves.
- D. Documentation: Review the following items in detail:
  - 1. Emergency manuals.
  - 2. Operations manuals.
  - 3. Maintenance manuals.
  - 4. Project record documents.
  - 5. Identification systems.
  - 6. Warranties and bonds.
  - 7. Maintenance service agreements and similar continuing commitments.
- E. Emergencies: Include the following, as applicable:
  - 1. Instructions on meaning of warnings, trouble indications, and error messages.
  - 2. Instructions on stopping.

3. Shutdown instructions for each type of emergency.
  4. Operating instructions for conditions outside of normal operating limits.
  5. Sequences for electric or electronic systems.
  6. Special operating instructions and procedures.
- F. Operations: Include the following, as applicable:
1. Startup procedures.
  2. Equipment or system break-in procedures.
  3. Routine and normal operating instructions.
  4. Regulation and control procedures.
  5. Control sequences.
  6. Safety procedures.
  7. Instructions on stopping.
  8. Normal shutdown instructions.
  9. Operating procedures for emergencies.
  10. Operating procedures for system, subsystem, or equipment failure.
  11. Seasonal and weekend operating instructions.
  12. Required sequences for electric or electronic systems.
  13. Special operating instructions and procedures.
- G. Adjustments: Include the following:
1. Alignments.
  2. Checking adjustments.
  3. Noise and vibration adjustments.
  4. Economy and efficiency adjustments.
- H. Troubleshooting: Include the following:
1. Diagnostic instructions.
  2. Test and inspection procedures.
- I. Maintenance: Include the following:
1. Inspection procedures.
  2. Types of cleaning agents to be used and methods of cleaning.
  3. List of cleaning agents and methods of cleaning detrimental to product.
  4. Procedures for routine cleaning
  5. Procedures for preventive maintenance.
  6. Procedures for routine maintenance.
  7. Instruction on use of special tools.
- J. Repairs: Include the following:
1. Diagnosis instructions.
  2. Repair instructions.
  3. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  4. Instructions for identifying parts and components.
  5. Review of spare parts needed for operation and maintenance.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

### **3.2 INSTRUCTION**

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Instructor: Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  - 1. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  - 1. Schedule training with Owner with at least fourteen days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

## **END OF SECTION**

## **SECTION 02 41 13 - SELECTIVE SITE DEMOLITION AND REMOVALS**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide all equipment and do all work necessary to demolish and/or remove the structures indicated and prepare the site as indicated on the Drawings.

#### **1.3 RELATED WORK**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 015639, TEMPORARY TREE AND PLANT PROTECTION.
  - 2. Section 311200, SITE CLEARING; Clearing and grubbing, stripping and stockpiling topsoil and tree removal.
  - 3. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Excavation and backfill.

#### **1.4 SUBMITTALS**

- A. The following shall be submitted:
  - 1. Permits and notices authorizing building demolition.
  - 2. Certificates of severance of utility services.
  - 3. Permit for transport and legal disposal off-site of demolition material and debris.
  - 4. Demolition procedures and operational sequence for review and acceptance by Architect.
  - 5. Location plan of staging areas and schedule for moving staging equipment into those areas shall be submitted for Architect's approval prior to mobilization and related site preparation operations.
  - 6. A list of all site operations and programs to be accommodated during construction period.

- B. Predemolition photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by building demolition operations. Submit before the Work begins.

### **1.5 QUALITY ASSURANCE**

- A. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 01, GENERAL REQUIREMENTS. Review methods and procedures related to selective demolition including, but not limited to, the following:
  - 1. Inspect and discuss condition of construction to be selectively demolished.
  - 2. Review structural load limitations of existing structure.
  - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
  - 5. Review areas where existing construction is to remain and requires protection.

### **1.6 PROTECTION**

- A. Do not interfere with use of adjacent buildings. Maintain free and safe passage to and from.
- B. Prevent movement or settlement of adjacent structures. Provide and place bracing or shoring and be responsible for safety and support of structures. Assume liability for such movement, settlement, damage, or injury.
- C. Cease operations and notify Architect immediately if safety of adjacent structures appears to be endangered. Take precautions to properly support structures. Do not resume operations until safety is restored.
- D. Prevent movement, settlement or collapse of adjacent services, sidewalks, driveways and trees. Assume liability for such movement, settlement, or collapse. Promptly repair damage at no cost to the Owner.
- E. Provide, erect, and maintain street boardings, sidewalk shed, barricades, lighting, and guardrails as required to protect general public, workers, and adjoining property.

### **1.7 EXISTING CONDITIONS**

- A. Arrange and pay for disconnecting, removing, capping, and plugging utility services. Disconnect and stub off. Notify the affected utility company in advance and obtain approval before starting this work.

- B. Place markers to indicate location of disconnected services. Identify service lines and capping locations on Project Record Documents.
- C. The Owner agrees to remove all asbestos from structures to be demolished. Before Construction Documents are issued to the Contractor for construction, the Owner will certify to the Architect and Contractor that the site is free of asbestos. If asbestos is found on the site and recognized as such, all work will cease without penalty to the Contractor or Architect so that the Owner can take appropriate steps for its removal.

## **1.8 MAINTAINING TRAFFIC**

- A. Do not close or obstruct roadways without permits.
- B. Conduct operations with minimum interference to public or private roadways.

## **1.9 MATERIALS OWNERSHIP**

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
  - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

## **1.10 WARRANTY**

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

## **PART 2 PRODUCTS**

### **2.1 SALVAGING**

- A. Materials indicated on the Drawings or designated in the field by the Owner to be salvaged shall be carefully removed and delivered to a location on site to be determined by the Owner.
- B. Mechanical and electrical items to be salvaged shall be protected from the weather.
- C. Storage requirements during construction.- storage site/location to be determined and reviewed by Architect and Owner.

### **PART 3 EXECUTION**

#### **3.1 DEMOLITION**

- A. Structures indicated to be removed shall be completely removed including foundations, except when approved by the Architect, to a minimum of 4 ft. below finished grade for graded areas.
- B. Pump out buried tanks located outside building proper. Remove tanks and service piping from site or to the satisfaction of the Architect. Fill tanks with sand or fine gravel and cover with fill.
- C. Remove from site, contaminated, vermin infested, or dangerous materials encountered and disposed of by safe means so as not endanger health of workers and public.
- D. Backfill areas excavated as a result of demolition. Use backfill material specified in Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING.
- E. Rough grade areas affected by demolition and leave areas level, maintaining grades and contours of site.
- F. Site Access and Temporary Controls: Conduct demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
  - 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

#### **3.2 ABANDONED PIPES - DRAINS AND SEWERS**

- A. Contractor shall arrange with appropriate utility company for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
  - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

- B. Drain and sewer pipes indicated to be abandoned shall be completely filled with an 8 in. thick mortar jointed masonry bulkhead. If a pipe indicated to be abandoned and plugged appears to be in active service, it shall not be plugged, and the Architect shall be notified.
- C. Other utility pipes shall be cut and capped outside the excavation and abandoned piping removed from the site.
- D. Frames, grates, covers, traps, and other castings shall be salvaged.

### **3.3 REMOVALS**

- A. Materials indicated on the Drawings or designated by the Architect in the field to be removed shall be dismantled, removed, and legally disposed of off-site or stockpiled as indicated on the Drawings.
- B. Areas formerly occupied by structures shall be regraded to conform with surrounding topography following demolition.

### **3.4 SALVAGEABLE MATERIALS**

- A. Materials indicated on the Drawings or designated by the Architect in the field to be salvaged shall be carefully removed, protected from damage, and put in temporary storage as follows:
  - 1. Salvaged material shall be stockpiled on-site in an area designated by the Owner.

### **3.5 DEMOLITION**

- A. Existing structures indicated on the Drawings to be removed, shall be completely dismantled and removed from the site.
  - 1. Structures not indicated on the Drawings for removal but conflict with proposed site improvements shall be reviewed with Architect prior to start of any removal operations.
- B. Areas formerly occupied by structures shall be regraded to conform with surrounding topography following demolition.
- C. Pump out buried tanks located outside building proper. Remove tanks and service piping from site or to the satisfaction of the Architect. Fill tanks with sand or fine gravel and cover with fill.
- D. Remove from site, contaminated, vermin infested, or dangerous materials encountered and disposed of by safe means.

- E. Backfill areas excavated as a result of demolition. Use backfill material specified in Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING.
- F. Rough grade areas affected by demolition and leave areas level, maintaining grades and contours of site.
- G. Site Access and Temporary Controls: Conduct demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
  - 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

### **3.6 PROTECTION OF EXISTING STRUCTURES AND UTILITIES**

- A. Existing memorials, fences, stone walls, catch basins, structures and utilities shall be suitably protected from damage.

### **3.7 PAVEMENT AND CURB REMOVAL**

- A. Where pavement and/or curb to be removed abuts pavement and curb to remain, a neat, straight saw cut shall be made with a concrete power saw.
  - 1. Pavement and/or curb removal shall include removal of subbase as required to accommodate proposed construction materials.

### **3.8 SITE RESTORATION**

- A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.
- B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

**3.9 PROTECTION OF PROPERTY TO REMAIN**

- A. The Contractor's attention is directed to Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING for protection of utilities to remain, and for the protection of existing trees, fences, etc.

**3.10 DISPOSAL OF MATERIALS**

- A. Material resulting from demolition and not scheduled for salvaging shall become the property of the Contractor and shall be suitably disposed of off-site. Disposal shall be performed as promptly as possible and not left until the final clean up.
- B. Debris, rubbish, and other material shall be disposed of promptly and shall not be left until final cleanup of site.

**END OF SECTION**

## **SECTION 03 30 00 - CAST-IN-PLACE CONCRETE**

### **PART 1 GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### **1.2 SUMMARY**

- A. Section Includes:
  - 1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:
  - 1. Section 033543 "Polished Concrete Finishing" for concrete floors scheduled to receive a polished concrete finish.
  - 2. Section 312000 "Earth Moving" for drainage fill under slabs-on-ground.

#### **1.3 DEFINITIONS**

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

#### **1.4 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixtures.
    - c. Ready-mix concrete manufacturer.
    - d. Concrete Subcontractor.
    - e. Special concrete finish Subcontractor.
  - 2. Review the following:
    - a. Special inspection and testing and inspecting agency procedures for field quality control.
    - b. Construction joints, control joints, isolation joints, and joint-filler strips.
    - c. Semirigid joint fillers.

- d. Vapor-retarder installation.
- e. Anchor rod and anchorage device installation tolerances.
- f. Cold and hot weather concreting procedures.
- g. Concrete finishes and finishing.
- h. Curing procedures.
- i. Forms and form-removal limitations.
- j. Shoring and reshoring procedures.
- k. Methods for achieving specified floor and slab flatness and levelness.
- l. Floor and slab flatness and levelness measurements.
- m. Concrete repair procedures.
- n. Concrete protection.
- o. Initial curing and field curing of field test cylinders (ASTM C31).
- p. Protection of field cured field test cylinders.

## 1.5 ACTION SUBMITTALS

- A. Product Data: For each of the following.
  1. Portland cement.
  2. Fly ash.
  3. Slag cement.
  4. Blended hydraulic cement.
  5. Silica fume.
  6. Performance-based hydraulic cement
  7. Aggregates.
  8. Admixtures:
    - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
  9. Fiber reinforcement.
  10. Vapor retarders.
  11. Floor and slab treatments.
  12. Liquid floor treatments.
  13. Curing materials.
    - a. Include documentation from color pigment manufacturer, indicating that proposed methods of curing are recommended by color pigment manufacturer.
  14. Joint fillers.
  15. Repair materials.
- B. Design Mixtures: For each concrete mixture, include the following:
  1. Mixture identification.
  2. Minimum 28-day compressive strength.
  3. Durability exposure class.
  4. Maximum w/cm.
  5. Calculated equilibrium unit weight, for lightweight concrete.

6. Slump limit.
  7. Air content.
  8. Nominal maximum aggregate size.
  9. Synthetic micro-fiber content.
- C. Shop Drawings:
1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
    - a. Location of construction joints is subject to approval of the Architect.
- D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:
1. Concrete Class designation.
  2. Location within Project.
  3. Exposure Class designation.
  4. Formed Surface Finish designation and final finish.
  5. Final finish for floors.
  6. Curing process.
  7. Floor treatment if any.

## **1.6 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For the following:
1. Installer: Include copies of applicable ACI certificates.
  2. Ready-mixed concrete manufacturer.
  3. Testing agency: Include copies of applicable ACI certificates.
- B. Material Certificates: For each of the following, signed by manufacturers:
1. Cementitious materials.
  2. Admixtures.
  3. Fiber reinforcement.
  4. Curing compounds.
  5. Floor and slab treatments.
  6. Bonding agents.
  7. Adhesives.
  8. Vapor retarders.
  9. Semirigid joint filler.
  10. Joint-filler strips.
  11. Repair materials.
- C. Material Test Reports: For the following, from a qualified testing agency:
1. Portland cement.
  2. Fly ash.
  3. Slag cement.
  4. Blended hydraulic cement.

5. Silica fume.
6. Performance-based hydraulic cement.
7. Aggregates.
8. Admixtures:
  - a. Permeability-Reducing Admixture: Include independent test reports, indicating compliance with specified requirements, including dosage rate used in test.
- D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.
- E. Research Reports:
  1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
  2. For sheet vapor retarder/termite barrier, showing compliance with ICC AC380.
- F. Preconstruction Test Reports: For each mix design.
- G. Field quality-control reports.
- H. Minutes of preinstallation conference.

#### **1.7 QUALITY ASSURANCE**

- A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician
- B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.
- C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.
- D. Field Quality Control Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

#### **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with ASTM C94 and ACI 301.

#### **1.9 FIELD CONDITIONS**

- A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  3. Do not use frozen materials or materials containing ice or snow.
  4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
  5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:
1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
  2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

#### **1.10 WARRANTY**

- A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.
1. Warranty Period: 10 years from date of Substantial Completion.

### **PART 2 PRODUCTS**

#### **2.1 CONCRETE, GENERAL**

- A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

#### **2.2 CONCRETE MATERIALS**

- A. Source Limitations:
1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
  2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
  3. Obtain aggregate from single source.
  4. Obtain each type of admixture from single source from single manufacturer.
- B. Cementitious Materials:
1. Portland Cement: ASTM C150, Type I, Type II, Type I/II, Type III or Type V as necessary to meet project specifications, gray.

2. Fly Ash: ASTM C618, Class C or F.
  3. Slag Cement: ASTM C989, Grade 100 or 120.
- C. Normal-Weight Aggregates: ASTM C33, Class 1N coarse aggregate or better, graded. Provide aggregates from a single source.
1. Alkali-Silica Reaction: Comply with one of the following:
    - a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
    - b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
    - c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.
  2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Air-Entraining Admixture: ASTM C260.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C494, Type A.
  2. Retarding Admixture: ASTM C494, Type B.
  3. Water-Reducing and -Retarding Admixture: ASTM C494, Type D.
  4. High-Range, Water-Reducing Admixture: ASTM C494, Type F.
  5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494, Type G.
  6. Plasticizing and Retarding Admixture: ASTM C1017, Type II.
  7. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494, Type C.
  8. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
  9. Permeability-Reducing Admixture: ASTM C494, Type S, hydrophilic, permeability-reducing crystalline admixture, capable of reducing water absorption of concrete exposed to hydrostatic pressure (PRAH).
    - a. Permeability: No leakage when tested in accordance with U.S. Army Corps of Engineers CRC C48 at a hydraulic pressure of 200 psi for 14 days.
- F. Water and Water Used to Make Ice: ASTM C94, potable.

## 2.3 FIBER REINFORCEMENT

- A. Synthetic Macro-Fiber: Synthetic macro-fibers engineered and designed for use in concrete, complying with ASTM C1116, Type III, 1 1/2 inches long.

## 2.4 VAPOR RETARDERS

- A. Sheet Vapor/Gas Barrier, Class A: ASTM E1745, Class A, B, & C, not less than 20 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.
  - 1. Basis of Design: Raven: Vaporblock Plus 20 Gold; [www.ravenefd.com](http://www.ravenefd.com)
    - a. Substitutions: Substitutions: See Section 01 60 00 - Product Requirements.
  - 2. **Install and test in accordance with manufacturers instructions and RIDEM Approval letter and Work Plan.**

## 2.5 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

## 2.6 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
  - 1. Color:
    - a. Ambient Temperature Below 50 deg F: Black.
    - b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
    - c. Ambient Temperature Above 85 deg F: White.
- D. Curing Paper: Eight-foot- wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.
- E. Water: Potable or complying with ASTM C1602.
- F. Clear, Waterborne, Membrane-Forming, Nondissipating Curing Compound: ASTM C309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering.

## 2.7 RELATED MATERIALS

- A. **Granular fill below slab: Granular fill to be filter stone per RI DOT Bluebook M.01.07, subsection M.01.09 - Column V, Table I.**
  - 1. **Verify with RIDEM vapor mitigation representative.**
  - 2. **Refer to structural drawings and RIDEM Approval Letter and Work Plan for subgrade depth and additional information.**
- B. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.
- C. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 in accordance with ASTM D2240.
- D. Bonding Agent: ASTM C1059, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- E. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:
  - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- F. Floor Slab Protective Covering: Eight-feet- wide cellulose fabric.

## 2.8 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C150 portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
  - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
  - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C150 portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
  - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.

3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109.

## **2.9 CONCRETE MIXTURES, GENERAL**

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.
  1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
  1. Fly Ash or Other Pozzolans: 25 percent by mass.
  2. Slag Cement: 50 percent by mass.
  3. Silica Fume: 10 percent by mass.
  4. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
  5. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
  1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
  2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  3. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
  4. Use permeability-reducing admixture in concrete mixtures where indicated.

## **2.10 CONCRETE MIXTURES**

- A. Footings: Normal-weight concrete.
  1. Minimum Compressive Strength: 3,000 psi at 28 days.
  2. Maximum W/C Ratio: 0.59.
  3. Maximum Coarse Aggregate Size: 1 ½" nominal.
  4. Slump Limit: 8 inches for concrete with verified slump of 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
  5. Air Content: Do not allow air content to exceed 3 percent.
- B. Walls and Curbs: Normal-weight concrete.
  1. Minimum Compressive Strength: 4,500 psi at 28 days.
  2. Maximum W/C Ratio: 0.50.

3. Maximum Coarse Aggregate Size: 1" nominal.
  4. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
  5. Air Content: 6.0 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size
- C. Slabs-on-Grade: Normal-weight concrete.
1. Minimum Compressive Strength: 4,500 psi at 28 days.
  2. Maximum W/C Ratio: 0.46.
  3. Maximum Coarse Aggregate Size: 1" nominal.
    - a. Coordinate aggregate size per section 03 3511 for Concrete Floor Finishes.
  4. Slump Limit: 4 inches, plus or minus 1 inch.
  5. Air Content: 3.0 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
  6. Reinforce with one of the following:
    - a. Welded Wire Reinforcing per Design Documents, or
    - b. Steel-Fiber Reinforcement: Add to concrete mixture, according to manufacturer's written instructions, per approval of Engineer of Record, or
    - c. Synthetic Micro-Fiber: Uniformly disperse 1 1/2" long fibrillated polypropylene and/or polyethylene fibers at 1.50 pounds per cubic yard.

## **2.11 CONCRETE MIXING**

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94[ and ASTM C1116], and furnish batch ticket information.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete in accordance with ASTM C94. Mix concrete materials in appropriate drum-type batch machine mixer.
  1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
  2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
  3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verification of Conditions:
  1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.

2. Do not proceed until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:
  1. Daily access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
  4. Security and protection for test samples and for testing and inspection equipment at Project site.

### 3.3 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.
  1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
  3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

### 3.4 INSTALLATION OF VAPOR RETARDER

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
  1. **Refer to RIDEM Approval letter and Work Plan for additional installation criteria.**
  2. Install vapor retarder with longest dimension parallel with direction of concrete pour.
  3. Face laps away from exposed direction of concrete pour.
  4. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
  5. Lap joints 6 inches and seal with manufacturer's recommended tape.
  6. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
  7. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
  8. Protect vapor retarder during placement of reinforcement and concrete.
    - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

- B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder in accordance with manufacturer's written instructions.

### 3.5 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
  - 1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
  - 2. Place joints perpendicular to main reinforcement.
    - a. Continue reinforcement across construction joints unless otherwise indicated.
    - b. Do not continue reinforcement through sides of strip placements of floors and slabs.
  - 3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
  - 4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  - 5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  - 6. Space vertical joints in walls as indicated on Drawings. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
  - 7. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  - 8. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:
  - 1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  - 2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
  - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
  - 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.

3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints:
1. Install dowel bars and support assemblies at joints where indicated on Drawings.
  2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.
- F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

### **3.6 CONCRETE PLACEMENT**

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
  2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
1. If a section cannot be placed continuously, provide construction joints as indicated.
  2. Deposit concrete to avoid segregation.
  3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
  4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
    - a. Do not use vibrators to transport concrete inside forms.
    - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.

- d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Do not place concrete floors and slabs in a checkerboard sequence.
  2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  3. Maintain reinforcement in position on chairs during concrete placement.
  4. Screed slab surfaces with a straightedge and strike off to correct elevations.
  5. Level concrete, cut high areas, and fill low areas.
  6. Slope surfaces uniformly to drains where required.
  7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
  8. Do not further disturb slab surfaces before starting finishing operations.

### **3.7 FINISHING FORMED SURFACES**

- A. As-Cast Surface Finishes:
1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
    - a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
    - b. Remove projections larger than 1 inch.
    - c. Tie holes do not require patching.
    - d. Surface Tolerance: ACI 117 Class D.
    - e. Apply to concrete surfaces not exposed to public view.
- B. Related Unformed Surfaces:
1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
  2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### **3.8 FINISHING FLOORS AND SLABS**

- A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish:
1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
  2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch in one direction.
  3. Apply scratch finish to surfaces to receive concrete floor toppings.

- C. Float Finish:
1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
  2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
  3. Apply float finish to surfaces to receive trowel finish.
- D. Trowel Finish:
1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
  2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
  3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  4. Do not add water to concrete surface.
  5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
  6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
  7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:
    - a. Slabs on Ground:
      - 1) Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.
      - 2) Specified overall values of flatness, FF 20; and of levelness, FL 17; with minimum local values of flatness, FF 17; and of levelness, FL 15.
- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
  2. Coordinate required final finish with Architect before application.

### **3.9 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS**

- A. Filling In:
1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
  2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
  3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations:
  - 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
  - 2. Construct concrete bases 8 inches high unless otherwise indicated on Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
  - 3. Minimum Compressive Strength: 4500 psi at 28 days.
  - 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 12-inch centers around the full perimeter of concrete base.
  - 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
  - 6. Prior to pouring concrete, place and secure anchorage devices.
    - a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    - b. Cast anchor-bolt insert into bases.
    - c. Install anchor bolts to elevations required for proper attachment to supported equipment.

### **3.10 CONCRETE CURING**

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
  - 1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
  - 2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
  - 3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h before and during finishing operations.
- B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:
  - 1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
  - 2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
  - 3. If forms remain during curing period, moist cure after loosening forms.
  - 4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
    - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
    - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
    - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.

- d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
  - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
    - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
    - 2) Maintain continuity of coating and repair damage during curing period.
- C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:
- 1. Begin curing immediately after finishing concrete.
  - 2. Interior Concrete Floors:
    - a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
      - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
        - a) Lap edges and ends of absorptive cover not less than 12-inches.
        - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
      - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
        - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
        - b) Cure for not less than seven days.
      - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
        - a) Water.
        - b) Continuous water-fog spray.
    - b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:
      - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
        - a) Lap edges and ends of absorptive cover not less than 12 inches.
        - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
      - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
        - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
        - b) Cure for not less than seven days.

- 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
  - a) Water.
  - b) Continuous water-fog spray.
- c. Floors to Receive Polished Finish: Contractor has option of the following:
  - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
    - a) Lap edges and ends of absorptive cover not less than 12 inches.
    - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
  - 2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
    - a) Water.
    - b) Continuous water-fog spray.
- d. Floors to Receive Curing Compound:
  - 1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
  - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
  - 3) Maintain continuity of coating, and repair damage during curing period.
  - 4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.
- e. Floors to Receive Curing and Sealing Compound:
  - 1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
  - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
  - 3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

### **3.11 TOLERANCES**

- A. Conform to ACI 117.

### **3.12 APPLICATION OF LIQUID FLOOR TREATMENTS**

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment in accordance with manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
  2. Do not apply to concrete that is less than 14 days' old.
  3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.
  4. Rinse with water; remove excess material until surface is dry.
  5. Apply a second coat in a similar manner if surface is rough or porous.
- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller in accordance with manufacturer's written instructions.

### **3.13 JOINT FILLING**

- A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.
1. Defer joint filling until concrete has aged at least one month.
  2. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.
- D. Overfill joint, and trim joint filler flush with top of joint after hardening.

### **3.14 CONCRETE SURFACE REPAIRS**

- A. Defective Concrete:
1. Repair and patch defective areas when approved by Architect.
  2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.
    - a. Limit cut depth to 3/4 inch.
    - b. Make edges of cuts perpendicular to concrete surface.
    - c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
    - d. Fill and compact with patching mortar before bonding agent has dried.
    - e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
  - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
  - b. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.
  - a. Correct low and high areas.
  - b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.
  - a. Finish repaired areas to blend into adjacent concrete.
5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.
  - a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  - b. Feather edges to match adjacent floor elevations.
6. Correct other low areas scheduled to remain exposed with repair topping.
  - a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
  - b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.
  - a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
  - b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
  - c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
  - d. Place, compact, and finish to blend with adjacent finished concrete.
  - e. Cure in same manner as adjacent concrete.
8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.
  - a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.

- b. Dampen cleaned concrete surfaces and apply bonding agent.
  - c. Place patching mortar before bonding agent has dried.
  - d. Compact patching mortar and finish to match adjacent concrete.
  - e. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

### **3.15 FIELD QUALITY CONTROL**

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
- B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- 1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
  - 2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
  - 3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
    - a. Test reports shall include reporting requirements of ASTM C31, ASTM C39, and ACI 301, including the following as applicable to each test and inspection:
      - 1) Project name.
      - 2) Name of testing agency.
      - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
      - 4) Name of concrete manufacturer.
      - 5) Date and time of inspection, sampling, and field testing.
      - 6) Date and time of concrete placement.
      - 7) Location in Work of concrete represented by samples.
      - 8) Date and time sample was obtained.
      - 9) Truck and batch ticket numbers.
      - 10) Design compressive strength at 28 days.
      - 11) Concrete mixture designation, proportions, and materials.
      - 12) Field test results.
      - 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
      - 14) Type of fracture and compressive break strengths at seven days and 28 days.
- C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design

air content, design slump at time of batching, and amount of water that can be added at Project site.

D. Inspections:

1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. Batch Plant Inspections: On a random basis, as determined by Architect.

E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172 shall be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
  - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C143:
  - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  - b. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C231 pressure method, for normal-weight concrete.
  - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064:
  - a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
5. Unit Weight: ASTM C567 fresh unit weight of structural lightweight concrete.
  - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
6. Compression Test Specimens: ASTM C31:
  - a. Cast and laboratory cure two sets of two 6-inch by 12-inch or 4-inch by 8-inch cylinder specimens for each composite sample.
  - b. Cast, initial cure, and field cure two sets of two standard cylinder specimens for each composite sample.
7. Compressive-Strength Tests: ASTM C39.
  - a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.
  - b. Test one set of two field-cured specimens at seven days and one set of two specimens at 28 days.
  - c. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
  9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
  10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
  11. Additional Tests:
    - a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
    - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 or by other methods as directed by Architect.
      - 1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 section 1.6.6.3.
  12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
  13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 48 hours of completion of floor finishing and promptly report test results to Architect.

### **3.16 PROTECTION**

- A. Protect concrete surfaces as follows:
1. Protect from petroleum stains.
  2. Diaper hydraulic equipment used over concrete surfaces.
  3. Prohibit vehicles from interior concrete slabs.
  4. Prohibit use of pipe-cutting machinery over concrete surfaces.
  5. Prohibit placement of steel items on concrete surfaces.
  6. Prohibit use of acids or acidic detergents over concrete surfaces.
  7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
  8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

**END OF SECTION**



## **SECTION 03 30 01 - CAST-IN-PLACE CONCRETE - SITEWORK**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide all equipment and materials, and do all work necessary to construct the cast-in-place concrete for slabs, pads, bases, footings and foundations, including formwork, reinforcing, and concrete, complete, as indicated on the Drawings and as specified.

#### **1.3 RELATED SECTIONS**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to the following:
  - 1. Section 079201, EXTERIOR JOINT SEALANTS - SITEWORK
  - 2. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Excavation and backfill.
  - 3. Section 321314, EXPOSED AGGREGATE CONCRETE PAVING.

#### **1.4 REFERENCES**

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.

- 1. American Concrete Institute (ACI):
  - 301 Structural Concrete for Buildings
  - 303R Guide to Cast-In-Place Architectural Concrete Practice
  - 306.1 Cold Weather Concreting
  - 308 Standard Practice for Curing Concrete
  - 325.9R Guide for Construction of Concrete Pavements and Concrete Bases

2. American Plywood Association (APA):

Ref. 1                                      APA Design/Construction Guide, Residential and Commercial

3. American Society for Testing and Materials (ASTM):

A 36                                          Structural Steel

A 123                                        Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip

A 185                                        Welded Steel Wire Fabric for Concrete Reinforcement

A 307                                        Carbon Steel Externally Threaded Standard Fasteners

A 386                                        Zinc Coating (Hot-Dip) on Assembled Steel Products

A510                                        General Requirements for Wire Rods and Course Round Wire, Carbon Steel

A 569                                        Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip, Commercial Quality

A 615                                        Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

C 33                                         Concrete Aggregates

C 143                                        Slump of Portland Cement Concrete

C 150                                        Portland Cement

C 171                                        Sheet Materials for Curing Concrete

C 309                                        Liquid Membrane-Forming Compounds for Curing Concrete

C 494                                        Chemical Admixtures for Concrete

D 1752

Preformed Sponge Rubber and Cork Expansion  
Joint Fillers for Concrete Paving and Structural  
Construction.

4. State of Rhode Island Department of Transportation (RIDOT):

Specifications

Standard Specifications for Road and Bridge  
Construction

**1.5 SUBMITTALS**

A. Shop drawings of reinforcing steel shall be submitted. Drawings shall indicate bar sizes, locations, spacings, quantity required, bending and cutting schedules, and supporting and spacing devices.

1. Shop drawing schedule shall allow adequate time for reviews. Reinforcing steel shall not be fabricated or placed before the shop drawings have been reviewed by the Architect and is returned.

B. Formwork Shop Drawings: Show formwork construction including form-facing joints, rustications, construction and contraction joints, form joint-sealant details, form tie locations and patterns, inserts and embedments, cutouts, cleanout panels, and other items that visually affect exposed to view cast-in-place concrete.

C. Samples of the following shall be submitted:

<u>Item</u>	<u>Sample Size</u>
Preformed joint filler	Two pieces, full depth and width, 4 in. length

D. Prior to start of concrete work, Contractor shall submit to the Architect for review a schedule for execution of the work of this section and a location plan indicating sequence of concrete placement and location of proposed expansion joints, control joints and construction joints, if required.

**1.6 DESIGN OF CONCRETE MIX**

A. Mix design shall be certified by independent testing laboratory. Statement of materials constituting design of mixes (as required by referenced standards) shall be submitted for Architect's approval within one week following award of Contract.

B. Concrete mix design shall include the following information:

1. Proportions of cement, fine and coarse aggregates, and water.
2. Water-cement ratio, design strength, slump, and air content.
3. Type of cement and aggregates.

4. Type and dosage of all admixtures.
  5. Special requirements for pumping.
  6. Range of ambient temperature and humidity for which the design is valid.
  7. Any special characteristics of the mix which require precautions in the mixing, placing, finishing, or curing methods to achieve the finished product specified.
- C. No concrete shall be delivered to the job site until the Architect has approved the design mixes.

#### **1.7 QUALITY ASSURANCE**

- A. Unless otherwise specified, cast-in-place concrete work shall conform to ACI 301. Construction of concrete subbases shall conform to ACI 325.9R
- B. Dimensions, locations, and details of equipment pads, anchors, supports, and similar features indicated on the Drawings are approximate. Manufacturer's approved shop drawings of equipment to be supported, anchored, or contained thereby shall be consulted for exact location, size, and details.
- C. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- D. Preinstallation Conference: Conduct conference at Project site.

#### **1.8 TESTING**

- A. Inspection and testing of the concrete mix will be performed by an independent testing laboratory approved by the Architect. Testing equipment shall be supplied by the laboratory, and the preparation of samples and all testing shall be performed by the laboratory personnel.
- B. Concrete materials and operations will be tested and inspected as work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered, nor shall it obligate the Architect to final acceptance.
- C. The following testing services may be provided by the Owner, at no cost to the Contractor:
1. Review and test of the Contractor's proposed materials for compliance with the specifications.
  2. Review of the Contractor's proposed mix design.
  3. Sampling and testing of materials at plants or stockpiles during the course of the work for compliance with the specifications.
  4. Strength tests of concrete specimens.
  5. Inspection of concrete batching, mixing, and delivery.

- D. The following testing services shall be provided, at the Contractor's expenses:
  - 1. Additional testing and inspection required because of changes in materials or proportions, requested by the Contractor.
  - 2. Additional testing of materials or concrete occasioned by their failure by testing or inspection to meet specification requirements.
  
- E. At least four standard compression test cylinders shall be made and tested from each day's placement of concrete. Four concrete test cylinders will be taken for every 50 cubic yards of each type and design strength of concrete placed. Two cylinders shall be tested at seven days, and two at 28 days. One additional test cylinder will be taken during cold weather concreting, and will be cured at the job site under the same conditions as the concrete it represents. If job experience indicates additional cylinder tests or other tests are required for proper control or determination of concrete quality, such tests shall be made.
  
- F. One slump test will be taken for each set of test cylinders taken.
  
- G. Submit to the testing laboratory, proposed concrete mix design for review, before beginning work. Forward testing laboratory's mix review to Architect for approval prior to beginning work.
  
- H. Provide free access to work and full assistance and cooperation, concrete for samples, and such auxiliary personnel and equipment as needed for testing agency to take samples for required tests. Notify testing agency and Architect of intent to place concrete at least 24 hours before placement.

## **PART 2 PRODUCTS**

### **2.1 AGGREGATE BASE**

- A. Material for aggregate base course shall be a graded, granular, non-frost susceptible, free-draining material, consisting of either durable stone and coarse sand or of blast furnace slag, practically free from loam and clay, and which can be readily compacted to form a stable foundation.
  - 1. Material shall conform to RIDOT Specifications Section M.01.09 Type I, with less than 10% by weight passing No. 200 sieve.

### **2.2 FORMS**

- A. Cylindrical Forms: Sonotube Fibre Forms, wax-impregnated strippable forms manufactured by Sonoco Products Company, General Products Division or approved equal, or ABS or PVC plastic reusable forms.

- B. Footing Form Materials: Bigfoot Footing Forms, manufactured by Bigfoot Systems; Bigfoot Systems Inc. 6750 Hwy. #3 Martin's Point Nova Scotia, Canada B0J 2E0 ; Tel. 1-800-934-0393, or approved equal.
- C. Forms for Unexposed Finish: Plywood, lumber or metal, with lumber dressed on at least two edges and one side.
- D. Form Ties: Provide prefabricated, adjustable length galvanized steel snap-off ties, with brackets, cones, cornerlocks and other accessories as necessary.
- E. Form Coatings: Commercial formulation compounds that will not bond with, stain or adversely affect concrete.
- F. Forms shall be true to line and free from warp, and shall be of sufficient strength, when staked, to resist the pressure of the concrete without springing. Formwork shall be designed so that sections may be fastened together to prevent vertical or horizontal movement of ends.

### **2.3 CONCRETE MIX**

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 and the following:
  - 1. Cement shall be Portland cement, conforming to ASTM C 150, Type I or II.
  - 2. Aggregates shall conform to ASTM C 33.
    - a. Normal-Weight Aggregates: ASTM C 33, graded, 3/4-inch (19-mm)] nominal maximum coarse-aggregate size.
    - b. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
  - 4. Minimum Compressive Strength: 4000 psi at 28 days.
  - 5. Maximum Water-Cementitious Materials Ratio: 0.45.
  - 6. Concrete slump shall be no less than 2 in. nor greater than 4 in., determined in accordance with ASTM C 143.
  - 7. Concrete shall be air-entrained type, conforming to ASTM C 94. Air-Entraining Admixture: ASTM C 260.
    - a. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.

## **2.4 CONCRETE REINFORCING**

- A. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420)] deformed bars, ASTM A 775/A 775M, epoxy coated, with less than 2 percent damaged coating in each 12-inch (300-mm) bar length.
- B. Welded wire fabric reinforcement shall conform to the applicable requirements of ASTM A 185. Fabric reinforcement shall be furnished in flat sheets. Fabric reinforcement in rolls will not be permitted.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

## **2.5 VAPOR RETARDERS**

- A. Plastic Vapor Retarder: ASTM E 1745, Class B. Include manufacturer's recommended adhesive or pressure-sensitive tape.

## **2.6 CURING MATERIALS**

- A. Curing shall be by moist curing or by use of curing compound.
- B. Curing paper shall be a nonstaining, fiber reinforced laminated kraft bituminous product conforming to ASTM C 171. Four mil polyethylene sheeting may be substituted for curing paper.
- C. Curing compound shall be a clear compound conforming to ASTM C 309, Type 1 or white pigmented compound conforming to ASTM C 309 Type 2, Class B.

## **2.7 EXPANSION JOINTS**

- A. Below grade base slab joints shall be located as indicated on the Drawings.
- B. Expansion joint filler shall be Deck-O-Foam, polyethylene expansion joint filler, manufactured by W.R.Meadows, Inc., P.O. Box 338, Hampshire, IL 60140; Tel. 847-214-2100; [www.wrmeadows.com](http://www.wrmeadows.com), or approved equal] preformed, nonbituminous type joint filler conforming to ASTM D 1752, Type II, similar to Sealtight Cork Expansion Joint Filler, manufactured by W.R.Meadows, Inc., P.O. Box 338, Hampshire, IL 60140; Tel. 847-214-2100; [www.wrmeadows.com](http://www.wrmeadows.com), or approved equal.
  - 1. Except as otherwise noted on the Drawings, joint filler shall be 3/8 in. thick.
- C. Expansion joints of slab-on-grade shall be doweled. Dowel shall be centered over the joint prior to concrete placement. The end of the dowel at the side of joint which will be poured second shall be greased immediately before concrete placement.

1. Round Expansion Joint Dowels: ASTM A615, Grade 60, epoxy-coated, smooth, billet-steel bars, clean and free of rust and scale.
  2. Sleeves for Square Dowels: Sika Greenstreak square dowel sleeves and bases sized to fit epoxy-coated square dowels.
  3. Dowel Caps for Round Dowels: Plastic caps approximately 4" long, designed and manufactured to fit over ends of expansion joint dowels to allow longitudinal movement of dowels after concrete has hardened.
  4. Dowel Aligners for Round Dowels: PNA Dowel Aligners, or approved equal.
- D. Where indicated, wall expansion joints shall be 3/8 in. wide, and recessed ½ in. from face of wall. Expansion joint filler shall be preformed, nonbituminous type joint filler conforming to ASTM D 1752, Type II, similar to Sealtight Cork Expansion Joint Filler, manufactured by W.R. Meadows, Inc., or approved equal.
1. Premolded filler shall be one piece for the full depth and width of the joint.
  2. Use of multiple pieces of lesser dimensions to make up required depth and width of joint will not be permitted.
  3. Except as otherwise noted on the Drawings, joint filler shall be 3/8 in. thick.

## **2.8 BOLTS**

- A. Anchor bolts shall conform to ASTM A 307.
- B. Expansion bolts for anchoring into existing concrete shall conform to ASTM A 307, and shall have a self-drilling shell similar to Phillips Red Head Self-Drilling Shells, manufactured by Phillips Red Head Anchor Division of ITT, Michigan City, IN., or approved equal.

## **PART 3 EXECUTION**

### **3.1 PREPARATION OF SUBGRADE**

- A. Areas to be paved will be compacted and brought to subgrade elevation under Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING before work of this section is performed. Final fine grading, filling, and compaction of areas to receive paving, as required to form a firm, uniform, accurate, and unyielding subgrade at required elevations and to required lines, shall be done under this Section.
- B. Existing subgrade material which will not readily compact as required shall be removed and replaced with satisfactory materials. Additional materials needed to bring subgrade to required line and grade and to replace unsuitable material removed shall be material conforming to this Section.

- C. Subgrade of areas to be paved shall be recompacted as required to bring top 8 in. of material immediately below gravel base course to a compaction at optimum moisture of at least 95% of maximum density, as determined by ASTM D 1557. Subgrade compaction shall extend for a distance of at least 1 ft. beyond pavement edge.
  - 1. Field testing shall be conducted to determine in-place density, accompanied by visual inspection of the compaction methods being used.
- D. Excavation required in pavement subgrade shall be completed before fine grading and final compaction of subgrade are performed. Where excavation must be performed in completed subgrade, subbase, base, or pavement, subsequent backfill and compaction shall be performed as directed by the Architect as specified in Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING. Completed subgrade after filling such areas shall be uniformly and properly graded.
- E. Areas being graded or compacted shall be kept shaped and drained during construction. Ruts greater than or equal to 2 in. deep in subgrade, shall be graded out, reshaped as required, and recompacted before placing pavement.
- F. Materials shall not be stored or stockpiled on subgrade.
- G. Disposal of debris and other material excavated under this section, and material unsuitable for or in excess of requirements for completing work of this section shall be disposed of off-site.
- H. Prepared subgrade will be inspected by the Architect. Subgrade shall be approved by the Architect before installation of gravel base course. Disturbance to subgrade caused by inspection procedures shall be repaired under this section of the specification.

### **3.2 AGGREGATE BASE COURSE**

- A. Aggregate base course for paving and the spreading, grading, and compaction methods employed shall conform to standard requirements for usual base course of this type for first class road work.
  - 1. RIDOT Specifications Section 301, "Aggregate and Gravel Base Courses".
- B. Compaction of aggregate base shall be to 95% of maximum density as determined by ASTM D 1557. Stone greater than 2 in. shall be excluded from course.
- C. Width of base course shall be greater than or equal to the width of stone dust surface, if continuous lateral support is provided during rolling, and shall extend at least 2 x base thickness beyond edge of the course above, if not so supported.
- D. Material shall be applied in lifts less than or equal to 3 in. thick, compacted measure. Each lift shall be separately compacted to specified density.

1. Rolling shall begin at sides and progress to center of crowned areas, and shall begin on low side and progress toward high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.
  2. Surface irregularities which exceed 1/2 in. as measured by means of a 10 ft. long straightedge, shall be replaced and properly compacted.
- E. Subgrade and base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with base course. Materials spilled outside stone dust surfacing lines shall be removed and area repaired.
- F. Portions of subgrade or of construction above which become contaminated, softened, or dislodged by passing of traffic, or otherwise injured, shall be cleaned, replaced, recompacted, or otherwise repaired to conform to the requirements of this specification before proceeding with next operation.

### **3.3 EMBEDDED ITEMS**

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

### **3.4 VAPOR RETARDERS**

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

### **3.5 FORMWORK**

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Forms shall be sufficiently tight to prevent leakage.
- D. Clean forms and adjacent surfaces to receive concrete. Remove debris just before placing concrete.
- E. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### **3.6 EARTH FORMED CONCRETE**

- A. Earth formed concrete footings shall be excavated under work of Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING to the depth and shape indicated on the Drawings. Earth formed footings shall be continuous.

### **3.7 REINFORCING**

- A. Before being placed in position, reinforcing shall be thoroughly cleaned of loose mill and rust scale, dirt, ice, and other foreign material which may reduce the bond between the concrete and reinforcing. Where there is delay in placing concrete after reinforcement is in place, bars shall be reinspected and cleaned when necessary.
- B. Any bar showing cracks after bending shall be discarded.
- C. Unless otherwise indicated on the Drawings, reinforcing shall extend within 2 in. of formwork and expansion joints. Reinforcing shall continue through control joints. Adjacent sheets of fabric reinforcing shall lap 6 in.
- D. After forms have been coated with form release agent, but before concrete is placed, reinforcing steel and anchors shall be securely wired in the exact position called for, and shall be maintained in that position until concrete is placed and compacted. Chair bars and supports shall be provided in a number and arrangement satisfactory to the Architect.

### **3.8 PLACING CONCRETE**

- A. Before placing concrete, forms and space to be occupied by concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint, and other material which might tend to reduce bond.
- B. Existing concrete, earth, and other water-permeable material against which new concrete is to be placed shall be thoroughly damp when concrete is placed. There shall be no free water on surface.
- C. Concrete which has set or partially set before placing shall not be employed. Retempering of concrete will not be permitted.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  - 2. If concrete can not be mechanically consolidated, concrete shall be thoroughly spaded and tamped to secure a solid and homogeneous mass, thoroughly worked around reinforcement and into corners of forms.

- E. Cold-Weather Placement: Comply with ACI 306.1.
- F. Hot-Weather Placement: Comply with ACI 301.
- G. When joining fresh concrete to concrete which has attained full set, latter shall be cleaned of foreign matter, and mortar scum and laitance shall be removed by chipping and washing. Clean, roughened base surface shall be saturated with water, but shall have no free water on surface. A coat of 1:1 cement-sand grout, approximately 1/8 in. thick, shall be well scrubbed into thoroughly dampened concrete base. New concrete shall be placed immediately, before grout has dried or set.

### **3.9 FINISHING**

- A. Vertical surfaces shall be formed to produce a "smooth form finish", as defined in ACI 301 and as follows:
  - 1. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Remove fins and other projections exceeding specified limits on formed-surface irregularities. Repair and patch tie holes and defects.

### **3.10 FINISHING BELOW GRADE SLABS**

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
  - 1. Concrete slabs and pads shall be screeded off and finished true to line and grade, and free of hollows and bumps. Surface shall be dense, smooth, and at exact level and slope required.
  - 2. Finished concrete surface for subbases shall be wood-floated to a slightly rough surface. Surface shall not deviate more than 1/4 in. in 10 ft.
- B. Control joints shall be sawn into slab surface using a diamond blade soff-type early entry cut saw
- C. Where finishing is performed before end of curing period, concrete shall not be permitted to dry out, and shall be kept continuously moist from time of placing until end of curing period, or until curing membrane is applied.

### **3.11 PROTECTION AND CURING**

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

- B. It is essential that concrete be kept continuously damp from time of placement until end of specified curing period. It is equally essential that water not be added to surface during floating and troweling operations, and not earlier than 24 hours after concrete placement. Between finishing operations surface shall be protected from rapid drying by a covering of waterproofing paper. Surface shall be damp when the covering is placed over it, and shall be kept damp by means of a fog spray of water, applied as often as necessary to prevent drying, but not sooner than 24 hours after placing concrete. None of the water so applied shall be troweled or floated into surface.
- C. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
- E. Concrete surfaces shall be cured by completely covering with curing paper or application of a curing compound.
  - 1. Concrete cured using waterproof paper shall be completely covered with paper with seams lapped and sealed with tape. Concrete surface shall not be allowed to become moistened between 24 and 36 hours after placing concrete. During curing period surface shall be checked frequently, and sprayed with water as often as necessary to prevent drying, but not earlier than 24 hours after placing concrete.
  - 2. If concrete is cured with a curing compound, compound shall be applied at a rate of 200 sq. ft. per gallon, in two applications perpendicular to each other.
  - 3. Curing period shall be seven days minimum.

### **3.12 EXPANSION JOINTS**

- A. Expansion joint shall be 3/8 in. wide, clean, dry, and free of loose material, dirt, oil and grease, and shall be formed in the concrete to required width. Joint filler shall extend the full length of the expansion joint.
  - 1. Depth of filler shall extend to the full thickness of the concrete in vertical surfaces and in concealed horizontal surfaces.
  - 2. Depth of filler in exposed horizontal surfaces shall be as required to form a sealant recess below finished surface to depth recommended by sealant manufacturer.

### **3.13 EXPANSION JOINT DOWELS:**

- A. Center vertically in slab, unless indicated otherwise.
- B. Center longitudinal position of each dowel horizontally on joint, except where indicated otherwise.

- C. Install at same spacing as slab bar unless indicated on Drawings.
- D. Install a cap or sleeve on one end of each dowel as indicated on Drawings.
- E. Prior to installing the cap or sleeve on the dowels, completely coat surfaces of each dowel on the cap-side or sleeve-side of the expansion joint with debonding compound.
- F. Cut holes in expansion joint fill material accurately to fit tightly around dowels so that concrete will not leak into gaps between the dowels and the expansion joint material.
- G. Install dowels 90 degrees horizontally and vertically to expansion joint using dowel aligners to help maintain alignment.
- H. Install the dowel aligners in accordance with the manufacturer's current printed instructions.

### **3.14 CONTROL JOINTS**

- A. Joints shall be sawn as soon as the concrete will withstand the energy of sawing without raveling or dislodging aggregate particles. For most concrete mixtures, this means sawing should be completed within the first 6 to 18 hours and never delay more than 24 hours. Early-entry saws may be used to allow cutting to begin within a few hours after placement.
- B. Control joints shall be sawn 1/8 in. wide by using a diamond blade concrete power saw. Saw shall cut into slab at least 25% of slab depth. Saw cut joints shall be straight and accurate to line.
  - 1. Sawcut joints shall be sawn flush to vertical surfaces.,
  - 2. Dowelled Control Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

### **3.15 COLD WEATHER CONCRETING**

- A. Materials for concrete shall be heated when concrete is mixed, placed, or cured when the mean daily temperature is below 40oF. or is expected to fall to below 40oF. within 72 hours, and the concrete after placing shall be protected by covering, heat, or both.
- B. Details of handling and protecting of concrete during freezing weather shall be subject to the approval and direction of the Architect. Procedures shall be in accordance with provisions of ACI 306R.

### **3.16 HOT WEATHER CONCRETING**

- A. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing shall be sprinkled with cold water. Every effort shall be

made to minimize delays which will result in excessive mixing of the concrete after arrival on the job.

- B. During periods of excessively hot weather (95oF., or above), ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305. Any concrete with a temperature above 95oF., when ready for placement will not be acceptable, and will be rejected.
- C. Temperature records shall be maintained throughout the period of hot weather giving air temperature, general weather conditions (calm, windy, clear, cloudy, etc.) and relative humidity. Records shall include checks on temperature of concrete as delivered and after placing in forms. Data should be correlated with the progress of the work so that conditions surrounding the construction of any part of the structure can be ascertained.

### **3.17 SEALING OF JOINTS**

- A. Where indicated on the Drawings, expansion joints shall be sealed with joint sealant in accordance with Section 079201, EXTERIOR JOINT SEALANTS - SITEWORK.

### **3.18 FIELD QUALITY CONTROL**

- A. Testing Agency: Contractor shall engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
  - 1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.
    - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
  - 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
  - 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
  - 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
  - 6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.
    - a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

- C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
- D. In-Place Density:
  - 1. In-place density of compacted pavement will be determined by testing core samples according to ASTM C 42.
    - a. One core sample will be taken for every 1000 sq. yd. (836 sq. m) or less of installed pavement, with no fewer than 3 cores taken.
- E. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- F. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- G. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- H. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.
- I. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### **3.19 PATCHING FORMED SURFACES OF EXPOSED CONCRETE**

- A. After forms have been removed, inspect concrete surfaces and only at the direction of the Architect, patch pour joints, voids, stone pockets, other defective areas and before concrete is thoroughly dry. Chip away defective areas to depth of not less than 1 in. with edges perpendicular to surface. Wet areas to be patched and space at least 6 in. wide entirely surrounding it, to prevent absorption of water from patching mortar. Do not patch concrete in freezing weather.
- B. Apply chemical bonding agent to surface in accordance with manufacturer's printed instructions, followed immediately by patching mortar. Make patch of same proportions used for concrete except omit coarse aggregate. Add only enough water consistent with requirements for handling and placing.

- C. Thoroughly compact mortar into place and screed off; leave patch slightly higher than surrounding surface. Leave undisturbed for one to two hours to permit initial shrinkage before final finishing. Finish patch to match texture and color of adjoining surface.

**3.20 CONCRETE SURFACE REPAIRS**

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

**END OF SECTION**

## **SECTION 03 35 11 - CONCRETE FLOOR FINISHES**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Liquid densifiers and hardeners.
- B. Polished concrete.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

#### **1.3 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.
- C. Maintenance Data: Provide data on maintenance and renewal of applied finishes.
- D. Warranty Documentation: Manufacturer warranty; ensure that forms have been completed in Owner's name and registered with manufacturer.

#### **1.4 MOCK-UP**

- A. For coatings, construct mock-up area under conditions similar to those that will exist during application, with coatings applied.
- B. Mock-Up Size: 5 feet square.
- C. Locate back of house corridor adjacent to toilet rooms.
- D. Mock-up may remain as part of the work.

#### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials in manufacturer's sealed packaging, including application instructions.

## 1.6 FIELD CONDITIONS

- A. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.
- B. Do not finish floors until interior heating system is operational.
- C. Maintain ambient temperature of 50 degrees F minimum.

## 1.7 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Correct defective work within a two-year period commencing on the Date of Substantial Completion.
- C. Finish Warranty: Provide five-year manufacturer warranty against excessive degradation of finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

## PART 2 PRODUCTS

### 2.1 CONCRETE FLOOR FINISH APPLICATIONS

- A. Unless otherwise indicated, all concrete floors are to be finished using polished concrete finish.
- B. Liquid Densifier and Hardener:
  - 1. Use at following locations: where indicated on finish plans.
- C. Polished Finish:
  - 1. Use at following locations: where indicated on finish plans.
    - a. Aggregate: River rock, size as recommended by polished concrete finisher.
    - b. Aggregate exposure: B, fine aggregate (salt and pepper)
    - c. Finish: Level 2, satin or matte appearance.
    - d. Abrasive passes: 5 minimum, 100-400 grit.

### 2.2 DENSIFIERS AND HARDENERS

- A. Liquid Densifier and Hardener: Penetrating chemical compound that reacts with concrete, filling the pores and dustproofing; for application to concrete after set.
  - 1. Composition: Lithium silicate.
  - 2. Products:
    - a. Euclid Chemical Company; ULTRASIL LI+: [www.euclidchemical.com/#sle](http://www.euclidchemical.com/#sle).
    - b. Kaufman Products Inc; SureHard LS: [www.kaufmanproducts.net/#sle](http://www.kaufmanproducts.net/#sle).

- c. W. R. Meadows, Inc; Liqui-Hard Ultra: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
- d. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.3 POLISHED CONCRETE SYSTEM**

- A. Polished Concrete System: Materials, equipment, and procedures designed and furnished by a single manufacturer to produce dense polished concrete of the specified sheen.
  - 1. Acceptable Systems:
    - a. Euclid Chemical Company; DOUBLE DIAMOND POLISHED CONCRETE FLOOR SYSTEMS: [www.euclidchemical.com/#sle](http://www.euclidchemical.com/#sle).
    - b. W. R. Meadows, Inc; Induroshine and Bellatrix Concrete Enhancer: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that floor surfaces are acceptable to receive the work of this section.
- B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

### **3.2 GENERAL**

- A. Apply materials in accordance with manufacturer's instructions.

### **3.3 CONCRETE POLISHING**

- A. Execute using materials, equipment, and procedures specified by manufacturer, using manufacturer approved installer.
  - 1. Final Polished Sheen: Satin finish; other sheens are included as comparison to illustrate required sheen; final sheen is before addition of any sealer or coating, regardless of whether that is also specified or not.
  - 2. Satin Finish: Reflecting images from side lighting.

## **END OF SECTION**

## **SECTION 05 12 00 - STRUCTURAL STEEL FRAMING**

### **PART 1 GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### **1.2 SUMMARY**

- A. Section Includes:
  - 1. Structural steel.
  - 2. Shrinkage-resistant grout.
- B. Related Requirements:
  - 1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.

#### **1.3 COORDINATION**

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

#### **1.4 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

#### **1.5 ACTION SUBMITTALS**

- A. Product Data:
  - 1. Structural-steel materials.
  - 2. High-strength, bolt-nut-washer assemblies.
  - 3. Anchor rods.
  - 4. Threaded rods.
  - 5. Shop primer.
  - 6. Galvanized-steel primer.

7. Etching cleaner.
  8. Galvanized repair paint.
  9. Shrinkage-resistant grout.
- B. Shop Drawings: Show fabrication of structural-steel components.
1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  2. Include embedment Drawings.
  3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
  4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
  5. Identify demand-critical welds.
  6. Identify members not to be shop primed.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide in accordance with AWS D1.1 for each welded joint.
- D. Delegated-Design Submittal: For structural-steel connections indicated on Drawings to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

## **1.6 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For Installer and fabricator.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural-steel materials, including chemical and physical properties.
- E. Product Test Reports: For the following:
1. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
  2. Direct-tension indicators.
  3. Tension-control, high-strength, bolt-nut-washer assemblies.
- F. Field quality-control reports.

## **1.7 QUALITY ASSURANCE**

- A. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1.
1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

## **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
  - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
  
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
  - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
  - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
  - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

## **PART 2 PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. Comply with applicable provisions of the following specifications and documents:
  - 1. ANSI/AISC 303.
  - 2. ANSI/AISC 341.
  - 3. ANSI/AISC 360.
  - 4. RCSC's "Specification for Structural Joints Using High-Strength Bolts."
  
- B. Connection Design Information:
  - 1. Option 2: Fabricator's experienced steel detailer shall select or complete connections in accordance with ANSI/AISC 303.
    - a. Select and complete connections using details indicated and ANSI/AISC 360.
    - b. Use Load and Resistance Factor Design; data are given at factored-load level.
  
- C. Moment Connections: Type PR, partially restrained.
  
- D. Construction: Braced frame.

### **2.2 STRUCTURAL-STEEL MATERIALS**

- A. W-Shapes: ASTM A992 or ASTM A572, Grade 50.
  
- B. Channels, Angles: ASTM A36.

- C. Plate and Bar: ASTM A36.
- D. Cold-Formed Hollow Structural Sections: ASTM A500, Grade B structural tubing.
- E. Steel Pipe: ASTM A53, Type E or Type S, Grade B.
- F. Welding Electrodes: Comply with AWS requirements.

### **2.3 BOLTS AND CONNECTORS**

- A. Provide one of the following:
- B. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; all with plain finish.
  - 1. Direct-Tension Indicators: ASTM F959, Type 325-1, compressible-washer type with plain finish.
- C. Zinc-Coated High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers.
  - 1. Finish: Mechanically deposited zinc coating.
  - 2. Direct-Tension Indicators: ASTM F959, Type 325-1, compressible-washer type with mechanically deposited zinc coating finish.
- D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125, Grade F1852, Type 1, heavy-hex head assemblies, consisting of steel structural bolts with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers.
  - 1. Finish: Plain or Mechanically deposited zinc coating.

### **2.4 RODS**

- A. Threaded Rods: ASTM F1554, GRADE 36.
  - 1. Nuts: ASTM A 63 heavy-hex carbon steel.
  - 2. Washers: ASTM F436, Type 1, hardened carbon steel.
  - 3. Finish: Plain.

### **2.5 SLIDE BEARINGS**

- A. Structural Slide Bearings: Low-friction assemblies, of configuration indicated, that provide vertical transfer of loads and allow horizontal movement perpendicular to plane of expansion joint while resisting movement within plane of expansion joint.
  - 1. Mating Surfaces: PTFE and mirror-finished stainless steel.
  - 2. Coefficient of Friction: Not more than 0.04.

3. Design Load: Not less than 2,000 psi.
4. Total Movement Capability: 3 inches.

## **2.6 PRIMER**

- A. Steel Primer:
  1. Comply with Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."
- B. Galvanized-Steel Primer: MPI#26.
  1. Etching Cleaner: MPI#25, for galvanized steel.
  2. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

## **2.7 SHRINKAGE-RESISTANT GROUT**

- A. Metallic, Shrinkage-Resistant Grout: ASTM C1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

## **2.8 FABRICATION**

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.
  1. Camber structural-steel members where indicated.
  2. Fabricate beams with rolling camber up.
  3. Identify high-strength structural steel in accordance with ASTM A6 and maintain markings until structural-steel framing has been erected.
  4. Mark and match-mark materials for field assembly.
  5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
  1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
- C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 3.

- F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
  - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
  - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

## **2.9 SHOP CONNECTIONS**

- A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  - 1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

## **2.10 GALVANIZING**

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123.
  - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
  - 2. Galvanize structural steel framing located in exterior walls.

## **2.11 SHOP PRIMING**

- A. Shop prime steel surfaces, except the following:
  - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
  - 2. Surfaces to be field welded.
  - 3. Surfaces of high-strength bolted, slip-critical connections.
  - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
  - 5. Galvanized surfaces unless indicated to be painted.
  - 6. Surfaces enclosed in interior construction.
- B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:
  - 1. SSPC-SP 3.

- C. Surface Preparation of Galvanized Steel: Prepare galvanized-steel surfaces for shop priming by thoroughly cleaning steel of grease, dirt, oil, flux, and other foreign matter, and treating with etching cleaner.
- D. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
  - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
  - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

## 2.12 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
  - 1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
  - 2. Bolted Connections: Inspect and test shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
  - 3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1 and the following inspection procedures, at testing agency's option:
    - a. Liquid Penetrant Inspection: ASTM E165.
    - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
    - c. Ultrasonic Inspection: ASTM E164.
    - d. Radiographic Inspection: ASTM E94.
  - 4. In addition to visual inspection, test and inspect shop-welded shear stud connectors in accordance with requirements in AWS D1.1 for stud welding and as follows:
    - a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear stud connector.
    - b. Conduct tests in accordance with requirements in AWS D1.1 on additional shear stud connectors if weld fracture occurs on shear stud connectors already tested.
  - 5. Prepare test and inspection reports.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.
  1. Do not remove temporary shoring supporting composite deck construction and structural-steel framing until cast-in-place concrete has attained its design compressive strength.

### **3.3 ERECTION**

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Baseplates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  1. Set plates for structural members on wedges, shims, or setting nuts as required.
  2. Weld plate washers to top of baseplate.
  3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.
- C. Maintain erection tolerances of structural steel within ANSI/AISC 303.
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
  2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection.

- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

### **3.4 FIELD CONNECTIONS**

- A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.
  - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  - 1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
  - 2. Remove backing bars or runoff tabs where exposed to view, back gouge, and grind steel smooth.
  - 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

### **3.5 FIELD QUALITY CONTROL**

- A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:
  - 1. Verify structural-steel materials and inspect steel frame joint details.
  - 2. Verify weld materials and inspect welds.
  - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
  - 1. Bolted Connections: Inspect and test]bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
  - 2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1.
    - a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
      - 1) Liquid Penetrant Inspection: ASTM E165.
      - 2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
      - 3) Ultrasonic Inspection: ASTM E164.
      - 4) Radiographic Inspection: ASTM E94.

### **3.6 PROTECTION**

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780.

- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Painting: Cleaning and touchup painting are specified in [Section 099113 "Exterior Painting."] [Section 099123 "Interior Painting."]
- D. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

**END OF SECTION**

## **SECTION 05 12 13 - ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING**

### **PART 1 GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### **1.2 SUMMARY**

- A. Section Includes:
  - 1. Architecturally exposed structural steel (AESS).
  - 2. Section 051200 "Structural Steel Framing" requirements that also apply to AESS.
- B. Related Requirements:
  - 1. [Section 099113 "Exterior Painting"] [Section 099123 "Interior Painting"] [and] [Section 099600 "High-Performance Coatings"] for surface preparation and priming requirements.

#### **1.3 DEFINITIONS**

- A. AESS: Architecturally exposed structural steel.
- B. Category AESS 1: Structural steel that is categorized by ANSI/AISC 303, Section 10, as AESS 1 and may be designated AESS 1 or Category AESS 1 in the Contract Documents.
- C. Category AESS 2: Structural steel that is categorized by ANSI/AISC 303, Section 10, as AESS 2 and is designated as AESS 2 or Category AESS 2 in the Contract Documents.
- D. Category AESS 3: Structural steel that is categorized by ANSI/AISC 303, Section 10, as AESS 3 and is designated as AESS 3 or Category AESS 3 in the Contract Documents.
- E. Category AESS 4: Structural steel that is categorized by ANSI/AISC 303, Section 10, as AESS 4 and is designated as AESS 4 or Category AESS 4 in the Contract Documents.
- F. Category AESS C: Structural steel with custom characteristics that is categorized by ANSI/AISC 303, Section 10, as AESS C and is designated as AESS C or Category AESS C in the Contract Documents.
- G. SEAC/RMSCA Guide Specification: SEAC/RMSCA's "Sample Specification, Section 05 02 13: Architecturally Exposed Structural Steel."

#### **1.4 COORDINATION**

- A. Coordinate surface preparation requirements for shop-primed items.
- B. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

#### **1.5 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

#### **1.6 ACTION SUBMITTALS**

- A. Product Data:
  - 1. Tension-control, high-strength, bolt-nut-washer assemblies.
  - 2. Corrosion-resisting (weathering steel), tension-control, high-strength, bolt-nut-washer assemblies.
  - 3. Filler.
  - 4. Primer.
  - 5. Galvanized-steel primer.
  - 6. Etching cleaner.
  - 7. Galvanized repair paint.
- B. Shop Drawings: Show fabrication of AESS components.
  - 1. Identify AESS category for each steel member and connection, including transitions between AESS categories and between AESS and non-AESS.
  - 2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 3. Include embedment Drawings.
  - 4. Indicate orientation of mill marks and HSS seams.
  - 5. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds.
  - 6. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections. Indicate orientation and location of bolt heads.
  - 7. Indicate exposed surfaces and edges and surface preparation being used.
  - 8. Indicate special tolerances and erection requirements.
  - 9. Indicate weep holes for HSS and vent holes for galvanized HSS.
  - 10. Indicate surface preparation, primer, and coating requirements, including systems specified in other Sections.

- C. Samples: Submit Samples to set quality standards for AESS.
  - 1. Two steel plates, 3/8 by 8 by 4 inches, with long edges joined by a groove weld and with weld ground smooth.
  - 2. Steel plate, 3/8 by 8 by 8 inches, with one end of a short length of rectangular steel tube, 4 by 6 by 3/8 inches, welded to plate with a continuous fillet weld and with weld ground smooth and blended.

#### **1.7 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For Installer, fabricator and shop-painting applicator.
- B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

#### **1.8 QUALITY ASSURANCE**

- A. Mockups: Build mockups of AESS to set quality standards for fabrication and installation.
  - 1. Build mockup of typical portion of AESS as shown on Drawings.
  - 2. Coordinate painting requirements with [Section 099113 "Exterior Painting."] [Section 099123 "Interior Painting."]
  - 3. Coordinate high-performance coatings requirements with Section 099600 "High-Performance Coatings."
  - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### **1.9 DELIVERY, STORAGE, AND HANDLING**

- A. Use special care in handling AESS to prevent twisting, warping, nicking, and other damage during fabrication, delivery, and erection. Store materials to permit easy access for inspection and identification. Keep AESS members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect AESS members and packaged materials from corrosion and deterioration.
  - 1. Do not store AESS materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

#### **1.10 FIELD CONDITIONS**

- A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

## **PART 2 PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. Comply with requirements of ANSI/AISC 303, Sections 1 through 9 and as modified in Section 10, "Architecturally Exposed Structural Steel."

### **2.2 BOLTS, CONNECTORS, AND ANCHORS**

- A. Tension-Control, High-Strength, Bolt-Nut-Washer Assemblies: ASTM F3125, Grade F1852, Type 1, round-head assemblies consisting of steel structural bolts with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers.
  - 1. Finish: Plain.

### **2.3 FILLER**

- A. Polyester filler intended for use in repairing dents in automobile bodies.

### **2.4 PRIMER**

- A. Steel Primer:
  - 1. Comply with [Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."] [Section 099600 "High-Performance Coatings."] [Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."]

### **2.5 FABRICATION**

- A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.
  - 1. Use special care handling and fabricating AESS before and after shop painting to minimize damage to shop finish.
- B. Category AESS 1:
  - 1. Comply with overall profile dimensions of AWS D1.1 for welded built-up members. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
  - 2. Prepare surfaces according to Part 2 "Shop Priming" Article and SSPC-SP 6 (WAB)/NACE WAB-3.
  - 3. Grind sheared, punched, and flame-cut edges to remove burrs and provide smooth surfaces and eased edges.
  - 4. Make intermittent welds appear continuous, using filler or additional welding.

5. Seal weld open ends of hollow structural sections with 3/8-inch closure plates.
6. Limit butt and plug weld projections to 1/16 inch.
7. Install bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
8. Remove weld spatter, slivers, and similar surface discontinuities.
9. Remove blemishes and surface irregularities resulting from temporary braces or fixtures by filling or grinding, before cleaning, treating, and shop priming.
10. Grind tack welds smooth unless incorporated into final welds.
11. Remove backing and runoff tabs, and grind welds smooth.

C. Category AESS 2:

1. Comply with overall profile dimensions of AWS D1.1 for welded built-up members. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
2. Prepare surfaces according to Part 2 "Shop Priming" Article and SSPC-SP 6 (WAB)/NACE WAB-3.
3. Grind sheared, punched, and flame-cut edges to remove burrs and provide smooth surfaces and eased edges.
4. Make intermittent welds appear continuous, using filler or additional welding.
5. Seal weld open ends of hollow structural sections with 3/8-inch closure plates.
6. Limit butt and plug weld projections to 1/16 inch.
7. Install bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
8. Remove weld spatter, slivers, and similar surface discontinuities.
9. Remove blemishes and surface irregularities resulting from temporary braces or fixtures by filling or grinding, before cleaning, treating, and shop priming.
10. Grind tack welds smooth unless incorporated into final welds.
11. Remove backing and runoff tabs, and grind welds smooth.
12. Limit as-fabricated straightness tolerance to one-half that permitted for structural-steel materials in ANSI/AISC 303.
13. Limit as-fabricated curved structural steel tolerance to that permitted for structural-steel materials in ANSI/AISC 303.
14. Limit as-fabricated straightness tolerance of welded built-up members to one-half that permitted by AWS D1.1.
15. Conceal fabrication and erection markings from view in the completed structure.
16. Make welds uniform and smooth.

D. Category AESS 3:

1. Comply with overall profile dimensions of AWS D1.1 for welded built-up members. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
2. Prepare surfaces according to Part 2 "Shop Priming" Article and SSPC-SP 6 (WAB)/NACE WAB-3.
3. Grind sheared, punched, and flame-cut edges to remove burrs and provide smooth surfaces and eased edges.
4. Make intermittent welds appear continuous, using filler or additional welding.

5. Seal weld open ends of hollow structural sections with 3/8-inch closure plates.
6. Limit butt and plug weld projections to 1/16 inch.
7. Install bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
8. Remove weld spatter, slivers, and similar surface discontinuities.
9. Remove blemishes and surface irregularities resulting from temporary braces or fixtures by filling or grinding, before cleaning, treating, and shop priming.
10. Grind tack welds smooth unless incorporated into final welds.
11. Remove backing and runoff tabs, and grind welds smooth.
12. Limit as-fabricated straightness tolerance to one-half that permitted for structural-steel materials in ANSI/AISC 303.
13. Limit as-fabricated curved structural steel tolerance to that permitted for structural-steel materials in ANSI/AISC 303.
14. Limit as-fabricated straightness tolerance of welded built-up members to one-half that permitted by AWS D1.1.
15. Conceal fabrication and erection markings from view in the completed structure.
16. Make welds uniform and smooth.
17. Cut out mill marks from mill material or hide these markings from view in the completed structure. Where neither method is possible, remove mill marks by grinding and filling surfaces as approved by Architect.
18. Grind butt and plug welds smooth or fill, removing weld splatter exposed to view.
19. Orient HSS seams as indicated or away from view.
20. Align and match abutting member cross sections.
21. At visible open joints of copes, miters, and cuts, maintain uniform clear gaps of 1/8 inch. At closed joints, maintain uniform contact within 1/16 inch.
22. Fabricate with exposed surfaces smooth, square, and of surface quality approved by Architect.

E. Category AESS 4:

1. Comply with overall profile dimensions of AWS D1.1 for welded built-up members. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
2. Prepare surfaces according to Part 2 "Shop Priming" Article and SSPC-SP 6 (WAB)/NACE WAB-3.
3. Grind sheared, punched, and flame-cut edges to remove burrs and provide smooth surfaces and eased edges.
4. Make intermittent welds appear continuous, using filler or additional welding.
5. Seal weld open ends of hollow structural sections with 3/8-inch closure plates.
6. Limit butt and plug weld projections to 1/16 inch.
7. Install bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
8. Remove weld spatter, slivers, and similar surface discontinuities.
9. Remove blemishes and surface irregularities resulting from temporary braces or fixtures by filling or grinding, before cleaning, treating, and shop priming.
10. Grind tack welds smooth unless incorporated into final welds.

11. Remove backing and runoff tabs, and grind welds smooth.
  12. Limit as-fabricated straightness tolerance to one-half that permitted for structural-steel materials in ANSI/AISC 303.
  13. Limit as-fabricated curved structural steel tolerance to that permitted for structural-steel materials in ANSI/AISC 303.
  14. Limit as-fabricated straightness tolerance of welded built-up members to one-half that permitted by AWS D1.1.
  15. Conceal fabrication and erection markings from view in the completed structure.
  16. Make welds uniform and smooth.
  17. Cut out mill marks from mill material or hide these markings from view in the completed structure. Where neither method is possible, remove mill marks by grinding and filling surfaces as approved by Architect.
  18. Grind butt and plug welds smooth or fill, removing weld splatter exposed to view.
  19. Orient HSS seams as indicated or away from view.
  20. Align and match abutting member cross sections.
  21. At visible open joints of copes, miters, and cuts, maintain uniform clear gaps of 1/8 inch. At closed joints, maintain uniform contact within 1/16 inch.
  22. Fabricate with exposed surfaces smooth, square, and of surface quality approved by Architect.
  23. Treat HSS seams to appear seamless.
  24. Contour and blend welds and weld transitions between members, removing splatter exposed to view.
  25. Fill surface imperfections with filler and sand smooth to achieve surface quality approved by Architect.
  26. Minimize weld show-through and distortion on the opposite side of exposed connections by grinding to a smooth profile aligned with adjacent material.
- F. Erection marks, painted marks, and other marks are permitted on galvanized-steel surfaces of completed structure.

## **2.6 SHOP CONNECTIONS**

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

## **2.7 GALVANIZING**

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A123.
1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.

2. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

## **2.8 SHOP PRIMING**

- A. Shop prime steel surfaces, except the following:
  1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
  2. Surfaces to be field welded.
  3. Surfaces to be high-strength bolted with slip-critical connections.
  4. Galvanized surfaces unless indicated to be painted.
- B. Surface Preparation: Clean nongalvanized surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
  1. SSPC-SP 2.
  2. SSPC-SP 3.
  3. SSPC-SP 7 (WAB)/NACE WAB-4.
  4. SSPC-SP 14 (WAB)/NACE WAB-8.
  5. SSPC-SP 11.
  6. SSPC-SP 6 (WAB)/NACE WAB-3.
  7. SSPC-SP 10 (WAB)/NACE WAB-2.
  8. SSPC-SP 5 (WAB)/NACE WAB-1.
  9. SSPC-SP 8.
- C. Preparing Galvanized Steel for Shop Priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
- D. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
  1. Stripe paint corners, crevices, bolts, welds, and eased edges.
  2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments, showing dimensions, locations, angles, and elevations.
- B. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

### **3.3 ERECTION**

- A. Take special care during erection to avoid marking or distorting the AESS and to minimize damage to shop painting. Set AESS accurately in locations and to elevations indicated and according to ANSI/AISC 303 and ANSI/AISC 360.
  1. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Take care to avoid any blemishes, holes, or unsightly surfaces resulting from the use or removal of temporary elements.
  2. Grind tack welds smooth.
  3. Remove backing and runoff tabs, and grind welds smooth.
  4. Orient bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
  5. Remove erection bolts in AESS, fill holes with weld metal or filler, and grind or sand smooth to achieve surface quality approved by Architect.
  6. Fill weld access holes in AESS with weld metal or filler and grind, or sand smooth to achieve surface quality as approved by Architect.
  7. Conceal fabrication and erection markings from view in the completed structure.
- B. In addition to ANSI/AISC 303, Section 10 requirements, comply with the following.
  1. Erection of Category AESS 1 and Category AESS 2:
    - a. Erect AESS to the standard frame tolerances specified in ANSI/AISC 303 for non-AESS.
    - b. Comply with AWS D1.1. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
    - c. Remove weld spatter, slivers, and similar surface discontinuities.
    - d. Grind off butt and plug weld projections larger than 1/16 inch.
    - e. Continuous welds shall be of uniform size and profile.
    - f. Ream holes that must be enlarged. Use of drift pins or burning is not permitted. Replace misaligned connection plates where holes cannot be aligned with acceptable appearance.
    - g. Splice members only where indicated on Drawings.

- h. No torch cutting or field fabrication is permitted.
- 2. Erection of Category AESS 3:
  - a. Erect AESS to the standard frame tolerances specified in ANSI/AISC 303 for non-AESS.
  - b. Comply with AWS D1.1. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
  - c. Remove weld spatter, slivers, and similar surface discontinuities.
  - d. Grind off butt and plug weld projections larger than 1/16 inch.
  - e. Continuous welds shall be of uniform size and profile.
  - f. Ream holes that must be enlarged. Use of drift pins or burning is not permitted. Replace misaligned connection plates where holes cannot be aligned with acceptable appearance.
  - g. Splice members only where indicated on Drawings.
  - h. No torch cutting or field fabrication is permitted.
  - i. Weld profiles, quality, and finish shall be as approved by Architect.
  - j. Make joint welds, including tack welds, appear continuous by filling intermittent welds.
- 3. Erection of Category AESS 4:
  - a. Erect AESS to the standard frame tolerances specified in ANSI/AISC 303 for non-AESS.
  - b. Comply with AWS D1.1. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
  - c. Remove weld spatter, slivers, and similar surface discontinuities.
  - d. Grind off butt and plug weld projections larger than 1/16 inch.
  - e. Continuous welds shall be of uniform size and profile.
  - f. Ream holes that must be enlarged. Use of drift pins or burning is not permitted. Replace misaligned connection plates where holes cannot be aligned with acceptable appearance.
  - g. Splice members only where indicated on Drawings.
  - h. No torch cutting or field fabrication is permitted.
  - i. Weld profiles, quality, and finish shall be as approved by Architect.
  - j. Make joint welds, including tack welds, appear continuous by filling intermittent welds.
  - k. Grind welds smooth.
  - l. Minimize weld show-through and distortion on the opposite side of exposed connections by grinding to a smooth profile aligned with adjacent material.
  - m. Oversize welds where ground, contoured, or blended, and grind to provide a smooth transition, matching profile approved by Architect.

### 3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Snug tightened.

- B. Weld Connections: Comply with AWS D1.1[ and AWS D1.8] for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

### **3.5 REPAIR**

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and touchup galvanizing to comply with ASTM A780.
- B. Touchup Painting:
  - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting, to comply with SSPC-PA 1 for touching up shop-painted surfaces.
    - a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
  - 2. Cleaning and touchup painting are specified in [Section 099113 "Exterior Painting."] [Section 099123 "Interior Painting."] [Section 099600 "High-Performance Coatings."]
- C. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

### **3.6 FIELD QUALITY CONTROL**

- A. Testing Agency: Owner will engage a qualified testing agency to inspect AESS as specified in Section 051200 "Structural Steel Framing." The testing agency is not responsible for enforcing requirements relating to aesthetic effect.
- B. Architect will observe AESS in place to determine acceptability relating to aesthetic effect.

### **END OF SECTION**

## **SECTION 05 31 00 - STEEL DECKING**

### **PART 1 GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### **1.2 SUMMARY**

- A. Section Includes:
  - 1. Roof deck.
- B. Related Requirements:
  - 1. Section 099123 "Interior Painting" for repair painting of primed deck and finish painting of deck.

#### **1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings:
  - 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Welding certificates.
- B. Product Certificates: For each type of steel deck.
- C. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
  - 1. Power-actuated mechanical fasteners.
- D. Evaluation Reports: For steel deck, from ICC-ES.
- E. Field quality-control reports.

#### **1.5 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- C. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
  - 1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

## **PART 2 PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- B. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

### **2.2 ROOF DECK**

- A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
  - 1. Galvanized and Shop-Primed Steel Sheet: ASTM A653, Structural Steel (SS), Grade 33, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
  - 2. Color: [Manufacturer's standard] [Gray] [White] [Gray top surface with white underside].
  - 3. Deck Profile: As indicated.
  - 4. Profile Depth: As indicated.
  - 5. Design Uncoated-Steel Thickness: As indicated.
  - 6. Span Condition: Double span or more.
  - 7. Side Laps: Overlapped or interlocking seam at Contractor's option.

## **2.3 ACCESSORIES**

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- G. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- H. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0747 inch thick, with factory-punched hole of 3/8-inch minimum diameter.
- I. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- J. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch- wide flanges and recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.
- K. Galvanizing Repair Paint: ASTM A780.
- L. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 INSTALLATION, GENERAL**

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
  - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

### **3.3 ROOF-DECK INSTALLATION**

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:
  - 1. Weld Diameter: 3/4 inch, nominal.
  - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 12 inches apart in the field of roof and 6 inches apart in roof corners and perimeter, based on roof-area definitions in FMG Loss Prevention Data Sheet 1-28.
  - 3. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 12 inches, and as follows:
  - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.

- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
  - 1. End Joints: Lapped 2 inches minimum.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld or mechanically fasten flanges to top of deck. Space welds or mechanical fasteners not more than 12 inches apart with at least one weld or fastener at each corner.
  - 1. Install reinforcing channels or zees in ribs to span between supports and weld or mechanically fasten.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
  - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

### **3.4 FIELD QUALITY CONTROL**

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field welds will be subject to inspection.
- C. Prepare test and inspection reports.

### **3.5 PROTECTION**

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
  - 1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
  - 2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- C. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

### **END OF SECTION**

## **SECTION 05 40 00 - COLD-FORMED METAL FRAMING**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Formed steel stud exterior wall framing.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 05 12 00: Structural building framing.
- B. Section 06 10 00 - Rough Carpentry: Wood blocking and miscellaneous framing.
- C. Section 06 10 00 - Rough Carpentry: Roof and wall sheathing.
- D. Section 07 21 00 - Thermal Insulation: Insulation within framing members.
- E. Section 07 25 00 - Weather Barriers: Weather barrier over sheathing.

#### **1.3 REFERENCE STANDARDS**

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.
- D. ASTM C955 - Standard Specification for Cold-Formed Steel Structural Framing Members; 2018.
- E. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2011a (Reapproved 2015).
- F. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- G. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

## 1.5 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, limitations.
- C. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.
- D. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.
  - 1. Describe method for securing studs to tracks and for bolted framing connections.
  - 2. Design data:
    - a. Shop drawings signed and sealed by a professional structural engineer.
  - 3. Calculations for loadings and stresses of specially fabricated framing, signed and sealed by a professional structural engineer.
  - 4. Details and calculations for factory-made framing connectors, signed and sealed by a professional structural engineer.
- E. Welding certificates.
- F. Qualification Data: For testing agency.
- G. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention.
- H. Designer's Qualification Statement.

## 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment, indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association or the Steel Stud Manufacturers Association.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

- E. E. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."
- F. Designer Qualifications: Design framing system under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
- G. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum three years of documented experience.
- H. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Metal Framing:
  - 1. ClarkDietrich: [www.clarkdietrich.com/#sle](http://www.clarkdietrich.com/#sle).
  - 2. Jaimes Industries: [www.jaimesind.com/#sle](http://www.jaimesind.com/#sle).
  - 3. SCAFCO Corporation: [www.scafco.com/#sle](http://www.scafco.com/#sle).
  - 4. Steel Construction Systems: [www.steelconsystems.com/#sle](http://www.steelconsystems.com/#sle).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Framing Connectors and Accessories:
  - 1. Same manufacturer as metal framing.
  - 2. Simpson Strong Tie: [www.strongtie.com/#sle](http://www.strongtie.com/#sle).

### **2.2 FRAMING SYSTEM**

- A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.
- B. Design Requirements: Provide completed framing system having the following characteristics:
  - 1. Design: Calculate structural characteristics of cold-formed steel framing members according to AISI S100-12.
  - 2. Structural Performance: Design, engineer, fabricate, and erect to withstand specified design loads for project conditions within required limits.
  - 3. Design Loads: In accordance with applicable codes.
  - 4. Live load deflection meeting the following, unless otherwise indicated:
    - a. Exterior Walls: Maximum horizontal deflection under wind load of 1/240 of span.
    - b. Design non-axial loadbearing framing to accommodate not less than 1/2 in vertical deflection.

5. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
6. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

### **2.3 FRAMING MATERIALS**

- A. Studs and Track: ASTM C955; studs formed to channel, C- or Sigma-shaped with punched web; U-shaped track in matching nominal width and compatible height.
  1. Gauge and Depth: As required to meet specified performance levels.
- B. Header: Engineered one-member or two-member assembly, with wide flanges, designed to replace conventional box or nested header framing at openings.
  1. Jamb Mounting Clips: Manufacturer's standard.
  2. Cripple Stud Clips: Manufacturer's standard.
- C. Framing Connectors: Factory-made, formed steel sheet.
  1. Material: ASTM A653/A653M SS Grade 33 and 40 (minimum), with G90/Z275 hot dipped galvanized coating for base metal thickness less than 10 gauge, 0.1345 inch, and factory punched holes and slots.
  2. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
  3. Fixed Connections: Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.

### **2.4 FASTENERS**

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.
- B. Anchorage Devices: Powder actuated.

### **2.5 ACCESSORIES**

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
- B. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- C. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify field measurements and adjust installation as required.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 INSTALLATION OF STUDS**

- A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.
- B. Place studs at 16 inches on center unless tighter spacing required by manufacturer; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using manufacturers recommended method.
- C. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.
- D. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- E. Touch-up field welds and damaged galvanized surfaces with primer.

### **3.3 FIELD QUALITY CONTROL**

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### **3.4 TOLERANCES**

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

**END OF SECTION**

## **SECTION 05 50 00 - METAL FABRICATIONS**

### **PART 1 GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Miscellaneous steel framing and supports.
  - 2. Metal ladders.
  - 3. Ladder safety cages.
  - 4. Metal bollards.
  - 5. Loose bearing and leveling plates.
  - 6. Steel pipe handrails and guardrails.
  
- B. Products furnished, but not installed, under this Section include the following:
  - 1. Loose steel lintels.
  - 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

#### **1.2 ACTION SUBMITTALS**

- A. Refer to the Required Submittal Log in Section 013300 - Submittal Procedures.
- B. Product Data: For the following:
  - 1. Steel pipe handrails and guardrails.
- C. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- D. Samples for Verification: Verify with Architect.
- E. Delegated-Design Submittal: For ladders, handrails, and guardrails, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

### **PART 2 PRODUCTS**

#### **2.1 PERFORMANCE REQUIREMENTS**

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

## 2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- C. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- D. Stainless-Steel Bars and Shapes: ASTM A 276,
  1. Type 304, typical.
  2. Type 316L in corrosive and environments.
- E. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- F. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- G. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
  1. Size of Channels: 1-5/8 by 1-5/8 inches, or as indicated in drawings.
  2. Material: Galvanized steel, ASTM A 653/A 653M, structural steel, Grade 33, with G90 coating; 0.064-inch minimum nominal thickness.
  3. Material: Cold-rolled steel, ASTM A 1008/A 1008M, structural steel, Grade 33, 0.0528-inch minimum thickness;
    - a. Finish: Refer to drawings.
- H. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
- I. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- J. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

## 2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 (normal use) or 316L (corrosive environments) stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
  1. Provide stainless-steel fasteners for fastening aluminum.
  2. Provide stainless-steel fasteners for fastening stainless steel.

- B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- C. Post-Installed Anchors: Torque-controlled expansion anchors.
  - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
  - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 in (normal use) or Group 2 (corrosive environments) stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

## **2.4 MISCELLANEOUS MATERIALS**

- A. Shop Primers: Provide primers that comply with Section 099100 Paint.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- E. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

## **2.5 FABRICATION, GENERAL**

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
- C. Weld corners and seams continuously to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.

- E. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 8 inches from ends and corners of units and 24 inches o.c.

## **2.6 MISCELLANEOUS FRAMING AND SUPPORTS**

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
  - 1. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches o.c.

## **2.7 METAL LADDERS**

- A. General:
  - 1. Comply with ANSI A14.3.
- B. Steel Ladders:
  - 1. Space siderails 18 inches apart unless otherwise indicated.
  - 2. Siderails: Continuous, 3/8-by-2-1/2-inch steel flat bars, with eased edges.
  - 3. Rungs: 3/4-inch-diameter steel bars.
  - 4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
  - 5. Provide nonslip surfaces on top of each rung.
  - 6. Prime exterior ladders, including brackets and fasteners, with zinc-rich primer.
- C. Aluminum Ladders:
  - 1. Space siderails 18 inches apart unless otherwise indicated.
  - 2. Siderails: Continuous extruded-aluminum channels or tubes, not less than 2-1/2 inches deep, 3/4 inch wide, and 1/8 inch thick.
  - 3. Rungs: Extruded-aluminum tubes, not less than 3/4 inch deep and not less than 1/8 inch thick, with ribbed tread surfaces.

## **2.8 LADDER SAFETY CAGES**

- A. Provide safety cages for ladders longer than 20 feet per OSHA.
- B. Fabricate ladder safety cages to comply with ANSI A14.3. Assemble by welding or with stainless-steel fasteners.

- C. Provide primary hoops at tops and bottoms of cages and spaced not more than 20 feet o.c. Provide secondary intermediate hoops spaced not more than 48 inches o.c. between primary hoops.
- D. Prime steel ladder safety cages, including brackets and fasteners, with zinc-rich primer.

## **2.9 METAL BOLLARDS**

- A. Fabricate metal bollards from Schedule 40 steel pipe.
- B. Size: 6 inches nominal diameter unless indicated otherwise on drawings.
- C. Fill steel pipe with concrete to top and provide 1 inch crown.
- D. Prime bollards with zinc-rich primer.
- E. Finish paint "Safety Yellow" unless indicated otherwise

## **2.10 LOOSE BEARING AND LEVELING PLATES**

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

## **2.11 EXTERIOR STEEL PIPE HANDRAILS AND GUARDRAILS**

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.
- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails and Top Rails of Guards:
    - a. Uniform load of 50 lbf/ ft. applied in any direction.
    - b. Concentrated load of 200 lbf applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 2. Infill of Guards:
    - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
    - b. Infill load and other loads need not be assumed to act concurrently.
- C. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
  - 1. Size:
    - a. Handrail: 1-1/2 inch diameter.
    - b. Guardrails, posts, and infill members: 1-1/2 inch diameter, typical.

- c. 2 inches where required structural load conditions.
- D. Prime steel pipe handrails and guardrails, including posts and infill members, with zinc-rich primer.
- E. Finish: As indicated in drawings.
- F. Fabrication:
  - 1. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
  - 2. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
  - 3. Form changes in direction by bending.
  - 4. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
  - 5. Weld caps to exposed ends of handrails or guardrails with 1/8 inch minimum steel plate and grind smooth.
  - 6. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.
  - 7. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

## **2.12 LOOSE STEEL LINTELS**

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- B. Galvanize loose steel lintels located in exterior walls, unless noted otherwise.
- C. Prime loose steel lintels located in exterior walls with zinc-rich primer where indicated.

## **2.13 FINISHES, GENERAL**

- A. Finish metal fabrications after assembly.

## **2.14 STEEL AND IRON FINISHES**

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless primers specified in Section 099100 "Paint" are indicated.
- C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
  1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  3. Items Indicated to Receive Primers Specified in Section 099100 "Paint": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  4. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

### **PART 3 EXECUTION**

#### **3.1 INSTALLATION, GENERAL**

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
  1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  2. Obtain fusion without undercut or overlap.
  3. Remove welding flux immediately.
  4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

### **3.2 INSTALLING METAL BOLLARDS**

- A. Anchor bollards in place with concrete footings. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- B. Fill bollards solidly with concrete, mounding top surface 1 inch to shed water.

### **3.3 INSTALLING BEARING AND LEVELING PLATES**

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

### **3.4 INSTALLATION, STEEL PIPE HANDRAILS AND GUARDRAILS**

- A. General:
  - 1. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
    - a. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
    - b. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
    - c. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
  - 2. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
    - a. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.
- B. Anchoring:
  - 1. Formed or core-drilled holes: Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
  - 2. Welded connections: Weld posts to embedded metal angle or base plate with continuous fillet weld.
- C. Attaching railings:

1. Attach railings to wall with wall brackets[, except where end flanges are used]. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
2. Secure wall brackets and railing end flanges to building construction as follows:
  - a. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
  - b. For hollow masonry anchorage, use toggle bolts.
  - c. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
  - d. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.
  - e. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.

### **3.5 ADJUSTING AND CLEANING**

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

**END OF SECTION**

## **SECTION 05 50 01 - METAL FABRICATIONS - SITEWORK**

### **PART 1 GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. The work of this Section includes, but is not limited to the following steel fabrications:
  - 1. Supports, brackets, fasteners and other site related metalwork indicated.

#### **1.3 RELATED SECTIONS**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 329300, PLANTING.

#### **1.4 REFERENCES**

- A. Comply with applicable requirements of following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
  - 1. American Institute of Steel Construction (AISC):

Code	Code of Standard Practice for Steel Buildings and Bridges
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Specification	Specification for the Design, Fabrication and Erection of Structural Steel for Buildings
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- 2. American Society for Testing and Materials (ASTM):

A 36	Structural Steel
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A 47	Ferritic Malleable Iron Castings
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A 53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
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- |       |                                                                                                                              |
|-------|------------------------------------------------------------------------------------------------------------------------------|
| A 123 | Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip |
| A 153 | Zinc Coating (Hot-Dip) on Iron and Steel Hardware                                                                            |
| A 307 | Carbon Steel Externally Threaded Standard Fasteners                                                                          |
| A 325 | High Strength Bolts for Structural Steel Joints                                                                              |
| A 366 | Steel, Carbon, Cold-Rolled sheet, Commercial Quality                                                                         |
| A 385 | High-Quality Zinc Coatings (Hot-Dip)                                                                                         |
| A 386 | Zinc Coating (Hot-Dip) on Assembled Steel Products                                                                           |
| A 444 | Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process for Culverts and Underdrains                                    |
| A 446 | Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality                                  |
| A 500 | Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes                                          |
3. American Welding Society (AWS):
- |      |                                       |
|------|---------------------------------------|
| D1.1 | Structural Welding Code - Steel       |
| D1.3 | Structural Welding Code - Sheet Steel |
4. Corps of Engineers (CE):
- |           |                                   |
|-----------|-----------------------------------|
| CRD-C-621 | Specification for Nonshrink Grout |
|-----------|-----------------------------------|
5. State of Rhode Island Building Code

## 1.5 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications stating that materials comply with requirements.

- B. Shop Drawings: Provide large scale shop drawings for fabrication, installation and erection of parts of Work. Provide plans, elevations, and details of anchorages, connections and accessory items. Provide installation templates for Work installed by others.
- C. Field Measurements: Take accurate field measurements before preparation of shop drawings and fabrication. Do not delay job progress. Allow for field cutting and fitting where taking field measurements before fabrication is not possible.
- D. Samples: Submit representative samples of each material that is to be exposed in finished Work, showing full range of color and finish variations expected. Provide minimum 12 in. long samples of handrails, top rails and posts. Provide samples of exposed fittings and brackets.

#### **1.6 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For qualified professional engineer.
- B. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- C. Welding certificates.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

#### **1.7 GENERAL REQUIREMENTS**

- A. The Contractor shall verify all measurements and shall take all field measurements necessary before fabrication. Welding to or on structural steel shall be in accordance with AWS D1.1/D1.1M. Items specified to be galvanized, when practicable and not indicated otherwise, shall be hot-dip galvanized after fabrication. Galvanizing shall be in accordance with ASTM A 123/A 123M, ASTM A 653/A 653M, or ASTM A 924/A 924M, as applicable. Exposed fastenings shall be compatible materials, shall generally match in color and finish, and shall harmonize with the material to which fastenings are applied. Materials and parts necessary to complete each item, even though such work is not definitely shown or specified, shall be included. Poor matching of holes for fasteners shall be cause for rejection. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall provide strength and stiffness. Joints exposed to the weather shall be formed to exclude water.

#### **1.8 WORKMANSHIP**

- A. Miscellaneous metalwork shall be well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching shall produce clean true lines and surfaces. Welding shall be continuous along the entire area of contact except where tack welding is permitted. Exposed connections of work in place shall not be tack welded. Exposed welds shall be ground smooth. Exposed surfaces of work in place shall have a smooth finish, and unless otherwise

approved, exposed riveting shall be flush. Where tight fits are required, joints shall be milled. Corner joints shall be coped or mitered, well formed, and in true alignment. Work shall be accurately set to established lines and elevations and securely fastened in place. Installation shall be in accordance with manufacturer's installation instructions and approved drawings, cuts, and details.

### **1.9 QUALITY ASSURANCE**

- A. Shop fabricate work to greatest extent possible. Label each piece in shop to facilitate field assembly.
- B. Welding: Perform welding in conformance with AWS D1.1 and D1.3. as applicable.
- C. Installer Qualifications: Arrange for installation of ornamental metal specified in this Section by the same firm that fabricated it.
- D. Fabricator Qualifications: A firm experienced in producing ornamental metal similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Organic-Coating Applicator Qualifications: A firm experienced in successfully applying organic coatings of type indicated to aluminum extrusions and employing competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.
- F. Welding: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1, "Structural Welding Code – Steel", AWS D1.2, and "Structural Welding Code - Sheet Steel"
- G. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
  - 1. Build mockups for the following fabricated metal features:
    - a. one full size galvanized steel round planter, including rubber edge treatment.
  - 2. If mockup is rejected by Architect, continue to build mockups until approved.
  - 3. Approved mockup may become part of the completed Work if permitted by the Architect.
- H. Shop fabricate work to the greatest extent possible. Clearly label pieces in shop to facilitate field assembly.

### **1.10 DELIVERY, STORAGE AND HANDLING**

- A. Store work off of the ground and under cover. Protect from damage. Maintain shop applied coatings until installation is complete. Sequence deliveries to avoid delays, but minimize on-site storage.

### **1.11 PROJECT CONDITIONS**

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with ornamental metal by field measurements before fabrication and indicate measurements on Shop Drawings.
  - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating railings without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
  - 2. If practical, provide allowance for trimming and fitting at site.

### **1.12 COORDINATION**

- A. Coordinate installation of anchorages for ornamental metal items. Furnish setting drawings, templates, and directions for installing anchorages, including items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

### **1.13 PERFORMANCE REQUIREMENTS**

- A. Thermal Movement: Design and engineer work of this section which allows for expansion and contraction throughout ambient temperature range up to 120°F.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

## **PART 2 - PRODUCTS**

### **2.1 FERROUS METALS**

- A. General: Provide products and materials of new stock, free from defects, and of best commercial quality for each intended purpose.
- B. Steel Plates, Shapes, and Bars: ASTM A 36.
- C. Steel Sheet: ASTM A 366, A 570, or A 611, grade required for design loading.

### **2.2 FASTENERS**

- A. Fastener Materials: Unless otherwise indicated, provide the following:
  - 1. Stainless-Steel Items: Type 316 stainless-steel fasteners.
  - 2. Dissimilar Metals: Type 316 stainless-steel fasteners.

- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 (ASTM F 738M) for bolts and ASTM F 594 (ASTM F 836M) for nuts, Alloy Group 2 (A4).
- D. Provide concealed fasteners for interconnecting components and for attaching ornamental metal items to other work, unless otherwise indicated.
  - 1. Provide tamper-resistant flat-head machine screws for exposed fasteners, unless otherwise indicated.
- E. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

## **2.6 FABRICATION, GENERAL**

- A. Assemble items in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces. Fabricate work to be truly straight, plumb, level and square and to sizes, shapes, and profiles indicated on approved shop drawings. Ease exposed edges. Cut, reinforce, drill and tap metalwork as necessary for proper assembly and use.
  - 1. Fabricate all miscellaneous metal supports, brackets, braces and the like required to fully complete the work of this Section.
  - 2. Coordinate with work of other Specification Sections to ensure proper interface of various parts of the work.
  - 3. Obtain loading requirements from suppliers of work to be supported and design and fabricate support systems with factor of safety of at least 6.
- B. Form metal to required shapes and sizes, true to line and level with true curves and accurate angles and surfaces. Finish exposed surfaces to smooth, sharp, well-defined lines and arris. Take special care in choosing materials that are smooth and free of blemishes such as pits, roller marks, trade names, scale and roughness. Fabricate work with uniform, hairline tight joints. Form welded joints and seams continuously and grind flush and smooth. For exposed fasteners, use hex head bolts or Phillips head machine screws.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form simple and compound curves in bars and extruded shapes by bending members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces.

- E. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/2 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- F. Mill joints to a tight, hairline fit. Cope or miter corner joints. Fabricate connections that will be exposed to weather in a manner to exclude water.
- G. Provide weep holes where water may accumulate.
- H. Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items, unless otherwise indicated.
- I. Comply with AWS for recommended practices in shop welding. Weld behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded joints of flux, and dress exposed and contact surfaces.
- J. Provide castings that are sound and free of warp, cracks, blowholes, or other defects that impair strength or appearance. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks.
- K. Site Elements: Fabricate custom galvanized steel, round planters from corrugated culvert pipe to size, shape and dimensions indicated on the Drawings. Provide rubber edge treatment at top edge as indicated on approved shop drawings and mockup.
- L. Hardware: of type, grade, and class required to produce connections suitable for anchoring indicated items to other types of construction indicated.
- M. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base materials.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove flux immediately.
  - 4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.

## **2.7 FINISHES, GENERAL**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of ornamental metal.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 INSTALLATION, GENERAL**

- A. Provide anchorage devices and fasteners where needed to secure ornamental metal to in-place construction.
- B. Perform cutting, drilling, and fitting required to install ornamental metal. Set products accurately in location, alignment, and elevation; measured from established lines and levels. Provide temporary bracing or anchors in formwork for items to be built into concrete, masonry, or similar construction.
- C. Fit exposed connections accurately together to form tight, hairline joints or, where indicated, with uniform reveals and spaces for sealants and joint fillers. Where cutting, welding, and grinding are required for proper shop fitting and jointing of ornamental metal, restore finishes to eliminate evidence of such corrective work.
- D. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
- E. Install joint fillers as work progresses.
- F. Restore protective coverings that have been damaged during shipment or installation. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at same location.
  - 1. Retain protective coverings intact; remove coverings simultaneously from similarly finished items to preclude nonuniform oxidation and discoloration.

- G. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal arc welding, for appearance and quality of welds, and for methods used in correcting welding work. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Grind exposed welded joints smooth and restore finish to match finish of adjacent surfaces.
- H. Field Brazing: Comply with applicable AWS specification for procedures, appearance and quality of brazing, and methods used in correcting brazing work. Braze connections that are not to be left as exposed joints but cannot be shop brazed because of shipping size limitations. Grind exposed brazed joints smooth and restore finish to match finish of adjacent surfaces.

### **3.3 INSTALLATION**

- A. Miscellaneous Items: Carefully review Drawings for miscellaneous metal items required by various trades but not specifically listed above, such as miscellaneous clip angles, miscellaneous steel bracketing, and other miscellaneous metal items as indicated on Drawings, reasonably implied therefrom, or reasonably necessary for thorough completion of work.

### **3.4 TOLERANCES**

- A. The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Document and shall not be added to allowable tolerances indicated for other work.
  - 1. Allowable Variation from True Plumb:  $\pm 1/8$  in. in 20 ft. - 0 in.
  - 2. Allowable Variation from True Level:  $\pm 1/8$  in. in 20 ft. - 0 in.
  - 3. Allowable Variation from True Line:  $\pm 1/8$  in. in 20 ft. - 0 in.

### **3.5 CLEANING**

- A. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.

### **3.6 PROTECTION**

- A. Protect finishes of galvanized metal from damage during construction period with temporary protective coverings approved by metal fabricator. Remove protective covering at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

**END OF SECTION**

**SECTION 05 59 01 - METAL EDGING**

**PART 1 - GENERAL**

**1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01, GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

**1.2 DESCRIPTION OF WORK**

- A. Provide metal edging work required for landscape edges as indicated on Drawings and as specified herein. Include, but do not limit to:
  - 1. Flat vertical steel edging.

**1.3 RELATED WORK**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 329200, LAWNS AND GRASSES.
  - 2. Section 329300, PLANTING.

**1.4 REFERENCES**

- A. Comply with applicable requirements of following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
  - 1. American Society for Testing and Materials (ASTM):

A 36	Structural Steel
A 123	Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip
A 153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A 386	Zinc Coating (Hot-Dip) on Assembled Steel Products

## **1.5 SUBMITTALS**

- A. **Product Data:** Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.
- B. **Shop Drawings:** Provide large scale shop drawings for fabrication, installation and erection of all parts of the work. Provide plans, elevations and details of anchorages, connections and accessory items. Show all interfaces and relationships to work of other trades.
- D. **Samples:** Submit representative samples of each shop finished material that is to be exposed in the completed work. Show full color ranges and finish variations expected. Provide samples having minimum size of 144 sq. in.

## **1.6 ANCHORAGE**

- A. Anchorage shall be provided where necessary for fastening metal edging securely in place. Anchorage not otherwise specified or indicated shall include slotted inserts made to engage with the anchors and power-driven fasteners when approved for concrete.

## **1.7 PRODUCT HANDLING AND STORAGE**

- A. Store work off ground and under cover. Protect from damage. Repair and clean work before erection.

## **PART 2 PRODUCTS**

### **2.1 STEEL EDGING**

- A. Steel edging shall be Border Concepts Edging, "Border King", manufactured by Border Concepts, Inc., P.O. Box 471185, Charlotte, NC 28247 or approved equal. Steel edging shall be shop fabricated, 1/4 in. thick x 6 in. deep, primed and painted Black. Edging shall be furnished in 16 ft. lengths.
  - 1. Steel edging shall have slotted holes for staking steel edging every 30 in. o.c.
  - 2. Steel stakes shall be 15 in. long, tapered.
  - 3. Provide manufacturer's end stake and splicer unit.
  - 4. Provide manufacturer's optional preformed tree rings and tree squares as indicated on the Drawings.
  - 5. Provide manufacturer's standard touch-up paint for in field touch-up of scratched or marred areas.

## **2.2 METAL**

- A. General: Provide products and materials of new stock, free from defects, and of best commercial quality for each intended purpose.
- B. Steel Plates, Shapes, and Bars: ASTM A 36.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of metal edging.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 INSTALLATION, GENERAL**

- A. Provide anchorage devices and fasteners where needed to secure metal edging to in-place construction.
- B. Perform cutting, drilling, and fitting required to install metal edging. Set edging accurately in location, alignment, and elevation; measured from established lines and levels.
- C. Backfill material on each side of edge shall be as specified for adjacent surface and shall be thoroughly compacted by means of power tampers. Extreme care shall be taken not to destroy alignment. Curb sections disturbed during backfilling or otherwise shall be reset to line and grade, and properly backfilled.

### **3.3 STEEL EDGING**

- A. Steel edging shall be installed at locations indicated on the Drawings. Where required, edging shall be cut square and accurately to required length.
  - 1. Steel edging shall be securely staked in required position. Stakes shall be driven every 30 in. o.c. along length of edging.
  - 2. Adjacent lengths of edging shall be spliced together with manufacturer's standard splicer unit.
  - 3. Edging shall be set plumb and vertical at required line and grade. Straight sections shall not be wavy; curved sections shall be smooth and shall have no kinks or sharp bends.

**3.4 TOUCH-UP REPAIR**

- A. After erection abraded areas of edging surfaces shall be touched-up and repaired with manufacturer's standard materials.

**END OF SECTION**

## **SECTION 06 10 00 - ROUGH CARPENTRY**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Rough opening framing for doors, windows, and roof openings.
- B. Sheathing.
- C. Roof-mounted curbs.
- D. Roofing nailers.
- E. Roofing cant strips.
- F. Preservative treated wood materials.
- G. Fire retardant treated wood materials.
- H. Communications and electrical room mounting boards.
- I. Concealed wood blocking, nailers, and supports.
- J. Miscellaneous wood nailers, furring, and grounds.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 07 25 00 - Weather Barriers: Water-resistive barrier over sheathing.

#### **1.3 REFERENCE STANDARDS**

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- B. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2017).
- C. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- D. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
- E. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010 (Reapproved 2017).

- F. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- G. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing; 2019a.
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.
- I. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- J. AWPA U1 - Use Category System: User Specification for Treated Wood; 2017.
- K. PS 1 - Structural Plywood; 2009.
- L. PS 20 - American Softwood Lumber Standard; 2015.

#### **1.4 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.
- C. Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.
- D. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.
- E. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.
- F. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
- G. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of all contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.
- H. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

## **1.5 QUALITY ASSURANCE**

- A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); [www.airbarrier.org/#sle](http://www.airbarrier.org/#sle):
  - 1. Installer Qualification: Use accredited contractor, certified installers, evaluated materials, and third-party field quality control audit.
  - 2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

## **1.7 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

## **PART 2 PRODUCTS**

### **2.1 GENERAL REQUIREMENTS**

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
  - 1. Species: Douglas Fir-Larch, unless otherwise indicated.
  - 2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
  - 3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee ([www.alsc.org](http://www.alsc.org)) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Provide sustainably harvested wood; see Section 01 60 00 - Product Requirements for requirements.

## 2.2 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
  - 1. Lumber: S4S, No. 2 or Standard Grade.
  - 2. Boards: Standard or No. 3.

## 2.3 CONSTRUCTION PANELS

- A. Wall Sheathing: Glass mat faced gypsum, ASTM C1177/C1177M, 5/8 inch Type X fire resistant.
  - 1. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly.
  - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  - 3. Manufacturers:
    - a. CertainTeed Corporation; GlasRoc Brand: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
    - b. Georgia-Pacific Gypsum; DensGlass Sheathing: [www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
    - c. National Gypsum Company; Gold Bond eXP Sheathing: [www.goldbondbuilding.com](http://www.goldbondbuilding.com)
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

## 2.4 ACCESSORIES

- A. Fasteners and Anchors:
  - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
  - 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
- B. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.
- C. Construction Adhesives: Adhesives complying with ASTM C557 or ASTM D3498.
  - 1. Manufacturers:
    - a. Franklin International, Inc; Titebond Fast Set Polyurethane Construction Adhesive: [www.titebond.com/#sle](http://www.titebond.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Water-Resistive Barrier: As specified in Section 07 25 00.

## 2.5 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
  2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B. Fire Retardant Treatment:
1. Manufacturers:
    - a. Lonza Group: [www.wolmanizedwood.com/#sle](http://www.wolmanizedwood.com/#sle).
    - b. Hoover Treated Wood Products, Inc: [www.frtw.com/#sle](http://www.frtw.com/#sle).
    - c. Koppers, Inc: [www.koppersperformancechemicals.com/#sle](http://www.koppersperformancechemicals.com/#sle).
    - d. Viance, LLC; D-Blaze: [www.treatedwood.com/#sle](http://www.treatedwood.com/#sle).
    - e. Substitutions: See Section 01 60 00 - Product Requirements.
  2. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
    - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
    - b. Do not use treated wood in direct contact with the ground.
  3. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
    - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
    - b. Treat rough carpentry items as indicated .
    - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.
- C. Preservative Treatment:
1. Manufacturers:
    - a. Lonza Group: [www.wolmanizedwood.com/#sle](http://www.wolmanizedwood.com/#sle).
    - b. Koppers Performance Chemicals, Inc: [www.koppersperformancechemicals.com/#sle](http://www.koppersperformancechemicals.com/#sle).
    - c. Viance, LLC; Preserve ACQ: [www.treatedwood.com/#sle](http://www.treatedwood.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.

2. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
  - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
  - b. Treat lumber exposed to weather.
  - c. Treat lumber in contact with roofing, flashing, or waterproofing.
  - d. Treat lumber in contact with masonry or concrete.
  - e. Treat lumber less than 18 inches above grade.
3. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
  - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
  - b. Treat plywood in contact with roofing, flashing, or waterproofing.
  - c. Treat plywood in contact with masonry or concrete.
  - d. Treat plywood less than 18 inches above grade.
4. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA U1, Use Category UC4A, Commodity Specification A using waterborne preservative.
  - a. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.

### **PART 3 EXECUTION**

#### **3.1 INSTALLATION - GENERAL**

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

#### **3.2 BLOCKING, NAILERS, AND SUPPORTS**

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

- D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- F. Provide the following specific non-structural framing and blocking:
  - 1. Cabinets and shelf supports.
  - 2. Wall brackets.
  - 3. Handrails.
  - 4. Grab bars.
  - 5. Towel and bath accessories.
  - 6. Wall-mounted door stops.
  - 7. Chalkboards and marker boards.
  - 8. Wall paneling and trim.
  - 9. Joints of rigid wall coverings that occur between studs.

### **3.3 ROOF-RELATED CARPENTRY**

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
- B. Provide wood curb at all roof openings except where specifically indicated otherwise. Form corners by alternating lapping side members.

### **3.4 INSTALLATION OF CONSTRUCTION PANELS**

- A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
  - 1. Place water-resistive barrier horizontally over wall sheathing, weather lapping edges and ends.
- B. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
  - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
  - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
  - 3. Install adjacent boards without gaps.

### **3.5 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Coordination of ABAA Tests and Inspections:
  - 1. Provide testing and inspection required by ABAA QAP.
  - 2. Notify in ABAA writing of schedule for air barrier work. Allow adequate time for testing and inspection.
  - 3. Cooperate with ABAA testing agency.
  - 4. Allow access to air barrier work areas and staging.
  - 5. Do not cover air barrier work until tested, inspected, and accepted.

### **3.6 CLEANING**

- A. Waste Disposal: Comply with the requirements of Section 01 74 19 - Construction Waste Management and Disposal.
  - 1. Comply with applicable regulations.
  - 2. Do not burn scrap on project site.
  - 3. Do not burn scraps that have been pressure treated.
  - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

**END OF SECTION**

## **SECTION 06 10 63 - EXTERIOR ROUGH CARPENTRY**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide all exterior rough carpentry work, as indicated on the Drawings and as specified herein. Work shall include exterior miscellaneous rough carpentry including but not limited to the following items:
  - 1. Insect Hotel structure.
  - 2. Support framing.
  - 3. Rough hardware, inserts, and related metal components and screens.

#### **1.3 RELATED WORK**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 132810, SPECIALTY TIMBER SITE FEATURES.

#### **1.4 REFERENCES**

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive shall govern:
  - 1. American National Standards Institute (ANSI):
    - A199.1 Construction and Industrial Plywood
  - 2. American Plywood Association (APA):
    - Ref. 1 APA Design/Construction Guide, Residential and Commercial
  - 3. American Society for Testing and Materials (ASTM):
    - A 153 Zinc Coating (Hot-Dip) on Iron and Steel Hardware

- |        |                                                                               |
|--------|-------------------------------------------------------------------------------|
| D 226  | Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing              |
| D 245  | Structural Grades and Related Allowable Properties for Visually Graded Lumber |
| D 2898 | Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing        |
| E 84   | Surface Burning Characteristics of Building Materials                         |
4. Federal Specifications (Fed. Spec.):
- |          |                                                                                            |
|----------|--------------------------------------------------------------------------------------------|
| UU-B-790 | Building Paper, Vegetable Fiber (Kraft, Waterproofed, Water Repellent, and Fire Resistant) |
|----------|--------------------------------------------------------------------------------------------|
5. U.S. Department of Commerce (USDC):
- |       |                                   |
|-------|-----------------------------------|
| PS 1  | Plywood                           |
| PS 20 | American Softwood Lumber Standard |

## 1.5 DEFINITIONS

- A. Boards: Lumber of less than 2 inches nominal (38 mm actual) in thickness and 2 inches nominal (38 mm actual) or greater width.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.
- C. Timber: Lumber of 5 inches nominal (114 mm actual) or greater in least dimension.
- D. Lumber grading agencies, and the abbreviations used to reference them, include the following:

Coordinate list below with product lists; delete those not required. See Evaluations.

- 1. NeLMA: Northeastern Lumber Manufacturers' Association.
- 2. NLGA: National Lumber Grades Authority.
- 3. RIS: Redwood Inspection Service.
- 4. SPIB: The Southern Pine Inspection Bureau.
- 5. WCLIB: West Coast Lumber Inspection Bureau.
- 6. WWPA: Western Wood Products Association.

## 1.6 SUBMITTALS

- A. Shop Drawings: Submit shop drawings of wood blocking installation and other rough carpentry work. Describe proposed methods of installation and anchorage to structure showing sizes, types, thicknesses, connections of wood blocking and related items, including adjoining work by other trades.
- B. Samples: Submit representative samples of all materials for use under this Section.
- C. Product Data: Submit product data consisting of manufacturer's product description and specifications.
- D. Certificates: Submit certificates of grading, treatment, and conformance to specified standards. Certifications shall state date of treatment, conformance with Specifications, and agency grading of wood.
  - 1. For lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by ALSC's Board of Review.
  - 2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.
  - 3. Local/Regional Materials:
    - a. Sourcing location(s): Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the project site.
    - b. Manufacturing location(s): Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.

## 1.7 QUALITY ASSURANCE

- A. Provide lumber and plywood bearing the grade-trademark of the association under the rules or standards of which it was produced. Grade-trademarks shall conform to the rule or standard under which the material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
  - 1. Grades specified are the minimum acceptable. Lumber grades shall be determined in accordance with ASTM D 245.
  - 2. Lumber shall bear the grade mark of an American Lumber Standards Committee, Board of Review-approved agency. Lumber shall conform to USDC PS 20.
  - 3. Lumber shall bear a mark of mill identification.
  - 4. Plywood shall comply with APA Ref. 1 grading requirements, USDC PS 1, and ANSI A199.1.
- B. Forest Certification: Provide wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

## **1.8 COORDINATION**

- A. Coordinate the work of this Section with the work of other Sections to assure the steady progress of all the work of the Contract.

## **1.9 PRODUCT DELIVERY AND STORAGE**

- A. Stack and store materials above ground under protective coverings, or indoors in such a manner to insure proper drainage, ventilation, and protection. Do not place kiln dried materials in the building until concrete and masonry work have been completed, and are sufficiently dry.
- B. Store rough carpentry materials stickered in elevated piles with spacers to allow for air circulation below. Wrapped lumber completely, including bottoms, in waterproof tarps. Tie tarps down to protect against wind blow-off. Stored lumber in covered storage trailers during project delays.

## **PART 2 PRODUCTS**

### **2.1 LUMBER, GENERAL**

- A. Lumber: Comply with DOC PS 20 and with applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by ALSC's Board of Review. Provide lumber graded by an agency certified by ALSC's Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each item with grade stamp of grading agency.
  - 2. For items that are exposed to view in the completed Work, mark grade stamp on end or back of each piece.
  - 3. In DOC PS 20, dressed sizes of green lumber are larger than dry lumber.
  - 4. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
  - 5. Provide dressed lumber, S4S, unless otherwise indicated.

### **2.2 DIMENSION LUMBER**

- A. Maximum Moisture Content: 15 percent for 2-inch nominal (38-mm actual) thickness or less; 19 percent for more than 2-inch nominal (38-mm actual) thickness.
- B. Exposed Lumber: Provide material hand selected for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.

- C. Framing: Unless otherwise indicated, Construction or No. 2 grade and any of the following species:
1. Hem-fir (North); NLGA.
  2. Locust
  3. Southern pine; SPIB.
  4. Douglas fir-larch; WCLIB or WWPA.
  5. Insect Hotel - Western Red Cedar: Grade: WRCLA "C and Better Clear".
    - a. Surface Texture: Rough.
- D. Dimension Lumber Posts: Unless otherwise indicated, Construction or No. 2 grade and any of the following species:
1. Hem-fir or hem-fir (North); NLGA, WCLIB, or WWPA.
  2. Douglas fir-larch, Douglas fir-larch (North), or Douglas fir-south; NLGA, WCLIB, or WWPA.
  3. Mixed southern pine; SPIB.
  4. Insect Hotel - Western Red Cedar: Grade: WRCLA "C and Better Clear".
    - a. Surface Texture: Rough.

### **2.3 PRESERVATIVE**

- A. Pressure Type: Preservative: Wolman® E copper azole; provided by Arch Treatment Technologies, Inc., 1955 Lake Park Drive, Suite 250 Smyrna, GA 30080; Tel:770.801.6600; E-mail: info@wolmanizedwood.com • Web: [www.wolmanizedwood.com](http://www.wolmanizedwood.com), or approved equal.
1. Lumber shall be pressure treated with copper azole, conforming to AWWA Standard U1. Supply certificate of treatment to Architect.
  2. Treatment: In accordance with the requirements of AWWA U1 Standard and in accordance with the following standards for indicated end uses:
    - a. Application: UC4A Ground Contact.
  3. Under no circumstances shall creosote, copper sulfate, arsenic, or mercuric chloride preservative be used.

### **2.4 BOARDS**

- A. Maximum Moisture Content: 19 percent.
- B. Provide boards hand selected for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.

### **2.5 SCREENS**

- A. General: Design to accommodate wire mesh screens in a tight-fitting arrangement, with a minimum of exposed fasteners. Fabricate screens to fully integrate with frame.

1. Aluminum Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet with minimum wall thickness as required for class indicated.
- B. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners.
- C. Aluminum Wire Fabric: 18-by-16 (1.1-by-1.3-mm) mesh of 0.011-inch- (0.28-mm-) diameter, coated aluminum wire.
  1. Wire-Fabric Finish: Charcoal gray.

## **2.6 FASTENERS**

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.
  1. Use stainless steel fasteners, Type 316 unless otherwise indicated.
- B. Nails: ASTM F 1667.
- C. Power-Driven Fasteners: ICC-ES AC70.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Screws: ASME B18.2.1 (ASME B18.2.3.8M).
- F. Stainless-Steel Bolts: ASTM F 593, Alloy Group 1 or 2 (ASTM F 738M, Grade A1 or A4); with ASTM F 594, Alloy Group 1 or 2 (ASTM F 836M, Grade A1 or A4) hex nuts and, where indicated, flat washers.

## **2.7 MISCELLANEOUS MATERIALS**

- A. Provide hammer drive anchors and fasteners for securing wood framing, blocking or plywood into masonry of sufficient length to meet structural requirements.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

- C. Verify all elevations, required pedestal heights and deck dimensions before commencing work.

### **3.2 ROUGH CARPENTRY WORK, GENERAL**

- A. Refer to Drawings to determine the major extent of the rough carpentry work required.
- B. The Contractor shall be responsible for structural integrity, connections, and anchorage of rough carpentry work.
- C. Discard units of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned, or too small to fabricate.
- D. Set rough carpentry work to required levels and lines, with members plumb and true to line, cut and fitted.
- E. Provide wood sleepers, blockings, curbs, cants, edgings, grounds, nailers, and furring where required for screeding or attachment to other work. Coordinate locations with other work to be supported.
- F. Attach to substrates as required to support applied loading.
- G. Provide permanent grounds of dressed, preservative treated, key-bevelled lumber not less than 1-1/2 in. wide, and of thickness required.
- H. Unless indicated otherwise, blockings, nailers, etc., of 2 in. nominal thickness or greater shall be bolted to back-up material with 1/2 in. bolts (Type 316 stainless steel at exterior locations and at roofs) located 4 in. from ends and splices, and spaced not greater than 16 in. on center along lengths of the members. Provide nails of sufficient length to penetrate receiving member to meet structural requirements, but not less than 1-1/2 in.
- I. Unless indicated otherwise, secure 2 in. thick or smaller wood framing, nailers, furring, etc., to back-up material by use of appropriate fasteners located 4 in. from ends and spaced not greater than 16 in. on center along lengths of the members. Provide type and length of fastening devices to develop positive and secure anchorage to the back-up material.
- J. Butt joints in wood shall be flush to provide smooth, uniform line with no irregularities. Built-up blocking shall have butt joints staggered 4 in. minimum layer to layer. The minimum length of any individual piece of lumber shall be 12 in. Lengths of lumber shall have a minimum of four fasteners.
- K. Construct all rough carpentry work plumb, level, and true with tight, close fitting joints, securely attached and braced to surrounding construction. Counterbore for bolt heads, nuts, and washers where required to avoid interference with other materials.

- L. Repair all damage caused by nailing, drilling, or powder-driving into concrete or masonry.

### **3.3 INSTALLATION, GENERAL**

- A. Set exterior rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit exterior rough carpentry to other construction; scribe and cope as needed for accurate fit.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction" unless otherwise indicated.
- C. Do not splice structural members between supports unless otherwise indicated.
- D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- E. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- F. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
  - 1. Use inorganic boron (SBX) for items that are continuously protected from liquid water.
  - 2. Use copper naphthenate for items not continuously protected from liquid water.
- G. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. ICC-ES AC70 for power-driven fasteners.
  - 2. Table 2305.2, "Fastening Schedule," in BOCA's BOCA National Building Code.
- H. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads unless otherwise indicated.
- I. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
- J. Indicate locations of other fasteners, such as wood screws, bolts, and lag screws, on Drawings.

**3.4 INSECT HOTEL**

- A. Wood work required shall include all work, regardless of whether or not each and every item is specifically called for. Refer to Drawings to determine the major extent of the Insect Hotel work required.
  - 1. Exposed wood surfaces shall be secured to wood backup by means of stainless steel screws unless otherwise indicated on the Drawings.
- B. The Contractor shall be responsible for structural integrity, connections, and anchorage of Insect Hotel work.
- C. Discard units of material which are unsound, warped, bowed, twisted, improperly treated, or not adequately seasoned. Structural members shall be full-length without splices.

**3.5 CLEANING**

- A. Upon completion of rough carpentry work in any given area, remove all rubbish and debris from the work area and leave in broom clean condition.

**END OF SECTION**

## **SECTION 06 15 33 - THERMALLY MODIFIED WOOD**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Steam/heat treated wood decking.

#### **1.2 RELATED REQUIREMENTS**

- A. SECTION 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Special administrative and procedural requirements related to the Owner's LEED certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- B. SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Administrative and procedural requirements for recycling of construction and demolition waste.
- C. SECTION 06 10 00 - ROUGH CARPENTRY: Wood framing and blocking.

#### **1.3 REFERENCES**

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - References. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
  - 1. ASTM D1037-12 - Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.
  - 2. ASTM E84-12a - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 3. CENS/TS 15083-1 2005 - Durability of wood and wood-based products - Determination of the natural durability of solid wood against wood-destroying fungi, test methods - Part 1: Basidiomycetes.
  - 4. EN 350-2: 1994 – Durability of Wood and Wood-based Products – Natural Durability of Solid Wood: Guide to natural durability and treatability of selected wood species of importance in Europe.
  - 5. FS MM-L-736D 2008 - Lumber; Hardwood.
  - 6. FSC® (Forest Stewardship Council): “FSC® Certification Program.”

#### **1.4 SUBMITTALS**

- A. Submit the following under provisions of Section 01 30 00 - SUBMITTALS:

- B. Product Data: Manufacturer's product data sheets, specifications, performance data and installation instructions for cladding, installation hardware, adhesives and accessories covered under the scope of work defined in this section.
- C. Certificates: Provide manufacturer's test results, certification and/or affirmation of following criteria.
  - 1. No chemicals are used in the wood treatment process.
  - 2. Surface Burning characteristics in accordance with ASTM E84.
  - 3. Biological durability testing Class.
  - 4. Peak curing temperature.
- D. Chain-of-Custody: Written documentation providing evidence of compliance with Chain-of-Custody supply of wood products, and compliance with FSC® standards. (LEED Credit MRc7).
  - 1. Demonstrate that products are FSC® certified by providing vendor invoices. Invoices will contain the vendor's chain of custody number and identify each chain of custody certified product on a line-item basis. A "vendor" is defined as the company that furnishes wood products to project contractors and/or subcontractors for on-site installation.
- E. Shop drawings:
  - 1. Submit large scale design details at a minimum 1 1/2 inch to one foot (8:1) scale, illustrating fastening methods and coordinating installation details.
- F. Samples:
  - 1. Provide decking samples to verify specified colors and finishes.
  - 2. Provide pre-finished samples of decking at least 9 inches (229mm) in length, containing both male and female ends of each joint.
  - 3. Provide pre-finished samples of decking at least 9 inches (229mm) in length, containing pre-installed PaCS concealed fastening strips.

## 1.5 QUALITY ASSURANCE

- A. Qualifications - Manufacturer: Minimum of 15 years documented experience in steam/heat modification of wood and demonstrating previously successful work of the type specified herein.
- B. Chain of Custody of Wood Products: All wood products furnished under this Section are to be FSC® Certified in accordance with the requirements of the Forest Stewardship Council (FSC®).
  - 1. FSC® Certification includes the following certification bodies of forests and forest products:
    - a. Certification Systems.
    - b. SmartWood.
    - c. SGS Qualifor.
    - d. Soil Association.
- C. Surface Burning characteristics

1. Northern White Ash: UL Class B finish achieves the following results when tested in accordance with ASTM E84:
  - a. Flame Spread Index (FSI): No greater than 35.
  - b. Smoke Developed Index (SDI):
    - 1) 1 inch (20mm) nominal thickness: No greater than 250.
- D. Biological Durability Testing: Achieves the following results when tested in accordance with European Test Standard CENS/TS 15083-1 2005:
  1. Thermory® treated North American White Ash: Class 1 (minimum 25 years and over).
- E. Chemical Agents: No chemicals may be used in the treatment process.
- F. Temperature Treatment: Peak temperature of not less than 419 degrees F (215 C).

## **1.6 DELIVERY STORAGE AND HANDLING**

- A. Delivery and Acceptance Requirements:
  1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
  2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.
- B. Storage and Handling Requirements:
  1. Protect cladding materials from moisture, sunlight, and potential damage from construction operations and other causes.
  2. Transport and handle materials in a manner that will prevent damage. Store in a dry, well ventilated and protected location elevated from the ground. Prior to installation, keep cladding protected from moisture and sunlight in its original packaging. Incorporate permeable coverings and vent stacks to prevent moisture from being trapped within coverings.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Basis of Design Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on:
  1. Thermory®USA: 1213 Wilmette Avenue, Wilmette, IL 60091, 847-256-8828, [support@thermoryusa.com](mailto:support@thermoryusa.com), [www.thermoryusa.com](http://www.thermoryusa.com).
- B. Substitution Limitations:
  1. Submit substitution requests in accordance with provisions of Section 01 60 00.

## 2.2 WOOD MATERIALS

- A. North American White Ash (*Fraxinus Americana*): Heat/steam treated clear grade.
  - 1. Basis of Design Product: Benchmark Series White Ash.
- B. Description: Wood is factory-treated in a computer controlled, high-temperature kiln without the use of chemicals. Heat and steam provide the materials with a higher dimensional stability and lower equilibrium moisture content compared to untreated hardwood cladding. The process darkens the wood, enhancing the color and grain.
- C. Moisture Content: Between 4.5 and 7.5 percent upon delivery to the project site.
- D. Structural Integrity: Joints must achieve point loads of no less than 1400 lbf (6.22 kN), in accordance with ASTM D1037, using 0.787 inch (20mm) thick cladding.

## 2.3 BOARD STOCK

- A. Profile: Ash Standard Stock 2x6.
  - 1. Dimensions: 5.5 inches wide by 1.65 inches thick (139mm x 42mm).
  - 2. Color: Submit full range for Architect review.
  - 3. Location: Architectural Wood Screen Wall.

## 2.4 HARDWARE AND ACCESSORIES

- A. Concealed Fastening System: Press-fit concealed fastening strips for use with pre-grooved cladding; Thermory®USA Press and Clip System (PaCS™).
  - 1. Pullout Resistance:
    - a. Ash – Nominal 1 inch (20mm): 186.4 lbf (829.08 N) per clip.
    - b. Ash – Nominal 5/4 (26mm): 180.7 lbf (803.95 N) per clip.
- B. Concealed Fastening System: Type 304 stainless steel mounting clips, 16 gauge, minimum 0.060 inch (1.5mm) thickness; Thermory®USA HiddenClipSystem.
  - 1. T4 Hidden Clips: 4 inch clips; matte black finish.
  - 2. T6 Hidden Clips: 6 inch clips; matte black finish.
- C. Screws: 4mm self-tapping stainless-steel terrace screws:
  - 1. Manufacturer: FixingGroup.
  - 2. Manufacturer: Eurotec.

## 2.5 FINISHES

- A. Wood Preservative: Cutek - Extreme Wood Preservative.

- B. Stain: Duckback Products, Inc. – Super Deck® Exotic Hardwood Stain; Color as noted in the Finish Schedule.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify adequacy of blocking, backing and support framing for all cladding and trim work.
  - 1. Ensure cladding support strips are spaced not greater than 16 inches on center.
- B. Beginning of installation means acceptance of site conditions.

#### **3.2 INSTALLATION**

- A. General: Must be properly framed, closely fitted and accurately set to the required lines and levels and shall be rigidly secured in place.
  - 1. Scribe and cut work to fit adjoining work closely.
  - 2. Refinish cut surfaces of prefinished boards.
- B. Install using specified decking clip system in accordance with manufacturer's written instruction. Install "first" board using specified self-tapping stainless-steel screws.
- C. Face screwing with stainless steel screws using other than the specified self-tapping screws requires predrilling a hole that is 1/32 inch (0.8mm) smaller in diameter than the screw and counter-bore for screw head's taper. Utilize depth stop to ensure size of screw head and counter-bore are the same.
  - 1. Minimum screwing distance from edge: 3/4 inch (19mm) minimum screwing distance from end: 1 1/2 inch (39mm). Predrilling is required, even with specified self tapping screws, less than 3 inches from the end of a deck board.

#### **3.3 FIELD FINISHING**

- A. Remove surface contaminants, stains, dirt, mildew, algae, fungus, and failed oxidized stains using cleaners recommended by the manufacturer.
- B. Apply finishes in accordance with preservative finish manufacturer's written instructions, prior to installation of boards.
  - 1. Application Method: Brush.
  - 2. Application Method: Roller.
  - 3. Application Method: Spray.
    - a. Use the lowest possible pressure required to maintain a consistent spray pattern.
    - b. Immediately following spraying, back-roll the finish, working the product smoothly and evenly into the wood to ensure a properly penetrated finish.

- C. Penetrating stain must be applied only at a rate the wood will absorb. Excess product allowed to sit on surface will result in a tacky finish and extended dry time. Remove tacky finish with mineral spirits within 24 hours of application or with a mild solution of Wood Cleaner after 24 hours. When properly applied, the wood surface will have a positive dry and the wood fibers beneath the surface will maintain excellent lubrication. Thoroughly coat the porous ends of all boards with finishing product.

### **3.4 TOLERANCES**

- A. Maintain a maximum variation for of 1/8 inch in 8 feet (3mm/2438mm) for plumb and level and a maximum of 1/16 inch (1.5mm) offset from adjoining surfaces intended to be flush.

### **3.5 CLEANING**

- A. Daily clean work areas by sweeping and disposing of scraps and sawdust.
- B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

### **3.6 PROTECTION**

- A. During the installation of exterior wood cladding and finishing, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

### **END OF SECTION**

## **SECTION 06 41 00 - ARCHITECTURAL WOOD CASEWORK**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Specially fabricated cabinet units.
- B. Hardware.
- C. Preparation for installing utilities.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 08 80 00 - Glazing: Glass for casework.

#### **1.3 REFERENCE STANDARDS**

- A. AWI (QCP) - Quality Certification Program; current edition at [www.awiqcp.org](http://www.awiqcp.org).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2016, with Errata (2017).
- C. BHMA A156.9 - American National Standard for Cabinet Hardware; 2015.

#### **1.4 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
  - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
  - 2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
  - 3. Include certification program label.
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
- E. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.

- F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

## **1.5 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
  - 1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
  - 2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
  - 3. Single Source Responsibility: Provide and install this work from single fabricator.
- B. Quality Certification:
  - 1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: [www.awiqcp.org/#sle](http://www.awiqcp.org/#sle).
  - 2. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
  - 3. Provide designated labels on shop drawings as required by certification program.
  - 4. Provide designated labels on installed products as required by certification program.
  - 5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
  - 6. Replace, repair, or rework all work for which certification is refused.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Protect units from moisture damage.

## **1.7 FIELD CONDITIONS**

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

## **PART 2 PRODUCTS**

### **2.1 CABINETS**

- A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS), unless noted otherwise.
- B. Cabinets:

1. Finish - Exposed Surfaces: Solid surface as indicated per drawings.
2. Finish - Concealed Surfaces: Manufacturer's option.
3. Interface Style for Cabinet and Door: Style 1 - Overlay; reveal overlay.
4. Adjustable Shelf Loading: 50 lbs. per sq. ft.
5. Cabinet Style: Flush overlay.

## **2.2 WOOD-BASED COMPONENTS**

- A. Wood fabricated from old growth timber is not permitted.
- B. Provide sustainably harvested wood, certified or labeled as specified in Section 01 60 00.

## **2.3 ACCESSORIES**

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Glass: Type 3/8 inch clear tempered as specified in Section 08 80 00.
- C. Fasteners: Size and type to suit application.
- D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- E. Concealed Joint Fasteners: Threaded steel.
- F. Grommets: Standard painted metal grommets for cut-outs, in color to match adjacent surface.

## **2.4 HARDWARE**

- A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.

## **2.5 FABRICATION**

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.

## **2.6 SHOP FINISHING**

- A. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified and as follows:

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

#### **3.2 INSTALLATION**

- A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- C. Secure cabinets to floor using appropriate angles and anchorages.
- D. Site glaze glass materials using the Interior Dry method specified in Section 08 80 00.

#### **3.3 ADJUSTING**

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

#### **3.4 CLEANING**

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

### **END OF SECTION**

## **SECTION 07 11 13 - BITUMINOUS DAMPPROOFING**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Bituminous dampproofing.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 31 23 23 - Fill.
- B. Section 33 41 00 - Subdrainage.

#### **1.3 REFERENCE STANDARDS**

- A. ASTM D3747 - Standard Specification for Emulsified Asphalt Adhesive for Adhering Roof Insulation; 1979 (Reapproved 2007).
- B. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free; 2007, with Editorial Revision (2012).
- C. NRCA (WM) - The NRCA Waterproofing Manual; 2005.

#### **1.4 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide properties of primer, bitumen, and mastics.
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

#### **1.5 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing the work of this section with at least three years of documented experience.

#### **1.6 FIELD CONDITIONS**

- A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until dampproofing has cured.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Bituminous Dampproofing Manufacturers:
  - 1. Karnak Corporation: [www.karnakcorp.com/#sle](http://www.karnakcorp.com/#sle).
  - 2. Mar-Flex Systems, Inc: [www.mar-flex.com/#sle](http://www.mar-flex.com/#sle).
  - 3. W. R. Meadows, Inc: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
  - 4. Henry Company: [www.henry.com](http://www.henry.com).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.2 BITUMINOUS DAMPPROOFING**

- A. Bituminous Dampproofing: Cold-applied, spray-grade; asphalt base, volatile petroleum solvents, and other content, suitable for application by spray, brush, roller, or squeegee; asbestos-free; suitable for application on vertical and horizontal surfaces.
  - 1. Composition: ASTM D4479/D4479M Type I, minimum, asbestos free.
  - 2. VOC Content: Not more than permitted by local, State, and federal regulations.
  - 3. Applied Thickness: 1/16 inch, minimum, wet film.
  - 4. Products:
    - a. W. R. Meadows, Inc; Sealmastic Spray-Mastic: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
    - b. Henry Company; Henry 788: [www.henry.com](http://www.henry.com).
    - c. Karnak; 100 Non-fibered Emulsion Dampproofing: [www.karnakcorp.com](http://www.karnakcorp.com)
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Primers, Mastics, and Related Materials: Type as recommended by dampproofing manufacturer.

### **2.3 BITUMEN MATERIALS**

- A. Cold Asphaltic Type:
  - 1. Bitumen: Asphalt emulsion, ASTM D3747.
  - 2. Asphalt Primer: ASTM D41/D41M, compatible with substrate.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify existing conditions are acceptable prior to starting this work.
- B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.

- C. Verify that items penetrating surfaces to receive dampproofing are securely installed.

### **3.2 PREPARATION**

- A. Protect adjacent surfaces not designated to receive dampproofing.
- B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.
- C. Do not apply dampproofing to surfaces unacceptable to manufacturer.
- D. Apply mastic to seal penetrations, small cracks, or minor honeycombs in substrate.

### **3.3 APPLICATION**

- A. Foundation Walls: Apply two coats of asphalt dampproofing.
- B. Foundation Walls: Patch disturbed areas of existing dampproofing with two additional coats of dampproofing of the same generic type.
- C. Perform this work in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- D. Prime surfaces in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- E. Prime surfaces at a rate approved by manufacturer for application indicated, and allow primer to dry thoroughly.
- F. Apply bitumen as recommended by manufacturer.
- G. Seal items watertight with mastic, that project through dampproofing surface.
- H. Immediately backfill against dampproofing to protect from damage.

### **END OF SECTION**

## **SECTION 07 21 00 - THERMAL INSULATION**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Board insulation at perimeter foundation wall, underside of floor slabs, and exterior wall behind exterior wall finish.
- B. Batt insulation and vapor retarder in exterior wall construction.
- C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 07 25 00 - Weather Barriers: Separate air barrier and vapor retarder materials.
- C. Section 07 42 10.21 - Continuous Insulation with Composite Framing Support System: Insulation associated with composite secondary framing system.
- D. Section 07 54 00 - Thermoplastic Membrane Roofing: Insulation specified as part of roofing system.
- E. Section 07 84 00 - Firestopping: Insulation as part of fire-rated through-penetration assemblies.
- F. Section 09 21 16 - Gypsum Board Assemblies: Acoustic insulation inside walls and partitions.

#### **1.3 REFERENCE STANDARDS**

- A. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2017, with Editorial Revision (2018).
- B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2018.
- C. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.
- E. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

#### **1.4 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.
- F. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
- G. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of contractor accreditation and installer certification on project site during and after installation. Present on-site documentation upon request.

#### **1.5 QUALITY ASSURANCE**

- A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); [www.airbarrier.org/#sle](http://www.airbarrier.org/#sle):
  - 1. Installer Qualification: Use accredited contractors, certified installers, evaluated materials, and third-party field quality control audit.
  - 2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

#### **1.6 FIELD CONDITIONS**

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

### **PART 2 PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Thermal Insulation Manufacturers:
  - 1. Dow; [www.dupont.com/building](http://www.dupont.com/building).

2. Kingspan; [www.kingspan.com](http://www.kingspan.com).
3. Certainteed; [www.certainteed.com](http://www.certainteed.com).
4. Owens Corning; [www.owenscorning.com](http://www.owenscorning.com).
5. Knauf; [www.knaufnorthamerica.com](http://www.knaufnorthamerica.com)
6. Johns Manville; [www.jm.com](http://www.jm.com).
7. Thermafiber; [www.thermafiber.com](http://www.thermafiber.com)
8. Rockwool; [www.rockwool.com](http://www.rockwool.com)
9. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.2 APPLICATIONS

- A. Insulation Under Concrete Slabs: Extruded polystyrene (XPS) board.
- B. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.
- C. Insulation in Metal Framed Walls: Batt insulation with integral vapor retarder.

## 2.3 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578 with either natural skin or cut cell surfaces.
  1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
  2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
  3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
  4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88) per 1 inch thickness at 75 degrees F mean temperature.
  5. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
  6. Board Edges: Square.
  7. Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.
  8. Manufacturers:
    - a. Dow Chemical Company; STYROFOAM HIGHLOAD 40:  
[www.dowbuildingsolutions.com/#sle](http://www.dowbuildingsolutions.com/#sle).
    - b. Kingspan Insulation LLC; GreenGuard XPS Type IV, 25 psi: [www.kingspan.com/#sle](http://www.kingspan.com/#sle).
    - c. Owens Corning Corporation; FOAMULAR Extruded Polystyrene (XPS) Insulation:  
[www.ocbuildingspec.com/#sle](http://www.ocbuildingspec.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.4 BATT INSULATION MATERIALS

- A. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.

1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
3. Provide foil facing on one side OR separate vapor retarder.
4. Thermal Resistance: R-value of 4.0 per inch.
5. Manufacturers:
  - a. Knauf Insulation; EcoBatt Insulation: [www.knaufinsulation.com/#sle](http://www.knaufinsulation.com/#sle).
  - b. ROCKWOOL (ROXUL, Inc); COMFORTBATT: [www.rockwool.com/#sle](http://www.rockwool.com/#sle).
  - c. Thermafiber, Inc; SAFB FF: [www.thermafiber.com/#sle](http://www.thermafiber.com/#sle).
  - d. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.5 ACCESSORIES

- A. Sheet Vapor Retarder: Provide integral factory facing vapor retarder OR Black polyethylene film reinforced with glass fiber square mesh, 10 mil thick.
- B. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.
  1. Application: Sealing of interior circular penetrations, such as pipes or cables.
  2. Width: Are required for application.
- C. Flashing Tape: Special reinforced film with high performance adhesive.
  1. Application: Window and door opening flashing tape.
  2. Width: As required for application.
- D. Tape joints of rigid insulation in accordance with roofing and insulation manufacturers' instructions.
- E. Insulation Fasteners: Appropriate for purpose intended.
- F. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.
- G. Adhesive: Type recommended by insulation manufacturer for application.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

### **3.2 BOARD INSTALLATION AT FOUNDATION PERIMETER**

- A. Adhere a 6 inches wide strip of polyethylene sheet over construction, control, and expansion joints with double beads of adhesive each side of joint.
  - 1. Tape seal joints.
  - 2. Extend sheet full height of joint.
- B. Apply adhesive to back of boards:
  - 1. Three continuous beads per board length.
  - 2. Full bed 1/8 inch thick.
- C. Install boards horizontally on foundation perimeter.
  - 1. Place boards to maximize adhesive contact.
  - 2. Install in running bond pattern.
  - 3. Butt edges and ends tightly to adjacent boards and to protrusions.
- D. Extend boards over expansion joints, unbonded to foundation on one side of joint.
- E. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- F. Immediately following application of board insulation, place protective boards over exposed insulation surfaces.

### **3.3 BOARD INSTALLATION UNDER CONCRETE SLABS**

- A. Place insulation under slabs on grade after base for slab has been compacted.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

### **3.4 BATT INSTALLATION**

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. Install with factory-applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.

- F. Staple or nail facing flanges in place at maximum 6 inches on center.
- G. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.
- H. Tape seal tears or cuts in vapor retarder.
- I. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

### **3.5 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Coordination of Air Barrier Association of America (ABAA) Tests and Inspections:
  - 1. Provide testing and inspection required by ABAA Quality Assurance Program (QAP).
  - 2. Notify ABAA in writing of schedule for air barrier work, and allow adequate time for testing and inspection.
  - 3. Cooperate with ABAA testing agency.
  - 4. Allow access to air barrier work areas and staging.
  - 5. Do not cover air barrier work until tested, inspected, and accepted.

### **3.6 PROTECTION**

- A. Do not permit installed insulation to be damaged prior to its concealment.

### **END OF SECTION**

## **SECTION 07 25 00 - WEATHER BARRIERS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Air Barriers: Materials that form a system to stop passage of air through exterior walls, joints between exterior walls and roof, joints around frames of openings in exterior walls, and \_\_\_\_.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete: Vapor retarder under concrete slabs on grade.
- B. Section 07 21 00 - Thermal Insulation: Vapor retarder installed in conjunction with batt insulation.
- C. Section 07 54 00 - Thermoplastic Membrane Roofing: Vapor retarder installed as part of roofing system.

#### **1.3 DEFINITIONS**

- A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
- B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.

#### **1.4 REFERENCE STANDARDS**

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.
- B. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- C. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.
- D. ICC-ES AC308 - Acceptance Criteria for Water-Resistive Barriers; 2016.
- E. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

## **1.5 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on material characteristics.
- C. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.
- D. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.
- E. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
- F. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification; keep copies of each contractor accreditation and installer certification on site during and after installation, and present on-site documentation upon request.
- G. Testing Agency Qualification Statement.
- H. Warranty Documentation for Installation of Building Rainscreen Assembly: Submit installer warranty and ensure that forms have been completed in Owner's name and registered with installer.

## **1.6 QUALITY ASSURANCE**

- A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); [www.airbarrier.org/#sle](http://www.airbarrier.org/#sle):
  - 1. Installer Qualification: Use accredited contractor, certified installers, evaluated materials, and third-party field quality control audit.
  - 2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture, and use secondary materials approved in writing by primary material manufacturer.
- B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

## **1.7 FIELD CONDITIONS**

- A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

## **PART 2 PRODUCTS**

### **2.1 WEATHER BARRIER ASSEMBLIES**

#### **A. Air Barrier:**

1. On outside surface of sheathing of exterior walls use air barrier sheet, self-adhered type.

### **2.2 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)**

#### **A. Air Barrier Sheet, Self-Adhered:**

1. Air Permeance: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
2. Water Vapor Permeance: 41 perms, minimum, when tested in accordance with ASTM E96/E96M Procedure A (Desiccant Method) at 73.4 degrees F.
3. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 90 days of weather exposure.
4. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less (Class A), when tested in accordance with ASTM E84.
5. Complies with NFPA 285 wall assembly requirements.
6. Water Resistance: Comply with applicable water-resistive requirements of ICC-ES AC308.
7. Seam and Perimeter Tape: As recommended by sheet manufacturer.
8. Manufacturers:
  - a. Carlisle Coatings and Waterproofing, Inc; Fire Resist 705 VP: [www.carlisleccw.com/#sle](http://www.carlisleccw.com/#sle).
  - b. Dorken Systems Inc; DELTA-VENT SA: [www.dorken.com/#sle](http://www.dorken.com/#sle).
  - c. GCP Applied Technologies; Perm-A-Barrier VPS: [www.gcpat.com/#sle](http://www.gcpat.com/#sle).
  - d. VaproShield, LLC; WrapShield SA - Self-Adhered: [www.vaproshield.com/#sle](http://www.vaproshield.com/#sle).
  - e. W. R. Meadows, Inc; Air-Shield SMP: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
  - f. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.3 ACCESSORIES**

#### **A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.**

#### **B. Sill Plate Sealer: Closed-cell foam tape with rubberized adhesive membrane; bridges gap between foundation structure and sill plate or skirt board.**

1. Width: 5-1/2 inches.
2. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 30 days of weather exposure.
3. Manufacturers:
  - a. Protecto Wrap Company; Triple Guard Energy Sill Sealer: [www.protectowrap.com/#sle](http://www.protectowrap.com/#sle).

- b. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Thinners and Cleaners: As recommended by material manufacturer.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that surfaces and conditions are ready to accept the work of this section.

#### **3.2 PREPARATION**

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
- B. Clean and prime substrate surfaces to receive adhesives in accordance with manufacturer's instructions.

#### **3.3 INSTALLATION**

- A. Install materials in accordance with manufacturer's instructions.
- B. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.
- D. Self-Adhered Sheets:
  - 1. Prepare substrate in manner recommended by sheet manufacturer; fill and tape joints in substrate and between dissimilar materials.
  - 2. Lap sheets shingle-fashion to shed water and seal laps air tight.
  - 3. Once sheets are in place, press firmly into substrate with resilient hand roller; ensure that laps are firmly adhered with no gaps or fishmouths.
  - 4. Use same material, or other material approved by sheet manufacturer for the purpose, to seal to adjacent construction and as flashing.
  - 5. At wide joints, provide extra flexible membrane allowing joint movement.
- E. Openings and Penetrations in Exterior Weather Barriers:
  - 1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
  - 2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches wide; do not seal sill flange.

3. At openings to be filled with non-flanged frames, seal weather barrier to each side of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

### **3.4 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Coordination of ABAA Tests and Inspections:
  1. Provide testing and inspection required by ABAA QAP.
  2. Notify ABAA in writing of schedule for air barrier work, and allow adequate time for testing and inspection.
  3. Cooperate with ABAA testing agency.
  4. Allow access to air barrier work areas and staging.
  5. Do not cover air barrier work until tested, inspected, and accepted.
- C. Take digital photographs of each portion of the installation prior to covering up.

### **3.5 PROTECTION**

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

**END OF SECTION**

## **SECTION 07 42 10.21 - CONTINUOUS INSULATION (CI) WITH COMPOSITE FRAMING SUPPORT (CFS) SYSTEM**

### **GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Continuous insulation (CI) steel and fiber reinforced polymer (sFRP) composite framing support (CFS) system integrated with anels or cintered stone exterior wall cladding.
  - 1. Substrate: Exterior sheathing over metal stud framing.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 05 4000 – Cold-Formed Metal Framing: Metal stud substrate support framing
- B. Section 06 1000 – Rough Carpentry: Exterior sheathing and wood stud substrate support framing
- C. Section 07 2500 – Weather Barriers: Air, water, vapor barrier over exterior sheathing
- D. Section 07 9200 – Joint Sealants: Perimeter sealant

#### **1.3 REFERENCE STANDARDS**

- A. ASTM International (American Society for Testing and Materials; [www.astm.org](http://www.astm.org))
  - 1. ASTM C1177/C1177M – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013
  - 2. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2015
  - 3. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus; 2011
  - 4. ASTM C1396/C1396M – Standard Specification for Gypsum Board; 2014a
  - 5. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination: Coordinate construction of wall cladding support system over substrate indicated for proper drainage, flashing, trim, back-up support, soffits, and other related Work.
  - 1. Review means and methods related to installation, including manufacturer's written instructions.
  - 2. Examine support conditions for compliance with requirements, including alignment and attachment to structural support system.

3. Review flashings, wall cladding details, wall penetrations, drainage plane, openings, and condition of other construction that affects this Work.
4. Review temporary protection requirements for during and after installation of this Work.

### **1.5 SUBMITTALS**

- A. See Section 01 3000 – Administrative Requirements, for submittal procedures.
- B. Product Data: Submit for each type of product indicated; include construction details, material descriptions, dimensions of individual components and profiles, and accessories as necessary for complete fully functioning and assembled system.
- C. Test and Inspection Reports: Submit test and inspection reports on each type of wall cladding/veneer system based on evaluation of comprehensive tests performed by nationally recognized testing agency.
- D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with at least ten years of documented experience.
- B. Installer: Company specializing in performing work of this section and the following:
  1. Install system in strict compliance with manufacturer's installation instructions.
  2. Have not less than three years of documented experience.
- C. Design Engineer's Qualifications: Design structural supports and anchorages under direct supervision of a licensed Structural Engineer experienced in design for this type of Work and licensed in State that Project is located. Engineering information provided shall be signed and verified by licensed Structural Engineer.
- D. Source Limitations: Obtain CI and CFS system from single source and single manufacturer.

### **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to site in manufacturer's original unopened containers and packaging with labels clearly identifying product name and manufacturer.
- B. Deliver components and other manufactured items or accessories without damage or deformation.
- C. Storage: Store materials in clean, dry, and level interior areas or outdoor areas for limited duration in accordance with manufacturer's written instructions.

- D. Protect components and auxiliary accessories during transportation, handling, and installation from moisture, excessive temperatures and other construction operations in accordance with manufacturer's written instructions.
- E. Handle components in strict compliance with manufacturer's written instructions and recommendations, and in a manner to prevent bending, warping, twisting, and surface, edge or corner damage.

## **1.8 SITE CONDITIONS**

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of this Work in accordance with manufacturer's written installation instructions and warranty requirements.

## **1.9 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. CI and CFS System Warranty: Provide written warranty by manufacturer and installer agreeing to correct defects in manufacturing within a five year or period after Date of Substantial Completion.

## **PRODUCTS**

### **2.1 MANUFACTURER**

- A. Advanced Architectural Products (A2P): SMARTci 2-in-1 System
  1. Address: 959 Industrial Drive, Allegan, Michigan 49010.
  2. Phone: (269) 355-1818; Fax: (866) 858-5568; Website: [www.smartcisystems.com](http://www.smartcisystems.com)
  3. Other products shall be pre-submitted and approved products that meet materials and performance requirements with specified and validated third party testing.

### **2.2 DESCRIPTION**

- A. CFS system components anchored to exterior sheathing over metal stud framing.
  1. Refer to Section 05 4000 for metal stud framing.
- B. Install CI panels and CFS system components horizontally on substrate system as indicated on drawings in compliance with specified requirements.

## 2.3 PERFORMANCE REQUIREMENTS

- A. Structural: Provide system tested in accordance with ASTM E330/E330M and certified to be without permanent deformation or failure of structural members in accordance with design wind velocities for project geographic location and probability of occurrence based on data from wind velocity maps provided in ASCE 7 and as approved by authorities having jurisdiction (AHJ).
1. Provide finite element analysis (FEA) to model and evaluate areas of the longest composite girt cantilever span possible between intermediate framing members/attachment.
    - a. FEA shall include max dead load and wind load conditions
    - b. Maximum directional stresses in model shall have a safety factor of 4 or greater.
    - c. Report shall be furnished with the submittal.
    - d. FEA shall be approved by a licensed PE.
  2. Butt joints (non-interlocking joints) of adjacent girts shall be installed on a minimum surface width of 3" or double stud condition to accommodate proper fastener margins to composite.
- B. System Thermal Design: Ensure installed CI and CFS system, opening trim, sub-framing, clips and cladding attachment does not have thermal bridging of fasteners or framing that creates a continuous metal path from exterior surface of insulation to interior face of insulation.
1. System thermal design shall meet or exceed thermal design requirements in compliance with more stringent of current edition of ASHRAE 90.1 or local energy code.
  2. Thermal Resistance: Wall assembly R Value of R-13 C.I. + R-10 or Assembly Maximum U-value of 0.055.
  3. Thermal Performance Test: Provide thermal resistance (R-value) indicated, in compliance with ASTM C1363, corrected to 15 mph outside and still air inside, with installed conditions including trim for openings, fastening and joints.
- C. Fire-Test-Response Characteristics: Provide composite framing support system with fire-test results indicated as determined by test standard indicated and applied by UL or other testing and inspection agency acceptable to authorities having jurisdiction.
1. Surface Burning Characteristics: In compliance with ASTM E84, for foam insulation, steel and fiber reinforced polymer (sFRP) and interior surfaces as follows:
    - a. Flame Spread Index (FSI): 25 or less.
    - b. Smoke Developed Index (SDI): 450 or less.

## 2.4 COMPOSITE FRAMING SUPPORT (CFS) SYSTEM

- A. CFS System: Provide CFS system consisting of polyester resin matrix (sFRP) with recycled materials, fire retardant additives and reinforced with integral continuous metal inserts the length of profile at all fastening locations. Reinforce CFS systems with glass strand rovings used internally for longitudinal (lengthwise) strength and continuous strand glass mats or stitched reinforcements used internally for transverse (crosswise) strength.
1. Depth of GreenGirt: 2 inch deep.
  2. On Center Spacing: 16 inch.

3. Provide continuous non-corrosive steel insert for engagement of fasteners, 16 gage, minimum thickness, with G90 galvanized coating designation in compliance with ASTM A653/A653M.
  - a. Fully engage steel insert with adjacent CFS at ends.
  - b. Anchor sub-girts and other wall cladding support accessories to steel insert set into and part of CFS.
  - c. Provide screw pullout testing that meets or exceeds [       lbs>].
  - d. Thermal Transmission: CFS system design should limit rate of heat flow crosswise through the profile section to less than 1.75 watts per 8' length in profile and temperature delta of 100 degrees Fahrenheit. Rate of heat flow to be determined in accordance with ASTM C1045-01, validated by a third party.
    - 1) Surface Burning Characteristics:
      - a) Flame Spread Index (FSI): 25 or less, when tested in accordance with ASTM E84.
      - b) Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
    - 2) Flammability: Comply with ASTM E84.
    - 3) Self-Extinguishing: Comply with ASTM D635.
    - 4) Profile Visual Requirements: Comply with ASTM D4385.
  - e. Mechanical Strength Requirements: Provide sFRP system in compliance with the performance loading criteria and specified safety factors to meet the below requirements:
    - 1) Longitudinal:

Evaluation	Method	Minimum Longitudinal
Modulus of Elasticity	ASTM D638	29,000,000 psi
Tensile Strength	ASTM D638	50,000 psi
Compressive Strength	ASTM 6641	50,000 psi
Flexural Stress	ASTM D790	50,000 psi

- a) Crosswise:

Evaluation	Method	Minimum Crosswise
Modulus of Elasticity	ASTM D638	3,300,000 psi
Tensile Strength	ASTM D638	40,000 psi
Compressive Strength	ASTM 6641	30,000 psi
Flexural Stress	ASTM D790	40,000 psi

- f. Barcol Hardness: 45, in accordance with ASTM D2583.
- g. Water Absorption: Less than 0.46 percent by weight, within 24 hours, tested in accordance with ASTM D570.

- h. Density: Within range of 0.062 to 0.070 lbs/cubic inch, in accordance with ASTM D792.
- i. Lengthwise Coefficient of Thermal Expansion:  $7.0 \times 10^{-6}$  inch/inch/degrees F, in accordance with ASTM D696.
- j. Notched Izod Impact, Lengthwise: 160 ft lbs/inch, in accordance with ASTM D256 within temperature range indicated.
- k. Notched Izod Impact, Crosswise: 100 ft lbs/inch, in accordance with ASTM D256 within temperature range indicated.

## 2.5 INSULATION

- A. Insulation Panel Edges: Provide factory formed edges on insulation panels that interlock with CFS system components.
- B. Polyisocyanurate Panel Insulation: Rigid closed cell foam, complying with ASTM C1289; Type I with impermeable aluminum foil facing on both sides; Class 1 with non-reinforced foam core.
  - 1. Flame Spread Index (FSI): 25 or less, tested in accordance with ASTM E84.
  - 2. Smoke Developed Index (SDI): 450 or less, tested in accordance with ASTM E84.
  - 3. Thermal Resistance: 2 inch, R-Value 13; ASTM C518 at 75 degrees F.
  - 4. Comply with fire-resistance requirements, as indicated on drawings, and as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
  - 5. Compressive Strength: Grade 2, 20 psi; tested in compliance with ASTM D1621.
  - 6. Dimensional Stability: Less than 2 percent linear change after 7 days; ASTM D2126.
  - 7. Moisture Vapor Permeance: Less than 0.05 perm; ASTM E96/E96M.
  - 8. Water Absorption: Less than 0.05 percent by volume; tested to ASTM C209.
  - 9. Service Temperature: Range of minus 100 degrees F to 250 degrees F.
  - 10. Acceptable Products:
    - a. Basis of Design (BOD): Hunter Panels, LLC; Product Xci Foil ([www.hunterxci.com](http://www.hunterxci.com))
    - b. Atlas Roof Insulation ([www.atlasroofing.com](http://www.atlasroofing.com))
    - c. Firestone Building Products; Product Enverge ISO ([www.firestonebpco.com](http://www.firestonebpco.com))
    - d. Dupont (DOW); Thermax Sheathing Insulation ([www.dupont.com](http://www.dupont.com))
    - e. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.6 CONTINUOUS INSULATION SYSTEM ASSEMBLY

- A. Assemble CI with CFS and trim system using manufacturer's standard procedures and processes identical to tested units and as necessary to comply with performance requirements indicated.
  - 1. Comply with CFS system and dimensional and structural requirements as indicated on drawings.
  - 2. Erect CFS system in sequence in accordance with manufacturer's standard installation procedures.
  - 3. Provide spray foam sealant on backside of cantilevered fasteners that completely puncture the insulation layer.

- a. Provide uninterrupted, monolithic drainage plane as required per project details.

## 2.7 ACCESSORIES

- A. Provide accessories necessary for complete CFS system including metal closure trim, transition angle, strapping, tie-in brackets and similar items.
- B. Fasteners: Corrosion-resistant, self-tapping and self-drilling screws, bolts, nuts, and other fasteners as recommended by CFS system manufacturer for sFRP material and project application.
  1. Cladding to sFRP: Use standard self-tapping metal screws as required by substrate manufacturer.
  2. sFRP to Metal Stud Wall Framing: Use standard self-tapping metal screws.
  3. DO NOT USE powder, air, or gas actuated fasteners or actuated fastener tools. DO NOT USE impact wrenches when fastening to or from the sFRP.
  4. sFRP attachments to follow guidelines of ASCE Structural Plastics Design Manual:
- C. Tape: Pressure sensitive adhesive coated polypropylene woven fabric. Must be mold, water, tear and UV resistant. Must be applicable in a wide temperature range (-20 degrees F).
- D. Wall Sheathing: Glass mat faced gypsum, ASTM C1177/C1177M, square long edges, Type X fire-resistant.
  1. Refer to Drawings for thickness and Section 06 1000 for additional requirements.
- E. Weather Resistant Barrier (WRB): Refer to Section 07 2500 for requirements.
- F. Sealants: Provide sealants as recommended by CFS manufacturer for openings within CFS system and perimeter conditions.
- G. Closure and Transition Accessories: Use metal angles and flat stock per standard system details.

## EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas of this work, and project conditions with installer present for compliance with requirements for installation tolerances, substrates, CFS system conditions, and other conditions affecting performance of this Work.
- B. Examine structural wall framing to ensure that angles, channels, studs, and other structural support members have been installed within alignment tolerances required by CFS system manufacturer.
- C. Examine rough-in for components and systems penetrating CFS system to coordinate actual locations of penetrations relative to CFS systems joint locations prior to installation.

- D. Verify that mechanical and electrical services for exterior walls have been installed and tested and, if appropriate, verify that adjacent materials and finishes are dry and ready to receive insulation.
- E. Proceed with installation only after wall substrate surfaces have been properly prepared and unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using methods recommended by CFS manufacturer for achieving best result for substrate under project conditions.
- C. Prepare sub-framing, base angles, sills, furring, and other CFS system members and provide anchorage in accordance with ASTM C754 for substrate type and wall cladding type in accordance with manufacturer's installation instructions.

### **3.3 INSTALLATION**

- A. Install CFS system in accordance with manufacturer's installation instructions.
- B. Install system to fill-in exterior spaces without gaps or voids, and do not compress insulation panels.
- C. Trim insulation neatly to fit spaces, and insulate miscellaneous gaps and voids.
- D. Fit insulation tight in spaces and tight to exterior side of Mechanical/Electrical services within plane of insulation.
- E. Seal gaps, voids or penetrations completely with approved expandable foam sealant on exterior and interior (if visible) before enclosing wall.
- F. Provide spray foam to seal metal penetrations, including cantilevered fasteners, to prevent interstitial space condensation.
- G. Exposed insulation must be protected from open flame and kept dry at all times.
- H. Exterior wall insulation panels are not intended to be left exposed for periods of time in excess of 60 days without adequate protection.
  - 1. When extended exposure is anticipated, protect exposed insulation surfaces including corners, window and door openings with a compatible waterproof tape.
- I. Install CFS system in compliance with system orientation, sizes, and locations as indicated on drawings.

### **3.4 TOLERANCES**

- A. Shim and align CFS system within installed tolerances of 1/4 inch in 20 feet, non-cumulative, level, plumb, and on location lines as indicated.

### **3.5 PROTECTION**

- A. Protect installed products from damage until Date of Substantial Completion.
- B. Ensure that insulation panels are not exposed to moisture.
  - 1. Remove wet insulation panels or allow them to completely dry prior to installation of CFS system.
- C. Replace damaged insulation panels prior to Date of Substantial Completion.

### **END OF SECTION**

## **SECTION 07 42 49 - SINTERED CERAMIC WALL PANELS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Manufactured sintered ceramic wall panels system and support assembly.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 05 40 00 - Cold-Formed Metal Framing: Metal stud support framing.
- B. Section 06 10 00 - Rough Carpentry: Water-resistive barrier under wall panels.
- C. Section 07 25 00 - Weather Barriers: Air/vapor barrier on wall sheathing.
- D. Section 07 92 00 - Joint Sealants: Sealing joints between wall panel system and adjacent construction.

#### **1.3 REFERENCE STANDARDS**

- A. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

#### **1.4 COORDINATION**

- A. Coordinate with installations of other wall mounted items, such as equipment, mechanical and electrical devices, so that their installation does not negatively effect wall panel system.
- B. Coordinate size and locations of wall panel penetrations on shop drawings with approval from wall panel manufacturer before starting on-site work.
- C. Coordinate interfaces, transitions, lappings, flashings, and compatibility of membranes as required for wall panel system installation.

#### **1.5 PREINSTALLATION MEETING**

- A. Preinstallation Meeting: Conduct a preinstallation meeting two weeks prior to the start of the work of this section; require attendance by other affected installers.
  - 1. Attendees: Architect, Owner's Representative, wall panel Manufacturer's Representative, and other effected installers.

## 1.6 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on wall substrate, wall sheathing, air/weather barrier, board insulation, panel support framing system, and wall panels; showing compliance with requirements, including:
  - 1. Physical characteristics of components shown on shop drawings.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation instructions and recommendations.
- C. Shop Drawings: Submit the following information from professional engineer licensed in the State in which the Project is located and responsible for engineering calculations necessary for this work:
  - 1. Finish, type and thickness of wall panel system components.
  - 2. Size, spacing, and location of support framing, sub-girts, support clips, connections, types and locations of fasteners.
- D. Test Reports: Submit test report verifying compliance with NFPA 285 for previously-tested exterior wall assembly.
- E. Manufacturer's Qualification Statement.
- F. Installer's Qualification Statement.
- G. Maintenance Data: Provide maintenance data describing panel finishes and required cleaning procedures.
- H. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- I. Warranty Documentation for Installation of Building Rainscreen Assembly: Submit installer warranty and ensure that forms have been completed in Owner's name and registered with installer.

## 1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with at least 10 years of documented experience.
- B. Installer Qualifications: Company specializing in installing products of the type specified in this section with at least ten years of documented experience, and approved as well as certified by manufacturer.
- C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

## **1.8 MOCK-UP**

- A. Erect integrated exterior mock-up, 6 feet long by 6 feet wide; including wall panel system components, attachments to building frame or supporting substrate, associated air/vapor barrier material on sheathing or substrate, weep drainage system, sealants and seals, and board insulation within mock-up assembly.
- B. See Section 01 40 00 - Quality Requirements for additional requirements.
- C. Do not proceed with wall panel system work until mock-up has been approved.
- D. Locate away from primary street elevation.
- E. Mock-up may remain as part of the Work.

## **1.9 DELIVERY, STORAGE, AND HANDLING**

- A. Store sintered ceramic panels and installation system materials in a dry location; handle in a manner to prevent chipping or breakage.
- B. Store sintered ceramic panels in an upright position supported along their long side.
- C. Protect exposed side of panels using wooden crating, cardboard or polystyrene.

## **1.10 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide manufacturer's warranty for five year period after Date of Substantial Completion, against wall panel surface staining, color fading, or other types of product deterioration.
- C. Installation Warranty for Building Rainscreen Assembly: Installer of exterior rainscreen assembly (including air/vapor barrier and attachments, framing, and exterior panels) to provide 10-year warranty that includes coverage for defective materials and/or workmanship. This warranty will also clearly include materials, labor, necessary activity to access these areas, and removal of any materials to effect repairs and restore to watertight conditions. [www.edacontractors.com/#sle](http://www.edacontractors.com/#sle)

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Sintered Ceramic Wall Panels Assembly:
  - 1. Basis-of-Design: Neolith by TheSize Surfaces; [www.thesize.es](http://www.thesize.es).

2. Elemex Inc; Ceramitex Sintered Ceramic Facade System (SCFS): [www.elemex.com/#sle](http://www.elemex.com/#sle).
3. Northern Facades; STX Ceramic Architectural Panels: [www.northernfacades.com/#sle](http://www.northernfacades.com/#sle).
4. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.2 SINTERED CERAMIC PANELS

- A. Description: Factory fabricated, prefinished sintered ceramic wall panel system, and site assembled.
1. Applications: Provide sintered ceramic panels for exterior walls and wall trim.
  2. Supporting Substrate Structure:
    - a. Metal studs as specified in Section 05 40 00 and wall sheathing, with horizontal sub-framing.
  3. Wall Sheathing: Provide approved materials as specified in Section 06 10 00.
  4. Weather resistive barrier: Provide approved materials as specified in Section 07 25 00.
  5. Provide exterior wall panel assembly with subgirt framing assembly, wall insulation, sheathing support system, related flashing, accessory components, and cement board substrates, adhesives, and grouts.
  6. Provide facade system consisting of compartmentalized and rear ventilated rainscreen system that allows moisture that enters or residual moisture from condensation to return to exterior along drainage plane.
  7. Fire Performance: Tested in accordance with, and complying with acceptance criteria of NFPA 285.
  8. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
  9. Design Pressure: In accordance with applicable codes.
  10. Maximum Allowable Deflection of Panel:  $L/180$  for length(L) of span.
  11. Structural and Thermal Movements: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
  12. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
  13. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
  14. Outside Corners: Factory-fabricated in one continuous piece, mitered and chamfered, with minimum 2 inch returns, and reinforced with extruded aluminum frame and compression gasket adhered to panel at inside of corner.
  15. Provide continuity of air barrier and vapor retarder seal at building enclosure elements in accordance with materials specified in Section 07 25 00.
- B. Wall Panels: Consist of ceramic and other raw, natural materials that have been run through a press and exposed to pressures of approximately 5800 psi, placed within oven and heated to at least 2192 degrees F, and fiberglass reinforcing mesh on backside embedded in two-component polyurethane adhesive system to provide additional stability and impact resistance.
1. Profile: As indicated on drawings.

2. Panel Thickness: 1/4 inch, nominal. (6mm)
  3. Panel Width: Refer to drawings for wall panel layout and size information.
  4. Panel Height: Refer to drawings for wall panel layout and size information.
  5. Panel Texture: As indicated on drawings.
  6. Panel Color Collection: As indicated on drawings.
- C. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.
- D. Supporting Z-Girts and insulating systems: Support framework for panel substrates, thermally broken.
1. Refer to Section 07 42 10.21 for Continuous Insulation and Composite Framing Support System.
- E. Thinset Mortar and Adhesives: As recommended by sintered stone manufacturer.
- F. Grout: As recommended by sintered stone manufacturer.
- G. Anchors: As recommended by manufacturer.

### **2.3 MATERIALS**

- A. Select materials with surface flatness, smoothness, and lack of surface blemishes where exposed to view in finished system.

### **2.4 FABRICATION**

- A. Factory fabricate panels in a controlled environment.
- B. Verify and coordinate field dimensions affecting work of this section, and ensure acceptability of adjacent building components relating to this work.
- C. Fabricate sintered ceramic slabs with multi-axis wet bridge saw to ensure cutting accuracy and smooth edge quality.
- D. Fabricate slabs square to difference of diagonal measurements of 0.2 percent, maximum.
- E. Scoring and cracking sintered ceramic slab using dry rail tile scorer method, and creating rough edges, is not permitted.
- F. Fabricate window sill, jamb and header conditions using continuous mitered and chamfered edge.
- G. Fabricate to profiles and sizes as indicated on approved shop drawings and confirmed field dimensions, complete with trims, flashings and filler components as required for interface with other work, and allowing for thermal and structural movements.

## **2.5 ACCESSORIES**

- A. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane in compliance with Section 07 92 00 specified requirements.
- B. Metal Lath: Provide as required by panel manufacturer.
- C. Fasteners: Manufacturer's standard type to suit application; stainless steel.
  - 1. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that framing substrate members and other related work are ready to receive wall panel system.
- B. Verify that weather barrier has been installed over substrate completely and correctly, refer to Section 06 1000.
- C. Report unsatisfactory conditions to Architect in writing, and do not start this work until these conditions have been corrected.

### **3.2 PREPARATION**

- A. Install supporting framework as indicated, ensure that it is securely fastened to substrates, shimmed and leveled to uniform plane.
  - 1. Spacing: Locate at 16 inches on center, maximum.

### **3.3 INSTALLATION**

- A. Install wall panels and components in accordance with manufacturer's written instructions and details, plumb, with intersecting components joined together and providing accurately fitted joints with adjoining surfaces in plane with each other.
- B. Attach components using system that does not restrict structural and thermal movement.
- C. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint; allow time for coatings to properly dry prior to installation.
- D. Install cold formed metal framing and sheathing as prescribed in related section.
  - 1. Coordinate tolerance requirements for sintered stone wall panels with framing contractor.

- E. Install weather barrier as prescribed in section 07 25 00. Terminate as required to maintain consistent and positively draining weather barrier assembly.
- F. Install horizontal composite Z-girts and insulation as prescribed in section 07 42 10.21.
- G. Fasten back board panels to horizontal structural supports; aligned, level, and plumb.
  - 1. Seal fasteners and tape joints as recommended by manufacturer per the application.
  - 2. Repair or replace damaged substrates.
  - 3. Remove substances and other blemishes that may interfere with panel installation.
- H. Thinset sintered panels to backer board as recommended by manufacturer; aligned, level, and plumb.
  - 1. Apply with notched trowel as recommended by manufacturer. Provide 100% coverage.
  - 2. Use rubber mallet to remove air pockets.
- I. Locate joints where indicated in drawings and within compliance of manufacturer recommendations.
  - 1. Panel joints to be 1/4" typical.
- J. Grout all joints solid, except for expansion and control joints.
  - 1. Provide flexible sealant control joints at 10 foot on center max.
  - 2. Color to match grouted joints.
  - 3. Coordinate locations with Architect.
  - 4. Remove excess material as recommended by sintered stone manufacturer.
- K. Align wall panels end-to-end providing accurate fit with adjacent panels; ensure adjacent panels are parallel and straight at joints.
- L. Replace misaligned, deflected, off-colored, and/or damaged panels to the satisfaction of the Owner and Architect.
- M. Install wall sheathing, air/vapor barrier, insulation and other necessary assembly components in accordance with manufacturer's instructions for locations as indicated.

### **3.4 TOLERANCES**

- A. Offset in Line Over Entire Area: For locations as shown on plan and continuous lines, do not exceed offset by 1:500 of length, or 9/16 inch, whichever is less.
- B. Offset in Plumb Over Entire Area: Vertical lines, external corners and other vertical lines, do not exceed 1:500 of length.
- C. Offset in Level From Panel to Panel: Horizontal bands, horizontal grooves, and other horizontal lines, do not exceed 1:500 of length.
- D. Offset in Panel Joint Width: 0.039 inch, maximum.

- E. Offset in Plane Between Adjacent Panels (Lipping or Step-in-Face): 0.039 inch, maximum.
- F. Offset in Alignment of Adjacent Panel Edges: 0.039 inch, maximum.

### **3.5 CLEANING**

- A. Remove protective material from wall panel surfaces.
- B. Clean and wash exposed surfaces with mild soap and water and rinse with clean water, in accordance with manufacturer's written instructions.

### **END OF SECTION**

## **SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN ROOFING - VERSICO**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Adhered roof system with thermoplastic-polyolefin (TPO) roofing membrane.
- B. Vapor retarder.
- C. Deck sheathing.
- D. Cover boards.
- E. Insulation.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 05 31 00 - Steel Decking.
- B. Section 06 10 00 - Rough Carpentry: Wood nailers, curbs, and landscape lumber.
- C. Section 07 62 00 - Sheet Metal Flashing and Trim: Counterflashings.
- D. Section 07 71 00 - Roof Specialties: Prefabricated roofing expansion joint flashing.
- E. Section 07 72 00 - Roof Accessories: Roof-mounted units; prefabricated curbs.

#### **1.3 REFERENCE STANDARDS**

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2018a.
- C. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing; 2017.
- D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- E. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011.
- F. FM (AG) - FM Approval Guide; current edition.

- G. FM DS 1-28 - Wind Design; 2016.
- H. FM DS 1-29 - Roof Deck Securement and Above-Deck Roof Components; Factory Mutual System; 2016.
- I. NRCA (RM) - The NRCA Roofing Manual; 2018.
- J. NRCA (WM) - The NRCA Waterproofing Manual; 2005.
- K. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings; Current Edition, Including All Revisions.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene one week before starting work of this section.
  - 1. Review preparation and installation procedures, in addition to coordination and scheduling required with related work.

#### **1.5 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's written information listed below.
  - 1. Product data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners.
  - 2. Preparation instructions and recommendations.
  - 3. Storage and handling requirements.
- C. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation, mechanical fastener layout, and roof slopes.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions provided.
- F. Manufacturer's Installation Instructions: Indicate membrane seaming precautions, finish coating installation, special procedures, and perimeter conditions requiring special attention.
- G. Manufacturer's Qualification Statement.
- H. Installer's Qualification Statement.
- I. Warranty Documentation.
  - 1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

2. Submit installer's certification that installation complies with required warranty conditions for waterproofing membrane.

## **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with at least twenty years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least five years documented experience.
  1. Approved by membrane manufacturer.
  2. Extend manufacturer's labor and materials warranty.
  3. Extend manufacturer's "No Dollar Limit" warranty.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.
- B. Store products in weather protected environment, clear of ground and moisture.
- C. Protect foam insulation from direct exposure to sunlight.
- D. Provide Safety Data Sheets (SDS) at project site during transportation, storage, and installation of materials.
- E. Comply with requirements from Owner to prevent overloading or disturbance of structure when loading materials onto roof.

## **1.8 FIELD CONDITIONS**

- A. Do not apply roofing membrane during unsuitable weather, and refer to manufacturer's written installation instructions.
- B. Do not apply roofing membrane when ambient temperature is below 40 degrees F or above \_\_\_\_ degrees F.
- C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed that same day.
- E. Proceed with work so new roofing materials are not subject to construction traffic as work progresses.

- F. Do not allow grease, oils, fats, or other contaminants to come into direct contact with roofing membrane.

## **1.9 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing membrane that leaks or is damaged due to wind or other natural causes.
  - 1. System Warranty Term: 25 years.
  - 2. For repair and replacement include costs of both material and labor in warranty.
  - 3. Include accidental punctures in accordance with manufacturer's standard warranty terms.
  - 4. Include hail damage in accordance with manufacturer's standard warranty terms.
  - 5. Include metal roof edge water tightness in accordance with manufacturer's standard warranty terms (edge-to-edge).
  - 6. Exceptions not permitted, are as follows:
    - a. Damage due to roof traffic.
    - b. Damage due to wind speeds up to 72 mph.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURER**

- A. Basis of Design: Versico Roofing Systems: [www.versico.com/#sle](http://www.versico.com/#sle).
- B. Acceptable manufacturers:
  - 1. Firestone Building Products; [www.carlisesyntec.com](http://www.carlisesyntec.com).
  - 2. Carlisle Syntec; [www.carlisesyntec.com](http://www.carlisesyntec.com).
  - 3. Johns Manville; [www.jm.com](http://www.jm.com).
  - 4. GAF; [www.gaf.com](http://www.gaf.com).
- C. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.2 ROOFING APPLICATIONS**

- A. Thermoplastic-Polyolefin (TPO) Membrane Roofing: Single-ply membrane.
  - 1. Adhered, over insulation.

### **2.3 PERFORMANCE / DESIGN CRITERIA**

- A. Solar Reflectance Index (SRI): Minimum of 64 based on three-year aged value; if three-year aged data is not available, minimum of 82 initial value, calculated in accordance with ASTM E1980.

1. Field applied coating may not be used to achieve specified SRI.
- B. Roof Covering External Fire Resistance Classification: Class A when tested in accordance to UL 790.
- C. Wind Uplift:
  1. Designed to withstand wind uplift forces calculated in accordance with ASCE 7.
  2. Design Wind Speed: In accordance with local building code and authorities having jurisdiction (AHJ).
- D. Insulation Thermal Resistance (R-Value): Provide R-30, minimum, over entire roof deck.
- E. Drainage: No standing water within 48 hours after precipitation.

## 2.4 ROOFING MEMBRANE MATERIALS

- A. Single Source Responsibility: Provide and install products from single source.
- B. Vapor/Retarder/Base Sheet: Manufacturer's standard, reinforced composite of aluminum foil with self-adhesive SBS backing and removable poly release films.
  1. Basis of Design:
    - a. Versico Roofing Systems; VapAir Seal MD Air/Vapor Barrier: [www.versico.com/#sle](http://www.versico.com/#sle).
- C. Membrane: Thermoplastic-Polyolefin (TPO); ASTM D6878/D6878M, with internal fabric reinforcing.
  1. Thickness: 80 mils, 0.080 inch, minimum.
  2. Sheet Width: Factory fabricated into largest sheets possible.
  3. Color: White.
  4. Products:
    - a. Versico Roofing Systems; VersiWeld TPO: [www.versico.com/#sle](http://www.versico.com/#sle).
- D. Seaming Materials: Hot air welded.
- E. Vapor Retarder: Material approved by roofing membrane manufacturer and in compliance with fire rating classification requirements, and compatible with roofing and insulation materials.
  1. Provide fire-retardant adhesive.
  2. Vapor Permeability: 0.03 perm inch, measured in accordance with ASTM E96/E96M.
- F. Flexible Flashing Material: Same material as roofing membrane.
- G. Base Flashing: Provide waterproof, fully adhered base flashing system at penetrations, plane transitions, and terminations.

## 2.5 COVER BOARDS

- A. Cover Board: Polyisocyanurate (ISO) foam insulation complying with ASTM C1289, Type II, Class 4 with glass fiber reinforced facers on both sides, and Grade 1 with 80 psi, minimum, compressive strength.
  - 1. Board Thickness: 1/2 inch.
  - 2. Products:
    - a. Versico Roofing Systems; SecurShield HD Polyiso: [www.versico.com/#sle](http://www.versico.com/#sle).

## 2.6 INSULATION

- A. Tapered Edge Strip: Provide tapered insulation along elevated perimeter edge metal to ensure roof drainage.
  - 1. Polyisocyanurate (ISO) Board: ISI foam core integrally bonded to facers, with shape as required for application.
- B. Polyisocyanurate (ISO) Board Insulation: Complies with ASTM C1289, Type II, Class 1 - Faced with organic felt facers (glass fiber reinforced cellulosic felt) on both major surfaces of core foam.
  - 1. Board thickness: As required to meet required R-value.
  - 2. Tapered Board: Slope as necessary for application, with 1/2 inch, minimum thickness, and fabricated from fewest possible layers.
  - 3. Grade and Compressive Strength: Grade 2, with 20 psi, minimum.
  - 4. Products:
    - a. Versico Roofing Systems; VersiCore MP-H: [www.versico.com/#sle](http://www.versico.com/#sle).
    - b. Versico Roofing Systems; VersiCore MP-H Tapered: [www.versico.com/#sle](http://www.versico.com/#sle).

## 2.7 ACCESSORIES

- A. Prefabricated Flashing Accessories:
  - 1. Miscellaneous Flashing: Non-reinforced TPO membrane; 60 mil (0.060 inch) thick, in manufacturer's standard lengths and widths.
  - 2. Refer to Section 07 62 00 for metal counterflashing and trim information.
  - 3. Corners and Seams:
    - a. Inside Corner: 60 mil (0.060 inch) thick, pre-molded TPO, used for flashing inside corners.
    - b. Outside Corner: 60 mil (0.060 inch) thick, pre-molded TPO, used for flashing outside corners.
    - c. T-Joint Covers: 60 mil (0.060 inch) thick, 4-1/2 inch in diameter, pre-punched TPO T-joint covers, used to seal step-offs at splice intersections.
    - d. Curb Wrap Corners: 60 mil (0.060 inch) thick TPO membrane, with 12 inch overall height and 6 inch wide base flange.
    - e. Inside/Outside Corner: 60 mil (0.060 inch) thick, pre-molded TPO, used for flashing inside or outside corners.

4. Penetrations: Same material as membrane, with manufacturer's standard cut-outs, rigid inserts, clamping rings, and flanges.
    - a. Pipe Seals: Injection molded, pre-formed TPO flashings for pipes from 3/4 inch to 8 inch in diameter.
  5. Sealant Pockets: Same material as membrane, with manufacturer's standard accessories, in manufacturer's standard configuration.
    - a. Molded Sealant Pockets: Interlocking, two-piece, injection molded TPO weldable pockets adjustable from 11-1/2 inch to 7-1/2 inch long, and used to waterproof pipe clusters or other odd shaped penetrations.
  6. Pressure Sensitive Cover Strips: 6 inch wide, with 30 mils (0.030 inch) thick non-reinforced TPO membrane laminated to 30 mils (0.030 inch) thick fully cured synthetic rubber pressure-sensitive adhesive.
  7. Reinforced Universal Securement Strip (RUSS): 45 mils, 0.045 inch thick, reinforced TPO membrane strip with 35 mils (0.035 inch) thick cured TPO splice tape adhesive strips, 3 inch wide, and laminated to TPO membrane.
    - a. TPO Membrane Width: 6 inch, nominal.
    - b. Splice tape adhesive strips are laminated to one edge.
- B. Walkway Rolls: Heat weldable TPO membrane, 34 inch wide by 50 feet long, with 170 mils, 0.170 inch overall thickness, gray colored; used to protect TPO membrane in areas exposed to foot traffic.
- C. Insulation Adhesive: Two component polyurethane, expanding foam.
  1. Products:
    - a. Versico Roofing Systems; Flexible DASH Dual Tanks: [www.versico.com/#sle](http://www.versico.com/#sle).
- D. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, and compatible with roofing materials; 6 inch wide; self adhering.
- E. Fasteners: Appropriate for application indicated as recommended and approved by membrane manufacturer.
  1. Length as required for thickness of membrane and insulation material and penetration of deck substrate; with metal washers.
  2. Fasteners, Wood/Steel Drill-in: Corrosion-resistant #15 threaded drill-in fastener with #3 Phillips drive for attachment through fastening plate into steel with 22 gauge, 0.0299 inch or greater thickness, and wood plank or CDX plywood roof decks with 15/32 inch or greater thickness.
  3. Fasteners and Plates: Barbed metal plate with 2-3/8 inch diameter, #21 threaded fastener with deep buttress threads at 13 per inch, and corrosion-resistant.
  4. Fastener and Plate Assembly: Phillips head screw pre-assembled with 3 inch diameter metal or plastic locking insulation plate, for use with wood or metal roof decks.
  5. Metal, Seam Fastening Plates: Galvalume coated metal plate, 22 gauge, 0.0366 inch minimum thickness, with 2 inch nominal diameter, used for insulation attachment on mechanically fastened systems or membrane securement at angle changes on adhered systems with appropriate fastener.
  6. Metal, Insulation Fastening Plates: Hexagon shaped galvalume-coated steel plate, with 2-7/8 inch hexagon width.

7. Metal Fastener: Corrosive-resistant deck screws with 3/8 inch thread diameter and 6-Lobe (T40) drive head used with 3 inch diameter metal plate for attaching insulation to cementitious wood fiber and gypsum decks in mechanically fastened membrane systems; provide 2 inch, minimum, deck penetration.
  8. Metal Fastening Bar: Galvalume-coated steel bar, 1 inch wide, with factory punched holes 6 inches on center; 10 feet long.
- F. Membrane Adhesive: As recommended by membrane manufacturer.
1. Seam Tape: White colored, 3 inch, or 6 inch wide seam tape, 100 feet long.
    - a. Products:
      - 1) Versico Roofing Systems; VersiGard QA (Quick-Applied) Seam Tape: [www.versico.com/#sle](http://www.versico.com/#sle).
  2. Bonding Adhesive: Solvent-based, synthetic rubber substrate adhesive.
    - a. Products:
      - 1) Versico Roofing Systems; Cav-Grip Adhesive: [www.versico.com/#sle](http://www.versico.com/#sle).
- G. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.
- H. Strip Reglet Devices: Consisting of galvanized steel, with maximum possible length for each location and attachment flanges.
- I. Sealants: As recommended by membrane manufacturer.
1. Lap Sealant: Universal Single Ply Sealant
  2. Water Cut-Off Mastic Sealant: One-component, low-viscosity, self-wetting, butyl-blend mastic sealant used between membranes terminated with compression-based seal.
    - a. Products:
      - 1) Versico Roofing Systems; G-500 CM Water Cut-Off Mastic: [www.versico.com/#sle](http://www.versico.com/#sle).
  3. Sealant: One-component, 100 percent solids, solvent-free, polyether sealant used to provide weather-tight seal.
    - a. Products:
      - 1) Versico Roofing Systems; Universal Single-Ply Sealant: [www.versico.com/#sle](http://www.versico.com/#sle).
  4. Pourable Sealant: One-component, moisture curing, elastomeric polyether sealant, black colored.
    - a. Products:
      - 1) Versico Roofing Systems; One-Part Pourable Sealant: [www.versico.com/#sle](http://www.versico.com/#sle).
  5. Pourable Sealant: One-component, moisture curing, elastomeric polyether sealant, white colored.
    - a. Products:
      - 1) Versico Roofing Systems; White One-Part Pourable Sealant: [www.versico.com/#sle](http://www.versico.com/#sle).
- J. Membrane Cleaner: Manufacturer's standard, clear, and solvent-based membrane cleaner.
1. Applications: Used for cleaning in-service and new EPDM black or white membrane and TPO membrane in preparation for application of primer, adhesives, seam tape, and flashing.

- a. Products:
  - 1) Versico Roofing Systems; Weathered Membrane Cleaner: [www.versico.com/#sle](http://www.versico.com/#sle).
  
- K. Primer: Manufacturer's recommended product.
  - 1. Primer: Solvent-based and used for one-step priming of EPDM or TPO membrane surfaces.
    - a. Products:
      - 1) Versico Roofing Systems; Low-VOC EPDM and TPO Primer: [www.versico.com/#sle](http://www.versico.com/#sle).
    - 2. Primer: Low-VOC, aerosol contact adhesive/primer with rubber/solvent base used for membrane surfaces.
      - a. Products:
        - 1) Versico Roofing Systems; Cav-Grip 3V Low-VOC Adhesive/Primer: [www.versico.com/#sle](http://www.versico.com/#sle).
  
- L. Roof Edgings and Terminations: Manufacturer's standard roof edge and termination accessories.
  - 1. Steel Cover: Galvanized steel, 24 gauge, 0.0239 inch thick, with finish as selected by Architect.
  - 2. Color: As selected by Architect.
  - 3. Roof Edge: Roof edge system with galvanized formed rail having pre-punched fastening slots, and stainless steel spring to lift cover at 4 feet on center.
    - a. Cover Height: 4 inch, and top edge extending 1-1/8 inch above roof surface.
    - b. Products:
      - 1) Versico Roofing Systems; VersiTrim One Roof Edge System, Model ESE-S40: [www.versico.com/#sle](http://www.versico.com/#sle).
  - 4. Termination Bar: Decorative metal cover over formed aluminum termination bar, 1-3/4 inch wide, with slotted fastening holes.
    - a. Products:
      - 1) Versico Roofing Systems; VersiTrim Term Bar Fascia: [www.versico.com/#sle](http://www.versico.com/#sle).

## **PART 3 EXECUTION**

### **3.1 VERIFICATION OF CONDITIONS**

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
- C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.
- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips, nailing strips, and reglets are in place.

### **3.2 SURFACE PREPARATION**

- A. Clean substrate thoroughly prior to roof application.
- B. Do not begin this work until other work that requires foot or equipment traffic on roof has been completed.
- C. Apply manufacturer's recommended vapor retarder or temporary roofing before roof installation.

### **3.3 METAL DECK PREPARATION**

- A. Provide deck sheathing on metal deck, layout sheathing with long side perpendicular to flutes and stagger end joints; provide support at ends.
  - 1. Cut sheathing cleanly and accurately at roof offsets and/or protrusions to provide smooth surface, and tape joints.
- B. Mechanically fasten sheathing to roof deck, in accordance with FM DS 1-29 and roofing manufacturer's installation instructions
  - 1. Fasten sheathing boards on entire roof area, using at least six fasteners with washers on each sheathing board.

### **3.4 INSTALLATION - GENERAL**

- A. Install roofing system in accordance with manufacturer's instructions, as well as NRCA (RM) and NRCA (WM) applicable requirements.
- B. Application of roofing membrane during unsuitable weather is not permitted.
- C. Application of roofing membrane when ambient temperature is outside temperature range recommended by manufacturer is not permitted.
- D. Application of roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring is not permitted.
- E. Exposing materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day is not permitted.
- F. Coordinate this work with installation of associated counterflashings being installed as specified in other sections as this work proceeds.

### **3.5 VAPOR RETARDER APPLICATION**

- A. Apply vapor retarder to deck surface with adhesive in accordance with manufacturer's instructions.
  - 1. Extend vapor retarder under cant strips and blocking to deck edge.
  - 2. Install flexible flashing from vapor retarder to air seal material of wall construction, lap and seal to provide continuity of air barrier plane.
- B. Verify that vapor retarder is clean and dry, continuous, and ready for application of insulation.

### **3.6 INSULATION APPLICATION**

- A. Attachment of Insulation:
  - 1. Mechanically fasten first layer of insulation to deck in accordance with roofing manufacturer's instructions and FM (AG), FM DS 1-28, and FM DS 1-29 applicable requirements.
  - 2. Embed second layer of insulation into full bed of adhesive in accordance with roofing and insulation manufacturer's instructions.
- B. Installing wet, damaged, or warped insulation boards is not permitted.
- C. Apply subsequent layers of insulation with joints staggered minimum 6 inch from joints of preceding layer.
- D. Apply tapered insulation to required slope pattern in accordance with manufacturer's instructions.
- E. On metal deck, place boards parallel to flutes with insulation board edges bearing on deck flutes.
- F. Apply boards with edges in moderate contact without forcing, and with gap between boards no greater than 1/4 inch wide; cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- G. Tape joints of insulation in accordance with roofing and insulation manufacturer's instructions.
- H. Only apply quantity of insulation than can be completely waterproofed in same day.

### **3.7 MEMBRANE APPLICATION**

- A. Roll out membrane, free from wrinkles or tears; place sheet membrane into place without stretching.
- B. Shingle joints on sloped substrates in direction of drainage.

- C. Adhesive Adhered Membrane Application: Apply adhesive at manufacturer's recommended rate, and fully embed membrane in adhesive except in areas directly over or within 3 inch of expansion joints; fully adhere one roll before proceeding to adjacent rolls.
- D. Seam Welding:
  - 1. Overlap edges and ends and seal seams by heat welding, 2 inch minimum.
  - 2. Cover seams with manufacturer's recommended joint covers.
  - 3. Probe seams once welds have thoroughly cooled, after approximately 30 minutes.
  - 4. Repair deficient seams the same day as seam created.
  - 5. Seal cut edges of reinforced membrane after seam probe is complete.
    - a. Cut edge sealant is recommended, but not specifically required, for flat surfaces.
    - b. Cut edge sealant is not required at vertical splices.
- E. At membrane intersections with vertical surfaces, provide the following:
  - 1. Extend membrane over and up cant strips at least 4 inch onto vertical surfaces.
  - 2. Fully adhere flexible flashing over membrane and up to nailing strips.
- F. At gravel stops, extend membrane under gravel stop and to outside face of wall.
- G. Install prefabricated joint components in accordance with manufacturer's instructions.
- H. Coordinate installation of roof related flashings, sumps, and drains; locate field splices away from low areas and roof drains, and shingle lap upslope sheets over downslope sheets.
- I. Install walkway pads and as indicated on drawings; space pad joints to permit drainage.
- J. Daily Seal: Provide daily seal in accordance with manufacturer's installation instructions at end of each work day to prevent infiltration of water at incomplete flashings, terminations, and other unfinished membrane edges.

### **3.8 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field quality control and inspection.
- B. Attendance is required on-site of roofing and insulation material manufacturer's daily during installation of this work.

### **3.9 CLEANING**

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Remove wrappings, empty containers, paper, and other debris from roof daily, and dispose of debris in compliance with local, State, and Federal regulations.

- C. Remove bituminous markings from finished surfaces.
- D. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and comply with their documented instructions.
- E. Repair or replace defaced or damaged finishes caused by work of this section.

**3.10 PROTECTION**

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

**END OF SECTION**

## **SECTION 07 84 00 - FIRESTOPPING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items. Only tested firestop systems shall be used in specific locations as follows:
1. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical raceways through fire-rated vertical barriers (walls and partitions).
  2. Joints in or between fire-resistance-rated constructions.
  3. Joints in smoke barriers.
  4. Gaps between the top of rated walls and ceilings or roof assemblies.

#### **1.2 DEFINITIONS**

- A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in, or construction joints between, fire rated wall and floor assemblies.
- B. System: The use of a specific firestop material or combination of materials around a specific penetrant(s) or into a specific joint in conjunction with a specific wall and/or floor construction type.
- C. Through-penetration: Any penetration of a fire-rated wall or floor that completely breaches the barrier.
- D. Membrane-penetration: Any penetration in a fire-rated wall that breaches only one side of the barrier.
- E. Fire Resistive Joint: Any gap, joint, or opening, whether static or dynamic, between two fire-rated barriers including where the top of a wall meets a floor; wall edge to wall edge configurations; floor edge to floor edge configurations; floor edge to wall configurations.
- F. Perimeter Barrier: Any gap, joint, or opening, whether static or dynamic, between a fire-rated floor assembly and a non-rated exterior wall assembly.

#### **1.3 ACTION SUBMITTALS**

- A. Refer to the Required Submittal Log in Section 13300 - Submittal Procedures.
- B. Product Data: For each type of product.

- C. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.
  - 1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Product test reports.

#### **1.5 CLOSEOUT SUBMITTALS**

- A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

#### **1.6 QUALITY ASSURANCE**

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."
- B. Single Source Responsibility: Obtain firestop systems for each kind of penetration and construction condition indicated from a single primary firestop systems manufacturer.
  - 1. Materials of different manufacture than allowed by the tested and listed system shall not be intermixed in the same firestop system or opening.
  - 2. Tested and listed firestop systems are to be used before an Engineering Judgment (EJ) or Equivalent Fire Resistance Rated Assembly (EFRRRA) is installed.
- C. Fire-Test-Response Characteristics: Provide firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:
  - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
  - 2. Firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
    - a. Firestop system products bear classification marking of qualified testing and inspecting agency.
    - b. Firestop systems correspond to those indicated by reference to firestop system designations listed by the following: 1) UL in "Fire Resistance Directory."

### **1.7 PRE-INSTALLATION MEETING**

- A. Pre-installation Conference: Conduct conference at Project site.

### **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.
- B. Store and handle materials for firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.
- C. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
- D. Do not use damaged or expired materials.

### **1.9 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not install firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers recommendations or when substrates are wet due to rain, frost, condensation, or other causes.
- B. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

### **1.10 COORDINATION**

- A. Coordinate construction of openings and penetrating items to ensure that firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate firestop systems.

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. General: For the following constructions, provide firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
  - 1. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings
- B. F-Rated Systems: Provide firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
- C. T-Rated Systems: For the following conditions, provide firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
  - 1. Penetrations located outside wall cavities.
  - 2. Penetrations located in construction containing fire-protection-rated openings.
  - 3. Penetrating items larger than 4-inch- diameter nominal pipe or 16 sq. in. in overall cross-sectional area.
- D. For firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
  - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture resistant firestop systems.
  - 2. For penetrations involving insulated piping, provide firestop systems not requiring removal of insulation.
- E. For firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.
- F. Fire-Test-Response Characteristics:
  - 1. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
    - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
      - 1) UL in its "Fire Resistance Directory."

### **2.2 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:

1. Hilti Construction Chemicals, inc.
2. 3M Fire Protection Products.
3. Specified Technologies, Inc.
4. Tremco
5. W.R. Grace
6. Other manufacturers listed in the UL Fire Resistance Directory.

## **2.3 FIRESTOPPING, GENERAL**

- A. **Compatibility:** Provide firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating firestop systems, under conditions of service and application, as demonstrated by firestop system manufacturer based on testing and field experience.
- B. **Accessories:** Provide components for each firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items.
  1. **Permanent forming/damming/backing materials, including the following:**
    - a. Slag-/rock-wool-fiber insulation.
    - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    - c. Temporary forming materials.
    - d. Substrate primers.
    - e. Collars.
    - f. Steel sleeves.

## **2.4 FILL MATERIALS**

- A. **General:** Provide firestop systems containing the types of fill materials standard with manufacturer for systems complying with rating requirements indicated. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.
- B. **Latex Sealants:** Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- C. **Firestop Devices:** Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. **Intumescent Putties:** Non-hardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- E. **Mortars:** Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar. F. **Fire Safe Insulation:** Mineral wool.

- F. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.
- G. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
  - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and non-sag formulation for openings in vertical and other surfaces requiring a non-slumping, gunnable sealant, unless indicated firestop system limits use to non-sag grade for both opening conditions.
  - 2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
  - 3. Grade for Vertical Surfaces: Non-sag formulation for openings in vertical and other surfaces

## 2.5 MIXING

- A. A. For those products requiring mixing before application, comply with firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

## 2.6 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.
  - 1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
  - 2. Basis of Design: Hilti Construction Chemicals, Inc.
  - 3. Joints:
    - a. Vertical: Elastomeric Firestop Sealant (CP 601S), Flexible Firestop Sealant (CP 606)
    - b. Wall to Deck: Firestop Joint Spray (CFS-SP WB)
    - c. Penetrations: High Performance Intumescent Firestop Sealant (FS-ONE); Firestop Collar (CP643N or CP644); Firestop Wrap Strip (CP 648-S)
    - d. Multiple Penetrations: Fire Foam (CP620)
- C. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.
  - 1. Basis of Design: Hilti Construction Chemicals, Inc.

2. Joints:
    - a. Joints: Smoke and Acoustic Sealant (CP 506)
    - b. Wall to Deck: Smoke and Acoustic Spray (CP 572)
  3. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.
- D. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. VOC Content: Fire-resistive joint system sealants shall comply with the following limits for VOC content:
1. Architectural Sealants: 250 g/L.
  2. Sealant Primers for Nonporous Substrates: 250 g/L.
  3. Sealant Primers for Porous Substrates: 775 g/L.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. Surface Cleaning: Clean out openings immediately before installing firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of firestop systems.
  2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestop systems. Remove loose particles remaining from cleaning operation.
  3. Remove laitance and form-release agents from concrete.
- C. Priming: Prime substrates where recommended in writing by firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- D. Masking Tape: Use masking tape to prevent firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

#### **3.2 INSTALLATION**

- A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

- B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  - 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:
  - 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
  - 2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
  - 3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### **3.3 IDENTIFICATION**

- A. A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  - 1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
  - 2. Contractor's name, address, and phone number.
  - 3. Designation of applicable testing agency.
  - 4. Date of installation.
  - 5. Manufacturer's name.
  - 6. Installer's name.

### **3.4 FIELD QUALITY CONTROL**

- A. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- B. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

### **3.5 CLEANING AND PROTECTION**

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by firestop system manufacturers and that do not damage materials in which openings occur.

- B. Provide final protection and maintain conditions during and after installation that ensure firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestop systems immediately and install new materials to produce on firestop systems complying with specified requirements.

**END OF SECTION**

## **SECTION 07 92 00 - JOINT SEALANTS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.
- D. Silicone joint sealants.
- E. Urethane joint sealants.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

#### **1.3 REFERENCE STANDARDS**

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015.
- B. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2018.
- C. ASTM C834 - Standard Specification for Latex Sealants; 2017.
- D. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012 (Reapproved 2017).
- E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- F. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2016.
- G. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- H. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).
- I. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2018.

- J. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015e1.

#### **1.4 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

#### **1.5 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
  - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
  - 2. List of backing materials approved for use with the specific product.
  - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
  - 4. Substrates the product should not be used on.
  - 5. Substrates for which use of primer is required.
  - 6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- E. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.
- F. Installation Plan: Submit at least four weeks prior to start of installation.
- G. Installation Log: Submit filled out log for each length or instance of sealant installed.
- H. Joint-Sealant Schedule: Include the following information:
  - 1. Joint-sealant application, joint location, and designation.
  - 2. Joint-sealant manufacturer and product name.
  - 3. Joint-sealant formulation.
  - 4. Joint-sealant color.

#### **1.6 QUALITY ASSURANCE**

- A. Maintain one copy of each referenced document covering installation requirements on site.

- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.
- D. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
  - 1. Adhesion Testing: In accordance with ASTM C794.
  - 2. Compatibility Testing: In accordance with ASTM C1087.
  - 3. Allow sufficient time for testing to avoid delaying the work.
  - 4. Deliver to manufacturer sufficient samples for testing.
  - 5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
  - 6. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.
- E. Installation Plan: Include schedule of sealed joints, including the following.
  - 1. Joint width indicated in Contract Documents.
  - 2. Joint depth indicated in Contract Documents; to face of backing material at centerline of joint.
  - 3. Method to be used to protect adjacent surfaces from sealant droppings and smears, with acknowledgement that some surfaces cannot be cleaned to like-new condition and therefore prevention is imperative.
  - 4. Approximate date of installation, for evaluation of thermal movement influence.
  - 5. Installation Log Form: Include the following data fields, with known information filled out.
    - a. Date of installation.
    - b. Name of installer.
    - c. Actual joint width; provide space to indicate maximum and minimum width.
    - d. Actual joint depth to face of backing material at centerline of joint.
    - e. Air temperature.

## **1.7 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
  - 1. Bostik Inc: [www.bostik-us.com/#sle](http://www.bostik-us.com/#sle).
  - 2. Dow Chemical Company:  
[consumer.dow.com/en-us/industry/ind-building-construction.html/#sle](http://consumer.dow.com/en-us/industry/ind-building-construction.html/#sle).
  - 3. Franklin International, Inc: [www.titebond.com/#sle](http://www.titebond.com/#sle).
  - 4. Hilti, Inc: [www.us.hilti.com/#sle](http://www.us.hilti.com/#sle).
  - 5. Master Builders Solutions by BASF: [www.master-builders-solutions.basf.us/en-us/#sle](http://www.master-builders-solutions.basf.us/en-us/#sle).
  - 6. Pecora Corporation: [www.pecora.com/#sle](http://www.pecora.com/#sle).
  - 7. Sika Corporation: [www.usa-sika.com/#sle](http://www.usa-sika.com/#sle).
  - 8. Specified Technologies Inc: [www.stifirestop.com/#sle](http://www.stifirestop.com/#sle).
  - 9. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com/#sle](http://www.tremcosealants.com/#sle).
  - 10. W.R. Meadows, Inc: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
  - 11. Substitutions: See Section 01 60 00 - Product Requirements.
  
- B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
  - 1. Bostik Inc: [www.bostik-us.com/#sle](http://www.bostik-us.com/#sle).
  - 2. Dow Chemical Company:  
[consumer.dow.com/en-us/industry/ind-building-construction.html/#sle](http://consumer.dow.com/en-us/industry/ind-building-construction.html/#sle).
  - 3. Master Builders Solutions by BASF: [www.master-builders-solutions.basf.us/en-us/#sle](http://www.master-builders-solutions.basf.us/en-us/#sle).
  - 4. Pecora Corporation: [www.pecora.com/#sle](http://www.pecora.com/#sle).
  - 5. Sika Corporation: [www.usa-sika.com/#sle](http://www.usa-sika.com/#sle).
  - 6. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com/#sle](http://www.tremcosealants.com/#sle).
  - 7. W.R. Meadows, Inc: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
  - 8. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.2 JOINT SEALANT APPLICATIONS**

- A. Scope:
  - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
    - a. Wall expansion and control joints.
    - b. Joints between door, window, and other frames and adjacent construction.
    - c. Joints between different exposed materials.
    - d. Openings below ledge angles in masonry.
    - e. Other joints indicated below.

2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
    - a. Joints between door, window, and other frames and adjacent construction.
    - b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
    - c. Other joints indicated below.
  3. Do not seal the following types of joints.
    - a. Intentional weepholes in masonry.
    - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
    - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
    - d. Joints where installation of sealant is specified in another section.
    - e. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
1. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.
  2. Wiring Slots in Concrete Paving: Self-leveling epoxy sealant.
- C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
  2. Wall and Ceiling Joints in Wet Areas: Non-sag polyurethane sealant for continuous liquid immersion.
  3. Floor Joints in Wet Areas: Non-sag polyurethane "non-traffic-grade" sealant suitable for continuous liquid immersion.
  4. Wall, Ceiling, and Floor Joints Where Tamper-Resistance is Required: Non-sag tamper-resistant silyl-terminated polyurethane sealant.
  5. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
  6. In Sound-Rated Assemblies: Acrylic emulsion latex sealant.
  7. Narrow Control Joints in Interior Concrete Slabs: Self-leveling epoxy sealant.
- D. Interior Wet Areas: Bathrooms; fixtures in wet areas include plumbing fixtures, countertops, and other similar items.
- E. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".
- F. Areas Where Tamper-Resistance is Required: As indicated on drawings.

### **2.3 JOINT SEALANTS - GENERAL**

- A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 61 16.

- B. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

## 2.4 NONSAG JOINT SEALANTS

- A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
  - 1. Movement Capability: Plus and minus 50 percent, minimum.
  - 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
  - 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
  - 4. Color: To be selected by Architect from manufacturer's standard range.
  - 5. Service Temperature Range: Minus 20 to 180 degrees F.
- B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
  - 1. Color: White.
- C. Polymer Sealant: ASTM C920; single component, cured sealant is paintable and mold/mildew resistant, low odor and VOC, and ultraviolet (UV) resistant.
  - 1. Adheres to wet surfaces.
  - 2. Color: Clear.
- D. Tamper-Resistant, Silyl-Terminated Polyurethane (STPU) Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
  - 1. Movement Capability: Plus and minus \_\_\_\_ percent, minimum
  - 2. Hardness Range: 25 to 30, Shore A, when tested in accordance with ASTM C661.
  - 3. Color: To be selected by Architect from manufacturer's standard range.
  - 4. Service Temperature Range: Minus 40 to 180 degrees F.
- E. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
  - 1. Movement Capability: Plus and minus \_\_\_\_ percent, minimum.
  - 2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
  - 3. Color: To be selected by Architect from manufacturer's standard range.
  - 4. Service Temperature Range: Minus 40 to 180 degrees F.
- F. Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface.
  - 1. Movement Capability: Plus and minus 35 percent, minimum.
  - 2. Color: To be selected by Architect from manufacturer's standard range.

3. Service Temperature Range: Minus 40 to 180 degrees F.
- G. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
1. Color: To be selected by Architect from manufacturer's standard range.
  2. Grade: ASTM C834; Grade Minus 18 Degrees C (0 Degrees F).

## 2.5 SELF-LEVELING SEALANTS

- A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
1. Movement Capability: Plus and minus 25 percent, minimum.
  2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
  3. Color: To be selected by Architect from manufacturer's standard range.
  4. Service Temperature Range: Minus 40 to 180 degrees F.
- B. Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
1. Composition: Multi-component, 100 percent solids by weight.
  2. Durometer Hardness: Minimum of 85 for Type A or 35 for Type D, after seven days when tested in accordance with ASTM D2240.
  3. Color: To be selected by Architect from manufacturer's standard colors.
  4. Joint Width, Minimum: 1/8 inch.

## 2.6 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
  2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
  3. Open Cell: 40 to 50 percent larger in diameter than joint width.
  4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

- D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Verify that joints are ready to receive work.
- C. Verify that backing materials are compatible with sealants.
- D. Verify that backer rods are of the correct size.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 PREPARATION**

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

#### **3.3 INSTALLATION**

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Install bond breaker backing tape where backer rod cannot be used.

- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- H. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

### **3.4 FIELD QUALITY CONTROL**

- A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- B. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet, notify Architect immediately.
- C. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

### **3.5 CLEANING**

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### **3.6 PROTECTION**

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

### **3.7 POST-OCCUPANCY**

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at low temperature in thermal cycle. Report failures immediately and repair.

### **END OF SECTION**





C 834	Latex Sealing Compounds
C 920	Elastomeric Joint Sealants
C 962	Use of Elastomeric Joint Sealants
C 1330	Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants
D 412	Test Methods for Rubber Properties in Tension
D 624	Test Method for Rubber Property - Tear Resistance
D 2628	Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements

3. Federal Specifications (Fed. Spec.):

TT-S-00227	Sealing Compound: Elastomeric Type, Multi-Component (For Calking, Sealing, and Glazing in Buildings and Other Structures)
TT-S-001543A	Sealing Compound: Silicone Rubber Base (For Calking, Sealing, and Glazing in Buildings and Other Structures)

**1.5 PRECONSTRUCTION TESTING**

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
  2. Submit not fewer than eight pieces of each kind of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
  3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
  4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
  5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
  2. Conduct field tests for each application indicated below:
    - a. Each kind of sealant and joint substrate indicated.
  3. Notify Architect seven days in advance of dates and times when test joints will be erected.
  4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
    - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
      1. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
  5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
  6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

## 1.6 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
1. Joint-sealant application, joint location, and designation.
  2. Joint-sealant manufacturer and product name.
  3. Joint-sealant formulation.
  4. Joint-sealant color.
- E. Qualification Data: For qualified Installer and testing agency.

- F. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- G. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- I. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
  - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- J. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- K. Field-Adhesion Test Reports: For each sealant application tested.
- L. Warranties: Sample of special warranties.

#### **1.7 COMPATIBILITY**

- A. Provide sealant and sealant joint backing materials suitable for the use intended and compatible with the materials with which they will be in contact. Compatibility of sealant and accessories shall be verified by the sealant manufacturer.

#### **1.8 QUALITY ASSURANCE:**

- A. Source: For each sealant material type required for the work of this section, provide primary materials which are the product of one manufacturer. Provide secondary or accessory materials which are acceptable to the manufacturers of the primary materials.
- B. Installer: A firm with a minimum of five years experience in type of work required by this Section and which is acceptable to the manufacturers of the primary materials.
- C. Product Testing: Test joint sealants using a qualified testing agency.
  - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
- D. Mock-Ups: Prior to commencing the primary work of this Section, provide mock-ups at locations acceptable to Architect. Obtain Architect's acceptance of visual qualities. Protect and maintain accepted mock-ups throughout the remainder of the work of this section to serve as criteria for acceptance of the work.

#### **1.9 PROJECT CONDITIONS**

- A. Do not proceed with installation of joint sealants under the following conditions:
  1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
  2. When joint substrates are wet.
  3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.
- B. Substrates: Proceed with work only when substrate construction and penetration work is complete.

#### **1.10 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. Materials under this Section shall be delivered to, and stored at, the job site in unbroken factory sealed containers with labels intact.

#### **1.11 WARRANTY**

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
  1. Warranty Period: 10 years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL REQUIREMENTS**

- A. Before installation check each sealant for compatibility with adjacent materials and surfaces and with indicated exposures. Select sealers which are recommended by manufacturer for each application indicated. Where exposed to pedestrian or vehicular traffic, provide sealants which are non-tracking and are strong enough to withstand the traffic without damage.
- B. Provide colors as selected by Architect from manufacturer's standard and special (Tremco Fastpak) colors. Where specifically requested, provide custom color matches.

### **2.2 SELF-LEVELING POLYURETHANE SEALANT**

- A. Sealant shall be a polyurethane-based, one component, elastomeric sealant complying with Federal Spec. TT-S-00230C, Class A Type 1 or ASTM C 920, Type S, Grade P, Class 50, Use T for horizontal use. Color shall match the color of the adjacent materials as approved by the Architect. Sealants shall be self-leveling pour grade type for horizontal use. Application of sealant for site improvements shall be in accordance with approved manufacturer's recommendations.
- B. Provide products of one of the following manufacturers, that meet or exceed specified requirements:
  1. Pecora Corporation
  2. Harry S. Peterson Co.
  3. Sika
  4. Sonneborn.
  5. Tremco
- C. Extent: Provide self-leveling polyurethane sealant for paving joints not indicated to be sealed with another type of sealant.

### **2.3 NON-SAG POLYURETHANE SEALANT**

- A. Sealant shall be a polyurethane-based, one component, elastomeric sealant complying with Federal Spec. TT-S-00230C, Class A Type 2 or ASTM C 920, Type S, Grade NS, Class 35, Use NT for vertical use. Color shall match the color of the adjacent materials as approved by the Architect. Sealants shall be non-sag grade type for vertical use. Application of sealant for site improvements shall be in accordance with approved manufacturer's recommendations.
- B. Provide products of one of the following manufacturers, that meet or exceed specified requirements:
  - 1. Pecora Corporation
  - 2. Harry S. Peterson Co.
  - 3. Sika
  - 4. Sonneborn.
  - 5. Tremco
- C. Extent: Provide non-sag polyurethane sealant for all other joints not indicated to be sealed with another type of sealant.

### **2.4 PREFORMED JOINT SEALER**

- A. Preformed Resilient Joint Sealer: Preformed Resilient Joint Sealer for use at expansion joints in exterior concrete walls where specifically called for on Drawings shall be preformed, resilient, extruded polychlorophrene elastomeric joint sealer, conforming to ASTM D 2628 and AASHTO M 220 of indicated configuration(s), in continuous lengths, set in manufacturer's recommended primer-lubricating-adhesive consisting of moisture curing polyurethane and aromatic hydrocarbon solvent mixture (73% solid by weight) concrete gray color, equal to one of the following:
  - 1. D.S. Brown Co.
  - 2. Watson-Bowman & Acme Corp.

### **2.5 MISCELLANEOUS MATERIALS**

- A. Primer: Provide primer recommended by sealant manufacturer for surfaces to be adhered to.
- B. Bond Breaker Tape: Provide polyethylene or other plastic tape recommended by sealant manufacturer to prevent three-sided adhesion.
- C. Backer Rod: Provide closed cell compressible rod of durable nonabsorptive material recommended by sealant manufacturer for compatibility with sealant, conforming to ASTM C 1330. Provide products of one of the following manufacturers:

1. Backer Rod Manufacturing and Supply Co.
  2. Dow Chemical Co.
  3. W. R. Meadows, Inc.
  4. Williams Products, Inc.
  5. Woodmont Products, Inc.
- D. Joint backing for general use at joints in horizontal surfaces shall consist of two rows of butyl rubber or neoprene foam rod in contact with one another, and each compressed to approximately  $2/3$  original width when in place.
- E. Provide miscellaneous materials of type that will not bleed through sealant, discolor surface, or produce other deleterious effects. Select size to provide compression to approximately  $2/3$  original width when in place. Provide backing material profile concave to the rear of the sealant, and equipped with a bond-breaking film.

### **PART 3 - EXECUTION**

#### **3.1 INSPECTION**

- A. The Installer shall examine substrates and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning of sealant work means Installer's acceptance of joint surfaces and conditions.

#### **3.2 PREPARATION**

- A. Strictly comply with manufacturers' instructions and recommendations, except where more restrictive requirements are specified in this Section.
- B. Clean joint surfaces immediately before installation of sealants, primers, tapes and fillers. Remove substances which could interfere with bond. Etch or roughen joint surfaces to improve bond. Surfaces which have been given protective coatings and those that contain oil or grease shall be thoroughly cleaned with xylol or MEK solvent, with due precautions taken to minimize hazards.
- C. Unless otherwise indicated, use of sealants shall conform to the following: ASTM C 790 for latex sealants and ASTM C 962 for other sealants.
- D. Tape or mask adjoining surfaces to prevent spillage and migration problems.
- E. Prime surfaces as recommended by sealant manufacturer.

### **3.3 INSTALLATION**

- A. Schedule work as long as possible after completion of concrete work and finished paving and granite work.
- B. Provide backer rods for liquid sealants except where specifically recommended against by sealant manufacturers.
- C. Prevent three sided adhesion by use of bond breaker tapes or backer rods.
- D. Force sealant into joints to provide uniform, dense, continuous ribbons free from gaps and air pockets. Completely wet both joint surfaces equally on opposite sides.
- E. Except in hot weather, make sealant surface slightly concave. Install sealants so that compressed sealants do not protrude from joints. Dry tool sealants to form a smooth dense surface. At horizontal joints form a slight cove to prevent trapping water.
- F. Provide sealants to depths indicated, or if not indicated, follow manufacturer's recommendations. For joints up to 3/8 in. width, depth of joint shall not exceed 1/2 in.; for joints larger than 1/2 in. width, depth of joint shall not exceed 5/8 in.

### **3.4 EXTENT OF SEALANT WORK**

- A. General Extent: Seal joints indicated, and all exterior joints, seams, and intersections between dissimilar materials. Provide elastomeric sealant installation with backer rod in all exterior control joints.
- B. Exterior Sealing: Without limitation, the work of this Section includes sealing the following:
  - 1. Masonry to masonry joints.
  - 2. Masonry to other exterior wall materials, including concrete, and metal.
  - 3. Concrete to concrete joints.
  - 4. Joints in paving and walks.
  - 5. Joint fillers for all joints.

### **3.5 CURING**

- A. Cure sealants in strict compliance with manufacturers' instructions and recommendations to obtain highest quality surface and maximum adhesion. Make every effort to minimize accelerated aging effects and increase in modulus of elasticity.

### **3.6 CLEANING AND PROTECTION**

- A. Remove smears from adjacent surfaces immediately, as the work progresses. Exercise particular care to prevent smearing or staining of surrounding surfaces which will be exposed in the finished work, and repair any damage done to same as result of this work without additional cost to Owner.
- B. Remove and replace work that is damaged or deteriorated.
- C. Clean adjacent surfaces using materials and methods recommended by sealant manufacturer. Remove and replace work that cannot be successfully cleaned.
- D. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protection immediately before final acceptance.

**END OF SECTION**

## **SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES**

### **PART 1 GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### **1.2 SUMMARY**

- A. Section Includes:
  - 1. Standard and custom hollow metal doors and frames.
  - 2. Steel sidelight, borrowed lite and transom frames.
  - 3. Louvers installed in hollow metal doors.
  - 4. Light frames and glazing installed in hollow metal doors.
- B. Related Sections:
  - 1. Division 01 Section "General Conditions".
  - 2. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
  - 3. Division 08 Section "Door Hardware".
  - 4. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.
- C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
  - 2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
  - 3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
  - 4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
  - 5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
  - 6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
  - 7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - 8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
  - 9. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
  - 10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.

11. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
12. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
13. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
14. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
15. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
16. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

### **1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
  1. Elevations of each door design.
  2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
  3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
  4. Locations of reinforcement and preparations for hardware.
  5. Details of anchorages, joints, field splices, and connections.
  6. Details of accessories.
  7. Details of moldings, removable stops, and glazing.
  8. Details of conduit and preparations for power, signal, and control systems.
- D. Samples for Verification:
  1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

### **1.4 QUALITY ASSURANCE**

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".

- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40" above sill) or UL 10C.
  - 1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
  - 2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
  - 3. Smoke Control Door Assemblies: Comply with NFPA 105.
    - a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
- D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.
- E. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

#### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.
  - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

#### **1.6 PROJECT CONDITIONS**

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

## **1.7 COORDINATION**

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Building Information Modeling (BIM) Support: Utilize designated BIM software tools and obtain training needed to successfully participate in the Project BIM processes. All technical disciplines are responsible for the product data integration and data reliability of their Work into the coordinated BIM applications.

## **1.8 WARRANTY**

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:
  - 1. CECO Door Products (C).
  - 2. Curries Company (CU).
  - 3. Steelcraft (S).

### **2.2 MATERIALS**

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

## 2.3 HOLLOW METAL DOORS

- A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.
- B. Exterior Doors (Energy Efficient): Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A924 A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model, ANSI/SDI A250.4 for physical performance level, and HMMA 867 for door construction.
1. Design: Flush panel.
  2. Core Construction: Foamed in place polyurethane and steel stiffened laminated core with no stiffener face welds, in compliance with HMMA 867 "Laminated Core".
    - a. Provide 22 gauge steel stiffeners at 6 inches on-center internally welded at 5" on-center to integral core assembly, foamed in place polyurethane core chemically bonded to all interior surfaces. No stiffener face welding is permitted.
    - b. Thermal properties to rate at a fully operable minimum U-Factor 0.37 and R-Value 2.7, including insulated door, thermal-break frame and threshold.
  3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053 inch - 1.3-mm) thick steel, Model 2.
  4. Vertical Edges: Vertical edges to be mechanically interlocked with hairline seam. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
  5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
  6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9".
  7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
1. Design: Flush panel.
    - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
  2. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.
  3. Vertical Edges: Vertical edges to have the face sheets spot welded and filled full height with an epoxy filler. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).

4. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.
5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

D. Manufacturers Basis of Design:

1. Curries Company (CU) - Polystyrene Core - 707 Series (interior doors).
2. Curries Company (CU) - Energy Efficient - 777 Trio-E Series (exterior doors).

## 2.4 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Thermal Break Frames: Subject to the same compliance standards and requirements as standard hollow metal frames. Tested for thermal performance in accordance with NFRC 102, and resistance to air infiltration in accordance with NFRC 400. Where indicated provide thermally broken frame profiles available for use in both masonry and drywall construction. Fabricate with 1/16" positive thermal break and integral vinyl weatherstripping.
- C. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.
  1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
  2. Frames: Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.
  3. Manufacturers Basis of Design:
    - a. Curries Company (CU) – Thermal Break TQ Series.
- D. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
  1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
  2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
  3. Manufacturers Basis of Design:
    - a. Curries Company (CU) - CM Series.
    - b. Curries Company (CU) - M Series.
- E. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
- F. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

## 2.5 FRAME ANCHORS

- A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
  2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.
- C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

## **2.6 LIGHT OPENINGS AND GLAZING**

- A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator's shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.
- B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.
- C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.
- D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

## **2.7 ACCESSORIES**

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

## **2.8 FABRICATION**

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.

C. Hollow Metal Doors:

1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
3. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
4. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".

D. Hollow Metal Frames:

1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
  - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
7. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
8. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
9. Jamb Anchors: Provide number and spacing of anchors as follows:
  - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
    - 1) Two anchors per jamb up to 60 inches high.
    - 2) Three anchors per jamb from 60 to 90 inches high.
    - 3) Four anchors per jamb from 90 to 120 inches high.
    - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
  - b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

- 1) Three anchors per jamb up to 60 inches high.
  - 2) Four anchors per jamb from 60 to 90 inches high.
  - 3) Five anchors per jamb from 90 to 96 inches high.
  - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
  - 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
10. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
11. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.
- E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
  2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
  3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
  4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

## **2.9 STEEL FINISHES**

- A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

- B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

### **3.3 INSTALLATION**

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
  - 1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
  - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
  - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
  - 4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
  - 1. Non-Fire-Rated Standard Steel Doors:
    - a. Jamb and Head: 1/8 inch plus or minus 1/16 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.

- d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
- 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

### **3.4 ADJUSTING AND CLEANING**

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

### **END OF SECTION**

## **SECTION 08 31 00 - ACCESS DOORS AND PANELS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Wall and ceiling access door and frame units.

#### **1.2 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

#### **1.3 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

### **PART 2 PRODUCTS**

#### **2.1 ACCESS DOORS AND PANELS ASSEMBLIES**

- A. Wall-Mounted Units:
  - 1. Location: Where access to concealed conditions is required. Coordinate location with Architect..
  - 2. Size: Coordinate with access requirements.
  - 3. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
  - 4. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.
  - 5. Acceptable Products:
    - a. Access Panel Solutions; Bauco Plus II: [www.accesspanelsolutions.com](http://www.accesspanelsolutions.com)
    - b. Intexforms; Hinged: [www.intexforms.com](http://www.intexforms.com)
    - c. Substitutions: See Section 01 6000 - Product Requirements.
- B. Wall-Mounted Units in Wet Areas:
  - 1. Location: Coordinate location with Architect..
  - 2. Size: Coordinate with access requirements.
  - 3. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
  - 4. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.

5. Acceptable Products:
  - a. Acudor Products, Inc; ADWT: [www.acudor.com](http://www.acudor.com)
  - b. Substitutions: See Section 01 6000 - Product Requirements.
- C. Ceiling-Mounted Units:
  1. Location: Where access to concealed conditions is required. Coordinate location with Architect..
  2. Size: Coordinate with access requirements.
  3. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
  4. Acceptable Products:
    - a. Access Panel Solutions; Bauco Plus II: [www.accesspanelsolutions.com](http://www.accesspanelsolutions.com)
    - b. Intexforms; Lift & Shift: [www.intexforms.com](http://www.intexforms.com)
    - c. Substitutions: See Section 01 6000 - Product Requirements.
- D. Fire-Rated Ceiling-Mounted Units:
  1. Ceiling Fire-Rating: As indicated on drawings.
  2. Size: 12 inch by 12 inch.
  3. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
  4. Acceptable Products:
    - a. Karp Associates; KATR: [www.karpinc.com](http://www.karpinc.com)
    - b. Substitutions: See Section 01 6000 - Product Requirements.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that rough openings are correctly sized and located.
- B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### **3.2 PREPARATION**

- A. Clean surfaces thoroughly prior to proceeding with this work.
- B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

### **3.3 INSTALLATION**

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.

- C. Position units to provide convenient access to concealed equipment when necessary.

**END OF SECTION**

## **SECTION 08 43 13 - ALUMINUM-FRAMED STOREFRONTS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Aluminum-framed storefront, with vision glass.
- B. Aluminum doors and frames.
- C. Weatherstripping.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
- B. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.
- C. Section 08 80 00 - Glazing: Glass and glazing accessories.

#### **1.3 REFERENCE STANDARDS**

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- B. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems; 2014.
- C. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- D. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).
- E. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- F. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- H. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.

- I. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- J. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- K. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).
- L. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

#### **1.5 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
  - 1. Include design engineer's stamp or seal on shop drawings for attachments and anchors.
- D. Samples: Submit two samples 6 inches in size illustrating finished aluminum surface, glass, glazing materials.
- E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- F. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
- G. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.
- H. Designer's Qualification Statement.

- I. Manufacturer's Qualification Statement.
- J. Installer's Qualification Statement.
- K. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

#### **1.6 QUALITY ASSURANCE**

- A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
  - 1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.
    - a. Insulating Glass Certification Council (IGCC).
    - b. Safety Glazing Certification Council (SGCC).
- C. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
  - 1. Provide company, field supervisors, and installers that hold active ANSI accredited certifications in appropriate categories for work specified.
    - a. North American Contractor Certification (NACC) for glazing contractors.
    - b. Equivalent independent third-party ANSI accredited certification.

#### **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

#### **1.8 FIELD CONDITIONS**

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

#### **1.9 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

- C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

## **PART 2 PRODUCTS**

### **2.1 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING**

- A. Front-Set Style, Thermally-Broken:
  - 1. Basis of Design: Tubelite, Inc; TU24650 Storefront .
  - 2. Vertical Mullion Dimensions: 2 inches wide by 6-1/2 inches deep.
- B. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of one of the manufacturers listed below:
  - 1. Kawneer North America: [www.kawneer.com/#sle..](http://www.kawneer.com/#sle..)
  - 2. C.R. Laurence Company, Inc; U.S. Aluminum: [www.crl-arch.com/#sle](http://www.crl-arch.com/#sle).
  - 3. Oldcastle BuildingEnvelope: [www.oldcastlebe.com/#sle](http://www.oldcastlebe.com/#sle).
- C. Substitutions: See Section 01 60 00 - Product Requirements.
  - 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

### **2.2 BASIS OF DESIGN -- SWINGING DOORS**

- A. Medium Stile, Insulating Glazing, Thermally-Broken:
  - 1. Basis of Design: Tubelite; Therml=Block Medium Series .
  - 2. Thickness: 1-3/4 inches.
- B. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of one of the manufacturers listed below:
  - 1. Kawneer North America: [www.kawneer.com/#sle..](http://www.kawneer.com/#sle..)
  - 2. C.R. Laurence Company, Inc; U.S. Aluminum: [www.crl-arch.com/#sle](http://www.crl-arch.com/#sle).
  - 3. Oldcastle BuildingEnvelope: [www.oldcastlebe.com/#sle](http://www.oldcastlebe.com/#sle).
- C. Substitutions: See Section 01 60 00 - Product Requirements.
  - 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

## 2.3 ALUMINUM-FRAMED STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
1. Finish: Class I color anodized.
    - a. Factory finish all surfaces that will be exposed in completed assemblies.
  2. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
  3. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
  4. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
  5. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
  6. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
  7. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
  8. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.
- B. Performance Requirements:
1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
    - a. Design Wind Loads: Comply with requirements of ASCE 7.
    - b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
  2. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8 psf.
  3. Air Leakage Laboratory Test: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.
  4. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.
  5. Overall U-value Including Glazing: 0.40 Btu/(hr sq ft deg F), maximum.

## **2.4 COMPONENTS**

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
  - 1. Glazing Stops: Flush.
- B. Glazing: As specified in Section 08 80 00.
- C. Swing Doors: Glazed aluminum.
  - 1. Thickness: 1-3/4 inches.
  - 2. Top Rail: 4 inches wide.
  - 3. Vertical Stiles: 4 inches wide.
  - 4. Bottom Rail: 10 inches wide.
  - 5. Glazing Stops: Square.
  - 6. Finish: Same as storefront.

## **2.5 MATERIALS**

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Fasteners: Stainless steel.
- C. Exposed Flashings: Aluminum sheet, 20 gauge, 0.032 inch minimum thickness; finish to match framing members.
- D. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- E. Glazing Accessories: As specified in Section 08 80 00.

## **2.6 FINISHES**

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.
- B. Touch-Up Materials: As recommended by coating manufacturer for field application.

## **2.7 HARDWARE**

- A. For each door, include weatherstripping and sill sweep strip.
- B. Other Door Hardware: As specified in Section 08 71 00.
- C. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.

- D. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

#### **3.2 INSTALLATION**

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

#### **3.3 TOLERANCES**

- A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

### **3.4 FIELD QUALITY CONTROL**

- A. Provide services of storefront manufacturer's field representative to observe for proper installation of system and submit report.
- B. See Section 01 40 00 - Quality Requirements, for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.
- C. Provide field testing of installed storefront system by independent laboratory in accordance with AAMA 503 during construction process and before installation of interior finishes.
  - 1. Perform a minimum of two tests in each designated area as indicated on drawings.
  - 2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
  - 3. Field test for water penetration in accordance with ASTM E1105 with uniform static air pressure difference (Procedure A) not less than 4.18 psf.
    - a. Maximum allowable rate of water penetration in 15-minute test is 0.5 ounce that is not contained in an area with provisions to drain to exterior, or collected on surface of interior horizontal framing member.
- D. Repair or replace storefront components that have failed designated field testing, and retest to verify performance complies with specified requirements.

### **3.5 ADJUSTING**

- A. Adjust operating hardware and sash for smooth operation.

### **3.6 CLEANING**

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.

### **3.7 PROTECTION**

- A. Protect installed products from damage until Date of Substantial Completion.

### **END OF SECTION**

## **SECTION 08 43 33 - THERMALLY BROKEN ALUMINUM FRAMED FOLDING GLASS STOREFRONT**

### **GENERAL**

#### **1.1 SUMMARY**

- A. Section includes furnishing and installing a sliding-folding thermally broken aluminum-framed glass panel system that includes:
  - 1. Aluminum framed panels.
  - 2. Threshold.
  - 3. Sliding-folding and locking hardware.
  - 4. Weather stripping.
  - 5. Bionic Turtle thermal break.
  - 6. Glass and glazing.
  - 7. Accessories as required for a complete working installation.
  
- B. Related Documents and Sections: Contractor to examine Contract Documents for requirements that directly affect or are affected by Work of this Section. A list of those Documents and Sections include, but is not limited to, the following:
  - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 General Requirements, Specification Sections, apply to this Section.
  - 2. Section 06 10 00, Rough Carpentry: Wood framing R.O. and blocking.
  - 3. Section 06 20 00, Finish Carpentry.
  - 4. Section 07 27 00, Air Barriers: Building paper and building wrap.
  - 5. Section 07 62 00, Sheet Metal Flashing and Trim: Flashing gutters, and other sheet metal work.
  - 6. Section 07 90 00, Joint Protection.
  - 7. Section 09 22 16, Non-Structural Metal Framing: Metal framing R.O. and reinforcement.

#### **1.2 REFERENCES**

- A. Reference Standards in accordance with Division 01 and current editions from the following:
  
- B. AAMA. American Architectural Manufacturers Association; [www.aamanet.org](http://www.aamanet.org)
  - 1. AAMA 205-15, In-Plant Testing Guidelines for Manufacturers and Independent Laboratories.
  - 2. AAMA 502, Voluntary Specification for Field Testing of Newly Installed Fenestration Products.
  - 3. AAMA 611, Voluntary Specification for Anodized Architectural Aluminum.
  - 4. AAMA 920-11, Specification for Operating Cycle Performance of Side-Hinged Exterior Door Systems.
  - 5. AAMA 1304, Voluntary Specifications for Forced Entry Resistance of Side-Hinged Door Systems.

6. AAMA 2604, Voluntary Specifications, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
  7. AAMA/WDMA/CSA 101/I.S.2/A440-17, NAFS, North American Fenestration Standard Specification for Windows, Doors and Skylights.
- C. ANSI. American National Standards Institute; [www.ansi.org](http://www.ansi.org)
1. ANSI Z97.1, Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.
- D. ASTM. ASTM International; [www.astm.org](http://www.astm.org)
1. ASTM C1036, Standard Specification for Flat Glass.
  2. ASTM C1048, Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
  3. ASTM E283-04 (2012), Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
  4. ASTM E330-00 (2016), Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
  5. ASTM E331-00 (2016), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
  6. ASTM E547-00 (2016), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference.
  7. ASTM E2068-00 (2016), Standard Test Method for Determination of Operating Force of Sliding Windows and Doors.
  8. ASTM E987-88 (2017), Standard Test Methods for Deglazing Force of Fenestration Products.
  9. ASTM E1332, Standard Classification for Rating Outdoor-Indoor Sound Attenuation.
  10. ASTM F842, Standard Test Methods for Measuring the Forced Entry Resistance of Sliding Door Assemblies, Excluding Glazing Impact.
- E. NFRC. National Fenestration Rating Council; [www.nfrc.org](http://www.nfrc.org)
1. NFRC 100, Procedure for Determining Fenestration Product U-factors.
  2. NFRC 200, Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
  3. NFRC 400, Procedure for Determining Fenestration Product Air Leakage.
  4. NFRC 500, Procedure for Determining Fenestration Product Condensation Resistance Rating Values.

### **1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination: Coordinate Folding Glass Door system and framing R.O.

### **1.4 SUBMITTALS**

- A. For Contractor submittal procedures see Section 01 30 00.

- B. Product Data: Submit manufacturer's printed product literature for each Folding Glass Door system to be incorporated into the Work. Show performance test results and details of construction relative to materials, dimensions of individual components, profiles and colors.
- C. Product Drawings: Indicate Folding Glass Door system component sizes, dimensions and framing R.O., configuration, swing panels, direction of swing, stacking layout, typical head jamb, side jambs and sill details, type of glazing material, and handle heights.
- D. Manufacturers' Instructions: Submit Owner's Manual from manufacturer which includes installation instructions, operation, and maintenance data: Identify with project name, location and completion date, and type and size of unit installed.
- E. Finish and Glass samples for architectural approval

### **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer capable of providing complete, precision built, engineered, pre-fitted units with a minimum thirty (30) years' experience in the sale of folding-sliding door systems for large openings in the North American market.
- B. Manufacturer to have DIN EN ISO 9001: 2015 quality management system registration.
- C. Manufacturer to have DIN EN ISO 14001: 2015 environmental management system registration.
- D. Installer Qualifications: Installer experienced in the installation of manufacturer's products or other similar products for large openings. Installer to provide reference list of at least three (3) projects of similar scale and complexity successfully completed in the last three (3) years.
- E. Installer to be trained and certified by manufacturer.
- F. Single Source Responsibility: Furnish Folding Glass Door system materials from one manufacturer for entire Project.

### **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with manufacturer's instructions and recommendations, Section 01 60 00 requirements, and as follows:
- B. Deliver materials to job site in sealed, unopened cartons or crates.
  - 1. Upon receipt, inspect the shipment to ensure it is complete, in good condition and meets project requirements.
- C. Store material under cover in a clean and dry location, protecting units against weather and defacement or damage from construction activities, especially to the edges of panels.

## 1.7 FIELD CONDITIONS

- A. Field Measurements: Contractor to field verify dimensions of rough openings (R.O.) and threshold depressions to receive sill. Mark field measurements on product drawing submittal.

## 1.8 WARRANTY

- A. Manufacturer Warranty: Provide Folding Glass Door system manufacturer's standard limited warranty as per manufacturer's published warranty document in force at time of purchase, subject to change, against defects in materials and workmanship.
- B. Warranty Period beginning with the earliest of 120 days from Date of Delivery or Date of Substantial Completion:

## PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design Product by Manufacturer: NanaWall NW Aluminum 840 (previously SL84) by NANA WALL SYSTEMS, INC. ([www.nanawall.com](http://www.nanawall.com))
- B. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.2 PERFORMANCE / DESIGN CRITERIA

- A. Performance Criteria (Lab Tested): Low Profile Saddle Sill
- B. Folding Glass Door Units tested to AAMA/WDMA/CSA 101/I.S.2/A440-17 (NAFS-17):
  - 1. Class CW-PG35 – FLD 4000 mm x 2600 mm (157.5 inch x 102 inch) with 1L3R configuration for inward opening units.
- C. Structural Load Deflection (ASTM E330):
  - 1. Design Pressure - Positive: 50 psf (2400 Pa)
  - 2. Design Pressure - Negative: 50 psf (2400 Pa)
  - 3. Uniform Load deflection, L/175: Pass 40 psf (1945 Pa)
- D. Air Infiltration (ASTM E283):
  - 1. 0.12 cfm/ft<sup>2</sup> (0.61 L/s/m<sup>2</sup>) at a static air pressure difference of 1.57 psf (75 Pa)
  - 2. 0.30 cfm/ft<sup>2</sup> (1.52 L/s/m<sup>2</sup>) at a static air pressure difference of 6.24 psf (300 Pa)
  - 3. Canadian Air Infiltration/Exfiltration Level: A2
- E. Water Penetration (ASTM E331, ASTM E547):

1. No uncontrolled water leakage at a static (with weeps) test pressure of 5.43 psf (260 Pa). (Not applicable for even-even configurations)

F. Performance Criteria (Lab Tested):

1. Swing Panel – Operation / Cycling Performance (AMMA 920): 500,000 cycles
2. System – Life Cycle Performance (DIN EN 1191/12400): 20,000 cycles
3. Forced Entry (AAMA 1304, DIN EN 1191): Pass
4. Forced Entry Resistance (ASTM F842, AMMA 1304, CAWM 300): Meets Grade 40; +F2
5. Unit Burglary Resistance: EN 1627-30, Class RC2/ RC2N certified
6. Thermal Performance (U-factor): NFRC 100 rated, certified, and labeled
7. Solar Heat Gain Coefficient (SHGC) + Visible Light Transmission (VT): NFRC 200 rated, certified, and labeled
8. Air Leakage: NFRC 400 rated, certified, and labeled
9. Condensation Resistance (CR): NFRC 500 rated, certified, and labeled

G. Design Criteria:

1. Sizes and Configurations: As indicated by the Drawings for selected number and size of panels, location of swing panels, and number of panels stacking to the left and to the right.
2. Unit Operation: Adjustable sliding and folding hardware with top and bottom tracks.
3. Mounting Type: Floor track supported with upper guide track.
4. Panel Configuration:
  - a. Straight
5. Stack Storage Configuration:
  - a. Inswing type
6. Panel Type: Hinged
  - a. Primary swing panel of paired swing panels, looking from inside, to be on the right.
  - b. With Entry/Egress panel hinged to side jamb.

## 2.3 MATERIALS

A. Thermally Broken Aluminum Framed Folding Glass Door Description: 3-5/16 inch (84 mm) thick, floor track supported system. Manufacturer's standard thermally broken panels and frame profiles, with head track, side jambs, sill and panels with dimensions as shown on Drawings.

1. Panels and Frame:
  - a. Panels
    - 1) Single lite:
    - 2) Panel Size (W x H): As indicated.
    - 3) Rail Depth: 3-1/8 inch (84 mm)
    - 4) Top Rail Width: 2-5/8 inch (66 mm)
    - 5) Typical Stile Width: 1-3/4 inch (45 mm) on both stiles for a nominal frame stile width of 3-7/8 inch (99 mm) between folding panels.
    - 6) Bottom Rail Width:
      - a) Manufacturer's standard kick-plate of 10 inches (254 mm)
    - 7) Frame:

- a) Thermally broken top track and side jambs with multi-purpose frame insert to hide anchoring connections. For long-term tight, consistent sealing, provide a lateral patented (Patent Number: US10683688B2) adjustment feature at the side jambs capable of adjustment of +/- 3/16" (5 mm). Frame finish to match panel finish.
  - b) Top Track Width:
    - 1 2-13/16 inch (72 mm) standard
  - c) Side Jamb Width: 2-13/16 inch (72 mm)
  - d) Top Track and Side Jamb Depth: 3-9/16 inch (91 mm)
  - e) Sill Type - Extruded Aluminum:
    - 1 Low profile saddle sill – ADA compliant with high heel protector insert (thermally broken)
  - f) Sill Finish:
    - 1 Clear anodized
- b. Aluminum Extrusion: AIMgSi0.5 alloy, 6063-T5 (F-22 - European standard)
- 1) Thickness: 0.078 inch (2.0 mm) nominal
  - 2) Thermal Break: 1-15/16 inch (49 mm) wide specially designed and patented (Patent Number: US10550625B2) glass fiber reinforced (GFR) polyamide "Bionic Turtle<sup>®</sup>" for panels. Standard thermal break elsewhere.
- c. Aluminum Finish:
- 1) Inside and Outside;
    - a) Same (one-color)
  - 2) Anodized (AAMA 611):
    - a) Clear
- B. Glass and Glazing:
- 1. Safety Glazing: In compliance with ASTM C1036, ASTM C1048, ANSI Z97.1 and CPSC 16CFR 1201.
  - 2. Manufacturer's tempered glass lites in double insulated glazing units, dry glazed with glass stops on the inside.
    - a. Insulated Glass Unit (IGU) Lites:
      - 1) Double IGU: 15/16 inch (24 mm)
      - 2) 2). St Gobain SKN 176 Low E on the #2 surface
    - b. IGU Fill:
      - 1) Argon filled
    - c. Glass Lite Type:
      - 1) Standard reduced iron
    - d. Glass Spacers: Manufacturer's standard
      - 1) Gray finish without capillary tubes
    - e. IGU Surface:
      - 1) Clear
      - 2) Low-E coating on # 2 surface of double IGU
- C. Locking Hardware and Handles:

1. Main Entry Panel(s) for Models WITH a Swing Panel: Provide manufacturers standards hardware unless otherwise ammended by Section 08 71 00 - Door hardware.
    - a. Locking:
      - 1) Adapter for Small Format Interchangeable Core (SFIC) by others
    - b. Rods to be concealed and not edge mounted.
    - c. After turn of key or thumb-turn, depression of handles withdraws latch.
    - d. Lifting of handles engages rods and turn of key or thumb-turn engages deadbolt and operates lock.
    - e. Lever Handle - Finish:
      - 1) Brushed satin stainless steel
    - f. Secondary Swing Panel: Provide concealed two-point, edge locking.
  2. Secondary Panels and Pairs of Folding Panels: Provide manufacturer's flat handle and concealed two-point locking hardware operated by 180° turn of handle between each pair. Face applied flush bolt locking NOT acceptable.
    - a. Flat Handle - Finish:
      - 1) Brushed satin stainless steel
  3. Handle Height: 41-3/8 inch (105 cm) centered from bottom of panel or as otherwise indicated.
  4. Locking rods with standard end caps at the top and bottom. Rods to have a stroke of 15/16 inch (24 mm).
  5. Panel Catch: panel catch to hold swing panel to adjacent folding panel to prevent incorrect operation when moving the panel.
- D. Sliding-Folding Hardware: Provide manufacturer's standard combination sliding and folding hardware with top and bottom tracks and threshold. All running carriages to be with sealed, self-lubricating, double ball bearing multi-rollers. Surface mounted hinges and running carriages NOT acceptable.
1. Lower Running Carriage Carrying Capacity: 240 lb. (110 kg). Lower running carriage provided with two vertical stainless-steel wheels with double row of ball bearings and two horizontal polyamide wheels.
  2. Vertical wheels with Gothic arch feature to ride on top of stainless-steel guide track covers over the full length of the sill track.
  3. Upper guide carriage with two horizontal polyamide guiding wheels. For configurations with pairs of panels that can slide left or right, additional concealed, additional vertical tilt protection hardware.
  4. Rollers: Clear double ball bearing stainless-steel wheels.
  5. Hinges: Clear anodized aluminum with stainless steel security hinge pins and set-screws. Concealed panel alignment with a tight seal through the patented (Patent Number: US10711510B2) TwinX mechanism reinforced between panels.
  6. Spring-Loaded Pull Handle: For outswing units with larger panel sizes, a spring loaded-pull handle is supplied for ease of closing the system. The pull handle is located above the flat handle. When not in use, the handle lays flat against the adjacent panel and is supplied with bumpers to avoid metal to metal contact.
    - a. Pull Handle – Finish:
      - 1) Brushed satin stainless steel

7. Weather Stripping: Manufacturer's double layer EPDM between panels and EPDM gasket, Q-Ion gasket, or brush seal between panel and frame, or brush seals with a two-layer fiberglass reinforced polyamide fin attached at both inner and outer edge of bottom of door panels with a recessed sill or on frame for sealing between panels and between panel and frame.
- E. Fasteners: Installation plates for connecting frame components made of stainless steel with sealing cushion to avoid thermal conductivity.

## 2.4 FABRICATION

- A. Folding Glass Wall: Extruded aluminum frame and panel profiles, corner connectors and hinges, sliding and folding hardware, locking hardware and handles, glass and glazing and weather stripping.
  1. Each unit factory pre-assembled and shipped with complete system components, installation mounting plates, and installation instructions.
  2. Exposed work to be carefully matched to produce continuity of line and design with all joints.
  3. No raw edges visible at joints.

## EXECUTION

### 3.1 EXAMINATION

- A. Carefully examine rough openings with Installer present, for compliance with requirements affecting Work performance.
  1. Examine surfaces of openings and verify dimensions; verify rough openings are level, plumb, and square with no unevenness, bowing, or bumps on the floor; and other conditions as required by the manufacturer for readiness to receive Work.
  2. Verify structural integrity of the header for deflection with live and dead loads limited to the lesser of  $L/720$  of the span or 1/4 inch (6 mm). Provide structural support for lateral loads, and both wind load and eccentric load when the panels are stacked open.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Install Folding Glass Door system in accordance with the Drawings, approved submittals, manufacturer's recommendations, and installation instructions, and as follows:
- B. Properly flash, waterproof and seal around opening perimeter.
- C. Securely attach anchorage devices to rigidly fit frame in place, level, straight, plumb, and square. Install frame in proper elevation, plane, and location, and in proper alignment with other work.

- D. When lower track is designed to drain, provide connections to allow for drainage.
- E. Install panels, handles, lockset, screens, and other accessories in accordance with manufacturer's recommendations and instructions.

### **3.3 FIELD QUALITY CONTROL**

- A. Field Tests and Inspections per Section 01 40 00 of the following:
- B. Verify the Folding Glass Door system operates and functions properly. Adjust hardware for proper operation.
- C. Non-Conforming Work: Repair or replace non-conforming work as directed by the Architect; see General and Supplementary Conditions, and Division 01, General Requirements.

### **3.4 CLEANING AND PROTECTION**

- A. Keep units closed and protect Folding Glass Door installation against damage from construction activities.
- B. Remove protective coatings and use manufacturer recommended methods to clean exposed surfaces.

### **END OF SECTION**

## **SECTION 08 80 00 - GLAZING**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Insulating glass units.
- B. Glazing units.
- C. Glazing compounds and accessories.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 06 41 00 - Architectural Wood Casework: Cabinets with requirements for glass shelves and \_\_\_\_\_.
- B. Section 07 25 00 - Weather Barriers.

#### **1.3 REFERENCE STANDARDS**

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015.
- C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2015).
- E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- F. ASTM C1036 - Standard Specification for Flat Glass; 2016.
- G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- H. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- I. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2015.
- J. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
- K. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.

## **SECTION 08 71 00 - DOOR HARDWARE**

### **PART 1 GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### **1.2 SUMMARY**

- A. This Section includes commercial door hardware for the following:
  - 1. Swinging doors.
  - 2. Sliding doors.
  - 3. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
  - 1. Mechanical door hardware.
  - 2. Automatic operators.
  - 3. Cylinders specified for doors in other sections.
- C. Related Sections:
  - 1. Division 08 Section "Hollow Metal Doors and Frames".
  - 2. Division 08 Section "Flush Wood Doors".
  - 3. Division 08 Section "Aluminum-Framed Entrances and Storefronts".
  - 4. Division 08 Section "Automatic Door Operators".
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
  - 2. ICC/IBC - International Building Code.
  - 3. NFPA 70 - National Electrical Code.
  - 4. NFPA 80 - Fire Doors and Windows.
  - 5. NFPA 101 - Life Safety Code.
  - 6. NFPA 105 - Installation of Smoke Door Assemblies.
  - 7. UL/ULC and CSA C22.2 - Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
  - 8. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
  - 1. ANSI/BHMA Certified Product Standards - A156 Series.
  - 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.

3. ANSI/UL 294 - Access Control System Units.
4. UL 305 - Panic Hardware.
5. ANSI/UL 437- Key Locks.

### **1.3 SUBMITTALS**

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
  2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
  3. Content: Include the following information:
    - a. Type, style, function, size, label, hand, and finish of each door hardware item.
    - b. Manufacturer of each item.
    - c. Fastenings and other pertinent information.
    - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    - e. Explanation of abbreviations, symbols, and codes contained in schedule.
    - f. Mounting locations for door hardware.
    - g. Door and frame sizes and materials.
    - h. Warranty information for each product.
  4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- D. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

#### **1.4 QUALITY ASSURANCE**

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
  1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
- F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
  1. Function of building, purpose of each area and degree of security required.
  2. Plans for existing and future key system expansion.
  3. Requirements for key control storage and software.
  4. Installation of permanent keys, cylinder cores and software.
  5. Address and requirements for delivery of keys.

- H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
  - 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
  - 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
  - 3. Review sequence of operation narratives for each unique access controlled opening.
  - 4. Review and finalize construction schedule and verify availability of materials.
  - 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

#### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

#### **1.6 COORDINATION**

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

## **1.7 WARRANTY**

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
  - 1. Structural failures including excessive deflection, cracking, or breakage.
  - 2. Faulty operation of the hardware.
  - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
  - 1. Ten years for mortise locks and latches.
  - 2. Five years for exit hardware.
  - 3. Ten years for manual overhead door closer bodies.
  - 4. Twenty five years for manual overhead door closer bodies.

## **1.8 MAINTENANCE SERVICE**

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

## **PART 2 PRODUCTS**

### **2.1 SCHEDULED DOOR HARDWARE**

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

## 2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
  1. Quantity: Provide the following hinge quantity:
    - a. Two Hinges: For doors with heights up to 60 inches.
    - b. Three Hinges: For doors with heights 61 to 90 inches.
    - c. Four Hinges: For doors with heights 91 to 120 inches.
    - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
  2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
    - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
    - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
  3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
    - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
    - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
  4. Hinge Options: Comply with the following:
    - a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
  5. Manufacturers:
    - a. Hager Companies (HA).
    - b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
    - c. Stanley Hardware (ST).
- B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
  1. Manufacturers:
    - a. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

## 2.3 DOOR OPERATING TRIM

- A. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
  - 1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
  - 2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
  - 3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
  - 4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
  - 5. Manufacturers:
    - a. Hiawatha, Inc. (HI).
    - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
    - c. Trimco (TC).

## 2.4 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
- C. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
  - 1. Threaded mortise cylinders with rings and cams to suit hardware application.
  - 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  - 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
  - 4. Tubular deadlocks and other auxiliary locks.
  - 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
  - 6. Keyway: Manufacturer's Standard.
- D. Removable Cores: Provide removable cores as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.
- E. Patented Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer's United States patents. Cylinders are to be factory keyed with owner having the ability for on-site original key cutting.

1. Patented key systems shall not be established with products that have an expired patent. Expired systems shall only be specified and supplied to support existing systems.
  2. Manufacturers:
    - a. Corbin Russwin (RU) - Access 3 AP.
    - b. Sargent (SA) - Degree DG1.
    - c. No Substitution.
- F. Keying System: Each type of lock and cylinders to be factory keyed.
1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
  2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
  3. New System: Key locks to a new key system as directed by the Owner.
- G. Key Quantity: Provide the following minimum number of keys:
1. Change Keys per Cylinder: Two (2)
  2. Master Keys (per Master Key Level/Group): Five (5).
  3. Construction Keys (where required): Ten (10).
- H. Construction Keying: Provide construction master keyed cylinders.
- I. Key Registration List (Bitting List):
1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
  2. Provide transcript list in writing or electronic file as directed by the Owner.

## 2.5 KEY CONTROL

- A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
1. Manufacturers:
    - a. Lund Equipment (LU).
    - b. MMF Industries (MM).
    - c. Telkee (TK).
- B. Electronic Key Management System: Provide an electronic key control system with Stand-alone Plug and Play features including advanced RFID technology. Touchscreen interface with PIN access for keys individually locked in place. Minimum 1,000 system users and 21 iFobs for locking receptors. System shall have a minimum 250,000 audit events screen displayed or ability to be exported via USB port.
1. Manufacturers:
    - a. Medeco (MC).
    - b. Traka (TA).

## 2.6 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
  - 1. Manufacturers:
    - a. Corbin Russwin Hardware (RU) - ML2000 Series.
    - b. Sargent Manufacturing (SA) - 8200 Series.
    - c. Yale Commercial(YA) - 8800FL Series.

## 2.7 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
  - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
  - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
  - 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
  - 4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
  - 1. Strikes for Mortise Locks and Latches: BHMA A156.13.
  - 2. Strikes for Bored Locks and Latches: BHMA A156.2.
  - 3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
  - 4. Dustproof Strikes: BHMA A156.16.

## 2.8 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
  - 1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
  - 2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
  - 3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
  5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
    - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
  6. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
  7. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
  8. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
  9. Rail Sizing: Provide exit device rails factory sized for proper door width application.
  10. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
1. Manufacturers:
    - a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
    - b. Sargent Manufacturing (SA) - 80 Series.

## 2.9 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
  2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
  3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
  4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
  5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
  6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
  - 1. Manufacturers:
    - a. Corbin Russwin Hardware (RU) - DC6000 Series.
    - b. Norton Door Controls (NO) - 7500 Series.
    - c. Sargent Manufacturing (SA) - 351 Series.
    - d. Yale Commercial(YA) - 4400 Series.
  
- C. Door Closers, Surface Mounted (Cam Action): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, high efficiency door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be of the cam and roller design, one piece cast aluminum silicon alloy body with adjustable backcheck and independently controlled valves for closing sweep and latch speed.
  - 1. Manufacturers:
    - a. Corbin Russwin (RU) - DC5000 Series.
    - b. Norton Door Controls (NO) - 2800ST Series.
    - c. Sargent Manufacturing (SA) - 422 Series.

## **2.10 ELECTROHYDRAULIC DOOR OPERATORS**

- A. General: Provide low energy operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for compliance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation devices.
  - 1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.
  
- B. Standard: Certified ANSI/BHMA A156.19.
  
- C. Performance Requirements:
  - 1. Opening Force if Power Fails: Not more than 15 lbf required to release a latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.
  - 2. Entrapment Protection: Not more than 15 lbf required to prevent stopped door from closing or opening.
  
- D. Configuration: Surface mounted or in-ground as required. Door operators to control single swinging and pair of swinging doors.

- E. Operation: Power opening and spring closing operation capable of meeting ANSI A117.1 accessibility guideline. Provide time delay for door to remain open before initiating closing cycle as required by ANSI/BHMA A156.19. When not in automatic mode, door operator to function as manual door closer with fully adjustable opening and closing forces, with or without electrical power.
- F. Features: Operator units to have full feature adjustments for door opening and closing force and speed, backcheck, motor assist acceleration from 0 to 30 seconds, time delay, vestibule interface delay, obstruction recycle, and hold open time from 0 up to 30 seconds.
- G. Provide outputs and relays on board the operator to allow for coordination of exit device latch retraction, electric strikes, magnetic locks, card readers, safety and motion sensors and specified auxiliary contacts.
- H. Brackets and Reinforcements: Manufacturer's standard, fabricated from aluminum with nonferrous shims for aligning system components.
- I. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Norton Door Controls (NO) - 6000 Series.

## **2.11 ARCHITECTURAL TRIM**

- A. Door Protective Trim
  - 1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
  - 2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
  - 3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
  - 4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
    - a. Stainless Steel: 300 grade, 050-inch thick.
  - 5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
  - 6. Manufacturers:
    - a. Hiawatha, Inc. (HI).
    - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
    - c. Trimco (TC).

## **2.12 DOOR STOPS AND HOLDERS**

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
  - 1. Manufacturers:
    - a. Hiawatha, Inc. (HI).
    - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
    - c. Trimco (TC).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
  - 1. Manufacturers:
    - a. Rixson Door Controls (RF).
    - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
    - c. Sargent Manufacturing (SA).

## **2.13 ARCHITECTURAL SEALS**

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
  - 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
  - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
  - 1. National Guard Products (NG).
  - 2. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).
  - 3. Reese Enterprises, Inc. (RE).

#### **2.14 FABRICATION**

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

#### **2.15 FINISHES**

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

### **3.2 PREPARATION**

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

### **3.3 INSTALLATION**

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
  - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
  - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
  - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
  - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

### **3.4 FIELD QUALITY CONTROL**

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures" and "Cash Allowances". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted.

Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.
2. Submit documentation of incomplete items in the following formats:
  - a. PDF electronic file.
  - b. Electronic formatted file integrated with the Openings Studio™ door opening management software platform.

### **3.5 ADJUSTING**

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

### **3.6 CLEANING AND PROTECTION**

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

### **3.7 DEMONSTRATION**

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

### **3.8 DOOR HARDWARE SETS**

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
  1. Quantities listed are for each pair of doors, or for each single door.
  2. The supplier is responsible for handing and sizing all products.

3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

1. MK - McKinney
2. OT - Other
3. PE - Pemko
4. RU - Corbin Russwin
5. RO - Rockwood
6. RF - Rixson
7. NO - Norton

**Hardware Sets**

**Set: 1.0**

Doors: 100.B

1 Cylinder	<b><u>1580 / 3580 x GMK - ass appropriate for lock</u></b>	<b>626</b>	<b>RU</b>
<b>1 Hardware</b>	<b>- Provided by Door Assembly Manufacturer</b>		<b>OT</b>

Notes:

**Set: 2.0**

Doors: 100.A

1 Continuous Hinge	<b><u>CFM-SLF-HD1</u></b>		<b>PE</b>
<b>1 Exit Device (rim, nightlatch)</b>	<b><u>ED4200S(M) K157 M110 M52</u></b>	<b>630</b>	<b>RU</b>
<b>1 Mort. Cylinder</b>	<b><u>1580 GMK</u></b>	<b>626</b>	<b>RU</b>
<b>1 Rim Cylinder</b>	<b><u>3580 GMK</u></b>	<b>626</b>	<b>RU</b>
<b>1 Door Pull</b>	<b>RM3301-12 Mtg-Type 12XHD</b>	<b>US32D- 316</b>	<b>RO</b>
<b>1 Conc Overhead Stop</b>	<b><u>6-X36</u></b>	<b>630</b>	<b>RF</b>
<b>1 Automatic Opener</b>	<b><u>6021(D) - confirm head detail</u></b>	<b>689</b>	<b>NO ☒</b>
<b>1 Threshold</b>	<b><u>1715AK MSES25SS</u></b>		<b>PE</b>
<b>1 Weatherstrip</b>	<b>- integral within construction of door and frame assembly</b>		<b>00</b>
<b>1 Door Sweep</b>	<b><u>29326CNB x TKSP8</u></b>		<b>PE</b>
<b>2 Wall Switch</b>	<b>704 (mullion mount)</b>		<b>NO ☒</b>

**Notes: Function: Key outside retracts latch bolt. Keyed cylinder inside controls latch bolt dogging. Free egress always permitted.**

**Activation of wave to open operator switch either side of door shall cycle automatic operator when latch bolt is in dogged / push - pull operation.**

**Set: 3.0**  
SET NOT USED

**Set: 4.0**

Doors: 104.A

3 Hinge, Full Mortise	<u>TA2714</u>	US26D	MK
1 Storeroom Lock	<u>ML2057 NSA ACP GMK</u>	626	RU
1 Surface Closer	<u>2800STH (hold open) - pull side mount</u>	689	NO
1 Kick Plate	<u>K1050 10" high 4BE CSK</u>	US32D	RO
3 Silencer	<u>608 / 609</u>		RO

**Notes: Function: Latch bolt operated by key outside or lever inside. Outside lever always rigid. Inside lever always free for egress.**

**Set: 5.0**

Doors: 102.A , 103.A

3 Hinge, Full Mortise	<u>TA2714</u>	US26D	MK
1 Privacy Set	<u>ML2060 NSA M34</u>	626	RU
1 Surface Closer	<u>7500 - pull side mount</u>	689	NO
1 Kick Plate	<u>K1050 10" high 4BE CSK</u>	US32D	RO
1 Wall Stop	<u>RM860</u>	US32D	RO
3 Silencer	<u>608 / 609</u>		RO
1 Coat Hook	<u>796</u>	US26D	RO

**Notes: Install coat hook at 48" centerline above floor.**

**END OF SECTION**

- L. GANA (GM) - GANA Glazing Manual; 2008.
- M. GANA (SM) - GANA Sealant Manual; 2008.
- N. GANA (LGRM) - Laminated Glazing Reference Manual; 2009.
- O. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2017.
- P. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2014, with Errata (2017).
- Q. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2017.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

#### **1.5 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- C. Samples: Submit two samples 12 by 12 inch in size of glass units.
- D. Certificate: Certify that products of this section meet or exceed specified requirements.
- E. Manufacturer's Qualification Statement.
- F. Installer's Qualification Statement.
- G. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Insulating Glass Units: One of each glass size and each glass type.

#### **1.6 QUALITY ASSURANCE**

- A. Perform Work in accordance with GANA (GM), GANA (SM), and GANA (LGRM) for glazing installation methods. Maintain one copy on site.

- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

## **1.7 FIELD CONDITIONS**

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

## **1.8 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Glass Fabricators:
  - 1. GGI - General Glass International: [www.generalglass.com/#sle](http://www.generalglass.com/#sle).
  - 2. JE Berkowitz, LP: [www.jeberkowitz.com/#sle](http://www.jeberkowitz.com/#sle).
  - 3. Standard Bent Glass Corp: [www.standardbent.com/#sle](http://www.standardbent.com/#sle).
  - 4. Trulite Glass & Aluminum Solutions, LLC: [www.trulite.com/#sle](http://www.trulite.com/#sle).
  - 5. Viracon, Inc: [www.viracon.com/#sle](http://www.viracon.com/#sle).
  - 6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Float Glass Manufacturers:
  - 1. AGC Glass North America, Inc; \_\_\_\_\_: [www.agcglass.com/#sle](http://www.agcglass.com/#sle).
  - 2. Cardinal Glass Industries; \_\_\_\_\_: [www.cardinalcorp.com/#sle](http://www.cardinalcorp.com/#sle).
  - 3. Guardian Glass, LLC; \_\_\_\_\_: [www.guardianglass.com/#sle](http://www.guardianglass.com/#sle).
  - 4. Pilkington North America Inc; \_\_\_\_\_: [www.pilkington.com/na/#sle](http://www.pilkington.com/na/#sle).
  - 5. Vitro Architectural Glass (formerly PPG Glass); \_\_\_\_\_: [www.vitroglazings.com/#sle](http://www.vitroglazings.com/#sle).
  - 6. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.2 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
  - 1. Design Pressure: Calculated in accordance with ASCE 7.
  - 2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
  - 3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
  - 4. Glass thicknesses listed are minimum.
- B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
  - 1. In conjunction with vapor retarder and joint sealer materials described in other sections.
    - a. Refer to Section 07 25 00.
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
  - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
  - 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
  - 3. Solar Optical Properties: Comply with NFRC 300 test method.

## 2.3 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
  - 1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
  - 2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
  - 3. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
  - 4. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
  - 5. Heat-Soak Testing (HST): Provide HST of fully tempered glass used on high-risk or other demanding applications of project, to reduce risks of spontaneous breakage due to nickel sulfide (NiS) induced fractures in accordance with industry established testing requirements.

## 2.4 BASIS OF DESIGN - INSULATING GLASS UNITS

- A. Basis of Design - Insulating Glass Units: Vision glazing, with Low-E coating.
  - 1. Applications: Exterior insulating glass glazing unless otherwise indicated.

2. Space between lites filled with air.
3. Total Thickness: 1 inch.
4. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.27, nominal.
5. Visible Light Transmittance (VLT): 70 percent, nominal.
6. Shading Coefficient: 0.45, nominal.
7. Solar Heat Gain Coefficient (SHGC): 0.39, nominal.
8. Visible Light Reflectance, Outside: 11 percent, nominal.
9. Durability: Certified by an independent testing agency to comply with ASTM E2190.
10. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
11. Metal Edge Spacers: Aluminum, bent and soldered corners.
12. Spacer Color: Black.
13. Edge Seal:
14. Color: Black.
15. Purge interpane space with dry air, hermetically sealed.
16. Basis of Design - Vitro Architectural Glass (formerly PPG Glass):  
[www.vitroglazings.com/#sle](http://www.vitroglazings.com/#sle).
17. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
  - a. Low-E Coating: Vitro Architectural Glass (formerly PPG Glass) Solarban 60 on #2 surface.
  - b. Glass: Clear.
18. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick.
  - a. Glass: Clear.
19. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of another acceptable manufacturer.
20. Substitution Procedures: See Section 01 60 00 - Product Requirements.

## 2.5 GLAZING COMPOUNDS

- A. Glazing Putty: Polymer modified latex recommended by manufacturer for outdoor use, knife grade consistency; gray color.
- B. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.
- C. Polysulfide Sealant: Two component; chemical curing, non-sagging type; ASTM C920, Type M, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.
- D. Polyurethane Sealant: Single component, chemical curing, non-staining, non-bleeding; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 20 to 35; color as selected.

- E. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

## 2.6 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
  - 1. Width: As required for application.
  - 2. Thickness: As required for application.
  - 3. Spacer Rod Diameter: As required for application.
- D. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.
- E. Glazing Clips: Manufacturer's standard type.

## 2.7 SOURCE QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Provide shop inspection and testing for Type \_\_\_\_\_ glass.

## PART 3 EXECUTION

### 3.1 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that the minimum required face and edge clearances are being provided.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

- D. Verify that sealing between joints of glass framing members has been completed effectively.
- E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

### **3.3 INSTALLATION, GENERAL**

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- D. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

### **3.4 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)**

- A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

### **3.5 INSTALLATION - DRY GLAZING METHOD (TAPE AND GASKET SPLINE GLAZING)**

- A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.

- B. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- D. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
- E. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
- F. Carefully trim protruding tape with knife.

### **3.6 FIELD QUALITY CONTROL**

- A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- B. Monitor and report installation procedures and unacceptable conditions.

### **3.7 CLEANING**

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove non-permanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

### **3.8 PROTECTION**

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

### **END OF SECTION**

## **SECTION 09 21 16 - GYPSUM BOARD ASSEMBLIES**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Metal channel ceiling framing.
- D. Acoustic insulation.
- E. Cementitious backing board.
- F. Gypsum wallboard.
- G. Joint treatment and accessories.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.

#### **1.3 REFERENCE STANDARDS**

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
- B. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2010 (Reaffirmed 2016).
- C. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2016).
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.
- F. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.
- G. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.

- H. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014, with Editorial Revision (2015).
- I. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.
- J. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2017.
- K. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2018b.
- L. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.
- M. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2016.
- N. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- O. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
- P. ASTM C1288 - Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets; 2017.
- Q. ASTM C1325 - Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units; 2017a.
- R. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
- S. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2018a.
- T. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- U. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- V. ASTM E413 - Classification for Rating Sound Insulation; 2016.
- W. GA-216 - Application and Finishing of Gypsum Panel Products; 2016.

#### 1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
- C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- E. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.
- F. Installer's Qualification Statement.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 5 years of experience.
- B. Manufacturer Qualifications: Member of Steel Stud Manufacturers Association (SSMA): [www.ssma.com/#sle](http://www.ssma.com/#sle).
- C. **NOTE TO CONTRACTOR: non-structural studs are to be 20 Gauge (0.030 inch) minimum thickness. Studs labeled as "EQ" or similar with a lesser thickness will not be accepted.**

### PART 2 PRODUCTS

#### 2.1 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
  - 1. See PART 3 for finishing requirements.
- B. Interior Partitions: Provide completed assemblies with the following characteristics:
  - 1. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Fire-Resistance-Rated Assemblies: Provide completed assemblies complying with applicable code.

## 2.2 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
  - 1. ClarkDietrich: [www.clarkdietrich.com/#sle](http://www.clarkdietrich.com/#sle).
  - 2. Jaimes Industries: [www.jaimesind.com/#sle](http://www.jaimesind.com/#sle).
  - 3. Marino: [www.marinoware.com/#sle](http://www.marinoware.com/#sle).
  - 4. Phillips Manufacturing Co: [www.phillipsmfg.com/#sle](http://www.phillipsmfg.com/#sle).
  - 5. SCAFCO Corporation: [www.scafco.com/#sle](http://www.scafco.com/#sle).
  - 6. Substitutions: See Section 01 60 00 - Product Requirements.
  
- B. Non-structural Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
  - 1. Studs: C-shaped.
  - 2. Runners: U shaped, sized to match studs.
  - 3. Ceiling Channels: C-shaped.
  
- C. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws, and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
  - 1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
  - 2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot-dipped galvanized coating.
  - 3. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
  - 4. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-resistance rating of the wall assembly.
  
- D. Deflection and Firestop Track: Intumescent strip factory-applied to track flanges expands when exposed to heat or flames to provide a perimeter joint seal.
  
- E. Preformed Top Track Firestop Seal:
  - 1. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
  
- F. Non-structural Framing Accessories:
  - 1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
  - 2. Partial Height Wall Framing Support: Provides stud reinforcement and anchored connection to floor.
    - a. Materials: ASTM A36/A36M formed sheet steel support member with factory-welded ASTM A1003/A1003M steel plate base.
  - 3. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.

- G. Grid Suspension Systems: Steel grid system of main tees and support bars connected to structure using hanging wire.

## 2.3 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
1. American Gypsum Company: [www.americangypsum.com/#sle](http://www.americangypsum.com/#sle).
  2. CertainTeed Corporation: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  3. Georgia-Pacific Gypsum: [www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
  4. National Gypsum Company: [www.nationalgypsum.com/#sle](http://www.nationalgypsum.com/#sle).
  5. USG Corporation: [www.usg.com/#sle](http://www.usg.com/#sle).
  6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
  2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
    - a. Mold resistant board is required at all locations.
  3. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
  4. Thickness:
    - a. Vertical Surfaces: 5/8 inch.
    - b. Ceilings: 5/8 inch.
    - c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
  5. Mold Resistant Paper Faced Products:
    - a. American Gypsum Company; M-Bloc Type X: [www.americangypsum.com/#sle](http://www.americangypsum.com/#sle).
    - b. American Gypsum Company; M-Bloc Type C: [www.americangypsum.com/#sle](http://www.americangypsum.com/#sle).
    - c. CertainTeed Corporation; M2Tech 5/8" Type C Moisture & Mold Resistant Drywall: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
    - d. CertainTeed Corporation; M2Tech 5/8" Type X Moisture & Mold Resistant Drywall: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
    - e. Georgia-Pacific Gypsum; ToughRock Mold-Guard: [www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
    - f. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold-Guard: [www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
    - g. National Gypsum Company; Gold Bond XP Gypsum Board: [www.nationalgypsum.com/#sle](http://www.nationalgypsum.com/#sle).
    - h. USG Corporation; USG Sheetrock Brand EcoSmart Panels Mold Tough Firecode X: [www.usg.com/#sle](http://www.usg.com/#sle).
    - i. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Abuse Resistant Wallboard:
1. Application: High-traffic areas indicated.
  2. Surface Abrasion: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.

3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
  4. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  5. Type: Fire-resistance-rated Type X, UL or WH listed.
  6. Thickness: 5/8 inch.
  7. Edges: Tapered.
  8. Paper-Faced Products:
    - a. American Gypsum Company; M-Bloc AR Type X: [www.americangypsum.com/#sle](http://www.americangypsum.com/#sle).
    - b. CertainTeed Corporation; Extreme Abuse Resistant Drywall with M2Tech: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
    - c. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold Guard Abuse-Resistant: [www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
    - d. National Gypsum Company; Gold Bond Hi-Abuse XP Gypsum Board: [www.nationalgypsum.com/#sle](http://www.nationalgypsum.com/#sle).
    - e. USG Corporation; USG Sheetrock Brand Mold Tough AR Firecode X Panels: [www.usg.com/#sle](http://www.usg.com/#sle).
    - f. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Backing Board for Tile Finishes: One of the following products:
1. Application: Surfaces behind tile in areas including toilet rooms.
  2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
    - a. Thickness: 1/2 inch.
  4. ASTM Cement-Based Board: Non-gypsum-based, cementitious board complying with ASTM C1288.
    - a. Thickness: 1/2 inch.
  5. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.

## 2.4 Gypsum Wallboard ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed mineral wool, friction fit type, unfaced. Thickness: 3-1/2 or 5-1/2 to fit stud cavity inch.
- B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
  1. Products:
    - a. Franklin International, Inc; Titebond GREENchoice Professional Acoustical Smoke and Sound Sealant: [www.titebond.com/#sle](http://www.titebond.com/#sle).
    - b. Liquid Nails, a brand of PPG Architectural Coatings; AS-825 Acoustical Sound Sealant: [www.liquidnails.com/#sle](http://www.liquidnails.com/#sle).
    - c. Specified Technologies Inc; Smoke N Sound Acoustical Sealant: [www.stifirestop.com/#sle](http://www.stifirestop.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.

- C. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
  - 1. Types: As detailed or required for finished appearance.
  - 2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead, L-bead, and LC-bead at exposed panel edges.
  - 3. Products:
    - a. Same manufacturer as framing materials.
    - b. Phillips Manufacturing Co: [www.phillipsmfg.com/#sle](http://www.phillipsmfg.com/#sle).
    - c. Trim-tex, Inc: [www.trim-tex.com/#sle](http://www.trim-tex.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
  - 1. Fiberglass Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
  - 2. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
  - 3. Joint Compound: Drying type, vinyl-based, ready-mixed.
  - 4. Joint Compound: Setting type, field-mixed.
- E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.
- F. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that project conditions are appropriate for work of this section to commence.

### **3.2 FRAMING INSTALLATION**

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
- C. Studs: Space studs at 16 inches on center.
  - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
  - 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
  - 3. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical

devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- E. Blocking: Install wood blocking for support of:
  - 1. Framed openings.
  - 2. Wall-mounted cabinets.
  - 3. Plumbing fixtures.
  - 4. Toilet partitions.
  - 5. Toilet accessories.
  - 6. Wall-mounted door hardware.

### **3.3 ACOUSTIC ACCESSORIES INSTALLATION**

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
  - 1. Place one bead continuously on substrate before installation of perimeter framing members.
  - 2. Place continuous bead at perimeter of each layer of gypsum board.
  - 3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

### **3.4 BOARD INSTALLATION**

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- C. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- D. Cementitious Backing Board: Install over steel framing members where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.
- E. Installation on Metal Framing: Use screws for attachment of gypsum board.

### **3.5 INSTALLATION OF TRIM AND ACCESSORIES**

- A. Control Joints: Place control joints consistent with lines of building spaces and as directed.

1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
  2. Coordinate locations with architect.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

### **3.6 JOINT TREATMENT**

- A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
  2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
  3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
  4. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
1. Feather coats of joint compound so that camber is maximum 1/32 inch.
- C. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

### **3.7 TOLERANCES**

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

### **END OF SECTION**

## **SECTION 09 30 00 - TILING**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Tile for wall applications.
- B. Ceramic accessories.
- C. Non-ceramic trim.

#### **1.2 REFERENCE STANDARDS**

- A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2017.
- B. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2014.
- C. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- D. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement; 1999 (Reaffirmed 2010).
- E. ANSI A108.2 - American National Standard General Requirements: Materials, Environmental and Workmanship; 2019.
- F. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2009 (Revised).
- G. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- H. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 1999 (Reaffirmed 2010).
- I. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2010).
- J. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (Reaffirmed 2010).

- K. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1999 (Reaffirmed 2010).
- L. ANSI A108.12 - American National Standard for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- M. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2010).
- N. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar; 2017.
- O. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2012 (Revised).
- P. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2010 (Reaffirmed 2016).
- Q. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2012.
- R. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2017.
- S. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2017.

### **1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.

### **1.4 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- C. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches in size illustrating pattern, color variations, and grout joint size variations.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Installer's Qualification Statement:

1. Submit documentation of National Tile Contractors Association (NTCA) or Tile Contractors' Association of America (TCAA) accreditation.
- F. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

## **1.5 QUALITY ASSURANCE**

- A. Maintain one copy of ANSI A108/A118/A136 and TCNA (HB) on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.
- C. Installer Qualifications:
1. Company specializing in performing tile installation, with minimum of five years of documented experience.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

## **1.7 FIELD CONDITIONS**

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

## **PART 2 PRODUCTS**

### **2.1 TILE**

- A. Manufacturers: As indicated on drawings.
1. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Ceramic Tile: ANSI A137.1, standard grade.
1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
  2. Shape: As indicated on drawings.
  3. Surface Finish: As indicated on drawings.
  4. Color(s): As indicated on drawings.
  5. Pattern: Refer to drawings.
  6. Products:
    - a. Refer to drawings.

## 2.2 TRIM AND ACCESSORIES

- A. Non-Ceramic Trim: Satin natural anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
  - 1. Applications:
    - a. Open edges of wall tile.
    - b. Wall corners, outside and inside.
  - 2. Manufacturers:
    - a. Schluter-Systems: [www.schluter.com/#sle](http://www.schluter.com/#sle).
    - b. Genesis APS International: [www.genesis-aps.com/#sle](http://www.genesis-aps.com/#sle).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.3 SETTING MATERIALS

- A. Provide setting and grout materials from same manufacturer.
- B. Manufacturers:
  - 1. Custom Building Products: [www.custombuildingproducts.com/#sle](http://www.custombuildingproducts.com/#sle).
  - 2. LATICRETE International, Inc: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
  - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
  - 1. Products:
    - a. Custom Building Products; ProLite Premium Rapid Setting Large Format Tile Mortar, with Multi-Surface Bonding Primer: [www.custombuildingproducts.com/#sle](http://www.custombuildingproducts.com/#sle).
    - b. LATICRETE International, Inc; 257 TITANIUM: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.4 GROUTS

- A. Provide setting and grout materials from same manufacturer.
- B. Manufacturers:
  - 1. Custom Building Products: [www.custombuildingproducts.com/#sle](http://www.custombuildingproducts.com/#sle).
  - 2. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
  - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- C. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
  - 1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
  - 2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
  - 3. Color(s): As selected by Architect from manufacturer's full line.

4. Products:
  - a. Custom Building Products; Prism Color Consistent Grout:  
[www.custombuildingproducts.com/#sle](http://www.custombuildingproducts.com/#sle).
  - b. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout:  
[www.laticrete.com/#sle](http://www.laticrete.com/#sle).
  - c. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.5 Maintenance Materials

- A. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.
  1. Applications: Between tile and plumbing fixtures.
  2. Color(s): As selected by Architect from manufacturer's full line.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

### 3.2 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

### 3.3 INSTALLATION - GENERAL

- A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.19 , manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

- E. Form internal angles square and external angles bullnosed.
- F. Install non-ceramic trim in accordance with manufacturer's instructions.
- G. Sound tile after setting. Replace hollow sounding units.
- H. Keep control and expansion joints free of mortar, grout, and adhesive.
- I. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- J. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- K. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

### **3.4 INSTALLATION - WALL TILE**

- A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244.
- B. Over coated glass mat backer board on studs, install in accordance with TCNA (HB) Method W245.
- C. Over gypsum wallboard on wood or metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.
  - 1. Where mortar bed is indicated, install in accordance with TCNA (HB) Method W222, one coat method.

### **3.5 CLEANING**

- A. Clean tile and grout surfaces.

### **3.6 PROTECTION**

- A. Do not permit traffic over finished floor surface for 4 days after installation.

### **END OF SECTION**

## **SECTION 09 65 00 - RESILIENT FLOORING**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Resilient base.
- B. Installation accessories.

#### **1.2 RELATED REQUIREMENTS**

#### **1.3 REFERENCE STANDARDS**

- A. ASTM F1861 - Standard Specification for Resilient Wall Base; 2016.

#### **1.4 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- D. Verification Samples: Submit two samples, 6 by 6 inch in size illustrating color and pattern for each resilient flooring product specified.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

#### **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.
- C. Testing Agency Qualifications: Independent firm specializing in performing concrete slab moisture testing and inspections of the type specified in this section.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

## **1.7 FIELD CONDITIONS**

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.
- B. Close spaces to traffic during floor tile installation.
- C. Close spaces to traffic for 48 hours after floor tile installation.
- D. Install floor tile after other finishing operations, including painting, have been completed.

## **PART 2 PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
  - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

### **2.2 RESILIENT BASE**

- A. Resilient Base: ASTM F1861, Type TP, rubber, thermoplastic Style B, Cove; style as scheduled.
  - 1. Manufacturers:
    - a. Burke Flooring: [www.burkeflooring.com/#sle](http://www.burkeflooring.com/#sle).
    - b. Johnsonite, a Tarkett Company: [www.johnsonite.com/#sle](http://www.johnsonite.com/#sle).
    - c. Roppe Corp: [www.roppe.com/#sle](http://www.roppe.com/#sle).
    - d. Shaw; [www.shawcontractgroup.com..](http://www.shawcontractgroup.com..)
    - e. Substitutions: See Section 01 60 00 - Product Requirements.
  - 2. Height: 3 inch.
  - 3. Thickness: 0.375 inch.
  - 4. Color: As indicated on drawings.
  - 5. Accessories: Premolded external corners and internal corners.

## **2.3 ACCESSORIES**

- A. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
- B. Moldings, Transition and Edge Strips: Same material as flooring.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Clean substrate.
- C. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

### **3.3 Installation - General**

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.

### **3.4 Installation - Resilient Base**

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 24 inches between joints and corners.
- B. Miter internal corners. At external corners, use mitered corners. At exposed ends, use premolded units.

- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

### **3.5 CLEANING**

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.
- C. Perform the following operations immediately after completing floor tile installation:
  - 1. Remove adhesive and other blemishes from surfaces.
  - 2. Sweep and vacuum surfaces thoroughly.
  - 3. Damp-mop surfaces to remove marks and soil.

### **3.6 PROTECTION**

- A. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- B. Prohibit traffic on resilient flooring for 48 hours after installation.
- C. Cover resilient flooring until Substantial Completion.

### **END OF SECTION**

## **SECTION 09 68 13 - TILE CARPETING**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Carpet tile, loose laid with edges and control grid adhered.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

#### **1.3 REFERENCE STANDARDS**

#### **1.4 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
    - a. Review delivery, storage, and handling procedures.
    - b. Review ambient conditions and ventilation procedures.
    - c. Review subfloor preparation procedures.

#### **1.5 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Shop Drawings: Indicate layout of joints, direction of carpet pile, and location of edge moldings.
- D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- E. Sustainable Design Submittal: Submit VOC content documentation for adhesives.
- F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- G. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- H. Manufacturer's Qualification Statement.

- I. Installer's Qualification Statement.
- J. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

#### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.
- C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

#### **1.7 DELIVERY STORAGE AND HANDLING**

- A. Comply with CRI's "CRI Carpet Installation Standard."

#### **1.8 FIELD CONDITIONS**

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.
- B. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.
- C. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- D. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- E. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

#### **1.9 WARRANTY**

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
  - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.

2. Failures include, but are not limited to, the following:
  - a. More than 10 percent edge raveling, snags, and runs.
  - b. Dimensional instability.
  - c. Excess static discharge.
  - d. Loss of tuft-bind strength.
  - e. Loss of face fiber.
  - f. Delamination.
3. Warranty Period: 10 years from date of Substantial Completion.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Tile Carpeting:
  1. Basis of Design: Interface, Inc: [www.interface.com/#sle](http://www.interface.com/#sle).
  2. Milliken & Company: [www.milliken.com/#sle](http://www.milliken.com/#sle).
  3. Mohawk Group: [www.mohawkgroup.com/#sle](http://www.mohawkgroup.com/#sle).
  4. Shaw: [www.shawcontractgroup.com](http://www.shawcontractgroup.com).
  5. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.2 MATERIALS**

- A. Tile Carpeting: Fusion bonded, manufactured in one color dye lot.
  1. Product: as indicated in drawing manufactured by Interface.
  2. Color: As indicated per drawings.
  3. Pattern: As indicated per drawings.
  4. Density Factor: 6,686 kilotex.
  5. Primary Backing Material: GlasBac.

### **2.3 ACCESSORIES**

- A. Subfloor Filler: self-leveling mix; type recommended by flooring material manufacturer.
- B. Edge Strips: Brushed stainless steel, color as selected by Architect.
- C. Adhesives:
  1. Compatible with materials being adhered; maximum VOC content as specified in Section 01 61 16.
- D. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.
- C. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.
- D. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
  - 1. Conduct tests by an independent testing agency acceptable to Owner.
    - a. Acceptable Testing Agencies:
      - 1) Independent Floor Testing and Inspection, Inc. (IFTI): [www.ifti.com/#sle](http://www.ifti.com/#sle).
      - 2) Other testing agency approved by Owner.
      - 3) Substitutions: Section 01 60 00 - Product Requirements.
  - 2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

### **3.2 PREPARATION**

- A. General: Comply with CRI's "Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- C. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.
- D. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- E. Broom and vacuum clean substrate.

### **3.3 INSTALLATION**

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.

- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in square pattern, with pile direction alternating to next unit, set aligned as indicated on shop drawings.
- F. Trim carpet tile neatly at walls and around interruptions.
- G. Complete installation of edge strips, concealing exposed edges.

### **3.4 CLEANING**

- A. Perform the following operations immediately after installing carpet tile:
  - 1. Remove excess adhesive without damage, from floor, base, and wall surfaces.
  - 2. Remove yarns that protrude from carpet tile surface.
  - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."
- C. Clean and vacuum carpet surfaces.
- D. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

### **END OF SECTION**

## **SECTION 09 90 00 - PAINTING AND COATING**

### **P1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Interior and exterior painting, including surface preparation for projects in the United States.

#### **1.2 RELATED SECTIONS**

- A. Section 05500 - Metal Fabrications.
- B. Section 06200 - Finish Carpentry.
- C. Section 06400 - Architectural Woodwork.

#### **1.3 REFERENCES**

- A. Occupational Safety and Health Act (OSHA) - Safety Standards.
- B. American National Standards Institute (ANSI) - Performance Standards.
- C. Paint Decorating Contractors of America (PDCA) - Application Standard.
- D. National Paint and Coatings Association (NPCA) - Gloss Standard.
- E. American Society for Testing Materials (ASTM) - Testing Methods.
- F. Master Paint Institute (MPI # ) - Established paint categories and standards.
- G. Ozone Transmission Commission (OTC) - Established levels of Volatile Organic Compounds.
- H. SCAQMD 1168 - South Coast Air Quality Management District Rule #1168; October 3, 2003.
- I. SSPC (PM1) - Steel Structures Painting Manual, Vol. 1, Good Painting Practice; Society for Protective Coatings; 1993, Third Edition.
- J. SSPC (PM2) - Steel Structures Painting Manual, Vol. 2, Systems and Specifications; Society for Protective Coatings; 1995, Seventh Edition.
- K. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

#### **1.4 DEFINITIONS**

- A. Commercial as used in this Section refers to a product well suited for a commercial application.
- B. DFT as used in this Section refers to the Dry Film Thickness of the coating.
- C. Enamel refers to any acrylic or alkyd (oil) base paint which dries leaving an eggshell, pearl, satin, semi-gloss or high gloss enamel finish.
- D. DTM as used in this Section refers to paint that is applied Direct To Metal.
- E. Premium as used in this Section refers to the best quality product "top of the line".
- F. VOC as used in this Section refers to Volatile Organic Compounds found in primers, paints, sealers and stains. The level of VOCs appears after each product listed in the Schedule in grams per liter (g/L).
- G. Paints are available in a wide range of sheens or glosses, as measured by a gloss meter from a 60 and/or 85 degree angle from vertical, as a percentage of the amount of light that is reflected. The following terms are used to describe the gloss of our products. The list below is provided for general guidance; refer to the technical data sheet for the actual gloss/sheen level for each product.
  - 1. Flat - Less than 5 Percent.
  - 2. Eggshell - 5 - 20 Percent.
  - 3. Satin - 20 - 35 Percent.
  - 4. Semi-Gloss - 30 - 65 Percent.
  - 5. Gloss - Over 65 Percent.

#### **1.5 SUBMITTALS**

- A. Submit under provisions of Section 01300 - Administrative Requirements.
- B. Coordinate with Section 01300 - Administrative Requirements.
- C. Product Data: Provide a complete list of all products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category.
  - 2. Cross-reference to specified paint system(s) that the product is to be used in; include description of each system.
- D. Samples: Submit three paper samples, 5 inches by 7 inches (127mm x 178mm) in size, illustrating selected colors for each color and system selected with specified coats cascaded.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.

- F. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

## **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years experience.
- B. Installer Qualifications: All products listed in this section are to be applied by a Painting Contractor with a minimum of five years demonstrated experience in surface preparation and field application of the same type and scope as specified.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  - 1. Mock-up areas designated by Architect.
  - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
  - 3. Approved mock-up areas will serve as the standard for remaining Work.
  - 4. Refinish mock-up area as required to produce acceptable Work.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
- C. Disposal:
  - 1. Never pour leftover coating down any sink or drain. Use up material on the job or seal can and store safely for future use.
  - 2. Do not incinerate closed containers.
  - 3. For specific disposal or recycle guidelines, contact the local waste management agency or district. Recycle whenever possible.

## **1.8 PROJECT CONDITIONS**

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

## **1.9 WARRANTY**

- A. Inspection of all surfaces to be coated must be done by the manufacturer's representative to insure proper preparation prior to application. All thinners, fillers, primers and finish coatings

shall be from the same manufacturer to support a product warranty. Products other than those submitted shall be accompanied by a letter stating its fitness for use and compatibility.

- B. At project closeout, provide to the Owner or owner's representative an executed copy of the Manufacturer's standard form outlining the terms and conditions of and any exclusions to their Limited Warranty against Manufacturing Defect.

#### **1.10 EXTRA MATERIALS**

- A. At project closeout, supply the Owner or owner's representative one gallon of each product for touch-up purposes. Cans shall be clearly marked with color name, number and type of paint.
- B. At project closeout, provide the color mixture name and code to the Owner or owner's representative for accurate future color matching.

### **PART 2 PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Basis-of-Design: Benjamin Moore and Co.; [www.benjaminmoore.com](http://www.benjaminmoore.com).
- B. Acceptable Manufacturers:
  - 1. PPG
  - 2. Sherwin Williams
  - 3. Coronado Paint Company
  - 4. Tenemec
- C. Substitutions: Will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

#### **2.2 MATERIALS - GENERAL**

- A. Volatile Organic Compound (VOC) Content:
  - 1. Provide coatings that comply with the most stringent requirements specified in the following:
    - a. 40 CFR 59, Subpart D-National Volatile Organic Compound Emission Standards for Architectural Coatings.
    - b. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

- B. Compatibility: Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

### 2.3 MIXING AND TINTING

- A. Except where specifically noted in this section, all paint shall be ready-mixed and pre-tinted. Agitate all paint prior to and during application to ensure uniform color, gloss, and consistency.
- B. Thinner addition shall not exceed manufacturer's printed recommendations. Do not use kerosene or other organic solvents to thin water-based paints.

### 2.4 INTERIOR PAINT SYSTEMS- UNITED STATES

- A. MASONRY: CMU - Concrete, Split Face, Scored, Smooth, High Density, Low Density, Fluted.
  - 1. Latex Systems:
    - a. Semi-Gloss Finish:
      - 1) 1st Coat: Benjamin Moore Ultra Spec® Masonry Interior/Exterior Hi-Build Block Filler 571 (45 g/L), MPI # 4, X-Green 4, LEED 2009, LEED V4, CHPS Certified.
      - 2) 2nd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Semi-Gloss N539 (0 g/L), MPI # 43, X-Green 43, 146, X-Green 146, 140, X-Green 140, LEED 2009, LEED V4, CHPS Certified.
      - 3) 3rd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Semi-Gloss N539 (0 g/L), MPI # 43, X-Green 43, 146, X-Green 146, 140, X-Green 140, LEED 2009, LEED V4, CHPS Certified.
    - b. Eggshell / Satin Finish:
      - 1) 1st Coat: Benjamin Moore Ultra Spec® Masonry Interior/Exterior Hi-Build Block Filler 571 (45 g/L), MPI # 4, X-Green 4, LEED 2009, LEED V4, CHPS Certified.
      - 2) 2nd Coat: Benjamin Moore Ultra Spec 500 Latex Eggshell N538 (0 g/L), MPI # 52, X-Green 52, 145, X-Green 145, 139, X-Green 139, LEED 2009, LEED V4, CHPS Certified.
      - 3) 3rd Coat: Benjamin Moore Ultra Spec 500 Latex Eggshell N538 (0 g/L), MPI # 52, X-Green 52, 145, X-Green 145, 139, X-Green 139, LEED 2009, LEED V4, CHPS Certified.
- B. METAL: Aluminum, Galvanized.
  - 1. Latex Systems:
    - a. Satin Finish:
      - 1) 1st Coat: Benjamin Moore Ultra Spec® HP Acrylic Metal Primer HP04 (47 g/L), MPI # 107, X-Green 107, 134, LEED 2009, CHPS Certified.

- 2) 2nd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Semi-Gloss N539 (0 g/L), MPI # 43, X-Green 43, 146, X-Green 146, 140, X-Green 140, LEED 2009, LEED V4, CHPS Certified.
  - 3) 3rd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Semi-Gloss N539 (0 g/L), MPI # 43, X-Green 43, 146, X-Green 146, 140, X-Green 140, LEED 2009, LEED V4, CHPS Certified.
  - b. Semi-Gloss High Performance:
    - 1) 1st Coat: Benjamin Moore Ultra Spec® HP Acrylic Metal Primer HP04 (47 g/L), MPI # 107, X-Green 107, 134, LEED 2009, CHPS Certified.
    - 2) 2nd Coat: Benjamin Moore Ultra Spec HP D.T.M. Acrylic Semi-Gloss Enamel, HP29 (147 g/L), MPI # 141, X-Green 141, 153, X-Green 153, LEED 2009, LEED V4.
    - 3) 3rd Coat: Benjamin Moore Ultra Spec HP D.T.M. Acrylic Semi-Gloss Enamel, HP29 (147 g/L), MPI # 141, X-Green 141, 153, X-Green 153, LEED 2009, LEED V4.
  - c. Eggshell Finish:
    - 1) 1st Coat: Benjamin Moore Ultra Spec® HP Acrylic Metal Primer HP04 (47 g/L), MPI # 107, X-Green 107, 134, LEED 2009, CHPS Certified.
    - 2) 2nd Coat: Benjamin Moore Ultra Spec 500 Latex Eggshell N538 (0 g/L), MPI # 52, X-Green 52, 145, X-Green 145, 139, X-Green 139, LEED 2009, LEED V4, CHPS Certified.
    - 3) 3rd Coat: Benjamin Moore Ultra Spec 500 Latex Eggshell N538 (0 g/L), MPI # 52, X-Green 52, 145, X-Green 145, 139, X-Green 139, LEED 2009, LEED V4, CHPS Certified.
- C. METAL: Galvanized; Ceilings, Duct work.
1. Multi-Surface Acrylic Coating System:
    - a. Gloss Finish High Performance:
      - 1) 1st Coat: 1st Coat: Benjamin Moore Ultra Spec® HP Acrylic Metal Primer HP04 (47 g/L), MPI # 107, X-Green 107, 134, LEED 2009, CHPS Certified.
      - 2) 2nd Coat: Benjamin Moore Ultra Spec® DTM Acrylic Gloss HP28 (199 g/L), MPI # 154, 164, LEED 2009, LEED V4.
    2. Dryfall Waterborne Topcoats:
      - a. Semi-Gloss Finish:
        - 1) 1st Coat: Benjamin Moore Dry Fall Latex Semi-Gloss 397 (43 g/L), MPI # 226.
        - 2) 2nd Coat: Benjamin Moore Dry Fall Latex Semi-Gloss 397 (43 g/L), MPI # 226.
      - b. Flat Finish:
        - 1) 1st Coat: Benjamin Moore Dry Fall Latex Flat 395 (46 g/L), MPI # 118.
        - 2) 2nd Coat: Benjamin Moore Dry Fall Latex Flat 395(46 g/L), MPI # 118.
- D. METAL - (Structural Steel Columns, Joists, Trusses, Beams, Miscellaneous and Ornamental Iron, Structural Iron, Ferrous Metal)
1. Latex Systems:
    - a. Semi-Gloss Finish High Performance:
      - 1) 1st Coat: Benjamin Moore Ultra Spec® HP Acrylic Metal Primer HP04 (47 g/L), MPI # 107, X-Green 107, 134, LEED 2009, CHPS Certified.

- 2) 2nd Coat: Benjamin Moore Ultra Spec® DTM Acrylic semi-Gloss HP29 (199 g/L), MPI # 151, 164, LEED 2009, LEED V4.
  - 3) 3rd Coat: Benjamin Moore Ultra Spec® DTM Acrylic semi-Gloss HP29 (199 g/L), MPI # 151, 164, LEED 2009, LEED V4.
  - b. Eggshell Finish High Performance:
    - 1) 1st Coat: Benjamin Moore Ultra Spec® HP Acrylic Metal Primer HP04 (47 g/L), MPI # 107, X-Green 107, 134, LEED 2009, CHPS Certified.
    - 2) 2nd Coat: Benjamin Moore Ultra Spec® DTM Acrylic low lustre HP25 (199 g/L), MPI # 53, 164, LEED 2009, LEED V4.
    - 3) 3rd Coat: Benjamin Moore Ultra Spec® DTM Acrylic low lustre HP25 (199 g/L), MPI # 53, 164, LEED 2009, LEED V4.
  - c. Flat Finish:
    - 1) 1st Coat: Benjamin Moore Ultra Spec® HP Acrylic Metal Primer HP04 (47 g/L), MPI # 107, X-Green 107, 134, LEED 2009, CHPS Certified.
    - 2) 2nd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Flat N536 (0 g/L), MPI # 53, X-Green 53, 143, X-Green 143, LEED 2009, LEED V4, CHPS Certified.
    - 3) 3rd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Flat N536 (0 g/L), MPI # 53, X-Green 53, 143, X-Green 143, LEED 2009, LEED V4, CHPS Certified.
- E. DRYWALL - (Walls, Ceilings, Gypsum Board and similar items)
1. Latex Systems:
    - a. Eggshell / Satin System:
      - 1) 1st Coat: Benjamin Moore Ultra Spec 500 Interior Latex Primer N534 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149, LEED 2009, LEED V4, CHPS Certified.
      - 2) 2nd Coat: Benjamin Moore Ultra Spec 500 Latex Eggshell N538 (0 g/L), MPI # 52, X-Green 52, 145, X-Green 145, 139, X-Green 139, LEED 2009 LEED V4, CHPS Certified.
      - 3) 3rd Coat: Benjamin Moore Ultra Spec 500 Latex Eggshell N538 (0 g/L), MPI # 52, X-Green 52, 145, X-Green 145, 139, X-Green 139, LEED 2009, LEED V4, CHPS Certified.
    - b. Flat System (Ceilings)
      - 1) 1st Coat: Benjamin Moore Ultra Spec 500 Interior Latex Primer N534 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149, LEED 2009, LEED V4, CHPS Certified.
      - 2) 2nd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Flat N536 (0 g/L), MPI # 53, X-Green 53, 143, X-Green 143, LEED 2009, LEED V4, CHPS Certified.
      - 3) 3rd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Flat N536 (0 g/L), MPI # 53, X-Green 53, 143, X-Green 143, LEED 2009, LEED V4, CHPS Certified.

## 2.5 EXTERIOR PAINT SYSTEMS - UNITED STATES

- A. MASONRY: Concrete Masonry Units (CMU) - Concrete Block.
1. Latex Systems:
    - a. Semi-Gloss Finish:
      - 1) 1st Coat: Benjamin Moore Ultra Spec® masonry Int/Ext Block Filler 5H.
      - 2) 2nd Coat: Benjamin Moore Ultra Spec Ext Semi-Gloss N449 (147 g/L).

- 3) 3rd Coat: Benjamin Moore Ultra Spec Ext Semi-Gloss N449 (147 g/L).
- b. Satin Finish:
  - 1) 1st Coat: Benjamin Moore Ultra Spec® masonry Int/Ext Block Filler 5H.
  - 2) 2nd Coat: Benjamin Moore Ultra Spec Ext Satin N448 (147 g/L).
  - 3) 3rd Coat: Benjamin Moore Ultra Spec Ext Satin N448 (147 g/L).
- B. METAL: Aluminum, Galvanized.
  1. Latex Systems:
    - a. Semi-Gloss Finish:
      - 1) 1st Coat: Benjamin Moore Ultra Spec HP Acrylic DTM Semi-Gloss Enamel HP29 (147 g/L), MPI # 141, X-Green 141, 153, X-Green 153, LEED 2009.
      - 2) 2nd Coat: Benjamin Moore Ultra Spec HP Acrylic DTM Semi-Gloss Enamel HP29 (147 g/L), MPI # 141, X-Green 141, 153, X-Green 153, LEED 2009.
    - b. Satin Finish:
      - 1) 1st Coat: Benjamin Moore Ultra Spec HP Acrylic DTM Low Lustre Enamel HP25 (147 g/L).
      - 2) 2nd Coat: Benjamin Moore Ultra Spec HP Acrylic DTM Low Lustre Enamel HP25 (147 g/L).
- C. METAL: Misc. Iron, Ornamental Iron, Structural Iron and Steel, Ferrous Metal.
  1. Latex Systems:
    - a. Semi-Gloss Finish
      - 1) 1st Coat: Benjamin Moore Ultra Spec® HP Acrylic Metal Primer HP04 (47 g/L), MPI # 107, X-Green 107, 134, LEED 2009, CHPS Certified.
      - 2) 2nd Coat: Benjamin Moore Ultra Spec HP D.T.M. Acrylic Semi-Gloss Enamel, HP29 (147 g/L), MPI # 141, X-Green 141, 153, X-Green 153, LEED 2009, LEED V4.
      - 3) 3rd Coat: Benjamin Moore Ultra Spec HP D.T.M. Acrylic Semi-Gloss Enamel, HP29 (147 g/L), MPI # 141, X-Green 141, 153, X-Green 153, LEED 2009, LEED V4.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. The Contractor shall review the product manufacturer's special instructions for surface preparation, application, temperature, re-coat times, and product limitations.
- B. The Contractor shall review product health and safety precautions listed by the manufacturer.
- C. The Contractor shall be responsible for enforcing on site health and safety requirements associated with the Work.
- D. Do not begin installation until substrates have been properly prepared.

- E. Ensure that surfaces to receive paint are dry immediately prior to application.
- F. Ensure that moisture-retaining substrates to receive paint have moisture content within tolerances allowed by coating manufacturer. Where exceeding the following values, promptly notify Architect and obtain direction before beginning work.
  - 1. Concrete and Masonry: 3-5 percent. Allow new concrete to cure a minimum of 28 days.
  - 2. Exterior Wood: 17 percent.
  - 3. Interior Wood: 15 percent.
  - 4. Interior Finish Detail Woodwork, Including Trim, and Casework: 10 percent.
  - 5. Plaster and Gypsum: 15 percent.
  - 6. Concrete Slab-On-Grade: Perform calcium chloride test over 24 hour period or other acceptable test to manufacturer. Verify acceptable moisture transmission and pH levels.
- G. Examine surfaces to receive coatings for surface imperfections and contaminants that could impair performance or appearance of coatings, including but not limited to, loose primer, rust, scale, oil, grease, mildew, algae, or fungus, stains or marks, cracks, indentations, or abrasions.
- H. Correct conditions that could impair performance or appearance of coatings in accordance with specified surface preparation procedures before proceeding with coating application.

### **3.2 PREPARATION - GENERAL**

- A. Clean surfaces thoroughly prior to coating application.
- B. Do not start work until surfaces to be finished are in proper condition to produce finished surfaces of uniform, satisfactory appearance.
- C. Stains and Marks: Remove completely, if possible, using materials and methods recommended by coating manufacturer; cover stains and marks which cannot be completely removed with isolating primer or sealer recommended by coating manufacturer to prevent bleed-through.
- D. Remove Mildew, Algae, and Fungus using materials and methods recommended by coating manufacturer.
- E. Remove dust and loose particulate matter from surfaces to receive coatings immediately prior to coating application.
- F. Remove or protect adjacent hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items not indicated to receive coatings.
- G. Move or protect equipment and fixtures adjacent to surfaces indicated to receive coatings to allow application of coatings.
- H. Protect adjacent surfaces not indicated to receive coatings.
- I. Prepare surfaces in accordance with manufacturer's instructions for specified coatings and indicated materials, using only methods and materials recommended by coating manufacturer.

### 3.3 SURFACE PREPARATION

- A. Concrete and Concrete Masonry: Clean surfaces free of loose particles, sand, efflorescence, laitance, form oil, curing compounds, and other substances which could impair coating performance or appearance.
- B. Concrete Floors: Remove contaminants which could impair coating performance or appearance. Verify moisture transmission and alkaline-acid balance recommended by coating manufacturer; mechanically abrade surface to achieve 80-100 grit medium-sandpaper texture.
- C. Existing Coatings:
  - 1. Remove surface irregularities by scraping or sanding to produce uniform substrate for coating application; apply one coat primer of type recommended by coating manufacturer for maximum coating adhesion.
  - 2. If presence of lead in existing coatings is suspected, cease surface preparation and notify Architect immediately.
- D. Gypsum Board: Repair cracks, holes and other surface defects with joint compound to produce surface flush with adjacent surfaces.
- E. Masonry Surfaces - Restored: Remove loose particles, sand, efflorescence, laitance, cleaning compounds and other substances that could impair coating performance or appearance.
- F. Metals - Aluminum, Mill-Finish: Clean and etch surfaces with a phosphoric acid-water solution or water based industrial cleaner. Flush with clean water and allow to dry, before applying primer coat.
- G. Metals - Copper: Clean surfaces with pressurized steam, pressurized water, or solvent washing.
- H. Metals - Ferrous, Unprimed: Remove rust or scale, if present, by wire brush cleaning, power tool cleaning, or sandblast cleaning; remove grease, oil, and other contaminants which could impair coating performance or appearance by solvent cleaning, with phosphoric-acid solution cleaning of welds, bolts and nuts; spot-prime repaired welds with specified primer.
- I. Metals - Ferrous, Shop-Primed: Remove loose primer and rust, if present, by scraping and sanding, feathering edges of cleaned areas to produce uniform flat surface; solvent-clean surfaces and spot-prime bare metal with specified primer, feathering edges to produce uniform flat surface.
- J. Metals - Galvanized Steel (not passivated): Clean with a water-based industrial strength cleaner, apply an adhesion promoter followed by a clean water rinse. Alternately, wipe down surfaces using clean, lint-free cloths saturated with xylene or lacquer thinner; followed by wiping the surface dry using clean, lint-free cloths.
- K. Metals - Galvanized Steel, Passivated: Clean with water-based industrial strength cleaner. After the surface has been prepared, apply recommended primer to a small area. Allow primer to cure for 7 days, and test adhesion using the "cross-hatch adhesion tape test" method in accordance

with ASTM D 3359. If the adhesion of the primer is positive, proceed with a recommended coating system for galvanized metal.

- L. Metals - Stainless Steel: Clean surfaces with pressurized steam, pressurized water, or water-based industrial cleaner.

### **3.4 APPLICATION - GENERAL**

- A. Application of primers, paints, stains or coatings, by the Contractor, will serve as acceptance that surfaces were properly prepared in accordance with the manufacturer's recommendation.
- B. Apply each coat to uniform coating thickness in accordance with manufacturer's instructions, not exceeding manufacturer's specified maximum spread rate for indicated surface; thins, brush marks, roller marks, orange-peel, or other application imperfections are not permitted.
- C. Allow manufacturer's specified drying time, and ensure correct coating adhesion, for each coat before applying next coat.
- D. Inspect each coat before applying next coat; touch-up surface imperfections with coating material, feathering, and sanding if required; touch-up areas to achieve flat, uniform surface without surface defects visible from 5 feet (1.5 m).
- E. Remove dust and other foreign materials from substrate immediately prior to applying each coat.
- F. Where paint application abuts other materials or other coating color, terminate coating with a clean sharp termination line without coating overlap.
- G. Where color changes occur between adjoining spaces, through framed openings that are of same color as adjoining surfaces, change color at outside stop corner nearest to face of closed door.
- H. Re-prepare and re-coat unsatisfactory finishes; refinish entire area to corners or other natural terminations.

### **3.5 CLEANING**

- A. Clean excess coating materials, and coating materials deposited on surfaces not indicated to receive coatings, as construction activities of this section progress; do not allow to dry.
- B. Re-install hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items that have been removed to protect from contact with coatings.
- C. Reconnect equipment adjacent to surfaces indicated to receive coatings.
- D. Relocate to original position equipment and fixtures that have been moved to allow application of coatings.
- E. Remove protective materials.

**3.6 PROTECTION AND REPAIR**

- A. Protect completed coating applications from damage by subsequent construction activities until completion of painting project.
- B. Touch-up coatings damaged by subsequent construction activities.

**END OF SECTION**

## **SECTION 13 28 10 - SPECIALTY TIMBER SITE FEATURES**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide all labor, materials, and equipment necessary to furnish and install the custom fabricated specialty timber site features, as indicated on the Drawings, and as specified herein.
  - 1. Large timber seating
  - 2. Natural play round wood slabs and trunks
  - 3. Natural play timbers
- B. Provide manufacturer's standard components, accessories, and complete structure to conform to architectural design appearance shown and to specified performance requirements and design criteria.

#### **1.3 RELATED WORK**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 033001, CAST-IN-PLACE CONCRETE - SITEWORK.
  - 2. Section 061063, EXTERIOR ROUGH CARPENTRY; Insect hotel.
  - 3. Section 321426, WOOD SLAB PAVING.

#### **1.4 REQUIREMENTS AND STANDARDS**

- A. Any material or operation specified by reference to published specifications of manufacturer, ASTM, AISC, AWS, IFI, SSPC, ANSI, MBMA, and other published standards shall comply with standards listed. In case of conflict between referenced specifications, etc., and Contract Documents, Contract Documents shall govern.

#### **1.5 QUALITY ASSURANCE**

- A. Design Loads: Basic design loads stated in applicable state and national building codes and indicated on Drawings, as well as auxiliary and collateral loads, as indicated on

Drawings.

1. Basic design loads include dead load, live load, wind load and seismic load.
2. Auxiliary loads include dynamic live loads such as loads generated by materials handling equipment.

## **1.6 SUBMITTALS**

- A. Shop Drawings: Submit complete fabrication and erection drawings showing anchor bolt settings, anchoring systems, connections, fasteners, and accessory installation details to clearly indicate proper installation and assembly of all specialty play feature components.
- B. Product Data: Submit manufacturer's product information, specifications and installation instructions for specialty play feature components and accessories.
- C. Samples: Submit samples of the following. Architect's review will be for color and texture only. Compliance with other requirements is responsibility of Contractor.
  1. Each material specified, with required finishes as requested by the Architect.
  2. Fasteners for application of specialty play feature components.
  3. Sealants and closures.

## **1.7 DESIGN CERTIFICATION REQUIREMENT**

- A. Certification: Submit written Certification prepared and signed by Professional Engineer registered in the State of Rhode Island, to verify that specialty site feature designs meet typical expected loading requirements and codes of authorities that have jurisdiction.

## **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store prefabricated specialty play feature components, and other manufactured items so they will not be damaged or deformed.
- B. Stack materials on platforms or pallets. Cover with tarpaulins or other suitable weathertight ventilated covering. Store so that water accumulations will drain freely. Do not store specialty play feature materials in contact with other materials which might cause staining.
- C. Do not damage materials or finishes during handling.

## **PART 2 PRODUCTS**

### **2.1 SPECIALTY SITE FEATURES**

- A. Specialty Play Features include the following:

1. Large timber seating
2. Natural play round wood slabs and trunks
3. Natural play timbers

## **2.2 LARGE TIMBER SEATING**

- A. Timbers: Provide 16 in. square x lengths indicated on the Drawings.
- B. Provide timbers from one of the following or other Architect approved source:
  1. Windy Hill Tree Farm (aka RI Sawmill), Coventry, RI; Tel. 1-401-265-0455.
  2. Jim Aaron Sawmill, New Salem, MA 413-259-1668
  3. A Black Locust Connection – Blue Sky, Colrain, MA 413-624-3645
  4. Black Locust Wood, 812 State Highway 29, Broadalbin, NY 12010; Tel. 518-396-0215.

## **2.3 NATURAL PLAY ROUND WOOD SLABS AND TRUNKS**

- A. Black locust logs for round wood slabs and trunks: Slabs and trunks shall be of various sizes and heights. Provide black locust logs, debark and sand smooth, embed in-grade, set in dense graded crushed stone. Slabs shall be between 12-24" diameter and trunks shall be 12-30" above finish grade.
- B. Provide logs from one of the following or other local source approved by the Architect.
  1. Windy Hill Tree Farm (aka RI Sawmill), Coventry, RI; Tel. 1-401-265-0455.
  2. Jim Aaron Sawmill, New Salem, MA 413-259-1668
  3. A Black Locust Connection – Blue Sky, Colrain, MA 413-624-3645
  4. Black Locust Wood, 812 State Highway 29, Broadalbin, NY 12010; Tel. 518-396-0215.

## **2.4 NATURAL PLAY TIMBERS**

- A. Black locust timber structures: Provide timber structures of black locust, stacked. Secure timbers to one another through threaded rebar. Black locust timbers will be 18-30" diameter and 15-25' in length. Debark and sand smooth all logs. Provide anchor for climbing structure, to be rebar embedded in sonotube footing to frost depth.
- B. Provide timbers from one of the following or other Architect approved source:
  1. Windy Hill Tree Farm (aka RI Sawmill), Coventry, RI; Tel. 1-401-265-0455.
  2. Jim Aaron Sawmill, New Salem, MA 413-259-1668
  3. A Black Locust Connection – Blue Sky, Colrain, MA 413-624-3645
  4. Black Locust Wood, 812 State Highway 29, Broadalbin, NY 12010; Tel. 518-396-0215.

## **2.5 HARDWARE**

- A. Provide stainless steel hardware required to complete this work and to attach this work in a secure and rigid manner to work of this and other trades, including all hinges, glides, handles, pulls, brackets, anchors, anchor bolts, thru bolts, washers, nuts, nails, and other hardware. Assist other trades as necessary in the placement of brackets and anchor bolts in concrete and furnish full instructions regarding locations, sizes, and other requirements of the items in order that they may properly prepare their work to receive same. Rough hardware shall comply in all respects with requirements of the governing laws and codes.
  - 1. Tubing: ASTM A 554, Grade MT 301, MT 302, or MT 304, as standard with manufacturer.
  - 2. Pipe: ASTM A 312, Grade TP 304.
  - 3. Castings: ASTM A 743, Grade CF 8 or CF 20.
  - 4. Plate: ASTM A 167, Type 301, 302, or 304.
  - 5. Satin, Directional Polish: AISI No. 6 Finish.
- B. Provide exposed fastenings of same material and finish as metal to which applied, unless otherwise noted.

## **PART 3 EXECUTION**

### **3.1 FABRICATION - GENERAL**

- A. Refer to Drawings to determine the major extent of the rough, naturalized wood work required.
  - 1. The Contractor shall be responsible for structural integrity, connections, and anchorage of naturalized timber feature work.
- B. Verify that all surfaces to receive artificial rockwork are satisfactory for the installation.
- C. Work Exposed to View: For work exposed to view, select materials with special care. Provide metal materials which are smooth and free of blemishes such as splinters, scale and roughness.

### **3.2 ERECTION**

- A. Install specialty site features as indicated on the Drawings and at the direction of the Architect.
- B. Bracing: Provide bracing as indicated.

### **3.3 INSTALLATION**

- A. General: Comply with manufacturer's written installation instructions, unless more stringent requirements are indicated. Anchor playground equipment securely, positioned at locations and elevations indicated.
  - 1. Maximum Equipment Height: Coordinate installed heights of equipment and components with finished elevations of protective surfacing. Set equipment so fall heights and elevation requirements for age group use and accessibility are within required limits. Verify that playground equipment elevations comply with requirements for each type and component of equipment.
- B. Post and Footing Excavation: Excavate holes for posts and footings as indicated in firm, undisturbed or compacted subgrade soil.
- C. Post Set with Concrete Footing: Comply with ACI 301 for measuring, batching, mixing, transporting, forming, and placing concrete.
  - 1. Set equipment posts in concrete footing as required by play equipment manufacturer. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at the correct angle, alignment, height, and spacing.
  - 2. Place concrete around posts and vibrate or tamp for consolidation. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
  - 3. Embedded Items: Use setting drawings and manufacturer's written instructions to ensure correct installation of anchorages for equipment.
  - 4. Concrete Footings: Smooth top, and shape to shed water.

### **3.4 TIMBER FEATURES**

- A. Timber work required shall include all work, regardless of whether or not each and every item is specifically called for. Refer to Drawings to determine the major extent of the timber feature work required.
- B. The Contractor shall be responsible for structural integrity, connections, and anchorage of timber features.
- C. Discard units of material which are unsound, warped, bowed, twisted, improperly treated, or not adequately seasoned. Structural members shall be full-length without splices.

### **3.5 FASTENING OF TIMBER MEMBERS**

- A. Timber features shall be secured to support framing as indicated on the Drawings.
  - 1. Exposed wood surfaces shall be secured to wood or steel backup by means of stainless steel screws, bolts and nuts unless otherwise indicated on the Drawings.

**END OF SECTION**

## **SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Single conductor building wire.
- B. Service entrance cable.
- C. Metal-clad cable.
- D. Wiring connectors.
- E. Electrical tape.
- F. Heat shrink tubing.
- G. Oxide inhibiting compound.
- H. Wire pulling lubricant.
- I. Cable ties.
- J. Firestop sleeves.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 07 84 00 - Firestopping.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 31 00 - Photovoltaic Collectors: Additional wiring requirements for photovoltaic systems.

#### **1.3 REFERENCE STANDARDS**

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2018).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011 (Reapproved 2017).

- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).
- E. ASTM B800 - Standard Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes - Annealed and Intermediate Tempers; 2005 (Reapproved 2015).
- F. ASTM B801 - Standard Specification for Concentric-Lay-Stranded Conductors of 8000 Series Aluminum Alloy Wire for Subsequent Covering of Insulation; 2016.
- G. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2017.
- H. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2013.
- I. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- J. NECA 104 - Recommended Practice for Installing Aluminum Building Wire and Cable; 2012.
- K. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); 2012.
- L. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2009.
- M. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.
- N. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- O. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- P. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- Q. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- R. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- S. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
- T. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.
- U. UL 854 - Service-Entrance Cables; Current Edition, Including All Revisions.
- V. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
  - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
  - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

#### **1.5 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- C. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors. Include proposed modifications to raceways, boxes, wiring gutters, enclosures, etc. to accommodate substituted conductors.

#### **1.6 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.

### **PART 2 PRODUCTS**

#### **2.1 CONDUCTOR AND CABLE APPLICATIONS**

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Underground feeder and branch-circuit cable is not permitted.
- E. Service entrance cable is permitted only as follows:
  - 1. Where not otherwise restricted, may be used:

- a. For overhead service drop, installed in raceway to service head.
  - b. For underground service entrance, installed in raceway.
- 2. In addition to other applicable restrictions, may not be used:
  - a. Where exposed to damage.
- F. Armored cable is not permitted.
- G. Metal-clad cable is permitted only as follows:
  - 1. Where not otherwise restricted, may be used:
    - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
    - b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.
  - 2. In addition to other applicable restrictions, may not be used:
    - a. Where not approved for use by the authority having jurisdiction.
    - b. Where exposed to damage.
    - c. For damp, wet, or corrosive locations.
- H. Manufactured wiring systems are not permitted.

## **2.2 CONDUCTOR AND CABLE GENERAL REQUIREMENTS**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Provide new conductors and cables manufactured not more than one year prior to installation.
- D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- E. Comply with NEMA WC 70.
- F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- G. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- H. Conductors for Grounding and Bonding: Also comply with Section 26 05 26.
- I. Conductors and Cables Installed Where Exposed to Direct Rays of Sun: Listed and labeled as sunlight resistant.
- J. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.
- K. Conductor Material:

1. Provide copper conductors except where aluminum conductors are specifically indicated or permitted for substitution. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
    - a. Substitution of aluminum conductors for copper is permitted, when approved by Owner and authority having jurisdiction, only for the following:
      - 1) Services: Copper conductors size 1/0 AWG and larger.
      - 2) Feeders: Copper conductors size 1/0 AWG and larger.
    - b. Where aluminum conductors are substituted for copper, comply with the following:
      - 1) Size aluminum conductors to provide, when compared to copper sizes indicated, equivalent or greater ampacity and equivalent or less voltage drop.
      - 2) Increase size of raceways, boxes, wiring gutters, enclosures, etc. as required to accommodate aluminum conductors.
      - 3) Provide aluminum equipment grounding conductor sized according to NFPA 70.
      - 4) Equip electrical distribution equipment with compression lugs for terminating aluminum conductors.
  2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
  3. Tinned Copper Conductors: Comply with ASTM B33.
  4. Aluminum Conductors (only where specifically indicated or permitted for substitution): AA-8000 series aluminum alloy conductors recognized by ASTM B800 and compact stranded in accordance with ASTM B801 unless otherwise indicated.
- L. Minimum Conductor Size:
1. Branch Circuits: 12 AWG.
    - a. Exceptions:
      - 1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
      - 2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
      - 3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
  2. Control Circuits: 14 AWG.
- M. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
  2. Color Coding Method: Integrally colored insulation.
  3. Color Code:
    - a. 480Y/277 V, 3 Phase, 4 Wire System:
      - 1) Phase A: Brown.
      - 2) Phase B: Orange.
      - 3) Phase C: Yellow.
      - 4) Neutral/Grounded: Gray.
    - b. 208Y/120 V, 3 Phase, 4 Wire System:
      - 1) Phase A: Black.
      - 2) Phase B: Red.

- 3) Phase C: Blue.
- 4) Neutral/Grounded: White.
- c. Equipment Ground, All Systems: Green.
- d. Isolated Ground, All Systems: Green with yellow stripe.
- e. Travelers for 3-Way and 4-Way Switching: Pink.
- f. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.
- g. For control circuits, comply with manufacturer's recommended color code.

### **2.3 SINGLE CONDUCTOR BUILDING WIRE**

- A. Description: Single conductor insulated wire.
- B. Conductor Stranding:
  - 1. Feeders and Branch Circuits:
    - a. Size 10 AWG and Smaller: Solid.
    - b. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation:
  - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.

### **2.4 SERVICE ENTRANCE CABLE**

- A. Service Entrance Cable for Above-Ground Use: NFPA 70, Type SE multiple-conductor cable listed and labeled as complying with UL 854, Style R.
- B. Service Entrance Cable for Underground Use: NFPA 70, Type USE single-conductor cable listed and labeled as complying with UL 854, Type USE-2, and with UL 44, Type RHH/RHW-2.
- C. Conductor Stranding: Stranded.
- D. Insulation Voltage Rating: 600 V.

### **2.5 METAL-CLAD CABLE**

- A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- B. Conductor Stranding:
  - 1. Size 10 AWG and Smaller: Solid.
  - 2. Size 8 AWG and Larger: Stranded.

- C. Insulation Voltage Rating: 600 V.
- D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- E. Provide dedicated neutral conductor for each phase conductor where indicated or required.
- F. Grounding: Full-size integral equipment grounding conductor.
- G. Armor: Steel, interlocked tape.

## 2.6 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 26 05 26.
- C. Wiring Connectors for Splices and Taps:
  - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
  - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
  - 3. Connectors for Aluminum Conductors: Use compression connectors.
- D. Wiring Connectors for Terminations:
  - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
  - 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
  - 3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
  - 4. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
  - 5. Aluminum Conductors: Use compression connectors for all connections.
  - 6. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
  - 7. Conductors for Control Circuits: Use crimped terminals for all connections.
- E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

- G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
- H. Mechanical Connectors: Provide bolted type or set-screw type.
- I. Compression Connectors: Provide circumferential type or hex type crimp configuration.
- J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

## 2.7 ACCESSORIES

- A. Electrical Tape:
  - 1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
  - 2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
  - 3. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
  - 4. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
  - 5. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.
- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
- C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
- D. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
- E. Cable Ties: Material and tensile strength rating suitable for application.
- F. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for cables and roofing system to be installed; designed to accommodate existing penetrations where applicable.
- G. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

### **3.2 PREPARATION**

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

### **3.3 INSTALLATION**

- A. Circuiting Requirements:
  - 1. Unless dimensioned, circuit routing indicated is diagrammatic.
  - 2. When circuit destination is indicated without specific routing, determine exact routing required.
  - 3. Arrange circuiting to minimize splices.
  - 4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
  - 5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
  - 6. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
  - 7. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is permitted, under the following conditions:
    - a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
    - b. Increase size of conductors as required to account for ampacity derating.
    - c. Size raceways, boxes, etc. to accommodate conductors.
  - 8. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Install aluminum conductors in accordance with NECA 104.
- E. Install metal-clad cable (Type MC) in accordance with NECA 120.
- F. Installation in Raceway:
  - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
  - 2. Pull all conductors and cables together into raceway at same time.
  - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
  - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- G. Exposed Cable Installation (only where specifically permitted):
  - 1. Route cables parallel or perpendicular to building structural members and surfaces.
  - 2. Protect cables from physical damage.
- H. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- I. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
  - 1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
- J. Terminate cables using suitable fittings.
  - 1. Metal-Clad Cable (Type MC):
    - a. Use listed fittings.
    - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- K. Install conductors with a minimum of 12 inches of slack at each outlet.
- L. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.
- M. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- N. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

- O. Make wiring connections using specified wiring connectors.
  - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
  - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
  - 3. Do not remove conductor strands to facilitate insertion into connector.
  - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
  - 5. Connections for Aluminum Conductors: Fill connectors with oxide inhibiting compound where not pre-filled by manufacturer.
  - 6. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
  - 7. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
  
- P. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
  - 1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
    - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
  - 2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
    - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
    - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
  
- Q. Insulate ends of spare conductors using vinyl insulating electrical tape.
  
- R. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
  
- S. Identify conductors and cables in accordance with Section 26 05 53.
  
- T. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
  
- U. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

### **3.4 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.

- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is only required for services and feeders. The resistance test for parallel conductors listed as optional is not required.
- D. Correct deficiencies and replace damaged or defective conductors and cables.

**END OF SECTION**

## **SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground bars.
- E. Ground rod electrodes.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- C. Section 26 31 00 - Photovoltaic Collectors: Additional grounding and bonding requirements for photovoltaic systems.

#### **1.3 REFERENCE STANDARDS**

- A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2007.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 99 - Health Care Facilities Code; 2017.
- G. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Verify exact locations of underground metal water service pipe entrances to building.
  - 2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
  - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
  - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

#### **1.5 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

#### **1.6 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.

### **PART 2 PRODUCTS**

#### **2.1 GROUNDING AND BONDING REQUIREMENTS**

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- E. Grounding System Resistance:

1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
  2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
- F. Grounding Electrode System:
1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
    - a. Provide continuous grounding electrode conductors without splice or joint.
    - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
  2. Metal Underground Water Pipe(s):
    - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
    - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
    - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
  3. Metal In-Ground Support Structure:
    - a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
  4. Concrete-Encased Electrode:
    - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
  5. Ground Rod Electrode(s):
    - a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
    - b. Space electrodes not less than 10 feet from each other and any other ground electrode.
    - c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
  6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
- G. Service-Supplied System Grounding:
1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.

2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.
- H. Grounding for Separate Building or Structure Supplied by Feeder(s) or Branch Circuits:
1. Provide grounding electrode system for each separate building or structure.
  2. Provide equipment grounding conductor routed with supply conductors.
  3. For each disconnecting means, provide grounding electrode conductor to connect equipment ground bus to grounding electrode system.
  4. Do not make any connections and remove any factory-installed jumpers between neutral (grounded) conductors and ground.
- I. Separately Derived System Grounding:
1. Separately derived systems include, but are not limited to:
    - a. Transformers (except autotransformers such as buck-boost transformers).
    - b. Uninterruptible power supplies (UPS), when configured as separately derived systems.
  2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
  3. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
  4. Outdoor Source: Where the source of the separately derived system is located outside the building or structure supplied, provide connection to grounding electrode at source in accordance with NFPA 70.
  5. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.
  6. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.
- J. Bonding and Equipment Grounding:
1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
  2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
  3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.

4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
  5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
  6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
  7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
    - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
    - b. Metal gas piping.
  8. Provide bonding for interior metal air ducts.
  9. Provide bonding for metal building frame.
  10. Provide bonding for metal siding not effectively bonded through attachment to metal building frame.
  11. Provide bonding and equipment grounding for pools and fountains and associated equipment in accordance with NFPA 70.
  12. Provide redundant grounding and bonding for patient care areas of health care facilities in accordance with NFPA 70 and NFPA 99.
- K. Communications Systems Grounding and Bonding:
1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
  2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
    - a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
    - b. Raceway Size: 3/4 inch trade size unless otherwise indicated or required.
    - c. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.

## 2.2 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
  2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:
1. Use insulated copper conductors unless otherwise indicated.
    - a. Exceptions:
      - 1) Use bare copper conductors where installed underground in direct contact with earth.
      - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:

1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
  2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
    - a. Exceptions:
      - 1) Use mechanical connectors for connections to electrodes at ground access wells.
  3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
- D. Ground Bars:
1. Description: Copper rectangular ground bars with mounting brackets and insulators.
  2. Size: As indicated.
  3. Holes for Connections: As indicated or as required for connections to be made.
- E. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
  2. Material: Copper-bonded (copper-clad) steel.
  3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as indicated.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### **3.2 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
- D. Make grounding and bonding connections using specified connectors.

1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
  2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
  3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
  4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
  5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 26 05 53.

### **3.3 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.13.
- D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

### **END OF SECTION**

## **SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 05 33.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- C. Section 26 05 33.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.
- D. Section 26 51 00 - Interior Lighting: Additional support and attachment requirements for interior luminaires.
- E. Section 26 56 00 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.

#### **1.3 REFERENCE STANDARDS**

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:

1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
  2. Coordinate the work with other trades to provide additional framing and materials required for installation.
  3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
  4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
  5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 30 00.

## **PART 2 PRODUCTS**

### **2.1 SUPPORT AND ATTACHMENT COMPONENTS**

- A. General Requirements:
1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
  2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
  3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 2. Include consideration for vibration, equipment operation, and shock loads where applicable.
  4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
  5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
  6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
    - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
    - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.

2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
  1. Comply with MFMA-4.
  2. Channel Material:
    - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
    - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- F. Non-Penetrating Rooftop Supports for Low-Slope Roofs: Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
  1. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
  2. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
  3. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.
- G. Anchors and Fasteners:
  1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### **3.2 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
  - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
  - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
  - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
  - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Conduit Support and Attachment: Also comply with Section 26 05 33.13.
- I. Box Support and Attachment: Also comply with Section 26 05 33.16.
- J. Interior Luminaire Support and Attachment: Also comply with Section 26 51 00.
- K. Exterior Luminaire Support and Attachment: Also comply with Section 26 56 00.
- L. Secure fasteners according to manufacturer's recommended torque settings.
- M. Remove temporary supports.

**END OF SECTION**

## **SECTION 26 05 33.13 - CONDUIT FOR ELECTRICAL SYSTEMS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Galvanized steel rigid metal conduit (RMC).
- B. Aluminum rigid metal conduit (RMC).
- C. Intermediate metal conduit (IMC).
- D. PVC-coated galvanized steel rigid metal conduit (RMC).
- E. Flexible metal conduit (FMC).
- F. Liquidtight flexible metal conduit (LFMC).
- G. Electrical metallic tubing (EMT).
- H. Rigid polyvinyl chloride (PVC) conduit.
- I. Conduit fittings.
- J. Accessories.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 07 84 00 - Firestopping.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- C. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- D. Section 26 05 33.16 - Boxes for Electrical Systems.
- E. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 21 00 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conduits.

#### **1.3 REFERENCE STANDARDS**

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2015.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2015.

- C. ANSI C80.5 - American National Standard for Electrical Rigid Metal Conduit -- Aluminum (ERMC-A); 2015.
- D. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.
- G. NECA 102 - Standard for Installing Aluminum Rigid Metal Conduit; 2004.
- H. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2003.
- I. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- J. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; 2018.
- K. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2013.
- L. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2016.
- M. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- N. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- O. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- P. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel; Current Edition, Including All Revisions.
- Q. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.
- R. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- S. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
- T. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
- U. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:

1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
  2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
  3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
  4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
  5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

## **PART 2 PRODUCTS**

### **2.1 CONDUIT APPLICATIONS**

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
1. Under Slab on Grade: Use PVC-coated galvanized steel rigid metal conduit or rigid PVC conduit.
  2. Exterior, Direct-Buried: Use PVC-coated galvanized steel rigid metal conduit or rigid PVC conduit. Rigid PVC conduit shall not be used under roadways or other vehicle routes in direct-burial applications.
  3. Exterior, Embedded Within Concrete: Use rigid PVC conduit.
- D. Embedded Within Concrete:
1. Within Slab on Grade: Not permitted.
  2. Within Slab Above Ground: Not permitted.
  3. Within Concrete Walls Above Ground: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
- E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

- F. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
- G. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
- H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit, aluminum rigid metal conduit, or PVC-coated galvanized steel rigid metal conduit.
- I. Exposed, Interior, Not Subject to Physical Damage: Use electrical metallic tubing (EMT).
- J. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.
- K. Exposed, Exterior: Use galvanized steel rigid metal conduit or PVC-coated galvanized steel rigid metal conduit.
- L. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit.

## **2.2 CONDUIT REQUIREMENTS**

- A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.
- B. Electrical Service Conduits: Also comply with Section 26 21 00.
- C. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- D. Provide products listed, classified, and labeled as suitable for the purpose intended.
- E. Minimum Conduit Size, Unless Otherwise Indicated:
  - 1. Branch Circuits: 1/2 inch (16 mm) trade size.
  - 2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
- F. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

## **2.3 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)**

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
  - 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use steel or malleable iron.
3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

#### **2.4 ALUMINUM RIGID METAL CONDUIT (RMC)**

- A. Description: NFPA 70, Type RMC aluminum rigid metal conduit complying with ANSI C80.5 and listed and labeled as complying with UL 6A.
- B. Fittings:
  1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  2. Material: Use aluminum.
  3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

#### **2.5 INTERMEDIATE METAL CONDUIT (IMC)**

- A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- B. Fittings:
  1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  2. Material: Use steel or malleable iron.
  3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

#### **2.6 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)**

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
- B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil.
- C. PVC-Coated Fittings:
  1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
  2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
  3. Material: Use steel or malleable iron.
  4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil.
- D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil.

## **2.7 FLEXIBLE METAL CONDUIT (FMC)**

- A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- B. Fittings:
  - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Material: Use steel or malleable iron.

## **2.8 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)**

- A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- B. Fittings:
  - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Material: Use steel or malleable iron.

## **2.9 ELECTRICAL METALLIC TUBING (EMT)**

- A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- B. Fittings:
  - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Material: Use steel or malleable iron.
  - 3. Connectors and Couplings: Use compression (gland) or set-screw type.
    - a. Do not use indenter type connectors and couplings.

## **2.10 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT**

- A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- B. Fittings:
  - 1. Manufacturer: Same as manufacturer of conduit to be connected.
  - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

## **2.11 ACCESSORIES**

- A. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.
- B. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- C. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.
- D. Duct Bank Spacers: Nonmetallic; designed for maintaining conduit/duct spacing for concrete encasement in open trench installation; suitable for the conduit/duct arrangement to be installed.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### **3.2 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install aluminum rigid metal conduit (RMC) in accordance with NECA 102.
- E. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- F. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.
- G. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- H. Conduit Routing:
  - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
  - 2. When conduit destination is indicated without specific routing, determine exact routing required.

3. Conceal all conduits unless specifically indicated to be exposed.
  4. Conduits in the following areas may be exposed, unless otherwise indicated:
    - a. Electrical rooms.
    - b. Mechanical equipment rooms.
    - c. Within joists in areas with no ceiling.
  5. Unless otherwise approved, do not route conduits exposed:
    - a. Across floors.
    - b. Across top of parapet walls.
    - c. Across building exterior surfaces.
  6. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
  7. Arrange conduit to maintain adequate headroom, clearances, and access.
  8. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
  9. Route conduits above water and drain piping where possible.
  10. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
  11. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
    - a. Heaters.
    - b. Hot water piping.
    - c. Flues.
  12. Group parallel conduits in the same area together on a common rack.
- I. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
  2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
  3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
  4. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
  5. Use conduit clamp to support single conduit from beam clamp or threaded rod.
  6. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
  7. Use of spring steel conduit clips for support of conduits is not permitted.
  8. Use of wire for support of conduits is not permitted.
- J. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
  2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
  3. Use suitable adapters where required to transition from one type of conduit to another.

4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
  5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
  6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
  7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- K. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
  2. Make penetrations perpendicular to surfaces unless otherwise indicated.
  3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
  4. Conceal bends for conduit risers emerging above ground.
  5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
  6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
  7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
  8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- L. Underground Installation:
1. Minimum Cover, Unless Otherwise Indicated or Required:
    - a. Underground, Exterior: 24 inches.
    - b. Under Slab on Grade: 12 inches to bottom of slab.
- M. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
  2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
  3. Where conduits are subject to earth movement by settlement or frost.
- N. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
  2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

- O. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.
- P. Provide grounding and bonding in accordance with Section 26 05 26.

### **3.3 CLEANING**

- A. Clean interior of conduits to remove moisture and foreign matter.

### **3.4 PROTECTION**

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

### **END OF SECTION**

## **SECTION 26 05 33.16 - BOXES FOR ELECTRICAL SYSTEMS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
- C. Floor boxes.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 08 31 00 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 27 26 - Wiring Devices:
  - 1. Wall plates.
  - 2. Floor box service fittings.
  - 3. Additional requirements for locating boxes for wiring devices.
- D. Section 27 10 00 - Structured Cabling: Additional requirements for communications systems outlet boxes.

#### **1.3 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.
- E. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports; 2013.
- F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2018.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

- I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 508A - Industrial Control Panels; 2013.
- K. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.
- L. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
  - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  - 3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
  - 4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
  - 5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
  - 6. Coordinate the work with other trades to preserve insulation integrity.
  - 7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
  - 8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

#### **1.5 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures and floor boxes.

### **PART 2 PRODUCTS**

#### **2.1 BOXES**

- A. General Requirements:

1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
  2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
  3. Provide products listed, classified, and labeled as suitable for the purpose intended.
  4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
  5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
  2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
  3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit is used.
  4. Use cast aluminum boxes where aluminum rigid metal conduit is used.
  5. Use nonmetallic boxes where exposed rigid PVC conduit is used.
  6. Use suitable concrete type boxes where flush-mounted in concrete.
  7. Use suitable masonry type boxes where flush-mounted in masonry walls.
  8. Use raised covers suitable for the type of wall construction and device configuration where required.
  9. Use shallow boxes where required by the type of wall construction.
  10. Do not use "through-wall" boxes designed for access from both sides of wall.
  11. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
  12. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
  13. Nonmetallic Boxes: Comply with NEMA OS 2, and list and label as complying with UL 514C.
  14. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
  15. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
  16. Wall Plates: Comply with Section 26 27 26.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
  2. NEMA 250 Environment Type, Unless Otherwise Indicated:
    - a. Indoor Clean, Dry Locations: Type 1, painted steel.
    - b. Outdoor Locations: Type 3R, painted steel.
  3. Junction and Pull Boxes Larger Than 100 cubic inches:
    - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
  4. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
- D. Floor Boxes:

1. Description: Floor boxes compatible with floor box service fittings provided in accordance with Section 26 27 26; with partitions to separate multiple services; furnished with all components, adapters, and trims required for complete installation.
2. Use nonmetallic floor boxes within slab on grade.
3. Metallic Floor Boxes: Fully adjustable (with integral means for leveling adjustment prior to and after concrete pour).
4. Manufacturer: Same as manufacturer of floor box service fittings.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

#### **3.2 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide separate boxes for emergency power and normal power systems.
- E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- H. Box Locations:
  1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 31 00 as required where approved by the Architect.
  2. Unless dimensioned, box locations indicated are approximate.
  3. Locate boxes as required for devices installed under other sections or by others.
    - a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 27 26.
    - b. Communications Systems Outlets: Comply with Section 27 10 00.

4. Locate boxes so that wall plates do not span different building finishes.
  5. Locate boxes so that wall plates do not cross masonry joints.
  6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
  7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
  8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
  9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
    - a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
  10. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
    - a. Concealed above accessible suspended ceilings.
    - b. Within joists in areas with no ceiling.
    - c. Electrical rooms.
    - d. Mechanical equipment rooms.
- I. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
  2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
  3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
- J. Install boxes plumb and level.
- K. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
  2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
  3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- L. Install boxes as required to preserve insulation integrity.
- M. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.
- N. Nonmetallic Floor Boxes: Cut box flush with finished floor after concrete pour.

- O. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- P. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- Q. Close unused box openings.
- R. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- S. Provide grounding and bonding in accordance with Section 26 05 26.

### **3.3 CLEANING**

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

### **3.4 PROTECTION**

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

### **END OF SECTION**

## **SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Floor marking tape.
- F. Warning signs and labels.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 09 91 13 - Exterior Painting.
- B. Section 09 91 23 - Interior Painting.
- C. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- D. Section 26 05 73 - Power System Studies: Arc flash hazard warning labels.
- E. Section 26 27 26 - Wiring Devices - Lutron: Device and wallplate finishes; factory pre-marked wallplates.
- F. Section 26 31 00 - Photovoltaic Collectors: Additional identification requirements for photovoltaic systems.
- G. Section 27 10 00 - Structured Cabling: Identification for communications cabling and devices.

#### **1.3 REFERENCE STANDARDS**

- A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.
- B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

- D. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
  - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
  - 2. Do not install identification products until final surface finishes and painting are complete.

### **PART 2 PRODUCTS**

#### **2.1 IDENTIFICATION REQUIREMENTS**

- A. Existing Work: Unless specifically excluded, identify existing elements to remain that are not already identified in accordance with specified requirements.
- B. Identification for Equipment:
  - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
    - a. Panelboards:
      - 1) Identify ampere rating.
      - 2) Identify voltage and phase.
      - 3) Identify power source and circuit number. Include location when not within sight of equipment.
      - 4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
      - 5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
    - b. Transformers:
      - 1) Identify kVA rating.
      - 2) Identify voltage and phase for primary and secondary.
      - 3) Identify power source and circuit number. Include location when not within sight of equipment.
      - 4) Identify load(s) served. Include location when not within sight of equipment.
    - c. Enclosed switches, circuit breakers, and motor controllers:
      - 1) Identify voltage and phase.
      - 2) Identify power source and circuit number. Include location when not within sight of equipment.

- 3) Identify load(s) served. Include location when not within sight of equipment.
    - d. Transfer Switches:
      - 1) Identify voltage and phase.
      - 2) Identify power source and circuit number for both normal power source and standby power source. Include location when not within sight of equipment.
      - 3) Identify load(s) served. Include location when not within sight of equipment.
      - 4) Identify short circuit current rating based on the specific overcurrent protective device type and settings protecting the transfer switch.
  2. Service Equipment:
    - a. Use identification nameplate to identify each service disconnecting means.
    - b. For buildings or structures supplied by more than one service, or any combination of branch circuits, feeders, and services, use identification nameplate or means of identification acceptable to authority having jurisdiction at each service disconnecting means to identify all other services, feeders, and branch circuits supplying that building or structure. Verify format and descriptions with authority having jurisdiction.
  3. Use voltage marker to identify highest voltage present for each piece of electrical equipment.
  4. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
  5. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
  6. Use field-painted floor markings, floor marking tape, or warning labels to identify required equipment working clearances where indicated or where required by the authority having jurisdiction.
    - a. Field-Painted Floor Markings: Alternating black and white stripes, 3 inches wide, painted in accordance with Section 09 91 23 and 09 91 13.
  7. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70, including but not limited to the following.
    - a. Service equipment.
    - b. Industrial control panels.
    - c. Motor control centers.
    - d. Elevator control panels.
    - e. Industrial machinery.
  8. Arc Flash Hazard Warning Labels: Comply with Section 26 05 73.
- C. Identification for Conductors and Cables:
  1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
  2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
  3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
    - a. At each source and load connection.

- b. Within boxes when more than one circuit is present.
  - 4. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.
- D. Identification for Raceways:
  - 1. Use voltage markers to identify highest voltage present for accessible conduits 2 inch (53 mm) trade size and larger at maximum intervals of 20 feet.
- E. Identification for Boxes:
  - 1. Use voltage markers to identify highest voltage present.
- F. Identification for Devices:
  - 1. Identification for Communications Devices: Comply with Section 27 10 00.
  - 2. Wiring Device and Wallplate Finishes: Comply with Section 26 27 26.
  - 3. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
    - a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.
  - 4. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.

## 2.2 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
  - 1. Materials:
    - a. Indoor Clean, Dry Locations: Use plastic nameplates.
    - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
  - 2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
  - 3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
  - 4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
  - 5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
  - 1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
  - 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C. Format for Equipment Identification:

1. Minimum Size: 1 inch by 2.5 inches.
  2. Legend:
    - a. Equipment designation or other approved description.
  3. Text: All capitalized unless otherwise indicated.
  4. Minimum Text Height:
    - a. System Designation: 1/2 inch.
    - b. Equipment Designation: 1/2 inch.
    - c. Other Information: 1/4 inch.
  5. Color:
    - a. Normal Power System: Black text on white background.
- D. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
  2. Legend: Power source and circuit number or other designation indicated.
  3. Text: All capitalized unless otherwise indicated.
  4. Minimum Text Height: 3/16 inch.
  5. Color: Black text on clear background.

### **2.3 WIRE AND CABLE MARKERS**

- A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- C. Legend: Power source and circuit number or other designation indicated.
- D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- E. Minimum Text Height: 1/8 inch.
- F. Color: Black text on white background unless otherwise indicated.

### **2.4 VOLTAGE MARKERS**

- A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.
- B. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
- C. Minimum Size:
  1. Markers for Equipment: 1 1/8 by 4 1/2 inches.
  2. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
  3. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.

4. Markers for Junction Boxes: 1/2 by 2 1/4 inches.

D. Legend:

1. Markers for Voltage Identification: Highest voltage present.

E. Color: Black text on orange background unless otherwise indicated.

## **2.5 FLOOR MARKING TAPE**

A. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlaminate, 3 inches wide, with alternating black and white stripes.

## **2.6 WARNING SIGNS AND LABELS**

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:

1. Materials:

a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.

b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.

2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.

3. Minimum Size: 7 by 10 inches unless otherwise indicated.

C. Warning Labels:

1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.

a. Do not use labels designed to be completed using handwritten text.

2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.

3. Minimum Size: 2 by 4 inches unless otherwise indicated.

## **PART 3 EXECUTION**

### **3.1 PREPARATION**

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

### **3.2 INSTALLATION**

A. Install products in accordance with manufacturer's instructions.

- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
  - 1. Surface-Mounted Equipment: Enclosure front.
  - 2. Flush-Mounted Equipment: Inside of equipment door.
  - 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
  - 4. Elevated Equipment: Legible from the floor or working platform.
  - 5. Branch Devices: Adjacent to device.
  - 6. Interior Components: Legible from the point of access.
  - 7. Conduits: Legible from the floor.
  - 8. Boxes: Outside face of cover.
  - 9. Conductors and Cables: Legible from the point of access.
  - 10. Devices: Outside face of cover.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Secure rigid signs using stainless steel screws.
- G. Mark all handwritten text, where permitted, to be neat and legible.

**END OF SECTION**

## **SECTION 26 05 73 - POWER SYSTEM STUDIES**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Short-circuit study.
- B. Protective device coordination study.
- C. Arc flash and shock risk assessment.
  - 1. Includes arc flash hazard warning labels.
- D. Criteria for the selection and adjustment of equipment and associated protective devices not specified in this section, as determined by studies to be performed.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 26 05 53 - Identification for Electrical Systems: Additional requirements for arc flash hazard warning labels.

#### **1.3 REFERENCE STANDARDS**

- A. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.
- B. IEEE 141 - IEEE Recommended Practice for Electrical Power Distribution for Industrial Plants; 1993 (Reaffirmed 1999).
- C. IEEE 242 - IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems; 2001, with Errata (2003).
- D. IEEE 399 - IEEE Recommended Practice for Industrial and Commercial Power Systems Analysis; 1997.
- E. IEEE 551 - IEEE Recommended Practice for Calculating Short-Circuit Currents in Industrial and Commercial Power Systems; 2006.
- F. IEEE 1584 - IEEE Guide for Performing Arc Flash Hazard Calculations; 2018.
- G. NEMA MG 1 - Motors and Generators; 2017.
- H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.
- I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

- J. NFPA 70E - Standard for Electrical Safety in the Workplace; 2017.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Existing Installations: Coordinate with equipment manufacturer(s) to obtain data necessary for completion of studies.
  - 2. Coordinate the work to provide equipment and associated protective devices complying with criteria for selection and adjustment, as determined by studies to be performed.
  - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Pre-Study Meeting: Conduct meeting with Owner to discuss system operating modes and conditions to be considered in studies.
- C. Sequencing:
  - 1. Submit study reports prior to or concurrent with product submittals.
  - 2. Do not order equipment until matching study reports and product submittals have both been evaluated by Architect.
  - 3. Verify naming convention for equipment identification prior to creation of final drawings, reports, and arc flash hazard warning labels (where applicable).
- D. Scheduling:
  - 1. Arrange access to existing facility for data collection with Owner.
  - 2. Where work of this section involves interruption of existing electrical service, arrange service interruption with Owner.

#### **1.5 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Study reports, stamped or sealed and signed by study preparer.
- C. Product Data: In addition to submittal requirements specified in other sections, include manufacturer's standard catalog pages and data sheets for equipment and protective devices indicating information relevant to studies.
  - 1. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
  - 2. Identify modifications made in accordance with studies that:
    - a. Can be made at no additional cost to Owner.
    - b. As submitted will involve a change to the contract sum.
- D. Field quality control reports.

- E. Certification that field adjustable protective devices have been set in accordance with requirements of studies.

## 1.6 POWER SYSTEM STUDIES

### A. Scope of Studies:

1. Perform analysis of new electrical distribution system as indicated on drawings.
2. Except where study descriptions below indicate exclusions, analyze system at each bus from primary protective devices of utility source down to each piece of equipment involved, including parts of system affecting calculations being performed (e.g. fault current contribution from motors).
3. Include in analysis alternate sources and operating modes (including known future configurations) to determine worst case conditions.

### B. General Study Requirements:

1. Comply with NFPA 70.
2. Perform studies utilizing computer software complying with specified requirements; manual calculations are not permitted.

### C. Data Collection:

1. Compile information on project-specific characteristics of actual installed equipment, protective devices, feeders, etc. as necessary to develop single-line diagram of electrical distribution system and associated input data for use in system modeling.
  - a. Utility Source Data: Include primary voltage, maximum and minimum three-phase and line-to-ground fault currents, impedance, X/R ratio, and primary protective device information.
    - 1) Obtain up-to-date information from Utility Company.
  - b. Generators: Include manufacturer/model, kW and voltage ratings, and impedance.
  - c. Motors: Include manufacturer/model, type (e.g. induction, synchronous), horsepower rating, voltage rating, full load amps, and locked rotor current or NEMA MG 1 code letter designation.
  - d. Transformers: Include primary and secondary voltage ratings, kVA rating, winding configuration, percent impedance, and X/R ratio.
  - e. Protective Devices:
    - 1) Circuit Breakers: Include manufacturer/model, type (e.g. thermal magnetic, electronic trip), frame size, trip rating, voltage rating, interrupting rating, available field-adjustable trip response settings, and features (e.g. zone selective interlocking).
    - 2) Fuses: Include manufacturer/model, type/class (e.g. Class J), size/rating, and speed (e.g. time delay, fast acting).
  - f. Protective Relays: Include manufacturer/model, type, settings, current/potential transformer ratio, and associated protective device.
  - g. Conductors: Include feeder size, material (e.g. copper, aluminum), insulation type, voltage rating, number per phase, raceway type, and actual length.
2. Existing Installations:

- a. Collect data on existing electrical distribution system necessary for completion of studies, including field verification of available existing data (e.g. construction documents, previous studies). Include actual settings for field-adjustable devices.
- D. Short-Circuit Study:
1. Comply with IEEE 551 and applicable portions of IEEE 141, IEEE 242, and IEEE 399.
  2. For purposes of determining equipment short circuit current ratings, consider conditions that may result in maximum available fault current, including but not limited to:
    - a. Maximum utility fault currents.
    - b. Maximum motor contribution.
    - c. Known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).
  3. For each bus location, calculate the maximum available three-phase bolted symmetrical and asymmetrical fault currents. For grounded systems, also calculate the maximum available line-to-ground bolted fault currents.
- E. Protective Device Coordination Study:
1. Comply with applicable portions of IEEE 242 and IEEE 399.
  2. Analyze alternate scenarios considering known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).
  3. Analyze protective devices and associated settings for suitable margins between time-current curves to achieve full selective coordination while providing adequate protection for equipment and conductors.
- F. Arc Flash and Shock Risk Assessment:
1. Comply with NFPA 70E.
  2. Perform incident energy and arc flash boundary calculations in accordance with IEEE 1584 (as referenced in NFPA 70E Annex D), where applicable.
    - a. Where reasonable, study preparer may assume a maximum clearing time of two seconds in accordance with IEEE 1584, provided that the conditions are such that a worker's egress from an arc flash event would not be inhibited.
  3. Analyze alternate scenarios considering conditions that may result in maximum incident energy, including but not limited to:
    - a. Maximum and minimum utility fault currents.
    - b. Maximum and minimum motor contribution.
    - c. Known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).
- G. Study Reports:
1. General Requirements:
    - a. Identify date of study and study preparer.
    - b. Identify study methodology and software product(s) used.
    - c. Identify scope of studies, assumptions made, implications of possible alternate scenarios, and any exclusions from studies.
    - d. Identify base used for per unit values.

- e. Include single-line diagram and associated input data used for studies; identify buses on single-line diagram as referenced in reports, and indicate bus voltage.
  - f. Include conclusions and recommendations.
2. Short-Circuit Study:
    - a. For each scenario, identify at each bus location:
      - 1) Calculated maximum available symmetrical and asymmetrical fault currents (both three-phase and line-to-ground where applicable).
      - 2) Fault point X/R ratio.
      - 3) Associated equipment short circuit current ratings.
    - b. Identify locations where the available fault current exceeds the equipment short circuit current rating, along with recommendations.
3. Protective Device Coordination Study:
    - a. For each scenario, include time-current coordination curves plotted on log-log scale graphs.
    - b. For each graph include (where applicable):
      - 1) Partial single-line diagram identifying the portion of the system illustrated.
      - 2) Protective Devices: Time-current curves with applicable tolerance bands for each protective device in series back to the source, plotted up to the maximum available fault current at the associated bus.
      - 3) Conductors: Damage curves.
      - 4) Transformers: Inrush points and damage curves.
      - 5) Generators: Full load current, overload curves, decrement curves, and short circuit withstand points.
      - 6) Motors: Full load current, starting curves, and damage curves.
      - 7) Capacitors: Full load current and damage curves.
    - c. For each protective device, identify fixed and adjustable characteristics with available ranges and recommended settings.
      - 1) Circuit Breakers: Include long time pickup and delay, short time pickup and delay, and instantaneous pickup.
      - 2) Include ground fault pickup and delay.
      - 3) Include fuse ratings.
      - 4) Protective Relays: Include current/potential transformer ratios, tap, time dial, and instantaneous pickup.
    - d. Identify cases where either full selective coordination or adequate protection is not achieved, along with recommendations.
4. Arc Flash and Shock Risk Assessment:
    - a. For the worst case for each scenario, identify at each bus location:
      - 1) Calculated incident energy and associated working distance.
      - 2) Calculated arc flash boundary.
      - 3) Bolted fault current.
      - 4) Arcing fault current.
      - 5) Clearing time.
      - 6) Arc gap distance.

- b. For purposes of producing arc flash hazard warning labels, summarize the maximum incident energy and associated data reflecting the worst case condition of all scenarios at each bus location.
- c. Include recommendations for reducing the incident energy at locations where the calculated maximum incident energy exceeds 8 calories per sq cm.

## **1.7 QUALITY ASSURANCE**

- A. Study Preparer Qualifications: Professional electrical engineer licensed in the State in which the Project is located and with minimum five years experience in the preparation of studies of similar type and complexity using specified computer software.
- B. Computer Software for Study Preparation: Use the latest edition of commercially available software utilizing specified methodologies.
  - 1. Acceptable Software Products:
    - a. ETAP/Operation Technology, Inc: [www.etap.com/#sle](http://www.etap.com/#sle).
    - b. SKM Systems Analysis, Inc: [www.skm.com/#sle](http://www.skm.com/#sle).

## **PART 2 PRODUCTS**

### **2.1 ARC FLASH HAZARD WARNING LABELS**

- A. Provide warning labels complying with ANSI Z535.4 to identify arc flash hazards for each work location analyzed by the arc flash and shock risk assessment.
  - 1. Materials: Comply with Section 26 05 53.
  - 2. Legend: Provide custom legend in accordance with NFPA 70E based on equipment-specific data as determined by arc flash and shock risk assessment.
    - a. Include orange header that reads "WARNING" unless otherwise indicated.
    - b. Include the text "Arc Flash and Shock Hazard; Appropriate PPE Required" or approved equivalent.
    - c. Include the following information:
      - 1) Arc flash boundary.
      - 2) Available incident energy and corresponding working distance.
      - 3) Nominal system voltage.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- A. Install arc flash warning labels in accordance with Section 26 05 53.

### **3.2 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Adjust equipment and protective devices for compliance with studies and recommended settings.
- D. Notify Architect of any conflicts with or deviations from studies. Obtain direction before proceeding.
- E. Submit detailed reports indicating inspection and testing results, and final adjusted settings.

**END OF SECTION**

## **SECTION 26 09 23 - LIGHTING CONTROL DEVICES**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Occupancy sensors.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- B. Section 26 05 33.16 - Boxes for Electrical Systems.
- C. Section 26 27 26 - Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, and fan speed controllers.

#### **1.3 REFERENCE STANDARDS**

- A. 47 CFR 15 - Radio Frequency Devices; current edition.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
  - 2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.
  - 3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
  - 4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

## 1.5 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
- C. Field Quality Control Reports.

## PART 2 PRODUCTS

### 2.1 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

### 2.2 OCCUPANCY SENSORS

- A. All Occupancy Sensors:
  - 1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
  - 2. Sensor Technology:
    - a. Passive Infrared (PIR) Occupancy Sensors: Designed to detect occupancy by sensing movement of thermal energy between zones.
    - b. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
  - 3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
  - 4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.
  - 5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.
  - 6. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
  - 7. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.

8. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on drawings.
  9. Where wired sensors are indicated, wireless sensors are acceptable provided that all components and wiring modifications necessary for proper operation are included.
  10. Wireless Sensors:
    - a. RF Range: 30 feet through typical construction materials.
    - b. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class B application.
    - c. Power: Battery-operated with minimum ten-year battery life.
- B. Wall Switch Occupancy Sensors:
1. All Wall Switch Occupancy Sensors:
    - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
    - b. Unless otherwise indicated or required to control the load indicated on drawings, provide line voltage units with self-contained relay.
    - c. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
    - d. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
    - e. Finish: Match finishes specified for wiring devices in Section 26 27 26, unless otherwise indicated.
  2. Passive Infrared (PIR) Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet.
  3. Passive Infrared/Ultrasonic Dual Technology Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet.
- C. Ceiling Mounted Occupancy Sensors:
1. All Ceiling Mounted Occupancy Sensors:
    - a. Description: Low profile occupancy sensors designed for ceiling installation.
    - b. Unless otherwise indicated or required to control the load indicated on drawings, provide low voltage units, for use with separate compatible accessory power packs.
    - c. Provide field selectable setting for disabling LED motion detector visual indicator.
    - d. Occupancy sensor to be field selectable as either manual-on/automatic-off or automatic on/off.
  2. Passive Infrared (PIR) Ceiling Mounted Occupancy Sensors:
    - a. Extended Range Sensors: Capable of detecting motion within an area of 1,200 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
  3. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:
    - a. Standard Range Sensors: Capable of detecting motion within an area of 450 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
    - b. Extended Range Sensors: Capable of detecting motion within an area of 1,200 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.

- D. Power Packs for Low Voltage Occupancy Sensors:
  - 1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.
  - 2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on drawings.
  - 3. Input Supply Voltage: Dual rated for 120/277 V ac.
  - 4. Load Rating: As required to control the load indicated on drawings.
  
- E. Power Packs for Wireless Occupancy Sensors:
  - 1. Description: Plenum rated, self-contained relay compatible with specified wireless occupancy sensors for switching of line voltage loads.
  - 2. Input Supply Voltage: Dual rated for 120/277 V ac.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.
- F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.
- G. Verify that conditions are satisfactory for installation prior to starting work.

#### **3.2 INSTALLATION**

- A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of lighting control devices provided under this section.
  - 1. Mounting Heights: As indicated on the drawings.

2. Orient outlet boxes for vertical installation of lighting control devices unless otherwise indicated.
  3. Locate wall switch occupancy sensors on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
- C. Install lighting control devices in accordance with manufacturer's instructions.
  - D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
  - E. Install lighting control devices plumb and level, and held securely in place.
  - F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 27 26.
  - G. Provide required supports in accordance with Section 26 05 29.
  - H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
  - I. Occupancy Sensor Locations:
    1. Location Adjustments: Locations indicated are diagrammatic and only intended to indicate which rooms or areas require devices. Provide quantity and locations as required for complete coverage of respective room or area based on manufacturer's recommendations for installed devices.
    2. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors a minimum of 4 feet from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.

### **3.3 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect each lighting control device for damage and defects.
- C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.
- D. Correct wiring deficiencies and replace damaged or defective lighting control devices.

### **3.4 ADJUSTING**

- A. Adjust devices and wall plates to be flush and level.

- B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.
- C. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on passive infrared (PIR) and dual technology occupancy sensor lenses to block undesired motion detection.

### **3.5 CLEANING**

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

### **3.6 COMMISSIONING**

- A. See Section 01 91 13 - General Commissioning Requirements for commissioning requirements.

### **3.7 CLOSEOUT ACTIVITIES**

- A. Demonstration: Demonstrate proper operation of lighting control devices to Architect, and correct deficiencies or make adjustments as directed.
- B. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
  - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

### **END OF SECTION**

## **SECTION 26 09 24 - LIGHTING CONTROLS - LUTRON VIVE**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Single space wireless lighting control systems and associated components:
  - 1. Wireless occupancy/vacancy sensors.
  - 2. Wireless daylight sensors.
  - 3. Wired load control modules with wireless communication inputs.
    - a. Includes fixture control modules with wired occupancy/vacancy/daylight sensors.
  - 4. Wired wall dimmers and switches with wireless communication inputs.
  - 5. Wired wallbox occupancy sensors with wireless communication inputs.
  - 6. Wireless control stations.
  - 7. LED Drivers.
- B. Wireless hub(s) for centralized control, monitoring, and system integration.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- B. Section 26 27 26 - Wiring Devices:
  - 1. Finish requirements for wall controls specified in this section.

#### **1.3 REFERENCE STANDARDS**

- A. 47 CFR 15 - Radio Frequency Devices; current edition.
- B. ANSI/ESD S20.20 - Standard for the Development of an Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices); 2014.
- C. ASTM D4674 - Standard Practice for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Office Environments; 2002a (Reapproved 2010).
- D. CAL TITLE 24 P6 - California Code of Regulations, Title 24, Part 6 (California Energy Code); 2016.
- E. IEC 60929 - AC and/or DC-Supplied Electronic Control Gear for Tubular Fluorescent Lamps - Performance Requirements; 2015.
- F. IEC 61000-4-2 - Electromagnetic Compatibility (EMC) - Part 4-2: Testing and Measurement Techniques - Electrostatic Discharge Immunity Test; 2008.

- G. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Corrigendum 2012).
- H. ISO 9001 - Quality management systems -- Requirements; 2015.
- I. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- J. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- K. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2016.
- L. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2015).
- M. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- N. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- O. UL 508 - Industrial Control Equipment; Current Edition, Including All Revisions.
- P. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- Q. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.
- R. UL 1598C - Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits; Current Edition, Including All Revisions.
- S. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; Current Edition, Including All Revisions.
- T. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the placement of sensors and wall controls with millwork, furniture, equipment, etc. installed under other sections or by others.
  - 2. Coordinate the placement of wall controls with actual installed door swings.
  - 3. Coordinate the placement of daylight sensors with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement installed under other sections or by others.
  - 4. Coordinate the work to provide luminaires and lamps compatible with the lighting controls to be installed.

5. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
- B. Pre-Wire Meeting: Include as part of the base bid additional costs for Lighting Control Manufacturer to conduct on-site meeting prior to commencing work. Manufacturer to review with installer:
1. Low voltage wiring requirements.
  2. Separation of power and low voltage/data wiring.
  3. Wire labeling.
  4. Wireless hub locations and installation.
  5. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", sensor locations to be reviewed in accordance with layout provided by Lighting Control Manufacturer. Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated.
  6. Control locations.
  7. Computer jack locations.
  8. Load circuit wiring.
  9. Network wiring requirements.
  10. Connections to other equipment.
  11. Installer responsibilities.
- C. Sequencing:
1. Do not install sensors and wall controls until final surface finishes and painting are complete.

## **1.5 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Design Documents: Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", Lighting Control Manufacturer to provide plans indicating occupancy/vacancy and/or daylight sensor locations.
- C. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
  1. Occupancy/Vacancy Sensors: Include detailed basic motion detection coverage range diagrams.
  2. Wall Dimmers: Include derating information for ganged multiple devices.
- D. Project Record Documents: Record actual installed locations and settings for lighting control system components.
- E. Operation and Maintenance Data: Include detailed information on lighting control system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.

## **1.6 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications:
  - 1. Company with not less than ten years of experience manufacturing lighting control products using wireless communication between devices.
  - 2. Registered to ISO 9001, including in-house engineering for product design activities.
  - 3. Provides factory direct technical support hotline available 24 hours per day, 7 days per week.
  - 4. Qualified to supply specified products and to honor claims against product presented in accordance with warranty.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

## **1.8 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Manufacturer's Standard Warranty, With Manufacturer Full-Scope Start-Up:
  - 1. Manufacturer Lighting Control System Components, Except Lighting Management System Computer, Ballasts/Drivers and Ballast Modules:
    - a. First Two Years:
      - 1) 100 percent replacement parts coverage, 100 percent manufacturer labor coverage to troubleshoot and diagnose a lighting issue.
      - 2) First-available on-site or remote response time.
      - 3) Remote diagnostics for applicable systems.
    - b. Telephone Technical Support: Available 24 hours per day, 7 days per week, excluding manufacturer holidays.
  - 2. Lighting Management System Computer: One year 100 percent parts coverage, one year 100 percent manufacturer labor coverage.
  - 3. Ballasts/Drivers and Ballast Modules:
    - a. With On-Site Full-Scope Start-Up: Five years 100 percent parts coverage, no manufacturer labor coverage.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Basis of Design Manufacturer: Lutron Electronics Company, Inc; Vive; [www.lutron.com/#sle](http://www.lutron.com/#sle).
- B. Substitutions: See Section 01 60 00 - Product Requirements.
  - 1. All proposed substitutions (clearly delineated as such) must be submitted in writing for approval by Architect a minimum of 10 working days prior to the bid date and must be made available to all bidders. Proposed substitutes must be accompanied by a review of the specification noting compliance on a line-by-line basis.
  - 2. By using pre-approved substitutions, Contractor accepts responsibility and associated costs for all required modifications to related equipment and wiring. Provide complete engineered shop drawings (including power wiring) with deviations from the original design highlighted in an alternate color for review and approval by Architect prior to rough-in.
- C. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

### **2.2 LIGHTING CONTROLS - GENERAL REQUIREMENTS**

- A. Sensor Layout and Tuning: Include as part of the base bid additional costs for Lighting Control Manufacturer's Sensor Layout and Tuning service:
  - 1. Lighting Control Manufacturer to take full responsibility for wired or wireless occupancy/vacancy and daylight sensor layout and performance for sensors provided by Lighting Control Manufacturer.
  - 2. Lighting Control Manufacturer to analyze the reflected ceiling plans, via supplied electronic AutoCAD format, and design a detailed sensor layout that provides adequate occupancy sensor coverage and ensures occupancy and daylight sensor performance per agreed upon sequence of operations. Contractor to utilize the layouts for sensor placement.
  - 3. During startup, Lighting Control Manufacturer to direct Contractor regarding sensor relocation, as required, should conditions require a deviation from locations specified in the drawings.
  - 4. Lighting Control Manufacturer to provide up to two additional post-startup on-site service visits, within one calendar year from Date of Substantial Completion to fine-tune sensor calibration per the agreed upon sequence of operations.
- B. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) as suitable for the purpose indicated.
- C. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, programming, etc. as necessary for a complete operating system that provides the control intent indicated.

- D. Design lighting control equipment for 10 year operational life while operating continually at any temperature in an ambient temperature range of 32 degrees F to 104 degrees F and 90 percent non-condensing relative humidity.
- E. Electrostatic Discharge Tolerance: Design and test equipment to withstand electrostatic discharges without impairment when tested according to IEC 61000-4-2.
- F. Power Failure Recovery: When power is interrupted for periods up to 10 years and subsequently restored, lights to automatically return to same levels (dimmed setting, full on, or full off) as prior to power interruption.
- G. Wireless Devices:
  - 1. Wireless device family includes area or fixture level sensors, area or fixture level load controls for dimming or switching, and load controls that can be mounted in a wallbox, on a junction box, or at the fixture.
  - 2. Wireless devices including sensors, load controls, and wireless remotes or wall stations, can be set up using simple button press programming without needing any other equipment (e.g. central hub, processor, computer, or other smart device).
  - 3. Wireless hub adds the ability to set up the system using any smart device with a web browser (e.g. smartphone, tablet, PC, or laptop).
  - 4. System does not require a factory technician to set up or program the system.
  - 5. Capable of diagnosing system communications.
  - 6. Capable of having addresses automatically assigned to them.
  - 7. Receives signals from other wireless devices and provides feedback to user.
  - 8. Capable of determining which devices have been addressed.
  - 9. RF Range: 60 feet line-of-sight or 30 feet through typical construction materials between RF transmitting devices and compatible RF receiving devices.
  - 10. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class B application.
- H. Wireless Network:
  - 1. RF Frequency: 434 MHz; operate in FCC governed frequency spectrum for periodic operation; continuous transmission spectrum is not permitted.
    - a. Wireless sensors, wireless wall stations and wireless load control devices do not operate in the noisy 2.4 GHz frequency band where high potential for RF interference exists.
    - b. Wireless devices operate in an uncongested frequency band providing reliable operation.
    - c. Fixed network architecture ensures all associated lights and load controls respond in a simultaneous and coordinated fashion from a button press, sensor signal, or command from the wireless hub (i.e. no popcorning).
  - 2. Distributed Architecture: Local room devices communicate directly with each other. If the wireless hub is removed or damaged, local control, sensing, and operation continues to function without interruption.
  - 3. Local room devices communicate directly with each other (and not through a central hub or processor) to ensure:

- a. Reliability of system performance.
  - b. Fast response time to events in the space (e.g. button presses or sensor signals).
  - c. Independent operation in the event of the wireless hub being removed or damaged.
- I. Device Finishes:
1. Wall Controls: Match finishes for Wiring Devices in Section 26 27 26 - Wiring Devices, unless otherwise indicated.
  2. Standard Colors: Comply with NEMA WD 1 where applicable.
  3. Color Variation in Same Product Family: Maximum delta E of 1, CIE L\*a\*b color units.
  4. Visible Parts: Exhibit ultraviolet color stability when tested with multiple actinic light sources as defined in ASTM D4674. Provide proof of testing upon request.

## 2.3 WIRELESS SENSORS

- A. General Requirements:
1. Operational life of 10 years without the need to replace batteries when installed per manufacturer's instructions.
  2. Communicates directly to compatible RF receiving devices through use of a radio frequency communications link.
  3. Does not require external power packs, power wiring, or communication wiring.
  4. Capable of being placed in test mode to verify correct operation from the face of the unit.
- B. Wireless Occupancy/Vacancy Sensors:
1. General Requirements:
    - a. Provides a clearly visible method of indication to verify that motion is being detected during testing and that the unit is communicating to compatible RF receiving devices.
    - b. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
    - c. Sensing Mechanism: Passive infrared coupled with technology for sensing fine motions. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
    - d. Provide optional, readily accessible, user-adjustable controls for timeout, automatic/manual-on, and sensitivity.
    - e. Turns off lighting after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area. Provide adjustable timeout settings of 1, 5, 15, and 30 minutes.
    - f. Capable of turning dimmer's lighting load on to an optional locked preset level selectable by the user. Locked preset range to be selectable on the dimmer from 1 percent to 100 percent.
    - g. Color: White.
    - h. Provide all necessary mounting hardware and instructions for both temporary and permanent mounting.

- i. Provide temporary mounting means for drop ceilings to allow user to check proper performance and relocate as needed before permanently mounting sensor. Temporary mounting method to be design for easy, damage-free removal.
- j. Sensor lens to illuminate during test mode when motion is detected to allow installer to place sensor in ideal location and to verify coverage prior to permanent mounting.
- k. Ceiling-Mounted Sensors:
  - 1) Provide recessed mounting bracket compatible with drywall and compressed fiber ceilings.
- 2. Wireless Combination Occupancy/Vacancy Sensors:
  - a. Ceiling-Mounted Sensors: Programmable to operate as an occupancy sensor (automatic-on and automatic-off), an occupancy sensor with low light feature (automatic-on when less than one footcandle of ambient light available and automatic-off), or a vacancy sensor (manual-on and automatic-off).
  - b. Wall-Mounted Sensors: Programmable to operate as an occupancy sensor (automatic-on and automatic-off), or a vacancy sensor (manual-on and automatic-off).
  - c. Product(s):
- C. Wireless Daylight Sensors:
  - 1. Open-loop basis for daylight sensor control scheme.
  - 2. Stable output over temperature from 32 degrees F to 104 degrees F.
  - 3. Partially shielded for accurate detection of available daylight to prevent fixture lighting and horizontal light component from skewing sensor detection.
  - 4. Provide linear response from 2 to 150 footcandles.
  - 5. Color: White.
  - 6. Mounting:
    - a. Provide surface mounting bracket compatible with drywall, plaster, wood, concrete, and compressed fiber ceilings.
    - b. Provide all necessary mounting hardware and instructions for both temporary and permanent mounting.
    - c. Provide temporary mounting means for drop ceilings to allow user to check proper performance and relocate as needed before permanently mounting sensor. Temporary mounting method to be design for easy, damage-free removal.

## **2.4 LOAD CONTROL MODULES**

- A. Provide wireless load control modules as indicated or as required to control the loads as indicated.
- B. Junction Box-Mounted Modules:
  - 1. Plenum rated.
  - 2. 0-10 V Dimming Modules:
    - a. Product(s):

- b. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.
  - c. Single low voltage dimming module with Class 1 or Class 2 isolated 0-10V output signal conforming to IEC 60929 Annex E.2; source or sink automatically configures.
  - d. Selectable minimum light level.
  - e. Configurable high- and low-end trim.
  - f. Relay: Rated for 0-10 V ballasts, LED drivers, or fixtures that conform with NEMA 410.
  - g. Dimming Modules with Emergency Lighting Mode:
    - 1) Operation With Wireless Hub: Upon loss of power, dimming module enters and remains in emergency lighting mode as long as wireless hub is de-energized; upon restoration of power to wireless hub, dimming module returns to normal mode and lights automatically return to same levels (dimmed setting, full on, or full off) as prior to power interruption.
    - 2) Operation Without Wireless Hub: Upon loss of power, dimming module enters and remains in emergency lighting mode for 90 minutes, during which time local unit buttons and wireless controls are disabled.
    - 3) UL 924 listed.
3. Digital Ballast/LED Driver Dimming Modules:
- a. Single dimming module with Class 1 or Class 2 isolated digital output signal conforming to IEC 60929 (or IEC 62386 DALI); capable of direct control without interface.
  - b. Provides direct low-voltage control of up to 32 compatible digital ballasts/LED drivers as a single zone (multiple ballasts/LED drivers connected to same module will be at same light level).
    - 1) Electronically links a digital ballast/LED driver to a zone for both dimming and turning on/off.
    - 2) Electronically assigns occupancy/vacancy sensors for manual on/auto off and auto on/auto off control.
    - 3) Electronically assigns wireless control stations for manual local control.
    - 4) Electronically assigns daylight sensor for automatic daylight dimming.
  - c. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.
  - d. Selectable minimum light level.
  - e. Configurable high- and low-end trim.
4. Relay Modules:
- a. Product(s):
    - 1) 16 A relay module, without emergency lighting mode, without contact closure output.
  - b. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.
  - c. Relay:
    - 1) Rated Life of Relay: Typical of 1,000,000 cycles at fully rated 16 A for all lighting loads.
    - 2) Load switched in manner that prevents arcing at mechanical contacts when power is applied to and removed from load circuits.

- 3) Fully rated output continuous duty for inductive, capacitive, and resistive loads.

C. Fixture Control Modules/Sensors:

1. Fixture Control Modules:

- a. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.
- b. Communicates via wired input with one combination occupancy/daylight or vacancy/daylight fixture sensor.
- c. Coordination between Wired and Wireless Sensors:
  - 1) Occupancy/Vacancy Sensing: Wired and wireless sensors work in conjunction (occupancy detected by either sensor turns lights on and vacancy detected by both sensors turns lights off).
  - 2) Daylight Sensing: Wireless sensor takes precedence over wired sensor.
- d. Selectable minimum light level setting.
- e. Configurable high- and low-end trim.
- f. Plenum rated.
- g. Mounts to fixture or junction box through 1/2 inch trade size knockout.
- h. Digital Ballast/LED Driver Fixture Control Modules:
  - 1) Product(s):
    - a) Digital ballast/LED driver fixture control module, without emergency lighting mode.
  - 2) Supports reporting of energy measurement to wireless hub at accuracy of plus/minus 2 percent or 0.5 W (whichever is higher)
  - 3) Single integral controller with Class 1 or Class 2 isolated digital output signal conforming to IEC 60929; capable of direct control without interface.
  - 4) Provides direct low-voltage control of up to 3 compatible digital ballasts/LED drivers.
    - a) Electronically links a digital ballast/LED driver to a zone for both dimming and turning on/off.
    - b) Electronically assigns occupancy/vacancy sensors for manual on/auto off and auto on/auto off control.
    - c) Electronically assigns wireless control stations for manual local control.
    - d) Electronically assigns daylight sensor for automatic daylight dimming.
- i. 0-10 V Dimming Fixture Control Modules:
  - 1) Product(s):
  - 2) Supports reporting of energy measurement to wireless hub at accuracy of plus/minus 2 percent or 0.5 W (whichever is higher)
  - 3) Single low voltage dimming module with Class 1 or Class 2 isolated 0-10 V output signal conforming to IEC 60929 Annex E.2; source or sink automatically configures.
  - 4) Provides 0-10 V control for up to 3 ballasts/LED drivers (1 A load at 120-277 V, 6 mA max control current).
  - 5) Rated for switching 0-10 V ballasts, LED drivers, or fixtures that conform with NEMA 410.

2. Wired Fixture Sensors:

- a. Product(s):
  - 1) Wired vacancy/daylight fixture sensor.
- b. Occupancy/Vacancy Sensing:
  - 1) Passive infrared coupled with technology for sensing fine motions. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
  - 2) Coverage: 300 square feet with mounting height of 8 to 12 feet; 360 degree field of view.
  - 3) Sensor Timeout: 15 minutes.
    - a) Sensor timeout adjustable via wireless hub when connected to compatible fixture control module.
- c. Daylight Sensing:
  - 1) Automatic calibration.
  - 2) Provide linear response to changes in perceived light level.
    - a) Response adjustable via wireless hub when connected to compatible fixture control module).
  - 3) Closed loop proportional control scheme.
  - 4) Sensor Range: 0 to 150 footcandles.
- d. Mounts to fixture or ceiling.

## **2.5 WIRED WALL DIMMERS AND SWITCHES WITH WIRELESS COMMUNICATION INPUTS**

- A. General Requirements:
  - 1. Provide air gap service switch to disconnect power to load for safe lamp replacement, accessible without removing faceplate.
  - 2. Operates at the rated capacity across the full ambient temperature range including modified capacities for ganged configurations which require removal of fins.
  - 3. Provide radio frequency interference suppression.
  - 4. Surge Tolerance: Designed and tested to withstand surges of 6,000 V, 200 amps according to IEEE C62.41.2 without impairment to performance.
  - 5. Dimmers: Provide full range, continuously variable control of light intensity.
  - 6. Dimmers for Electronic Low Voltage (ELV) Transformers:
    - a. Provide circuitry designed to control the input of electronic (solid-state) low voltage (ELV) transformers. Do not use dimmers that utilize standard phase control.
    - b. Provide resettable overload protection that provides automatic shut-off when dimmer capacity is exceeded. Do not use protection methods that are non-resettable or require device to be removed from outlet box.
    - c. Designed to withstand a short, per UL 1472, between load hot and either neutral or ground without damage to dimmer.
  - 7. Dimmers for Magnetic Low Voltage (MLV) Transformers:
    - a. Provide circuitry designed to control and provide a symmetrical AC waveform to input of magnetic low voltage transformers per UL 1472.
    - b. Magnetic low voltage transformers to operate below rated current or temperature.
  - 8. Electronic Switches:
    - a. Listed as complying with UL 20, UL 508, and UL 1472.

- B. Preset Smart Wall Dimmers and Switches with Wireless Communication Inputs:
1. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.
  2. Dimmer Control: Multi-function tap switch with small, raised rocker for dimmer adjustment.
    - a. Rocker raises/lowers light level, with new level becoming the current preset level.
    - b. Switch single tap raises lights to preset level or fades lights to off.
    - c. Switch double tap raises light to full on level.
    - d. Switch tap and hold slowly fades lights to off over period of 10 seconds.
    - e. LEDs adjacent to tap switch indicate light level when dimmer is on, and function as locator light when dimmer is off.
  3. Switch Control: Switch single tap turns lights on/off.
  4. Dimmer High End Trim:
    - a. Incandescent Dimmers: Minimum of 92 percent of line voltage.
    - b. Dimmers for Electronic Low Voltage (ELV) Transformers: Minimum of 95 percent of line voltage.
    - c. Dimmers for Magnetic Low Voltage Transformers: Minimum of 92 percent of line voltage.

## 2.6 WIRED WALLBOX OCCUPANCY SENSORS WITH WIRELESS COMMUNICATION INPUTS

- A. 0-10 V Wall Dimmer/Switch Combination Occupancy/Vacancy Sensors with Wireless Communication Inputs.
1. Communicates via radio frequency with up to ten compatible wireless occupancy/vacancy sensors, ten wireless control stations, and one wireless daylight sensor.
  2. Compatible with sourcing electronic 0-10 V ballasts/drivers, as per IEC 60929 Annex E.2 0-10 V protocol.
  3. Selectable option to enable low light feature (automatic-on when ambient light is below threshold). Ambient light threshold to be selectable as either adaptive utilizing occupant feedback or as fixed (high, medium, low, and minimum presets).
  4. Occupancy/Vacancy Sensors:
    - a. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
    - b. Sensing Mechanism: Passive infrared coupled with technology for sensing fine motions. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
    - c. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
    - d. Turns off lighting after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area; adjustable timeout settings (1, 5, 15, and 30 minutes).
    - e. Adjustable sensitivity (high, medium, low, and minimum presets).
    - f. Selectable option to inhibit automatic turn-on of lights after manual-off operation while room is occupied for applications such as presentation viewing in conference

- rooms and classrooms; when room is vacated, returns to normal automatic-on operation after time delay period.
- g. Selectable walk-through mode to override selected timeout and automatically turn off lights if no motion is detected within 3 minutes after initial occupancy for applications where space may be briefly occupied.
- 5. Dimmer Features:
    - a. Adjustable high/low end trims.
    - b. Selectable dimming curve (linear or switched).
    - c. Selectable fade on/fade off times (15, 5, 2.5, or 0.75 sec).
    - d. Adjustable auto-on light level (fully adjustable from one to 100 percent).
  - 6. Dimmer Control: Multi-function tap switch with small, raised rocker for dimmer adjustment.
    - a. Rocker raises/lowers light level, with new level becoming the current preset level.
    - b. Switch single tap raises lights to preset level or fades lights to off.
    - c. Switch double tap raises light to full on level.
  - 7. Switch Control: Switch single tap turns lights on/off.
  - 8. Product(s):

## **2.7 WIRELESS CONTROL STATIONS**

- A. Product(s):
- B. Quantity: As indicated on the drawings.
- C. Communicates directly to compatible RF receiving devices through use of a radio frequency communications link.
- D. Does not require external power packs, power or communication wiring.
- E. Allows for easy reprogramming without replacing unit.
- F. Button Programming:
  - 1. Single action.
  - 2. Toggle action.
- G. Includes LED to indicate button press or programming mode status.
- H. Mounting:
  - 1. Capable of being mounted with a table stand or directly to a wall under a faceplate.
  - 2. Faceplates: Provide concealed mounting hardware.
- I. Power: Battery-operated with minimum ten-year battery life (3-year battery life for night light models).
- J. Finish: As specified for wall controls in "Device Finishes" under LIGHTING CONTROLS - GENERAL REQUIREMENTS article above.

## 2.8 LED DRIVERS

### A. General Requirements:

1. Operate for at least 50,000 hours at maximum case temperature and 90 percent non-condensing relative humidity.
2. Provide thermal fold-back protection by automatically reducing power output (dimming) to protect LED driver and LED light engine/fixture from damage due to over-temperature conditions that approach or exceed the LED driver's maximum operating temperature at calibration point.
3. Provide integral recording of operating hours and maximum operating temperature to aid in troubleshooting and warranty claims.
4. Designed and tested to withstand electrostatic discharges incurred during manufacturing, installation, or field troubleshooting without impairment of performance when tested according to IEC 61000-4-2.
5. Manufactured in a facility that employs ESD reduction practices in compliance with ANSI/ESD S20.20.
6. UL 8750 recognized or listed as applicable.
7. UL Type TL rated or UL Class P listed where possible to allow for easier fixture evaluation and listing of different driver series.
8. Suitable for field replacement as applicable; listed in accordance with UL 1598C or UL 8750, Class P as indicated.
9. Designed and tested to withstand Category A surges of 4,000 V according to IEEE C62.41.2 without impairment of performance.
10. Class A sound rating; inaudible in a 27 dBA ambient.
11. Demonstrate no visible change in light output with a variation of plus or minus 10 percent change in line-voltage input.
12. LED drivers of the same family/series to track evenly across multiple fixtures at all light levels.
13. Offer programmable output currents in 10 mA increments within designed driver operating ranges for custom fixture length and lumen output configurations, while meeting a low-end dimming range of 100 to 0.1 percent, 100 to 1 percent or 100 to 5 percent as applicable.
14. Meet NEMA 410 inrush requirements for mitigating inrush currents with solid state lighting sources.
15. Employ integral fault protection up to 277 V to prevent LED driver damage or failure in the event of incorrect application of line-voltage to communication link inputs.
16. LED driver may be remote located up to 100 feet from LED light engine depending on power outputs required and wire gauge utilized by installer.

### B. 3-Wire Control:

1. Provide integral fault protection to prevent driver failure in the event of a mis-wire.
2. Operate from input voltage of 120 V through 277 V at 50/60 Hz.

### C. Digital Control (when used with compatible lighting control systems):

1. Employ power failure memory; LED driver to automatically return to the previous state/light level upon restoration of utility power.
2. Operate from input voltage of 120 V through 277 V at 50/60 Hz.
3. When normal power is lost, drivers fed with emergency power go to emergency mode.
4. Replacement of single driver during maintenance does not require reprogramming.
5. Digital low-voltage control wiring capable of being wired as either Class 1 or Class 2.

## 2.9 WIRELESS HUBS

- A. Product(s):
  1. Wireless hub without BACnet.
    - a. Flush-mount wireless hub; supports up to 70 total paired devices.
- B. Integrated multicolor LED provides feedback on what mode the hub is in for simple identification and diagnosis.
- C. Integrated processor and web server allows hub to set up and operate the system without any external connections to outside processors, servers, or the internet.
- D. Utilizes Ethernet connection for:
  1. Networking up to 64 hubs together to create a larger system.
  2. Remote connectivity capabilities, including maintaining system date/time and receiving periodic firmware updates (requires internet connection).
- E. A single hub or network of hubs can operate on either a dedicated lighting control only network or can be integrated with an existing building network as a VLAN.
- F. Communicates directly to compatible RF devices through use of radio frequency communications link; does not require communication wiring; RF range of 71 feet through walls to cover an area of 15836 square feet (device and hub must be on the same floor).
- G. Communicates directly to mobile device (smartphone or tablet) or computer using built-in Wi-Fi. 2.4 GHz 802.11b/g; wireless range of 71 feet through walls (device and hub must be on the same floor).
  1. Does not require Wi-Fi router for connecting to the hub.
- H. Allows for system setup, control, and monitoring from mobile device or computer using web-based software:
  1. Supports paired devices up to maximum number indicated including compatible wireless sensors, wireless control stations, and wireless load devices.
  2. Allows for timeclock scheduling of events, both time of day and astronomic (sunrise and sunset).
    - a. Timeclock is integrated into the unit and does not require a constant internet connection.
    - b. Retains time and programming information after a power loss.
    - c. 365-day schedulable timeclock allows for:

- 1) Scheduling of events years in advance.
- 2) Setting of recurring events with exceptions on holidays.
- d. Timeclock events can be scheduled to:
  - 1) Send lights to a desired level and select the fade rate desired to reach that level.
  - 2) Adjust level lights go to when occupied.
  - 3) Adjust level lights go to when unoccupied.
  - 4) Enable/disable occupancy.
  - 5) Adjust timeout of sensors (requires wired fixture sensor or wireless fixture control dongle with integral sensing capabilities).
3. Daylighting:
  - a. Daylighting can be enabled/disabled. Can be used to override the control currently taking place in the space.
  - b. Daylight set point can be adjusted with the software to increase or decrease the electric light level in the room based on the same amount of natural light.
4. Allows for control, monitoring, and adjustment from anywhere in the world (wireless hub internet connection required).
5. Uses RF signal strength detection to find nearby devices for quick association and programming without having to climb ladders.
  - a. Association and setup does not require a factory technician to perform.
6. System using Lutron Vive wireless hub(s) can operate with or without connection to the internet.
7. Supports energy reporting.
  - a. Reports measured energy data for fixture control modules at accuracy of plus/minus 2 percent or 0.5 W (whichever is higher).
  - b. Reports calculated energy data for junction box mounted modules at accuracy of 10 percent.
8. Supports automatic demand response for load shedding via:
  - a. Local contact closure without need for separate interface.
  - b. OpenADRaE 2.0b compliant utility command.
9. Support automatic generation of alerts in web-based application for designated events/triggers, including:
  - a. Low-battery condition in battery-operated sensors and controls; alert cleared when battery is replaced.
  - b. Missing device (e.g., control or sensor); alert cleared when device is detected.
10. Wireless hub can be firmware upgraded to provide new software features and system updates.
  - a. Firmware update can be done either locally using a wired Ethernet connection or Wi-Fi connection, or remotely if the wireless hub is connected to the internet.
- I. Web-Based Application:
  1. Accessibility and Platform Support:
    - a. Web-based; runs on most HTML5 compatible browsers (including Safari and Chrome).

- b. Supports multiple platforms and devices; runs from a tablet, desktop, laptop, or smartphone.
  - c. User interface supports multi-touch gestures such as pinch to zoom, drag to pan, etc.
  - d. Utilizes HTTPS (industry-standard certificate-based encryption and authentication for security).
  - e. Multi-level Password Protected Access: Individual password protection on both the integrated Wi-Fi network and web-based software.
  - f. WPA2 security for Wi-Fi communication with wireless hub.
2. System Navigation and Status Reporting:
- a. Area Tree View: Easy navigation by area name to view status and make programming adjustments through the software.
  - b. Area and device names can be changed in real time.
3. Setup app available for iOS and Android that allows for:
- a. Job registration to extend product warranty.
  - b. Management of setup for multiple projects in different locations.
  - c. Creation of handoff documents that are sent directly to a facility manager via email once setup is complete.
  - d. Backup of wireless hub database to cloud for hub replacement.
  - e. Access to native help and instructions to assist user with system setup.
- J. API Integration:
- 1. Support communication, without requiring interface, between lighting control system and third-party system via RESTful API.
  - 2. Requires one network connection per wireless hub.
  - 3. API Integration Capabilities:
    - a. Control all zones or subset of zones.
      - 1) Set zones in designated area to specific level.
      - 2) Raise/lower dimmable lights in designated area.
    - b. Control individual zones.
    - c. Subscribe to and Monitor:
      - 1) Area status changes (e.g, occupancy, light level, and instantaneous power).
      - 2) Individual zone changes in light level.
      - 3) Alerts (e.g., missing device and low battery).
- K. Contact Closure Interface: Provide two contact closure inputs; accepts both momentary and maintained contact closures that can be used for automatic demand response.
- L. Rated for use in air-handling spaces as defined in UL 2043.
- M. Meets CAL TITLE 24 P6 requirements.
- N. Provide Ethernet switch(es) as required for inter-hub network wiring per manufacturer's instructions; do not exceed manufacturer's required maximum wiring segment lengths.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that ratings and configurations of system components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive system components.
- D. Verify that conditions are satisfactory for installation prior to starting work.

### **3.2 PREPARATION**

- A. System and Network Integration Consultation: Include as part of the base bid additional costs for Lighting Control Manufacturer to conduct meeting with facility representative and other related equipment manufacturers to discuss equipment and integration procedures.
  - 1. Coordinate scheduling of visit with Lighting Control Manufacturer. Manufacturer recommends that this visit be scheduled early in construction phase, after system purchase but prior to system installation.

### **3.3 INSTALLATION**

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, except for mounting heights specified in those standards.
- B. Install products in accordance with manufacturer's instructions.
- C. Sensor Locations:
  - 1. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", locate sensors in accordance with layout provided by Lighting Control Manufacturer. Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated. Where Lighting Control Manufacturer Sensor Layout and Tuning service is not specified, locate sensors in accordance with Drawings.
- D. Ensure that daylight sensor placement minimizes sensor view of electric light sources. Locate ceiling-mounted and luminaire-mounted daylight sensors to avoid direct view of luminaires.
- E. Lamp Burn-In: Operate lamps at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.

- F. LED Light Engine/Array Lead Length: Do not exceed 100 feet.
- G. Identify system components in accordance with Section 26 05 53.

### **3.4 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Manufacturer's Full-Scope Start-Up Service is required.
- C. Manufacturer's Programming Service:
  - 1. Product(s):
    - a. On-site programming, 8-hour block.
  - 2. Include as part of base bid additional costs for manufacturer to perform on-site programming tasks for 8 hours.
  - 3. Furnish unit prices for each available programming time interval.
- D. Manufacturer's Full-Scope Start-Up Service: Provide manufacturer's On-Site Full-Scope Start-Up Service.
  - 1. On-Site Full-Scope Start-Up Service: Manufacturer's authorized Service Representative to conduct site visit upon completion of lighting control system installation to perform system start-up and verify proper operation:
    - a. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", authorized Service Representative to verify sensor locations, in accordance with layout provided by Lighting Control Manufacturer. Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated.
    - b. Verify connection of power wiring and load circuits.
    - c. Verify connection and location of controls.
    - d. Energize wireless hubs.
    - e. Associate occupancy/vacancy sensors, daylight sensors, wireless remotes, and wall stations to load control devices.
    - f. Provide initial rough calibration of sensors; fine-tuning of sensors is responsibility of Contractor unless provided by Lighting Control Manufacturer as part of Sensor Layout and Tuning service where specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS".
    - g. Program timeclock schedules per approved sequence of operations.
    - h. Configure load shed parameters per approved sequence of operations.
    - i. Verify system operation control by control.
    - j. Obtain sign-off on system functions.
    - k. Train Owner's representative on system capabilities, operation, and maintenance, as specified in Part 3 under "Closeout Activities".

- E. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

### **3.5 ADJUSTING**

- A. Sensor Fine-Tuning: Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", Lighting Control Manufacturer to provide up to two additional post-startup on-site service visits for fine-tuning of sensor calibration. Where Lighting Control Manufacturer Sensor Layout and Tuning is not specified, Contractor to provide fine-tuning of sensor calibration.

### **3.6 CLEANING**

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

### **3.7 COMMISSIONING**

- A. See Section 01 91 13 - General Commissioning Requirements for commissioning requirements.

### **3.8 CLOSEOUT ACTIVITIES**

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
- B. See Section 01 79 00 - Demonstration and Training, for additional requirements.
- C. Training:
  - 1. Include services of manufacturer's certified service representative to perform on-site training of Owner's personnel on operation, adjustment, and maintenance of lighting control system as part of on-site system start-up services.

### **3.9 PROTECTION**

- A. Protect installed products from subsequent construction operations.

### **END OF SECTION**

## **SECTION 26 21 00 - LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Electrical service requirements.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 31 00 - Photovoltaic Collectors: Photovoltaic system for interconnection with normal utility electrical supply.
- E. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.

#### **1.3 DEFINITIONS**

- A. Service Point: The point of connection between the facilities of the serving utility and the premises wiring as defined in NFPA 70, and as designated by the Utility Company.

#### **1.4 REFERENCE STANDARDS**

- A. IEEE C2 - National Electrical Safety Code; 2017.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

#### **1.5 ADMINISTRATIVE REQUIREMENTS**

- A. No later than two weeks following date of the Agreement, notify Utility Company of anticipated date of service.
- B. Coordination:
  - 1. Verify the following with Utility Company representative:
    - a. Utility Company requirements, including division of responsibility.
    - b. Exact location and details of utility point of connection.

- c. Utility easement requirements.
    - d. Utility Company charges associated with providing service.
  2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
  3. Coordinate arrangement of service entrance equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  4. Coordinate the work with other installers to provide communication lines required for Utility Company meters.
  5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.
- D. Utility Company charges associated with providing permanent service to be paid by Owner.
- E. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.
- F. Scheduling:
  1. Where work of this section involves interruption of existing electrical service, arrange service interruption with Owner.
  2. Arrange for inspections necessary to obtain Utility Company approval of installation.

## **1.6 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product. Include ratings, configurations, standard wiring diagrams, outline and support point dimensions, finishes, weights, service condition requirements, and installed features.
- C. Drawings prepared by Utility Company.
- D. Project Record Documents: Record actual locations of equipment and installed service routing.

## **1.7 QUALITY ASSURANCE**

- A. Comply with the following:
  1. IEEE C2 (National Electrical Safety Code).
  2. NFPA 70 (National Electrical Code).
  3. The requirements of the Utility Company.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

## **PART 2 PRODUCTS**

### **2.1 ELECTRICAL SERVICE REQUIREMENTS**

- A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.
- B. Electrical Service Characteristics: As indicated on drawings.
- C. Division of Responsibility:
  - 1. Pad-Mounted Utility Transformers:
    - a. Transformer Vaults and Pads: Furnished and installed by Contractor per Utility Company requirements.
    - b. Transformers: Furnished and installed by Utility Company.
    - c. Transformer Grounding Provisions: Furnished and installed by Contractor per Utility Company requirements.
    - d. Secondary:
      - 1) Trenching and Backfilling: Provided by Contractor.
      - 2) Conduits: Furnished and installed by Contractor.
      - 3) Conductors: Furnished and installed by Contractor (Service Point at transformer).
  - 2. Terminations at Service Point: Provided by Utility Company.
  - 3. Metering Provisions:
    - a. Meter Bases: Furnished and installed by Contractor per Utility Company requirements.
- D. Products Furnished by Contractor: Comply with Utility Company requirements.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that ratings and configurations of service entrance equipment are consistent with the indicated requirements.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### **3.2 PREPARATION**

### **3.3 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions and Utility Company requirements.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Provide required trenching and backfilling in accordance with Section 31 23 16.13.
- E. Provide required support and attachment components in accordance with Section 26 05 29.
- F. Provide grounding and bonding for service entrance equipment in accordance with Section 26 05 26.
- G. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 26 05 53.

### **3.4 PROTECTION**

- A. Protect installed equipment from subsequent construction operations.

### **END OF SECTION**

## **SECTION 26 24 16 - PANELBOARDS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Power distribution panelboards.
- B. Overcurrent protective devices for panelboards.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 43 00 - Surge Protective Devices.

#### **1.3 REFERENCE STANDARDS**

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; 2013e (Amended 2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2015.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2018.
- E. NEMA PB 1 - Panelboards; 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; 2013.
- G. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

- K. UL 67 - Panelboards; Current Edition, Including All Revisions.
- L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- M. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
  - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
  - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

#### **1.5 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

### **PART 2 PRODUCTS**

#### **2.1 PANELBOARDS - GENERAL REQUIREMENTS**

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
  - 1. Altitude: Less than 6,600 feet.
  - 2. Ambient Temperature:
    - a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
- C. Short Circuit Current Rating:
  - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

- D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
  - 1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
  - 2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
  - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
  - 2. Boxes: Galvanized steel unless otherwise indicated.
    - a. Provide wiring gutters sized to accommodate the conductors to be installed.
  - 3. Fronts:
    - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
    - b. Finish for Painted Steel Fronts: Manufacturer's standard grey unless otherwise indicated.
  - 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- K. Surge Protective Devices: Where factory-installed, internally mounted surge protective devices are provided in accordance with Section 26 43 00, list and label panelboards as a complete assembly including surge protective device.
- L. Load centers are not acceptable.

## **2.2 POWER DISTRIBUTION PANELBOARDS**

- A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
  - 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
  - 2. Main and Neutral Lug Type: Mechanical.

- C. Bussing:
  - 1. Phase and Neutral Bus Material: Aluminum.
  - 2. Ground Bus Material: Aluminum.
- D. Circuit Breakers:
  - 1. Provide bolt-on type.
  - 2. Provide thermal magnetic circuit breakers unless otherwise indicated.
- E. Enclosures:
  - 1. Provide surface-mounted enclosures unless otherwise indicated.
  - 2. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
  - 3. Provide clear plastic circuit directory holder mounted on inside of door.

## **2.3 OVERCURRENT PROTECTIVE DEVICES**

- A. Molded Case Circuit Breakers:
  - 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
  - 2. Interrupting Capacity:
    - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
      - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
    - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
  - 3. Conductor Terminations:
    - a. Provide mechanical lugs unless otherwise indicated.
    - b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
  - 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
  - 5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.

- D. Verify that conditions are satisfactory for installation prior to starting work.

### **3.2 INSTALLATION**

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 26 05 29.
- F. Install panelboards plumb.
- G. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- H. Provide grounding and bonding in accordance with Section 26 05 26.
- I. Install all field-installed branch devices, components, and accessories.
- J. Provide filler plates to cover unused spaces in panelboards.
- K. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads. Also provide for the following:
  - 1. Emergency and night lighting circuits.
  - 2. Fire detection and alarm circuits.
  - 3. Intrusion detection and access control system circuits.
- L. Identify panelboards in accordance with Section 26 05 53.

### **3.3 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than \_\_\_\_\_ amperes. Tests listed as optional are not required.
- D. Correct deficiencies and replace damaged or defective panelboards or associated components.

**3.4 ADJUSTING**

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.

**3.5 CLEANING**

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

**END OF SECTION**

## **SECTION 26 27 26 - WIRING DEVICES**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Wall switches.
- B. Receptacles.
- C. Wall plates.
- D. Floor box service fittings.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 26 05 33.16 - Boxes for Electrical Systems.
- B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- C. Section 27 10 00 - Structured Cabling: Voice and data jacks.

#### **1.3 REFERENCE STANDARDS**

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2017h.
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); 2017g.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2015).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2016.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- K. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
  - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
  - 3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
  - 4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
  - 5. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

#### **1.5 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

### **PART 2 PRODUCTS**

#### **2.1 WIRING DEVICE APPLICATIONS**

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide GFCI protection for receptacles installed within 6 feet of sinks.
- E. Unless noted otherwise, do not use combination switch/receptacle devices.
- F. For flush floor service fittings, use tile rings for installations in tile floors.
- G. For flush floor service fittings, use carpet flanges for installations in carpeted floors.

## **2.2 WIRING DEVICE FINISHES**

- A. Provide wiring device finishes as described below unless otherwise indicated. All wiring device finishes will require approval of the Architect prior to ordering.
- B. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.
- C. Wiring Devices Installed in Finished Spaces: White with white nylon wall plate.
- D. Wiring Devices Installed in Unfinished Spaces: Gray with stainless steel wall plate.
- E. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover.
- F. Flush Floor Box Service Fittings: Gray wiring devices with stainless steel cover and ring/flange.

## **2.3 WALL SWITCHES**

- A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
  - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- B. Standard Wall Switches: Commercial specification grade, 20 A, 120/277 V with decorator style rocker type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

## **2.4 RECEPTACLES**

- A. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
  - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
  - 2. NEMA configurations specified are according to NEMA WD 6.
- B. Convenience Receptacles:
  - 1. Standard Convenience Receptacles: Commercial specification grade, 15A, 125V, NEMA 5-15R; single or duplex as indicated on the drawings.
  - 2. Weather Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
- C. GFCI Receptacles:

1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
2. Standard GFCI Receptacles: Commercial specification grade, duplex, 15A, 125V, NEMA 5-15R, rectangular decorator style.
3. Weather Resistant GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

## 2.5 WALL PLATES

- A. Wall Plates: Comply with UL 514D.
  1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
  2. Size: Standard.
  3. Screws: Metal with slotted heads finished to match wall plate finish.
- B. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.
- C. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- D. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.
- E. Weatherproof Covers for Wet Locations: Gasketed, thermoplastic, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

## 2.6 FLOOR BOX SERVICE FITTINGS

- A. Description: Service fittings compatible with floor boxes provided under Section 26 05 33.16 with components, adapters, and trims required for complete installation.
- B. Flush Floor Service Fittings:
  1. Single Service Flush Convenience Receptacles:
    - a. Cover: Rectangular.
    - b. Configuration: One standard convenience duplex receptacle(s) with duplex flap opening(s).
  2. Dual Service Flush Combination Outlets:
    - a. Cover: Rectangular.
    - b. Configuration:
      - 1) Power: One standard convenience duplex receptacle(s) with duplex flap opening(s).
      - 2) Communications: \_\_\_\_\_.
      - 3) Voice and Data Jacks: As specified in Section 27 10 00.

3. Accessories:
  - a. Tile Rings: Finish to match covers; configuration as required to accommodate specified covers.
  - b. Carpet Flanges: Finish to match covers; configuration as required to accommodate specified covers.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that floor boxes are adjusted properly.
- F. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- G. Verify that conditions are satisfactory for installation prior to starting work.

#### **3.2 PREPARATION**

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

#### **3.3 INSTALLATION**

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of wiring devices provided under this section.
  1. Mounting Heights: As indicated on the drawings.
  2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
  3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.

4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
  5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- C. Install wiring devices in accordance with manufacturer's instructions.
  - D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
  - E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
  - F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
  - G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
  - H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
  - I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
  - J. Install wall switches with OFF position down.
  - K. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
  - L. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
  - M. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
  - N. Identify wiring devices in accordance with Section 26 05 53.

### **3.4 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect each wiring device for damage and defects.

- C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
- D. Test each receptacle to verify operation and proper polarity.
- E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- F. Correct wiring deficiencies and replace damaged or defective wiring devices.

### **3.5 ADJUSTING**

- A. Adjust devices and wall plates to be flush and level.

### **3.6 CLEANING**

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

### **END OF SECTION**

## **SECTION 26 28 13 - FUSES**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Fuses.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 26 28 16.16 - Enclosed Switches: Fusible switches.

#### **1.3 REFERENCE STANDARDS**

- A. NEMA FU 1 - Low Voltage Cartridge Fuses; 2012.
- B. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements; Current Edition, Including All Revisions.
- C. UL 248-4 - Low-Voltage Fuses - Part 4: Class CC Fuses; Current Edition, Including All Revisions.
- D. UL 248-12 - Low-Voltage Fuses - Part 12: Class R Fuses; Current Edition, Including All Revisions.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate fuse clips furnished in equipment provided under other sections for compatibility with indicated fuses.
    - a. Fusible Enclosed Switches: See Section 26 28 16.16.
  - 2. Coordinate fuse requirements according to manufacturer's recommendations and nameplate data for actual equipment to be installed.
  - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

### **PART 2 PRODUCTS**

#### **2.1 APPLICATIONS**

- A. Service Entrance:
  - 1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
- B. Feeders:

1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
- C. General Purpose Branch Circuits: Class RK1, time-delay.
- D. Individual Motor Branch Circuits: Class RK1, time-delay.
- E. In-Line Protection for Pole-Mounted Luminaires: Class CC, time-delay.
- F. Primary Protection for Control Transformers: Class CC, time-delay.

## **2.2 FUSES**

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.
- C. Provide fuses of the same type, rating, and manufacturer within the same switch.
- D. Comply with UL 248-1.
- E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.
- F. Voltage Rating: Suitable for circuit voltage.
- G. Class R Fuses: Comply with UL 248-12.
- H. Class CC Fuses: Comply with UL 248-4.
- I. Provide the following accessories where indicated or where required to complete installation:
  1. Fuseholders: Compatible with indicated fuses.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.
- B. Verify that conditions are satisfactory for installation prior to starting work.

### **3.2 INSTALLATION**

- A. Do not install fuses until circuits are ready to be energized.

- B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

**END OF SECTION**

## **SECTION 26 28 16.16 - ENCLOSED SWITCHES**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Enclosed safety switches.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 28 13 - Fuses.

#### **1.3 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2018.
- C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.
- I. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

#### **1.4 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.

## 1.5 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

## PART 2 PRODUCTS

### 2.1 ENCLOSED SAFETY SWITCHES

- A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
  - 1. Altitude: Less than 6,600 feet.
  - 2. Ambient Temperature: Between -22 degrees F and 104 degrees F.
- D. Horsepower Rating: Suitable for connected load.
- E. Voltage Rating: Suitable for circuit voltage.
- F. Short Circuit Current Rating:
  - 1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- G. Enclosed Safety Switches Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- H. Provide with switch blade contact position that is visible when the cover is open.
- I. Fuse Clips for Fusible Switches: As required to accept fuses indicated.
- J. Conductor Terminations: Suitable for use with the conductors to be installed.
- K. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- L. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
  - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:

- a. Indoor Clean, Dry Locations: Type 1.
  - b. Outdoor Locations: Type 3R.
- M. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- N. Heavy Duty Switches:
- 1. Comply with NEMA KS 1.
  - 2. Conductor Terminations:
    - a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
  - 3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive enclosed safety switches.
- D. Verify that conditions are satisfactory for installation prior to starting work.

#### **3.2 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 26 05 29.
- E. Install enclosed switches plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 26 05 26.
- H. Provide fuses complying with Section 26 28 13 for fusible switches as indicated or as required by equipment manufacturer's recommendations.

- I. Identify enclosed switches in accordance with Section 26 05 53.

### **3.3 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.
- D. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

### **3.4 ADJUSTING**

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

### **3.5 CLEANING**

- A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

**END OF SECTION**

## **SECTION 26 31 00 - PHOTOVOLTAIC COLLECTORS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Photovoltaic system requirements.
- B. Photovoltaic modules.
- C. Photovoltaic module mounting system.
- D. Photovoltaic combiner boxes.
- E. Photovoltaic inverters.
- F. Monitoring system.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- C. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- D. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 26 21 00 - Low-Voltage Electrical Service Entrance.
- F. Section 26 28 13 - Fuses.
- G. Section 26 28 16.16 - Enclosed Switches.
- H. Section 26 43 00 - Surge Protective Devices.

#### **1.3 REFERENCE STANDARDS**

- A. IEC 61215-1 - Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval - Part 1: Test Requirements; 2016.
- B. IEC 61215-1-1 - Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval - Part 1-1: Special Requirements for Testing of Crystalline Silicon Photovoltaic (PV) Modules; 2016.

- C. IEC 61215-1-2 - Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval - Part 1-2: Special Requirements for Testing of Thin-Film Cadmium Telluride (CDTE) Based Photovoltaic (PV) Modules; 2016.
- D. IEC 61215-1-3 - Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval - Part 1-3: Special Requirements for Testing of Thin-Film Amorphous Silicon Based Photovoltaic (PV) Modules; 2016.
- E. IEC 61215-1-4 - Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval - Part 1-4: Special Requirements for Testing of Thin-Film Cu(In,GA)(S,Se)<sub>2</sub> Based Photovoltaic (PV) Modules; 2016.
- F. IEC 61215-2 - Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval - Part 2: Test Procedures; 2016.
- G. IEEE 1547 - Standard for Interconnecting Distributed Resources with Electric Power Systems; 2008 (Amended 2014).
- H. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- I. NECA 412 - Standard for Installing and Maintaining Photovoltaic (PV) Power Systems; 2012.
- J. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2018.
- K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. UL 489B - Outline of Investigation for Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures for Use with Photovoltaic (PV) Systems; Current Edition, Including All Revisions.
- M. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.
- N. UL 1699B - Outline of Investigation for Photovoltaic (PV) DC Arc-Fault Circuit Protection; Current Edition; Current Edition, Including All Revisions.
- O. UL 1703 - Flat Plate Photovoltaic Modules and Panels; Current Edition, Including All Revisions.
- P. UL 1741 - Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources; Current Edition, Including All Revisions.
- Q. UL 2579 - Low-Voltage Fuses - Fuses for Photovoltaic Systems; Current Edition, Including All Revisions.
- R. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment or other potential obstructions within the spaces dedicated for photovoltaic system components.
  - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  - 3. Roof-Mounted Arrays: Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
  - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work. Coordinate the mounting of the solar array with the canopy system.
- B. Preinstallation Meeting: Convene one week prior to commencing work of this section; require attendance of all affected installers. Include adequate instruction on the electrical hazards associated with photovoltaic systems and appropriate safety procedures to be followed.
- C. Utility Interconnection:
  - 1. See Section 26 21 00 for Utility Company contact information and additional requirements.
  - 2. Prepare and submit documentation as required for securing utility interconnection agreement between Owner and Utility Company.
    - a. Include copies of documentation with submittals.
  - 3. Preinstallation Meeting: Convene one week prior to commencing work of this section to review interconnection requirements and details with Utility Company representative.
  - 4. Coordinate with Utility Company to provide utility metering suitable for system requirements.
  - 5. Arrange for inspections and secure permits necessary to obtain Utility Company approval of system.

#### **1.5 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Design Documents: Prepare and submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, details, and description of operation.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product. Include ratings, configurations, standard wiring diagrams, outline and support point dimensions, finishes, weights, service condition requirements, and installed features.
- D. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, attachment locations and details, and proposed size, type, and

routing of conduits and cables. Include system interconnection schematic diagrams showing all factory and field connections.

1. Include proposed locations of roof penetrations and proposed methods for sealing.
- E. Manufacturer's detailed field testing procedures.
- F. Manufacturer's detailed startup procedures.
- G. Utility interconnection documentation.
- H. Field quality control test reports.
1. Include manufacturer's field reports.
- I. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
1. Include contact information for entity that will be providing contract maintenance and trouble call-back service.
- J. Maintenance contracts.

## **PART 2 PRODUCTS**

### **2.1 PHOTOVOLTAIC SYSTEM REQUIREMENTS**

- A. Design and provide complete photovoltaic system consisting of photovoltaic modules and associated balance of system components necessary for connection to facility electrical system.
- B. System Description:
1. Photovoltaic array is roof-mounted in location indicated on the drawings.
  2. Orientation of array is as indicated on the drawings.
  3. Photovoltaic DC system is negative grounded.
  4. System includes interconnection with utility grid (grid-tied system).
    - a. Utility metering configuration: Net metering.
  5. System does not include battery storage system.
  6. System does not include engine generator.
  7. System includes DC system surge protection.
  8. System includes monitoring system.
- C. Capacity:
1. Minimum Expected Annual Energy Production: 20,000 kWh, as calculated by National Renewable Energy Laboratory's PVWatts calculator or approved equivalent.
- D. Size:
1. Array: Designed to fit within the area designated on the drawings.
  2. Individual Modules: Size is not critical.

- E. Appearance:
  - 1. Only systems with similar appearance to basis of design system will be considered.
  - 2. Arrange array such that modules are aligned with uniform spacing.
  - 3. Make no alterations affecting appearance of building exterior or interior without approval of Architect.
  - 4. Final determination of acceptable appearance is by Architect.
- F. Fire Resistance Rating: Provide photovoltaic module and mounting system combination that together with the roof covering form a system listed in accordance with UL 1703 to provide a fire rating equal to or better than the required fire rating of the roof.
- G. Provide photovoltaic system and associated components suitable for wind loads, snow loads, seismic loads, and other structural design considerations of the installed location.
- H. Provide photovoltaic system and associated components suitable for continuous operation under the service conditions at the installed location.
- I. Provide products listed, classified, and labeled as suitable for the purpose intended.
- J. Provide photovoltaic system and associated components that qualify for available federal, state, and utility company rebate and incentive programs.
- K. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system.
- L. DC Arc Fault Circuit Protection: Provide DC photovoltaic arc-fault protection devices listed as complying with UL 1699B as required for compliance with NFPA 70.
- M. Rapid Shutdown of Photovoltaic Systems on Buildings: Provide listed equipment arranged to provide rapid shutdown in accordance with NFPA 70.
- N. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- O. Arrange array to minimize shading during peak production periods.
- P. Roof-Mounted Arrays:
  - 1. Arrange array such that normal roof drainage is not affected.
  - 2. Arrange array to maintain required safety clearances from edges of roof as indicated.
  - 3. Arrange array to maintain access and clearance requirements for other roof-mounted equipment.
  - 4. Arrange array to avoid spanning of expansion joints.

## 2.2 PHOTOVOLTAIC MODULES

- A. Acceptable Module Types: Either crystalline silicon or thin film modules complying with specified requirements will be considered for this project.
- B. General Requirements:
  - 1. Photovoltaic Modules: Factory assembled; consisting of photovoltaic cells, frame, junction box, cables for series connection, and bypass diodes for shade tolerance; rated for 600 V DC; complying with IEC 61215-1 and IEC 61215-2 and listed as complying with UL 1703.
  - 2. Crystalline Silicon Photovoltaic Modules: Comply with IEC 61215-1-1.
  - 3. Thin Film Photovoltaic Modules: Comply with IEC 61215-1-2, IEC 61215-1-3, or IEC 61215-1-4 as applicable.
  - 4. Frame: Anodized aluminum.
  - 5. Factory-Installed Junction Box: Weatherproof, with factory-installed terminals and bypass diodes.
  - 6. Factory-Installed Cables: Type USE-2 or listed photovoltaic (PV) wire with polarized locking connectors.
  - 7. Unless otherwise indicated, specified module performance characteristics are rated under Standard Test Conditions (STC).

## 2.3 BALANCE OF SYSTEM COMPONENTS

- A. Photovoltaic Module Mounting System:
  - 1. Provide complete mounting system compatible with modules to be installed and suitable to properly install them in the location indicated, including all necessary hardware and accessories.
  - 2. Support Structure and Associated Hardware Materials: Use aluminum or stainless steel.
  - 3. Roof-Mounted Arrays:
    - a. Acceptable System Types: Either non-penetrating or penetrating systems complying with specified requirements will be considered for this project.
    - b. Provide system compatible with the roof at the installed location.
    - c. Module Tilt Angle: As required to provide maximum energy production for installed location.
    - d. Provide minimum clearance of 3 inches between roof and module for air circulation and drainage.
- B. Photovoltaic Combiner Boxes:
  - 1. Provide combiner box(es) for termination of strings as indicated or as required for the array configuration installed.
  - 2. Combiner Boxes: Rated for 600 V DC; current ratings suitable for connected strings; equipped with circuit breakers or fuseholders; listed as complying with UL 1741.
  - 3. Fuseholders: Touch-safe; suitable to accept fuses indicated.
  - 4. Number of Input Circuits: As indicated or as required for termination of strings, with minimum of 25 percent spare capacity for future expansion.

5. Enclosure: NEMA 250, Type 3R, unless otherwise indicated.
  6. Provide integral load-break rated disconnect.
  7. Provide with capability of current monitoring for individual strings.
- C. Photovoltaic Inverters:
1. Provide inverter(s) as indicated or as required for connection of the photovoltaic array DC system to the AC system indicated.
  2. Inverters: Suitable for the requirements of the connected array; output configuration compatible with connected system; listed as complying with UL 1741; furnished with the following features:
    - a. Maximum power point tracking (MPPT).
    - b. LCD display.
    - c. Integral AC disconnect.
    - d. Integral DC disconnect.
    - e. Integral DC ground fault detection and interruption (GFDI).
    - f. Communications Interface: As required for connection to system indicated.
  3. Grid-Tied Inverters: Comply with IEEE 1547, including over/under grid voltage and frequency protection, and anti-islanding protection to automatically disconnect upon loss of utility power and to remain disconnected until utility power restoration has been maintained for five minutes.
  4. Grounded Photovoltaic DC Systems: Furnish with integral isolation transformer. Transformerless inverters may be used if a separate isolation transformer is provided.
  5. Total Harmonic Distortion: Less than five percent.
  6. Enclosure Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
    - a. Indoor Clean, Dry Locations: Type 1.
    - b. Outdoor Locations: Type 3R.
- D. Enclosed Switches, in Addition to Requirements of Section 26 28 16.16:
1. Switches for DC System: Rated for 600 V DC.
  2. Switches Connected to Supply Side of Service Disconnecting Means: Listed and labeled as suitable for use as service equipment according to UL 869A.
- E. Surge Protective Devices, in Addition to Requirements of Section 26 43 00:
1. Surge Protective Devices for DC System:
    - a. Rated for 600 V DC.
    - b. Listed and labeled as complying with UL 1449, Type 1.
    - c. Surge Current Rating: Not less than 50 kA per mode.
    - d. UL 1449 Nominal Discharge Current (I-n): 20 kA.
- F. Molded-Case Circuit Breakers and Switches for DC System: Rated for 600 V DC; listed as complying with UL 489B.
- G. Fuses, in Addition to Requirements of Section 26 28 13:
1. Fuses for DC System: Rated for 600 V DC.

2. Fuses for Protection of Photovoltaic Strings and Arrays: Photovoltaic fuses listed as complying with UL 2579.
- H. Monitoring System:
1. Provide a system to monitor photovoltaic system performance including all sensors, dataloggers, connections, software, equipment and accessories necessary for a complete operating system.
  2. System communications interfaces to be wired or wireless, with compatible interconnected components.
    - a. Provide suitable raceway, minimum 3/4 inch trade size, for all required wired connections.
  3. System to monitor and record, in 15 minute intervals:
    - a. Inverter status.
    - b. Instantaneous power (kW).
    - c. Cumulative energy production (kWh).
    - d. Current monitoring for individual strings.
  4. Energy Production Meter: Revenue grade, with accuracy of plus or minus two percent.
  5. System real-time and historical data to be accessible from the following locations:
    - a. Personal computer(s), via internet connection.
  6. System to provide alarm notification via e-mail or instant message.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that ratings and configurations of system components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive system components.
- D. Verify that conditions are satisfactory for installation prior to starting work.

### **3.2 PREPARATION**

- A. Use open circuiting, short circuiting, or opaque covering to disable modules, array or portions of array prior to installation and service.
- B. Roof-Mounted Arrays: Protect roof and adjacent roof-mounted items from damage.

### **3.3 INSTALLATION**

- A. Perform work in accordance with NECA 1 (general workmanship).

- B. Install products in accordance with manufacturer's instructions.
- C. Provide required support and attachment in accordance with Section 26 05 29.
- D. Mount equipment such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor, ground, or working platform.
- E. Circuiting Requirements. in Addition to Requirements of Section 26 05 19:
  - 1. Photovoltaic DC System Conductor Color Code:
    - a. Negative Grounded System:
      - 1) Positive: Red.
      - 2) Negative/Grounded: White.
  - 2. Maintain separation of photovoltaic and non-photovoltaic circuits in accordance with NFPA 70.
- F. Grounding and Bonding Requirements, in Addition to Requirements of Section 26 05 26:
  - 1. Ensure that there is only one AC System bonding connection between grounding system and grounded/neutral conductor, including external connections and connections internal to equipment.
  - 2. Grounded DC Systems: Ensure that there is only one point of system grounding connection to the grounded conductor, including external connections and connections internal to equipment.
- G. Identification Requirements, in Addition to Those Specified in Section 26 05 53:
  - 1. Use identification nameplate or means of identification acceptable to authority having jurisdiction to identify the presence of multiple power sources and the location of main service disconnecting means and each photovoltaic system disconnecting means. Locate at main service disconnecting means and at each photovoltaic system disconnecting means. Verify format and descriptions with authorities having jurisdiction.
  - 2. Use identification nameplate to identify each photovoltaic system disconnecting means with text "PV SYSTEM DISCONNECT".
  - 3. Use identification nameplate or identification label to identify systems equipped with rapid shutdown and associated rapid shutdown switch(es). Format, descriptions, and locations to comply with NFPA 70 and requirements of authorities having jurisdiction.
  - 4. Use identification nameplate or identification label to identify the information required by NFPA 70 for marking of direct-current photovoltaic power sources. Locate at each DC disconnect means requiring marking.
  - 5. Use identification nameplate or identification label to identify the interactive system point of interconnection at the disconnecting means as a power source and with the rated AC output current and the nominal operating AC voltage.
  - 6. Where the inverter output connection is located in a panelboard on the opposite (load) end from the input feeder location or main circuit location in order to meet requirements of NFPA 70, use identification nameplate or identification label to identify the overcurrent device with the word message "Warning; Inverter output connection; Do not relocate this overcurrent device".

7. Use warning labels to identify electrical hazards for photovoltaic system disconnecting means. Include the word message "Warning - Electric Shock Hazard; Terminals on the line and load sides may be energized in the open position" or approved equivalent.
8. Use warning labels, identification nameplates, or identification labels to identify electrical hazards for photovoltaic systems equipped with DC ground-fault protection in accordance with NFPA 70. Include the word message "Warning - Electric Shock Hazard; If a ground fault is indicated, normally grounded conductors may be ungrounded and energized".
9. Use wire and cable markers to identify photovoltaic system source, output, and inverter circuit conductors at all points of termination, connection, and splices.
10. Use voltage markers, identification labels, stenciled text, or suitable permanent marking approved by authority having jurisdiction to identify exposed raceways, cable trays, pull boxes, junction boxes, and conduit bodies with the text "Warning: Photovoltaic Power Source" at maximum intervals of 10 feet in accordance with NFPA 70.

### **3.4 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. See article "SYSTEM STARTUP" below for additional requirements related to testing and inspection.
- C. Provide services of a manufacturer's authorized representative to observe installation and assist in inspection and testing. Include manufacturer's detailed testing procedures and field reports with submittals.
- D. Inspection and testing to include, at a minimum:
  1. Inspect each system component for damage and defects.
  2. Verify that equipment enclosures, boxes, and associated connections installed outdoors are weatherproof.
  3. Verify proper wiring connections have been made and check for conductor continuity. Verify proper polarity.
  4. Verify tightness of mechanical and electrical connections are according to manufacturer's recommended torque settings.
  5. Measure and record voltages at the inverter AC and DC inputs.
  6. Measure and record AC output power.
  7. Perform inverter functional test.
    - a. Grid-Tied Inverters: Include simulation of loss of utility power and subsequent power restoration.
  8. Verify proper operation of monitoring system.
- E. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.
- F. Diagnostic Period: After successful completion of inspections and tests, operate system in normal mode for at least 14 days without any system or equipment malfunctions.
  1. Record all system operations and malfunctions.

- 2. If a malfunction occurs, start diagnostic period over after correction of malfunction.
- G. Submit detailed reports indicating inspection and testing results and corrective actions taken.
- H. Repair roof or adjacent roof-mounted items damaged as a result of work of this section.

### **3.5 SYSTEM STARTUP**

- A. Provide services of a manufacturer's authorized representative to assist in performing system startup. Include manufacturer's detailed startup procedures with submittals.
- B. Obtain Owner's approval prior to performing system startup.
- C. Grid-Tied Systems: Obtain Utility Company's approval prior to performing system startup.
- D. Prepare and start system in accordance with manufacturer's instructions.

### **3.6 CLEANING**

- A. Clean modules using only methods recommended by manufacturer to avoid scratches and other damage. Clean exposed surfaces on other components to remove dirt, paint, or other foreign material and restore to match original factory finish.

### **3.7 COMMISSIONING**

- A. See Section 01 91 13 - General Commissioning Requirements for commissioning requirements.

### **3.8 CLOSEOUT ACTIVITIES**

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
- B. See Section 01 79 00 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of system to Owner, and correct deficiencies or make adjustments as directed.
- D. Training: Train Owner's personnel on operation, adjustment, and maintenance of photovoltaic system.
  - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
  - 2. Provide minimum of four hours of training.

**3.9 PROTECTION**

- A. Protect installed products from subsequent construction operations.

**3.10 MAINTENANCE**

- A. Provide to Owner, a proposal as an alternate to the base bid, a separate maintenance contract for the service and maintenance of photovoltaic system for two years from date of Substantial Completion, to include the work described below; Include a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.

**END OF SECTION**

## **SECTION 26 43 00 - SURGE PROTECTIVE DEVICES**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Surge protective devices for branch panelboard locations.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 24 16 - Panelboards.

#### **1.3 ABBREVIATIONS AND ACRONYMS**

- A. SPD: Surge Protective Device.

#### **1.4 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2018.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

#### **1.5 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination: Coordinate size and location of overcurrent device compatible with the actual surge protective device and location to be installed. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to ordering equipment.

#### **1.6 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure

ratings, outline and support point dimensions, weight, service condition requirements, and installed features.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Basis of Design: Surge Suppression, LLC (SSI), as indicated under product descriptions below; [www.surgesuppression.com/#sle](http://www.surgesuppression.com/#sle).
- B. Field-installed, Externally Mounted Surge Protective Devices - Other Acceptable Manufacturers:
  - 1. ABB/GE: [www.geindustrial.com/#sle](http://www.geindustrial.com/#sle).
  - 2. Advanced Protection Technologies, Inc (APT): [www.aptsurge.com/#sle](http://www.aptsurge.com/#sle).
  - 3. Current Technology; a brand of Thomas & Betts Power Solutions: [www.tnbpowersolutions.com/#sle](http://www.tnbpowersolutions.com/#sle).
  - 4. Schneider Electric; Square D Brand Surgelogic Products: [www.surgelogic.com/#sle](http://www.surgelogic.com/#sle).
  - 5. Surge Suppression, LLC (SSI): [www.surgesuppression.com/#sle](http://www.surgesuppression.com/#sle).
- C. Factory-installed, Internally Mounted Surge Protective Devices:
  - 1. Same as manufacturer of equipment containing surge protective device, to provide a complete listed assembly including SPD.

### **2.2 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS**

- A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.
- B. Unless otherwise indicated, provide field-installed, externally-mounted or factory-installed, internally-mounted SPDs.
- C. List and label as complying with UL 1449, Type 1 when connected on line side of service disconnect overcurrent device and Type 1 or 2 when connected on load side of service disconnect overcurrent device.
- D. Protected Modes:
  - 1. Wye Systems: L-N, L-G, N-G, L-L.
- E. UL 1449 Voltage Protection Ratings (VPRs):
  - 1. 208Y/120V System Voltage: Not more than 1,000 V for L-N, L-G, and N-G modes and 1,200 V for L-L mode.
- F. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.

- G. Enclosure Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
- H. Mounting for Field-installed, Externally Mounted SPDs: Unless otherwise indicated, as specified for the following locations:
  - 1. Provide surface-mounted SPD where mounted in non-public areas or adjacent to surface-mounted equipment.
- I. Equipment Containing Factory-installed, Internally Mounted SPDs: Listed and labeled as a complete assembly including SPD.
  - 1. Panelboards: See Section 26 24 16.

### **2.3 SURGE PROTECTIVE DEVICES FOR BRANCH PANELBOARD LOCATIONS**

- A. Surge Protective Device:
  - 1. Protection Circuits: Field-replaceable modular or non-modular.
  - 2. Surge Current Rating: Not less than 60 kA per mode/120 kA per phase.
  - 3. UL 1449 Nominal Discharge Current (I-n): 20 kA.
  - 4. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.
  - 5. Diagnostics:
    - a. Protection Status Monitoring: Provide indicator lights to report the protection status for each phase.
    - b. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that the service voltage and configuration marked on the SPD are consistent with the service voltage and configuration at the location to be installed.
- C. Verify system grounding and bonding is in accordance with Section 26 05 26, including bonding of neutral and ground for service entrance and separately derived systems where applicable. Do not energize SPD until deficiencies have been corrected.
- D. Verify that conditions are satisfactory for installation prior to starting work.

### **3.2 INSTALLATION**

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- C. Install conductors between SPD and equipment terminations as short and straight as possible, not exceeding manufacturer's recommended maximum conductor length. Breaker locations may be reasonably rearranged in order to provide leads as short and straight as possible. Twist conductors together to reduce inductance.
- D. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 26 05 26 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.

### **3.3 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.

**END OF SECTION**

## **SECTION 26 51 00 - INTERIOR LIGHTING**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Exit signs.
- D. Ballasts and drivers.
- E. Accessories.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- B. Section 26 05 33.16 - Boxes for Electrical Systems.

#### **1.3 REFERENCE STANDARDS**

- A. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.
- B. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015, with Errata (2017).
- C. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.
- D. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- H. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- I. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
  - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
  - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
  - 4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

#### **1.5 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
  - 1. LED Luminaires:
    - a. Include estimated useful life, calculated based on IES LM-80 test data.

### **PART 2 PRODUCTS**

#### **2.1 LUMINAIRE TYPES**

- A. Furnish products as indicated in luminaire schedule included on the drawings.
- B. Substitutions: See Section 01 60 00 - Product Requirements, except where individual luminaire types are designated with substitutions not permitted.

#### **2.2 LUMINAIRES**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.

- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. LED Luminaires:
  - 1. Components: UL 8750 recognized or listed as applicable.
  - 2. Tested in accordance with IES LM-79 and IES LM-80.
  - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
- H. Track Lighting Systems: Provide track compatible with specified track heads, with all connectors, power feed fittings, dead ends, hangers and canopies as necessary to complete installation.
- I. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

### **2.3 EMERGENCY LIGHTING UNITS**

- A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
- B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
- C. Battery:
  - 1. Size battery to supply all connected lamps, including emergency remote heads where indicated.
- D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
- E. Provide low-voltage disconnect to prevent battery damage from deep discharge.

### **2.4 EXIT SIGNS**

- A. Description: Exit signs complying with NFPA 101 and applicable state and local codes, and listed and labeled as complying with UL 924.

1. Number of Faces: Single- or double-face as indicated or as required for installed location.
2. Directional Arrows: As indicated or as required for installed location.

B. Self-Powered Exit Signs:

1. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
2. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
3. Provide low-voltage disconnect to prevent battery damage from deep discharge.
4. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.

## 2.5 BALLASTS AND DRIVERS

A. Ballasts/Drivers - General Requirements:

1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.

B. Dimmable LED Drivers:

1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
2. Control Compatibility: Fully compatible with the dimming controls to be installed.

## 2.6 ACCESSORIES

- A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2" size, factory finished to match luminaire or field-painted as directed.
- B. Threaded Rods for Suspended Luminaires: Zinc-plated steel, minimum 1/4" size, field-painted as directed.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

### **3.2 PREPARATION**

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

### **3.3 INSTALLATION**

- A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- D. Provide required support and attachment in accordance with Section 26 05 29.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Suspended Ceiling Mounted Luminaires:
  - 1. Do not use ceiling tiles to bear weight of luminaires.
  - 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
  - 3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
  - 4. Secure pendant-mounted luminaires to building structure.
  - 5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
  - 6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gage, connected from opposing corners of each recessed luminaire to building structure.
  - 7. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
- G. Recessed Luminaires:
  - 1. Install trims tight to mounting surface with no visible light leakage.
  - 2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.

- H. Suspended Luminaires:
  - 1. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
- I. Install accessories furnished with each luminaire.
- J. Bond products and metal accessories to branch circuit equipment grounding conductor.
- K. Emergency Lighting Units:
  - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- L. Exit Signs:
  - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- M. Install lamps in each luminaire.

### **3.4 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

### **3.5 ADJUSTING**

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.
- C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

**3.6 CLEANING**

- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

**3.7 PROTECTION**

- A. Protect installed luminaires from subsequent construction operations.

**END OF SECTION**

## **SECTION 26 56 00 - EXTERIOR LIGHTING**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Exterior luminaires.
- B. Ballasts.
- C. Poles and accessories.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- B. Section 26 05 33.16 - Boxes for Electrical Systems.
- C. Section 26 27 26 - Wiring Devices: Receptacles for installation in poles.

#### **1.3 REFERENCE STANDARDS**

- A. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.
- B. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015, with Errata (2017).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2006.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- G. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:

1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
2. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

## **1.5 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
  1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
  2. Provide photometric calculations where luminaires are proposed for substitution upon request.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
  1. LED Luminaires:
    - a. Include estimated useful life, calculated based on IES LM-80 test data.

## **1.6 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.

## **PART 2 PRODUCTS**

### **2.1 LUMINAIRE TYPES**

- A. Furnish products as indicated in luminaire schedule included on the drawings.

### **2.2 LUMINAIRES**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.

- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.
- H. LED Luminaires:
  - 1. Components: UL 8750 recognized or listed as applicable.
  - 2. Tested in accordance with IES LM-79 and IES LM-80.
  - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

### **2.3 BALLASTS AND DRIVERS**

- A. Ballasts/Drivers - General Requirements:
  - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
  - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
- B. Dimmable LED Drivers:
  - 1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
  - 2. Control Compatibility: Fully compatible with the dimming controls to be installed.

### **2.4 POLES**

- A. All Poles:
  - 1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
  - 2. Material: Steel, unless otherwise indicated.
  - 3. Shape: Square straight, unless otherwise indicated.
  - 4. Finish: Match luminaire finish, unless otherwise indicated.
  - 5. Mounting: Install on concrete foundation, height as indicated on the drawings, unless otherwise indicated.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

### **3.2 INSTALLATION**

- A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires in accordance with NECA/IESNA 501.
- D. Provide required support and attachment in accordance with Section 26 05 29.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Pole-Mounted Luminaires:
  - 1. Foundation-Mounted Poles:
    - a. Install foundations plumb.
    - b. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
    - c. Tighten anchor bolt nuts to manufacturer's recommended torque.
  - 2. Grounding:
    - a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.
  - 3. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.
  - 4. Install weather resistant GFI duplex receptacle with weatherproof cover as specified in Section 26 27 26 in designated poles.
- G. Install accessories furnished with each luminaire.
- H. Bond products and metal accessories to branch circuit equipment grounding conductor.

- I. Install lamps in each luminaire.

### **3.3 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

### **3.4 ADJUSTING**

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

### **3.5 CLEANING**

- A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

### **3.6 PROTECTION**

- A. Protect installed luminaires from subsequent construction operations.

### **END OF SECTION**



## **1.5 SUBMITTALS**

- A. Manufacturer's product data shall be submitted for each lighting fixture specified under this Section.
- B. Shop drawings of each site lighting fixture and accessories shall be submitted. Drawings shall indicate lighting pattern (symmetrical/asymmetrical), size, dimensions, materials, finish, connections, wiring diagrams, foundations and anchorage, and all other items required for complete lighting installation.

## **1.6 QUALITY ASSURANCE**

- A. Lighting materials shall be UL approved and shall conform to NFPA 70 requirements, as applicable.
- B. The Owner reserves the right to retain an Independent Testing Laboratory in accordance with Section 014000, QUALITY REQUIREMENTS, to perform observation and testing as required.
- C. Where finish of fixtures and accessories is specified to be anodized aluminum, anodizing shall have an integral color, and shall conform to AA Ref. 1, AA-A42, Architectural Class I, 0.7 mil thick.

## **1.7 EXTRA MATERIALS**

- A. Furnish extra lighting fixtures in quantities described below. Package materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to Owner.
  - 1. Quantity: Furnish Owner with an additional two (2) fixtures of each type and two (2) poles of type specified.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS - GENERAL**

- A. Anchor bolts shall conform to ASTM A 325. Anchor bolts, nuts, washers, and anchor bolt templates shall be hot-dip galvanized steel.
- B. Aluminum poles shall be extruded of high strength aluminum alloys, 6063-T5 or 6063-T6.

### **2.2 UPLIGHT**

- A. Uplight Fixture: shall be Nite Star, manufactured by BK Lighting; 40429 Brickyard Drive Madera, CA 93636; Tel. 1-559-438-5800, or approved equal.

1. Material: Aluminum.
2. 12 v LED
3. Color temp. 3000K

### **2.3 POLE LIGHTS**

- A. Cluster Spike Pole: shall be Odessa Cluster Spike Pole Model # UOD-2103X, manufactured by Ligman Lighting USA, or approved equal.
- b. Cluster Pole Mounted Floodlights: shall be Odessa Cluster Pole Mounted Floodlights Model # UOD-2102X, manufactured by Ligman Lighting USA, or approved equal.

### **2.4 PATHWAY BOLLARD LIGHT**

- A. Bollard Light Fixture: shall be Bega Model No. 77-752, manufactured by BEGA-US, 1000 BEGA Way, Carpinteria, CA 93013; P 805.684.0533; F 805.684.6682; info@bega-us.com, or approved equal.
  1. 7.4 W per fixture
  2. Graphite finish
  3. Color temp. 3000K

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- A. Set units plumb, square, level, and secure according to manufacturer's written instructions and shop drawings.
- B. Coordinate in-ground LED fixture with surrounding paving work as indicated on the Drawings.

### **3.2 CONCRETE FOUNDATIONS**

- A. Construct concrete foundations with 5000-pound, 28-day concrete conforming to Division 3 Section "Cast-In-Place Concrete." Comply with details and manufacturer's recommendations for reinforcing, anchor bolts, nuts, and washers.
- B. Pole Installation: Use fabric web slings (not chain or cable) to raise and set poles.
- C. Fixture Attachment: Fasten to indicated structural supports.
- D. Lamp fixtures with indicated lamps according to manufacturer's instructions. Replace malfunctioning lamps.

**3.3 GROUNDING**

- A. Ground fixtures according to Division 26 Section "Grounding."

**3.4 FIELD QUALITY CONTROL**

- A. Inspect installed units for damage.
- B. Provide advance notice of dates and times for field tests.
- C. Provide instruments to make and record test results.
- D. Tests: Verify normal operation of lighting units after installing fixtures and energizing circuits with normal power source. Include the following:
  - 1. Check for excessively noisy ballasts.
  - 2. Check for uniformity of illuminations.
  - 3. Written report of tests indicating actual illumination results.
- E. Replace or repair damaged and malfunctioning units and retest.

**3.5 ADJUSTING AND CLEANING**

- A. Clean components on completion of installation. Use methods and materials recommended by manufacturer.

**END OF SECTION**

## **SECTION 27 10 00 - STRUCTURED CABLING**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Communications system design requirements.
- B. Communications pathways.
- C. Copper cable and terminations.
- D. Communications equipment room fittings.
- E. Communications outlets.
- F. Communications grounding and bonding.
- G. Communications identification.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 33.13 - Conduit for Electrical Systems.
- C. Section 26 05 33.16 - Boxes for Electrical Systems.
- D. Section 26 27 26 - Wiring Devices.

#### **1.3 REFERENCE STANDARDS**

- A. BICSI N1 - Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure, 1st Edition; 2019.
- B. EIA/ECA-310 - Cabinets, Racks, Panels, and Associated Equipment; Revision E, 2005.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set; 2018.
- E. TIA-568.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards; 2009c, with Addendum (2016).
- F. TIA-569 - Telecommunications Pathways and Spaces; 2015d, with Addendum (2016).

- G. TIA-606 - Administration Standard for Telecommunications Infrastructure; 2017c.
- H. TIA-607 - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises; 2015c, with Addendum (2017).
- I. UL 444 - Communications Cables; Current Edition, Including All Revisions.
- J. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.
- K. UL 1863 - Communications-Circuit Accessories; Current Edition, Including All Revisions.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate requirements for service entrance and entrance facilities with Communications Service Provider.
  - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.
  - 3. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Arrange for Communications Service Provider to provide service.

#### **1.5 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- C. Shop Drawings: Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
- D. Evidence of qualifications for installer.
- E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.
- F. Field Test Reports.

## **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.
- B. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
  - 1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
  - 2. Supervisors and installers factory certified by manufacturers of products to be installed.
- C. Products: Listed, classified, and labeled as suitable for the purpose intended.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep stored products clean and dry.

## **PART 2 PRODUCTS**

### **2.1 SYSTEM DESIGN**

- A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
  - 1. Comply with TIA-568 (SET) (cabling) and TIA-569 (pathways) (commercial standards).
  - 2. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 and are UL listed or third party independent testing laboratory certified.
  - 3. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F at relative humidity of 0 to 95 percent, noncondensing.
  - 4. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.
- B. Main Distribution Frame (MDF): Centrally located support structure for terminating horizontal cables that extend to telecommunications outlets, functioning as point of presence to external service provider.
  - 1. Locate main distribution frame in the Mech/Storage room.
- C. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

## 2.2 PATHWAYS

- A. Conduit: As specified in Section 26 05 33.13; provide pull cords in all conduit.

## 2.3 COPPER CABLE AND TERMINATIONS

- A. Copper Horizontal Cable:
  - 1. Description: 100 ohm, balanced twisted pair cable complying with TIA-568.2 and listed and labeled as complying with UL 444.
  - 2. Cable Type - Voice and Data: TIA-568.2 Category 6 UTP (unshielded twisted pair); 23 AWG.
  - 3. Cable Capacity: 4-pair.
  - 4. Cable Applications: Use listed NFPA 70 Type CMP plenum cable unless otherwise indicated.
  - 5. Cable Jacket Color - Voice and Data Cable: Blue.
- B. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.
- C. Jacks and Connectors: Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; UL 1863 listed.
  - 1. Performance: 500 mating cycles.
  - 2. Voice and Data Jacks: 8-position modular jack, color-coded for both T568A and T568B wiring configurations.
- D. Copper Patch Cords:
  - 1. Description: Factory-fabricated 4-pair cable assemblies with 8-position modular connectors terminated at each end.

## 2.4 COMMUNICATIONS EQUIPMENT ROOM FITTINGS

- A. Copper Cross-Connection Equipment:
  - 1. Connector Blocks for Category 5e and Up Cabling: Type 110 insulation displacement connectors; capacity sufficient for cables to be terminated plus 25 percent spare.
  - 2. Patch Panels for Copper Cabling: Sized to fit EIA/ECA-310 standard 19 inch wide equipment racks; 0.09 inch thick aluminum; cabling terminated on Type 110 insulation displacement connectors; printed circuit board interface.
    - a. Jacks: Non-keyed RJ-45, suitable for and complying with same standard as cable to be terminated; maximum 48 ports per standard width panel.
    - b. Capacity: Provide ports sufficient for cables to be terminated plus 25 percent spare.
    - c. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA-606.
    - d. Provide incoming cable strain relief and routing guides on back of panel.

- B. Backboards: Interior grade plywood without voids, 3/4 inch thick; UL-labeled fire-retardant.
  - 1. Do not paint over UL label.
- C. Equipment Frames, Racks and Cabinets:
  - 1. Component Racks: EIA/ECA-310 standard 19 inch wide.
  - 2. Wall Mounted Racks: Steel construction, hinged to allow access to back of installed components.

## **2.5 COMMUNICATIONS OUTLETS**

- A. Outlet Boxes: Comply with Section 26 05 33.16.
  - 1. Provide depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.
  - 2. Minimum Size, Unless Otherwise Indicated:
    - a. Data or Combination Voice/Data Outlets: 4 inch square by 2-1/8 inch deep (100 by 54 mm) trade size.
- B. Wall Plates:
  - 1. Comply with system design standards and UL 514C.
  - 2. Accepts modular jacks/inserts.
  - 3. Capacity:
    - a. Data or Combination Voice/Data Outlets: 2 ports.
  - 4. Wall Plate Material/Finish - Flush-Mounted Outlets: Match wiring device and wall plate finishes specified in Section 26 27 26.

## **2.6 GROUNDING AND BONDING COMPONENTS**

- A. Comply with TIA-607.
- B. Comply with Section 26 05 26.

## **2.7 IDENTIFICATION PRODUCTS**

- A. Comply with TIA-606.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION - GENERAL**

- A. Comply with latest editions and addenda of TIA-568 (SET) (cabling), TIA-569 (pathways), TIA-607 (grounding and bonding), BICSI N1, NFPA 70, and SYSTEM DESIGN as specified in PART 2.

- B. Comply with Communication Service Provider requirements.
- C. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.

### **3.2 INSTALLATION OF PATHWAYS**

- A. Install pathways with the following minimum clearances:
  - 1. 48 inches from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
  - 2. 12 inches from power conduits and cables and panelboards.
  - 3. 5 inches from fluorescent and high frequency lighting fixtures.
  - 4. 6 inches from flues, hot water pipes, and steam pipes.
- B. Conduit, in Addition to Requirements of Section 26 05 33.13:
- C. Outlet Boxes:
  - 1. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of telecommunications outlets provided under this section.
    - a. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
    - b. Provide minimum of 24 inches horizontal separation between flush mounted outlet boxes installed on opposite sides of fire rated walls.
    - c. Unless otherwise indicated, provide separate outlet boxes for line voltage and low voltage devices.

### **3.3 INSTALLATION OF EQUIPMENT AND CABLING**

- A. Cabling:
  - 1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
  - 2. Do not over-cinch or crush cables.
  - 3. Do not exceed manufacturer's recommended cable pull tension.
  - 4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.
- B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
  - 1. At Distribution Frames: 120 inches.
  - 2. At Outlets - Copper: 12 inches.
- C. Copper Cabling:
  - 1. Category 5e and Above: Maintain cable geometry; do not untwist more than 1/2 inch from point of termination.
  - 2. For 4-pair cables in conduit, do not exceed 25 pounds pull tension.

3. Use T568B wiring configuration.
- D. Wall-Mounted Racks and Enclosures:
1. Install to plywood backboards only, unless otherwise indicated.
  2. Mount so height of topmost panel does not exceed 78 inches above floor.
- E. Identification:
1. Use wire and cable markers to identify cables at each end.
  2. Use manufacturer-furnished label inserts, identification labels, or engraved wallplate to identify each jack at communications outlets with unique identifier.
  3. Use identification nameplate to identify cross-connection equipment, equipment racks, and cabinets.

### **3.4 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Comply with inspection and testing requirements of specified installation standards.
- C. Visual Inspection:
1. Inspect cable jackets for certification markings.
  2. Inspect cable terminations for color coded labels of proper type.
  3. Inspect outlet plates and patch panels for complete labels.
- D. Testing - Copper Cabling and Associated Equipment:
1. Test operation of shorting bars in connection blocks.
- E. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

### **END OF SECTION**

## **SECTION 28 46 00 - FIRE DETECTION AND ALARM**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Fire alarm system design and installation, including all components, wiring, and conduit. Fire alarm designer shall be responsible for submitting for and obtaining the fire alarm permit.
- B. Circuits from protected premises to supervising station, including conduit.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 21 13 00 - Fire-Suppression Sprinkler Systems: Supervisory, alarm, and actuating devices installed in sprinkler system.

#### **1.3 REFERENCE STANDARDS**

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Corrigendum 2012).
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. NFPA 72 - National Fire Alarm and Signaling Code; 2016.

#### **1.4 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Proposal Documents: Submit the following with cost/time proposal:
  - 1. NFPA 72 "Record of Completion", filled out to the extent known at the time.
  - 2. Manufacturer's detailed data sheet for each control unit, initiating device, and notification appliance.
  - 3. Certification by Contractor that the system design will comply with Contract Documents.
  - 4. Proposed maintenance contract.
- C. Evidence of designer qualifications.

- D. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
1. Copy (if any) of list of data required by authority having jurisdiction.
  2. NFPA 72 "Record of Completion", filled out to the extent known at the time.
  3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
  4. System zone boundaries and interfaces to fire safety systems.
  5. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
  6. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
  7. List of all devices on each signaling line circuit, with spare capacity indicated.
  8. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
  9. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
  10. Detailed drawing of graphic annunciator(s).
  11. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
  12. Certification by the manufacturer of the control unit that the system design complies with Contract Documents.
  13. Certification by Contractor that the system design complies with Contract Documents.
- E. Evidence of installer qualifications.
- F. Evidence of maintenance contractor qualifications, if different from installer.
- G. Inspection and Test Reports:
1. Submit inspection and test plan prior to closeout demonstration.
  2. Submit documentation of satisfactory inspections and tests.
  3. Submit NFPA 72 "Inspection and Test Form," filled out.
- H. Operating and Maintenance Data: See Section 01 78 00 for additional requirements; revise and resubmit until acceptable; have one set available during closeout demonstration:
1. Complete set of specified design documents, as approved by authority having jurisdiction.
  2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
  3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
  4. List of recommended spare parts, tools, and instruments for testing.
  5. Replacement parts list with current prices, and source of supply.
  6. Detailed troubleshooting guide and large scale input/output matrix.

7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
  8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.
- I. Project Record Documents: See Section 01 78 00 for additional requirements; have one set available during closeout demonstration:
1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
  2. "As installed" wiring and schematic diagrams, with final terminal identifications.
  3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.
- J. Closeout Documents:
1. Certification by manufacturer that the system has been installed in compliance with manufacturer's installation requirements, is complete, and is in satisfactory operating condition.
  2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.
- K. Maintenance Materials, Tools, and Software: Furnish the following for Owner's use in maintenance of project.
1. Furnish spare parts of same manufacturer and model as those installed; deliver in original packaging, labeled in same manner as in operating and maintenance data.

## 1.5 QUALITY ASSURANCE

- A. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer, with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction. Designer shall also be familiar with typical systems that are used by the Owner and shall provide a system that the Owner shall find acceptable.
- B. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
  2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
  3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.
  4. Certified in the State in which the Project is located as fire alarm installer.

- C. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.

## **1.6 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide control panel manufacturer's warranty that system components other than wire and conduit are free from defects and will remain so for 1 year after date of Substantial Completion.
- C. Provide installer's warranty that the installation is free from defects and will remain so for 1 year after date of Substantial Completion.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Fire Alarm Control Units and Accessories:
  - 1. Honeywell Security & Fire Solutions/Fire-Lite: [www.firelite.com/#sle](http://www.firelite.com/#sle).
  - 2. Honeywell Security & Fire Solutions/Notifier: [www.notifier.com/#sle](http://www.notifier.com/#sle).
  - 3. Honeywell Security & Fire Solutions/Silent Knight: [www.silentknight.com/#sle](http://www.silentknight.com/#sle).
  - 4. National Time & Signal: [www.natsco.net/#sle](http://www.natsco.net/#sle).
  - 5. Siemens Building Technologies, Inc: [www.usa.siemens.com/#sle](http://www.usa.siemens.com/#sle).
  - 6. Simplex, a Tyco Business: [www.simplex-fire.com/#sle](http://www.simplex-fire.com/#sle).
  - 7. Provide control units made by the same manufacturer. Verify that manufacturer is acceptable to the owner prior to submission of bids.
- B. Initiating Devices and Notification Appliances:
  - 1. Same manufacturer as control units.
  - 2. Provide initiating devices and notification appliances made by the same manufacturer, where possible.
- C. Substitutions: See Section 01 60 00 - Product Requirements.
  - 1. For other acceptable manufacturers of control units specified, submit product data showing equivalent features and compliance with Contract Documents.
  - 2. For substitution of products by manufacturers not listed, submit product data showing features and certification by Contractor that the design will comply with Contract Documents.
  - 3. All substitutions are subject to the approval of the Owner.

### **2.2 FIRE ALARM SYSTEM**

- A. Fire Alarm System: Provide a new automatic fire detection and alarm system:

1. Provide all components necessary, regardless of whether shown in Contract Documents or not.
  2. Protected Premises: Entire building shown on drawings.
  3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
    - a. ADA Standards.
    - b. The requirements of the local authority having jurisdiction, which is \_\_\_\_\_.
    - c. Applicable local codes.
    - d. Contract Documents (drawings and specifications).
    - e. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
  4. Evacuation Alarm: Single smoke zone; general evacuation of entire premises.
  5. Hearing Impaired Occupants: Provide visible notification devices in all public areas.
  6. Fire Alarm Control Unit: New, located as shown on drawings.
- B. Fire Department Connections:
1. Public Fire Department Notification: By new auxiliary fire alarm system approved by authority having jurisdiction.
  2. Auxiliary Connection Type: Local energy.
- C. Circuits:
1. Initiating Device Circuits (IDC): Class B, Style A.
  2. Signaling Line Circuits (SLC) Within Single Building: Class B, Style 0.5.
  3. Notification Appliance Circuits (NAC): Class B, Style W.
- D. Spare Capacity:
1. Fire Alarm Control Units: Capable of handling all circuits utilized to capacity without requiring additional components other than plug-in control modules.
- E. Power Sources:
1. Primary: Dedicated branch circuits of the facility power distribution system.
  2. Secondary: Storage batteries.
  3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.
  4. Each Computer System: Provide uninterruptible power supply (UPS).

### **2.3 FIRE SAFETY SYSTEMS INTERFACES**

- A. Supervision: Provide supervisory signals in accordance with NFPA 72 for the following:
1. Sprinkler water control valves.
  2. Dry-pipe sprinkler system pressure.
  3. Dry-pipe sprinkler valve room low temperature.
- B. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
1. Sprinkler water flow.

## 2.4 COMPONENTS

- A. General:
  - 1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
  - 2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.
  - 3. All device finishes are to be white in color unless otherwise noted.
- B. Fire Alarm Control Units: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.
- C. Master Control Unit: As specified for Basis of Design above, or equivalent.
- D. Initiating Devices:
  - 1. Addressable Systems:
    - a. Addressable Devices: Individually identifiable by addressable fire alarm control unit.
    - b. Provide suitable addressable interface modules as indicated or as required for connection to conventional (non-addressable) devices and other components that provide a dry closure output.
- E. Circuit Conductors: Copper or optical fiber; provide 200 feet extra; color code and label.
- F. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.
  - 1. Equipment Connected to Alternating Current Circuits: Maximum let through voltage of 350 V(ac), line-to-neutral, and 350 V(ac), line-to-line; do not use fuses.
  - 2. Initiating Device Circuits, Notification Appliance Circuits, and Communications Circuits: Provide surge protection at each point where circuit exits or enters a building; rated to protect applicable equipment; for 24 V(dc) maximum dc clamping voltage of 36 V(dc), line-to-ground, and 72 V(dc), line-to-line.
  - 3. Signaling Line Circuits: Provide surge protection at each point where circuit exits or enters a building, rated to protect applicable equipment.
- G. Locks and Keys: Deliver keys to Owner.
  - 1. Provide the same standard lock and key for each key operated switch and lockable panel and cabinet; provide 5 keys of each type
- H. Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.
  - 1. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
  - 2. Provide one for each control unit where operations are to be performed.
  - 3. Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
  - 4. Provide extra copy with operation and maintenance data submittal.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and Contract Documents.
- B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.
- C. Obtain Owner's approval of locations of devices, before installation.
- D. Install instruction cards and labels.

### **3.2 INSPECTION AND TESTING FOR COMPLETION**

- A. Notify Owner 7 days prior to beginning completion inspections and tests.
- B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
- D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.
- E. Provide all tools, software, and supplies required to accomplish inspection and testing.
- F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
- G. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

### **3.3 CLOSEOUT**

- A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
  - 1. Be prepared to conduct any of the required tests.
  - 2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
  - 3. Have authorized technical representative of control unit manufacturer present during demonstration.
  - 4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.

5. Repeat demonstration until successful.

### **3.4 MAINTENANCE**

- A. See Section 01 70 00 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.
- B. Provide to Owner, a proposal as an alternate to the base bid, for a maintenance contract for entire warranty period, to include the work described below; include the total cost of contract, proposal to be valid at least until 30 days after date of Substantial Completion.
- C. Perform routine inspection, testing, and preventive maintenance required by NFPA 72, including:
  1. Maintenance of fire safety interface and supervisory devices connected to fire alarm system.
  2. Repairs required, unless due to improper use, accidents, or negligence beyond the control of the maintenance contractor.
  3. Record keeping required by NFPA 72 and authorities having jurisdiction.
- D. Provide trouble call-back service upon notification by Owner:
  1. Provide on-site response within 2 hours of notification.
  2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
  3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.
- E. Provide a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.
- F. Maintain a log at each fire alarm control unit, listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced. Submit duplicate of each log entry to Owner's representative upon completion of site visit.
- G. Comply with Owner's requirements for access to facility and security.

### **END OF SECTION**

## **311000 SITE CLEARING**

### **Part 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:
  - 1. Protecting existing trees and vegetation to remain, including temporary fencing for trees in close proximity to construction operations.
  - 2. Removing existing trees and vegetation indicated to be removed.
  - 3. Clearing and grubbing.
  - 4. Stripping and stockpiling topsoil.
  - 5. Removing above and below grade site improvements.
  - 6. Disconnecting, capping, or sealing of utilities as required.
  - 7. Disposal of waste.
- B. Alternates: Not Applicable.
- C. Items To Be Installed Only: Not Applicable.
- D. Items To Be Furnished Only: Not Applicable.
- E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
  - 1. Section 312000 – EARTH MOVING for soil materials, excavating, backfilling, and site grading and removal of site utilities.
  - 2. Section 312500 – EROSION AND SEDIMENTATION CONTROLS for required erosion and sedimentation control measures.
- F. References:
  - 1. Geotechnical Report – Appendix 01 – Geotechnical Engineering Report – Proposed Roger Williams Park Gateway Center.
  - 2. Remedial Action Work Plan – Appendix 02.

### **1.3 DEFINITIONS**

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

### **1.4 MATERIAL OWNERSHIP**

- A. Except for materials indicated to remain the Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

### **1.5 SUBMITTALS**

- A. Photographs sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.
- B. Record drawings, identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.

### **1.6 PROJECT CONDITIONS**

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the Owner's Representative and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- D. Do not commence site clearing operations until erosion and sedimentation control measures are in place.

- E. Refer to the "Geotechnical Engineering Report" and the "Remedial Action Work Plan" for information regarding on-site contamination prior to any movement of soil or excavation of materials due to site contamination.
- F. Protection of Existing Improvements: Provide protection necessary to prevent damage to existing improvements indicated to remain in place or outside of the limit of work. Protect improvements on adjoining properties and on Owner's property.
  - 1. Restore improvements damaged by Contractor's clearing activities to their original condition, at no additional expense to the Owner.

## Part 2 - EXECUTION

### 2.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to the Owner's Representative.

### 2.2 TREE PROTECTION

- A. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.
  - 1. Do not store construction materials, debris, or excavated material within fenced area.
  - 2. Do not permit vehicles, equipment, or foot traffic within fenced area.
  - 3. Maintain fenced area free of weeds and trash.
  - 4. Except as otherwise directed, cutting, and trimming of existing trees will not be permitted.
- B. Do not excavate within tree protection zones, unless otherwise indicated.
- C. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
  - 1. Cover exposed roots with burlap and water regularly.
  - 2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
  - 3. Coat cut faces of roots more than 1-1/2 inches in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
  - 4. Backfill with soil as soon as possible.

- D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by the Designer.
  - 1. Employ an arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
  - 2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the Designer.
  
- E. Routinely inspect protective barriers, trees, shrubs and vegetated areas for damage and conditions that are causing damage and may cause damage. Repair, treat and take corrective action without delay.
  - 1. Inspect immediately after rains and during periods of runoff for ponding and silting caused by drainage from construction areas. Promptly drain and remove mud and silt back to natural grade.
  - 2. Inspect and remove boulders, rocks, soil, stumps, limbs, vegetative matter, debris, rubbish and waste that has been disposed of and accidentally accumulated, particularly in shrub masses and wooded areas.
  - 3. Water trees and plants to remain as required to maintain their health through construction period.

### **2.3 UTILITIES**

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
  - 1. Arrange with utility companies to shut off indicated utilities.
  
- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner's Representative or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  - 1. Notify the Owner's Representative not less than two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without the Owner's Representative's written permission.
  
- C. Removal of underground utilities is included in Section 312000 – EARTH MOVING.
  
- D. Removal of underground utilities is included in Division 33 Sections covering site utilities.

### **2.4 CLEARING AND GRUBBING**

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
  - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
  - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
  - 3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.

4. Use only hand methods for grubbing within tree protection zone.
  5. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.

## **2.5 TOPSOIL STRIPPING**

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust or contamination by air-borne weed seed.
1. Limit height of topsoil stockpiles to 72 inches.
  2. Do not stockpile topsoil within tree protection zones.

## **2.6 EXCESS TOPSOIL**

- A. Topsoil that has been stripped and stockpiled but is not needed after the completion of all final topsoil spreading and grassing, shall be removed from the site and legally disposed of.

## **2.7 SITE IMPROVEMENTS**

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
  2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

## **2.8 DISPOSAL**

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off the Owner's property.
1. Burning on site is prohibited.

2. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

**END OF SECTION**

## **SECTION 31 12 00 - SITE CLEARING**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide all equipment and do all work necessary to clear the site, complete, including clearing and grubbing, tree removal, and stripping and stockpiling topsoil, as indicated on the Drawings and as specified.

#### **1.3 RELATED WORK**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 015639, TEMPORARY TREE AND PLANT PROTECTION.
  - 2. Section 024113, SELECTIVE SITE DEMOLITION AND REMOVALS.
  - 3. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Excavation and backfill.

#### **1.4 REFERENCES**

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
  - 1. American National Standards Institute (ANSI):
    - Z133.1 Safety Requirements for Pruning, Trimming, Repairing, Maintaining and Removing Trees, and for Cutting Brush
  - 2. State of Louisiana Department of Transportation and Development (LDOTD):
    - Specifications Standard Specifications for Roads and Bridges

#### **1.5 SUBMITTALS**

- A. The following shall be submitted:

1. Certificates of severance of utility services.
2. Permit for transport and legal disposal of debris.
3. Location plan of staging areas and schedule for moving staging equipment into those areas shall be submitted for Architect's approval prior to mobilization and related site preparation operations.
4. After review of the site, Contractor shall submit proposed location for temporary access road around stormwater outfalls and existing utilities.

- B. Submit schedule of existing trees to be pruned including extent of pruning.

## **1.6 PROTECTION**

- A. Prevent movement, settlement or collapse of adjacent services and trees. Assume liability for such movement, settlement, or collapse. Promptly repair damage at no cost to the Owner.

## **1.7 TREE DAMAGE PENALTIES**

- A. Refer to Section 015639, TEMPORARY TREE AND PLANT PROTECTION.

## **1.8 EXISTING SERVICES**

- A. Existing structures and utilities shall be suitably protected from damage.

## **1.9 MAINTAINING TRAFFIC**

- A. Do not close or obstruct roadways without permits.
- B. Conduct operations with minimum interference to public or private roadways.

## **1.10 QUALITY ASSURANCE**

- A. Selective pruning methods shall conform to the applicable requirements of ANSI Z133.1.
- B. Work of this section shall be completed by a professional ISA Certified Arborist with a minimum five years experience, who has successfully completed an exam and education program equal to the International Society of Arboriculture (ISA) Certification Program, sponsored by the International Society of Arboriculture 2009, P.O. Box 3129, Champaign, IL 61826 (217) 355-9411; Email: [isa@isa-arbor.com](mailto:isa@isa-arbor.com).

## **PART 2 - PRODUCTS**

### **2.1 TEMPORARY SEED MIX**

- A. Seed shall conform to RIDOT Standard Specifications for temporary seeding.

### **PART 3 - EXECUTION**

#### **3.1 STRIPPING AND STOCKPILING TOPSOIL**

- A. Remove sod and grass before stripping topsoil.
- B. Topsoil shall be stripped to full depth from areas to be excavated, filled, regraded, or resurfaced. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials
  - 1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Topsoil shall be stockpiled on-site and protected. No topsoil shall be removed from the site without the written permission of the Architect.
- D. Stockpiled topsoil which conforms to the specifications may be used for fill and finish grading within landscaped areas. Refer to Section 329119, LANDSCAPE GRADING, Section 329200, LAWNS AND GRASSES and Section 329300, PLANTING.
- E. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. If duration of stockpile is 3 months or less: Limit height of topsoil stockpiles to 72 inches.
  - 2. If duration of stockpile is greater than 3 months: Limit height of topsoil stockpiles to 40 inches.
  - 3. Do not stockpile topsoil within tree protection zones.
  - 4. Stockpile surplus topsoil to allow for respreading deeper topsoil.
- F. Stockpiled topsoil which conforms to the Section 329200, LAWNS AND GRASSES and 329300, PLANTING may be used for within landscaped areas. Material which does not conform shall be deemed unsuitable and shall be removed from the site and legally disposed.

#### **3.2 CLEARING AND GRUBBING**

- A. Trees, shrubs, and other vegetation not indicated on the Drawings or designated in the field by the Architect to remain and required for execution of the Work shall be cleared and grubbed.
- B. Stumps shall be removed to their full depth. Roots 3 in. and larger shall be removed to a depth of 2 ft. below finished grade. Stumps shall be legally disposed of off-site.

### **3.3 TREE REMOVAL**

- A. Unless otherwise indicated, trees and shrubs not indicated on the Drawings or designated in the field by the Architect to remain, and required for execution of the Work shall be removed.
- B. Trees shall be cut and stumps shall be removed to their full depth. Trees may be able to be pushed over exposing complete root system; dig entire root mass and completely remove.
  - 1. Roots 3 in. and larger shall be removed to a depth of 2 ft. below finished grade.
  - 2. Stumps shall be legally disposed of off-site.
- C. Do not apply herbicide to remaining stumps or plant life to inhibit growth.
- D. Fill depressions caused by stump removal and clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated. Seed with temporary erosion control mixture as specified.
  - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.
- E. At the Contractor's option:
  - 1. Felled trees, including stumps, may be legally disposed of off-site at a location selected by the Contractor; or
  - 2. Felled trees, not including stumps, may be chipped on-site and completely removed to a location selected by the Contractor.
  - 3. Felled trees, not including stumps, may be chipped off-site and removed to a location selected by the Contractor.
- F. Stumps: Contractor shall be required to haul stumps to and legally dispose of at an off-site location selected by the Contractor.
- G. Burning shall not be permitted on-site.

### **3.4 PROTECTION OF EXISTING STRUCTURES AND UTILITIES**

- A. Existing structures and utilities shall be suitably protected from damage, including but not limited to existing stone walls, concrete vault, manholes, and utility lines.
- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Architect's written permission.

**3.4 DISPOSAL OF MATERIALS**

- A. Material resulting from the site clearing work and not scheduled to be salvaged and which is unsuitable for reuse on the project, shall become the property of the Contractor and shall be legally disposed of off-site.
- B. Debris, rubbish, and other material shall be disposed of promptly and shall not be left until final cleanup of site.

**END OF SECTION**

## **SECTION 312000 - EARTH MOVING**

### **Part 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
  1. Preparing subgrades for buildings, structures and landscaping.
  2. Bioretention engineer soil mix, stone filter strip, and related drainage work.
  3. Excavating and backfilling for buildings and structures.
  4. Removal of underground utilities as applicable.
  5. Drainage course for slabs-on-grade.
  6. Subbase course for concrete pavements.
  7. Subbase and base course for asphalt paving.
  8. Subsurface drainage backfill for walls and trenches.
  9. Excavating and backfilling for utility trenches.
  10. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.
  11. Coordination with maintenance of safe path of travel for the public.
  12. Excavation, removal, and off-site disposal or processing of over-sized boulders utilizing mechanical techniques, or other methods approved by the Designer. Procedures shall prevent damage to existing and new site improvements.
  13. Handling, processing, moisture conditioning, re-handling, segregating, and stockpiling materials during the course of the Work. Existing on-site materials may require processing and moisture conditioning prior to reuse. Processing may include crushing, blending, screening, drying, and other measures to meet the requirements herein and as directed by the Designer. All excavated soils shall be reused on-site in accordance with the requirements herein and on the Drawings. No soil shall be removed from the site without written authorization from the Owner.
  14. Provide, place, moisture condition, compact, and grade fill and other materials to the horizontal and vertical limits to construct the proposed site improvements and achieve the lines and grades as shown on the Drawings.
  15. Soil management, sampling and testing, special handling, loading and hauling of contaminated or hazardous soil (meeting the requirements of the Remedial Action Work Plan prepared by the geotechnical engineer), and disposal at an off-site recycling or

disposal facility of these materials in accordance with RIDEM regulations for recycling/disposal, and the Remedial Action Work Plan (see Appendix 02).

- B. Alternates: Not Applicable.
- C. Items To Be Installed Only: Not Applicable.
- D. Items To Be Furnished Only: Not Applicable.
- E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
  - 1. Section 311000 – SITE CLEARING for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements.
  - 2. Section 312319 – DEWATERING for construction dewatering.
  - 3. Section 312500 – EROSION AND SEDIMENTATION CONTROLS for temporary erosion and sedimentation control measures.
  - 4. Division 02, 22, 23, and 26 Sections for installing underground mechanical and electrical utilities and buried mechanical and electrical structures.
  - 5. Section 026100 – REMOVAL AND DISPOSAL OF SOILS.
- F. References:
  - 1. Geotechnical Report – Appendix 01 – Geotechnical Engineering Report – Proposed Roger Williams Park Gateway Center.
  - 2. Remedial Action Work Plan – Appendix 02.

### **1.3 UNIT PRICES**

- A. Rock Measurement: Volume of rock actually removed, measured in original position. Unit prices for rock excavation include replacement with approved materials.

### **1.4 DEFINITIONS**

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
- B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.
- D. Contaminated Soil: Soil within the project area which has been deemed contaminated per the geotechnical reports.
- E. Off-Site Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- F. On-Site Borrow Soil: Satisfactory soil obtained from on-site sources for use as a fill or backfill.

- G. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- H. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
  - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Designer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
  - 2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
  - 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Designer. Unauthorized excavation, as well as remedial work directed by Designer, shall be without additional compensation.
- I. Fill: Soil materials used to raise existing grades.
- J. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed without systematic drilling, ram hammering, ripping, or blasting.
- K. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- L. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- M. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- N. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

## 1.5 SUBMITTALS

- A. Product Data: For the following:
  - 1. Each type of plastic warning tape.
  - 2. Geotextile.
  - 3. Controlled low-strength material, including design mixture.
- B. Borrow Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
  - 1. Classification according to ASTM D 2487 of each off-site and on-site borrow soil material proposed for fill and backfill.

2. Laboratory Particle Size Distribution Report according to ASTM D 422 for each onsite and off-site borrow soil material proposed for fill and backfill.
  3. Laboratory compaction curve according to ASTM D 1557 for each onsite and off-site borrow soil material proposed for fill and backfill.
- C. Pre-excavation Photographs and Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins. Maintain catalog of up-to-date photographs at the site.

## 1.6 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner's Representative or others unless permitted in writing by Designer and then only after arranging to provide temporary utility services according to requirements indicated.
1. Notify the Owner's Representative not less than two days in advance of proposed utility interruptions.
  2. Do not proceed with utility interruptions without the Owner's Representative's written permission.
  3. Contact utility-locator service for area where Project is located before excavating.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.
- C. Due to on-site contamination, any movement of soil and excavation of materials must follow the "Remedial Action Work Plan" document in Appendix 02.

## Part 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. General: Provide off-site borrow soil materials when sufficient satisfactory on-site borrow soil materials are not available from excavations.
- B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: ASTM D 2487 Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT, or a combination of these groups.
1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content as determined by ASTM D 1557 at time of compaction.

- D. Gravel Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand meeting the requirements of RIDOT Section M.03.01 with not more than 12 percent passing a No. 200 sieve.
- E. Gravel Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand meeting the requirements of RIDOT Section M.03.01 with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- G. Drainage Stone: Crushed stone shall consist of durable crushed rock or durable crushed gravel stone, free from ice and snow, sand, clay, loam, or other deleterious or organic material. The crushed stone shall be uniformly blended and shall conform to the following requirements.

<b>Percent Passing by Weight</b>		
<b>Sieve Size</b>	<b>3/4-inch Crushed Stone</b>	<b>Peastone</b>
1-inch	100	---
3/4-inch	90-100	---
5/8-inch	---	---
1/2-inch	10-50	100
3/8-inch	0-20	85-100
No. 4	0-5	20-50
No. 8	---	0-15
No. 16	---	0-5

- H. Filter Course: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.
- I. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.
- J. Structural Fill: Structural fill shall be used as fill below footings and slabs. Structural Fill shall consist of hard, durable sand and gravel, free of clay, organic matter, surface coatings, and other

deleterious materials. Soil finer than the No. 200 sieve (the “fines”) shall be non-plastic. Structural Fill shall meet the following gradation requirements:

<u>Sieve Size</u>	<u>Percent Finer By Weight</u>
3 in.	100
No. 4	35-85
No. 16	20-65
No. 50	5 - 40
No. 200	0-8

Note: The Contractor shall confirm the suitability of proposed Structural Fill materials with the Designer prior to import to the site.

- K. Common Fill: Common fill shall consist of natural or processed soil free from contamination, organic materials, loam, wood, ice, cinders, asphalt, concrete, trash and other weak, compressible, or objectionable materials. Common Fill shall not contain stones larger than one-third of the compacted lift thickness in maximum dimension and shall have a maximum of 70 percent passing the No. 40 sieve and a maximum of 20 percent passing the No. 200 sieve. The material passing the No. 200 sieve shall be non-plastic. Common Fill shall not contain unprocessed broken concrete, masonry rubble, glass, plastic, or other similar materials and shall have physical properties such that it can be readily spread and compacted during filling, and placed to form embankments and compacted to the specified densities in a reasonable length of time. Snow, ice and frozen soil shall not be permitted. Common Fill from all materials subject to decay, decomposition, or dissolution and from cinders or other materials which may corrode piping or other metal. It shall have a maximum dry density of not less than 120 lbs per cubic foot as determined by ASTM D 1557. The maximum particle size shall be 3 in. for backfill placed within 2 ft of foundation walls and utilities.

On-site soils may be allowed as common fill if such materials meet the requirements herein, can be readily placed and compacted as specified herein, and is approved by the Owner's Representative.

- L. Bioretention Area Engineered Soil Mix:  
The Bioretention soil shall be a sandy loam, loamy sand, loam (USDA), or a loam/sand mix (should contain 85-88% sand, by volume). The clay content for these soils shall be less than 2% by volume. A permeability of at least 2.0 feet per day (1 inch per hour) is required. The soil shall be free of stones, stumps, roots, other woody materials over 1 inch in diameter, or brush/seeds from noxious weeds. Placement of planting soil shall be in lifts of 12 to 18 inches, loosely compacted (tamped lightly with a dozer or backhoe bucket). The specific characteristics shall be as shown below.

Mineral Mix  
Sand: 85% - 88%  
Organic Matter: 3% - 5%  
Clay: 0% - 2%  
Silt: 8% - 12%

Bioretention Soil Mix

Mineral Mix: 80%

Well Aged (6-12 month), well-aerated leaf compost, or approved equal: 20% by volume.\*

Leaf compost to be mixed into Mineral Mix after Mineral Mix has been created.

Bioretention Soil pH shall be between 5.5 and 6.5, and soluble salt concentration shall not exceed 500 ppm.

Sand for Engineered Soil Mix shall be gravelly sand meeting the requirements of ASTM D422 with gradation as follows:

Sieve Designation	Percent Passing
50 mm	100
19 mm	70-100
6.35 mm	50-80
425 µm	15-40
75 µm	0-3

Topsoil for Bioretention Soil shall be sandy loam or loamy sand.

Compost for Bioretention Soil shall be processed from yard waste. Compost shall have a pH between 6 and 8 and shall be free of biosolids. Compost shall have a Carbon to Nitrogen Ratio of 10-20:1 C:N, shall be at least 40% organic content, shall be less than 60% ash content, and shall contain less than 1% combined glass, plastic, and metal. Moisture content shall be between 35% and 50% by weight. Compost shall be resistant to further decomposition, and shall be free of compounds, such as ammonia and organic acids, present in concentrations that are toxic to plant growth. Pathogens and noxious weeds shall be minimized. 98 percent of the compost shall pass through a 19 mm screen. Pathogens and noxious seeds within the compost shall be minimized.

At substantial completion of the project, the contractor shall submit as-built drawings of the entire project which shall include, but is not limited to, a full topographic survey of the landscape area consisting of the bioretention basins.

M. Pretreatment Stone Filter Strip:

This work shall consist of furnishing all labor, equipment, tools and materials to install a stone filter strip, per the "Filter Strip" detail on the plans. The installation of the filter strip shall conform to Section 205 and Section 703 of the Rhode Island Standard Specifications for Road and Bridge Construction, Amended March 2018, and all revisions.

The FS-2 stone shall meet the requirements of Section M.10 of the Standard Specifications. The filter fabric shall meet the requirements of Section 703.02.2 of the Standard Specifications.

Installation of the Filter Strip within the project limits shall be in accordance with Section 703 of the Standard Specifications at the locations shown on the Plans and/or as directed by the

Engineer. The contractor is responsible for the protection of all trees that are not proposed to be removed during installation. The trench shall be lined with filter fabric as shown in the details.

Pricing shall include full and complete compensation for excavation, grading, FS-2 stone, filter fabric and all materials, labor, tools, equipment, and all other incidentals necessary to complete the work and accepted by the Engineer.

## 2.2 GEOTEXTILES

A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 157 lbf ; ASTM D 4632.
3. Sewn Seam Strength: 142 lbf ; ASTM D 4632.
4. Tear Strength: 56 lbf ; ASTM D 4533.
5. Puncture Strength: 56 lbf ; ASTM D 4833.
6. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
7. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

B. Separation Geotextile: Woven or non-woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 247 lbf ; ASTM D 4632.
3. Sewn Seam Strength: 222 lbf ; ASTM D 4632.
4. Tear Strength: 90 lbf ; ASTM D 4533.
5. Puncture Strength: 90 lbf; ASTM D 4833.
6. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
7. Permittivity: 0.02 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

## 2.3 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric.
2. Blue: Water systems.
3. Green: Sewer systems.

### **Part 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials as specified in Section 311000 - SITE CLEARING.
- C. Protect and maintain erosion and sedimentation controls, which are specified in Section 312500 – EROSION AND SEDIMENTATION CONTROLS, during earthwork operations.
- D. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

#### **3.2 DEWATERING**

- A. Provide adequate pumping and drainage facilities to maintain the excavated area sufficiently dry from groundwater and/or surface runoff so as not to adversely affect construction procedures nor cause excessive disturbance of underlying natural ground. The flows of all water resulting from pumping shall be managed so as not to cause erosion, siltation of drainage systems, or damage to adjacent property.
- B. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting of footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, sumps, suction and discharge lines, and other dewatering system components necessary to remove water from excavations.
- C. Provide filters for all pumps to prevent silt and fine sand from being pumped with the water.
- D. Establish and maintain temporary drainage ditches outside excavation limits to convey rainwater and water removed from excavations to collecting or run-off areas.
- E. Dispose of water from excavations in a manner that does not damage adjacent property, and that complies with all applicable laws and regulations. Obtain permits from local authorities before disposing of water into sewers, storm drains, or wetlands.
- F. If feasible, discharge collected surface water or groundwater to on-site recharge pits. The Designer must approve the location of any on-site recharge pits.
- G. Any damage resulting from the failure of the dewatering operations of the Contractor, and any damage resulting from the failure of the Contractor to maintain all the areas of work in a suitable dry condition, shall be repaired by the Contractor, as directed by the Designer, at no additional expense to the Owner. The Contractor's pumping and dewatering operations shall be carried out

in such a manner as to prevent damage to the Contract work and so that no loss of ground will result from these operations. Precautions shall be taken to protect new work from flooding during storms or from other causes. Pumping shall be continuous to protect the work and/or to maintain satisfactory progress.

- H. All pipelines or structures not stable against uplift during construction or prior to completion shall be thoroughly braced or otherwise protected. Water from the trenches, excavations, and stormwater management operations shall be disposed of in such a manner as to avoid public nuisance, injury to public health or the environment, damage to public or private property, or damage to the work completed or in progress.
- I. Control the grading in the areas surrounding all excavations so that the surface of the ground will be properly sloped to prevent water from running into the excavated area. Where required, temporary ditches shall be provided to control drainage. Upon completion of the work and when directed, all areas shall be restored by the Contractor in a satisfactory manner and as directed.

### **3.3 EXPLOSIVES**

- A. Explosives: Do not use explosives.

### **3.4 FROST PROTECTION**

- A. Do not excavate to full depth when freezing temperatures may be expected unless intended improvements can be accomplished immediately after the excavations have been completed. Protect subgrades from frost if progress is delayed. Do not install foundations, slabs, or utilities on frozen ground. Protect the subsurface of in-place foundations from frost. Should protection fail, remove frozen materials and replace with concrete or Structural Fill as directed at no additional cost to the Owner.
- B. Keep the site clear and free of accumulations of snow as necessary to carry out the work.
- C. Do not use fill materials containing snow, frost, or frozen soil and do not backfill over frozen material.
- D. Protect the underside of all in-place construction from frost penetration. Provide frost protection for all in-place foundations, slabs, and utilities during all periods of freezing temperatures until the entire project is complete. Provide, as a minimum, frost protection consisting of a 4-foot thickness of earth or equivalent in insulating properties.

### **3.5 EXCAVATION, GENERAL**

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
  - a. 24 inches outside of concrete forms other than at footings.
  - b. 12 inches outside of concrete forms at footings.
  - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
  - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
  - e. 6 inches beneath bottom of concrete slabs on grade.
  - f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.
- B. Perform all excavations in accordance with OSHA requirements. The Contractor shall be solely responsible for maintaining site safety, in accordance with OSHA, the Contractor's Health and Safety Plan and other applicable regulations.
- C. The Contractor shall handle, segregate to prevent intermixing of materials, protect, and stockpile as required to complete the Work specified in this Section and as shown on the Drawings.
- D. Where soil has been softened, frozen or otherwise disturbed, due to the presence of water or as a result of unfavorable weather, remove the unstable, disturbed material and replace with suitable material as directed by the Designer, at no additional cost to the Owner.

### **3.6 EXCAVATION FOR WALKS AND PAVEMENTS**

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### **3.7 EXCAVATION FOR STRUCTURES**

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
  1. Excavations for Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
  2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

### **3.8 FOUNDATION SUBGRADE PREPARATION**

- A. Remove all topsoil, fill, and any other unsuitable materials to the top of natural soil subgrades.

- B. Proof-compact subgrades with a minimum of four passes of compaction equipment suitable to the Designer and in the presence of the Designer prior to placing concrete mudmats, constructing foundations, or placing fill.
- C. In areas of excessive pumping or soft or unstable soils, remove the soft materials and replace with compacted Structural Fill, crushed stone or other acceptable materials to the limits directed by the Designer, at no additional cost to the Owner.

### **3.9 EXCAVATION FOR UTILITY TRENCHES**

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
  - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
  - 1. Clearance: 12 inches each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
  - 1. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
  - 2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
  - 3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

### **3.10 SUBGRADE INSPECTION**

- A. Notify Designer when excavations have reached required subgrade.
- B. If Designer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. In the presence of the Designer, proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
  - 1. Proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
  - 2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.

3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Designer, and replace with compacted backfill or fill as directed.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Designer, at no additional cost to the Owner.

### **3.11 UNAUTHORIZED EXCAVATION**

- A. Backfill to the subgrade elevation in accordance with Section 3.18 or fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi may be used when approved by Designer.
  1. Fill unauthorized excavations under other construction or utility pipe as directed by Designer.

### **3.12 STORAGE OF SOIL MATERIALS**

- A. Stockpile excavated unsatisfactory and soil materials and satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
  2. Stockpile soil materials in a location, acceptable to the Owner's Representative, that will preclude having to relocate stockpiled soil materials that would otherwise delay or impact the Work.

### **3.13 BACKFILLING**

- A. Place and compact backfill in excavations promptly, but not before completing the following:
  1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
  2. Surveying locations of underground utilities for Record Documents.
  3. Testing and inspecting underground utilities.
  4. Removing concrete formwork.
  5. Removing trash and debris.
  6. Removing temporary shoring and bracing, and sheeting.
  7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.
- C. Backfill shall not be placed against walls until they are braced or have cured sufficiently to develop the strength necessary to withstand, without damage, pressure from backfilling and compacting operations.

- D. Foundation walls not designed to support unbalanced earth pressures shall be backfilled in sequence to maintain balanced lateral soil pressures on either side of the wall. The fill height difference between either side of the wall shall not exceed 3 feet.
- E. If excessive pumping or instability of the fill is observed during compaction, compaction efforts shall be discontinued until the Contractor stabilizes the subgrade or moisture conditions the fill to a moisture content suitable for compaction. If required, the Contractor shall remove and replace the unstable fill material with acceptable compacted material, at no additional cost to the Owner.

### **3.14 UTILITY TRENCH BACKFILL**

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings.
- D. Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.
- E. Place and compact initial backfill of subbase material free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit.
  - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- F. Backfill voids with satisfactory soil while installing and removing shoring and bracing.
- G. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- H. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

### **3.15 SOIL MOISTURE CONTROL**

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
  - 1. Remove and replace or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to the specified density.
  - 2. Fill that is too wet for proper compaction shall be harrowed, or otherwise dried or treated to achieve a proper moisture content to allow compaction to the required density. If fill

cannot be dried within 24 hours of placement, it shall be removed and replaced with drier material, at no additional cost to the Owner.

3. Fill that is too dry for proper compaction shall receive water uniformly applied over the surface of the loose layer. Sufficient water shall be added to allow compaction to the required density.
4. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until the moisture content and the density of the previously placed fill are as specified.

### **3.16 COMPACTION OF SOIL BACKFILLS AND FILLS**

- A. Place backfill and fill soil materials in layers not more than 8 inches thick in loose depth for material compacted by heavy compaction equipment, and not more than 6 inches thick in loose depth for material compacted by hand-operated equipment.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
  1. Under foundations, structures, building slabs, steps, and pavements, compact each layer of backfill or fill soil material to at least 95 percent of the maximum dry density as determined by ASTM D 1557.
  2. Under walkways, compact each layer of backfill or fill soil material to at least 92 percent of the maximum dry density as determined by ASTM D 1557.
  3. Under lawn or unpaved areas, compact each layer of backfill or fill soil material at 85 percent of the maximum dry density as determined by ASTM D 1557.
  4. For utility trenches, compact each layer of initial and final backfill soil material at 90 percent.

### **3.17 GRADING**

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  1. Provide a smooth transition between adjacent existing grades and new grades.
  2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
  1. Lawn or Unpaved Areas: Plus or minus 1 inch.
  2. Walks: Plus or minus 1 inch.
  3. Pavements: Plus or minus 1/2 inch.

- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

### **3.18 SUBSURFACE DRAINAGE**

- A. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches of filter material, placed in compacted layers 6 inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
- B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with 1 layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
  - 1. Place and compact impervious fill over drainage backfill in 6-inch-thick compacted layers to final subgrade.

### **3.19 SUBBASE AND BASE COURSES**

- A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase and base course under pavements and walks as follows:
  - 1. If required by the project details, install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
  - 2. Place base course material over subbase course under hot-mix asphalt pavement.
  - 3. Shape subbase and base course to required crown elevations and cross-slope grades.
  - 4. Place subbase and base course 6 inches or less in compacted thickness in a single layer.
  - 5. Place subbase and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
  - 6. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
- C. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

### **3.20 DRAINAGE COURSE**

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

### **3.21 FIELD QUALITY CONTROL**

- A. Independent Testing Agency: Cooperate with the Independent Testing Agency for field quality control activities for the Work of this Section.
- B. Cooperate with field quality control personnel.
- C. Additional inspections and retesting of materials which fail to comply with specified material and installation requirements shall be performed at Contractor's expense.
- D. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- E. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Designer.
- F. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
  1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than 3 tests.
  2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet or less of wall length, but no fewer than 2 tests.
  3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 2 tests.
- G. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.
- H. Notify the Independent Testing Agency a minimum of 72 hours prior to start of earthwork operations, to comply with Code requirement that a registered design professional be present at all times during backfill to assure adequate compaction with no bridging effects.

### **3.22 PROTECTION**

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
  - 1. Scarify or remove and replace soil material to depth as directed by Designer; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

### **3.23 DISPOSAL OF SURPLUS AND WASTE MATERIALS**

- A. Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the property.
- B. Testing of surplus and waste materials for off-site disposal may be required, depending on the nature of the materials. The frequency of testing and the types of tests required for off-site disposal will depend on the nature of the surplus and waste material, and on the requirements of the receiving facilities. The contractor is responsible for determining if testing of waste and surplus materials for offsite disposal is required, and the types and frequency of tests. The contractor is responsible for performing any and all testing required by the receiving facilities, and local, state, and federal regulations for the off-site removal and disposal of surplus and waste materials at no additional cost to the Owner. The contractor may need to engage the services of a Licensed Site Professional registered in the state of Rhode Island for this task.

**END OF SECTION**

## **SECTION 31 23 00 - SITE EXCAVATING, BACKFILLING AND COMPACTING**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide all equipment and materials, and do all work necessary for site excavating, backfilling, and compacting, as indicated on the Drawings and as specified.
- B. The work of this section shall include, but is not necessarily limited to the following:
  - 1. Site excavation, filling, and grading.
  - 2. Excavation and backfill for site structures and utilities.
  - 3. Preparation of subgrade for slabs, pavements, and landscaping.
  - 4. Grading for landscape and pavement areas.
  - 5. Sheeting, bracing, and support of excavations as necessary.
  - 6. Drainage and dewatering as necessary to perform work in the dry.
  - 7. Placement and compaction of fills.
  - 8. Placement and compaction of aggregate base other than beneath pavements.

#### **1.3 RELATED WORK**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 014000, QUALITY REQUIREMENTS; Inspection and testing.
  - 2. Section 024113, SELECTIVE SITE DEMOLITION AND REMOVALS; Clearing and grubbing and stripping of topsoil.
  - 3. Section 311200, SITE CLEARING; Clearing and grubbing, stripping and stockpiling topsoil and tree removal.
  - 4. Section 329119, LANDSCAPE GRADING.
  - 5. Furnishing and installing utility bedding and embedment materials is included under the appropriate utility specification section.
  - 6. Aggregate base courses beneath paving is included under the applicable paving specification section.

#### 1.4 REFERENCES

A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. American Society for Testing and Materials (ASTM):

C 33	Concrete Aggregates
C 136	Sieve Analysis of Fine and Coarse Aggregates
D 422	Particle - Size Analysis of Soils
D 698	Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft <sup>3</sup> (6000kN-m/m <sup>3</sup> ))
D 1556	Density of Soil In-Place by the Sand Cone Method
D 1557	Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb. (4.54-kg) Rammer and 18-in. (457-mm) Drop
D 2487	Classification of Soils for Engineering Purposes (Unified Soil Classification System)
D 3017	Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 3740	Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils
E 329	Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction
E 548	General Criteria Used for Evaluating Laboratory Competence

2. Associated General Contractors of America, Inc.(AGC):

Manual	Manual of Accident Prevention in Construction
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#### **1.4 EXISTING CONDITIONS**

- A. The Contractor shall become thoroughly familiar with the site, consult records and drawings of adjacent structures and of existing utilities and their connections, and note all conditions which may influence the work of this Section.
- B. By submitting a bid, the Contractor affirms that he has carefully examined the site and all conditions affecting work under this Section including work which has been let for construction under previous bid packages. No claim for additional costs will be allowed because of lack of full knowledge of existing conditions.
- C. The Contractor may, at his own expense, conduct additional subsurface testing as required for his own information.

#### **1.5 INFORMATION NOT GUARANTEED**

- A. Information on the Drawings and in the Specifications relating to subsurface conditions, natural phenomena, and existing utilities and structures is from the best sources presently available. Such information is furnished only for the information and convenience of the Contractor, and the accuracy or completeness of this information is not guaranteed.
- B. Plans, surveys, measurements, and dimensions under which the work is to be performed are believed to be correct, but the Contractor shall have examined them for himself during the bidding period, as no additional compensation will be made for errors and inaccuracies that may be found therein.

#### **1.6 QUALITY CONTROL**

- A. The Owner reserves the right to retain a Geotechnical Consultant, to perform on-site observation and testing in accordance with Section 014000, QUALITY REQUIREMENTS during the following phases of the construction operations. The services of the Geotechnical Consultant may include, but not be limited to the following:
  - 1. Observation during excavation and replacement of existing fill beyond the building area.
  - 2. Observation during placement and compaction of fills.
  - 3. Laboratory testing and analysis of fill and bedding materials specified, as required.
  - 4. Observe construction and perform water content, gradation, and compaction tests at a frequency and at locations determined by the Testing Laboratory. The results of these tests will be submitted to the Architect, copy to the Contractor, on a timely basis so that the Contractor can take such action as is required to remedy indicated deficiencies. During the course of construction, the Testing Laboratory will advise the Architect in writing with copy to Contractor if, at any time, in his opinion, the work is not in substantial conformity with the Contract Documents.
  - 5. Observation of fills following interruptions by rains or other inclement weather.

- B. Perform field density tests in accordance with ASTM D 1556 or D 3017.
  - 1. Make at least one field density test of the subgrade for every 2000 sq. ft. of paved area, but in no case less than three tests.
  - 2. In each compacted fill layer, make one field density test for every 2000 sq. ft. of overlaying paved areas, but in no case less than three tests.
- C. The Testing Laboratory's presence does not include supervision or direction of the actual work by the Contractor, his employees, or agents. Neither the presence of the Testing Laboratory, nor any observations and testing performed by him shall excuse the Contractor from defects discovered in his work.
- D. The Owner reserves the right to modify or waive Testing Laboratory services.
- E. Testing of soils shall be in accordance with the following:

<u>Property</u>	<u>ASTM Test Method</u>
Particle-Size Analysis	D 422
Liquid Limit	D 4318
Plasticity Index	D 4318

## 1.7 SUBMITTALS

- A. A 5 lb. sample of each off-site material proposed for use, and of any on-site material when so requested by the Architect, shall be submitted for approval.
  - 1. Samples shall be delivered to office of the Architect or Testing Laboratory, as directed.
  - 2. Samples required in connection with compaction tests will be taken and transported by the Testing Laboratory.

## 1.8 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. The work shall be executed in such manner as to prevent any damage to adjacent property and any other property and existing improvements such as, but not limited to: streets, curbs, paving, utility lines and structures, monuments, bench marks and other public and private property. Protect existing structures and foundations from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. In case of any damage or injury caused in the performance of the work, the Contractor shall, at his own expense, make good such damage or injury to the satisfaction of, and without cost to the Owner. Existing roads, sidewalks, and curbs damaged during the project work shall be repaired or replaced to their original condition at the completion of operations. The Contractor shall replace, at his own cost, existing bench marks, monuments, and other reference points which are disturbed or destroyed.

- C. Buried structures, utility lines, etc., including those which project less than 18 in. above grade, which are subject to damage from construction equipment shall be clearly marked to indicate the hazard. Markers shall indicate limits of danger areas, by means which will be clearly visible to operators of trucks and other construction equipment, and shall be maintained at all times until completion of Project.

#### **1.9 DRAINAGE AND DEWATERING**

- A. The Contractor shall provide, at his own expense, adequate pumping and drainage facilities to keep excavated areas sufficiently dry from groundwater and/or surface runoff so as not to adversely affect construction procedures or cause excessive disturbance of underlying natural ground or excavation bottom.
- B. The Contractor shall grade and ditch the site as necessary to direct surface runoff away from open excavations and subgrade surfaces. Positive drainage (minimum 2.0% slope) shall be maintained at all times.
- C. Water from trenches and excavations shall be disposed of in such a manner as will not cause injury to public health nor to public or private property, nor to existing work, nor to the work completed or in progress, nor to the surface of roads, walks, and streets, nor cause any interference with the use of the same by the public. Methods of disposal of pumped effluent shall not cause erosion or siltation, and shall conform to requirements of Section 312500, EROSION AND SEDIMENT CONTROL.
- D. Under no circumstances place fills, pour concrete, or install piping and appurtenances in excavations containing free water.
- E. There shall be sufficient pumping equipment, in good working order, available at all times to remove water.
- F. Where, in the opinion of the Architect, pumping of excavations is not effective in maintaining a dry firm subgrade, other dewatering methods acceptable to the Architect, shall be employed. This may include the use of well points or deep well dewatering.

#### **1.10 FROST PROTECTION**

- A. Do not excavate to full indicated depth when freezing temperatures may be expected, unless footings or slabs can be poured immediately after the excavation has been completed. Protect the excavation from frost if placing of concrete is delayed.
- B. Completed footings which have not been backfilled shall be protected from freezing by temporary additional earth cover, insulating blankets, heaters, or other methods acceptable to the Architect.
- C. Frozen material shall not be placed as fill or backfill.

### **1.11 SHORING AND SHEETING**

- A. Provide shoring, sheeting and/or bracing at excavations, as required, to prevent collapse of earth at side of excavations.
- B. Comply with federal, state, and local regulations, or in the absence of such regulations, comply with the requirements contained in the AGC Manual.
- C. Remove sheeting and shoring and the like, as backfilling operations progress, taking all necessary precautions to prevent collapse of excavation sides.

### **1.12 ROCK**

- A. Rock shall be defined as sound and solid mass, layer, or ledge of mineral matter in place of such hardness and texture that it:
  - 1. Mechanical Definition of Rock: Cannot be effectively loosened or broken down by ripping in a single pass with a late model tractor-mounted hydraulic ripper equipped with one digging point of standard manufacturer's design adequately sized for use with and propelled by a crawler type tractor rated between 210-and 240-net flywheel horsepower, operating in low gear, or
  - 2. Manual Definition of Rock: In areas where the use of the ripper described above is impracticable, rock defined as sound material of such hardness and texture that it cannot be loosened or broken by a 6-lb. drifting pick. The drifting pick shall have a handle not less than 34 in. in length.

### **1.13 COORDINATION**

- A. Prior to start of earthwork the Contractor shall arrange an on-site meeting with the Architect for the purpose of establishing Contractor's schedule of operations and scheduling inspection procedures and requirements.
- B. As construction proceeds, the Contractor shall be responsible for notifying the Architect prior to start of earthwork operations requiring inspection and/or testing.
- C. The Contractor shall be responsible for obtaining test samples of soil materials proposed to be used and transporting them to the site sufficiently in advance of time planned for use of these materials for testing of materials to be completed. Use of these proposed materials by the Contractor prior to testing and approval or rejection, shall be at the Contractor's risk.
- D. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.
3. Contact utility-locator service for area where Project is located before excavating.

#### **1.14 PROTECTION OF EXISTING LANDSCAPE**

- A. The Contractor shall exercise care to preserve the natural landscape and shall conduct his construction operations so as to prevent any unnecessary destruction, scarring, or defacing of the natural surroundings in the vicinity of the Work.
  1. Except where clearing is required for permanent works, for approved construction roads, and for excavation operations, all trees, native shrubbery, and vegetation shall be preserved and shall be protected from damage which may be caused by the Contractor's construction operations and equipment. Existing trees to remain shall be suitably protected from damage with fencing or other means acceptable to the Architect.
  2. Movement of crews and equipment within the right-of-way and over routes provided for access to the work shall be performed in a manner to prevent damage to property. Where unnecessary destruction, scarring, damage, or defacing may occur as a result of the Contractor's operations the same shall be repaired, replanted, reseeded, or otherwise corrected at the Contractor's expense.
- B. Where indicated on the Drawings and as directed by the Architect, disturbed areas shall be temporary seeded in accordance with Section 312500, EROSION AND SEDIMENT CONTROL.

#### **1.15 PROTECTION OF EXISTING WATER SYSTEMS**

- A. The Contractor shall comply with applicable Federal and State laws, orders, and regulations concerning the control and abatement of water pollution.
- B. The Contractor's construction activities shall be performed by methods that will prevent entrance, or accidental spillage, of solid matter, contaminants, debris, and other objectionable pollutants and wastes into streams, water courses, lakes, and underground water sources.

### **PART 2 - PRODUCTS**

#### **2.1 SOURCE OF MATERIALS**

- A. Material shall be obtained from required on-site excavation, to the extent that suitable material is available, and from off-site sources, to the extent that suitable material is not available from on-site excavation.

- B. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.
  - 1. Unsuitable material is defined as surficial organics, surficial and buried topsoil and subsoil, old foundations and pavement, and compressible and deleterious materials.
  - 2. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

## 2.2 EMBANKMENT MATERIALS

- A. Embankment material shall be a granular material conforming to the following:
  - 1. Liquid Limit shall not exceed 35%.
  - 2. Plasticity Index shall be in the range of 2 to 10.
  - 3. Gradation shall conform to the following:

<u>Sieve Size</u>	<u>% Passing by Weight</u>
2 in.	100
3/4 in.	80-100
No. 4	60-85
No. 40	35-60
No. 100	15-40
No. 200	0-12

## 2.3 BACKFILL MATERIALS

- A. On-site material for use in compacted backfill shall be natural, inorganic, granular soil, taken from areas of excavation after stripping of topsoil and removal of unsuitable material.
- B. Material containing organic matter, topsoil, organic silt, peat, or soft or frost-susceptible soil is unsuitable for any of the following uses:
  - Backfill beneath site structures
  - Backfill beneath pavement and within 5 ft. of subgrade
  - Bearing strata material
  - Bedding
- C. Backfill materials shall be free from rocks greater than 8 in. in diameter or length, having largest dimension greater than 3/4 lift thickness, or greater than 1/2 ft.<sup>3</sup> in volume, and foreign matter, such as construction debris, trash, wood, roots, leaves, sod, organic

matter, or soft clay and silt. Backfill shall be clean, non-organic material, of non-swelling character, capable of being readily compacted to form a solid, stable embankment. Materials containing ice or frozen lumps shall not be employed.

- D. Backfill material shall be compacted clean washed sand with less than 10% passing the No. 200 sieve. Maximum diameter shall be 1-1/2 in. Testing laboratory shall examine and approve material before backfilling.
- E. Structural Fill: Backfill below and around foundations and other structural elements and above the select fill in trenches should consist of clean, well-graded sand and gravel free of organic material, trash, ice, frozen soil, and other deleterious materials. The recommended gradation for structural fill should satisfy the following limits.

<u>U.S. Sieve Size and Number</u>	<u>Percent Finer by Weight</u>	
	<u>Minimum</u>	<u>Maximum</u>
4 inch	100 ---	
2 inch	65	100
No. 4	30	80
No. 20	10	65
No. 40	5	40
No. 100	0	20
No. 200	0	8

- 1. The moisture content of the structural fill material should be adjusted before placement so that it is within 2 percent of the optimum moisture content.

- F. Select Fill: should be used as backfill around and above underground piping. Select fill shall consist of hard, durable sand and gravel, free from trash, organic matter, surface coatings and other deleterious materials. The recommended gradation for select fill should satisfy the following limits.

<u>U.S. Sieve Size and Number</u>	<u>Percent Finer by Weight</u>	
	<u>Minimum</u>	<u>Maximum</u>
4 inch	100 ---	
No. 10	30	100
No. 40	0	70
No. 200	0	15

- 1. The moisture content of the select fill material should be adjusted before placement so that it is within 2 percent of the optimum moisture content.

- G. Common Fill (in landscaped areas) shall be bankrun sand, gravel, or mixture thereof, graded within the following limits:

<u>Sieve Size</u>	<u>% Passing by Weight</u>
6 in.	100
No. 4	30-95
No. 200	0-15

- H. Material for aggregate base shall conform to RIDOT Specifications Section M.01.09 Type I, with less than 10% by weight passing No. 200 sieve.

### **PART 3 - EXECUTION**

#### **3.1 EXCAVATION**

- A. Sheeting, shoring, bracing, pumping, bailing, and other incidental work necessary to make and maintain excavations and keep them free from water at all times during placing of concrete, utility lines, and fill and backfill materials, shall be performed or supplied as required. Fill and backfill shall be placed in dry or dewatered areas only.
- B. Sheeting shall be installed where required to maintain safe and workable conditions in excavations. Sheeting, including necessary swales and struts, shall be selected and designed by the Contractor. Use of sheeting shall equal or exceed minimum required for safety and/or conformance to law.
- C. Structures, pipes, pavement, earth, and other property liable to damage from excavation operations shall be braced, underpinned, and supported as required to prevent damage and movement.
- D. As excavation approaches underground utilities and structures, excavation shall be done by hand tools. Such manual excavation is incidental to normal excavation and no special payment will be made.
- E. Excavation shall include satisfactory disposal of excavated material not employed as backfill or fill materials.
1. Excavation material, other than topsoil, which is not required for or is unsuitable for backfill or fill materials, shall be legally disposed of off-site.
- F. Excavation for pipe and other items shall be carried far enough below underside of item to accommodate bedding material.
- G. Excavations which extend below indicated or specified levels ("over-excavation"), shall be filled to those levels with compacted Granular Fill Material.

- H. If bearing surface of subgrade which is to receive fill, structure, concrete, or other construction becomes softened, disturbed, or unstable, unsuitable material shall be removed down to a firm bearing surface and replaced with suitable material. Subgrade shall then be protected from further disturbance until construction item is placed.
- I. Excavations shall not be wider than required to set, brace, and remove forms for concrete, install structures, piping, or perform other necessary work. Width of trench at 12 in. above top of pipe or conduit shall not be greater than the sum of outside diameter of the pipe or the conduit plus 2 ft. (pipe O.D. + 2 ft.). Sides of trench above this level shall be sloping, at an angle 30 degrees or less from vertical, from this level to grade. In materials where sloping walls are not stable, trench walls shall be sheeted.
- J. Explosives: Do not use explosives.
- K. Below-ground Demolition
  - 1. Underground items, not indicated on the Drawings, which impede construction of new work indicated, shall be abandoned, demolished, and/or removed only with the approval of the Architect.
- L. Proofroll areas to support foundations, pavements with a 35 ton rubber tired roller in four passes in two perpendicular directions. Undercut to level of stable soils in unstable areas. Perform work in presence of Geotechnical Engineer.

### **3.2 SUBGRADE INSPECTION**

- A. Notify Architect when excavations have reached required subgrade.
- B. When excavations have reached required subgrade, Contractor shall have subgrades surveyed to determine if subgrade elevations will allow for the indicated depth of proposed materials to be placed on them.
  - 1. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material to achieve required subgrade elevation, as directed.
  - 2. If survey indicates that subgrade elevations are too high, continue excavation and reconstruct subgrades to required elevation as directed, without additional compensation.
  - 3. If survey indicates that subgrade elevations are too low, add compacted backfill or fill material to achieve required subgrade elevation as directed, without additional compensation.
- C. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5 km/h).
  2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
  3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

### **3.3 FILLING**

- A. Filling shall be done in any area only after the Geotechnical Consultant has reviewed subgrade.
- B. Benching: Fills placed on existing slopes which exceed 6 ft. horizontal to 1 ft. vertical shall be keyed or benched into the existing slope not less than 5 ft. to prevent the formation of slippage planes.
- C. Compaction at End of Day: Areas undergoing filling shall be smooth-rolled before the end of the work day to seal and protect these areas from rainfall infiltration during the night.

### **3.4 FILL, BACKFILL, AND COMPACTION**

- A. Excavation below finished grades shall be backfilled. Temporary planking, timbering, forms, debris, and refuse shall be removed before backfill is placed.
- B. Backfilling shall be done in any area only after the Architect or Geotechnical Consultant has inspected and approved subgrade, or other work in excavations. Notice that the work is ready for inspection shall be given promptly, and sufficient time shall be allowed for making necessary examinations.
- C. Structural Fill: Backfill below and around pool, foundations and other structural elements and above the select fill in trenches. Fill shall be placed in loose lifts not exceeding 12 inches in thickness and compacted with a minimum of 4 passes of a vibratory compactor to at least 95 percent of the maximum dry density as determined by the laboratory test designated ASTM D 1557, Method C.
1. Steel drum vibratory compactors shall be used to compact fill within the limits of structures. Each roller shall vibrate with a minimum dynamic force of 20,000 pounds. In confined areas including trenches, or adjacent to walls, small hand operated equipment such as walk behind vibratory compactors should be used.

- D. Select Fill: should be used as backfill around and above underground piping, and in areas beyond the building limits and beyond structures. Fill shall be placed in loose lifts not exceeding 9 inches in thickness and compacted with a minimum of 4 passes of a vibratory compactor to at least 92 percent of the maximum dry density as determined by the laboratory test designated ASTM D 1557, Method C.
- E. Where pumping of excavations is not effective and where permitted by the Architect or Geotechnical Consultant, Stone Fill may be placed below water without compaction in lieu of Granular Fill. There will be no adjustment in Contract price.
- F. In order to prevent lateral movement, care shall be exercised in placing backfill adjacent to foundation wall, footing, utility line and other structures. Backfill on opposite sides of such items shall be kept at approximately the same elevation as backfilling progresses to prevent unbalanced earth pressure. During backfilling the difference in elevation of backfill on opposite sides of the structure shall not exceed 12 in.
  - 1. Shoring shall be employed as necessary to protect such items.
  - 2. Footings have been designed to act with other portions of the structure to withstand the loads they will bear in completed project; they have not been designed to withstand construction loads or unbalanced earth or equipment loadings.
- G. Except as otherwise noted, tolerance of top surface of completed backfill shall be  $\pm 2$  in. from true grade indicated, and variations from indicated tolerance shall approximately compensate within each 100 ft.<sup>2</sup> area.
- H. Subgrade and backfill of indicated areas or structures shall be compacted in accordance with requirements of ASTM D 1557, and as specified in the following table:

COMPACTION TABLE

<u>Area or Structure</u>	<u>Subgrade Compaction Minimum %</u>	<u>Max. Compacted Thickness Per Lift - in.</u>	<u>Compaction of Each Lift Minimum %</u>
Above pipe cover to subgrade	85	12	90
Area or structure not otherwise noted	85	12	90
Concrete equipment pad	90	8	95
Footing, foundation, or similar structure, and within 2 ft. horizontally	90	8	95

COMPACTION TABLE (continued)

<u>Area or Structure</u>	<u>Subgrade Compaction Minimum %</u>	<u>Max. Compacted Thickness Per Lift - in.</u>	<u>Compaction of Each Lift Minimum %</u>
Pavement, including 1 ft. beyond edge	90	8	95
Aggregate base, including 1 ft. beyond edge	90	6	95
Pipe cover	--	9	92

- I. Compaction requirements shall apply to material directly below the indicated supported item (base course, footing, or structure), and to all material above the undisturbed earth beneath fill, and enclosed by the following planes:
  - 1. Horizontal plane at the elevation of the bottom of the supported item (base course, footing, or structure), within a perimeter line located 2 ft. beyond the exterior face or edge of item.
  - 2. Flat planes extending from the perimeter line downward and outward at 45° angle with the horizontal, to where the planes intersect undisturbed earth. Where zones of higher and lower percentages of compaction overlap, that of the higher percentage shall apply.
- J. Compaction of backfill in excavation shall be to a density not less than that required of the surrounding area fill.
- K. Equipment and methods employed to achieve specified compaction shall be subject to the approval of the Architect and Testing Laboratory, and equipment shall be replaced and methods revised as directed until specified compaction is obtained.
- L. Compaction of each lift shall be completed before compaction of the next lift is started.
- M. Backfill adjacent to wall, conduit, pipe, and similar item, and in other areas where wheeled equipment cannot safely be employed, shall be placed in 4 in. thick layers, to the specified compaction, using mechanical tampers.

**3.5 MOISTURE CONTROL**

- A. Variation of moisture content in fill and backfill materials shall be limited to Optimum Moisture (-1% to +2%). Moisture content shall be as uniformly distributed as practicable within each lift, and shall be adjusted as necessary to obtain the specified compaction.
- B. Material which does not contain sufficient moisture to be compacted to the specified densities shall be moisture conditioned by sprinkling, disking, windrowing, or other method approved by the Geotechnical Consultant.

1. Material conditioned by sprinkling shall have water added before compaction. Uniformly apply water to surface of subgrade or layer of soil material to obtain sufficient moisture content. The Contractor shall maintain sufficient hoses and/or water distributing equipment at the site for this purpose.
- C. Material containing excess moisture shall be dried to required Optimum Moisture Content before it is placed and compacted. Excessively moist soils shall be removed and replaced or shall be scarified by use of plows, discs, or other approved methods, and air-dried to meet the above requirements.
- D. Materials which are within the moisture requirements specified above, but which display pronounced elasticity or deformation under the action of earthmoving and compaction equipment, shall be reduced to Optimum Moisture Content, or below, to secure stability.
- E. In the event of sudden downpours or other inclement weather, exposed subgrades and fills which, in the opinion of the Geotechnical Consultant, become inundated or excessively moistened shall have excess water removed and soil dried as specified above.

### **3.6 DUST CONTROL**

- A. Contractor shall be responsible for dust control during all construction operations. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities including sweeping and sprinkling of streets as necessary, so as to minimize the creation and dispersion of dust. If the Architect decides that it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread calcium chloride as directed. Methods and materials for dust control shall be as approved by the Architect.

### **3.7 PROTECTION**

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
  1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

**3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS**

- A. Disposal: Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.
  - 1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

**END OF SECTION**

## **SECTION 312319 - DEWATERING**

### **Part 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:
  - 1. Construction dewatering.
- B. Alternates: Not Applicable.
- C. Items To Be Installed Only: Not Applicable.
- D. Items To Be Furnished Only: Not Applicable.
- E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
  - 1. Section 312000 - EARTH MOVING for excavating, backfilling, site grading, and for site utilities.
- F. References:
  - 1. Geotechnical Report – Appendix 01 – Geotechnical Engineering Report – Proposed Roger Williams Park Gateway Center.
  - 2. Remedial Action Work Plan – Appendix 02.

#### **1.3 PERFORMANCE REQUIREMENTS**

- A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
  - 1. Delegated Design: Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer registered in the State of Rhode Island, using performance requirements and design criteria indicated. All costs for delegated design shall be included in the bid price for the Work of this Section.

2. Test liquids for hazardous waste at start of construction operations and provide on-site remediation as acceptable to authorities having jurisdiction.
3. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
4. Prevent surface water from entering excavations by grading, dikes, or other means.
5. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
6. Remove dewatering system when no longer required for construction.

#### **1.4 SUBMITTALS**

- A. Shop Drawings: For dewatering system. Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water.
  1. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
  2. Include a written plan for dewatering operations including control procedures to be adopted if dewatering problems arise.
- B. Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation. Dewatering system must be approved by the City of Providence Conservation Commission prior to implementation.
- C. Qualification Data: For qualified Installer
- D. Field quality-control reports.
- E. Other Informational Submittals:
  1. Photographs: Show existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.

#### **1.5 QUALITY ASSURANCE**

- A. Installer Qualifications: An experienced installer that has specialized in dewatering work.
- B. Regulatory Requirements: Comply with governing EPA and Rhode Island Department of Environmental Protection notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.
  1. Review methods and procedures related to dewatering including, but not limited to, the following:

- a. Inspection and discussion of condition of site to be dewatered including coordination with temporary erosion control measures and temporary controls and protections.
- b. Geotechnical report.
- c. Remedial Action Work Plan.
- d. Proposed site clearing and excavations.
- e. Existing utilities and subsurface conditions.
- f. Coordination for interruption, shutoff, capping, and continuation of utility services.
- g. Construction schedule. Verify availability of Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- h. Testing and monitoring of dewatering system.
- i. Control of dewatering equipment during non-work hours.

## 1.6 PROJECT CONDITIONS

- A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
  1. Notify Owner's Representative no fewer than two days in advance of proposed interruption of utility.
  2. Do not proceed with interruption of utility without Owner's Representative's written permission.
- B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data.
  1. Make additional test borings and conduct other exploratory operations necessary for dewatering.
  2. See the geotechnical report that is referenced.
  3. Refer to the "Geotechnical Engineering Report" and the "Remedial Action Work Plan" for information regarding on-site contamination prior to any movement of soil or excavation of materials due to site contamination.
- C. Survey Work: Engage a qualified land surveyor or professional engineer licensed in the State of Rhode Island to survey adjacent existing buildings, structures, and site improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
  1. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Designer if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

## Part 2 - PRODUCTS (Not Used)

### **Part 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.
  - 1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
  - 2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
- B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the Owner's Representative and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Provide temporary grading to facilitate dewatering and control of surface water.
- D. Monitor dewatering systems continuously.
- E. Promptly repair damages to adjacent facilities caused by dewatering.
- F. Protect and maintain temporary erosion and sedimentation controls, which are specified in Section 312500 - EROSION AND SEDIMENTATION CONTROLS during dewatering operations.

#### **3.2 INSTALLATION**

- A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
  - 1. Space well points or wells at intervals required to provide sufficient dewatering.
  - 2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.
- B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.
- C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
  - 1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

- D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
  - 1. Maintain piezometric water level a minimum of 24 inches below surface of excavation.
- E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.
- F. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to the Owner.
  - 1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.
- G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

### **3.3 FIELD QUALITY CONTROL**

- A. Observation Wells: Provide, take measurements, and maintain at least the minimum number of observation wells or piezometers indicated; additional observation wells may be required by authorities having jurisdiction.
  - 1. Observe and record daily elevation of ground water and piezometric water levels in observation wells.
  - 2. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.
  - 3. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.
- B. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

**END OF SECTION**

(this is for double sided printing)

## **SECTION 312500 - EROSION AND SEDIMENT CONTROLS**

### **Part 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
  - 1. Control measures to prevent all erosion, siltation and sedimentation of wetlands, waterways, construction areas, adjacent areas and off-site areas.
  - 2. Control measures shall be accomplished adjacent to or in the following work areas:
    - a. Soil stockpiles and on-site storage and staging areas.
    - b. Cut and fill slopes and other stripped and graded areas.
    - c. Constructed and existing swales and ditches.
    - d. Erosion control fabric at slopes greater than 3:1.
  - 3. Additional means of protection shall be provided by the Contractor as required for continued or unforeseen erosion problems, at no additional cost to Owner Project Manager.
  - 4. Periodic maintenance of all sediment control structures shall be provided to ensure intended purpose is accomplished. Sediment control measures shall be in working condition at the end of each day.
  - 5. The contractor shall inspect the sediment barrier after each rain event to ensure that they are working effectively and as intended. Contractor shall be responsible for ensuring that an effective barrier is in place for all phases of the contract.
  - 6. Barriers that decompose naturally due to weatherization over time such that they no longer provide the function required shall be repaired or replaced as directed. If the resulting berm of compost within the fabric tube is sufficiently intact and continues to provide water and sediment control, barrier does not necessarily require replacement.
  - 7. Provide documents such as field reports and photos of erosion and sedimentary control strategies implemented on site.
  - 8. Report in regular basis the status of sedimentary control strategy and implementation checks to project team.
- B. Alternates: Not Applicable.
- C. Items To Be Installed Only: Not Applicable.

- D. Items To Be Furnished Only: Not Applicable.
- E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
  - 1. Section 312000 – EARTH MOVING for soil materials, excavating, backfilling, and site grading and removal of site utilities.
  - 2. Section 018113 – Sustainable Design Requirements
  - 3. Section 017419 – Construction Waste Management and Disposal
  - 4. Section 018119 – Construction Indoor Air Quality Requirements

### 1.3 QUALITY ASSURANCE

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to a sediment and erosion control plan specific to the site that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
- B. Erosion control measures shall be established at the beginning of construction and maintained during the entire period of construction. On-site areas which are subject to severe erosion, and off-site areas which are especially vulnerable to damage from erosion and/or sedimentation, are to be identified and receive special attention.
- C. All land-disturbing activities are to be planned and conducted to minimize the size of the area to be exposed at any one time, and the length of time of exposure.
- D. Surface water runoff originating upgrate of exposed areas should be controlled to reduce erosion and sediment loss during the period of exposure.
- E. When the increase in the peak rates and velocity of storm water runoff resulting from a land-disturbing activity is sufficient to cause accelerated erosion of the receiving stream bed, provide measures to control both the velocity and rate of release so as to minimize accelerated erosion and increased sedimentation of the stream.
- F. All land-disturbing activities are to be planned and conducted so as to minimize off-site sedimentation damage.
- G. The Contractor is responsible for cleaning out and disposing of all sediment once the storage capacity of the sediment facility is reduced by one-half.
- H. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- I. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

## Part 2 - PRODUCTS

### 2.1 GENERAL

- A. All materials and equipment shall be of a quality, capacity, and strength that will function according to the requirements and will withstand the conditions at the site. Contractor shall maintain all materials and equipment in good working order throughout the Contract.
- B. Erosion control for slope and soil stabilization shall be Jute Mesh Erosion Control Fabric. Netting shall be biodegradable natural material such as cotton, hemp, or jute. No sediment barriers with non-biodegradable fabric or photo-degradable fabrics may be used.
- C. Single 12" filter tube for slopes less than 2 to 1. Triple 12" filter tubes arranged in a berm on slopes 2 to 1 and steeper.
- D. Stakes shall be 4' in length and spaced 5' on center or as recommended by manufacturer.
- E. Promptly remove used, damaged or extra materials from the work areas and legally dispose off-site.
- F. Disposal of waste, concrete washouts or hazardous materials in sewers, catch basins, or any other water-collecting opening will not be allowed.
- G. Not all the Erosion and Sediment Control Best Management Practices summarized below are applicable to the proposed Project, but are provided in the event they are applicable.

### 2.2 SILTATION FENCE

- A. Fabricated or prefabricated unit consisting of the following filter fabric properties:

1.	Grab Tensile Strength	120	ASTM D4632
2.	Elongation at Failure (%)	15	ASTM D4632
3.	Mullen Burst Strength (PSI)	300	ASTM D3786
4.	Puncture Strength (lbs)	65	ASTM D4833
5.	Water Flow Rate (gal/min/sf)	8	ASTM D4491
6.	Apparent Opening Size (U.S. Sieve)	30	ASTM D4751
7.	Ultraviolet Radiation Stability (%)	80	ASTM D4355

### 2.3 CATCH BASIN

- A. When necessary, provide catch basins complying with the specification and the following.

- B. Where catch basins, either new or existing, are used in connection with site dewatering and drainage during construction, they shall be made watertight and shall be provided with a silt filtering media or device to prevent silt from entering the catch basin.
- C. Each catch basin utilized as part of the Erosion and Sediment Control System shall be equipped with a hood and grease trap, which shall consist of a 90-degree elbow or effluent tee extending 15 inches below the static liquid level in the catch basin. The hood shall be provided with a vacuum break located at the top of the elbow to prevent siphoning in the basin.
- D. Pipe connections to catch basins used in connection with site dewatering and drainage during construction shall be watertight.
- E. Replaceable sorbent booms or pads shall be placed around each catch basin grate or in each catch basin to absorb oil, grease or hazardous materials that enter the catch basin. The sorbent devices shall be secured using a nylon rope attached to the grate or near the top of the structure as applicable. These sorbent devices shall be replaced or maintained as needed, in conformance with the manufacturer's recommendations, to ensure absorption or absorption in the event of a spill. The sorbent devices shall be disposed of in accordance with regulations governing disposal of such material.

### **Part 3 - EXECUTIONS**

#### **3.1 CATCH BASIN INLET PROTECTION**

- A. Install sediment silt sack inside catch basin prior to construction.

#### **3.2 DUST CONTROL**

- A. Throughout the construction period the Contractor shall carry on an active program for the control of fugitive dust within all site construction zones, or areas disturbed as a result of construction. Control methods shall include the following: Apply calcium chloride at a uniform rate of one and one-half (1 ½) pounds per square yard in areas subject to blowing. For emergency control of dust apply water to affected areas. The source of supply and the method of application for water are the responsibility of the contractor.
- B. The frequency and methods of application for fugitive dust control shall be as directed by the Architect with concurrence by the Owner Project Manager.

#### **3.3 TEMPORARY PROTECTIVE COVERINGS (AFTER GROWING SEASON)**

- A. Place temporary covering for erosion and sedimentation control on all areas that have been graded and left exposed after October 30. Contractor shall have the choice to use either or both of the methods described herein.

- B. Hay or straw shall be anchored in-place by one of the following methods and as approved by the Architect with concurrence by the Owner Project Manager: Mechanical “crimping” with a tractor drawn device specifically devised to cut mulch into top two inches of soil surface or application of non-petroleum based liquid tackifier, applied at a rate and in accordance with manufacturer’s instructions for specific mulch material utilized.
- C. Placement of mesh or blanket matting and anchoring in place shall be in accordance with manufacturer’s printed instructions.
- D. Inspect protective coverings periodically and reset or replace materials as required.

### **3.4 CONCRETE RINSING**

- A. Clean concrete from transit mix trucks and finishing tools into delineated washout area(s). Excess concrete that cannot be disposed of on site shall be collected in a watertight lined box and removed from the site by the contractor as necessary.
- B. Sediment from rinsing concrete shall be prevented from entering the storm sewer by protection of the storm sewer or capturing rinse water in settling tank(s).

**END OF SECTION**

(this is for double sided printing)

## **SECTION 321216 - ASPHALT PAVING**

### **Part 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:
  - 1. Hot-mix asphalt paving.
  - 2. Hot-mix asphalt patching.
- B. Alternates: Not Applicable.
- C. Items To Be Installed Only: Not Applicable.
- D. Items To Be Furnished Only: Not Applicable.
- E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
  - 1. Section 312000 - EARTH MOVING for aggregate subbase and base courses and for aggregate pavement shoulders.
  - 2. Section 017419 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

#### **1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
  - 1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
- B. Material Certificates: For each paving material, from manufacturer.

#### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by the Rhode Island Department of Transportation Highway Division (RIDOT).

- B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the Rhode Island Department of Transportation Highway Division (RIDOT) for hot mix asphalt paving work.
  - 1. Comply with requirements of the Rhode Island Department of Transportation Highway Division (RIDOT) Standard Specifications for Road and Bridge Construction, including supplemental specifications and special provisions.
  - 2. Comply with requirements of the Americans with Disabilities Act (ADA). If these requirements cannot be met with the grades and slopes indicated on the plans, notify the Designer immediately.
  - 3. Comply with requirements of the local authority having jurisdiction concerning the location and construction of accessible curb cuts.
  
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.
  - 1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
    - a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
    - b. Review condition of subgrade and preparatory work.
    - c. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
    - d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
  
- B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

### **1.6 PROJECT CONDITIONS**

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
  
- B. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
  - 1. Tack Coat: Minimum surface temperature of 60 deg F.

2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
  3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.
- C. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F for water-based materials, and not exceeding 95 deg F.

## Part 2 - PRODUCTS

### 2.1 AGGREGATES

- A. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag and
- B. Fine Aggregate: ASTM D 1073 or AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.
- C. Mineral Filler: ASTM D 242 or AASHTO M 17, rock or slag dust, hydraulic cement, or other inert material.
- D. Reclaimed Asphalt Pavement (RAP): Provide material obtained from the highways or streets by crushing, milling, or planing existing hot mix asphalt pavements.
  1. The proportion of RAP to virgin aggregate for base course mixtures and intermediate course mixtures shall be limited to a maximum of 40% for drum mix plants and 20% for modified batch plants. The maximum amount of RAP for surface course mixtures shall be 10%.

### 2.2 ASPHALT MATERIALS

- A. Asphalt Binder, Performance Graded: AASHTO M320 or AASHTO MP 1a, performance grade as required by RIDOT Specifications.
- B. Tack Coat: AASHTO M 140 emulsified asphalt, or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

### 2.3 ASPHALT MIXES

- A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by RIDOT Specifications and designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types".

## Part 3 - EXECUTION

### **3.1 EXAMINATION**

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.

### **3.2 COLD MILLING**

- A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.

### **3.3 PATCHING**

- A. Existing Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Existing Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseal concrete pieces firmly.
  - 1. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.
- C. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a minimum rate of 0.05 to 0.15 gal./sq. yd..
  - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
  - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- D. Patching: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

### **3.4 SURFACE PREPARATION**

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

### **3.5 HOT-MIX ASPHALT PLACING**

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
  1. Spread mix at minimum temperature of 250 deg F.
  2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

### **3.6 JOINTS**

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
  1. Clean contact surfaces and apply tack coat to joints.
  2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
  3. Offset transverse joints, in successive courses, a minimum of 24 inches.
  4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

### **3.7 COMPACTION**

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
  1. Complete compaction before mix temperature cools to 20 deg F less than the specified compaction temperature.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
  - 1. Average Density per RIDOT Specifications.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

### **3.8 INSTALLATION TOLERANCES**

- A. Accessibility: Comply with requirements of ADAAG. Remove and replace paving that does not meet required tolerances, when measured with a 2 foot straightedge.
- B. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
  - 1. Base Course: Plus or minus 1/2 inch.
  - 2. Surface Course: Plus 1/4 inch, no minus.
- C. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within RIDOT Specification tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas.

### **3.9 PAVEMENT MARKING**

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Designer.
- B. Allow paving to age for a minimum of 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Dimensions indicated on the plans are to/from the centerline of pavement striping. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils. Parking stall striping shall be 4-inch wide.

### **3.10 FIELD QUALITY CONTROL**

- A. Independent Testing Agency: Contractor shall retain the services of an independent testing agency for field quality control activities for the Work of this Section. Performance testing requirements and the means and methods should be per the RIDOT Standard Specifications for Road and Bridge Construction.
- B. Test the plane of the finished surfaces of base, binder, and surface courses with a 16-foot straightedge, except use a 10-foot straightedge on vertical courses and on the top course of resurfaced streets which contain manhole covers, valve boxes, and the like.
- C. Carefully apply the straightedge immediately after the first compaction by rolling, and from then on as may be necessary until and after the final compaction of the material in place. Hold the straightedge in successive positions parallel to the road centerline and in contact with the road surface; check the entire area from one side of the pavement to the other.
- D. Correct irregularities which vary  $3/8$  inch from a true finished surface in base and binder courses, and  $1/4$  inch in top courses. For Open-Graded Friction Course (OG-FC) for the asphalt the surface smoothness cannot exceed  $1/8$  inch.
- E. Irregularities which may develop before the completion of rolling and while the material is still workable, may be remedied by loosening the surface mixture and removing or adding material as necessary. Should any unsatisfactory irregularities or defects remain after final compaction, correct the defective work by removing and replacing with new material to form a true and even surface.
- F. Thickness: In-place compacted thickness tested in accordance with ASTM D 3549 will not be acceptable if exceeding following allowable variations:
  - 1. Open-Graded Friction Course: Plus or minus  $1/8$  inch.

### **3.11 OPENING TO TRAFFIC**

- A. No vehicular traffic or loads shall be permitted on the newly completed pavement until adequate stability has been attained, and the material has cooled sufficiently to prevent distortion or loss of fines, and the pavement has achieved a maximum temperature of 140 degrees F.
- B. If the climatic or other conditions warrant it, the period of time before opening to traffic may be extended at the discretion of the Designer.

### **3.12 DISPOSAL**

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

### **END OF SECTION**

(this is for double sided printing)

## **SECTION 32 13 14 - EXPOSED AGGREGATE CONCRETE PAVING**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide all equipment and materials and do all work necessary to construct the exposed aggregate concrete paving work, complete, as indicated on the Drawings and as specified.

#### **1.3 RELATED WORK**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 014000, QUALITY REQUIREMENTS; Inspection and testing.
  - 2. Section 033001, CAST IN PLACE CONCRETE - SITEWORK.
  - 3. Section 0-79201, EXTERIOR JOINT SEALANTS – SITEWORK.
  - 4. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Excavation and backfill.

#### **1.4 REFERENCES**

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
  - 1. American Concrete Institute (ACI):

302	Recommended Practice for Concrete Floor and Slab Construction
304	Measuring, Mixing, Transporting, and Placing Concrete.
305	Hot Weathering Concrete
316	Construction of Concrete Pavements and Concrete Bases.

2. American Society for Testing and Materials (ASTM):

C 94	Ready Mixed Concrete
C 150	Portland Cement
C 171	Sheet Materials for Curing Concrete
D 698	Moisture-Density Relations of Soils and Soil-Aggregate Moistures Using 5.5-lb. (2.5-kg) Rammer and 12-in. (304.8-mm) Drop
D 1752	Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

3. Americans with Disabilities Act (ADA):

Appendix to Part 1191	Accessibility Guidelines for Buildings and Facilities
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4. Portland Cement Association (PCA):

Ref. 1	Finishing Concrete Surfaces Exposed Aggregate Finishes for Slabs.
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5. State of Rhode Island Department of Transportation (RIDOT):

Specifications	Standard Specifications for Road and Bridge Construction
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## 1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.

C. ACI Publications: Unless otherwise specified, work and materials for construction of the Portland cement concrete paving shall conform to ACI 301 and 325.9R.

- D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
  - 1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixtures.
    - c. Ready-mix concrete producer.
- F. Work, materials, and color of the handicap ramp paving shall conform to applicable sections of Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.
- G. Paving work, base course etc., shall be done only after excavation and construction work which might injure them have been completed. Damage caused during construction shall be repaired before acceptance.
- H. Existing paving areas shall, if damaged or removed during course of this project, be repaired or replaced under this section of the specification. Workmanship and materials for such repair and replacement, except as otherwise noted, shall match as closely as possible those employed in existing work.
- I. Pavement, base, or subbase shall not be placed on a muddy or frozen subgrade.

## **1.6 PROJECT CONDITIONS**

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

## **1.7 PRECONSTRUCTION MOCK-UP PANELS**

- A. General
  - 1. Schedule mock-up casting for acceptance 30 days prior to casting of concrete surfaces represented by the mockups.
  - 2. Locate mock-up panels in non-public areas accepted by the Architect.
  - 3. Continue to cast mock-ups until acceptable mock-ups area produced. Accepted mock-ups shall be the standard for color, texture, and workmanship for the work.
  - 4. Mock-up sequence of forming, placing, form removal, curing, and finishing shall be reviewed and accepted by the Architect.

5. Mock-up formwork shall be inspected and accepted by the Architect before placing of concrete.
  6. Use the same concrete mixes and placement procedures, accepted in mock-ups, in the final work, unless otherwise directed by the Architect.
  7. Protect accepted mock-ups from damage until completion and acceptance of the work represented by the mock-up.
  8. Remove mock-up panels from site at completion of project, as directed by the Architect.
- B. Construct mock-up panels or areas as indicated to demonstrate the ability to cast concrete for concrete paving to achieve shape, color, and textured finish required. Mock-ups shall include or meet the following requirements:
1. Provide full scale mock-up panels and areas.
  2. Provide mock-ups simulating actual design and execution conditions for concrete mix materials, reinforcement, formwork, placing sequence, form removal, curing, finishing, and methods and materials of stain removal and correction of defective work. Tamping or vibrating shall be minimized to allow coarse aggregate to remain near the surface.
  3. On mock-ups where directed by the Architect, provide minimum of three variation of mix color to be used in the repair of defective work, in order to determine acceptable color and texture match.
  4. Demonstrate in the construction of the mock-up formwork the surface retarder, sealer material, form release agent, and curing materials and methods to be used.
- C. Sample panel, 5 ft. x 5 ft. minimum, shall be constructed prior to start of handicap ramp paving, exhibiting detectable warning surface and required color contrast with adjacent paving in accordance with ADA Guidelines.
- D. Source of Materials. Utilize the same source, stock, or brand of concrete materials for each class or mix of concrete which is to be exposed. Do not interchange materials or mixes until an additional mock-up shows that uniformity in finish texture and color, as compared to original mock-up will be maintained. If necessary, obtain and stockpile materials in sufficient quantity to ensure continuity and uniformity.

## 1.8 SUBMITTALS

- A. Description of Methods and Sequence of Placement. For each type of specially-finished concrete provide description of methods and sequence of placement.
- B. Manufacturers' product data shall be submitted for the following items:

Admixtures  
Aggregate, including sieve analysis  
Concrete sealer  
Curing material  
Preformed joint filler

Form release agent  
Surface retarder  
Sealants

- C. Shop drawings of exposed aggregate paving shall be submitted. Drawings shall indicate expansion joint and control joint locations.
- D. Submit samples of the following:
  - 1. Prefabricated control joint.
  - 2. Preformed joint filler, two pieces, full depth and width, 4 in. length.
  - 3. Color chart for selection of sealant color.
  - 4. A minimum 10 lb. sample of aggregates proposed for use on the exposed aggregate paving shall be submitted for approval. Accompanying each sample shall be information from the aggregate supplier indicating source, type, color, and gradation of aggregate.
- E. Qualification Data: For testing agency.
- F. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
  - 1. Cementitious materials.
  - 2. Fiber reinforcement.
  - 3. Admixtures.
  - 4. Curing compounds.
  - 5. Applied finish materials.
  - 6. Bonding agent or epoxy adhesive.
  - 7. Joint fillers.
- G. Field quality-control test reports.
- H. Minutes of preinstallation conference.

#### **1.9 TESTING AND INSPECTION**

- A. The Owner reserves the right to inspect and test paving and associated work in accordance with Section 014000, QUALITY REQUIREMENTS.

#### **1.10 DESIGN OF CONCRETE MIX**

- A. The Contractor shall be responsible for the design of the concrete mixture. Mix design shall be certified by an independent testing laboratory. The statement of materials constituting the design mix shall be submitted to the Architect for approval within one week following award of Contract. The concrete mix design shall include the following information:

1. Proportions of cement, fine and coarse aggregates, and water.
  2. Water-cement ratio, design strength, slump, and air content.
  3. Type of cement.
  4. Type of aggregates including sieve analysis.
  5. Type and dosage of all admixtures.
  6. Special requirements for pumping.
  7. Range of ambient temperature and humidity for which the design is valid.
  8. Any special characteristics of the mix which require precautions in the mixing, placing, finishing, or curing methods to achieve the finished product specified.
- B. No concrete shall be delivered to the job site until the Architect has reviewed and approved the design mix.

## **PART 2 PRODUCTS**

### **2.1 AGGREGATE BASE**

- A. Material for aggregate base course shall be a graded, granular, non-frost susceptible, free-draining material, consisting of either durable stone and coarse sand or of blast furnace slag, practically free from loam and clay, and which can be readily compacted to form a stable foundation.
1. Material shall conform to RIDOT Specifications Section M.01.09 Type I, with less than 10% by weight passing No. 200 sieve.

### **2.2 FIBER REINFORCEMENT**

- A. Synthetic Fiber: Monofilament or fibrillated polypropylene fibers engineered and designed for use in concrete pavement, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches (13 to 38 mm long).
1. Monofilament Fibers:
    - a. Axim Concrete Technologies; Fibrasol IIP.
    - b. Euclid Chemical Company (The); Fiberstrand 100.
    - c. FORTA Corporation; Forta Mono.
    - d. Grace, W. R. & Co.--Conn.; Grace MicroFiber.
    - e. Metalcrete Industries; Polystrand 1000.
    - f. SI Concrete Systems; Fibermix Stealth.
  2. Fibrillated Fibers:
    - a. Axim Concrete Technologies; Fibrasol F.
    - b. FORTA Corporation; Forta.
    - c. Euclid Chemical Company (The); Fiberstrand F.
    - d. Grace, W. R. & Co.--Conn.; Grace Fibers.
    - e. SI Concrete Systems; Fibermesh.

## 2.3 CONCRETE

- A. Concrete shall be air-entrained type, conforming to ASTM C 94. Concrete to receive an exposed-aggregate surface shall be 4,000 psi "Peastone Concrete", supplied by Consolidated Concrete, East Providence, RI; Tel. 1-401-828-4700, or approved equal. Minimum compressive strength shall be 4,000 psi at 28 days.
1. Water-cement ratio no greater than 0.45 by weight.
  2. Maximum slump shall not exceed 4 in. and air entrainment shall be 6 percent  $\pm$  1 percent.
  3. Ready mixed concrete, if used, shall meet ASTM C 94.
  4. Aggregate source and cement type and brand shall not be altered once construction begins.

## 2.4 COLOR ADMIXTURE

- A. Color admixture shall be suitable for concrete pavement and shall meet or exceed the requirements set by Portland Cement Association (PCA) and ASTM C 979.
- B. Color admixture shall not affect workability, setting, or strength of concrete adversely. Color pigments shall consist of chemically inert, non-fading, alkali-fast mineral oxides, finely ground and prepared for use in cement and mortar. Admixture shall not contain calcium chloride.
- C. Color admixture shall be Chromamix Color Admixture, manufactured by L.M. Scofield Company, 4155 Scofield Road, Douglasville, GA 30134; Tel. 800-800-9900, distributed by Contractor Supply, East Providence, RI, or approved equal.
1. Color shall be "C-34 Dark Gray".
- D. Mix design shall conform to manufacturer's recommendations, and directions of the Architect to achieve proposed color. Strictly monitor additive/cement ratio throughout job to ensure uniform color.

## 2.5 CHEMICAL ADMIXTURES

- A. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

## **2.6 CONCRETE FINISH RETARDER**

- A. Spray applied, film forming, water based top surface retarder, calibrated for specific sized aggregate and finish requirements.
  - 1. Acceptable Material: "Top Cast" manufactured by W.R. Grace & Co. 62 Whittemore Ave., Cambridge, MA 02140. 800-354-5414 x 5439, 703-626-1577, distributed by Contractor Supply, East Providence, RI, or approved equal.
    - a. Depth of etch: Acid Etch, 03 Light Violet
- B. Spray applied film forming protective coating for surfaces adjacent to retarded finish surfaces.
  - 1. Acceptable Materials: "Face Off" by W.R. Grace & Co. 62 Whittemore Ave., Cambridge, Ma 02140. 800-354-5414 x 5439, 703-626-1577, distributed by Contractor Supply, East Providence, RI, or approved equal.

## **2.7 FLATWORK SEALER**

- A. Sealer shall be Scofield Cureseal-W Concrete Sealer, manufactured by L.M. Scofield Company; 1-800-800-9900, or approved equal. Sealer shall be subject to the approval of the Architect.

## **2.8 CURING MATERIALS**

- A. Curing shall be by use of curing paper.
- B. Moisture-Retaining Cover: Curing paper shall be nonstaining, fiber reinforced laminated kraft bituminous product conforming to ASTM C 171. Four mil polyethylene sheeting may be substituted for curing paper.
- C. Water: Potable.

## **2.9 RELATED MATERIALS**

- A. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to requirements.

## **2.10 CONCRETE MIXING**

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M[ and ASTM C 1116]. Furnish batch certificates for each batch discharged and used in the Work.
  - 1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

## **2.11 EXPANSION JOINTS**

- A. Unless otherwise indicated on the Drawings, expansion joints shall be located 30 ft. o.c., maximum.
- B. Expansion joint filler shall be preformed, nonbituminous type joint filler conforming to ASTM D 1752, Type II, similar to Sealtight Cork Expansion Joint Filler, manufactured by W.R. Meadows, Inc., Elgin, IL 60120, or approved equal.
  - 1. Premolded filler shall be one piece for the full depth and width of the joint leaving a sealant recess as indicated.
  - 2. Use of multiple pieces of lesser dimensions to make up required depth and width of joint will not be permitted.
  - 3. Except as otherwise noted on the Drawings, joint filler shall be 1/2 in. thick.
  - 3. Except as otherwise noted on Drawings, joint filler shall be max. 3/8 in. (1/2 in., ¼ in.) thick.
- C. Dowels shall be furnished under this Section, and shall be Type 304 stainless steel.
- D. To isolate filler from sealant, use SEALTIGHT SNAP CAP, manufactured by W.R. Meadows, Inc., Elgin, IL 60120, or approved equal.
- E. Expansion joint shall receive joint backer rod and shall be sealed with joint sealant under the work of Section 079201, JOINT SEALANTS - SITEWORK.

## **2.12 CONTROL JOINTS**

- A. Control joints indicated to be sawn shall be made by saw cutting concrete slab 1/8 in. wide after concrete is finished and when the surface is stiff enough to support the weight of workmen without damage to the slab. Saw blade shall cut into slab at least 1 in., but in no case less than 1/3 of slab depth.
- B. Unless otherwise indicated on the Drawings, control joints shall be located 10 ft. o.c. maximum.

### 2.13 CONSTRUCTION JOINTS

- A. Transverse construction joints shall be placed whenever placing of concrete is suspended for more than 30 minutes.
  - 1. Butt joint with dowels or thickened edge joint shall be used if construction joints occurs at location of control joint.
  - 2. Keyed joints with tiebars shall be used if the joint occurs at any other location.

### 2.14 GROUT

- A. Grout shall be mixed in the proportions of one part Portland cement to two parts sand, by volume. Only sufficient water shall be used to enable grout to barely hold its shape when squeezed into a ball in the hand. Sand for grout shall be "Fine Aggregate", conforming to ASTM C 33.
- B. Nonshrink grout shall be pre-mixed non-shrinking, high strength grout. Compressive strength in 28 days shall be 5,000 psi minimum, but in no case less than the specified strength of the adjacent concrete. Manufacturer shall provide evidence that the material meets the requirements of the COE CRD-C 621 (558). Grout permanently exposed to view shall be nonoxidizing; metallic grout may be used in other locations.
  - 1. Nonshrink grout shall be one of the following, or approved equal:

<u>Manufacturer</u>	<u>Product</u>
Gifford-Hill Co.	Supreme
Master Builders Co.	Embeco
U.S. Grout Corporation	Five Star Grout

### 2.15 BOND BREAKER

- A. Bond breaker shall be asphalt felt conforming to ASTM D 226, Type I or 6 mil polyethylene sheeting.

## PART 3 EXECUTION

### 3.1 GRADING

- A. Areas to be paved will be compacted and brought approximately to subgrade elevation under Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING before work of this section is performed. Final fine grading, filling, and compaction of areas to receive paving, as required to form a firm, uniform, accurate, and unyielding subgrade at required elevations and to required lines, shall be done under this Section.

- B. Subgrade shall be compacted as required to bring the top 6 in. of subgrade material immediately below the concrete pavement to a density of not less than 97 percent at optimum moisture content as determined by ASTM D 698. Subgrade compaction shall extend for a distance of at least 1 ft. beyond edge of pavement.
  - 1. Existing subgrade material which will not readily compact as required shall be removed and replaced with satisfactory materials. Additional materials needed to bring subgrade to required line and grade and to replace unsuitable material removed shall be material conforming to this Section.
- C. Subgrade of areas to be paved shall be recompacted as required to bring top 8 in. of material immediately below gravel base course to a compaction at optimum moisture of at least 95% density, as determined by ASTM D 698. Subgrade compaction shall extend for a distance of at least 1 ft. beyond pavement edge.
- D. Excavation required in pavement subgrade shall be completed before fine grading and final compaction of subgrade are performed. Completed subgrade after filling such areas shall be uniformly and properly graded.
- E. Areas being graded or compacted shall be kept shaped and drained during construction. Ruts greater than or equal to 2 in. deep in subgrade, shall be graded out, reshaped as required, and recompacted before placing pavement.
- F. Materials shall not be stored or stockpiled on subgrade.
- G. Disposal of debris and other material excavated and/or stripped under this section, and material unsuitable for or in excess of requirements for completing work of this section shall conform to the following.
  - 1. Material shall be disposed of off-site.
- H. Subgrade shall be kept clean and uncontaminated. Portions of subgrade which becomes contaminated, softened, or dislodged by passing of traffic, or otherwise injured, shall be cleaned, replaced, or otherwise repaired to conform to the requirements of this specification before proceeding with next operation.
- I. Prepared subgrade will be inspected by the Architect. Subgrade shall be approved by the Architect before installation of gravel base course. Disturbance to subgrade caused by inspection procedures shall be repaired under this section of the specification.

### **3.2 AGGREGATE BASE COURSE**

- A. Aggregate base for paving and the spreading, grading, and compaction methods employed shall conform to standard requirements for usual base and subbase course of this type for first class road work, and the following:
  - 1. RIDOT Specifications Section 301, "Aggregate and Gravel Base Courses".

- B. Width of base course shall be greater than or equal to the width of pavement surface, if continuous lateral support is provided during rolling, and shall extend at least 2 x base thickness beyond edge of the course above, if not so supported.
- C. Aggregate material shall be applied in lifts less than or equal to 6 in. thick, compacted measure. Each lift shall be separately compacted to specified density, using a 6 ton smooth drum vibratory roller equivalent to a 6 ton static roller, or an approved equivalent. Smaller areas or areas impossible to reach with large drum rollers shall be compacted to specified density using a vibrating plate compactor.
  - 1. Material shall be placed adjacent to wall, manhole, catch basin, and other structures only after they have been set to required grade and level.
  - 2. Rolling shall begin at sides and progress to center of crowned areas, and shall begin on low side and progress toward high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.
  - 3. Surface irregularities which exceed 1/2 in. as measured by means of a 10 ft. long straightedge, shall be replaced and properly recompacted.
- D. Base course shall be compacted at optimum moisture content to not less than 95% of maximum density as determined by ASTM D 1557.
- E. Subgrade and base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with gravel. Materials spilled outside pavement lines shall be removed and area repaired.
- F. Portions of subgrade or of construction above which become contaminated, softened, or dislodged by passing of traffic, or otherwise injured, shall be cleaned, replaced, or otherwise repaired to conform to the requirements of this specification before proceeding with next operation.

### **3.3 FIBER REINFORCEMENT**

- A. Mix fiber reinforcement into concrete in strict accordance with manufacturer's printed instructions.

### **3.4 CONCRETE PLACEMENT**

- A. Paving mix, equipment, methods of mixing and placing, and precautions to be observed as to weather, condition of base etc., shall meet the requirements of ACI 301 and 325.9R. Pavement shall be constructed in accordance with the Drawings.
  - 1. Mix one bag color admixture per yard of concrete in accordance with admixture manufacturer's printed instructions.

- B. The Architect shall be notified of concrete placement sufficiently in advance of start of operation to allow his representative to complete preliminary inspection of the work, including subgrade, forms, and reinforcing steel, if used.
- C. Normal concrete placement procedures shall be followed. Concrete shall arrive at the jobsite so that no additional water will be required to produce the desired slump. When conditions develop that require addition of water to produce the desired slump, permission of the Architect must be obtained. The concrete shall be transported from the mixer to its place of deposit by a method that will prevent segregation or loss of material. Concrete shall be placed in accordance with ACI 304.
- D. Concrete shall be consolidated by suitable means to eliminate voids and pockets.
- E. The strike-off and darby or bullfloat operations should be such that a level surface is obtained sufficiently below the final finish grade to allow for volume growth due to the addition of the seeding aggregate.
- F. Expansion joints shall be formed in the concrete to required width with preformed joint filler in place. Depth of filler shall be as required to form a 5/8 in. deep sealant and backer rod recess below finished surface of walkway.

### **3.5 MONOLITHIC EXPOSED-AGGREGATE FINISH**

- A. Monolithic Exposed-Aggregate Finish: Expose coarse aggregate in pavement surfaces as follows:
  - 1. Immediately after float finishing, spray-apply chemical surface retarder to pavement according to manufacturer's written instructions. (Surface retarder may be used, only after approval by the Architect and shall be of the same brand used to prepare the approved sample panel. The retarder shall be applied uniformly over the concrete surface and in accordance with the manufacturer's instructions.)
  - 2. If recommended by surface retarder manufacturer, cover pavement surface with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.
  - 3. When the concrete is hard enough to retain the aggregate and the mortar is still soft enough to be removed by brushing, the surface retarder shall be removed by brushing and flushing with water. The exposing operation of washing and brushing with a stiff-bristle broom and pressure washer shall continue until the surface matches the approved sample panel. The final washing operation shall cease when the flush water runs clear, there is no noticeable cement film on the aggregate, and cement film is removed from aggregate surfaces to depth required.

### **3.6 CURING AND SEALING**

- A. As soon as the washing operation ceases, the curing operation shall begin. The concrete shall be kept in continuously moist condition by covering with new, unwrinkled, non-staining, high-quality curing paper for 5 days in warm weather (70 deg. F. or higher) or 7

days in cooler weather (50-70 deg. F.). The temperature of the concrete shall not be allowed to fall below 50 deg. F. during the curing period.

1. During periods of excessively hot weather (95 deg. F., or above) ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305. Any concrete with a temperature above 95 deg. F. when ready for placement will not be acceptable, and will be rejected.
- B. After curing is completed, concrete surface shall be protected by applying concrete sealer in accordance with manufacturer's printed instructions.

### **3.7 CONSTRUCTION JOINTS**

- A. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
  2. Provide tie bars at sides of pavement strips where indicated.
  3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
  5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

### **3.8 EXPANSION JOINTS**

- A. Expansion joints (isolation joints) shall be 1/2 in. wide and unless otherwise indicated on the Drawings, shall be located 30 ft. o.c. and at places where pavement meets other structures. Expansion joint shall be formed in the concrete to required width with preformed joint filler in place. Joint filler shall extend the full width and depth of the slab. Joint filler shall extend the full length of the expansion joint.
1. For concrete banding and concrete pavements and pads, depth of joint filler shall be as required to form a 1-1/4 in. deep sealant and backer rod recess below finished concrete surface.

### **3.9 CONTROL JOINTS**

- A. Control joints indicated shall be sawn by using a diamond blade concrete power saw. Joint shall be made after concrete is finished and when the surface is stiff enough to support the weight of workmen without damage to the slab. Saw shall cut into slab at least 1 in., but in no case less than 1/3 of slab depth.

### **3.10 DECORATIVE SAW CUT JOINTS**

- A. Unless otherwise indicated, decorative saw cut joints shall be sawn into the concrete slab at intervals and patterns indicated on the Drawings. Joint shall be made after concrete is finished and when the surface is stiff enough to support the weight of workmen without damage to the slab, but before slab has achieved its final set. Saw cut joints shall be straight and accurate to line.

- 1. Saw cut joints shall be sawn flush to vertical surfaces.

- B. Depth of decorative saw cut joint shall be 3/4 in.

### **3.11 HANDICAP RAMPS**

- A. Paving mix, equipment, methods of mixing and placing, and precautions to be observed as to weather, condition of base etc., shall meet the requirements of ACI 316 for any concrete paving in similar conditions. Handicap ramps shall be constructed in accordance with the Drawings, and ADA Guidelines 4.7.10, and 4.29.2.

### **3.12 SEALING OF JOINTS**

- A. Sealing of expansion joints and construction joints will be sealed under Section 079201, EXTERIOR JOINT SEALANTS - SITEWORK.

### **3.13 SEAL COAT**

- A. After the slab is acid washed and is completely dry, the sealer shall be uniformly applied to the surface at the application rate and methods recommended by the sealer manufacturer.

### **3.14 FIELD QUALITY CONTROL**

- A. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
  - 1. Testing Frequency: Obtain at least 1 composite sample for each 5000 sq. ft. or fraction thereof of each concrete mix placed each day.
    - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
  3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
  4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
  5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
  6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.
    - a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
- D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### **3.15 PROTECTION OF CONCRETE SURFACES**

- A. Concrete surfaces shall be protected from traffic or damage until surfaces have hardened sufficiently. If necessary 1/2 in. thick plywood sheets shall be used to protect the exposed surface.

- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

**END OF SECTION**

## **SECTION 32 14 26 - WOOD SLAB PAVING**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Install Owner-furnished wood log pavers, as indicated on the Drawings and as specified.

#### **1.3 RELATED WORK**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Excavation and backfill.

#### **1.4 REFERENCES**

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
  - 1. American Wood Preservers' Association (AWPA):
    - C2 Lumber, Timbers, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes
  - 2. State of Rhode Island Department of Transportation (RIDOT):
    - Specifications Standard Specifications for Road and Bridge Construction

#### **1.5 QUALITY ASSURANCE**

- A. Materials and workmanship shall conform to governing laws and building code.

## **1.6 SUBMITTALS**

- A. Shop drawings of wood log pavers shall be submitted. Shop drawings shall indicate dimensions of materials to be used, required connections and supports, hardware, and all other required items.

## **1.7 COORDINATION**

- A. Work under this section shall be properly coordinated with the work of other sections to assure the steady progress of all the work of the Contract.

## **1.8 PRODUCT DELIVERY AND STORAGE**

- A. Materials when delivered to site shall be stacked and stored above the ground under protective coverings or indoors in such manner as to insure proper drainage, ventilation, and protection.
- B. Wood materials shall be stored on elevated piles to allow for air circulation below and tipped in one direction to effectively drain moisture. Lumber shall be wrapped completely, including bottoms, in waterproof tarps. Tarps shall be tied down to protect against wind blow-off. Should delays in Project be anticipated, lumber shall be stored in covered storage.

## **PART 2 - PRODUCTS**

### **2.1 AGGREGATE BASE**

- A. Material for aggregate base course shall be a graded, granular, non-frost susceptible, free-draining material, consisting of either durable stone and coarse sand or of blast furnace slag, practically free from loam and clay, and which can be readily compacted to form a stable foundation.
  - 1. Material shall conform to RIDOT Specifications Section M.01.09 Type I, with less than 10% by weight passing No. 200 sieve.

### **2.2 LOG PAVERS**

- A. Log pavers will be furnished by the Owner for cutting and installation by the Contractor.

### **2.3 SEALER**

- A. Wood Preservative shall be Eco Wood Treatment, a powder composed of natural substances from minerals that mixes with water, manufactured by **Int. Eco Wood Treatment Ltd.** PO Box 328, Salt Spring Island, BC Canada V8K 1P1; Phone: 250-538-

5516; Fax: 250-538-5517; E-mail: [ecowoodtreatment@yahoo.com](mailto:ecowoodtreatment@yahoo.com); toll free 888-738-5516 250-538-5516, or approved equal..

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION OF SUBGRADE**

- A. Areas to receive wood paving will be compacted and brought to subgrade elevation under Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING before work of this section is performed. Final fine grading, and furnishing, installing and compacting aggregate base course will be done under Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING before work of this section is performed. Wood paving shall be done under this Section.
- B. Existing subgrade material which will not readily compact as required shall be removed and replaced with satisfactory materials under Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING. Additional materials needed to bring subgrade to required line and grade and to replace unsuitable material removed shall be material specified under Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING WORK.
- C. Where excavation must be performed in completed subgrade or aggregate base, subsequent backfill and compaction shall be performed as specified in Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING. Completed subgrade after filling such areas shall be uniformly and properly graded.

#### **3.2 AGGREGATE BASE COURSE**

- A. Aggregate base for paving and the spreading, grading, and compaction methods employed shall conform to standard requirements for usual base and subbase course of this type for first class road work, and the following:
  - 1. RIDOT Specifications Section 301, "Aggregate and Gravel Base Courses".
- B. Width of base course shall be greater than or equal to the width of pavement surface, if continuous lateral support is provided during rolling, and shall extend at least 2 x base thickness beyond edge of the course above, if not so supported.
- C. Aggregate material shall be applied in lifts less than or equal to 6 in. thick, compacted measure. Each lift shall be separately compacted to specified density, using a 6 ton smooth drum vibratory roller equivalent to a 6 ton static roller, or an approved equivalent. Smaller areas or areas impossible to reach with large drum rollers shall be compacted to specified density using a vibrating plate compactor.

1. Material shall be placed adjacent to wall, manhole, catch basin, and other structures only after they have been set to required grade and level.
  2. Rolling shall begin at sides and progress to center of crowned areas, and shall begin on low side and progress toward high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.
  3. Surface irregularities which exceed 1/2 in. as measured by means of a 10 ft. long straightedge, shall be replaced and properly recompacted.
- D. Base course shall be compacted at optimum moisture content to not less than 95% of maximum density as determined by ASTM D 1557.
- E. Subgrade and base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with gravel. Materials spilled outside pavement lines shall be removed and area repaired.
- F. Portions of subgrade or of construction above which become contaminated, softened, or dislodged by passing of traffic, or otherwise injured, shall be cleaned, replaced, or otherwise repaired to conform to the requirements of this specification before proceeding with next operation.

### **3.3 ESTABLISHING LINE**

- A. Establish location and line of wood log pavers before construction, by staking in field. Contractor shall stake and paint the log locations on slope. Final locations shall be approved by Architect and Play Consultant in the field prior to start of work of this Section.

### **3.4 INSTALLATION**

- A. Wood log paver work required shall include all work, regardless of whether or not each and every item is specifically called for. Refer to Drawings to determine the major extent of the wood log paver work required.
1. Contractor shall be responsible for sawing logs lengthwise in half to create level, consistent top surfaces exposed in final setting. Flat exposed surface shall be sealed.
- B. The Contractor shall be responsible for structural integrity and anchorage of log paver work.
- C. Discard units of material which are unsound, warped, bowed, twisted, improperly treated, or not adequately seasoned. Structural members shall be full-length without splices.

### **3.5 SEALER**

- A. Flat sawn surfaces of logs shall be sealed in accordance with manufacturer's printed instructions.

**3.6 LOG PAVERS**

- A. Construct log pavers to lines and grades shown on Drawings. Wood log pavers shall be set flush with surrounding material, on compacted aggregate base, to the layout and spacing indicated on the Drawings and as approved by the Architect.

**END OF SECTION**

## **SECTION 32 14 40 - STONE PAVING**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide all equipment and materials, and do all work necessary to construct the granite paving, as indicated on the Drawings and as specified, including but not limited to:
  - 1. Granite paving on sand setting bed over compacted aggregate base with sand swept joints.

#### **1.3 RELATED WORK**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Excavation and backfill.
  - 2. Section 321543, STONE DUST SURFACING.

#### **1.4 REFERENCES**

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
  - 1. American Society for Testing and Materials (ASTM):

C 97	Absorption and Bulk Specific Gravity of Natural Building Stone
C 144	Aggregate for Masonry Mortar
C 150	Portland Cement
C 170	Compressive Strength of Dimension Stone

C 615	Granite Dimension Stone
C 880	Flexural Strength of Natural Building Stone
C 1028	Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method

2. State of Rhode Island Department of Transportation (RIDOT):

Specifications	Standard Specifications for Road and Bridge Construction
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**1.4 SUBMITTALS**

- A. Samples: Samples of stone pavers shall be "range samples" provided from the exact quarry stone pavers will be supplied from. Samples of the following shall be submitted:

Item	Quantity and Size
Granite Paver	2 required each size, full size, full thickness, specified color and finish.

- B. Shop Drawings: Shop drawings of stone paving pieces specified here in shall be submitted. Drawings shall indicate sizes, dimensions, layout, and finishes and relationship to adjacent items.
- C. Contractor's Review: Before commencing work, submit written statement signed by the Contractor stating that the Contract Documents have been reviewed with a qualified representative of the stone supplier, and that he is in agreement that the selected materials and construction are proper, compatible, and adequate for the application shown.

**1.5 SAMPLE PANEL**

- A. Construct a sample panel of specified stone paving on the specified base as directed by the Architect before start of any stone paving work. Sample panel shall exhibit stone pavers, base and setting bed, grain and grain direction, and required jointing and relationship to adjacent paving. Minimum size of panel shall be 8 ft. x 8 ft. Sample panel shall be inspected by the Architect. If the original sample is not acceptable, construct additional panels at no cost to the Owner until an acceptable panel is constructed. The acceptable panel shall become the standard for the entire job, and shall remain undisturbed until completion of all stone paving.
1. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  2. Demonstrate the proposed range of aesthetic effects and workmanship.

3. Obtain Architect's approval of mockups before starting unit paver installation.
4. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
5. Demolish and remove mockups when directed.

## **1.6 TESTS, INSPECTIONS AND VERIFICATIONS**

- A. Granite: Sampling of paving blocks prior to the start of the work for the purposes of verifying the color and shape of the blocks will only be required when these considerations are critical to the project aesthetics. For jobs of less than 1000 square meters (10,000 square feet) or for pavements not to be exposed to vehicular traffic, a manufacturer's certificate which certifies that the paving blocks meet the requirements of ASTM C 936 can be accepted in lieu of sampling and testing the blocks of each lot.
- B. Test Report: Submit reports from tests conforming to ASTM C 67 methods indicating:
  1. Compressive strength, psi. (ASTM C 170)
  2. Density, lbs./c.f. (ASTM C 97)
  3. Absorption by weight, % (ASTM C 97)
  4. Abrasion resistance (ASTM C 241)
  5. Flexural strength psi, (MPa) (ASTM C 880)
- C. Resistance to freezing and thawing shall be determined in accordance with Section 8 of ASTM C 67 for five pavers. The pavers shall have no breakage and no more than 1.0 percent loss of any individual unit in dry weight when subjected to 50 cycles of freezing and thawing.
- D. Dimensional Tolerance:
  1. The length and width of each paver in the sample shall not vary from any other paver in this or any other lot sample by more than 1/8 inch.
  2. Thickness of any paver in the sample shall not vary by more than 1/8 inch from the specified paver thickness.
- E. Retest: The Contractor shall notify the Architect if any pavers fail to meet the specified requirements. In case the shipment fails to conform to the specified requirements, the Contractor may sort it, and new specimens shall be selected by the Contractor from the retained lot for retesting, as directed by the Architect. All granite paver retests shall be performed at the expense of the Contractor. In case the second set of specimens fail to conform to the test requirements, the entire lot shall be rejected.
- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information

## **1.7 QUALITY ASSURANCE**

- A. Granite shall conform to the requirements of ASTM C 615, Architectural Grade and NBGQA Specifications, except as modified herein.
- B. Installer Qualifications: An experienced installer who has completed unit paver installations similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- C. Source Limitations: Obtain each type of unit paver and curb from one source; obtain joint material and setting material from one source. Sources shall have ability to provide materials and products of consistent quality in appearance and physical properties.
  - 1. Granite shall be quarried by members of the National Building Granite Quarries Association, Inc. and shall meet the specified test criteria.
  - 2. Granite shall be free of cracks, seams, starts or other defects which may impair its strength, durability or appearance. Color, texture and finish shall be within the range of samples approved by the Architect.

## **1.8 LAYOUT**

- A. The stone paving layout indicated on the Drawings is approximate. The final configuration of the paving will be determined in the field by the Architect.

## **1.9 DELIVERY, HANDLING, AND STORAGE**

- A. Stone shall be carefully packed and banded by the supplier for shipment. Following shipping stone shall be stored on wood skids or pallets, covered with non-staining, waterproof membrane and protected from the weather. Skids shall be placed and stacked in such a manner as to evenly distribute the weight of the stone materials and to prevent breakage, cracking, and damage to stone pieces. Stone materials shall be stored in such a manner as to allow air to circulate around the stone material. Stone shall not be permitted to be in direct contact with the ground any time during storage.
- B. Stone damaged in any manner will be rejected and replaced with new materials at no additional cost to the Owner.

## **1.10 PROTECTION OF FINISHED SURFACES**

- A. Finished surfaces adjacent to the paving work shall be adequately protected from soiling, staining, and other damage.

## **1.11 JOB CONDITIONS**

- A. Cold Weather Protection:

1. Remove any ice or snow formed on stone by carefully applying heat until top surface is dry to touch.
  2. Remove stone work determined to be damaged by freezing conditions.
- B. Cold Weather Protection for Completed Stone Work:
1. Do not use frozen materials or materials mixed or coated with ice or frost.
  2. Do not build on frozen work; remove and replace stone work damaged by frost or freezing.
  3. During all seasons, protect partially completed stone work against weather when work is not in progress.

## **PART 2 - PRODUCTS**

### **2.1 FILTER FABRIC**

- A. Filter fabric shall be a non-woven polypropylene fabric made specifically for use in subsurface drainage structures equal to Mirafi 140N, manufactured by Tencate, 365 South Holland Drive, Pendergrass, GA 30567; Tel 800 685 9990; Tel 706 693 2226; Fax 706 693 4400; [www.mirafi.com](http://www.mirafi.com), or approved equal.

### **2.2 AGGREGATE BASE**

- A. Material for aggregate base course shall be a graded, granular, non-frost susceptible, free-draining material, consisting of either durable stone and coarse sand or of blast furnace slag, practically free from loam and clay, and which can be readily compacted to form a stable foundation.
1. Material shall conform to RIDOT Specifications Section M.01.09 Type I, with less than 10% by weight passing No. 200 sieve.

### **2.3 STONE PAVERS**

- A. Stone pavers shall be supplied by Plymouth Quarries, LLC, 410 Whiting Street, Rte. 53, Hingham, MA; Tel. 781-335-3686, or other approved source.
- B. Granite: Smoky Mountain Granite
1. Sizes: 1' x 2', 18" x 3', 1' x 3' – 1-3/4" depth.
  2. Finish: as indicated on the Drawings.

**2.4 SAND SETTING BED**

- A. Sand shall be a clean, sharp, natural sand conforming to ASTM C 33, except that the fineness modulus shall be  $2.25 \pm 0.10$ .

1. Gradation for setting bed sand shall be as follows:

<u>Sieve Size</u>	<u>% Passing by Weight</u>
3/8 in.	100
No. 4	95 - 100
No. 8	80 - 100
No. 16	50 - 85
No. 50	10 - 30
No. 100	5 - 15
No. 200	0 - 10

**2.5 PAVER SPACERS**

- A. Paver Spacer: Provide masonry spacer of size indicated on the Drawings, capable of ensuring even joint spacing of pavers, manufactured by Unilock Boston 35 Commerce Dr., Uxbridge, MA 01569; T 508-278-4536; F 508-278-4572, or approved equal.

**2.6 SAND JOINT FILLER**

- A. Sand shall be a clean, sharp, concrete sand conforming to ASTM C 33.
1. Joint Filler Sand: Gradation for joint filler sand shall be as follows:
- a. Sand shall be a clean, washed, uniformly well graded masonry sand with 100 percent passing No. 16 (1.18-mm) sieve and no more than 10 percent passing No. 200 (0.075-mm) sieve, conforming to ASTM C 144, except that the fineness modulus shall be  $2.25 + 0.10$ . Sand shall be from a single source. Source of supply shall not be changed during course of job without written permission of the Architect.
  - b. Color of sand shall be uniform matching the paver in color, and shall be approved by the Architect.
  - c. Sand shall be supplied by a single source. Source of supply shall not be changed during course of project without written permission of the Architect.

**2.7 WATER**

- A. Water shall be potable and shall be free of injurious contaminants.

## **PART 3 - EXECUTION**

### **3.1 GRADING**

- A. Areas to be paved will be compacted and brought approximately to subgrade elevation under Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING before work of this section is performed. Final fine grading, filling, and compaction of subgrade to receive paving, as required to form a firm, uniform, accurate, and unyielding subgrade at required elevations and to required lines, shall be done under this Section.
- B. Existing subgrade material which will not readily compact as required shall be removed and replaced with satisfactory materials. Additional materials needed to bring subgrade to required line and grade and to replace unsuitable material removed shall be material conforming to Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING .
- C. Subgrade of areas to be paved shall be recompacted as required to bring top 8 in. of material immediately below aggregate base course to a compaction of at least 95% of maximum density, as determined by ASTM D 1557, Method D. Subgrade compaction shall extend for a distance of at least 1 ft. beyond pavement edge.
- D. Excavation required in pavement subgrade shall be completed before fine grading and final compaction of subgrade are performed. Where excavation must be performed in completed subgrade or subbase subsequent backfill and compaction shall be performed as directed by the Architect as specified in Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING . Completed subgrade after filling such areas shall be uniformly and properly graded.
- E. Areas being graded or compacted shall be kept shaped and drained during construction. Ruts greater than or equal to 2 in. deep in subgrade, shall be graded out, reshaped as required, and recompacted before placing pavement.
- F. Materials shall not be stored or stockpiled on subgrade.
- G. Disposal of debris and other material excavated and/or stripped under this section, and material unsuitable for or in excess of requirements for completing work of this Section shall conform to the following:
  - 1. Material shall be legally disposed of off-site.
- H. Prepared subgrade will be inspected and tested by an independent testing agency, provided and paid for by the Contractor, prior to installation of paving base course. Disturbance to subgrade caused by inspection procedures shall be repaired under this Section of the specification.
  - 1. Contractor shall submit a minimum of six (6) Proctor compaction test results indicating conformance to compaction density requirements specified herein.

### **3.2 FILTER FABRIC**

- A. Filter fabric shall be placed over compacted aggregate base in accordance with manufacturer's printed instructions. Overlap adjacent edges by minimum of 12 in.

### **3.3 AGGREGATE BASE COURSE**

- A. Aggregate base course for paving and the spreading, grading, and compaction methods employed shall conform to standard requirements for usual base course of this type for first class road work, and the following:
  - 1. MHD Specifications Section 402, "Dense Graded Crushed Stone for Sub-Base".
- B. Compaction of aggregate base course shall be to 95% of maximum density as determined by ASTM D 1557, Method D. Stone greater than 2-1/2 in. shall be excluded from course.
- C. Width of base course shall be greater than or equal to the width of pavement surface, if continuous lateral support is provided during rolling, and shall extend at least 2 x base thickness beyond edge of the course above, if not so supported.
- D. Aggregate material shall be applied in lifts less than or equal to 6 in. thick, compacted measure. Each lift shall be separately compacted to specified density, using a 6 ton steel wheel roller or vibratory roller equivalent to a 6 ton static roller, or an approved equivalent.
  - 1. Material shall be placed adjacent to wall, manhole, catch basin, and other structures only after they have been set to required grade and level.
  - 2. Rolling shall begin at sides and progress to center of crowned areas, and shall begin on low side and progress toward high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.
  - 3. Surface irregularities which exceed 1/2 in. measured by means of a 10 ft. long straightedge shall be replaced and properly compacted.
- E. Subgrade and base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with gravel. Materials spilled outside pavement lines shall be removed and area repaired.
- F. Portions of subgrade or of construction above which become contaminated, softened, or dislodged by passing of traffic, or otherwise damaged, shall be cleaned, replaced, and otherwise repaired to conform to the requirements of this specification before proceeding with next operation.

### **3.4 INSTALLATION, GENERAL**

- A. Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be visible or cause staining in finished work.
- B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
- C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
- D. Joint Pattern: As indicated on the Drawings.
- E. Tolerances: Do not exceed 1/32-inch (0.8-mm) unit-to-unit offset from flush (lippage) nor 1/8 inch in 10 feet (3 mm in 3 m) from level, or indicated slope, for finished surface of paving.

### **3.5 SETTING STONE PAVERS ON SAND SETTING BED**

- A. All setting shall be done by competent stone setters under adequate supervision.
- B. Stone pavers with chips, cracks, stains, or other defects which might be visible in the finished work shall not be used.
- C. Before setting, stone pavers shall be clean and free of dirt, and foreign matter on all sides. Stone block shall be dry before setting.
- D. Place leveling course and screed to a thickness of 1 to 1-1/2 inches (25 to 38 mm), taking care that moisture content remains constant and density is loose and constant until pavers are set and compacted.
- E. Joint Width:
  - 1. Set pavers with a minimum joint width of 1/16 inch (1.6 mm) and a maximum of 1/8 inch (3 mm), being careful not to disturb leveling base.
  - 2. Use joint spacers for paver areas indicated on the Drawings.
  - 3. Use string lines to keep straight lines.
- F. Joint Width – Permeable Joints:
  - 1. Set pavers with a consistent joint width of 3/8.

- G. Pavers: Unless otherwise directed by stone supplier, vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf (16- to 22-kN) compaction force at 80 to 90 Hz. Perform at least three passes across paving with vibrator. Vibrate under the following conditions:
1. After edge pavers are installed and there is a completed surface or before surface is exposed to rain.
  2. Before ending each day's work, fully compact installed stone pavers to within 36 inches (900 mm) of the laying face. Cover open layers with nonstaining plastic sheets overlapped 48 inches (1200 mm) on each side of the laying face to protect it from rain.
- H. Pavers: Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Surface shall be misted with water to settle sand and joints shall be refilled by sweeping sand into them. Vibrate pavers and add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.
- I. Pavers with permeable joints:
1. Fill the openings and joints with No. 8 stone.
  2. Remove excess aggregate on the surface by sweeping pavers clean.
  3. Compact and seat the pavers into the bedding material using a low-amplitude, 75-90 Hz plate compactor capable of at least 4,000 lbs (18 kN) centrifugal compaction force. This will require at least two passes with the plate compactor.
  4. Do not compact within 6 ft (2 m) of the unrestrained edges of the paving units.
  5. Apply additional aggregate to the openings and joints, filling them completely. Remove excess aggregate by sweeping then compact the pavers. This will require at least two passes with the plate compactor.
- J. Repeat joint-filling process 30 days later.

### **3.6 CLEANING OF PAVED SURFACE**

- A. Remove and replace stone pieces which are broken, chipped, stained, or otherwise damaged. Remove and replace units which are misaligned or not to grade or do not match adjoining stone work. Provide new matching units, use joint spacer where required, install as specified and refill with sand to eliminate evidence of replacement. Repair defective and unsatisfactory joints as required to provide a neat, uniform appearance.
- B. Clean stone work not less than six days after completion of work, using clean water and stiff-bristle brushes. Do not use wire brushes, acid type cleaning agents, or other cleaning compounds with caustic or harsh fillers.

**END OF SECTION**

## **SECTION 32 15 43 - STABILIZED STONE DUST SURFACING**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide all equipment and materials, and do all work necessary to construct the stone dust pavement with stabilizer material, including aggregate base, geotextile, weed barrier and metal edge, as indicated on the Drawings and as specified.

#### **1.3 RELATED WORK**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Excavation and backfill.
  - 2. Section 055901, METAL EDGING.

#### **1.4 REFERENCES**

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
  - 1. American Society for Testing and Materials (ASTM):

D 1557	Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb. (4.54-kg) Rammer and 18-in. (475-mm) Drop
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  - 2. State of Rhode Island Department of Transportation (RIDOT):

Specifications	Standard Specifications for Road and Bridge Construction
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#### **1.5 SUBMITTALS**

- A. Samples: The following samples shall be submitted:

<u>Material</u>	<u>Sample Size or Quantity</u>
Stone dust	2 lb. (for color approval)
Stabilizer	2 lb.

- C. Manufacturer's Product Data: Manufacturer's product data shall be submitted for the following materials:
- Stabilizer
- D. Letter from stabilizer manufacturer confirming that stone dust material is suitable for use with stabilizer product

## **1.6 QUALITY ASSURANCE**

- A. Crushed granite sample of sufficient quantity shall be submitted to stabilizer manufacturer for recommended blending proportions and procedures to be followed by crushed granite supplier. Blending operations shall be performed at crushed granite supplier facility, and provided to Contractor pre-blended in accordance with stabilizer manufacturer's recommendations.
- B. Installer shall provide evidence to indicate successful experience in providing crushed granite surfacing containing stabilizer binder/additive or ability to follow installation instructions.
- C. Installer shall provide documentation of at least three (3) installations similar in scale (all reference projects to be equal or greater than 75% of the total square footage of the project being bid on) using specified stabilizer solution material, completed over the past five (5) years. If Contractor is not able to meet experience qualifications, Contractor shall be required to have a representative from Stabilizer Solutions be present on site for pre-construction training, installation of mockup, and at least 25% of the project installation. Contractor shall be responsible for any and all costs associated with this requirement. If contractor is unable to meet these requirements a qualified replacement contractor will be located subject to all qualifications listed above and Owner approval.

## **1.7 MOCK-UP**

- A. General
1. Schedule mock-up for acceptance 30 days prior to constructing stone dust surfaces represented by the mockups.
  2. Locate mock-up panels in non-public areas accepted by the Architect.
  3. Continue to construct mock-ups until acceptable mock-up is produced. Accepted mock-up shall be the standard for color, texture, mix ratio, and workmanship for the work.
  4. Use the same stone dust/stabilizer mix and placement procedure, accepted in mock-ups, in the final work, unless otherwise directed by the Architect.

5. Protect accepted mock-ups from damage until completion and acceptance of the work represented by the mock-up.
  6. Remove mock-up panels from site at completion of project, as directed by the Architect.
- B. Sample panel shall be 5 ft. x 5 ft. minimum.
- C. Source of Materials. Utilize the same source, stock, or brand of stabilizer material for all stone dust surfacing. Do not interchange materials or mixes until an additional mock-up shows that uniformity in finish texture and color, as compared to original mock-up will be maintained. If necessary, obtain and stockpile materials in sufficient quantity to ensure continuity and uniformity.

## **1.8 TESTING AND INSPECTION**

- A. The Owner reserves the right to inspect and test paving and associated work in accordance with Section 014000, QUALITY REQUIREMENTS.

## **1.9 WARRANTY**

- A. Provide written warranty signed by stabilizer manufacturer, installer, and Contractor, agreeing to repair or replace all work of this section which exhibits defects in materials or workmanship. Warranty shall cover stabilizer, decomposed granite and aggregate base work. "Defects" is defined to include, but not limited to, differential settlement, ponding of water, abnormal aging or deterioration of stabilized paving system, and failure to perform as required.
1. Warranty Period: 90 days from date of Substantial Completion.
  2. Contractor shall provide unconditional maintenance and repairs as required through the warranty period.

## **PART 2 - PRODUCTS**

### **2.1 FILTER FABRIC**

- A. Filter fabric shall be a non-woven polypropylene fabric made specifically for use in subsurface drainage structures equal to Mirafi 140N, manufactured by Tencate, 365 South Holland Drive, Pendergrass, GA 30567; Tel 800 685 9990; Tel 706 693 2226; Fax 706 693 4400; www.mirafi.com, or approved equal.

### **2.2 WEED-CONTROL BARRIERS**

- A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, (101g/sq. m) minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally-encountered chemicals, alkalis, and acids.

### 2.3 AGGREGATE BASE

- A. Material for aggregate base course shall be a graded, granular, non-frost susceptible, free-draining material, consisting of either durable stone and coarse sand or of blast furnace slag, practically free from loam and clay, and which can be readily compacted to form a stable foundation.
1. Material shall conform to RIDOT Specifications Section M.01.09 Type I, with less than 10% by weight passing No. 200 sieve.

### 2.4 STONE DUST

- A. Stone dust or 3/8 in. or 1/4 in. crushed aggregate screenings.
1. Surfacing material shall be sand and crushed stone consisting of inert materials that are hard and durable, with stone free from surface coatings and deleterious materials. Gradation requirements shall be as follows:
  2. Crushed Stone Sieve Analysis Percentage of weight Passing a Square Mesh AASHTO T11-82 and T2782.

<u>Sieve Size</u>	<u>% Passing by Weight</u>
3/8 in.	100
No. 4	90 - 100
No. 8	75 - 80
No. 16	55 - 65
No. 30	40 - 50
No. 50	25 - 35
No. 100	15 - 20
No. 200	10 - 15

- B. Color shall be Natural, provided by Read Custom Soils, 5 Pond Park Road #1, Hingham, MA 02043; Tel. 781.828.6300, or approved equal.

### 2.5 STABILIZER

- A. Stabilizer additive shall be "Stabilizer", a non-toxic, colorless, odorless, concentrated powder organic binder capable of binding crushed aggregate screenings, manufactured by Stabilizer Solutions, Inc., 33 South 28<sup>th</sup> Street, Phoenix, AZ 85034; Tel. 602-225-5900; 1-800-336-2468; Fax: 602-225-5902; E-mail: info@stabilizersolutions.com, or approved equal.
1. Material shall be provided by supplier pre-mixed with stone dust material specified above.

## **2.6 EDGING**

- A. Steel edging: Refer to Section 055901, METAL EDGING.

## **PART 3 - EXECUTION**

### **3.1 GRADING**

- A. Areas to be paved will be compacted and brought approximately to subgrade elevation under Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; before work of this section is performed. Final fine grading, filling, and compaction of subgrade to receive paving, as required to form a firm, uniform, accurate, and unyielding subgrade at required elevations and to required lines, shall be done under this Section.
- B. Existing subgrade material which will not readily compact as required shall be removed and replaced with satisfactory materials. Additional materials needed to bring subgrade to required line and grade and to replace unsuitable material removed shall be aggregate base material conforming to this Section.
- C. Subgrade of areas to be paved shall be recompacted as required to bring top 8 in. of material immediately below gravel base course to a compaction of at least 90% of maximum density, as determined by ASTM D 1557, Method D. Subgrade compaction shall extend for a distance of at least 1 ft. beyond pavement edge.
- D. Excavation required in pavement subgrade shall be completed before fine grading and final compaction of subgrade are performed. Where excavation must be performed in completed subgrade or subbase subsequent backfill and compaction shall be performed as directed by the Architect as specified in Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING;. Completed subgrade after filling such areas shall be uniformly and properly graded.
- E. Areas being graded or compacted shall be kept shaped and drained during construction. Ruts greater than or equal to 2 in. deep in subgrade, shall be graded out, reshaped as required, and recompacted before placing pavement.
- F. Materials shall not be stored or stockpiled on subgrade.
- G. Disposal of debris and other material excavated and/or stripped under this section, and material unsuitable for or in excess of requirements for completing work of this Section shall be legally disposed of off-site.
- H. Prepared subgrade will be inspected by the Architect. Subgrade shall be approved by the Architect before installation of paving base course. Disturbance to subgrade caused by inspection procedures shall be repaired under this Section of the specification.

### **3.2 AGGREGATE BASE COURSE**

- A. Aggregate base course for paving and the spreading, grading, and compaction methods employed shall conform to standard requirements for usual base course of this type for first class road work, and the following:
  - 1. RIDOT Specifications Section 301, "Aggregate and Gravel Base Courses".
- B. Compaction of aggregate base course shall be to 95% of maximum density as determined by ASTM D 1557, Method D. Stone greater than 2-1/2 in. shall be excluded from course.
- C. Width of base course shall be greater than or equal to the width of pavement surface, if continuous lateral support is provided during rolling, and shall extend at least 2 x base thickness beyond edge of the course above, if not so supported.
- D. Aggregate material shall be applied in lifts less than or equal to 6 in. thick, compacted measure. Each lift shall be separately compacted to specified density, using a 6 ton steel wheel roller or vibratory roller equivalent to a 6 ton static roller, or an approved equivalent.
  - 1. Material shall be placed adjacent to wall, manhole, catch basin, and other structures only after they have been set to required grade and level.
  - 2. Rolling shall begin at sides and progress to center of crowned areas, and shall begin on low side and progress toward high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.
  - 3. Surface irregularities which exceed 1/2 in. measured by means of a 10 ft. long straightedge shall be replaced and properly compacted.
- E. Subgrade and base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with gravel. Materials spilled outside pavement lines shall be removed and area repaired.
- F. Portions of subgrade or of construction above which become contaminated, softened, or dislodged by passing of traffic, or otherwise damaged, shall be cleaned, replaced, and otherwise repaired to conform to the requirements of this specification before proceeding with next operation.

### **3.3 GEOTEXTILE FABRICS**

- A. Install at locations indicated on the Drawings in accordance with manufacturer's printed instructions.

### **3.4 EDGING**

- A. Refer to Section 055901, METAL EDGING.

### 3.5 STALOK SURFACING

- A. Stabilizer shall be provided thoroughly and uniformly pre-blended with decomposed granite by local supplier, at rate, and by method in strict accordance with manufacturer's printed instructions.
  - 1. Blend 12 to 16-lbs (contact manufacturer for exact blend) of Stabilizer per 1-ton of decomposed granite or crushed aggregate screenings. It is critical that Stabilizer be thoroughly and uniformly mixed throughout decomposed granite or crushed aggregate screenings.
  - 2. Bucket blending is not acceptable. Blending with a rake and or shovel is not acceptable.
  - 3. Blend material dry.
- B. Decomposed granite surfacing shall be done only after excavation and construction work which might injure it has been completed. Damage caused during construction shall be repaired before acceptance.
- C. Decomposed granite surfacing shall be constructed on a compacted aggregate base or sand-based structural soil mix as indicated on the Drawings.
- D. Pre-blended stabilized decomposed granite or crushed aggregate screenings shall be spread evenly over the base in 2 in. maximum lifts, rolled and compacted to 85% of maximum density as determined by ASTM D 1557.
  - 1. Contractor shall wait a minimum of 24 hours after placing stabilized decomposed granite material prior to compaction. Longer periods may be required for material to adequately dry. Consult manufacturer to make determination.
- E. Water shall be added to decomposed granite for full-depth moisture penetration prior to compacting.
  - 1. Minimum 25 to 45-gallons of water per 1-ton must be applied to achieve saturation of stabilized pathway profile.
  - 2. During water application randomly test for depth using a probing device, which reaches full depth.
- F. Upon thorough moisture penetration, compact stabilized decomposed granite to 85% relative compaction with 2 to 4 ton durable drum roller or 1000 lb. single drum roller as required to achieve a dense, hard packed surface conforming to the finish grades indicated.
  - 1. Do not use vibratory rollers or compactors.
  - 2. Do not begin compaction for 12 hours after placement and up to 72 hours.
  - 3. Contractor shall hand tamp areas adjacent to irrigation or plantings with 8 in. or 10 in. hand tamper.

4. If surface aggregate dries significantly quicker than subsurface material, lightly mist surface before compaction operations.
- G. Variations in smoothness of finished stone dust surface shall be less than or equal to 1/4 in. when tested with a 10 ft. straightedge, applied both parallel to and at right angles to centerline of stone dust surface areas. Irregularities exceeding these amounts or which retain water on surface shall be corrected by removing defective work and replacing with new material conforming to this specification.
- H. Crushed stone surface shall comply with ADA Requirements for slip resistance and accessibility, with a minimum static coefficient of friction of 0.6 for accessible routes and 0.8 for ramps, when tested in accordance with ASTM C1028.
- I. Allow finished surface to dry completely before permitting use.

### **3.6 INSPECTION**

- A. Finished aggregate surfacing shall be smooth, uniform and solid. Cured and compacted aggregate shall be firm throughout profile with no spongy areas. Loose material shall not be present on the surface after installation, but may appear after use and according to environmental conditions. Aggregate shall remain stable underneath loose decomposed granite on top. Surfacing shall appear "natural" yet stable throughout. Any significant irregularities in surfacing shall be repaired to the uniformity of the entire installation.

### **3.7 MAINTENANCE**

- A. Remove debris, such as paper, grass clippings, leaves or other organic material by mechanically blowing or hand raking the surface as needed. Any plowing program required during winter months shall involve the use of a rubber baffle on the plow blade or wheels on the plow that lifts the blade 1/4" off the paving surface.
- B. During the first year, a minor amount of loose aggregate will appear on the paving surface (1/16" to 1/4"). If this material exceeds a 1/4", redistribute the material over the entire surface. Water thoroughly to the depth of 1". Compact with power roller of no less than 1000 lbs. This process should be repeated as needed.
- C. If cracking occurs, simply sweep fines into the cracks, water thoroughly and hand tamp with an 8" – 10" hand tamp plate.

### **3.8 REPAIRS**

- A. Excavate damaged area to the depth of the stabilized aggregate and square off sidewalls.
- B. If area is dry, moisten damaged portion lightly.
- C. Pre-blend the dry required quantity of stabilizer powder with the proper quantity of aggregate in a concrete batch mixer.

- D. Add water to the pre-blended aggregate and stabilizer. Thoroughly moisten mix with 25 to 45 gallons per 1 ton of pre-blended material or to approximately 10% moisture content.
- E. Apply moistened, pre-blended aggregate to excavated area to finish grade.
- F. Compact with an 8 in. to 10 in. hand tamper or 250 lb to 300 lb. roller. Keep traffic off areas for 12 to 48 hours after repair has been completed.

**END OF SECTION**

## **SECTION 321600 - CURBS AND GUTTER**

### **Part 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.
- B. Related Documents: The City of Providence DPW Standards and RIDOT Standard Specifications for Road and Bridge Construction and all subsequent amendments shall apply to this Section for general requirements, materials and execution of Work only. Compensation for Work specified in this Section shall be included as part of the total Contract sum for this project.

#### **1.2 WORK INCLUDED**

- A. This section includes the following:
  - 1. Re-use salvaged, existing Roadway Granite Curb.
  - 2. New Roadway Granite Curb.
  - 3. Inlet/Apron Stone Reveal

#### **1.3 RELATED WORK**

- A. The following items of work are not included in this Section and are to be performed under the designated Sections:
  - 1. SECTION 312000 – EARTH MOVING
    - a. Excavation, backfill, and grading.
  - 2. SECTION 321216 – ASPHALT PAVING
    - a. Preparation/placement of bituminous concrete pavement.
  - 3. SECTION 321313 – CONCRETE PAVING
    - a. Preparation/placement of cement concrete sidewalks.
  - 4. Section 017419 – Construction Waste Management and Disposal

#### **1.4 REFERENCES**

- A. Standards: The following referenced standards and standard specifications, referred to thereafter by designation only, form a part of this Section:
  - 1. American Society for Testing and Materials (ASTM):
    - a. A615/A615M-96a, Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

- b. C33-93, Specification for Concrete Aggregates.
- c. C150-97, Specification for Portland Cement.
- d. C260-95, Specification for Air-Entraining Admixtures for Concrete.
- e. C404-95, Specification for Aggregates for Masonry Grout.
- f. C494-90, Specification for Chemical Admixtures for Concrete.

## **1.5 SUBMITTALS**

- A. Product Data: Submit in accordance with the provisions of Division 1.
- B. Material Certificates: Provide copies of materials certificates signed by the material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

## **1.6 INSPECTION, TESTING & QUALITY CONTROL**

- A. Codes and Standards: Comply with the City of Providence Standards and the RIDOT Standard Specifications for Road and Bridge Construction and all subsequent amendments.
- B. Quality Assurance: Comply in accordance with the provisions of Division 1.

## **1.7 PROJECT CONDITIONS**

- A. Grade Control: Establish and maintain required lines and elevations.
- B. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

## **Part 2 - PRODUCTS**

### **2.1 GRANITE CURB**

- A. Provide granite curb complying with requirements of the City of Providence Standards and Section M.09.01 of the Rhode Island Standard Specifications.
- B. Provide curbstone with a top surface sawed or dressed to an approximate true plane with no depressions or projections over 1/8".
- C. Provide curbstones with a top front and back arris lines pitched straight and true with no variations from a straight line greater than 1/4".
- D. Provide curbstone with front face at right angles to the planes of top and ends and smooth split, free from drill holes, and with no projects greater than 1" or depressions greater than 1/2" measured from the vertical plane of the face through the arris or pitch line for a distance down

from the top of 8". The remainder of the face shall have no projections or depressions greater than 1" from the plane of the face.

- E. Provide curbstone with ends square with the planes of the top and face so that when stones are placed end to end as closely as possible no space shall show in the joint at the top of and face of more than 1/2" for the full width of the top and for 10" down on the face, after which the end may break back not over 8" from the plane of the joint. The arris formed by the intersection of the plane of the joint with the planes of the top and exposed faces shall have no variation from the plane of the top and exposed faces greater than 1/8".

## **2.2 INLET/APRON STONE REVEAL**

- A. Provide inlet/stone reveal complying with requirements of the City of Providence Standards.

## **2.3 CEMENT MORTAR**

- A. Cement Mortar: Portland Cement, ASTM C150, Type II, and clean natural sand, ASTM C404. Mix at ratio of 1 part cement to 2 parts sand, by volume, with sufficient water for placement and hydration.

## **Part 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Excavate trenches for curbstone to a width of 18". Excavate to subgrade depths indicated or, if not indicated, to a depth below the proposed finished grade of the curb equal to 6" plus the depth of the curb.
- B. Provide 6" deep thoroughly compacted gravel foundation for curb. Gravel shall comply with requirements specified in SECTION 312000 - EARTH MOVING.

### **3.2 RESETTING CURB**

- A. Set curb on the compacted gravel foundation so that the front arris line conforms to the lines and grades required. Set curb units as close together as possible.
- B. Backfilling: Fill all spaces under curb with thoroughly hand tamped gravel so that curb units are supported throughout their length and width. Fill remaining areas surrounding the curb with gravel fill, placing material in layers not exceeding 6" in loose depth and thoroughly compacting each layer. Carry fill to indicated finish elevations.
- C. Granite Curb shall be set in concrete cradle as shown on the plans.

- D. Pointing: Carefully fill all joints between curbstones with cement mortar and neatly point on the top and front exposed portions. After pointing, clean off all excess mortar.
- E. Protect installed curb and keep in good condition. Clean and restore to satisfactory condition all exposed surfaces that become smeared or discolored, or remove and replace units.

**END OF SECTION**



## 1.5 SUBMITTALS

- A. Samples: The following samples shall be submitted:

<u>Material</u>	<u>Sample Size or Quantity</u>
Wood fiber mulch surfacing	10 lb.
Filter fabric	1 sq. ft.

- B. Manufacturer's Product Data: Manufacturer's product data shall be submitted for the following materials:

Filter fabric

## 1.6 TESTING AND INSPECTION

- A. The Owner reserves the right to test and inspect materials and construction of processed organic surfacing.

## PART 2 PRODUCTS

### 2.1 AGGREGATE BASE

- A. Material for aggregate base course shall be a graded, granular, non-frost susceptible, free-draining material, consisting of either durable stone and coarse sand or of blast furnace slag, practically free from loam and clay, and which can be readily compacted to form a stable foundation.

1. Material shall conform to RIDOT Specifications Section M.01.09 Type I, with less than 10% by weight passing No. 200 sieve.

### 2.2 SOIL SEPARATOR

- A. Soil separator shall be Mirafi 140NS nonwoven drainage fabric manufactured by Mirafi, Inc., Charlotte, NC 28224, or approved equal.

### 2.3 ENGINEERED WOOD FIBER SURFACING

- A. Engineered Wood Fibers: Random-sized wood fibers, in manufacturer's standard fiber size, approximately 10 times longer than wide; containing no bark, leaves, twigs, or foreign or toxic materials according to ASTM F 2075; graded according to manufacturer's standard specification for material consistency for playground surfaces.

1. Products:
  - a. Zeager Bros., Inc.; Wood Carpet.
  - b. Fibar, Inc.; Fibar System 100
  - c. GameTime; GT Impax Fiber.

2. Uncompressed Material Depth: Not less than indicated .
- B. Processed organic surfacing shall be dark brown in color with color relatively uniform and shall be subject to the approval of the Owner.

### **PART 3 EXECUTION**

#### **3.1 GRADING**

- A. Areas to receive processed organic surfacing will be compacted and brought to subgrade elevation under Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING before work of this section is performed. Final fine grading, furnishing and installing aggregate base course, filter fabric, and processed organic surface and compaction of these materials as required to form a firm, uniform, accurate, and unyielding processed organic surface at required elevations and to required lines, shall be done under this Section.
- B. Existing subgrade material which will not readily compact as required shall be removed and replaced with satisfactory materials. Additional materials needed to bring subgrade to required line and grade and to replace unsuitable material removed shall be material conforming to this Section.
- C. Subgrade of areas to receive processed organic surfacing shall be recompacted as required to bring top 4 in. of material immediately below gravel base to a compaction of at least 90% of maximum density, as determined by ASTM D 1557. Subgrade compaction shall extend for a distance of at least 1 ft. beyond proposed edge of processed organic surface.
- D. Excavation required in subgrade shall be completed before fine grading and final compaction of subgrade are performed. Where excavation must be performed in completed subgrade or gravel base, subsequent backfill and compaction shall be performed as directed by the Owner as specified in Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING. Completed subgrade after filling such areas shall be uniformly and properly graded.
- E. Areas being graded or compacted shall be kept shaped and drained during construction. Ruts greater than or equal to 1 in. deep in subgrade, shall be graded out, reshaped as required, and recompacted before placing processed organic surfacing.
- F. Materials shall not be stored or stockpiled on subgrade.
- G. Disposal of debris and other material excavated and/or stripped under this section, and material unsuitable for or in excess of requirements for completing work of this section shall be disposed of off-site.

### **3.2 BASE COURSE**

- A. Unless otherwise specified, base course for processed organic surfacing and the spreading, grading, and compaction methods employed shall conform to the following:
  - 1. RIDOT Specifications Section 301, "Aggregate and Gravel Base Courses".
- B. Compaction of aggregate base shall be to 95% of maximum density as determined by ASTM D 1557. Stone greater than 2 in. shall be excluded from course.
- C. Width of base course shall be greater than or equal to the width of processed organic surface, if continuous lateral support is provided during rolling, and shall extend at least 2 x base thickness beyond edge of the course above, if not so supported.
- D. Material shall be applied in lifts less than or equal to 3 in. thick, compacted measure. Each lift shall be separately compacted to specified density.
  - 1. Rolling shall begin at sides and progress to center of crowned areas, and shall begin on low side and progress toward high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.
  - 2. Surface irregularities which exceed 1/2 in. as measured by means of a 10 ft. long straightedge, shall be replaced and properly compacted.
- E. Subgrade and base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with base course. Materials spilled outside processed organic surfacing lines shall be removed and area repaired.
- F. Portions of subgrade or of construction above which become contaminated, softened, or dislodged by passing of traffic, or otherwise injured, shall be cleaned, replaced, recompacted, or otherwise repaired to conform to the requirements of this specification before proceeding with next operation.

### **3.3 HORTICULTURAL SUBSOIL**

- A. Refer to Section 329200, LAWNS AND GRASSES.

### **3.4 SOIL SEPARATOR**

- A. Soil separator shall be placed over the compacted horticultural subsoil. Soil separator shall be overlapped a minimum of 8 in. both side to side and end to end.

### **3.5 ENGINEERED WOOD FIBER SURFACING**

- A. Loose Fill: Place surface system materials including manufacturer's standard amount of excess material for compacting naturally with time to required depths indicated on the Drawings.

- B. Grading: Uniformly grade loose-fill according to manufacturer's written instructions to an even surface free from irregular surface changes as indicated.
- C. Finish Grading: Hand rake to a smooth finished surface and to required elevations.

**END OF SECTION**

## **SECTION 32 31 29 - WOOD FENCING**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide all equipment and materials, and do all work necessary to construct the wood fence as indicated on the Drawings and as specified herein.

#### **1.3 RELATED WORK**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Section 033001, CAST-IN-PLACE CONCRETE - SITEWORK; Concrete footings.

#### **1.4 REFERENCES**

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.

1. American Society for Testing and Materials (ASTM):

A 153	Zinc - Coating (Hot-Dip) on Iron and Steel Hardware
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F 537	Design, Fabrication, and Installation of Fences Constructed of Wood and Related Materials
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2. Western Red Cedar Lumber Association "Designer's Handbook".
3. Western Red Cedar Lumber Association ""Specifying Western Red Cedar for Timber Construction and Landscape Structures"". "
4. Western Red Cedar Lumber Association "Guide to Finishing Western Red Cedar"
5. NLGA - National Lumber Grades Authority "Grading Standards".

6. WCLIB - West Coast Lumber Inspection Bureau "Grading Standards".
7. WWPA - Western Wood Products Association "Grading Rules".

### **1.5 SUBMITTALS**

- A. Shop drawings of wood fence shall be submitted.
- B. Submit duplicate samples of fence boards, posts, and rails representing actual product with finished color and texture for Architect's approval.
- C. Manufacturer's data sheets on each product to be used, including:
  1. Preparation instructions and recommendations.
  2. Storage and handling requirements and recommendations.
  3. Installation methods.

### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer shall be a member of the Western Red Cedar Lumber Association capable of providing all cedar fence materials specified in this section.
- B. Installer Qualifications:
  1. Installer shall have five (5) years experience installing cedar fencing on the type and size of project specified by this section.
  2. Installer shall be licensed, registered or otherwise approved by the local jurisdiction to install Cedar fencing.

### **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Inspect the materials upon delivery to assure that specified products have been received. Store materials in safe area, away from construction traffic; store under cover and off ground, protected from moisture.
- B. Keep materials clearly separated and identified with grade marks legible. Keep damaged material identified as damaged and stored separately.

### **1.8 PROJECT CONDITIONS**

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

### **1.9 SUPPLEMENTAL MATERIALS**

- A. Fasteners and supports shall conform to the requirements set forth by this section.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturer: Western Red Cedar Lumber Association, which is located at: 1501 - 700 W. Pender St. Pender Place 1, Business Bldg. ; Vancouver, BC, Canada V6C 1G8; Toll Free Tel: 866-778-9096; Tel: 604-684-0266; Fax: 604-687-4930; Email: [request info](mailto:request_info@wrcla.org); Web: [www.wrcla.org](http://www.wrcla.org)
- B. Requests for substitutions will be considered in accordance with provisions of Division 01, GENERAL REQUIREMENTS.

### **2.2 WOOD FENCE**

- A. Fence lumber shall be selected Western Red Cedar of sound stock, conforming to ASTM F 537, Architectural Class I Sawn Posts and Rails.
- B. Grade:
  - 1. Grade: WRCLA "C and Better Clear".
  - 2. Surface Texture: Posts - Surfaced Four Sides (S4S).  
Rails - Surfaced Four Sides (S4S)  
Boards- Surfaced one side and two edges (S1S2E)
- C. Moisture Content:
  - 1. Moisture Content: Air-dried; max. 15%.
- D. Lumber shall bear a mark of mill identification and shall bear the grade - trademark of the association under the rules or standards of which they were produced.
  - 1. Posts shall be 11 ft. in length. Minimum diameter at top shall be 5 in.
  - 2. Bottom 3 ft. of posts shall be treated with minimum of two coats of brush applied high-quality copper naphthenate, an oil-borne formulation wood preservative , manufactured by Merichem Company 5455 Old Spanish Trail, Houston, Texas 77023; Tel: 713-428-5000; Fax: 713-926-3634, or approved equal.
  - 2. Boards shall be as indicated on the Drawings.
  - 3. Top and bottom rails shall be 3-1/2 in. x 1/2 in.
  - 4. Fence cap and post caps shall be as indicated on the Drawings.

### **2.3 WOOD GATE**

- A. Gate lumber shall be selected Western Red Cedar of sound stock, conforming to ASTM F 537, Architectural Class I Sawn Posts and Rails to match fence lumber specified above.
- B. Bracing: Provide diagonal adjustable length truss rods on gates to prevent sag.

- C. Hardware Materials: Galvanized steel or stainless steel shapes to suit gate size.
- D. Hinges: Structurally capable of supporting gate leaf and allow opening and closing without binding. Non-lift-off type hinge design shall permit gate to swing 180° (3.14 rad).
- E. Latch: Capable of retaining gate in closed position and have provision for padlock.
- F. Keeper: Provide keeper for each gate leaf over 5' (1500 mm) wide. Gate keeper shall consist of mechanical device for securing free end of gate when in full open position.
- G. Gate Stop: Provide gate stop pipe to prevent manual swing gate from opening beyond 90 degree position to gate post.

#### **2.4 FASTENERS AND ACCESSORIES**

- A. Nails: Provide one of the following:
  - 1. Material: No. 304 stainless steel.
  - 2. Material: Hot-dipped galvanized in accordance with ASTM A 153.
- B. Screws: provide one of the following:
  - 1. Material: No. 304 stainless steel.
  - 2. Material: Double Hot-Dipped Galvanized in accordance with ASTM A 153.
- C. Unless otherwise indicated, nails for attaching boards to rails shall be 6d galvanized box.
- D. Unless otherwise indicated, nails for attaching fence cap to rails shall be 8d galvanized box.

#### **2.5 STAIN**

- A. Water repellent, fungus and mildew resistant solid body stain that is resistant to Ultra Violet (UV) light.
  - 1. Color: to be selected by Architect from manufacturer's standard color chart, manufactured by Cabot, Benjamin Moore, California Paints, Sherwin Williams or other approved manufacturer.
  - 2. Follow guidelines of the Western Red Cedar Lumber Association.
  - 3. Adhere to coating manufacturer's instructions.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Coordinate work with related trades.
- B. Discard members that are warped, twisted, bowed, crooked or otherwise defective.

#### **3.2 WOOD FENCE INSTALLATION**

- A. Unless otherwise indicated, installation of wood fence shall conform to ASTM F 537.
- B. Fence shall be installed by experienced fence erection crews. Fence shall be straight, true, and plumb, with a straight top line, installed to a height of 6 ft. above grade.
- C. All rails shall fit snug against posts. Boards shall assemble tongue and groove together and be laid straight. Boards shall be nailed to rails, 2 each to top and bottom rail.
- D. Follow all appropriate building codes and industry best practices.

#### **3.3 WOOD GATE INSTALLATION**

- A. Install gates plumb, level and secure for full opening without interference.
  - 1. Gate posts and hardware: Set keepers, stops, and sleeves into concrete. Check each post for vertical and top alignment, and maintain in position during placement and finishing operations.
- B. Attach hardware by means which will prevent unauthorized removal.
- C. Adjust hardware for smooth operation.

#### **3.4 ADJUSTING AND CLEANING**

- A. As work proceeds, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris related to this work.

#### **3.5 MAINTENANCE**

- A. Explain proper maintenance procedures to Owner or Owner's Representative at project closeout.
- B. Visually inspect finish condition. Re-apply coating as necessary.
- C. The use of pressure washers is not recommended.

### **END OF SECTION**

## **SECTION 32 33 00 - SITE FURNISHINGS**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide all materials and equipment, and do all work necessary to furnish and install the site furnishings, as indicated on the Drawings and as specified.

#### **1.3 RELATED WORK**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 033001, CAST-IN-PLACE CONCRETE - SITEWORK; Poured in place concrete foundation.
  - 2. Section 055001, METAL FABRICATIONS – SITEWORK.
  - 3. Section 132810, SPECIALTY TIMBER SITE FEATURES.
  - 4. Section 321314, EXPOSED AGGREGATE CONCRETE PAVING.

#### **1.4 REFERENCES**

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
  - 1. American Society for Testing and Materials (ASTM):
    - A 153 Zinc Coating (Hot-Dip) on Iron and Steel Hardware

#### **1.5 SUBMITTALS**

- A. Complete shop drawings of each item specified shall be submitted.
- B. Where appropriate, and when approved by the Architect, manufacturer's catalogue cuts may be substituted for shop drawings.
- C. Submit assembly instruction drawings showing layout(s), connections, bolting and anchoring details as per manufacturer's standards.

- D. Color charts and decals for selection by Architect.

## **1.6 PRELIMINARY LAYOUT**

- A. Preliminary layout is required to confirm alignment of site furnishings. Contractor shall provide Architect two days minimum notice prior to proposed layout review on site. Contractor shall mark up layout of proposed furnishings using stakes, paint, tape or other temporary measures sufficient for Architect to review and approve layout and alignment prior to installation. While this may not be feasible for the entire site at one time, the Contractor shall make every effort to layout large areas such that the overall design intent and any site conditions can be reviewed, resolved and approved.
- B. Schedule conference with Architect prior to start of layout work to confirm the layout, survey and engineering procedures to be used for laying out all site furnishing work in the field for review and approval by Architect.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Materials shall be the standard products of a manufacturer regularly engaged in the manufacture of such products. The materials provided shall be of a type with proven satisfactory usage for at least 2 years.

### **2.2 FASTENERS AND HARDWARE**

- A. Provide manufacturer's standard materials and accessories as required for assembly of units and as indicated on the assembly drawings. Provide unexposed aluminum, stainless steel or steel plates, angles and supports as required for complete assembly. Separate dissimilar materials to prevent electrolytic action.
  - 1. Fasteners and metal components shall be cadmium-plated steel or steel hot-dipped galvanized in accordance with ASTM A 153.
- B. Exposed metal surfaces shall be hot-dip galvanized. Provide coating for iron and steel fabrications applied by the hot-dip process, Duragalv<sup>®</sup> by Duncan Galvanizing, or approved equal. Comply with ASTM A 123 for fabricated products and ASTM A 153 for hardware. Provide thickness of galvanizing specified in referenced standards. The galvanizing bath shall contain special high grade zinc, nickel, and other earthy materials.

### **2.3 METAL PLANTERS**

- A. Corrugated Metal Planters: shall be vidaXL Garden Raised bed, 62.9 in. x 31.4 in. x 31.8 in. galvanized steel with Silver finish, manufactured by vidaLX.

## **2.4 ANCHORED TABLES AND CHAIRS**

- A. Harvest Dining Height Tables and Chairs, manufactured by Landscape Forms, Inc., 431 Lawndale Avenue, Kalamazoo, Michigan 49048. Toll Free (800) 521-2546. Phone (269) 381-0396. Fax (269) 381-3455. Website [www.landscapeforms.com](http://www.landscapeforms.com).
1. Red.

## **2.5 PICNIC TABLES**

- A. BERG Picnic Table, manufactured by Vestre, Inc., 175 Varick Street, New York, NY 10014; Tel. 1-212-634-9658.
1. Materials:
    - a. Hot dip galvanized steel.
    - b. Linseed oil-proofed Nordic Pine.

## **2.6 BOLLARDS**

- A. Removable and Fixed Bollards: Bollards shall be manufactured by Reliance Foundry, Unit 207, 6450-148 Street, Surrey, BC, Canada V3S-7G7; Tel. 1-888-735-5680; Web: [www.reliance-foundry.com](http://www.reliance-foundry.com).
1. R-8907 Stainless Steel Bollard (both removable mounting and flanged surface mounting)
  2. Mounting:
    - a. Flanged surface mount
    - b. Fold down mount
  3. Finish: Stainless steel brushed.

## **2.7 BIKE RACK**

- A. Bike Rack: shall be "Ring", as manufactured by Landscape Forms, 7800 E. Michigan Ave., Kalamazoo, MI 49048; Tel. 1-800-521-2546, or approved equal.
1. Material: Carbon steel, ASTM A513: Outside diameter: 1.5", wall thickness: 0.120".
  2. Finish: Landscape Forms, Inc. "Pangard II".
  3. Color: Metallic Silver.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. The Contractor shall verify that finished grades and other operations affecting mounting surfaces have been completed prior to the installation of site furnishings. Site furnishings

shall be installed plumb and true, at locations indicated, in accordance with the approved manufacturer's instructions.

### **3.2 ASSEMBLY AND ERECTION OF COMPONENTS**

- A. Items shall be shipped knocked-down (KD) ready for site assembly. Packaged components shall be complete including all accessories and hardware. New parts shall be acquired from the manufacturer; substitute parts will not be accepted unless approved by the manufacturer. When the inspection of parts has been completed, the site furnishings shall be assembled and anchored according to manufacturer's instructions or as indicated. When site furnishings are assembled at the site, assembly shall not interfere with other operations or pedestrian and vehicular circulation.

### **3.3 ANCHORAGE, FASTENINGS AND CONNECTIONS**

- A. Furnish metal work, mounting bolts or hardware in ample time for securing into concrete or masonry as the work progresses. Provide anchorage where necessary for fastening furniture or furnishings securely in place. Provide, for anchorage not otherwise specified or indicated, slotted inserts, expansion shields, and power-driven fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; through bolts, lag bolts, and screws for wood. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish the fastenings to which they are applied. Conceal fastenings where practicable.

### **3.4 TESTING**

- A. Each site furnishing shall be tested to determine a secure and correct installation. A correct installation shall be according to the manufacturer's recommendations and by the following procedure: The Contractor shall measure the physical dimensions and clearance of each installed site furnishing for compliance with manufacturer's recommendations and as indicated. Site furnishings which do not comply shall be reinstalled. Fasteners and anchors determined to be non-compliant shall be replaced. A written report describing the results of the testing shall be provided.

### **3.5 SITE FURNISHINGS**

- A. Examination
  - 1. Examine areas to receive site furnishings.
  - 2. Notify Architect of conditions that would adversely affect installation or subsequent use.
  - 3. Do not begin installation until unacceptable conditions are corrected.

B. Installation

1. Install site furnishings in accordance with manufacturer's instructions at locations indicated on the Drawings.
2. Install site furnishings level.
3. Anchor site furnishings securely in place.

C. Adjusting

1. Finish Damage: Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.
2. Component Damage: Remove and replace damaged components that cannot be successfully repaired as determined by Architect.

D. Cleaning

1. Clean site furnishings promptly after installation in accordance with manufacturer's instructions.
2. Do not use harsh cleaning materials or methods that could damage finish.

E. Protection

1. Protect installed site furnishings to ensure that, except for normal weathering, tables and chairs will be without damage or deterioration at time of Substantial Completion.

**END OF SECTION**

## **SECTION 32 91 19 - LANDSCAPE GRADING**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide all equipment and materials, and do all work necessary to complete the site grading as indicated on the Drawings and as specified.

#### **1.3 RELATED WORK**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Excavation, backfill; establishment of subgrade elevations.
  - 2. Section 329200, LAWNS AND GRASSES.
  - 3. Section 329300, PLANTING.

#### **1.4 REFERENCES**

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
  - 1. American Society for Testing and Materials (ASTM):

D 1556 Density of Soil in Place by the Sand-Cone Method

D 2167 Density and Unit Weight of Soil In Place by the Rubber-Balloon Method

#### **1.5 EXISTING CONDITIONS**

- A. By submitting a bid, the Contractor affirms that he has carefully examined the site and all conditions affecting work under this Section. No claim for additional costs will be allowed because of lack of full knowledge of existing conditions.

## **1.6 QUALITY CONTROL**

- A. The Architect reserves the right to perform on-site observation during the grading operations. The observations may include, but not be limited to the following:
1. Observation of subgrade preparation for slab-on-grade and paved areas.
  2. Observation of rough and finish grading operations.
- B. All grade breaks shall be staked with grade stakes at each end, any change of direction, and at 20' centers along the length for Architect's review during grading operations.
- C. Stake out and indicate finish grades at all spot elevations, 25 ft. intervals along all grade break lines, and in a 25 ft. x 25 ft. grid for the quad lawn for Architect's review and approval during grading operations.
- D. Perform field density tests in accordance with ASTM D 1556 or ASTM D 2167.
1. Make at least one field density test of the subgrade for every 2000 sq. ft. of paved area, but in no case less than three tests.
  2. In each compacted fill layer, make one field density test for every 2000 sq. ft. of overlaying paved area, but in no case less than three tests.
  3. Make at least one field density test of the planting soil for every 2000 sq. ft. of plant bed area, but in no case less than three tests.
  4. Make at least one field density test of the planting soil for every 2000 sq. ft. of lawn area, but in no case less than three tests.
- E. If, in the opinion of the Architect, based on reports of the testing service and inspection, the subgrade or fills which have been placed are below the specified density, additional compaction and testing will be required until satisfactory results are obtained.
1. The results of density tests of soil-in-place will be considered satisfactory if the average of any four consecutive density tests which may be selected are in each instance equal to or greater than the specified density, and if not more than one density test out of five has a value more than 2% below the required density.
- F. The Architect's presence does not include supervision or direction of the actual work by the Contractor, his employees, or agents. Neither the presence of the Architect, nor any observations and testing performed by him shall excuse the Contractor from defects discovered in his work.

## **1.7 PROTECTION OF EXISTING STRUCTURES AND UTILITIES**

- A. The work shall be executed in such manner as to prevent any damage to adjacent property and any other property and existing improvements such as, but not limited to: streets, curbs, paving, utility lines and structures, monuments, bench marks and other public and private property.

- B. In case of any damage or injury caused in the performance of the grading work, the Contractor shall, at his own expense, make good such damage or injury to the satisfaction of, and without cost to the Owner. Existing roads, sidewalks, and curbs damaged during the grading work shall be repaired or replaced to their original condition at the completion of operations. The Contractor shall replace, at his own cost, existing bench marks, monuments, and other reference points which are disturbed or destroyed.

## **1.8 COORDINATION**

- A. Prior to start of grading operations, the Contractor shall arrange an on-site meeting with the Architect for the purpose of establishing Contractor's schedule of operations and scheduling inspection procedures and requirements.
- B. As construction proceeds, the Contractor shall be responsible for notifying the Architect prior to start of grading operations requiring inspection and/or testing.
- C. The Contractor shall be responsible for obtaining test samples of soil materials proposed to be used and transporting them to the site sufficiently in advance of time planned for use of these materials for testing of materials to be completed. Use of these proposed materials by the Contractor prior to testing and approval or rejection, shall be at the Contractor's risk.

## **PART 2 - PRODUCTS**

### **2.1 SOURCE OF MATERIALS**

- A. Material shall be obtained from required on-site excavation, to the extent that suitable material is available, and from off-site sources, to the extent that suitable material is not available from on-site excavation.
- B. Refer to following Sections for preparation and placement of planting soils.
  - 1. Section 329200, LAWNS AND GRASSES.
  - 2. Section 329300, PLANTING.

## **PART 3 - EXECUTION**

### **3.1 GRADING - GENERAL**

- A. Uniformly grade areas within the limits of site grading under this section, including adjacent transition areas. Smooth finished surfaces within specified tolerances, and between points where elevations are shown, or between such points and existing grades.
- B. The degree of finish required will be that ordinarily obtainable from either blade-grader or scraper operations.

1. Ditches: Finish ditches to ensure proper flow and drainage. Conduct final rolling operations to produce a hard, uniform, and smooth cross-section.
2. Grade Breaks located on the plans indicate crisp transitions, not blended or rounded edges. These should be clean, sharp, and uniform in line and curve as indicated on the plans

### **3.2 ROUGH GRADING**

- A. General: Rough grading shall include the shaping, trimming, rolling and refinishing of all surfaces of the subbase, shoulders, earth embankments and the preparation of grades as shown on the Drawings. The grade of shoulders and sloped areas may be done by machine methods.
- B. Do all cutting, filling and grading to lines and grades indicated on the Drawings. Grade evenly to within the dimensions required for grades shown on the Drawings and specified herein. No stones larger than 4 in. shall be placed in upper 6 in. of fill. Fill shall be left in compacted state at the end of work day and sloped to drain.
  1. Architect may make such adjustments in grades and alignments as are found necessary to avoid special conditions encountered.
  2. Provide a smooth transition between adjacent existing grades and new grades.
  3. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- C. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
  1. Lawn or Unpaved Areas: Plus or minus 1 inch (25 mm).
  2. Walks: Plus or minus 1 inch (25 mm).
  3. Pavements: Plus or minus 1/2 inch (13 mm).
  4. Up to 2 in. in 10 ft tolerance shall be permitted on slopes provided the slopes are uniform in appearance and without any abrupt changes.
  5. Traffic of men and equipment across soil subgrade areas shall be prohibited following excavation to the required lines and grades.

### **3.3 FINE GRADING**

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  1. Provide a smooth transition between adjacent existing grades and new grades.
  2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Finish Grading:

1. Lawn or Unpaved Areas: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
2. Walks: Shape the surface of areas under walks to line, grade and cross-section, with the finish surface not more than 0.00 ft. above or 0.10 ft. below the required subgrade elevation, compacted as specified, and graded to prevent ponding of water after rains.
3. Pavements: Shape the surface of the areas under pavement to line, grade and cross-section, with the finish surface not more than 1/2 in. above or below the required subgrade elevation, compacted as specified, and graded to prevent ponding of water after rains. Include such operations as plowing, discing, and any moisture or aerating required to provide the optimum moisture content for compaction. Fill low areas resulting from removal of unsatisfactory soil materials, obstructions, and other deleterious materials, using satisfactory soil material. Shape to line, grade, and cross-section as shown on the Drawings.

**3.4 MAINTENANCE**

- A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Repair and re-establish grades in settled, eroded, and rutted areas to the specified tolerances.
- C. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, re-shape, and compact to the required density prior to further construction.

**3.5 DISPOSAL OF EXCESS AND WASTE MATERIALS**

- A. Remove waste materials, including excavated material classified as unsatisfactory soil material, trash and debris, and dispose of it legally off the Owner's property.

**END OF SECTION**

## **SECTION 32 92 00 - NATIVE SEEDING**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide all materials and equipment, and do all work required to complete the native plant seeding, as indicated on the Drawings and as specified.
- B. The work of this Section also includes providing all equipment and materials and doing all work necessary to supply and place planting soils as indicated on the Contract Documents and as specified. Supplying and placement of planting soils shall include, but not be limited to:
  - 1. Sampling and testing of topsoil, loam borrow, and planting soils.
  - 2. Supplying, mixing, placing, and spreading of planting soils. Final grading shall be completed under work of Section 329119, LANDSCAPE GRADING.

#### **1.3 RELATED WORK**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Establishment of subgrade elevation.
  - 2. Section 329119, LANDSCAPE GRADING.
  - 3. Section 329222, SODDING.
  - 4. Section 329300, PLANTING.

#### **1.4 REFERENCES**

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
  - 1. American Society for Testing and Materials (ASTM):

C 136

Sieve Analysis of Fine and Coarse Aggregates

D 422

Particle-Size Analysis of Soils

E 11

Wire-Cloth Sieves for Testing Purposes

## 1.5 DEFINITIONS

- A. Finish Grade: Elevation of finished surfaces.
- B. Subgrade: Surface or elevation of subgrade soil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil or underdrainage components.
- C. Topsoil: Soil that is present at the top layer of the existing natural soil profile at the Project site. This shall be considered the "Base Loam" component of Planting Soil mixes should adequate volume and quantities of topsoil exist on site and provisions have been made for stockpiling said topsoil.
- D. Loam: Soil that contains a combination of particles typically almost equal in parts sand, silt and clay and including organic matter.
- E. Loam Borrow: Soil that contains a combination of particles typically almost equal in parts sand, silt and clay and including organic matter obtained from off-site sources.
- F. Planting Soil: Unless otherwise indicated throughout this Section, the term "Planting Soil" shall apply to off-site blended soil modified with planting soil components and soil amendments to meet the specific Planting Soil mix recommendations submitted by the testing laboratory.

## 1.6 SUBMITTALS

- A. Samples: The following samples shall be submitted:

<u>Material</u>	<u>Quantity (lb.)</u>
Fertilizer	10
Lime	10
Seed, each mix	1
Loam borrow	10

- B. Manufacturer's Product Data: Manufacturer's product data shall be submitted for the following materials:
  - Aluminum sulfate
  - Fertilizer
- C. Certificates: Labels from the manufacturer's container certifying that the product meets the specified requirements shall be submitted for the following materials:

Commercial fertilizer

Seed  
Ground limestone

- D. Certification of Seed: From seed vendor for each native seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
- E. Site Preparation for Native Seed: Indicate means and method for ensuring seed contact with the soil in all restoration zones and landscape areas (see plans), where leaf litter and other duff may prohibit seed contact with soil.

### 1.7 OWNER'S INSPECTION AND TESTING

- A. Work will be subject to inspection at all times by the Architect. The Owner reserves the right to engage an independent testing laboratory in accordance with requirements of Section 01 4000, QUALITY REQUIREMENTS to analyze and test materials used in the construction of the work. Where directed by the Architect, the testing laboratory will make material analyses and will report to the Architect whether materials conform to the requirements of this specification.
  - 1. Cost of tests and material analyses made by the testing laboratory will be borne by the Owner when they indicate compliance with the specification, and by the Contractor when they indicate non-compliance.
  - 2. Testing equipment will be provided by and tests performed by the testing laboratory. Upon request by the Architect, shall provide such auxiliary personnel and services needed to accomplish the testing work.
  - 3. Gradation of granular materials shall be determined in accordance with ASTM C 136. Sieves for determining material gradation shall be as described in ASTM E 11.

### 1.8 CONTRACTOR'S INSPECTION AND TESTING

- A. The Contractor shall engage an independent testing agency, experienced in the testing of agricultural soils and acceptable to the Architect, to perform the topsoil/planting soil tests and analyses specified herein. All costs associated with testing shall be the Contractor's responsibility.

- 1. Particle size analysis shall include the following gradient of mineral content:

<u>USDA Designation</u>	<u>Size in mm</u>
Gravel	+ 2 mm
Very coarse sand	1-2 mm
Coarse sand	0.5-1 mm
Medium sand	0.25-0.5 mm
Fine sand	0.1-0.25 mm
Very fine sand	0.05-0.1 mm
Silt	0.002-0.05 mm
Clay	< 0.002 mm

2. Chemical analysis shall include the following:
  - a. pH and buffer pH
  - b. percentage of organic content by oven-dried weight
  - c. Nutrient levels by parts per million, including phosphorus, potassium, magnesium, manganese, iron, zinc, and calcium; tests for soil nitrate shall also be obtained if possible. Nutrient test shall include testing laboratory recommendations for supplemental additions to the soil, if necessary, based on the requirements for pasture grass. Recommendations shall include rates at which additives are to be applied. For native seeding fertilization is typically not required unless the soils are particularly infertile.
  - d. Soluble salt by electrical conductivity of a 1:2 soil/water sample.

### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Seed may be mixed by an approved method on the site, or may be mixed by a dealer. If seed is mixed on-site, each variety shall be delivered in the original containers which shall bear the dealer's guaranteed analysis. If the seed is mixed by a dealer, the Contractor shall furnish the Owner the dealer's guaranteed statement of the composition of the mixture.
- B. Seed shall be stored under cool and dry conditions so that the endophytic seed in the mixture is capable of maintaining a high level of endophytes
- D. Deliver fertilizer in sealed waterproof bags, printed with manufacturer's name, weight, and guaranteed analysis.
- E. Deliver native seed in original sealed containers, labeled with weight, certified analysis, name and address of manufacturer, and indication of conformance with local requirements, as applicable. Damaged containers will not be accepted.

### 1.10 PLANTING SEASON

- A. Planting season shall be as follows:

<u>Material</u>	<u>Planting Season</u>
Native Mix	<u>Spring</u> <u>Fall</u> Refer to Paragraph 3.5 below

- B. Planting shall only be performed when weather and soil conditions are suitable for planting the material specified in accordance with locally accepted practice.
- C. Planting season may be extended with the written permission of the Architect.

### **1.11 ACCEPTANCE**

A. Acceptance:

1. The Architect will inspect all work for Substantial Completion upon written request of the Contractor. The request shall be received at least ten calendar days before the anticipated date of inspection.
2. Acceptance of material by the Architect will be for general conformance to specified requirements, and shall not relieve the Contractor of responsibility for full conformance to the Contract Documents.
3. Upon completion and reinspection of all repairs or renewals necessary in the judgement of the Architect, the Architect will recommend to the Owner that the work of this Section be accepted.

B. Native Seed Acceptance

1. The Contractor shall guarantee seeded areas will meet or exceed the following performance criteria one full year after Provisional Acceptance.
  - a. Within three months of seeding, total vegetation cover in all zones shall exceed 50% (by areal cover).
  - b. Total vegetation cover in all zones combined shall exceed 75% (by areal cover), and 5% of all species present shall be native.  
Seedlings from 10% of seeded grass species shall be present in all zones combined.
  - c. Seedlings from 20% of seeded forb species shall be present in all zones combined.
  - d. The Contractor shall guarantee seeded areas will meet or exceed the following performance criteria two full years after Provisional Acceptance.
  - e. Total vegetation cover in all zones combined shall exceed 70% (by areal cover).

### **1.12 QUALITY ASSURANCE**

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Five years' experience in landscape installation in addition to requirements in Division 01 General Requirements.
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress

B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Seeding Seeding Work: Contractor shall have a minimum of five years experience in work of the type required by this Section.

- D. All native seed species shall be supplied as pure live seed.
- E. Seed shall be native to New England and seed source origin shall be from within a 500 mile radius of the project site unless approved by Architect.
- F. All native seed mixes to be applied at the rates and quantities of seeds per acre specified on the Plans.

## **PART 2 PRODUCTS**

### **2.1 NATIVE SEED SOURCES**

Ernst Conservation Seeds, Inc.  
8884 Mercer Pike  
Meadville PA 16335  
(800) 873  
<http://www.ernstseed.com/seed-mixes>

NESeed  
122 Park Ave, Building H  
East Hartford, CT 06108  
(800) 825 4577  
<https://www.neseed.com/>

New England Wetland Plants, Inc.  
820 West Street  
Amherst, MA 01002  
(413)548 8000  
<http://newp.com/>

### **2.2 PLANTING SOIL**

- A. Existing Topsoil
  - 1. Existing topsoil from on-site source(s) may be used for planting soil, to the extent available, if it meets the requirements of this Section for planting soil, or if approved by the Architect.
  - 2. Planting soil shall be composed of a natural, fertile, friable soil typical of cultivated topsoils of the locality, suitable for the germination of seeds and support of vegetative growth, with additives, if required, to achieve particle distribution and organic content specifications . Topsoil shall be taken from a well-drained, arable site, free of subsoil, large stones, earth clods, sticks, stumps, clay lumps, roots, other objectionable, extraneous matter or debris nor contain toxic substances. Planting soil shall have a pH value between 5.5 and 6.5 and organic matter content of 5 to 10% of total dry weight.

3. Planting soil shall have the following mechanical analysis (see paragraph 1.7 for particle sizes):

Approximate Particle Distribution

Gravel	Less than 10%
Coarse to medium sand	55 – 65%
Fine to very fine sand	15 – 25%
Silt	10– 20%
Clay	15 – 20%

4. Minimum planting soil nutrient levels shall be: Nitrogen @ 5% average of organic matter, Phosphorus @ .02 to .05% average of total soil content, Potassium @ 1.2% average of total soil content.
5. The Contractor shall provide the Architect with planting soil test results, as specified in Paragraph 1.7, before the start of planting operations. If planting soil does not fall within the required particle distribution, organic content, or pH range, it shall be adjusted to meet the specifications through the addition of sand, compost, limestone, or aluminum sulfate to bring it within the specified limits.

## 2.3 COMPOST

- A. Compost shall be derived from organic wastes such as food and agricultural residues, animal manures, mixed solid waste and biosolids (treated sewage sludge) that meet all State Environmental Agency requirements. Neither wood chips, nor bark, nor sedge peat, nor peat moss nor any other material shall be used to increase soil organic matter. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

1. Compost shall have the following properties:

<u>Parameters</u>	<u>Range</u>
pH	5.5 – 8.0
Moisture Content	35% - 55%
Soluble Salts	≤ 4.0 mmhos (dS)
C:N ratio	15 – 30:1
Particle Size	< 1"
Organic Matter Content	> 50%
Bulk Density	< 1000 lbs./cubic yard
Foreign Matter	< 1% (dry weight)

2. Compost generator shall also provide minimum available nitrogen and other macro and micro nutrients to determine fertilizer requirements.
3. Compost shall be "AllGro", distributed by AllGro, 4 Liberty Lane West, Hampton, NH 03842; "Agresoil", distributed by Agresource, 100 Main Street, Amesbury, MA 01913; or approved equal.
4. Guidelines for quantity of compost required to achieve suitable soil organic content in soil mixes for ornamental horticultural planting shall be as recommended by the compost manufacturer.

**2.4 LIMESTONE**

- A. Ground limestone shall be an agricultural limestone containing a minimum of 85% total carbonates, by weight. Ground limestone shall be graded within the following limits:

<u>Sieve Size</u>	<u>% Passing by Weight</u>
No. 10	100
No. 20	90
No. 100	60

- B. Water shall be suitable for irrigation and free from ingredients harmful to seeded areas.

**2.5 ALUMINUM SULFATE**

- A. Aluminum sulfate shall be unadulterated and shall be delivered in containers with the name of the material and manufacturer, and net weight of contents.

**2.6 COMMERCIAL FERTILIZER**

- A. Fertilizer shall conform to the following:
- When applied as a topsoil amendment, fertilizer shall have an analysis that will deliver appropriate amounts of nitrogen, phosphorus, and potassium as required to remedy deficiencies revealed by testing the topsoil.
    - 50% of nitrogen shall be derived from natural organic source of ureaform.
    - Available phosphorus shall be derived from superphosphate, bone meal, or tannage.
    - Potassium shall be derived from muriate of potash containing 60% potash.
- B. Fertilizer shall be delivered in manufacturer's standard container printed with manufacturer's name, material weight, and guaranteed analysis.

**2.7 SUPERPHOSPHATE**

- A. Superphosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes, and containing not less than 20% available phosphoric acid. The superphosphate shall be delivered to the site in the original unopened containers, each bearing the manufacturer's guaranteed analysis. Any superphosphate which becomes caked or otherwise damaged making it unsuitable for use, will be rejected.

### **PART 3 EXECUTION**

#### **3.1 PREPARATION OF SUBGRADE**

- A. Subgrade shall be examined to ensure that rough grading and all other subsurface work in lawn areas and other areas to be seeded or sodded is done prior to start of seeding.
- B. Existing subgrade shall be loosened or scarified to a minimum depth of 3 in. prior to spreading topsoil. Subgrade shall be brought to true and uniform grade, and shall be cleared of stones greater than 3 in., sticks, and other extraneous material.

#### **3.2 EXAMINATION**

- A. For native seeding:
  - 1. Examine areas to receive native seeding for compliance with requirements outlined above. Check that finish grades slope to drain, are free of depressions or other irregularities after thorough settlement and compaction of soil, and are uniform in slope between grading controls and the elevations indicated in the Plans. If finish grades are determined by the Architect to be insufficient for seeding, the Contractor shall re-grade areas as directed by the Architect.
  - 2. Within landscaping areas (see plans), ensure ground layer is cleared of leaf litter and other duff prior to seeding. Submit to the Architect for approval the method for making seed contact with the soil where the soil will not be graded or otherwise disturbed prior to seeding.
  - 3. Ensure that soil preparation is consistent with the requirements of the Soil Preparation Plan.
  - 4. Proceed with installation only after unsatisfactory conditions have been corrected. Obtain approval from Architect regarding pre-installation conditions before proceeding.

#### **3.3 SPREADING OF PLANTING SOIL**

- A. Planting soil shall not be spread until it is possible to follow immediately or within 24 hours with seeding operations. If topsoil is spread prior to this time it shall be cultivated to loosen soil prior to seeding.
- B. Planting soil shall not be placed when subgrade or topsoil material are frozen, excessively wet, or excessively dry.
- C. Planting soil shall be spread in a uniform layer, to a thickness which will compact to the depth required to bring final lawn and grass surfaces to required elevation. Unless otherwise indicated minimum depth of topsoil shall be 6 in..
  - 1. Place approximately 1/2 the thickness of planting soil mixture required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil mixture.

- D. Grade native seed areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1-1/2 inches (38 mm) in any dimension, and other objects that may interfere with planting or maintenance operations.
- E. Moisten prepared seed areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.

### **3.4 PLACING PLANTING SOIL**

- A. Planting soil shall not be spread until it is possible to follow immediately or within 24 hours with planting operations. If planting soil is spread prior to this time it shall be cultivated to loosen soil prior to planting.
- B. Planting soil shall be spread in lifts not greater than 8 inches and compacted to a density between 82% and 86% Standard Proctor Maximum Dry Density in accordance with ASTM D698. The surface area of each lift, including the subgrade after it has been compressed by a backhoe, shall be scarified by raking prior to placing the next lift.
- C. Place and spread planting medium to a depth greater than required such that after settlement, finished grade shall conform to the lines, grades and elevations shown on the Drawings. Ensure proper drainage in an uninterrupted pattern free of hollows and pockets.
- D. Remove stiff clods, lumps, brush, roots, stumps, litter and other foreign material and stones over 1 inch diameter and legally dispose of off-site.
- E. Surfaces shall be graded and smoothed, eliminating all sharp breaks by rounding, scraping off bumps and ridges, and filling in holes and cuts.
- F. Grading: Refer to Section 329119, LANDSCAPE GRADING.

### **3.5 SITE PREPARATION**

- A. Two interrelated and variable actions are needed prior to native seeding:
  - 1. Establishment of a temporary cover crop to stabilize the soil and prevent erosion until the correct time for native seeding and
  - 2. Weed control.

NOTE: These recommendations may need to be modified depending on the time of season/ weather conditions when the final grading is completed and on the abundance

and types of weeds present in the soil – this simply cant be determined before the actual soil is in place, after final grading. On-site consultations to observe agronomic conditions during the planting and establishment periods are strongly recommended.

Because site grading will involve spreading of stockpiled existing/amended soil, most likely there will be a large number of weed seeds present that will germinate rapidly (because some will end up in the perfect soil habitat to germinate) at any time during the growing season.

If these weeds are not controlled, they may out-compete the native seedlings, and because these annuals mature rapidly, they will produce a new crop of annual weed seeds, continuing the weed problem into the following year - and preventing the native from successful establishment. Failure to control weeds is the most common cause of native failure.

- B. After final grading, seed all areas with Annual Ryegrass (*Lolium multiflorum*) (not winter or cereal rye) at 8 pounds per 1000sf. Areas with steep slopes can be mulched lightly with 1-2" of straw (not hay!) to prevent erosion. Annual Rye will prevent erosion and help to control weeds. The annual rye cover will establish quickly during the spring or fall growing season. The Annual Rye will die off the following season without reseeding.
- C. Inspect the Annual Ryegrass after establishment (30-45 days) to assess the amount of weeds present (growing with the rye grass) see 1 or 2 below:
  - 1. Minimal Weeds Present. If the weeds in the Annual Rye are minimal/few, mow repeatedly at a height of 4-6" to prevent weeds from maturing and setting seed (most are annuals). Continue mowing regularly at 4-6" until late fall then seed through the Annual Rye using a slit seeder.
  - 2. Significant Weeds Present: If the weeds are significant or dominant within the Annual Rye, herbicide treatment is necessary (agronomic inspection recommended). When the weeds are growing vigorously (May – October) spray with Glyphosphate (Roundup), which is a non-selective foliar herbicide. The Round-up will kill the weeds and the Annual Rye. The dead plants should provide adequate erosion protection – if necessary a small amount of straw can be added(perhaps on the steeper berm slopes). Inspect weekly and spot-treat/spray any surviving, or new weeds again with Glyphosphate until the appropriate planting time. Do not disturb the soil any more than necessary during herbicide treatment, as this will expose new weeds seeds to favorable conditions for germination (better to hand spray than to drive a tractor over it). Just before seeding, mow the dead weeds and rake the debris, again try not to disturb the soil, as this will expose new weed seeds to germination.

### **3.6 SEED APPLICATION**

- A. Prepare planting sites as discussed above. Be sure to wait a minimum of 2 weeks after the last Glyphosphate treatment before seeding, and cut using a flail mower and rake and remove the dead plants. Remove debris from the planting locations. If seeding into Annual Rye, mow short before seeding.

- B. Timing: Seeding should be done when soil is near normal moisture conditions (moist, not saturated, no puddles). If the soil is too wet, wait until it dries. Germination is not desired in the fall, so irrigation shall not be necessary. Seeding should not be done under windy conditions, as the grass seeds are light and fluffy and may blow away.
- C. Acceptable planting times/seasons include:
  - 1. Fall/Dormant Seeding (Preferred)
    - a. For best results, native seeding should occur in late fall – October to early November - and can take place into the dormant season until the ground is frozen or snow covered. Many of the seeds require cold scarification for germination. If fall seeding is occurs too early in the season, seeds which do not require cold scarification (approximately 10% of most mixes) may germinate before becoming hardened off and may die from the frost.
  - 2. Spring and Early Summer Seeding
    - a. Seeding in the spring and early summer is acceptable. While earlier planting is preferred (after the risk of frost), late spring and early summer seeding will require a light layer of weed free straw mulch to conserve soil moisture. If conditions are drier than usual watering may be required (See section 3.7).
- D. Seeding shall occur no sooner than 24 hours after herbicide application and no greater than 14 days after herbicide application.
- E. Sowing rates vary with mix of species but are usually much lighter than turfgrass seed application rates.
- F. Seeding Methods: Seed mixes shall be applied using one of the following acceptable methods:
  - 1. Drill Seeding
    - a. If using a seed drill or slice/slit seeder and the seeds do not come premixed, the grass and forb seeds should be mixed, weighed, and applied separately. The forb seed is much smaller than the grass seed in quantity and should therefore be very carefully weighed and separated according to the mix rates. Note: if an accurate scale is not available, the seed quantities can be divided in proportion to the total amount of seed to be used for each area. Mix the forb mix with two to four times the volume of damp sand, sawdust, or horticultural vermiculite as an inert “filler” material.
    - b. The slicing seeder should be calibrated to provide the recommended seeding rates. For the grass and forb seed, seed in two perpendicular passes. This assumes that the seeding machine is calibrated for 50% of the recommended seeding rate. Applying the seed in multiple passes will break up the ryegrass more completely, and will help to assure a more uniform distribution of seed, and will help to assure good soil:seed contact.

2. Broadcasting

- a. Broadcast seeding can be accomplished by hand or using a hand operated mechanical spreader. If seeds do not come premixed from the supplier, grass and forb seed should be mixed together with two to four times the volume of damp sand, sawdust, or horticultural vermiculite as an inert “filler” material. Seed shall be applied in two perpendicular passes at 50% of the recommended seeding rate. Applying the seed in multiple passes will help to assure a more uniform distribution of seed throughout. Lightly rake or roll with a cultipacker after seeding.

- G. Do not use wet seed or seed that is moldy or otherwise damaged.
- H. Seeding operations must occur when soil moisture is appropriate and areas are in a friable condition and neither hard nor muddy
- I. Lightly roll seeded areas with a cultipack roller and water with fine spray.
- J. Ensure seeds have proper stratification and/or scarification to break seed dormancy for spring emergence.

**3.7 RAKE, ROLL, MULCH**

- A. The planting area should be lightly raked or rolled with a cultipacker after seeding to ensure good soil:seed contact. After the seed mixes have been applied to all areas, rake or roll the seeded areas so they are lightly covered with soil, 1/4 – 1/2” deep.

**3.8 SEED ESTABLISHMENT**

- A. Irrigation During Germination (Spring-Summer Planting Only)
  1. For optimal germination it is recommended that seeded areas receive a minimum of 0.25 inch of natural rainfall or irrigation within 10 days of seeding. If natural rainfall is not received within 10 days, it shall be the responsibility of the Contractor to irrigate the new seeding with a minimum of 0.25 inch of water, or so that the water penetrates the soil to a uniform minimum depth of 4.0 inches.
  2. The soil of the seedbed should be maintained in a moist condition for 6-8 weeks after seeding – as necessary to favor germination and the critical early establishment period, depending on precipitation.
  3. For fall seeding the meadows are not expected germinate so they do not require irrigation.

**3.9 NATIVE PLANT MANAGEMENT**

- A. First Growing Season
  1. Mowing is an important management practice during the first growing year. Mowing favors perennial species over annual weeds that may be present. The first mowing

should start when the tallest growth approaches 12" (mid – late June). Mow at a height of 6" to cut the annual weed flower/seed heads. Continue mowing every 3-4 weeks, as needed until late October, with a mowing height of 6". Most native perennials will not grow taller than 4-6" inches in the first year. Some vegetation such as Black Eyed Susan will grow taller but will not be adversely affected by cutting.

2. Refrain from mowing after late October until the next growing season. Mowing is extremely important for the first year to control weeds. It is strongly recommended not pull any weeds within the first year as such activity will disturb the native seedlings. These (typically annual) weeds will not present a problem and can be controlled by mowing. Once the native plants have become established the native species should out-compete the weeds, except for unusual situations which can be "spot" treated with herbicide, or hand-pulled.

B. Second Growing Season

1. Around April 1 -15 (following the first growing season), the plants should be mowed to a height of 3-4" and raked lightly to expose the small plants and some soil. Remove the mowing debris if possible. Mowing should only be performed twice throughout the second growing season to a height of 12 inches, which should be sufficient to control annual and biennial weeds. Timing of mowing should correspond to the bloom and seed cycles of biennial weeds such as Sweet clover, Burdock, and Queen Anne's Lace. Rhizomatous weeds such as Canada thistle, Canada goldenrod, and Reed canary grass can be spot-treated or physically removed as needed.

**3.10 LONG TERM MANAGEMENT: MOWING**

- A. It is recommended that the native plantings be managed by flail mowing every one to two years, mid-spring (Mid-late April) to a height of 3-4". Spring mowing will not adversely impact emerging native grasses and perennials and will help prevent establishment of woody species. Spring mowing also leaves native plants intact over winter for added visual interest, wildlife habitat, and additionally provides a buffer from extreme weather and frost action on the soil. Mid-spring mowing also will cut some of the undesirable cool-season grasses that will likely invade the native plantings. Always rake and remove the cuttings to expose the soil. If the new growth of the native plantings gets over 12" before it is mowed, do not mow that year.

**END OF SECTION**

## **SECTION 32 92 22 - SODDING**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide all materials and equipment, and do all work required to complete the sodding of grass mounds, as indicated on the Drawings and as specified.
- B. The work of this Section also includes providing all equipment and materials and doing all work necessary to supply and place planting soils as indicated on the Contract Documents and as specified. Supplying and placement of planting soils shall include, but not be limited to:
  - 1. Sampling and testing of topsoil, loam borrow, and planting soils.
  - 2. Supplying, mixing, placing, and spreading of planting soils. Final grading shall be completed under work of Section 329119, LANDSCAPE GRADING.

#### **1.3 RELATED WORK**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Establishment of subgrade elevation.
  - 2. Section 329119, LANDSCAPE GRADING.
  - 3. Section 329200, NATIVE SEEDING.
  - 4. Section 329300, PLANTING; New plantings.

#### **1.4 REFERENCES**

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
  - 1. American Society for Testing and Materials (ASTM):

C 136

Sieve Analysis of Fine and Coarse Aggregates

D 422

Particle-Size Analysis of Soils

E 11

Wire-Cloth Sieves for Testing Purposes

## 1.5 DEFINITIONS

- A. Finish Grade: Elevation of finished surfaces.
- B. Subgrade: Surface or elevation of subgrade soil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil or underdrainage components.
- C. Topsoil: Soil that is present at the top layer of the existing natural soil profile at the Project site. This shall be considered the "Base Loam" component of Planting Soil mixes should adequate volume and quantities of topsoil exist on site and provisions have been made for stockpiling said topsoil.
- D. Loam: Soil that contains a combination of particles typically almost equal in parts sand, silt and clay and including organic matter.
- E. Loam Borrow: Soil that contains a combination of particles typically almost equal in parts sand, silt and clay and including organic matter obtained from off-site sources.
- F. Planting Soil: Unless otherwise indicated throughout this Section, the term "Planting Soil" shall apply to off-site blended soil modified with planting soil components and soil amendments to meet the specific Planting Soil mix recommendations submitted by the testing laboratory.

## 1.6 SUBMITTALS

- A. Samples: The following samples shall be submitted:

<u>Material</u>	<u>Quantity (lb.)</u>
Fertilizer	1
Lime	1
Compost	1
Loam borrow	1
- B. Manufacturer's Product Data: Manufacturer's product data shall be submitted for the following materials:
  - Fertilizer
- C. Certificates: Labels from the manufacturer's container certifying that the product meets the specified requirements shall be submitted for the following materials:
  - Commercial fertilizer
  - Ground limestone

## 1.7 OWNER'S INSPECTION AND TESTING

- A. Work will be subject to inspection at all times by the Owner and Architect. The Owner reserves the right to engage an independent testing laboratory in accordance with requirements of Section 014000, QUALITY REQUIREMENTS to analyze and test materials used in the construction of the work. Where directed by the Architect, the testing laboratory will make material analyses and will report to the Architect whether materials conform to the requirements of this specification.
1. Cost of tests and material analyses made by the testing laboratory will be borne by the Owner when they indicate compliance with the specification, and by the Contractor when they indicate non-compliance.
  2. Testing equipment will be provided by and tests performed by the testing laboratory. Upon request by the Architect, shall provide such auxiliary personnel and services needed to accomplish the testing work.
  3. Gradation of granular materials shall be determined in accordance with ASTM C 136. Sieves for determining material gradation shall be as described in ASTM E 11.

## 1.8 CONTRACTOR'S INSPECTION AND TESTING

- A. The Contractor shall engage an independent testing agency, experienced in the testing of agricultural soils and acceptable to the Architect, to perform the topsoil/planting soil tests and analyses specified herein. All costs associated with testing shall be the Contractor's responsibility.
1. Particle size analysis shall include the following gradient of mineral content:

<u>USDA Designation</u>	<u>Size in mm</u>
Gravel	+ 2 mm
Very coarse sand	1-2 mm
Coarse sand	0.5-1 mm
Medium sand	0.25-0.5 mm
Fine sand	0.1-0.25 mm
Very fine sand	0.05-0.1 mm
Silt	0.002-0.05 mm
Clay	< 0.002 mm
  2. Chemical analysis shall include the following:
    - a. pH and buffer pH
    - b. percentage of organic content by oven-dried weight
    - c. Nutrient levels by parts per million, including phosphorus, potassium, magnesium, manganese, iron, zinc, and calcium. Nutrient test shall include testing laboratory recommendations for supplemental additions to the soil, if necessary, based on the requirements for ornamental horticultural plants. Recommendations shall include rates at which additives are to be applied.
    - d. Soluble salt by electrical conductivity of a 1:2 soil/water sample.

**1.9 DELIVERY, STORAGE, AND HANDLING**

A. Digging Sod:

1. Sod shall not be dug at the nursery or approved source until ready to transport sod to the site of the work or acceptable storage location.
2. Before stripping, sod shall be mowed at a uniform height of 2 in.
3. Cut sod to specified thickness and to standard width and length desired.

B. Transportation of Sod:

1. Sod transported to the Project in open vehicles shall be covered with tarpaulins or other suitable covers securely fastened to the body of the vehicle to prevent injury. Closed vehicles shall be adequately ventilated to prevent overheating of the sod.
2. Evidence of inadequate protection following the digging, carelessness while in transit, or improper handling shall be cause for rejection.
3. Sod shall be kept moist, fresh, and protected at all times. Such protection shall encompass the entire period during which the sod is in transit, being handled, or are in temporary storage.
4. Upon arrival at the temporary storage location or the site of the work, sod material shall be inspected for proper shipping procedures. Should the sod be dried out, the Architect will reject the sod. When sod has been rejected, the Contractor shall at once remove it from the area of the work and replace it with acceptable material.
5. Unless otherwise authorized by the Architect, the Contractor shall notify the Architect at least two working days in advance of the anticipated delivery date of sod material. Certificate of Inspection when required shall accompany each shipment.

C. Handling and Storage of Sod:

1. Sod material shall be handled with extreme care to avoid breaking or tearing strips.
2. Sod shall not be stored for longer than 30 hours prior to installation. Sod shall be stored in a compact group and shall be kept moist. Sod shall be prevented from freezing.
3. Sod that has been damaged by poor handling or improper storage will be rejected by the Architect.

D. Deliver fertilizer in sealed waterproof bags, printed with manufacturer's name, weight, and guaranteed analysis.

**1.10 PLANTING SEASON**

A. Planting season shall be as follows:

<u>Material</u>	<u>Planting Season</u>	
	<u>Spring</u>	<u>Fall</u>
Sodding	3/15 to 5/15	8/15 to 10/15

- B. Planting shall only be performed when weather and soil conditions are suitable for planting the material specified in accordance with locally accepted practice.
- C. Planting season may be extended with the written permission of the Architect.

#### **1.11 ACCEPTANCE**

- A. Acceptance:
  - 1. The Architect will inspect all work for Substantial Completion upon written request of the Contractor. The request shall be received at least ten calendar days before the anticipated date of inspection.
  - 2. Acceptance of material by the Architect will be for general conformance to specified requirements, and shall not relieve the Contractor of responsibility for full conformance to the Contract Documents.
  - 3. Upon completion and reinspection of all repairs or renewals necessary in the judgement of the Architect, the Architect will recommend to the Owner that the work of this Section be accepted.
- B. Sod areas will be accepted when in compliance with all the following conditions:
  - 1. Roots are thoroughly knit to the soil;
  - 2. Absence of visible joints;
  - 3. All areas show a uniform stand of specified grass in healthy condition;
  - 4. At least 60 days have elapsed since the completion of work under this Section.

### **PART 2 PRODUCTS**

#### **2.1 SOD**

- A. Certified Turfgrass Sod: Superior sod grown from certified, high quality seed of known origin or from plantings of certified grass seedlings or stolons. It shall be inspected by the certification agency of the state in which it is grown to assure satisfactory genetic identity and purity, overall high quality and freedom from noxious weeds as well as excessive quantities of other crop and weedy plants at time of harvest. All seed or original plant material in mixture must be certified. Turfgrass sod shall meet the published state standards for certification.
  - 1. Sod shall be Fine Fescue sod supplied by Tuckahoe Turf, Richmond, RI; Tel. 1-800-556-6985; [www.tuckahoeturf.com](http://www.tuckahoeturf.com), or approved equal.
- B. Sod shall be nursery grown on cultivated mineral agricultural soils. Sod shall have been mowed regularly and carefully, and otherwise maintained from planting to harvest.

- C. Thickness of Cut: Sod shall be machine cut at a uniform soil thickness of 5/8 in., plus or minus 1/4 in., at the time of cutting. Measurement for thickness shall exclude top growth and thatch.
- D. Strip Size: Individual pieces of sod shall be cut to the supplier's standard width and length. Maximum allowable deviation from standard widths and lengths shall be plus or minus 1/2 in. on width, and plus or minus 5% on length. Broken strips and torn and uneven ends will not be acceptable.
- E. Strength of Sod Strips: Standard size sections of sod shall be strong enough to support their own weight and retain their size and shape if suspended vertically when grasped in the upper 10% of the section.
- F. Moisture Content: Sod shall not be harvested or transplanted when moisture content (excessively dry or wet) may adversely affect its survival.
- G. Time Limitations: Sod shall be harvested, delivered, and transplanted within a 36 hour period unless a suitable preservation method is approved prior to delivery. Sod not transplanted within this period shall be inspected and approved by the Architect prior to its installation.
- H. Thatch: Sod shall be relatively free of thatch. A maximum of 1/2 in. (uncompressed) thatch will be permitted.
- I. Diseases, Nematodes, and Insects: Sod shall be free of diseases, nematodes, and soil-borne insects. State Nursery and Plant Materials Laws require that all sod be inspected and approved for sale. The inspection and approval must be made by the State Agricultural Department, Office of the State Entomologist.
- J. Weeds: Sod shall be free of objectionable grassy and broad leaf weeds. Turfgrass sod shall be considered free of such weeds if less than five such plants are found per 100 sq. ft. of area.
  - 1. Turfgrass sod shall not be acceptable if it contains any of the following weeds: common bermudagrass (wiregrass), quackgrass, johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel and bromegrass.

## **2.2 SOD FARM GROWING MEDIUM**

- A. Soil in which sod was grown shall be classified as loam or sandy loam (silt loam is not acceptable) and shall conform to the following grain size distribution for material passing the #10 sieve:

<u>U.S. Sieve No.</u>	<u>% Passing by Weight</u>	
	<u>Minimum</u>	<u>Maximum</u>
10	100	---
20	75	100
40	30	85
100	12	45
270	5	25
0.002 mm	1	4

1. The maximum retained on the #10 sieve shall be 15% by weight of the total sample.
2. Tests shall be by combined hydrometer and wet sieving in compliance with ASTM D422.
3. The organic content shall be between 3.0 and 8.0 percent.

**2.3 PLANTING SOIL**

A. Existing Topsoil

1. Existing topsoil from on-site source(s) may be used for planting soil, to the extent available, if it meets the requirements of this Section for planting soil, or if approved by the Architect.
2. Planting soil shall be composed of a natural, fertile, friable soil typical of cultivated topsoils of the locality, suitable for the germination of seeds and support of vegetative growth, with additives, if required, to achieve particle distribution and organic content specifications . Topsoil shall be taken from a well-drained, arable site, free of subsoil, large stones, earth clods, sticks, stumps, clay lumps, roots, other objectionable, extraneous matter or debris nor contain toxic substances. Planting soil shall have a pH value between 5.5 and 6.5 and organic matter content of 5 to 10% of total dry weight.
3. Planting soil shall have the following mechanical analysis (see paragraph 1.7 for particle sizes):

Approximate Particle Distribution

Gravel	Less than 10%
Coarse to medium sand	55 – 65%
Fine to very fine sand	15 – 25%
Silt	10– 20%
Clay	15 – 20%

4. Minimum planting soil nutrient levels shall be: Nitrogen @ 5% average of organic matter, Phosphorus @ .02 to .05% average of total soil content, Potassium @ 1.2% average of total soil content.
5. The Contractor shall provide the Architect with planting soil test results, as specified in Paragraph 1.7, before the start of planting operations. If planting soil does not fall within the required particle distribution, organic content, or pH range, it shall be adjusted to meet the specifications through the addition of sand, compost, limestone, or aluminum sulfate to bring it within the specified limits.

## 2.4 COMPOST

- A. Compost shall be derived from organic wastes such as food and agricultural residues, animal manures, mixed solid waste and biosolids (treated sewage sludge) that meet all State Environmental Agency requirements. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

1. Compost shall have the following properties:

<u>Parameters</u>	<u>Range</u>
pH	5.5 – 8.0
Moisture Content	35% - 55%
Soluble Salts	≤ 4.0 mmhos (dS)
C:N ratio	15 – 30:1
Particle Size	< 1"
Organic Matter Content	> 50%
Bulk Density	< 1000 lbs./cubic yard
Foreign Matter	< 1% (dry weight)

2. Compost generator shall also provide minimum available nitrogen and other macro and micro nutrients to determine fertilizer requirements.
3. Compost shall be "AllGro", distributed by AllGro, 4 Liberty Lane West, Hampton, NH 03842; "Agresoil", distributed by Agresource, 100 Main Street, Amesbury, MA 01913; or approved equal.
4. Guidelines for quantity of compost required to achieve suitable soil organic content in soil mixes for ornamental horticultural planting shall be as recommended by the compost manufacturer.

## 2.5 LIMESTONE

- A. Ground limestone shall be an agricultural limestone containing a minimum of 85% total carbonates, by weight. Ground limestone shall be graded within the following limits:

<u>Sieve Size</u>	<u>% Passing by Weight</u>
No. 10	100
No. 20	90
No. 100	60

## 2.6 WATER

- A. Water shall be suitable for irrigation and free from ingredients harmful to sodded areas.

## **2.7 COMMERCIAL FERTILIZER**

- A. Starter fertilizer shall be HD Scotts Starter Fertilizer or approved equal.
- B. Fertilizer shall conform to the following:
  - 1. When applied as a topsoil amendment, fertilizer shall have an analysis that will deliver appropriate amounts of nitrogen, phosphorus, and potassium as required to remedy deficiencies revealed by testing the topsoil.
    - a. 50% of nitrogen shall be derived from natural organic source of ureaform.
    - b. Available phosphorus shall be derived from superphosphate, bone meal, or tankage.
    - c. Potassium shall be derived from muriate of potash containing 60% potash.
- C. Fertilizer shall be delivered in manufacturer's standard container printed with manufacturer's name, material weight, and guaranteed analysis.

## **2.8 SUPERPHOSPHATE**

- A. Superphosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes, and containing not less than 20% available phosphoric acid. The superphosphate shall be delivered to the site in the original unopened containers, each bearing the manufacturer's guaranteed analysis. Any superphosphate which becomes caked or otherwise damaged making it unsuitable for use, will be rejected.

## **2.9 WEED CONTROL**

- A. Weed control for stockpiled topsoil shall be a non-selective weed killer for control of grassy and broadleaf weeds; weed control shall have short residual, allowing sodding operations to occur within 7 days of application.

## **PART 3 EXECUTION**

### **3.1 PREPARATION OF SUBGRADE**

- A. Subgrade shall be examined to ensure that rough grading and all other subsurface work in lawn areas and other areas to be sodded is done prior to start of sodding.
- B. Existing subgrade shall be loosened or scarified to a minimum depth of 4 in. prior to spreading planting soil Subgrade shall be brought to true and uniform grade, and shall be cleared of stones greater than 3 in., sticks, and other extraneous material.

### **3.2 SPREADING OF PLANTING SOIL**

- A. Planting soil shall not be spread until it is possible to follow immediately or within 24 hours with sodding operations. If topsoil is spread prior to this time it shall be cultivated to loosen soil prior to sodding.
- B. Planting soil shall not be placed when subgrade or topsoil material are frozen, excessively wet, or excessively dry.
- C. Planting soil shall be spread in a uniform layer, to a thickness which will compact to the depth required to bring final lawn and grass surfaces to required elevation. Unless otherwise indicated minimum depth of topsoil shall be 6 in..
  - 1. Place approximately 1/2 the thickness of planting soil mixture required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil mixture.
- D. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1-1/2 inches (38 mm) in any dimension, and other objects that may interfere with planting or maintenance operations.
- E. Moisten prepared lawn areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.

### **3.3 APPLICATION OF FERTILIZER AND CONDITIONERS**

- A. Fertilizer and conditioners shall be applied at the following rates:
  - 1. Compost - as required by test results of topsoil.
  - 2. Limestone - as required by test results of topsoil.
  - 3. Fertilizer - as required by test results of topsoil.
- B. Mixing with planting soil:
  - 1. Fertilizer and conditioners shall be spread over the entire lawn areas at the application rates indicated above.
  - 2. Materials shall be uniformly and thoroughly mixed into the top 4 in. of planting soil by discing, rototilling, or other approved method.

### **3.4 PLACING PLANTING SOIL**

- A. Planting soil shall not be spread until it is possible to follow immediately or within 24 hours with planting operations. If planting soil is spread prior to this time it shall be cultivated to loosen soil prior to planting.
- B. Planting soil shall be spread in lifts not greater than 8 inches and compacted to a density between 82% and 86% Standard Proctor Maximum Dry Density in accordance with ASTM D698. The surface area of each lift, including the subgrade after it has been compressed by a backhoe, shall be scarified by raking prior to placing the next lift.
- C. Place and spread planting medium to a depth greater than required such that after settlement, finished grade shall conform to the lines, grades and elevations shown on the Drawings. Ensure proper drainage in an uninterrupted pattern free of hollows and pockets.
- D. Remove stiff clods, lumps, brush, roots, stumps, litter and other foreign material and stones over 1 inch diameter and legally dispose of off-site.
- E. Surfaces shall be graded and smoothed, eliminating all sharp breaks by rounding, scraping off bumps and ridges, and filling in holes and cuts.
- F. Grading: Refer to Section 329119, LANDSCAPE GRADING.

### **3.5 SODDING**

- A. Edges of the sodded areas shall be smooth, and all sodded areas shall conform to the design cross sections and grade. At edges adjacent to curbs, paved areas, etc., top surface of earth in sod shall be 1/2 in. below adjacent hard surface.
- B. Sod shall be placed and all sodding operations completed within 72 hours following stripping from sod source bed.
- C. On slopes steeper than 2 to 1, sod shall be fastened in place with suitable wood pins or other approved methods, spaced at not less than 1 pin per square foot.
- D. Surface of completed sodded area shall be smooth. Sod shall be laid edge-to-edge, with tight-butted, staggered joints. Sod shall be carefully placed to insure that it is neither stretched or overlapped. Immediately after laying sod shall be pressed firmly into contact with sod bed by tamping or rolling, to eliminate air pockets. Following compaction, topsoil shall be used to fill all cracks, and excess soil shall be worked into grass with rakes or other suitable equipment. Sod shall not be smothered with excess fill soil.
- E. Immediately after sodding operations have been completed, entire surface shall be compacted with a cultipacker roller or other approved equipment weighing 100 to 160 lb./ft. of roller.

- F. Completed sod shall immediately be watered sufficiently to uniformly wet the soil to at least 1 in. below the bottom of sod bed.

### 3.6 CONTRACTOR MAINTENANCE

- A. Except as otherwise specified below, maintenance shall include all operations required to produce an established lawn, including but not limited to:
  - Fertilizing
  - Mowing
  - Replanting
  - Watering
  - Weeding
- B. Maintenance of sodded areas shall begin upon completion of sodding and shall continue for 45 days thereafter, unless sodding is not completed until after September 15, in which case maintenance shall continue until the June 15 following.
  - 1. Watering
    - a. Week No. 1: Provide all watering necessary for rooting of sod. Soil on sod pads shall be kept moist at all times. Perform watering daily or as necessary to maintain moist soil to a depth of 4 in. Watering shall be done during the heat of the day to prevent wilting.
    - b. Week No. 2 and Subsequent Weeks: Water as necessary to maintain adequate moisture in the upper 4 in. of soil to promote deep root growth.
  - 2. Mowing
    - a. Mowing shall not be attempted until the sod is firmly rooted and securely in place. Not more than 40% of the grass leaf shall be removed during the first or subsequent mowings.
    - b. Bluegrass and other cool season grasses shall be maintained between 1-1/2 in. and 2-1/2 in.
    - c. All clippings shall be removed.
    - d. After 2 mowings, the Contractor shall top dress the sod with an application of fertilizer at the rate of 1 pound of actual nitrogen per 1000 square feet.
- C. After grass has sprouted, seeded areas which fail to show a uniform stand of grass shall be replanted as often as necessary to establish an acceptable stand of grass.
  - 1. Scattered bare spots, shall not exceed 15 sq. in. each.
- D. Weeds and growth other than varieties of grass named in grass seed formula shall be removed. Removal may be accomplished by use of suitable herbicides or by physical removal, in which case top growth and roots shall both be removed, and bare spots exceeding specified limits shall be resodded.

- E. If lawn or grass is established in the fall and maintenance is required to continue into spring months, lawn and grass shall receive an application of lime and fertilizer in the spring. Lime and fertilizer shall be spread in a uniform layer over the entire lawn surface, at the following rates.

<u>Material</u>	<u>Application Rate</u>
Lime	100 lb./1000 sq. ft.
Fertilizer	20 lb./1000 sq. ft.

- F. Remove rope barricades only after second cutting of lawns.

**END OF SECTION**

## **SECTION 32 93 00 - PLANTING**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide all materials and equipment, and do all work required to complete the planting, as indicated on the Drawings and as specified.
- B. The work of this Section also includes providing all equipment and materials and doing all work necessary to supply and place planting soils as indicated on the Contract Documents and as specified. Supplying and placement of planting soils shall include, but not be limited to:
  - 1. Sampling and testing of topsoil, loam borrow, horticultural subsoil and planting soils.
  - 2. Supplying, mixing, placing, and spreading of planting soils. Final grading shall be completed under work of Section 329119, LANDSCAPE GRADING.

#### **1.3 RELATED WORK**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Establishment of subgrade elevation.
  - 2. Section 329119, LANDSCAPE GRADING.
  - 3. Section 329200, NATIVE SEEDING.

#### **1.4 REFERENCES**

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. All standards shall include the latest additions and amendments as of the date of advertisement for bids.
  - 1. American National Standards Institute, Inc. (ANSI):

Z60.1 American Standard for Nursery Stock (Sponsor:  
American Nursery and Landscape Association)

A 300 American National Standards for Tree Care  
Operations

2. American Society for Testing and Materials (ASTM):

C 136 Sieve Analysis of Fine and Coarse Aggregates

D 422 Particle-Size Analysis of Soils

E 11 Wire-Cloth Sieves for Testing Purposes

F 405 Corrugated Polyethylene (Pe) Tubing and Fittings

4. "Hortus Third", A Concise Dictionary of Plants Cultivated in the United States and  
Canada, Cornell University, L.H. Bailey Hortorium, MacMillian Publishing Co., New  
York, NY.

**1.5 DEFINITIONS**

- A. Finish Grade: Elevation of finished surfaces.
- B. Subgrade: Surface or elevation of subgrade soil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil or underdrainage components.
- C. Topsoil: Soil that is present at the top layer of the existing natural soil profile at the Project site. This shall be considered the "Base Loam" component of Planting Soil mixes should adequate volume and quantities of topsoil exist on site and provisions have been made for stockpiling said topsoil.
- D. Loam: Soil that contains a combination of particles typically almost equal in parts sand, silt and clay and including organic matter.
- E. Loam Borrow: Soil that contains a combination of particles typically almost equal in parts sand, silt and clay and including organic matter obtained from off-site sources.
- F. Planting Soil: Unless otherwise indicated throughout this Section, the term "Planting Soil" shall apply to off-site blended soil modified with planting soil components and soil amendments to meet the specific Planting Soil mix recommendations submitted by the testing laboratory.

**1.6 SUBMITTALS**

- A. Samples: The following samples shall be submitted:

<u>Material</u>	<u>Sample Size or Quantity</u>
Mulch	1 ft. <sup>3</sup>
Compost	1 ft. <sup>3</sup>
Topsoil	1 ft. <sup>3</sup>
Planting soil	1 ft. <sup>3</sup>
Tree stake	24 in. length
Tree wrap	24 in. length

- C. Manufacturer's Product Data: Manufacturer's product data shall be submitted for the following materials:  
Aluminum sulfate  
Antidessicant  
Fertilizer  
Fungicide  
Herbicide  
Insecticide  
Compost  
Tree wrap  
Water retention additive  
Mycorrhizal fungi innoculent
- D. Certificates: Labels from the manufacturer certifying that the product meets the specified requirements shall be submitted for the following materials:  
Compost  
  
Commercial fertilizer  
Limestone  
Compost
- E. Test Reports: Test reports from an approved testing agency indicating compliance with the specifications shall be submitted for topsoil and any other materials designated by the Architect.
- F. Product Data: Product data for each type of product specified, including ornamental features.
- G. Qualifications: Submit qualifications for grower, grower foreman, installation firm, and for installation foreman and pesticide applicator to Architect before pre-installation conference.
- H. Plant Certification: Certify in writing that selected plants will be available at time of installation in size, quantity, and species specified.
- I. Product Certificates: For the following materials, certify that products meets specified requirements, and submit label:

1. Herbicides.
  2. Pesticides.
- J. Time Restrictions and Planting Conditions: After Award of Contract, submit schedule indicating anticipated start of plug growing, anticipated year of plant tagging and anticipated planting dates that reflect appropriate timing for plant varieties in Project locale.
- K. Inspection Report: Submit report on condition of planting, including recommendations and remedial actions, to Architect during maintenance period.
- L. Maintenance Record Calendar: Submit record calendar for use by Post maintenance control of planting and lawns showing recommended and schedule of tasks, and providing data entry space for five years of maintenance.
- M. Maintenance Manual: Submit maintenance guidelines for plantings, lawns, and irrigation system. Provide instructions for plant placement, pruning, watering, mowing, fertilization, weeding, disease and pest control, and plant replacement.
1. Include product data sheets in manual, along with maintenance instructions and parts lists for those products.
  2. Include maintenance record calendar and schedule of tasks.
- N. Samples: Provide samples of stakes, 8 ft. in length and specified guying materials.

#### **1.7 OWNER'S INSPECTION AND TESTING**

- A. Work will be subject to inspection at all times by the Owner and Architect. The Owner reserves the right to engage an independent testing laboratory in accordance with requirements of Section 014000, QUALITY REQUIREMENTS to analyze and test materials used in the construction of the work. Where directed by the Architect, the testing laboratory will make material analyses and will report to the Architect whether materials conform to the requirements of this specification.
1. Cost of tests and material analyses made by the testing laboratory will be borne by the Owner when they indicate compliance with the specification, and by the Contractor when they indicate non-compliance.
  2. Testing equipment will be provided by and tests performed by the testing laboratory.

#### **1.8 CONTRACTOR'S INSPECTION AND TESTING**

- A. The Contractor shall engage an independent testing laboratory, experienced in the testing of agricultural soils and acceptable to the Architect, to perform the topsoil and planting soil tests and analyses specified herein. All costs associated with testing shall be the Contractor's responsibility.

1. Particle size analysis shall include the following gradient of mineral content:

<u>USDA Designation</u>	<u>Size in mm</u>
Gravel	+ 2 mm
Very coarse sand	1-2 mm
Coarse sand	0.5-1 mm
Medium sand	0.25-0.5 mm
Fine sand	0.1-0.25 mm
Very fine sand	0.05-0.1 mm
Silt	0.002-0.05 mm
Clay	< 0.002 mm

2. Chemical analysis shall include the following:
  - a. pH and buffer pH
  - b. percentage of organic content by oven-dried weight
  - c. Nutrient levels by parts per million, including phosphorus, potassium, magnesium, manganese, iron, zinc, copper, boron, lead and calcium. Nutrient test shall include testing laboratory recommendations for supplemental additions to the soil, if necessary, based on the requirements for the specific types of plants and planting conditions documented on the Drawings.
  - d. Recommendations shall include rates at which additives are to be applied.
  - e. Soluble salt by electrical conductivity of a 1:2 soil/water sample.
  - f. Cation Exchange CEC.

## **1.9 SOURCE QUALITY CONTROL**

- A. Identification of plant materials shall be as named in "Hortus Third".
- B. Selection of Plant Materials: Contractor shall submit to Architect a complete list of all proposed nurseries including location, contact #, plant list for each nursery, all proposed substitutions, credits and/or additional charges. No tagging will occur until this list is complete and submitted. Contractor shall be responsible for delays if list is not submitted complete and in advance of proposed tagging dates.
  1. Inspect all nursery materials to determine that the materials meet the requirements of this section. Proposed materials shall be flagged by the nurseries for review by the Contractor and the Architect.
  2. Schedule with the Architect a time for viewing plant material at the nursery. Trips to nurseries shall be efficiently arranged to allow Architect to maximize viewing time. A minimum of six weeks shall be allowed for this viewing prior to time that plants are to be dug.
  3. Architect may choose to attach seal to each plant, or representative samples.
  4. Viewing and/or sealing of plant materials by the Architect at the nursery does not preclude the Architect's right to reject material at the site of planting.
  5. Architect will provide a maximum of two (2) tagging trips. Additional tagging trips (time and expense) shall be paid for by the Contractor.

6. If re-wholesalers or distributors are proposed as sources of plant material, the Contractor shall supply the Architect with names and locations of nurseries from which plants were obtained.
- C. Plant Material Availability: Submit documentation within fourteen (14) days after award of contract that all plant materials have been located and are ready to be secured or contract grown for specific project area. Arrange specific review procedure of plant materials and growers at time of submission. Submittals and reviews shall be organized as follows:
1. Fourteen (14) day plant material confirmation described above.
  2. Plant Materials: After twenty-one (21) days from award of contract submit a list of plant materials as specified on the drawings and/or schedule. Include species type, quantities, quality, sources, size and proposal showing size at time of installation for review and approval.
  3. Plant Photographs: After twenty-one (21) days from award of contract submit color photographs in digital 3 in. x 5 in. print format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than ten (10) plants are required, include a minimum of three (3) photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
  4. All specified plant materials shall be available in the required approved size and quantity a minimum of fifteen (15) days prior to site need date.
  5. Procurement quantity shall include a 10% minimum excess material to account for possible loss, rejection, or failure of procured material.
  6. Tagging: Architect may elect to review any of the material at the place of growth. Upon review and acceptance of plant material photograph, specific items will be selected for field review by the Architect. The Installation Contractor shall arrange the review and shall accompany the Architect for all reviews and tagging plants at place of growth and upon delivery for conformity to specifications.
  7. Photographic acceptance and Nursery review: Acceptance of material through photographs does not preclude rejection of unsatisfactory material upon delivery. Architect reserves the right to refuse review from photographs or at the grower if, in his judgment, suitable material or sufficient quantity of plants are not available. Seller shall insure a sufficient quantity of plants will be available whenever trips are arranged to a nursery for the purposes of tagging material for the project.
  8. Unavailable material: if proof is submitted that any plant specified is not obtainable, a proposal will be considered for use of the nearest equivalent size, species or variety with corresponding adjustment of Contract Price.
  9. Special Conditions: the above provisions shall not relieve the Seller of the responsibility of obtaining specified materials in advance if special growing conditions or other arrangements must be made in order to supply specified materials.

## 1.10 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of similar plantings with highly technical soil installations. Installer shall provide evidence of the following credentials:
1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
  2. Experience: Five years' experience in landscape installation in addition to requirements in Division 01 General Requirements."
  3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
  4. 3 projects similar scale and similar components within last 5 years
  5. 3 references with phone numbers
  6. 3 photos each for each reference project
  7. Positive responses from all references
  8. Reference project review by Architect and Owner within Washington, DC area.
- B. Pesticide Applicator: State licensed, commercial.
- C. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed. Testing laboratory shall be one of the following or other Architect approved lab:
1. UMass Soil Testing Laboratory; [ag.umass.edu/services/soil-plant-nutrient-testing-laboratory](http://ag.umass.edu/services/soil-plant-nutrient-testing-laboratory).
  2. Turf & Soil Diagnostics (Formerly Hummel & Co); <http://www.turfdiag.com>.
- D. Measurements: Measurement must meet dimensions as specified on the drawings and/or planting schedule. Do not prune to obtain required sizes.
1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 in. above the root flare for trees up to 6 in. caliper size, and 12 in. above the root flare for larger sizes. Take girth measurements 3 ft. above root flare.
  2. Plugs: Measure with stems, petioles, and foliage in their normal position, as well as root growth.
  3. Other Plants: Measure with stems, petioles, and foliage in their normal position.
  4. Size Range: If a range of size is not given, do not use plant materials less than the minimum size. Not less than forty percent (40%) of the plants shall be as large as the maximum size specified. The measurements specified are the minimum size acceptable and are the measurements after pruning, where pruning is required. Plants that meet the measurements specified, but do not possess a normal balance between height and spread shall be rejected.

5. Substitutions: Substituted plants shall be true to species and variety and shall conform to measurements specified except that plants larger than specified may be used if accepted. Use of such plants shall not increase the Contract price. If larger plants are accepted, increase the ball of earth in proportion to the size of the plant.

E. Grower Qualifications:

1. Credentials: Demonstrate experience and success in similar projects of equal magnitude. Present a portfolio that includes information on company, staff, training, and a minimum of three reference projects that include propagation of native plant species. Architect may visit some or all of the referenced project sites for examination.
2. Foreman: All work shall be under direction and general supervision of Foreman who possesses verifiable experience and technical competence in plant propagation. Foreman shall be present at all times work is performed, and is responsible for controlling quality of work and inspecting completed work to ensure that contract requirements are met. Foreman shall be primary contact for work of this Section.
3. Workers: All workers, through related training and on-the-job experience, shall be familiar with technical aspects of plant propagation and equipment used in such operations.

F. Plant Material Observation: Architect may observe plant material either at place of growth at time of procurement, before shipping and planting for compliance with requirements for genus, species, variety, cultivar, size, and quality.

1. Plants shall be subject to inspection and approval of Architect at place of growth and upon delivery for conformity to Specifications. Such approval shall not impair the right of inspection and rejection during progress of work. Inspection of plant material by Architect is for genus, species, variety, cultivar for design intent only and does not constitute approval of health and vigor.
2. Architect shall inspect, approve, and tag all plants. The inspections and tagging will take place at Supplier's nursery and/or holding location. Once the Architect inspects and tags a plant, the Supplier shall not sell that plant to any other prospective buyer. The Supplier shall provide access to the Architect for random inspections of the previously tagged plants. Prior to loading and/or shipping to the Project Site, the Architect reserves the right to inspect all tagged plants.
3. Inspection at growing site does not preclude right of rejection at project site for shipping and/or handling damage, infestation and/or infection not previously identified.
4. Architect reserves the right to inspect contract growing areas for verification of growth status.

**1.11 PLANT MATERIAL QUANTITIES**

- A. In the event of a discrepancy in plant material quantities between the Drawings and the Plant List(s), the larger quantity shall be required.

**1.12 UNAVAILABILITY OF PLANT MATERIALS**

- A. Before changes or substitutions can be made due to unavailability of plant material, submit satisfactory evidence that the Contractor has advertised for a one month period in a trade journal such as the "American Nurseryman", (Tel. 312-427-7339 and Fax: 312-427-7346), with no response, or has undertaken other methods of locating plant material acceptable to the Architect.

**1.13 DELIVERY, STORAGE, AND HANDLING**

- A. Transportation of Plant Material: Plants transported to the project in open vehicles shall be covered with tarpaulins or other suitable covers securely fastened to the body of the vehicle to prevent injury to the plants. Closed vehicles shall be adequately ventilated to prevent overheating of the plants. Trees shall not be transported when daytime air temperatures are below 20°.
  - 1. Plants shall be kept moist, fresh, and protected at all times. Such protection shall encompass the entire period during which the plants are in transit, being handled, or are in temporary storage.
  - 2. Unless otherwise authorized by the Architect, notify the Architect at least two working days in advance of the anticipated delivery date of any plant material. A legible copy of the bill of lading, showing the quantities, kinds, and sizes of materials included for each shipment shall be furnished to the Architect, if requested.
- B. Storage: Unless specific authorization is obtained from the Architect, unprotected plants shall not remain on the site of work longer than three days prior to being planted.
  - 1. Plants that are not planted immediately shall be protected as follows:
    - a. Earth balls shall be kept moist, not be allowed to freeze, and their solidity carefully preserved.
  - 2. Both the duration and method of storage of plant materials shall be subject to the approval of the Architect.
- C. Handling of Plant Materials: Exercise care in handling plant materials to avoid damage or stress. Do not drop plants. Do not pick up container plants by stems or trunks. Handle planting stock by root ball.

**1.14 REJECTION OF MATERIALS**

- A. Evidence of inadequate protection following digging, carelessness while in transit, or improper handling or storage, shall be cause for rejection.
- B. Upon arrival at the temporary storage location or the site of the work, plants shall be inspected for proper shipping procedures. Plants with roots dried out, large branches broken, balls of earth broken or loosened, or areas of bark torn shall be subject to rejection by the Architect.

- C. Rejected plants shall be removed from the area of work and replaced with same species of the required size and quality.

#### **1.15 DIGGING/PLANTING SEASONS**

- A. Spring Digging: Spring digging of plant materials may commence as soon as the ground has thawed and weather conditions make it practicable to dig at the nursery.
  - 1. Deciduous plants shall not be dug after they have leafed out.
  - 2. Broadleaf evergreens and conifers shall not be dug after new growth or candle push is visible.
- B. Fall Digging: Fall digging of plant materials may commence after dormancy has begun and shall continue until such time as the ground has frozen or weather conditions make it impractical to work.
  - 1. Fall digging hazards shall conform to American National Standards Institute, Inc. (ANSI) species and guidelines.
- C. Planting Seasons: Planting shall only be performed when weather and soil conditions are suitable for planting the material specified, in accordance with locally accepted practice, approval of the Architect, and to maintain the Contractor's guarantee.

#### **1.16 ACCEPTANCE FOR SUBSTANTIAL COMPLETION**

- A. The Architect shall inspect all work of this Section for Acceptance for Substantial Completion upon receipt of written notice of completion by the Contractor. The request shall be received at least ten calendar days before the anticipated date of inspection.
- B. Acceptance: Plants will not be accepted until inspected and approved by Architect. Plants not meeting specifications for quality and size are subject to rejection. All rejected stock shall be replaced with stock of designated variety, size, age, and other applicable attributes as identified in Construction Documents at no additional cost to the Owner.
- C. Plant areas will be accepted by Architect when plants are in compliance with the following conditions:
  - 1. General Condition: Healthy, free of pests and disease, and in flourishing condition.
  - 2. Branches: Free of dead and dying branches and branch tips.
  - 3. Foliage: Plants shall bear foliage of normal density, size, and color.
- D. Upon completion and reinspection of all repairs or renewals necessary in the judgement of the Architect, the Architect shall recommend that Acceptance for Substantial Completion of the work of this Section be given by the Owner.
- E. Remove nursery plant identification tags.

F. Acceptance in Part

1. The work may be Accepted in parts when it is deemed to be in the Owner's best interest to do so, and when permission is given to the Contractor in writing to complete the work in parts.
2. Acceptance and use of such areas by the Owner shall not waive any other provisions of this Contract.

**1.17 MAINTENANCE**

- A. The Contractor shall maintain plant material until the completion of the two year Guarantee Period and Final Acceptance of work, as described in this Section.

**1.18 GUARANTEE**

- A. Plants shall be guaranteed for a period of two years after the date of Acceptance by the Owner. However, under no conditions shall the Guarantee Period include less than 2 full growing seasons.
1. When the work is Accepted in parts, the guarantee periods shall extend from each of the partial Acceptances to the terminal date of the last guarantee period. Thus, all guarantee periods terminate at one time.
- B. Plants shall be healthy, free of pests and disease, and in flourishing condition at the end of the guarantee period. Plants shall be free of dead and dying branches and branch tips, and shall bear foliage of normal density, size, and color.
- C. Replace dead plants and all plants not in a vigorous, thriving condition, as determined by the Architect during and at the end of the guarantee period, without cost to the Owner, as soon as weather conditions permit and within the specified planting period.
1. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this Specification.
  2. Make all necessary repairs due to plant replacements. Such repairs shall be done at no extra cost to the Owner.
  3. The guarantee of all replacement plants shall extend for an additional one year period from the date of their Acceptance after replacement. In the event that a replacement plant is not acceptable during or at the end of the said extended guarantee period, the Owner may elect one more replacement or credit for each item.
- D. At the end of the guarantee period, and no less than five days prior to final inspection, staking and guying materials, and tree wrap and ties shall be removed from the site.

**1.19 FINAL INSPECTION AND FINAL ACCEPTANCE**

- A. At the end of the guarantee period, the Architect shall, upon receipt of written notice of end of guarantee period, inspect the work for Final Acceptance. Request shall be received at least ten calendar days before the anticipated date for Final Inspection.
- B. Final Inspection shall not be conducted while plants are in a dormant state.
- C. Upon completion and reinspection of full repairs or replacements necessary in the judgment of the Architect at that time, the Architect shall recommend to the Owner that Final Acceptance of the work of this Section be given.

**1.20 PROJECT CONDITIONS**

- A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained.
- B. Coordination with Turf Areas (Lawns) and meadow areas Refer to Section 329222, SODDING and Section 329200, MEADOW GRASS SEEDING: Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
  - 1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas and promptly repair damage caused by planting operations.

**1.21 MAINTENANCE SERVICE**

- A. Initial Maintenance Period: Begin immediately after each plant is planted, and continue until end of warranty/guarantee period. Maintenance consists of keeping plants in healthy growing condition, and keeping beds and individual pits in neat appearance, and shall be performed by qualified and approved individuals. Plants shall be protected from damage. Maintenance activities include, but are not limited to, the following:
  - 1. Watering: As necessary to promote natural growth. Apply in amounts to prevent excessive runoff. Water shall be suitable for irrigation, and free from ingredients harmful to plant life.
  - 2. Weeding and Cleaning: Keep planting areas free of weeds and trash. Volunteer specimens of native species shall not be considered weeds. Natural regeneration of installed or otherwise native species shall not be controlled, disturbed, or removed except where necessary to maintain safety, sightlines, and intent of design.
  - 3. Cultivating.
  - 4. Pruning. Pruning shall seek to maintain and reinforce the natural form of the specimen. Shrubs and trees shall not be hedged into any geometrical form. Every year, multistem trees shall be limbed up to approximately 2 meters by a professional arborist in order to maintain clear sightlines and showcase the branching structure of multistem trees. Native grasses shall not be pruned, hedged, mown, nor otherwise

cut in any season except at the end of dormant period, immediately prior to emergence of new growth.

5. Re-mulching. Mulch is stone and therefore should not be renewed except where erosion or another force has exposed underlying soil.
6. Tightening and repairing of guys: Remove stakes and guy wires at end of warranty period.
7. Straightening of trees to a plumb position.
8. Removal of dead material. Dry stems of grasses shall not be removed as dead material except at the end of the dormant period, immediately prior to emergence of new growth.
9. Resetting plants to proper grades or upright position.
10. Restore planting saucers.
11. Protection from insects, pests, and disease.
12. Provide temporary irrigation for all plantings during plant establishment period (two growing seasons).
14. Mow the plugged meadow landscape once annually in the fall after planted species have broadcast their seeds.

- B. During maintenance period, any decline in condition of plantings requires Contractor to take immediate action to identify potential problems and to undertake corrective measures. If Contractor does not have sufficient expertise or if problems persist, engage professional arborists and/or horticulturalists at no cost to the Owner to inspect plant materials and to identify problems and recommend corrective procedures. Advise Architect immediately of such actions.

## **PART 2 PRODUCTS**

### **2.1 PLANT MATERIALS - GENERAL**

- A. Labeling: In each shipment, label 100 percent of each herbaceous plant species and 100% of each woody (tree and shrub) species and variety, including also plant size and caliper, with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species.
- B. Standards: All plant materials, including nomenclature, shall conform with the following, except where specifically indicated otherwise in the Contract Documents:
1. American Standard for Nursery Stock, ANSI Z60.1: American Nursery and Landscape Association.
  2. Hortus III: J.H. Bailey, Cornell University.
- C. Growing Practice: Plants shall be grown under climatic conditions similar to those of the project for at least two years, unless specifically noted otherwise. Each plant shall be exceptionally heavy for its species and variety, and so trained or favored in development and appearance as to be superior in form, number of branches, and compactness. Size and grade of plant materials shall conform to ANSI Z60.1.

- D. Health:
1. Sound, healthy, vigorous, well branched, with straight trunks and densely foliated when in leaf.
  2. Free of disease, insect pests, eggs, larvae, and shall have healthy, well-developed root systems.
  3. Free from physical damage or adverse conditions that would prevent thriving growth.
- E. Variety and Size: Plants shall be true to species and variety indicated in Plant Schedule, and shall conform to measurements scheduled, except that plants larger than scheduled may be used if approved by Architect. Use of such plants shall not increase contract price. If larger plants are approved, ball of earth or container size shall be increased in proportion to size of plant. Plants shall be measured when branches are in normal position. Height and spread dimensions identified refer to main body of plant, and not branch tip-to-tip. Measurements identified are minimum size acceptable, and are measurements after pruning, where pruning is required. Plants that meet identified characteristics, but do not possess a normal balance between height and spread may be rejected.
- F. Container Grown Stock: This stock shall have been grown in containers in which it was delivered for at least six months, but not over two years. Samples shall demonstrate that no root-bound conditions exist. Container plants that have cracked or broken balls of earth will be accepted only upon special approval by Architect. All container specimens including perennials, grasses, vines, shrubs and trees shall conform to the ANSI technical & quality standards for nurserystock. Further, all container specimens shall conform to ANSI guidelines for size, health and quality. Sizes per species listed in the plant schedule Planting Details shall be considered minimum acceptable sizes and if unavailable, larger size substitutes are preferred to smaller sizes.

## 2.2 PLANTS

- A. Except as otherwise specified, size and grade of plant materials and their root balls shall conform to ANSI Z60.1.
- B. Plants shall have outstanding form; symmetrical, heavily branched with an even branch distribution, densely foliated and/or budded, and a strong, straight, distinct leader where this is characteristic of species. Plants shall possess a normal balance for the species between height and spread. The Architect will be the final arbiter of acceptability of plant form.
1. Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required.
  2. Small Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form.

3. Multistem Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form.
  4. Deciduous Shrubs: Form and Size: Deciduous shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.
  5. Coniferous Evergreens: Form and Size: Normal-quality, well-balanced, coniferous evergreens, of type, height, spread, and shape required, complying with ANSI Z60.1.
  6. Coniferous Evergreens: Form and Size: Specimen-quality, exceptionally heavy, tightly knit, symmetrically shaped coniferous evergreens.
  7. Broadleaf Evergreens: Form and Size: Heavy, well-balanced, broadleaf evergreens, of type, height, spread, and shape required, complying with ANSI Z60.1.
- C. Plants shall be healthy and vigorous, free of disease, insect pests and their eggs, and larvae.
- D. Plants shall have a well-developed fibrous root system.
- E. Plants shall be free of physical damage such as scrapes, broken or split branches, scars, bark abrasions, sunscalds, fresh limb cuts, disfiguring knots, or other defects.
- F. Plants shall meet the sizes indicated on the Plant List. Plants larger or smaller than specified may be used only if accepted in writing by the Architect.
- G. Where a size or caliper range is stated, at least 50% of the material shall be closer in size to the top of the range stated.
- H. Plants shall not be pruned before delivery.
- I. All trees and shrubs shall be labeled. Labels shall be durable and legible, stating the correct plant name and size in weather-resistant ink or embossed process. Labels shall be securely attached to all plants prior to delivery to the site, being careful not to restrict growth.
- J. Plants indicated as "B&B" shall be balled and burlapped.
1. Unless otherwise permitted by the Architect, plants shall be nursery grown.
  2. Plants shall be grown for at least two years under climatic conditions similar to those in the locality of the Project.
  3. Nursery grown plants shall be dug in the current planting season. No heeled in plants or plants from cold storage that were dug in the previous season shall be accepted.
- K. Container grown plants shall be well rooted and established in the container in which they were grown. They shall have grown in the container for a sufficient length of time for the root system to hold the planting medium when taken from the container, but not long enough to become root bound. Container grown plants exceeding the sizes indicated in ANSI Z60.1 shall have containers which are not less than 75% of the ball sizes for

comparable B&B plant material. Each container plant shall be inspected and circling roots loosened or pruned as needed.

1. Any trees grown in pots, including pot-in-pot culture, will be rejected.

L. Canes or Trunk(s) and Branches:

1. Very well formed and sturdy with distinct leader and no crotches that may interfere with growth of leader. Trees with included bark in crotches shall be avoided.
2. Branching well spaced and uniformly distributed both vertically and around the circumference to form a well balanced plant.
3. Scars shall be free of rot and not exceed  $\frac{1}{4}$  the diameter of the wood beneath in greatest dimension unless completely healed (except pruning scars).
4. Pruning scars clean cut leaving little or no protrusion from the trunk or branch.
5. Graft union completely healed.
6. No mechanical or pest damage.
7. No extreme succulence.
8. Evidence of adequate twig growth in the past 2-4 years, and well-formed buds.

M. Foliage:

1. Densely supplied with healthy, vigorous leaves of normal size, shape, color and texture (except shrubs moved bare-root or deciduous shrubs when dormant).
2. One half of the foliage should be growing on the lower  $\frac{2}{3}$  of the trunk.
3. No chlorosis.
4. No more than 5% of total foliage affected by pest or mechanical damage.

N. Root System:

1. Sturdily established and evenly distributed.
2. Container grown plants shall be well developed and hold the soil ball together when removed from the container.
3. Container grown plants shall not be excessively rootbound (except if deliberately grown rootbound to produce a dwarf plant).

### 2.3 GROUND COVER PLANTS AND VINES

A. Ground Cover: Provide ground cover of species indicated, established and well rooted in pots or similar containers, and complying with ANSI Z60.1.

B. Fast-Growing Vines: Provide vines of species indicated complying with requirements in ANSI Z60.1 as follows:

1. Two-year plants with heavy, well-branched tops, with not less than 3 runners 18 inches (450 mm) or more in length, and with a vigorous well-developed root system.
2. Provide field-grown vines. Vines grown in pots or other containers of adequate size and acclimated to outside conditions will also be acceptable.

## 2.4 PLUGS

- A. Plugs: Perennials Quality/Premium, including limitations on weeds, diseases, nematodes, and insects. Furnish viable perennials of uniform density, color, and texture, cut into square or round plugs, strongly rooted, and capable of vigorous growth and development when planted; of the following perennial species and plug size:
1. Perennial Species: TBD.
  2. Plug Size: [2 inches (50 mm)] [3 inches (75 mm)] [4 inches (100 mm)] as selected by Architect.

## 2.5 PLANTING SOIL – SEEDED LAWNS

- A. Refer to Section 329200, LAWNS AND GRASSES.

## 2.6 PLANTING SOIL – PLANTS

- A. Existing Topsoil

1. Existing topsoil from on-site source(s) may be used for planting soil, to the extent available, if it meets the requirements of this Section for planting soil, or if approved by the Architect. Due to existing site development, it is not anticipated that there will be adequate existing topsoil.

- B. Planting Soil

1. Planting soil shall be composed of a natural, fertile, friable soil typical of cultivated topsoils of the locality, suitable for the germination of seeds and support of vegetative growth, with additives, if required, to achieve particle distribution and organic content specifications. Topsoil shall be taken from a well-drained, arable site, free of subsoil, large stones, earth clods, sticks, stumps, clay lumps, roots, other objectionable, extraneous matter or debris nor contain toxic substances. Planting soil shall have a pH value between 5.5 and 6.5 and organic matter content of 3 to 6% of total dry weight.
2. Planting soil shall be a well graded soil having the following mechanical analysis (see paragraph 1.7 for particle sizes):

### Approximate Particle Distribution

Gravel	Less than 10%
Coarse to medium sand	55 – 65%
Fine to very fine sand	15 – 25%
Silt	10– 20%
Clay	15 – 20%

3. Minimum planting soil nutrient levels shall be: Nitrogen @ 5% average of organic matter, Phosphorus @ .02 to .05% average of total soil content, Potassium @ 1.2% average of total soil content.

4. The Contractor shall provide the Architect with planting soil test results as specified in Paragraph 1.7, two months sbefore the start of soil installation operations. If planting soil does not fall within the required particle distribution, organic content, or pH range, it shall be adjusted to meet the specifications through the addition of sand, compost, limestone, or aluminum sulfate to bring it within the specified limits, or an alternative source of soil shall be provided, at the Architect’s discretion
  5. Planting soil for ericaceous shrubs shall have a pH value range of 4.5 to 5.0.
- C. After amendments are installed, contractor shall retest the soil as directed by testing agency, and resubmit results for review and approval. If results fall outside of specification requirements, contractor shall continue the cycle of amending/testing until the soils meet requirements.

**2.7 HORTICULTURAL SUBSOIL**

- A. Base Loam shall be imported. Test results shall be reported to the Architect who may request minor adjustments to specified approximate mixing ratios and mix requirements for each mix type. Topsoil, which has been contaminated by incorporation of subsoil shall not be acceptable for use and shall be replaced with imported topsoil meeting specification requirements at no additional cost to be Owner.
- B. Base Loam as required for the work shall be free of subsoil, large stones, earth clods, sticks, stumps, clay lumps, roots or other objectionable, extraneous matter or debris. Base Loam shall also be free of quack-grass rhizomes, Agropyron Repens, and the nut-like tubers of nutgrass, Cyperus Esculentus, and all other primary noxious weeds. Base Loam shall not be delivered or used for planting while in a frozen or muddy condition. Base Loam for mixing shall conform to the following grain size distribution for material passing the #10 sieve:

U.S. Sieve Size Number	Minimum	Percent Passing	
		Minimum	Maximum
10		---	100
18		85	100
35		70	95
60		50	85
140		36	53
270		32	42
0.002mm	3	6	

1. The ratio of the particle size for 80% passing (D80) to the particle size for 30% passing (D30) shall be 8 or less. (D80/D30 < 8)
2. Maximum size shall be one-inch largest dimension. The maximum retained on the #10 sieve shall be 20% by weight of the total sample.
3. The organic content shall be between 4.0 and 8.0 percent.
4. The pH shall be between 5.5 and 7.0

C. Sand

- Sand for Planting Soil Mixes shall be uniformly graded medium to coarse sand consisting of clean, inert, rounded to sub-angular grains of quartz or other durable rock free from loam or clay, surface coatings and deleterious materials with the following gradation.

U.S. Sieve Size Number	Percent Passing	
	Minimum	Maximum
10	100	--
18	65	85
35	35	50
60	15	28
140	4	10
270	0	5
0.002mm	0	0.5

- Maximum size shall be one inch largest dimension. The maximum retained on the #10 sieve shall be 15% by weight of the total sample. The ratio of the particle size for 70% passing (D70) to the particle size for 20% passing (D20) shall be 3.0 or less. (D70/D20 <3.0) Tests shall be by combined hydrometer and wet sieving in compliance with ASTM D422 after destruction of organic matter by ignition.
- pH: Shall be less than 7.2.

D. Horticultural Subsoil

- Horticultural Subsoil shall consist of a combination of approximately 1 part Sand and 1 part Base Loam (1S:1L), all by volume. The following gradation for material passing a Number 10 Sieve shall be achieved in the final mix.

U.S. Sieve Size Number	Percent Passing	
	Minimum	Maximum
10	100	
18	85	95
35	55	80
60	30	60
140	20	33
270	12	17
0.002 mm	1	3

- Maximum size shall be one half-inch largest dimension. The maximum retained on the #4 sieve shall be 10% by weight of the total sample. The ratio of the particle size for 80% passing (D80) to the particle size for 30% passing (D30) shall be 6.5 or less. (D80/D30 < 6.5). The final mix shall have an organic content between 1.5 and 3.0 percent. The final mix shall have a hydraulic conductivity of not less than 2.5 inches per hour according to test procedure ASTM D5856-95 (2000) when compacted to a

minimum of 90 percent Standard Proctor ASTM D698. Tests shall be by combined hydrometer and wet sieving in compliance with ASTM D422 after destruction of organic matter by ignition.

3. Chemical analysis shall be undertaken for Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium Magnesium, Aluminum, Iron, Manganese, Lead, Cation Exchange Capacity, Soluble Salts, acidity (pH) and buffer pH.
4. pH shall be 6.0 to 6.5.

## **2.8 BIORETENTION PLANTING SOIL - GENERAL**

### **A. Planting Soil For The Bioretention Areas**

1. Organic materials used in the soil media shall consist of well-decomposed natural c-containing organic material such as peat moss, humus, compost, pine bark fines or other organic soil conditioning material. However, per above, the combined filter media shall contain 3 to 5 percent soil organic matter on dry weight basis (grams organic matter per 100 grams dry soil) by the walkley-black method or other similar analytical technique.
2. In creating the filter media, it is recommended to start with an open-graded coarse sand material and proportionately mix in the topsoil materials to achieve the desired ratio of sand and fines. Sufficient suitable organic amendments can then be added to achieve the 3 to 5 percent soil organic matter target. The exact composition of organic matter and topsoil material will vary, making the exact particle size distribution of the final total soil media mixture difficult to define in advance of evaluating available materials.

## **2.9 BIORETENTION PLANTING SOIL**

- A. Filter Media. The filter media and surface cover are the two most important elements of a bioretention facility in terms of long-term performance. Particle Size Composition. The bioretention soil mixture shall be classified as a loamy sand on the USDA Texture Triangle, with the following particle size composition:
  1. 80-90 percent sand (at least 75 percent of which must be classified as coarse or very coarse sand)
  2. 10-20 percent soil fines (silt and clay)
  3. Maximum 10 percent clay
- B. The particle size analysis must be conducted on the mineral fraction only or following appropriate treatments to remove organic matter before particle size analysis.
- C. Organic Matter. The filter media must contain 3 to 5 percent organic matter by the conventional V/alkley-Black soil organic matter determination method or similar analysis. Soil organic matter is expressed on a dry weight basis and does not include coarse particulate (visible) components.

- D. Available Soil Phosphorus (P). The filter media should contain sufficient available P to support initial plant establishment and growth, but not serve as a significant source of P for long-term leaching. Plant-available soil P should be within the range of Low\* (L+) to Medium (M) as defined in Table 2.2 of Virginia Nutrient Management Standards and Criteria (2005). For the Mehlich I extraction procedure this equates to a range of 5 to 15 mg/kg P or 18 to 40 mg/kg P for the Mehlich III procedure.
- E. Cation Exchange Capacity (CEC). The relative ability of soils to hold and retain nutrient cations like Ca and K is referred to as cation exchange capacity (CEC) and is measured as the total amount of positively charged cations that a soil can hold per unit dry mass. CEC is also used as an index of overall soil reactivity and is commonly expressed in milliequivalents per 100 grams (meq/100g) of soil or cmol<sup>+</sup>/kg (equal values). A soil with a moderate to high CEC indicates a greater ability to capture and retain positively charged contaminants, which encourages conditions to remove phosphorus, assuming that soil fines (particularly fine silts and clays) are at least partially responsible for CEC. The minimum CEC of the filter media is 5.0 (meq/100 g or cmol<sup>+</sup>/kg). The filter media CEC should be determined by the Unbuffered Salt, Ammonium Acetate, Summation of Cations or Effective CEC techniques (Sumner and Miller, 1996) or similar methods that do not utilize strongly acidic extracting solutions.
- F. The goal of the filter media mixture described in this section is to create a soil media that maintains long-term permeability while also providing enough nutrients to support plant growth. The initial permeability of the mixture will exceed the desired long-term permeability of 1 to 2 in. /hr.
- G. The root structure of maturing plants and the biological activity of a self-sustaining organic content will maintain sufficient long-term permeability as well as support plant growth without the need to add fertilizer. The following is the recommended composition of the three media ingredients:

1. Sand: Sand shall consist of silica-based coarse aggregate, angular or round in shape and meet the mixture grain size distribution specified in Table 3.19. No substitutions of alternate materials (such as diabase, calcium carbonate, rock dust, or dolomitic sands) are accepted. In particular, mica can make up no more than 5 percent of the total sand fraction. The sand fraction may also contain a limited amount of particles greater than 2.0 mm and less than 9.5 mm per the table below, but the overall sand fraction must meet the specification containing greater than 75 percent coarse or very coarse sand. Consult Table 3.19 for recommended sand sizing criteria.

Table 3.19 Sand Sizing Criteria

<u>Sieve Type</u>	<u>Particle Size (mm)</u>	<u>Percent Passing (%)</u>
3/8 in.	9.50	100
No.4	4.75	95- 100
No.8	2.36	80- 100
No. 16	1.18	45- 85
No.30	0.60	15- 60
No.50	0.30	3- 15
No. 100	0.15	0-4

Note: Effective particle size (D10) > 0.3mm. Uniformity coefficient (D60/D10) < 4.0.

2. Topsoil. Topsoil is generally defined as the combination of the ingredients referenced in the bioretention filter media: sand, fines (silt and clay), and any associated soil organic matter. Since the objective of the specification is to carefully establish the proper blend of these ingredients, the designer (or contractor or materials supplier) must carefully select the topsoil source material in order to not exceed the amount of any one ingredient.
    - a. Generally, the use of a topsoil defined as a loamy sand, sandy loam, or loam (per the USDA Textural Triangle) will be an acceptable ingredient and in combination with the other ingredients meet the overall performance goal of the soil media.
  3. Organic Matter. Organic materials used in the soil media mix should consist of well decomposed natural materials such as peat moss, humus, compost, pine bark fines or other organic soil conditioning material. However, per above, the combined filter media should contain 3 to 5 percent soil organic matter on dry weight basis (grams organic matter per 100 grams dry soil) by the Walkley-Black method or other similar analytical technique.
- H. In creating the filter media, it is recommended to start with an open-graded coarse sand material and proportionately mix in the topsoil materials to achieve the desired ratio of sand and fines. Sufficient suitable organic amendments can then be added to achieve the 3 to 5 percent soil organic matter target. The exact composition of organic matter and topsoil material will vary, making the exact particle size distribution of the final total soil media mixture difficult to define in advance of evaluating available materials.

## 2.10 METAL PLANTER FILL MATERIALS

### A. Planting Media

1. Custom growing media mix capable of supporting vigorous growth of the specified vegetation, complying with the following specification. - American Hydrotech, Inc., Extensive LiteTop® Growing Media, or approved equal.

Property	Extensive LiteTop Growing Media*
<b>Grain Size Distribution (ASTM F1632 Method B)</b>	
clay fraction (<0.002mm)	< 2 %
silt fraction (0.075-0.002mm)	< 8%
passing #200 sieve (0.075mm)	< 10%
passing #60 sieve (0.25mm)	5 – 25 %
passing #18 sieve (1.0mm)	15 – 45 %
passing #10 sieve (2.0mm)	25 – 60%
passing 1/8-inch sieve	30 – 75 %
passing 1/4-inch sieve	45 – 95%
passing 3/8-inch sieve	95 – 100 %
<b>Density (ASTM E2399)</b>	

Initial Media Density	55 lbs – 80 lbs/cf
Maximum Media Density	70 lbs – 90 lbs/cf
<b>Water/Air Management (ASTM E2399)</b>	
saturated water capacity	> 30%
air filled space (porosity)	> 10%
total pore space	> 40%
<b>Water Permeability</b>	
Hydraulic Conductivity	>12 in/hr
<b>pH, Lime, and Salt Content</b>	
pH (saturated paste)	6.0 – 8.0
salts content (water extract)	<2.5 mmhos/cm
<b>Organics (LOI 550°C) (ASTM F1647)</b>	
Organic Matter content	3 – 8 % by volume
<b>Compost Fraction:</b>	
1) Meet or exceed USEPA Class A standard, 40 CFR 503.13, Tables 1 & 3 (chemical contaminants) and 40 CFR 503.32(a) (pathogens) and/or be permitted in the state of origin to produce Class A material.	
2) Meet or exceed US Compost Council STA/TMECC criteria or equal for Class I or II stable, mature product.	
* Values shall be adjusted due to availability of local materials or special project conditions related to plant selection and/or environmental conditions.	

2. Expanded lightweight aggregate for use as fill material for drainage/water retention component as required. - American Hydrotech, Inc., LiteTop® Lightweight Aggregate, or approved equal.
  - a. 5/16" - 3/8" expanded, lightweight aggregate.

B. EPS for lightweight fill shall be Foam-Control EPS Geofoam, manufactured by AFM Corporation, 17645 Juniper Path, Suite 260, Lakeville, MN 55044; Phone: (800) 255-3908; Phone: (952) 892-0809; Fax: (952) 892-0811; [www.geofoam.com](http://www.geofoam.com), in compliance with ASTM D6817.

C. Filter fabric shall be a non-woven polypropylene fabric made specifically for use in subsurface drainage structures equal to Mirafi 140N, manufactured by Tencate, 365 South Holland Drive, Pendergrass, GA 30567; Tel 800 685 9990; Tel 706 693 2226; Fax 706 693 4400; [www.mirafi.com](http://www.mirafi.com), or approved equal.

D. Drainage Rock: shall consist of clean, durable, crushed rock free from fine sand, silt or rock flour. Gradation shall conform to the following:

<u>Sieve Size</u>	<u>% Passing by Weight</u>
1-1/2 inch	100
1 inch	90-100
3/4 inch	40-85
1/2 inch	10-40
3/8 inch	0-15
No. 4	0-5

**2.11 LIMESTONE**

- A. Limestone shall be an approved agricultural limestone containing no less than 50% of total carbonates, and 25% total magnesium with a neutralizing value of at least 100%. The material shall be ground to such a fineness that 40% will pass through a No. 100 U.S. Standard Sieve, and 98% will pass through a No. 20 U.S. Standard Sieve. The lime shall be uniform in composition, dry and free flowing, and shall be delivered to the site in the original unopened containers, each bearing the manufacturer's guaranteed analysis. Any lime which becomes caked or otherwise damaged making it unsuitable for use, will be rejected.

**2.12 ALUMINUM SULFATE**

- A. Aluminum sulfate shall be unadulterated and shall be delivered in containers with the name of the material and manufacturer and net weight of contents.

**2.13 WATER**

- A. Water shall be suitable for irrigation and shall be free from ingredients harmful to plant life.

**2.14 FERTILIZER**

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
  - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency. Manufacturer's literature shall be submitted for approval.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
  - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

**2.15 SUPERPHOSPHATE**

- A. Superphosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes, and containing not less than 20% available phosphoric acid. The superphosphate shall be delivered to the site in the original unopened containers, each bearing the manufacturer's guaranteed analysis. Any superphosphate which becomes caked or otherwise damaged making it unsuitable for use, will be rejected.

## **2.16 MYCORRHIZAL FUNGI INNOCULANT**

- A. Mycorrhizal Fungi Inoculant shall be three ounce (3 oz.) premeasured dry formulation packets, such as Mycor Tree Saver Transplant®, as manufactured by Plant Health Care, Inc., Pittsburgh, PA, or approved equal. Packets shall contain, as a minimum: one thousand (1000) live spores of Vesicular-Arbuscular fungi, including: *Entrophosphora columbiana*, *Glomus clarum*, *Glomus etunicatum*, and *Glomus sp.*; seventeen million five hundred thousand (17,500,000) live spores of Ectomycorrhizal fungi, including: *Pisolithus tinctorius*; biostimulants including *Yucca schidigera* extract; soluble sea kelp extract derived from *Ascophylum nodosum*; humic acids; and acrylamide copolymer gel as a water absorbent medium.
1. Apply at each tree pit three (3) three-ounce (3 oz.) packets added to the top six to eight inches (6" to 8") of backfill soil added and thoroughly mixed to distribute the inoculant in accordance with manufacturer's printed instructions.

## **2.17 MULCH**

- A. Mulch shall be a 100% fine-shredded pine bark or double shredded, aged hardwood mulch, typical to the Providence area, of uniform size and free from rot, leaves, twigs, debris, stones, or any material harmful to plant growth. Bark shall have been shredded and stockpiled no less than six months and no more than two years before use. No chunks 3 in. or more in size, and thicker than 1/4 in. shall be left on site.

## **2.18 GUYING AND STAKING MATERIALS**

- A. Wood Stakes: Straight, sound, rough sawn lumber 2"+ diameter, cedar stakes with bark on, tops chamfered 1/2", length 8-10 ft. Wire for staking shall be 12 gauge steel.
- B. Wire for Guying: Galvanized steel 1 x 19 preformed 3/16 in. diameter. Thimbles and nicopress clips shall be used for connections and splices.
- C. Turnbuckles: 1/4" x 7-3/4" Galvanized steel with a 2-1/2" in. lengthwise opening fitted with eyebolts, as manufactured by Crown Bolt Inc., or approved equal.
- D. Hose: High quality braided rubber hose, 3/4 in. diameter and suitable length, black in color.
- E. Strapping: Arbortie, manufactured by DeepRoot Green Infrastructure, LLC, 530 Washington Street, San Francisco, CA 94111Tel: 800 458 7668 or 415 781 9700; Fax: 800 277 7668 or 415 781 0191, or approved equal.
- F. Below Grade Rootball Tiedown: Arborguy by GreenBlueUrban; <https://www.greenblue.com/na/products/arborguy/>, or approved equal.

**2.19 WRAPPING MATERIAL**

- A. Tree wrapping material shall be equal to the following:
1. Osnaburg Cloth, 4-7/8 in. wide, unbleached, pinked on both edges, manufactured by The Carnegie Textile Co., 1734 Ivanhoe Road, P.O. Box 10276, Cleveland, OH 44110.
  2. Tree wrap shall be secured to the trunk using bio-degradable tape suitable for nursery use and expected to degrade in sunlight in less than two years after installation.
  3. Option: Arbor Tape, supplied by American Arborist Supplies, 882 S Matlack Street, Unit A, West Chester, PA 19382: Phone: 800-441-8381/610-430-1214; Fax: 610-430-8560; E-mail Address: [info@arborist.com](mailto:info@arborist.com), or approved equal.

**2.20 AERATION SYSTEM**

- A. Pipe for aeration system shall be oblong corrugated panel piping, manufactured by ADS, Advanced Drainage Systems, Inc., 4640 Trueman Blvd., Hilliard, OH 43026; Tel. 1-800-821-6710, or approved equal.
1. ADS AdvanEDGE shall have annular interior and exterior corrugations. 12- and 18-inch (300 to 450 mm) shall meet ASTM D 7001. Size shall be as indicated on the Drawings.
  2. Pipe and fittings shall be made of polyethylene with a minimum cell classification of 424420C as defined and described in ASTM D 3350.
  3. Fittings and cap shall be supplied by pipe manufacturer.
  4. Joints shall be manufacturer's standard snap tight joint.
  5. Pipe shall have internal bracing adjoining each long wall to prevent crushing under typical loading. Pipe shall be made available with an external geotextile wrap.

**2.21 ANTIDESICCANT**

- A. Antidesiccant shall be an emulsion specifically manufactured for plant protection which provides a protective film over plant surfaces which is permeable enough to permit transpiration. Antidesiccant shall be delivered in manufacturer's sealed containers and shall contain manufacturer's printed instructions for use.

- B. Antidesiccant shall be equal to the following:

<u>Product</u>	<u>Manufacturer</u>
Wilt-Pruf	Wilt-Pruf Products, Inc. P.O. Box 469 Essex, CT 06426
Winter Shield	Rockland Corporation

**2.22 FUNGICIDE**

- A. Fungicide shall be "Bordeaux Mix", manufactured by Hi-Yield, or approved equal.

**2.23 INSECTICIDE**

- A. Insecticide shall be LESCO Sevin Brand SL, #019106, for broad spectrum control for most trees, shrubs and ornamentals, manufactured by LESCO, Rocky River, OH 44116, or approved equal.

**2.24 POST-EMERGENT HERBICIDE**

- A. Herbicide shall be QuikPRO™ herbicide, formulated as a water-soluble granule and packaged in easy-measure bottles, complete weed control, manufactured by Monsanto, or approved equal.

**2.25 PRE-EMERGENT HERBICIDE**

- A. Herbicide shall be LESCO Ornamental Herbicide 5G, pre-emergent grassy and selected broadleaf weed control for ornamental plants, nursery stock and ground covers, #019515, manufactured by LESCO, Rocky River, OH 44116, or approved equal.

**2.26 EDGING**

- A. Refer to Section 055901, METAL EDGING.

**2.27 TREE WATERING SYSTEM**

- A. Tree watering system shall be 20 gallon Treegator® , a slow release watering system for new trees., capable of delivering a high volume of water directly to the root system of a newly planted tree with no run-off or evaporation, manufactured by Spectrum Products, Inc., Youngsville, North Carolina, 27596; supplied by PlanetGreenSpot.com PO Box 674 Pasadena, MD 21123, Tel. 888.574.6348.

**2.28 WATER RETENTION ADDITIVE**

- A. Water Retention Additive for application at time of planting shall be a granular polyacrylamide polymer of a potassium base and not a sodium base that slowly releases moisture into the root zone such as Terra Sorb, as manufactured by Plant Health Care, Inc., 440 William Pitt Way, Pittsburgh, PA, or approved equal.
  - 1. Apply at each tree in non-irrigated areas Water Retention Additive in three (3) ounces or the amount specified by Water Retention Additive manufacturer's printed instructions.

### **PART 3 EXECUTION**

#### **3.1 PREPARATION OF PLANT MATERIALS**

- A. Immediately before digging and following consultation with the Architect, spray all evergreen or deciduous trees in full leaf with Transplant Biostimulant, applying an adequate film over trunks, branches, twigs and foliage and apply Transplant Biostimulant to the root ball area
- B. Dig, and ball and burlap (B&B) plants with firm, natural balls of earth, of depth and diameter not less than that recommended by the American Standard for Nursery stock. Plants moved with a ball will not be accepted if the ball is cracked or broken before or during planting operation. Remove all grass, weeds and accumulated soil resulting from nursery cultivation from the top of the root ball prior to digging so that the original trunk flare shows on top of the root ball.
- C. Use only natural burlap and jute twine. Do not use synthetic fibers or wire to ball and burlap root balls. Wire baskets will be acceptable if removed in accordance with these specifications.
- D. All plant material in transit or temporary stored shall be covered with burlap or similar covering to keep plants from drying out.
- E. Ship and store bare root material in refrigerated trucks and storage areas. Keep roots moist and cool until time of planting.
- F. If the construction schedule requires trees over 3 ½" in caliper to be planted in the fall, that are of a species considered to be difficult to transplant in the fall, these trees shall be root pruned the previous spring in the nursery.
  - 1. The Architect will determine tree species to be root pruned.
  - 2. A trench shall be dug around the tree at the limit of the proposed root ball to a minimum depth of 24" and back-filled.
  - 3. A 3" high saucer shall be built around the tree outside the edge of the trench.
  - 4. The tree shall be guyed or braced.
  - 5. The tree shall be watered as necessary through the summer.
  - 6. When the tree is dug in the fall, the digging shall be done using methods that preserve the new root growth growing in the soft soil of the trench.
  - 7. Root pruning, when required, shall be done at no additional cost to the Owner, except for owner pre-purchased trees.

#### **3.2 EXAMINATION OF SUBGRADE**

- A. Examine subgrade and rough grading before planting. Alert Architect to unacceptable rough grading or subgrade conditions.

### **3.3 DECOMPACTION OF PLANTING AREAS**

- A. After subgrade levels have been reached and immediately prior to placing planting soils, the entire subgrade area shall be loosened to a minimum depth of 12 inches utilizing the bucket of a backhoe or equivalent equipment.
- B. Any subgrade areas which have become heavily compacted (defined as exceeding 86% - 88% compaction ASTM C698 Standard Proctor) including, but not limited to, temporary parking areas, material stockpile areas, temporary roadways, construction areas, areas shown on the plans, or areas identified by Architect shall be deep-scarified. Immediately prior to placing soils, heavily compacted areas shall be loosened to a minimum depth of 36 inches using the teeth of a backhoe or other suitable equipment. Frequency of compaction tests shall be one per 200 square feet.
- C. Using a wide-track bulldozer size D-5 or smaller, compact the scarified subgrade to 86% - 88% compaction ASTM D698 Standard Proctor. Contractor shall provide shovel dug test pits to the full depth of the mitigation, where located per the direction of the Architect, in order for the Architect to review whether the work has been done as required. Backfill the pits after the review(s).
- D. Confirm that the subgrade is at the proper elevation and that no further earthwork is required to bring the subgrade to proper elevations. Provide a written report to Architect indicating that subgrade has been placed to the required elevations, has been decompacted according to the Contract Documents and is ready for inspection at least 3 days prior to placing planting soil. Perform no work of placing and spreading planting mixes until elevations have been confirmed and written report has been accepted by the Architect.
- E. After the soils have been loosened and inspected, planting soil may be spread by using a wide track bulldozer size D-5 or smaller or may be dumped and spread with bucket of a backhoe from the edge of the loosened area. No rubber-tired equipment or heavy equipment except for small bulldozer shall pass over the subsoils (subgrade) after they have been loosened. If Contractor plans to utilize such areas for any use of heavy equipment, this should be carried out prior to beginning the process of loosening soils or filling in that area, or it shall be rescarified to meet this specification requirement.

### **3.4 SOIL DRAINAGE/DETRIMENTAL SOILS**

- A. Test drainage of five planting pits in each area where trees are being planted in locations as directed by the Architect. Pits shall be filled with water twice in succession. The time at which water is put into the pit for a second filling shall be noted. Architect shall then be notified of the time it takes for pit to drain completely. Planting operations shall not proceed until Architect has reviewed test drainage results.
  - 1. To test drainage, dig a hole about 1 foot deep. Fill with water and allow it to drain completely. Immediately refill the pit and measure the depth of the water with a

ruler. 15 minutes later, measure the drop in water in inches, and multiply by 4 to calculate how much water drains in an hour.

- a. Less than 1 inch per hour is poor drainage, indicating the site may stay wet for periods during the year. Plants that don't tolerate poor drainage will suffer. 1 to 6 inches of drainage per hour is desirable. Soils that drain faster than 6 inches per hour have excessive drainage, and Architect may consider choosing plants that tolerate dry or drought conditions. Any tree pits not meeting these criteria shall be excavated to a depth of 4 ft. and backfilled with enriched subsoil.
- B The Contractor shall notify the Architect in writing if the need for underdrainage can be eliminated. Submit proposal and cost estimate for correction of the conditions for Architect's approval before starting work.
- C. In areas without underdrainage, soil percolation test shall be completed on every 1 of 3 plant pits, report and location map to be reviewed by Architect. Contractor shall remediate soils and retest until meeting specified infiltration rates.
- D. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.
  1. Verify sub grade to ensure that rough grading is correct, and that suitable subgrade materials exist before start of planting work.
  2. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, roofing compound, or acid has been deposited in soil within planting area.
  3. Verify service and utility location and irrigation components.
  4. Soil Moisture: Verify that topsoil and subgrade are damp when topsoil is spread. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- E. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove soil and contamination as directed by Architect, and replace with new planting soil in accordance with requirements of this Section.
- F. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- G. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- H. Wrap shade trees with burlap fabric over trunks to first main branch to protect from wind and other damage during digging, handling, and transportation.

### **3.5 LAYOUT OF PLANTING AREAS**

- A. Individual trees shall be located in the field as indicated on the Drawings for Architect's approval prior to planting. Contractor shall provide one foreman, one loader with operator and two laborers to work with Architect in the field to determine the final

location and orientation of each tree prior to planting. It is anticipated that this process may take several days to complete. Contractor shall plan to have this layout crew available to work with Architect at a slow and deliberate pace in order to achieve the desired results.

- B. Individual shrubs and perennials to be planted shall be laid out in plant beds by the Contractor in ample time to allow inspection by the Architect.

### **3.6 PREPARATION OF SUBGRADE**

- A. Subgrade shall be brought to true and uniform grade and shall be cleared of stones greater than 2 in., sticks, and other extraneous material.

### **3.7 PLANT PIT EXCAVATION**

- A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
  1. Excavate to the depth and width as shown on the drawings.
  2. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
  3. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
  4. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
  5. Maintain supervision of excavations during working hours.
  6. Keep excavations covered or otherwise protected overnight, after working hours and when unattended by Installer's personnel.
- B. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
  1. Hardpan Layer: Drill 6 in. diameter holes, 24 in. apart, into free-draining strata or to a depth of 10 ft., whichever is less, and backfill with free-draining material.
- C. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.
- D. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

### **3.8 EDGING**

- A. Refer to Section 055901, METAL EDGING.

### **3.9 PLACING PLANTING SOIL**

- A. Planting soil shall not be spread until it is possible to follow immediately or within 24 hours with planting operations. If planting soil is spread prior to this time it shall be cultivated to loosen soil prior to planting.
- B. Planting soil shall be spread in lifts not greater than 8 inches and compacted to a density between 82% and 86% Standard Proctor Maximum Dry Density in accordance with ASTM D698. The surface area of each lift, including the subgrade after it has been compressed by a backhoe, shall be scarified by raking prior to placing the next lift.
- C. Place and spread planting medium to a depth greater than required such that after settlement, finished grade shall conform to the lines, grades and elevations shown on the Drawings. Ensure proper drainage in an uninterrupted pattern free of hollows and pockets.
- D. Remove stiff clods, lumps, brush, roots, stumps, litter and other foreign material and stones over 1 inch diameter and legally dispose of off-site.
- E. Surfaces shall be graded and smoothed, eliminating all sharp breaks by rounding, scraping off bumps and ridges, and filling in holes and cuts.
- F. Grading: Refer to Section 329119, LANDSCAPE GRADING.

### **3.10 PLACING HORTICULTURAL SUBSOIL**

- A. Horticultural SubSoil shall be spread in lifts not greater than eight inches and compacted with a minimum of three passes of vibratory compaction equipment to a density between 92 and 96 percent Standard Proctor Maximum Dry Density. Horticultural SubSoil shall be placed to a minimum depth of 18 in. within the areas shown on the Drawings, except as otherwise indicated.
- B. Grading: Refer to Section 329119, LANDSCAPE GRADING.

### **3.11 PLANTING**

- A. Tree, shrub, and groundcover beds shall be excavated to the depth and widths indicated on the Drawings. Most plants are located within continuous soil volumes; See Soil Plans. Immediately following tree planting, the area surrounding each tree shall be amended with additional compost in the upper soil layer. Apply 4" compost on top of the planting soil within 10' of the rootball on all sides. Incorporate into the top 6-9" of soil by rototilling or discing. Where trees will be located within decked areas, complete compost amendment following soil placement and before installation of rodent deterrent fabric

and deck framing. If the planting pit for any tree is dug too deep, soil shall be added to bring it to correct level, and the soil shall be thoroughly tamped. Walls of plant pits shall be dug so that they are sloped as shown on the Drawings, and scarified. Do not excavate compacted subgrades of adjacent pavement or structures.

- B. Plants shall be set as indicated on Drawings. Plants shall be set so that the root flare is at, or slightly above, finished grade as indicated on the Drawings. Plants located in poorly drained soils shall be set 2 to 4 inches above finished grade, gradually sloping between the top of the root ball and the surrounding finished grade.
- C. Plants shall be turned to the desired orientation when required by Architect.
- D. Containerized plants shall be removed from container taking care not to damage roots. The side of the root ball shall be scarified to prevent root-bound condition before positioning in planting pit.
- E. Prior to Placing in Pit: Cut away bottom of wire basket and bottom of wrap material.
- F. Pits shall be backfilled with planting soil. Soil shall be worked carefully into voids and pockets, tamping lightly every 6 in.
  - 1. When pit is two-thirds full, plants shall be watered thoroughly, and water left to soak in before proceeding.
  - 2. At this time, ropes or strings on top of balls shall be cut and removed. Burlap or cloth wrapping shall be cut away from the top of the ball and slit down the sides. Non-biodegradable ball wrapping and support wire shall be totally removed from ball and planting pit.
  - 3. Wire baskets shall be completely cut away from sides of root ball, and removed from pit. Bottom of basket may remain.
  - 4. Remove nursery plant identification tags.
- G. Backfilling and tamping shall then be finished and a saucer formed around plant pits as indicated on the Drawings.
- H. Saucer shall be filled with water and water left to soak in. Saucer shall then be filled with water again.

### **3.12 PERENNIALS AND GROUNDCOVERS**

- A. Set out and space plants as indicated on the Drawings. Amend top layer of soil as indicated on the Drawings.
- B. Perennials: Check root ball after removing plant from its container. Encircling roots need to be gently loosened from the tight mat of root-bound plants. If roots are very dense at bottom of pot, slice off the bottom 1". If roots are seriously disturbed when planting, cut

back some foliage to reduce the water stress that will occur. Plant at the same soil level as the plant was in its container.

- C. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- D. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- E. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

### **3.13 TREE WATERING SYSTEM**

- A. Street trees shall be irrigated with Gator Bags, placed in quantity and location as recommended by manufacturer.

### **3.14 LIQUID BIOLOGICAL AMENDMENTS**

- A. In all new planting areas, create injection sites made every 2 feet in a grid pattern. If the viable root zone varies from this area, adjust the pattern accordingly. Each injection site shall have a 2-inch wide diameter by 8-inch deep column that will act as leaching fields during the planting process. After the liquid and aeration injection is completed, the injection columns shall be backfilled with a custom blend of long-term granular food sources that include 25% feathermeal, 75% humate plus corresponding mycorrhizal spores.
- B. Early spring injection for both Ecto and Endo Mycorrhizal plants shall consist of 50% concentrated liquid Biological Amendment with 1/2 gallon per a 100 gallons of soluble kelp, humic acid and molasses (or fish hydrolysate).

### **3.15 FERTILIZER APPLICATION**

- A. Fertilizer, if required, shall be applied at the rates recommended by soil testing results.

### **3.16 CHEMICAL APPLICATIONS**

- A. Spray apply insecticides, pesticides, and herbicides, to inhibit damage from insects, pests, and diseases, only with approval of Architect. Spray products and application shall conform to the National Arborist Association Standards under the section titled "Standards for Pesticide Application Operations." and as approved by Architect. All insecticides, pesticides, and herbicides shall be EPA approved. Spraying shall be performed only by authorized personnel.
  1. Immediately after planting, all trunks of deciduous trees shall be sprayed with fungicide, applied as directed by chemical manufacturer.
  2. Upon the appearance of insect problems, all trunks of deciduous trees shall be sprayed with insecticide, applied as directed by chemical manufacturer.

3. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer’s written recommendations. Do not apply to seeded areas.
4. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer’s written recommendations.

**3.17 WRAPPING**

- A. Trunks of deciduous trees shall be spiral wrapped to a minimum height of the first major branch. Wrap shall be applied from base up so that layers overlap and shed water. Secure at the top with flexible weatherproof tape, as specified.

**3.18 STAKING AND GUYING**

- A. All trees shall be staked or guyed immediately following planting. Plants shall stand verticle and plumb after staking or guying.
  1. Staking and Guying: Set vertical stakes and space to avoid penetrating root balls or root masses. Allow enough slack to avoid rigid restraint of tree. Stakes and guys shall be installed as indicated on the Drawings.
- B. Below Grade Rootball Tiedown: install in accordance with manufacturer’s printed instructions.

**3.19 AERATION SYSTEM**

- A. Pipe shall be installed in position and at locations indicated on the Drawings.
- B. Perforated pipe shall be fitted with pipe manufacturer’s filter fabric “sock” prior to installation.

**3.20 MULCHING**

- A. Mulch shall be applied as follows (entire area listed shall be mulched):

<u>Plant Type</u>	<u>Mulch Area</u>	<u>Mulch Depth, in.</u>
Tree	Saucer	3
Shrub	Saucer or Bed	3
Ground Cover	Bed	3

Mulch shall not be allowed to cover the base of trunks.

### **3.21 PRUNING**

- A. Each tree and shrub shall be pruned to preserve the natural character of the plant. Pruning shall be done after delivery of plants and after plants have been inspected and approved by the Architect. Pruning procedures shall be reviewed with Architect before proceeding.
- B. Pruning shall be done with clean, sharp tools. Cuts shall be made flush, leaving no stubs. No tree paint shall be used.
- C. Dead wood, suckers, and broken, weak, interfering and badly bruised branches shall be removed.

### **3.22 MAINTENANCE OF PLANTING**

- A. Maintenance shall begin immediately after each plant is planted and shall continue until expiration of the two year Guarantee Period.
- B. Maintenance shall consist of pruning, watering, cultivating, weeding, mulching, fertilizing, removal of dead material, repairing and replacing of tree stakes, tightening and repairing of guys, adjusting and replacing of damaged tree wrap material, resetting plants to proper grades and upright position, and furnishing and applying such sprays as are necessary to keep plantings free of insects and disease, and in a healthy growing condition.
- C. Daily watering of 1 gal./caliper inch should be delivered to the root ball of each tree during the first summer after planting. Continue through fall, reducing frequency. For trees larger than 3 inch caliper, fill saucer with 6 – 8 gallons twice per week during hot, dry weather, and once per week during cooler, wetter periods. Refer to Irrigation Plans for plantings outside of automated irrigation zone.
- D. Planting areas shall be kept free of weeds, grass, and other undesired vegetative growth.
- E. Upon completion of the Guarantee Period, the Owner shall assume all maintenance activities.

### **3.23 CLEANUP AND PROTECTION**

- A. During planting, daily keep adjacent paving and construction clean and work area in orderly condition.
- B. Protect plants from damage due to landscape operations, and due to operations of other contractors and trades. Maintain protection during installation and initial maintenance periods. Treat, repair, or replace damaged plants.

**END OF SECTION**

## **SECTION 331000 - WATER UTILITIES**

### **Part 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.
- B. The Contractor shall comply with the requirements of Providence Water.

#### **1.2 DESCRIPTION OF WORK**

- A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:
  - 1. Water systems piping for domestic water service from 10 feet outside the foundation wall to existing water main in Broad Street and as indicated on the Contract Plans.
- B. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
  - 1. Section 312000 – EARTH MOVING
  - 2. Section 017419 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

#### **1.3 SYSTEM PERFORMANCE REQUIREMENTS**

- A. Minimum Working Pressure Ratings: Except where otherwise indicated, the following are minimum pressure requirements for water system piping.
  - 1. Underground Piping: 150 psig (1035 kPa).
  - 2. Underground Piping, Downstream of Fire Department Connections: 200 psig (1380 kPa).

#### **1.4 SUBMITTALS**

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
- B. Product data, including pressure rating, rated capacity, and settings of selected models for the following:
  - 1. Pipe and fittings.
  - 2. Valves.
  - 3. Identification materials and devices.

- C. Test reports specified in "Field Quality Control" Article in Part 3.

### **1.5 QUALITY ASSURANCE**

- A. Comply with requirements of the State of Rhode Island Department of Environmental Protection (RI DEP).
- B. Comply with standards of the City of Providence for domestic water services. Include materials, installation, and testing.

### **1.6 DELIVERY, STORAGE AND HANDLING**

- A. Deliver pipes and tubes with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- C. Protect flanges, fittings, and piping specialties from moisture and dirt.

### **1.7 PROJECT CONDITIONS**

- A. Perform site survey, research public utility records, and verify existing utility locations.
- B. Verify that water system piping may be installed in compliance with original design and referenced standards.

### **1.8 SEQUENCING AND SCHEDULING**

- A. Coordinate connection to water main with Owner Project Manager. Do not shut off water main without receiving written permission from Owner Project Manager.
- B. Coordinate with the City of Providence Water in advance prior to any water main shut off.
- C. Coordinate with pipe materials, sizes, entry locations, and pressure requirements of building water distribution systems piping.
- D. The Contractor shall notify and coordinate with owners of business and commercial establishments of any disruptions to, or shutdowns of, water service to their facilities. The Contractor shall schedule service disruptions or shutdowns such that operations of business and commercial establishments are not impacted, and furthermore shall coincide with periods of minimal water usage by these properties.

- E. Coordinate with other utility work.

## Part 2 - PRODUCTS

### 2.1 PIPE

- A. Boltless Restrained Joint Ductile-Iron Push-On-Joint Pipe: AWWA C151, Class 56 – Zinc coating required.
  - 1. Lining: AWWA C104, cement mortar, seal coated.
  - 2. Gaskets, Glands, and Bolts and Nuts: AWWA C111.
  - 3. Push-On-Joint-Type Pipe: AWWA C111, rubber gaskets.
  - 4. Restrained Joint Fittings and Restraining Components: AWWA C110 and/or C153.
  - 5. Mechanical-Joint-Type Pipe: AWWA C111, rubber gaskets, ductile-iron and steel bolts and nuts.
  - 6. Encasement: polyethylene (AWWA C105).

### 2.2 PIPE FITTINGS

- A. Restrained Joint Ductile-Iron Push-On-Joint Pipe Fittings: AWWA C153, ductile-iron compact fittings, 350-psig (2400 kPa) pressure rating.
  - 1. Lining: AWWA C104, cement mortar.
  - 2. Gaskets: AWWA C111, rubber.
  - 3. Encasement: polyethylene (AWWA C105).

### 2.3 JOINING MATERIALS

- A. Ductile-Iron Pipe and Ductile-Iron Fittings: The following materials apply:
  - 1. Restrained Push-On Joints: AWWA C111 rubber gaskets and lubricant.
  - 2. Mechanical Joints: AWWA C111 ductile-iron or gray-iron glands, high-strength steel bolts and nuts, and rubber gaskets.
  - 3. Flanged Joints: AWWA C115 ductile-iron or gray-iron pipe flanges, rubber gaskets, and high-strength steel bolts and nuts.
    - a. Gaskets: Rubber, flat face, 1/8 inch (3 mm) thick except where other thickness is indicated; and full-face or ring type except where other type is indicated.
    - b. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, except where other material is indicated.
- B. Pipe Couplings: Iron-body sleeve assembly, fabricated to match outside diameters of pipes to be joined.
  - 1. Sleeve: ASTM A 126, Class B, gray iron.
  - 2. Followers: ASTM A 47, Grade 32510, or ASTM A 536 ductile iron.
  - 3. Gaskets: Rubber.
  - 4. Bolts and Nuts: AWWA C111, ASTM A242.

5. Finish: Red alkyd enamel paint.
6. Encasement: AWWA C105, polyethylene film tube or sheet.

## 2.4 GATE VALVES

- A. Nonrising Stem Gate Valves 3 Inches (80 mm) and Larger: AWWA C509, resilient seated; bronze stem, cast-iron or ductile-iron body and bonnet, stem nut, 200-psig (1380 kPa) working pressure, mechanical joint ends and shall be equal to ANSI/AWWA C11/A21.11. Valve shall open right (clockwise).
- B. Valve Boxes: Cast-iron box having top Section and cover with lettering "WATER," bottom Section with base of size to fit over valve and barrel approximately 6 inches in diameter, and adjustable cast-iron extension of length required for depth of bury of valve.

## 2.5 ANCHORAGES

- A. Mechanical Joint Restraint: Megalug™, TR Flex™, Romac™, or approved equal.
  1. Glands shall be ductile iron conforming to ASTM A536-80 Steel.
  2. Dimensions of gland shall be such that it can be used with the mechanical joint bell and tee-head bolts conforming to ANSI/AWWA A21.11 and ANSI/AWWA C153/A21.53 of the latest revision.
- B. Clamps, Straps, and Washers: ASTM A 506, steel.
- C. Rods: ASTM A 575, steel.
- D. Rod Couplings: ASTM A 197, malleable iron.
- E. Bolts: ASTM A 307, steel.
- F. Cast-Iron Washers: ASTM A 126, gray iron.
- G. Concrete Reaction Backing: Portland cement concrete mix, 3000 psi (20.7 MPa).
  1. Cement: ASTM C 150, Type I.
  2. Fine Aggregate: ASTM C 33, sand.
  3. Coarse Aggregate: ASTM C 33, crushed gravel.
  4. Water: Potable.

## 2.6 IDENTIFICATION

- A. Plastic Underground Warning Tapes: Polyethylene plastic tape, 6 inches (150 mm) wide by 4 mils (1 mm) thick, solid blue in color with continuously printed caption in black letters "CAUTION - WATER LINE BURIED BELOW."

### **Part 3 - EXECUTION**

#### **3.1 EARTHWORK**

- A. Excavation, trenching, and backfilling are specified in SECTION 312000 – EARTH MOVING.

#### **3.2 SERVICE ENTRANCE PIPING**

- A. Extend water system piping and connect to water supply source 10 feet outside of the foundation wall in locations and pipe sizes indicated.
  - 1. Terminate water system piping at a point 10 feet outside of the building wall until building water systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building water systems when those systems are installed.
- B. Install restrained joints for buried piping within 10 feet of building. Use restrained-joint pipe and fittings, thrust blocks, anchors, tie-rods and clamps, and other supports at vertical and horizontal offsets.

#### **3.3 JOINT CONSTRUCTION**

- A. Ductile-Iron Piping Gasketed Joints: Construct joints according to AWWA C600.
- B. Flanged Joints: Align flanges and install gaskets. Assemble joints by sequencing bolt tightening. Use lubricant on bolt threads.
- C. Dissimilar Materials Piping Joints: Construct joints using adapters that are compatible with both piping materials, outside diameters, and system working pressure. Refer to "Piping Systems - Common Requirements" Article for joining piping of dissimilar metals.

#### **3.4 PIPING SYSTEMS - COMMON REQUIREMENTS**

- A. General Locations and Arrangements: Drawings indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated except where deviations to layout are approved on coordination drawings.
- B. Unless otherwise shown or stated, the minimum total finished cover over the top of the barrel of all installed pipe shall be 5 feet. All excavation necessary for the pipe installation, shall be included in the cost of the pipe.
- C. Install components having pressure rating equal to or greater than system operating pressure.
- D. Install piping free of sags and bends.

- E. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- F. Install fittings for changes in direction and branch connections.
- G. Piping Connections: Except as otherwise indicated, make piping connections as specified below.
  - 1. Install flanges, in piping 2-1/2 inches (65 mm) and larger, adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.
  - 2. Install dielectric fittings to connect piping of dissimilar metals.

### **3.5 PIPING INSTALLATION**

- A. Install ductile-iron pipe and ductile-iron fittings according to AWWA C600.
  - 1. Install polyethylene encasement according to AWWA C105 on ductile-iron pipe, ductile-iron and cast-iron pipe fittings, and ferrous couplings where specified.
- B. Bury piping at minimum depth of 60 inches (1.5 m) below finished grade and not less than 18 inches (0.5 m) below average local frost depth.
- C. All bends 45 degrees or greater, and tees, shall be restrained with a cast-in-place thrust block in addition to restrained joints.

### **3.6 VALVE INSTALLATION**

- A. Comply with AWWA C600. Install buried valves with stem pointing up and with cast iron valve box.
  - 1. Set valves in conformance with Providence Water Requirements.

### **3.7 ANCHORAGE INSTALLATION**

- A. Anchorages: Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems gasketed-joint, ductile-Iron piping according to AWWA C600.
- B. Apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of installed ferrous anchorage devices.

### **3.8 IDENTIFICATION INSTALLATION**

- A. Install continuous plastic underground warning tape during back-filling of trench for underground water service piping. Locate 6 inches (150 mm) to 8 inches (200 mm) below finished grade, directly over piping.

### **3.9 FIELD QUALITY CONTROL**

- A. Piping Tests: Conduct piping tests before joints are covered and after thrust blocks have hardened sufficiently. Fill pipeline 24 hours prior to testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than 1-1/2 times working pressure for 2 hours. Comply with testing procedures of Providence Water.

### **3.10 CLEANING**

- A. Clean and disinfect water distribution piping as follows:
  - 1. Purge new water distribution piping system and parts of existing systems that have been altered, extended, or repaired prior to use.
  - 2. Use purging and disinfecting procedure prescribed by Providence Water or, if method is not prescribed by that authority, use procedure described in AWWA C651 or as described below:
    - a. Fill system or part of water system with water/chlorine solution containing at least 50 parts per million of chlorine. Isolate (valve off) system or part thereof and allow to stand for 24 hours.
    - b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 parts per million of chlorine; isolate and allow to stand for 3 hours.
    - c. Following allowed standing time, flush system with clean, potable water until chlorine does not remain in water coming from system.
- B. Submit water samples in sterile bottles to approved State of Rhode Island Department of Environmental Protection Laboratory following the submittal procedures outlined by the laboratory. Repeat cleaning and disinfecting procedure if laboratory results indicate that there is contamination in samples.
- C. Prepare reports for purging and disinfecting activities.
  - 1. Submit laboratory results to the Owner Project Manager.

### **3.11 CONSTRUCTION WASTE MANAGEMENT**

- A. Remove and dispose of construction debris and waste legally offsite.

**END OF SECTION**

(this is for double sided printing)

## **SECTION 333000 - SANITARY SEWER UTILITIES**

### **Part 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.
- B. All Work shall comply with the standards and specifications of the City of Providence Department of Public Works (DPW) and the Narraganset Bay Commission.

#### **1.2 DESCRIPTION OF WORK**

- A. Work Included: Provide labor, materials and equipment necessary to complete the Work of this Section, including but not limited to the following:
  - 1. Sanitary sewerage systems from 10 feet outside the foundation wall to existing sewerage system in street.
  - 2. Disconnecting and abandoning existing sanitary sewer lines.
- B. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
  - 1. SECTION 312000 – EARTH MOVING
  - 2. Section 017419 – Construction Waste Management and Disposal

#### **1.3 DEFINITIONS**

- A. Sewerage Piping: System of sewer pipe, fittings, and appurtenances for gravity flow of sanitary sewage.

#### **1.4 SUBMITTALS**

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for the following:
  - 1. Sanitary sewer piping
- C. Inspection and test reports specified in the "Field Quality Control" Article.

### **1.5 QUALITY ASSURANCE**

- A. Environmental Agency Compliance: Comply with regulations pertaining to sanitary sewerage systems.
- B. Utility Compliance: Comply with regulations pertaining to sanitary sewerage and storm drainage systems. Include standards of water and other utilities where appropriate.
- C. Comply with the requirements of the City of Providence Department of Public Works (DPW) and the Narraganset Bay Commission.

### **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Protect pipe, pipe fittings, and seals from dirt and damage.
- B. Handle precast concrete manholes and other structures according to manufacturer's rigging instructions.

### **1.7 PROJECT CONDITIONS**

- A. Site Information: Perform site survey, research public utility records, and verify existing utility locations.
- B. Locate existing structures and piping to be closed and abandoned.
- C. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner Project Manager or others except when permitted under the following conditions and then only after arranging to provide acceptable temporary utility services.
  - 1. Notify Owner Project Manager's Representative not less than 48 hours in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without receiving written permission from the Owner Project Manager's Representative.

## **Part 2 - PRODUCTS**

### **2.1 PIPES AND FITTINGS**

- A. Polyvinyl Chloride (PVC) Gravity Sewer Pipe and Fittings: ASTM D3034, SDR 35, bell-and-spigot ends, for gasket joints.

### **2.2 CONCRETE**

- A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

### **2.3 FLEXIBLE SEWER COUPLINGS**

- A. Rubber Sleeve and Steel Band; Fernco, E.J. Prescott, or approved equal.

## **Part 3 - EXECUTION**

### **3.1 EARTHWORK**

- A. Excavating, trenching, and backfilling are specified in SECTION 312000 – EARTH MOVING.

### **3.2 IDENTIFICATION**

- A. Materials and their installation are specified in SECTION 312000 – EARTH MOVING. Arrange for installation of warning tapes directly over piping and at outside edges of underground structures.
  1. Use detectable warning tape over nonferrous piping and over edges of underground structures.

### **3.3 INSTALLATION, GENERAL**

- A. General Locations and Arrangements: Drawings (plans and details) indicate the general location and arrangement of underground sewerage and drainage systems piping. Location and arrangement of piping layout take into account many design considerations. Install piping as indicated, to extent practical.
- B. Install piping on properly compacted crushed stone bedding material.
- C. Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's recommendations for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.
- D. Use proper size increasers, reducers, and couplings, where different sizes or materials of pipes and fittings are connected. Reduction of the size of piping in the direction of flow is prohibited.
- E. Install gravity-flow-systems piping at constant slope between points and elevations indicated. Install straight piping runs at constant slope, not less than that specified, where slope is not indicated.

- F. Extend sewerage piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.
- G. Install sewerage piping pitched down in direction of flow, at minimum slope of 1 percent (1:100) and 36-inch min. cover, except where otherwise indicated.

### **3.4 PIPE JOINT CONSTRUCTION AND INSTALLATION**

- A. General: Join and install pipe and fittings according to the following.
- B. Polyvinyl Chloride (PVC) Gravity Sewer Pipe and Fittings: Install pipe and fittings with elastomeric seals in conformance with ASTM D2321.

### **3.5 CONCRETE PLACEMENT**

- A. Place cast-in-place concrete according to ACI 318, ACI 350R, and as indicated.

### **3.6 FIELD QUALITY CONTROL**

- A. Clear interior of piping and structures of dirt and superfluous material as the Work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.
  - 1. In large, accessible piping, brushes and brooms may be used for cleaning.
  - 2. Place plug in end of incomplete piping at end of day and whenever Work stops.
  - 3. Flush all new piping between manholes and other structures to remove collected debris.
- B. Inspect interior of gravity piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of the Project.
  - 1. Submit separate reports for each system inspection.
  - 2. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visual between structures.
    - b. Deflection: Flexible piping with deflection that prevents passage of a ball or cylinder of a size not less than 92.5 percent of piping diameter.
    - c. Crushed, broken, cracked, or otherwise damaged piping.
    - d. Infiltration: Water leakage into piping.
    - e. Exfiltration: Water leakage from or around piping.
  - 3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
  - 4. Reinspect and repeat procedure until results are satisfactory.
- C. Test new piping systems and parts of existing systems that have been altered, extended, or repaired for leaks and defects.
  - 1. Do not enclose, cover, or put into service before inspection and approval.

2. Test completed piping systems using low pressure air testing according to the BWSC Standards.
3. Test manholes prior to backfill using vacuum testing in accordance with BWSC Standards.
4. Schedule tests, and their inspections with at least 24-hours advance notice.
5. Submit separate reports for each test.
6. Leaks and loss in test pressure constitute defects that must be repaired.
7. Replace leaking piping using new materials and repeat testing until leakage is within allowances specified.
8. Repair or replace defective sewer manhole components using new materials and repeat vacuum tests until satisfactory test results are obtained.

### **3.7 CONSTRUCTION WASTE MANAGEMENT**

- A. Remove and dispose of construction debris and waste legally offsite.

**END OF SECTION**

(this is for double sided printing)

## **SECTION 334000 - STORM DRAINAGE UTILITIES**

### **Part 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.
- B. All Work shall comply with the standards and specifications of the City of Providence Department of Public Works (DPW) and the Narraganset Bay Commission.

#### **1.2 DESCRIPTION OF WORK**

- A. Work Included: Provide labor, materials and equipment necessary to complete the Work of this Section, including but not limited to the following:
  - 1. Building storm drainage systems from 10 feet outside the foundation wall to existing storm drainage system in street or point of discharge.
  - 2. Erosion control.
- B. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
  - 1. Section 312000 – EARTH MOVING
  - 2. Section 312500 - EROSION AND SEDIMENTATION CONTROLS
  - 3. Section 017419 – Construction Waste Management and Disposal

#### **1.3 DEFINITIONS**

- A. Drainage Piping: System of storm pipe, fittings, valves, and appurtenances for gravity flow of storm drainage.

#### **1.4 SUBMITTALS**

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for the following:
  - 1. Storm drain pipes and fittings
  - 2. Drain Manhole
  - 3. Backflow check valve for inside manhole

- a. Shop drawing shall include orientation of valve on pipe. The drawing shall be a scaled version of the actual valve, generic drawings with listed dimensions will not be accepted. Dimensions required on the drawing include the following:
    - Overall length
    - Cuff diameter
    - Cuff seating depth
    - Overall height at the bill
    - Orientation of the curved bill
    - Location of Lifting Clevis
    - Elastomer Material used on interior layer
    - Elastomer Material used on exterior layer
    - Clamp Material
  - b. Manufacturers must be pre-approved by the Engineer, the Contractor shall submit to the Engineer at least twenty days prior to the bid date a reference submittal package as defined within the section entitled Submittal Documents showing that the alternate manufacturer can comply with the scope, performance and general intentions of this specification.
4. Area Drains
- C. Shop drawings for premanufactured storm drain treatment structure. Include frames and covers.
  - D. Inspection and test reports specified in the "Field Quality Control" Article.

### **1.5 QUALITY ASSURANCE**

- A. Environmental Agency Compliance: Comply with regulations pertaining to sanitary sewerage and storm drainage systems.
- B. Utility Compliance: Comply with regulations pertaining to sanitary sewerage and storm drainage systems. Include standards of water and other utilities where appropriate.
- C. Comply with the requirements of the City of Providence Department of Public Works (DPW) and the Narraganset Bay Commission.

### **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Protect pipe, pipe fittings, and seals from dirt and damage.
- B. Handle precast concrete manholes and other structures according to manufacturer's rigging instructions.
- C. Backflow Preventer Check Valve - The check valves shall be stored in a cool, dry location and remained packaged on the shipping pallets for storage periods prior to installation. Do not

remove any bracing or shipping rings until the valve is to be installed. During the storage period, avoid exposure to UV light, corrosive chemicals, and concentrated noxious gases (i.e. Ozone).

## **1.7 PROJECT CONDITIONS**

- A. Site Information: Perform site survey, research public utility records, and verify existing utility locations.
- B. Locate existing structures and piping to be closed and abandoned.
- C. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner Project Manager or others except when permitted under the following conditions and then only after arranging to provide acceptable temporary utility services.
  - 1. Notify Architect not less than 48 hours in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without receiving Architect's written permission.

## **Part 2 - PRODUCTS**

### **2.1 PIPES, FITTINGS, AND CHECK VALVES**

- A. Polyvinyl Chloride (PVC) Gravity Sewer Pipe and Fittings: ASTM D1785, Schedule 80, bell-and-spigot ends, for gasket joints.
- B. BACKFLOW CHECK VALVE
  - 1. The backflow check valve shall be Tideflex Series TF-1 or approved equal. Check Valves are to be all rubber and the flow operated check type with slip-in cuff connection.
  - 2. The check valve shall have a flat bottom and flared top in the location where silt, sand, and debris might tend to collect beneath the valve. The increased angle in the upper spine shall be durable with great strength to support the weight of the valve and the weight of the water discharging from it. The inside diameter of the valve shall be fabricated to match the inside diameter of the pipe.
  - 3. The valve shall be a one-piece elastomer construction with internal fabric reinforcing all vulcanized into a composite material. The amount and configuration of the internal reinforcing shall be sufficient to maintain structural integrity of the valve under the operating conditions. The valve shall be installed onto the carrier pipe by means of sliding the cuff portion of the valve over the pipe outlet at the specified minimum cuff depth and compressing the valve cuff portion against the exterior surface of the pipe by using a metallic compression clamp.
  - 4. The port area shall contour down to a duckbill, which shall allow passage of flow when the line pressure exceeds the backpressure. When forward flow through the carrier pipe is discontinued the valve shall prevent backflow through the carrier pipe by sealing closed when hydrostatic pressure is applied to the exterior of the valve. The valve shall be capable of withstanding the maximum backpressure without causing plastic deformation.

5. The valve shall be configured as an eccentric type where the bottom of the valve is flat and the top is flared upward to provide the specified bill opening to diameter ratio dimension. The valve bill opening shall be aligned exactly vertical when installed to maintain symmetrically equal loads on each side of the valve under static and dynamic operating conditions. Valves not constructed eccentrically or requiring rotation of the bill opening from the vertical to avoid peripheral interferences shall not be accepted.
6. The bill opening at the valve must be at least 1.57 times the nominal pipe diameter. Valves submitted with a bill opening below this ratio and/or utilizing expanded cuff adapters will not be accepted.
7. The valve shall include an 18" curved bill to maintain closure of the bill opening during zero flow and zero hydrostatic load. It shall be an integral part of the valve and be comprised of a permanently set curvature of the bill portion extending over the entire length of the bill opening. The bill shall be curved at a minimum of 120 degrees from the direction of flow. The curvature shall be permanently set through vulcanization and shall be an integral part of the valve body.
8. The compression clamps and bolting hardware shall be constructed of 304 stainless steel for Hose Clamps and 304L stainless steel for Fabricated Clamps and provided as an ancillary component with each valve. The following clamp type and quantities shall be provided:

<u>Valve Size</u>	<u>Clamp Type</u>	<u>Quantity</u>
1" – 6"	Worm Gear – Hose Clamp	1
8" – 12"	Worm Gear – Hose Clamp	2
14" – 18"	Bolted - Fabricated Band Clamp	1
20" – 54"	Bolted - Fabricated Band Clamp	2
60" – Greater	Bolted - Fabricated Band Clamp	3

## 2.2 MANHOLES

- A. Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasket joints. Steel reinforcement shall comply with latest ASTM-A185 specification, 0.12 square inches per lineal foot and 0.12 square inches both directions for base Section.
  1. Base Section: 6-inch minimum thickness for floor slab and 5-inch minimum thickness for walls and base riser Section, and having a separate base slab or base Section with integral floor.
  2. Riser Sections: 5-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
  3. Top Section: Eccentric cone type, unless concentric cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
  4. Gaskets: ASTM C 443, butyl resin.
  5. Grade Rings: Include 2 or 3 reinforced-concrete rings, of 6- to 9-inch total thickness, that match a 24-inch diameter frame and cover.
  6. Steps: ASTM C 478 individual steps. Omit steps for manholes less than 60 inches deep.

- B. Manhole Frames and Covers: ASTM A48-76 for Class No. 30 gray iron casting. Include 24-inch inside diameter by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch diameter cover. Include indented top design with lettering, equivalent to the following, cast into cover:
  - 1. Storm Drainage Piping Systems: "DRAIN".

### **2.3 AREA DRAIN GRATE AND FRAME**

- A. Area drain grate shall be cast ductile iron from 100% recycled materials.
- B. All drain grate castings shall be manufactured true to pattern and component parts, and shall fit together in a satisfactory manner. The castings shall be of uniform pattern and quality, free from blowholes, hard spots, shrinkage, distortion or other defects. Castings shall be cleaned by shot blasting.
- C. Area drain grate shall have ¼" slot opens. Area drain grate shall be ADA compliant.
- D. Drain grate frames shall be supplied by grate manufacturer and shall conform with the installation details shown on the Project plans.

### **2.4 CONCRETE**

- A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:
  - 1. Cement: ASTM C 150, Type II.
  - 2. Fine Aggregate: ASTM C 33, sand.
  - 3. Coarse Aggregate: ASTM C 33, crushed gravel.
  - 4. Water: Potable.

### **2.5 BRICK**

- A. Shall meet ASTM C32.

## **Part 3 - EXECUTION**

### **3.1 EARTHWORK**

- A. Excavating, trenching, and backfilling are specified in Division 31 Section 312000 "EARTH MOVING".

### **3.2 IDENTIFICATION**

- A. Materials and their installation are specified in Division 31 Section "EARTH MOVING." Arrange for installation of warning tapes directly over piping and at outside edges of underground structures.
  - 1. Use warning tapes or detectable warning tape over ferrous piping.
  - 2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

### **3.3 INSTALLATION, GENERAL**

- A. General Locations and Arrangements: Drawings (plans and details) indicate the general location and arrangement of underground sewerage and drainage systems piping. Location and arrangement of piping layout take into account many design considerations. Install piping as indicated, to extent practical.
- B. Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's recommendations for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.
- C. Use manholes for changes in direction, except where fittings are indicated. Use fittings for branch connections, except where direct tap into existing sewer is indicated.
- D. Use proper size increasers, reducers, and couplings, where different sizes or materials of pipes and fittings are connected. Reduction of the size of piping in the direction of flow is prohibited.
- E. Install gravity-flow-systems piping at constant slope between points and elevations indicated. Install straight piping runs at constant slope, not less than that specified, where slope is not indicated.
- F. Extend drainage piping and connect to building's storm drains, of sizes and in locations indicated. Terminate piping as indicated.
- G. Install drainage piping pitched down in direction of flow, at minimum slope of 1 percent (1:100) and 36-inch minimum cover, except where otherwise indicated.
- H. Pipe penetrations through permanent steel sheeting shall be sealed watertight by the contractor.

### **3.4 PIPES, FITTINGS, AND VALVE CONSTRUCTION AND INSTALLATION**

- A. General: Join and install pipes, fittings, pipe valves, and check valves according to manufacturer's instructions and recommendations.

### **3.5 BACKFLOW PREVENTER CHECK VALVE**

- A. Valve shall be installed in accordance with manufacturer's written Installation and Operation Manual and approved submittals.
- B. General: Install manholes, complete with accessories, as indicated.
- C. Form continuous concrete channels and benches between inlets and outlet, where indicated.
- D. Set tops of frames and covers flush with finished surface where manholes occur in pavements. Set tops 3 inches above finished surface elsewhere, except where otherwise indicated.
- E. Place precast concrete manhole sections as indicated and install according to ASTM C 891.
  - 1. Provide preformed flexible joint sealants complying with ASTM C 990, at joints of Sections.
  - 2. Apply bituminous mastic coating at joints of Sections.

### **3.6 INSTALLATION OF AREA DRAIN GRATE AND FRAME**

- A. Install frame in accordance with the manufacture's recommendations, as shown in the detail and the approved shop drawing.
- B. Install frame so that the grate will be flush with the surrounding pavement.

### **3.7 CONCRETE PLACEMENT**

- A. Place cast-in-place concrete according to ACI 318, ACI 350R, and as indicated.

### **3.8 FIELD QUALITY CONTROL**

- A. Clear interior of piping and structures of dirt and superfluous material as the Work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.
  - 1. In large, accessible piping, brushes and brooms may be used for cleaning.
  - 2. Place plug in end of incomplete piping at end of day and whenever Work stops.
  - 3. Flush piping between manholes and other structures, if required by authorities having jurisdiction, to remove collected debris.
- B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of the Project.
  - 1. Submit separate reports for each system inspection.
  - 2. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visual between structures.
    - b. Deflection: Flexible piping with deflection that prevents passage of a ball or cylinder of a size not less than 92.5 percent of piping diameter.
    - c. Crushed, broken, cracked, or otherwise damaged piping.
    - d. Infiltration: Water leakage into piping.

- e. Exfiltration: Water leakage from or around piping.
- C. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
- D. Reinspect and repeat procedure until results are satisfactory.
- E. Test new piping systems and parts of existing systems that have been altered, extended, or repaired for leaks and defects.
  - 1. Do not enclose, cover, or put into service before inspection and approval.
  - 2. Test completed storm drainage piping systems according to the Providence Department of Public Works (DPW) and the Narraganset Bay Commission requirements.
  - 3. Schedule tests, and their inspections by authorities having jurisdiction, with at least 24 hours' advance notice.
  - 4. Submit separate reports for each test.
  - 5. Perform tests as follows:
    - a. Perform air test of storm drain piping according to the City of Providence Department of Public Works (DPW) and the Narraganset Bay Commission requirements.
    - b. Manholes: Perform hydraulic test according to ASTM C 969.
    - c. Leaks and loss in test pressure constitute defects that must be repaired.
    - d. Replace leaking piping using new materials and repeat testing until leakage is within allowances specified.

### **3.9 INSTALLATION OF BACKFLOW CHECK VALVE**

- A. Install the backflow check valve as indicated on the plans and in accordance with manufacturer's written instructions.

### **3.10 CONSTRUCTION WASTE MANAGEMENT**

- A. Comply with the requirements of Section, Construction Waste Management, for removal and disposal of construction debris and waste.

### **END OF SECTION**

## **SECTION 33 49 15 - DRAINS, GRATES, AND FRAMES**

### **PART 1 - GENERAL**

#### **1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide all equipment and materials, and do all work necessary to furnish and install the drains, grates, and frames as indicated on the Drawings and as specified.

#### **1.3 RELATED WORK**

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 1. Section 033001, CAST-IN-PLACE CONCRETE - SITEWORK; Concrete.
  - 2. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Establishment of subgrade elevation.

#### **1.4 REFERENCES**

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

- 1. American Society for Testing and Materials (ASTM):
  - B 26 Aluminum-Alloy Sand Castings

#### **1.5 SUBMITTALS**

- A. Shop drawings shall be submitted for specified products indicating construction of frame for trench drain grate and methods of installation and connection to grate.
- B. Submit manufacturer's product data for specified products.

## **PART 2 PRODUCTS**

### **2.1 TRENCH GRATE**

- A. Decorative trench grate shall be Rainbow, 6 in. x 18 in. ASTM B26 cast aluminum Trench Grate, manufactured by Urban Accessories, 465 E. 15<sup>th</sup> Street, Tacoma, WA 98421; Tel. 1-877-487-0488, or approved equal.
1. Finish: Raw.
  2. Grate shall be  $\frac{3}{4}$  in, thick at edge.
  3. No openings greater than  $\frac{3}{8}$  in. in conformance with ADA Accessibility Guidelines.
  4. By default, the last grate in a trench drain will be sheared to meet a drain length specified at the time of order. Alternately, the trench drain length may be adjusted to the nearest whole grate (tolerances in the grate size WILL compound across the overall run).
  5. 25.3 sq. in. open area per grate.
  6. Grate weighs 16.5 lbs.

## **PART 3 EXECUTION**

### **3.1 TRENCH GRATE**

- A. Trench grate shall be installed at required elevation, in accordance with manufacturer's recommendations and approved submittals, and as indicated on the Drawings.

**END OF SECTION**

**GEOTECHNICAL ENGINEERING REPORT  
FOR THE PROPOSED  
ROGER WILLIAMS PARK GATEWAY CENTER  
PROVIDENCE, RHODE ISLAND**

**Prepared for:**

Providence Redevelopment Agency  
444 Westminster Street  
Providence, RI 02903

**Prepared by:**

Paul B. Aldinger & Associates, Inc.  
860A Waterman Avenue Suite 9  
East Providence, Rhode Island 02914

PBA No. 20024  
July 2020

**PAUL B. ALDINGER & ASSOCIATES, INC.**  
**Consulting in Geotechnical Engineering & Groundwater Hydrology**  
**860A Waterman Avenue Suite 9 East Providence, Rhode Island 02914 (401) 435-5570**

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July 27, 2020

Ms. Bonnie Nickerson  
Executive Director  
Providence Redevelopment Agency  
444 Westminster Street  
Providence, RI 02903

Re: Geotechnical Engineering Report  
Roger Williams Park Gateway Center  
1197 Broad Street  
Providence, RI 02905  
PBA No. 20024

Dear Ms. Nickerson:

Paul B. Aldinger & Associates, Inc. (PBA) is pleased to provide Providence Redevelopment Agency (PRA) with this geotechnical engineering report for the above referenced project. This report is subject to the limitations that are outlined in Appendix A.

### **1.00 INTRODUCTION/PROJECT DESCRIPTION**

The project development site is located at 1197 Broad Street in Providence, Rhode Island which is located north of the Hawthorne Avenue entrance to Roger Williams Park. The approximate site location is provided on Figure 1, Site Vicinity Plan. The project consists of the construction of a new single-story Visitor Center building with a proposed footprint of approximately 1,200 square feet. It is understood that the proposed building is to be at-grade type construction, i.e. no below grade levels or slab contained pit structures are currently planned. The proposed project development also consists of a full length canopy supported at the proposed building and one independent column, a 20 foot deep excavation to construct a geothermal feature, a plaza area with pervious and impervious ground surface treatments, and a sculpted land children's "play area," consisting of dunes elevated up to five (5) feet in height above ambient grade and, similarly, troughs depressed on the order of three (3) feet in depth.

The project site is approximately 0.834 acres in extent and is generally flat. The current project site is mostly paved and consists of two (2) one-story, concrete block buildings, including an abandoned restaurant (to be demolished) on the east portion of the site and a three-car garage (to remain in place) on the west side of the site. The project site is immediately bordered by Broad

Street to the approximate east, a one-story concrete block commercial building to the approximate north, and Roger Williams Park to the approximate west and south. Vehicle entrance and egress points exist on the approximate east side of the project site to Broad Street.

We have reviewed an undated, untitled survey base plan provided to us, that indicates the existing conditions of the project site, including the two block structures located on the site, ground surface elevation points, trees, a transformer, and other site features. We have also reviewed a plan titled "Architectural Site Plan," dated April 20, 2020, and developed by INFORM Studio, which indicates the proposed Roger Williams Park Gateway Center building footprint and canopy locations. We have also reviewed the INFORM Studio architectural package for the project which includes a Site Demolition Plan, Landscape Site Plan, and Grading Plan for the site.

The objectives of our engineering services were to develop, coordinate, guide, and monitor a subsurface exploration program (borings, geoprobes, and test pits), environmental and geotechnical laboratory soil testing programs, perform engineering analyses, and develop a Geotechnical Engineering Report with building foundation design and earthwork recommendations for the proposed new construction and related site development, results of environmental laboratory testing, and soil evaluation data.

## **2.00 GEOLOGY**

### **2.10 Surficial Geology**

The 1956 US Geological Survey, *Geologic Map of the Providence Quadrangle, Rhode Island, Surficial Geology*, compiled by J. Hiram Smith, indicates that the surficial geology underlying the project site is Outwash Plains. The Outwash Plains reportedly consist of sorted sands and local deposits of coarse gravel.

### **2.20 Bedrock Geology**

The 1994 US Geological Survey, *Bedrock Geologic Map of Rhode Island*, compiled by O.D. Hermes, L.P. Gromet, and D.P. Murray, indicates that the bedrock underlying the project site consists of Rhode Island Formation, consisting of gray to black, fine- to coarse-grained quartz arenite, litharenite, shale, and conglomerate, with minor beds of anthracite and meta-anthracite.

## **3.00 SUBSURFACE INVESTIGATION PROGRAM**

The project's subsurface exploration program consisted of four (4) test borings (B-1 through B-4) and four (4) geoprobes (P-1 through P-4) drilled by SAGE EnviroTech Drilling Services (SAGE)

of Pawtucket, Rhode Island and two (2) test pits (TH-1 and TH-2), excavated by RP Saxon, Inc. of Rehoboth, Massachusetts. The test borings and test pits were completed on July 8, 2020 and the geoprobes were completed on July 13, 2020. The exploration locations were located by taping from existing site features indicated on the provided plans, and are included on Figure 2, Subsurface Exploration Plan. The test borings and geoprobes were monitored and logged by a geotechnical engineer from PBA. The test pits were monitored and logged by a registered Soil Evaluator provided by Applied Bio-Systems, Inc. of West Kingston, Rhode Island. The test boring and geoprobe logs are included in Appendix B, Test Boring and Geoprobe Logs.

The test borings were advanced by the dual tube method to depths between 27 and 52 feet below the ground surface. The dual tube method utilizes an outer drive casing to maintain a cased bore hole and an inner string of rods that obtain a continuous soil core. Both casings were advanced via the direct push method to desired split spoon sample depths. Standard split spoon soil samples were obtained at typically standard intervals of 5 feet, or where stratum change was observed. Soil sampling was performed using a 1 $\frac{3}{8}$ -inch inside diameter split spoon sampler in substantial conformance with ASTM D1586, the Standard Penetration Test (SPT). The standard ASTM method of driving the sampler was employed using a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler for each 6 inches of penetration was recorded. The number of blows required to drive the sampler from 6 to 18 inches of penetration is the SPT blow count (N-value), a commonly-used indicator of soil density.

The geoprobes were advanced by the dual tube method to depths of 30 feet below the ground surface and were generally conducted in the vicinity of the proposed Storm Water Basin Area. For each of the four (4) geoprobes, field screening of continuous 5 foot soil sample cores were conducted on all dry soil samples using a Photoionization Detector (PID).

The test pits were excavated utilizing a backhoe to depths of approximately 9 feet below the ground surface. Test pits were completed within the proposed Storm Water Basin Area on the north side of the site. Test pits were excavated to depths determined by the Soil Evaluator, Ms Deborah Bosworth. The test pit logs and Soil Evaluation report are included in Appendix C, Soil Evaluation.

#### **4.00 SUBSURFACE CONDITIONS**

Generalized soil conditions encountered in the test borings include the following strata from the ground surface downward. Actual conditions between the subsurface explorations will likely vary and may only be revealed during more extensive project construction excavation. For more detailed information, refer to the project exploration logs contained in Appendix B, Test Boring and Geoprobe Logs.

#### 4.10 Soil Conditions

**Asphalt** - Approximately between 3 to 5 inches of asphalt pavement was encountered at the ground surface in all test borings. The surface covering was underlain by;

**Non-Engineered Granular Fill** - Non-engineered Granular Fill, described as loose to medium dense, brown FINE TO MEDIUM SAND, with 'trace' Silt, 'trace' Gravel, trace brick/asphalt was encountered underlying the asphalt pavement. This stratum was encountered to depths of approximately between 4 to 5 feet below the existing ground surface in all test borings. The average SPT blow count (uncorrected) of this stratum is  $N_{avg} = 13$ . This stratum was underlain by:

**Outwash Plains** - Very loose to medium dense Outwash Plains, described as brown FINE SAND with 'trace' to 'some' Silt was encountered underlying the granular fill in all test borings. In test boring B-4, a very loose layer of SILT with 'trace' to 'some' fine sand was encountered at a depth of 41.5 feet below the ground surface and extended to a depth of 52 feet, where the boring was terminated. The average SPT blow count (uncorrected) of this stratum is  $N_{avg} = 6$ . All test borings were terminated within the Outwash Plains stratum at depths of approximately between 27 to 52 feet below the grounds surface.

#### 4.20 Groundwater Conditions

A groundwater level reading was obtained on July 8, 2020 by SAGE from an existing groundwater monitoring well, GRA-1. The approximate location of groundwater monitoring well GRA-1 is indicated on Figure 2, Subsurface Exploration Plan. Groundwater was observed at a depth of approximately 31 feet below the existing ground surface within this well. It should be noted that fluctuations in the levels of the groundwater will likely occur due to variations in rainfall, temperature, season, and other factors occurring since the time measurements were made.

#### 5.00 GEOTECHNICAL LABORATORY TESTING DATA

Four (4) grain size analyses were conducted in accordance with ASTM D-422 on representative soil samples collected from the test borings to precisely classify the site soils and to assess their suitability for reuse. The detailed results of the grain size analyses are included in Appendix D, Geotechnical Laboratory Testing. A brief description of the grain size results are included in the table on the following page.

Boring & Sample Number	Sample Depth	Soil Stratum	Percent Finer than No. 200 sieve	Soil Description with USCS Classification
B-3 S-1	0.5'-2.5'	Granular Fill	11.8	FINE TO MEDIUM SAND, little Silt, trace Gravel, trace coarse Sand (SP-SM)
B-4 S-3	10'-12'	Outwash Plains	27.6	FINE SAND, some Silt, trace medium Sand (SM)
B-4 S-10	45'-47'	Outwash Plains	89.0	SILT, little fine to medium Sand (ML)
TH-1 S-1	6'	Outwash Plains	2.7	FINE TO COARSE SAND, trace Gravel, trace Silt (SW)

**6.00 ENVIRONMENTAL SOIL SAMPLING AND TESTING**

All environmental soil sampling and testing was performed as directed by Gordon R. Archibald, Inc. (GRA) of Pawtucket, Rhode Island. Head space screening of dry soil samples obtained from test borings were performed with a handheld Tiger LT Photo Ionization Detector (PID). Head space screening of dry soil samples obtained from geoprobes were performed with a handheld ppBRAE 3000 Photo Ionization Detector (PID). The soil samples were placed in a clean glass jar, immediately covered with aluminum foil and covered with the screw cap. The jar was vigorously shaken for 15 seconds. Following a minimum of 10 minutes, the jar was shaken vigorously again for 15 seconds. The screw cap was removed and the aluminum foil was punctured with the PID to obtain a soil head space reading. The PID readings are included on test boring and geoprobe logs.

Soil samples for environmental laboratory testing were obtained from geoprobes P-1 through P-4. Following field screening with the PID, the sample with the highest PID reading from each geoprobe location was selected for environmental testing. The soil samples were filled as instructed by GRA. After filling the containers, the samples were placed in a cooler with ice and transported to New England Testing Laboratory, Inc. of West Warwick, Rhode Island. At the request of GRA, the following analyses were performed on the soil samples: TPH-EPA 8100M and VOCs-EPA 8260. The results of the laboratory soil testing are presented in Appendix E, Environmental Analytical Results of Soil Testing.

**7.00 GEOTECHNICAL EVALUATION & RECOMMENDATIONS**

The project consists of the construction of a new 1,200 square foot, single-story Visitor Center

building, a full length canopy, a 20 foot deep excavation to construct a geothermal feature, a plaza area with pervious and impervious ground surface treatments, and a sculpted land children's "play area."

The subsurface conditions encountered during the test boring program generally consisted of non-engineered granular fill to depths of approximately 4 to 5 feet below the ground surface. Underlying the granular fill, a layer of naturally deposited, very loose to medium dense outwash plains was encountered to the bottom of all test borings and generally consisted of a fine sand, with trace to some silt. Groundwater was observed in an existing ground water monitoring well (GRA-1) at a depth of approximately 31 feet below the existing ground surface.

Based on the results of our geotechnical investigation and evaluation, the following design recommendations have been developed.

#### **7.10 Building Foundation Design**

It is recommended that the building be supported on shallow footing and slab-on-grade foundations supported by compacted structural fill placed over the naturally deposited glacial outwash bearing stratum. All topsoil, subsoil, asphalt, non-engineered fill, and any other unsuitable soils encountered should be removed from beneath the footprint of the proposed Roger Williams Park Visitors Center and Canopy column. We recommend that all footings and slabs-on-grade be supported on a minimum 12-inches of compacted structural fill. All building exterior footing inverts should be located a minimum of 3 feet 4 inches (3'4") below adjacent finished grade for protection from frost, as specified by the State Building Code, the 2012 International Building Code. Interior building (heated space) footings should be constructed with inverts a minimum of 2 feet below the bottom of the slab-on-grade to develop sufficient bearing capacity. Minimum footing dimensions regardless of loads or embedment depths should not be less than 24 inches for either continuous wall footings or individual column footings.

Based on computed ultimate bearing capacities with appropriate factors of safety, the allowable soil bearing pressures for building exterior footings at 3 feet 4 inches (3'4") of embedment should not exceed 2 kips per square foot. This bearing capacity assumes complete removal of any topsoil, subsoil, asphalt, non-engineered fill, and any other unsuitable material from beneath all footings, and footing support on a minimum of 12-inches of compacted structural fill. The allowable soil bearing pressure for building interior (heated space) footings founded a minimum of two (2) feet below bottom of slab-on-grade should not exceed 1.5 kips per square foot. Estimated total settlement of the footings is anticipated to be less than one (1) inch, and it is expected that this settlement will occur rapidly, as the building is constructed. Long term footing consolidation settlement is not anticipated.

### 7.20 Site Preparation

Based on the test boring explorations, non-engineered fill was encountered to depths of up to 4 to 5 feet below existing grade. It should be noted that the estimate of non-engineered fill thickness is based on widely spaced explorations and sampling intervals, and that the actual extent of existing fill will vary between the subsurface explorations.

Special care should be taken when preparing the subgrade for footings and slabs-on-grade to ensure that all unsuitable material is excavated and replaced with compacted structural fill. Boulders observed within the limits of the excavation should be removed and the resulting voids filled with compacted structural fill. The exposed surface of subgrade soils are recommended to be proof-compacted with suitable (approved) vibratory compaction equipment. Any observed areas of subgrade yielding resulting in depressions during the proof-compaction should be over-excavated and replaced with compacted structural fill. Compacted structural fill should be placed as soon as possible after structural excavation and subgrade proof-compaction. This work should not be performed during a precipitation event or when the excavation cannot be backfilled during the same day as the excavation.

### 7.30 Backfill, & Compaction Requirements

We recommend that a minimum of 12-inches of compacted structural fill be placed below footings and slabs-on-grade to provide an adequate bearing surface. A geotechnical engineer familiar with the site subsurface conditions should observe the final footing and slab-on-grade bearing surfaces (subgrade), the subgrade proof-compactions, and structural backfill placement and compaction.

Compacted structural fill should be processed or bank-run gravel conforming to the gradation requirements presented in the table below.

U.S. Standard Sieve Size	Structural Fill Percent Passing, by Weight
2-inch	100
½-inch	50-85
3/8 -inch	45-80
No. 4	40-75
No. 40	0-45
No. 200	0-8

Compaction of all structural fill within building areas should be to a minimum of 95 percent of the maximum dry density as determined by ASTM D-1557, the Modified Proctor test. Under paved

areas, fill and backfill should be compacted to a minimum of 90 percent of the maximum material dry density, except the top two (2) feet supporting pavement base course, which should be compacted to a minimum of 95 percent. For other areas not supporting buildings, structures, or pavements (landscaped areas) compaction should be to a minimum of 85 percent of Modified Proctor maximum dry density. Lift thickness should be appropriate for the compaction equipment being utilized. Specifications should require that the Contractor adjust lift thickness to meet required compaction criteria. In no case should lift thickness exceed 12 inches.

#### **7.40 Reuse of on-site Soils**

Based on the results of the grain size analyses and visual inspection of the boring program's soil samples, the existing granular fill does not meet our specified gradation requirements for structural fill due to excessive fines content, with more than 11 percent passing the #200 sieve, and is not recommended for reuse as such.

We typically recommend that the percentage of fines contained in soils to be considered for reuse as structural fill be limited to 8 percent or less. The reason for this recommendation is that the control of the water content and compaction become increasingly difficult when the fines content of the soil exceeds 8 percent. During cooler or cold wet weather, soils with elevated percentages of fines tend to remain saturated or near saturated for long periods of time, and adequate compaction when saturated is not possible.

Any soil considered for reuse as structural fill should first be tested to ensure that it meets the recommended gradation requirements. On-site granular soils and the natural glacial outwash which do not meet structural fill requirements, could be considered for reuse in areas not intended for the support of buildings, pavements, or other structures, such as landscaped areas.

#### **7.50 Liquefaction Potential and Seismic Design Requirements**

We have considered seismic design requirements in accordance with the requirements of the State Building Code. Based on the subsurface data collected, it is our opinion that the site soils are not susceptible to earthquake liquefaction. Based on our interpretation of the State Building Code, we recommend that a Site Class of "E" be utilized for the seismic design of the Roger Williams Park Gateway Center.

#### **7.60 Dewatering & Control of Surface Runoff**

All earthwork operations should be conducted in the dry. Groundwater was measured at a depth of approximately 31 feet below the existing ground surface in an existing ground water monitoring well (GRA-1). Site excavation is anticipated to extend up to 5 feet below the ground surface for

removal of the existing granular fill and to ensure that all building exterior footing inverts be located a minimum of 3 feet 4 inches (3'4") below adjacent finished grade for protection from frost. The need for dewatering is not anticipated to be required. If dewatering becomes necessary, we anticipate the use of sump pits and pumps in combination with ditching should provide adequate dewatering means.

Specifications should require that the Contractor provide for proper diversion of surface water runoff away from any excavations so that structures, embankments, and compacted fill are not damaged. During periods of heavy rainfall, diversion of trapped surface water may also be a significant problem.

### **7.70 Temporary Slopes and Excavation Support**

All temporary excavation slopes are recommended to be constructed no steeper than 1.5 horizontal to 1 vertical (1.5H:1V), and in accordance with the requirements of the latest OSHA safety standards. If excavation slopes need to be steeper, temporary excavation support will be required. For slope exposure beyond a temporary condition, protective fabric placed on the slope or other approved slope protection means will be required to prevent soil erosion. Surface water should be diverted away from all slopes and excavations.

The finish floor elevation of the Visitor's Center was not provided to us, however, we understand the proposed building is to be at-grade type construction. Based on our understanding of the project site and the limits of excavation required for the proposed new building, we anticipate that there is sufficient space on the property for excavation slopes to meet or be flatter than the 1.5H:1V recommendation.

### **7.80 Preconstruction Survey and Vibration Monitoring**

Vibration caused by the compaction of building and pavement area subgrade and placed fills could impact nearby structures. We recommend that PBA be hired to conduct a pre-construction survey of adjacent existing structures within 200 feet of project earthwork construction. There appears to be five (5) commercial structures currently located within 200 feet of the proposed project site. The purpose of the survey is to document existing conditions in the event that structure damage is alleged to have occurred due to construction activities. The survey should consist of relevant photographs, video recording, sketches and text to document existing conditions.

The Contractor should be required by specification to conduct their operations without causing damage to adjacent and nearby structures. In addition, the Contractor should limit construction activity vibration levels to acceptable peak particle velocity values of 0.5 inches per second for single impact type event vibration, and 0.2 to 0.3 inch per second for a continuous vibration event,

such as soil compaction. A lower criteria may be required based upon site specific structures and/or sensitive equipment. During construction, we recommend that PBA be hired to monitor construction vibrations at or near adjacent and nearby structures during specific construction vibration producing activities, specifically during soil compaction. The specifications should require construction activity suspension and/or modification if vibration levels exceed defined threshold values.

## **8.00 FINAL DESIGN & CONSTRUCTION MONITORING**

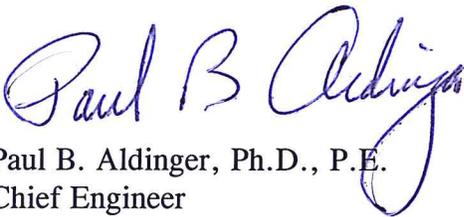
It is recommended that PBA be provided the opportunity to review foundation design plans and prepare or review project earthwork specifications to ensure that our recommendations have been properly interpreted. Accordingly, we recommend that PBA be given the opportunity to provide a geotechnical engineer or a qualified (by training and experience) engineering technician during selective construction to perform the following:

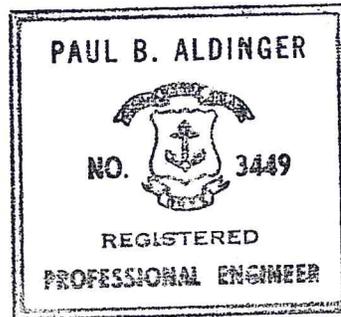
- Review Contractor submittals for backfill material.
- Monitor the excavation and segregation of the existing fill to assess its character, completeness of the removal of the fill and other unsuitable soils or materials, and to assess the adequacy of the exposed bearing subgrade stratum.
- Monitor the subgrade proof-compaction.
- Monitor the placement and compaction of fill materials beneath footings and slabs-on-grade.
- Conduct a preconstruction survey of structures within 200 feet of construction activities, which cause significant vibrations in order to document their existing conditions prior to construction.
- Monitoring of construction vibrations with a seismograph during soil compaction.

We appreciate the opportunity to have been of service to Providence Redevelopment Agency and we trust that the information contained in this report is adequate for your needs at this time. Please contact the undersigned if there are questions on these recommendations or if you need additional information.

Very truly yours,

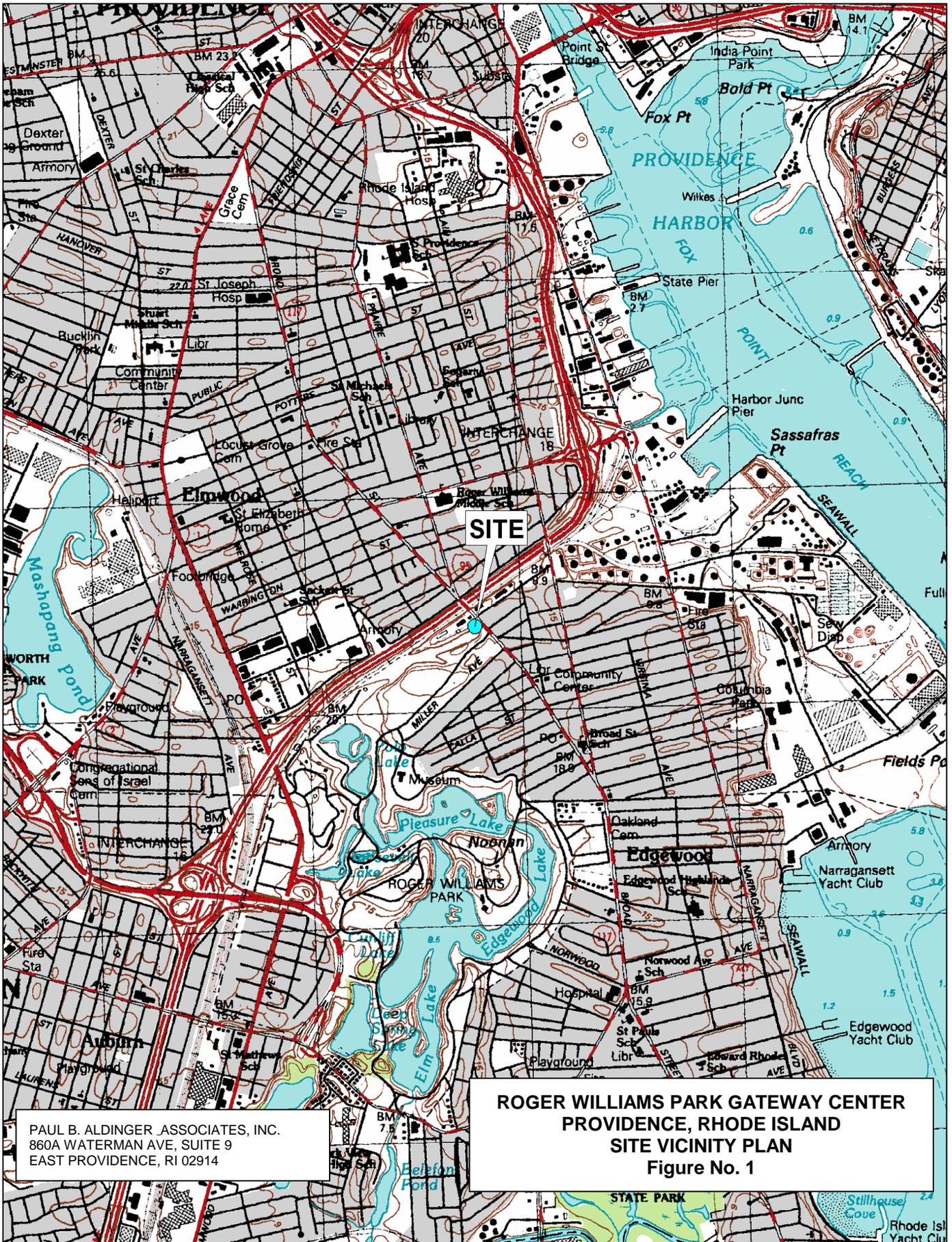
**PAUL B. ALDINGER & ASSOCIATES, INC.**

  
Paul B. Aldinger, Ph.D., P.E.  
Chief Engineer



cc: Mr. Pandush Gaqi, INFORM Studio

## **FIGURES**



**SITE**

PAUL B. ALDINGER ASSOCIATES, INC.  
 860A WATERMAN AVE, SUITE 9  
 EAST PROVIDENCE, RI 02914

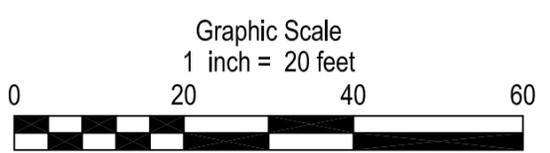
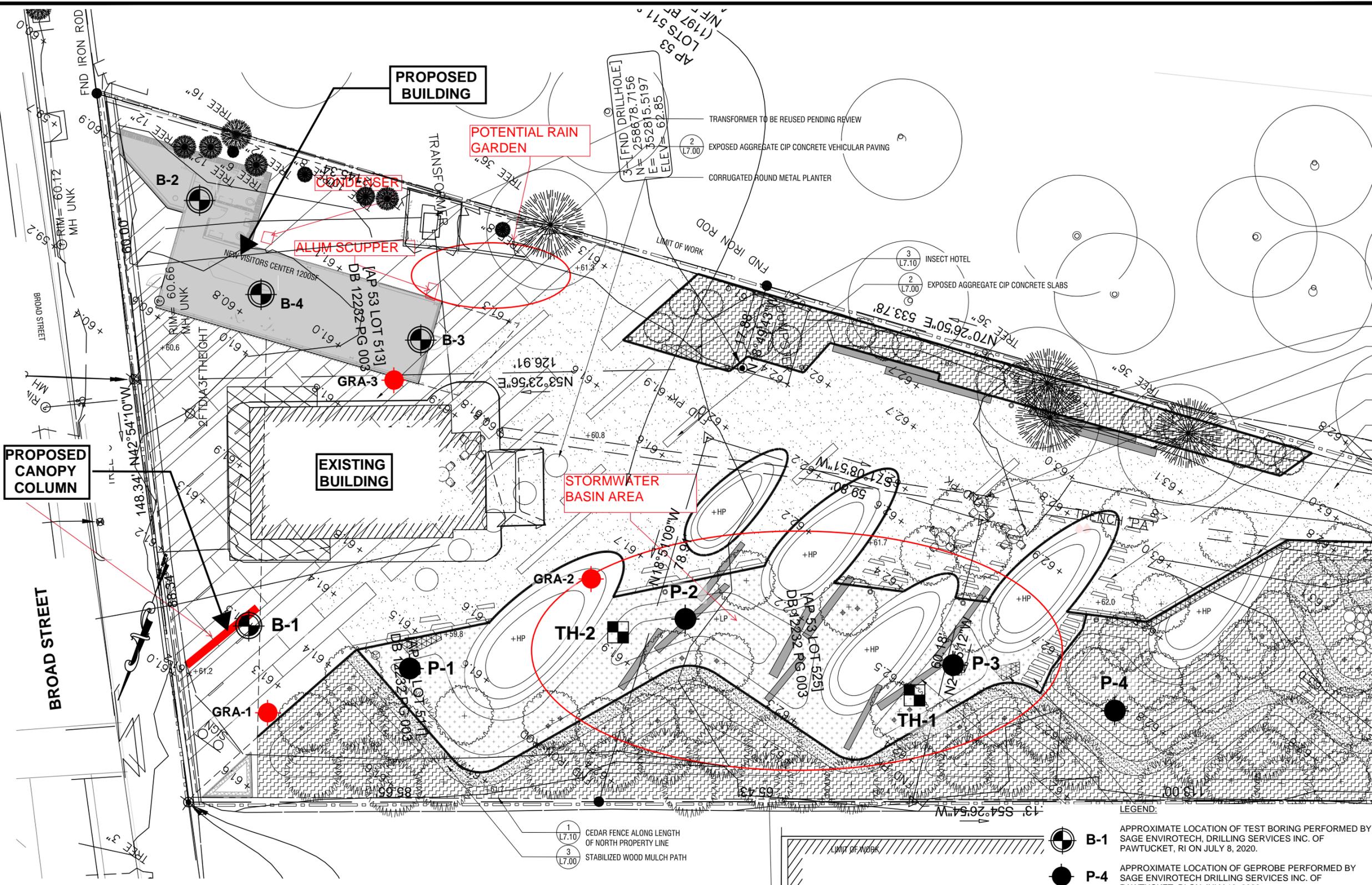
**ROGER WILLIAMS PARK GATEWAY CENTER  
 PROVIDENCE, RHODE ISLAND  
 SITE VICINITY PLAN  
 Figure No. 1**



© 2001 DeLorme. XMap®. Data copyright of content owner.  
 Zoom Level: 13-1 Datum: WGS84

Scale 1 : 24,000  
 1" = 2,000 ft





**NOTE:**  
DEVELOPED FROM A PLAN TITLED "MATERIAL PLAN - ROGER WILLIAMS PARK GATEWAY CENTER" DATED JUNE 10, 2020 DEVELOPED BY INFORM STUDIO AND AN UNDATED AND UNTITLED SURVEY BASE PLAN RECEIVED ELECTRONICALLY ON JUNE 8, 2020.

- LEGEND:**
- B-1** APPROXIMATE LOCATION OF TEST BORING PERFORMED BY SAGE ENVIROTECH, DRILLING SERVICES INC. OF PAWTUCKET, RI ON JULY 8, 2020.
  - P-4** APPROXIMATE LOCATION OF GEPROBE PERFORMED BY SAGE ENVIROTECH DRILLING SERVICES INC. OF PAWTUCKET, RI ON JULY 13, 2020
  - TH-1** APPROXIMATE LOCATION OF TEST PIT COMPLETED BY R.P. SAXON, INC. OF REHOBOTH, MA ON JULY 8, 2020.
  - GRA-1** APPROXIMATE LOCATION OF GROUND WATER MONITORING WELLS INSTALLED ON SEPTEMBER 26 AND 29, 2019. WELL LOCATIONS WERE INDICATED ON A PLAN TITLED "SUBSURFACE INVESTIGATION PLAN," DATED OCTOBER 2019, AND DEVELOPED BY GORDON R. ARCHIBALD, INC. OF PAWTUCKET, RI.

**Paul B. Aldinger & Associates, Inc.**  
Geotechnical Engineering and Hydrogeology  
860A Waterman Avenue, Suite 9  
East Providence, RI 02914  
Phone: (401) 435-5570 Fax: (401) 435-5569

**ROGER WILLIAMS PARK GATEWAY CENTER**  
1197 Broad Street  
Providence, Rhode Island

**SUBSURFACE EXPLORATION PLAN**  
PBA JOB NO.: 20024  
DRAWN BY: BDD  
DATE: JULY 2020  
DESIGNED BY:  
CHECKED BY: PBA

**Figure No: 2**

**APPENDIX A**  
**LIMITATIONS**

## **APPENDIX A**

### **LIMITATIONS**

#### **A. Explorations**

1. The analyses and recommendations submitted in this report are based in part upon the data obtained from subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.
2. The generalized soil profiles described in the text and shown on the figures are intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more erratic. For specific information, refer to the boring logs.
3. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. These data have been reviewed and interpretations have been made in the text of this report; however, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, tide and other factors occurring since the time measurements were made.

#### **B. Review**

1. In the event that any changes in the nature, design, or location of the proposed structures are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report are modified or verified in writing by Paul B. Aldinger & Associates, Inc. It is recommended that this firm be provided the opportunity for a general review of final design and specifications, in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications.

#### **C. Construction**

1. It is recommended that this firm be retained to provide soil engineering services during construction of the excavation and foundation phases of the work. This is to observe compliance with the design concepts, specifications, or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

**D. Use of Report**

1. This report has been prepared for the exclusive use of the **Providence Redevelopment Agency** for specific application to the proposed **Roger Williams Park Gateway Center** located at **1197 Broad Street in Providence, Rhode Island** in accordance with generally accepted soil and foundation engineering practices. No warranty, express or implied, is made.

2. This report may contain comparative cost estimates for the purpose of evaluating alternative construction schemes. These estimates may also involve approximate quantity evaluations. It should be noted that quantity estimates may not be accurate enough for construction bids. Since Paul B. Aldinger & Associates, Inc. has no control over labor and materials cost and design, the estimates of construction costs have been made on the basis of experience. We cannot guarantee the accuracy of cost estimates as compared to contractors' bids for construction costs.

**APPENDIX B**

**TEST BORING AND GEOPROBE LOGS**

BORING CONTRACTOR:  
**SAGE Envirotech Drilling Services**  
 Pawtucket, RI  
 LOG PREPARED BY:  
 PBA TGL

**PAUL B. ALDINGER & ASSOCIATES, INC.**  
 860A WATERMAN AVENUE, SUITE 9 EAST PROVIDENCE, RI  
**BORING LOG**  
 PROJECT NAME: Roger Williams Park Gateway Center  
 TOWN, STATE: Providence, RI  
 PBA NO.: 20024 OFFICE: Prov. Redevelopment

SHEET 1 OF 1  
 LOCATION:  
 HOLE NO.: B-1  
 BORING TYPE: Dual Tube  
 LINE & STA.:  
 OFFSET:

GROUND WATER OBSERVATIONS  
 AT None FT AFTER 0 HRS  
 AT \_\_\_\_\_ FT AFTER \_\_\_\_\_ HRS

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	---	3.25"	S/S	---
SIZE, I.D.	---	---	1 3/8"	---
HAMMER WT.	---	---	140#	BIT
HAMMER FALL	---	---	30"	---

SURFACE ELEV.:  
 DATE STARTED 07/08/20  
 DATE FINISHED: 07/08/20  
 FOREMAN: Steve Perry  
 INSPECTOR: T. Leidner

LOCATION OF BORING:

DEPTH BELOW SURFACE	CASING BLOWS/FOOT	SAMPLE DEPTH FROM - TO	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER FROM-TO				STRATA CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL & ROCK INCL. COLOR, LOSS OF WASH WATER, JOINTS IN ROCK, ETC.	SAMPLE NO. PEN. REC.		
				0-6	6-12	12-18	18-24					
		0.5'-2.5'	D	4	7	6	4	3"	Asphalt			
		PID=88.3 ppm										
5								2.5'	Dry, medium dense, brown FINE TO MEDIUM SAND, trace coarse Sand, trace Silt, trace Gravel (Fill)	1	24	17
									Bottom of Exploration = 2.5 feet			
									Test Boring B-1 was terminated due to potential utility			
10									Test Boring was offset approximately 4.5 feet and redrilled as test boring B-1A			
15												
20												
25												
30												
35												
40												

GROUND SURFACE TO \_\_\_\_\_ FT., USED \_\_\_\_\_ " CASING:  
 THEN split spoon sample  
 TYPE OF SAMPLE: D=DRY W=WASHED C=CORED  
 TP=TEST PIT A=AUGER V=VANE TEST  
 UP=UNDISTURBED, PISTON  
 US=UNDISTURBED, SHELBY

PROPORTIONS USED:  
 TRACE=0-10%  
 LITTLE=10-20%  
 SOME=20-35%  
 AND=35-50%

COHESIONLESS DENSITY:  
 0-4 VERY LOOSE  
 5-9 LOOSE  
 10-29 MED. DENSE  
 30-49 DENSE  
 50 + VERY DENSE

FOOTAGE IN EARTH: 2.5  
 FOOTAGE IN ROCK: -  
 WELL FOOTAGE: -  
 NO. OF SAMPLES: 1  
 HOLE NO.: B-1  
 TYPE: Cased

BORING CONTRACTOR:  
**SAGE Envirotech Drilling Services**  
 Pawtucket, RI  
 LOG PREPARED BY:  
 PBA TGL

**PAUL B. ALDINGER & ASSOCIATES, INC.**  
 860A WATERMAN AVENUE, SUITE 9 EAST PROVIDENCE, RI  
**BORING LOG**  
 PROJECT NAME: Roger Williams Park Gateway Center  
 TOWN, STATE Providence, RI  
 PBA NO.: 20024 OFFICE: Prov. Redevelopment

SHEET 1 OF 1  
 LOCATION:  
 HOLE NO.: B-1A  
 BORING TYPE: Dual Tube  
 LINE & STA.:  
 OFFSET:

GROUND WATER OBSERVATIONS  
 AT None FT AFTER 0 HRS  
 AT \_\_\_\_\_ FT AFTER \_\_\_\_\_ HRS

AUGER CASING SAMPLER CORE BAR.  
 TYPE --- 3.25" S/S ---  
 SIZE, I.D. --- 1 3/8" ---  
 HAMMER WT. --- 140# BIT  
 HAMMER FALL --- 30"

SURFACE ELEV.:  
 DATE STARTED 07/08/20  
 DATE FINISHED: 07/08/20  
 FOREMAN: Steve Perry  
 INSPECTOR: T. Leidner

LOCATION OF BORING: Vicinity of Proposed Canopy Column Location

DEPTH BELOW SURFACE	CASING BLOWS/FOOT	SAMPLE DEPTH FROM - TO	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER FROM-TO				STRATA CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL & ROCK INCL. COLOR, LOSS OF WASH WATER, JOINTS IN ROCK, ETC.	SAMPLE NO. PEN. REC.		
				0-6	6-12	12-18	18-24					
									See Test Boring B-1			
5		5'-7' PID=180.3 ppm	D	5	6	7	8	4'	Dry, medium dense, brown FINE TO COARSE SAND, trace Silt, trace Gravel	2	24	18
10		10'-12' PID = 202.8 ppm	D	6	6	5	5		Dry, medium dense, brown FINE TO MEDIUM SAND, trace Silt	3	24	19
15		15'-17' PID = 304.0 ppm	D	4	3	5	4		Dry, loose, brown FINE SAND, trace Silt	4	24	18
20		20'-22' PID = 472.6 ppm	D	4	3	4	3		Dry, loose, brown FINE SAND, little Silt	5	24	20
25		25'-27' PID = 472.8 ppm	D	4	3	5	4	27'	Dry, loose, brown FINE SAND, little Silt	6	24	20
30									Bottom of Exploration = 27 feet			
35												
40												

GROUND SURFACE TO 25 FT., USED 3.25 " CASING:

THEN split spoon sample  
 TYPE OF SAMPLE  
 D=DRY W=WASHED C=CORED  
 TP=TEST PIT A=AUGER V=VANE TEST  
 UP=UNDISTURBED, PISTON  
 US=UNDISTURBED, SHELBY

PROPORTIONS USED:  
 TRACE=0-10%  
 LITTLE=10-20%  
 SOME=20-35%  
 AND=35-50%

COHESIONLESS DENSITY:  
 0-4 VERY LOOSE  
 5-9 LOOSE  
 10-29 MED. DENSE  
 30-49 DENSE  
 50 + VERY DENSE

FOOTAGE IN EARTH: 27  
 FOOTAGE IN ROCK: -  
 WELL FOOTAGE: -  
 NO. OF SAMPLES: 5  
 HOLE NO.: B-1A  
 TYPE: Cased

BORING CONTRACTOR:  
**SAGE Envirotech Drilling Services**  
 Pawtucket, RI  
 LOG PREPARED BY:  
 PBA TGL

**PAUL B. ALDINGER & ASSOCIATES, INC.**  
 860A WATERMAN AVENUE, SUITE 9 EAST PROVIDENCE, RI  
**BORING LOG**  
 PROJECT NAME: Roger Williams Park Gateway Center  
 TOWN, STATE: Providence, RI  
 PBA NO.: 20024 OFFICE: Prov. Redevelopment

SHEET 1 OF 1  
 LOCATION:  
 HOLE NO.: B-2  
 BORING TYPE: Dual Tube  
 LINE & STA.:  
 OFFSET:

GROUND WATER OBSERVATIONS  
 AT None FT AFTER 0 HRS  
 AT \_\_\_\_\_ FT AFTER \_\_\_\_\_ HRS

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	---	3.25"	S/S	---
SIZE, I.D.	---	---	1 3/8"	---
HAMMER WT.	---	---	140#	BIT
HAMMER FALL	---	---	30"	---

SURFACE ELEV.:  
 DATE STARTED: 07/08/20  
 DATE FINISHED: 07/08/20  
 FOREMAN: Steve Perry  
 INSPECTOR: T. Leidner

LOCATION OF BORING: East Side of Proposed Building Footprint

DEPTH BELOW SURFACE	CASING BLOWS/FOOT	SAMPLE DEPTH FROM - TO	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER FROM-TO				STRATA CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL & ROCK INCL. COLOR, LOSS OF WASH WATER, JOINTS IN ROCK, ETC.	SAMPLE		
				0-6	6-12	12-18	18-24			NO.	PEN.	REC.
								5"	Asphalt			
		0.5'-2.5'	D	6	12	5	1		Dry, medium dense, brown FINE TO MEDIUM SAND, trace Gravel, trace Silt (Fill)	1	24	9
		PID=3037 ppm										
5								5'	Casing Advanced to 5 feet Bottom of Exploration = 5 feet			
10									Test Boring B-2 was terminated due to potential underground utility			
15									Test Boring B-2 was offset approximately 3 feet and re-drilled as test boring B-2A			
20												
25												
30												
35												
40												

GROUND SURFACE TO 5 FT., USED 3.25 " CASING:  
 THEN split spoon sample  
 TYPE OF SAMPLE: D=DRY W=WASHED C=CORED  
 TP=TEST PIT A=AUGER V=VANE TEST  
 UP=UNDISTURBED, PISTON  
 US=UNDISTURBED, SHELBY

PROPORTIONS USED:  
 TRACE=0-10%  
 LITTLE=10-20%  
 SOME=20-35%  
 AND=35-50%

COHESIONLESS DENSITY:  
 0-4 VERY LOOSE  
 5-9 LOOSE  
 10-29 MED. DENSE  
 30-49 DENSE  
 50 + VERY DENSE

FOOTAGE IN EARTH: 5  
 FOOTAGE IN ROCK: -  
 WELL FOOTAGE: -  
 NO. OF SAMPLES: 1  
 HOLE NO.: B-2  
 TYPE: Cased

BORING CONTRACTOR:  
**SAGE Envirotech Drilling Services**  
 Pawtucket, RI  
 LOG PREPARED BY:  
 PBA TGL

**PAUL B. ALDINGER & ASSOCIATES, INC.**  
 860A WATERMAN AVENUE, SUITE 9 EAST PROVIDENCE, RI  
**BORING LOG**  
 PROJECT NAME: Roger Williams Park Gateway Center  
 TOWN, STATE: Providence, RI  
 PBA NO.: 20024 OFFICE: Prov. Redevelopment

SHEET 1 OF 1  
 LOCATION:  
 HOLE NO.: B-2A  
 BORING TYPE: Dual Tube  
 LINE & STA.:  
 OFFSET:

GROUND WATER OBSERVATIONS  
 AT None FT AFTER 0 HRS  
 AT \_\_\_\_\_ FT AFTER \_\_\_\_\_ HRS

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	---	3.25"	S/S	---
SIZE, I.D.	---	---	1 3/8"	---
HAMMER WT.	---	---	140#	BIT
HAMMER FALL	---	---	30"	---

SURFACE ELEV.:  
 DATE STARTED 07/08/20  
 DATE FINISHED: 07/08/20  
 FOREMAN: Steve Perry  
 INSPECTOR: T. Leidner

LOCATION OF BORING: East Side of Proposed Building Footprint

DEPTH BELOW SURFACE	CASING BLOWS/FOOT	SAMPLE DEPTH FROM - TO	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER FROM-TO				STRATA CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL & ROCK INCL. COLOR, LOSS OF WASH WATER, JOINTS IN ROCK, ETC.	SAMPLE NO. PEN. REC.		
				0-6	6-12	12-18	18-24					
5		5'-5'6"	D	4	2/0"			5'	See test boring B-2			
								5'6"	Dry, brown GRAVEL, little fine to coarse Sand, trace Silt (Fill)	1	6	3
10									Bottom of Exploration = 5.5'			
									Test Boring B-2A was terminated due to potential underground utility			
15												
20												
25												
30												
35												
40												

GROUND SURFACE TO 5 FT., USED 3.25 " CASING:  
 THEN split spoon sample

TYPE OF SAMPLE: D=DRY W=WASHED C=CORED TP=TEST PIT A=AUGER V=VANE TEST UP=UNDISTURBED, PISTON US=UNDISTURBED, SHELBY

PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

COHESIONLESS DENSITY: 0-4 VERY LOOSE 5-9 LOOSE 10-29 MED. DENSE 30-49 DENSE 50+ VERY DENSE

FOOTAGE IN EARTH: 5.5  
 FOOTAGE IN ROCK: -  
 WELL FOOTAGE: -  
 NO. OF SAMPLES: 1  
 HOLE NO.: B-2A  
 TYPE: Cased

BORING CONTRACTOR:  
**SAGE Envirotech Drilling Services**  
 Pawtucket, RI  
 LOG PREPARED BY:  
 PBA TGL

**PAUL B. ALDINGER & ASSOCIATES, INC.**  
 860A WATERMAN AVENUE, SUITE 9 EAST PROVIDENCE, RI  
**BORING LOG**  
 PROJECT NAME: Roger Williams Park Gateway Center  
 TOWN, STATE: Providence, RI  
 PBA NO.: 20024 OFFICE: Prov. Redevelopment

SHEET 1 OF 1  
 LOCATION:  
 HOLE NO.: B-3  
 BORING TYPE: Dual Tube  
 LINE & STA.:  
 OFFSET:

GROUND WATER OBSERVATIONS  
 AT 31 FT AFTER     HRS\*\*  
 AT     FT AFTER     HRS

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	---	3.25"	S/S	---
SIZE, I.D.	---	---	1 3/8"	---
HAMMER WT.	---	---	140#	BIT
HAMMER FALL	---	---	30"	---

SURFACE ELEV.:  
 DATE STARTED: 07/08/20  
 DATE FINISHED: 07/08/20  
 FOREMAN: Steve Perry  
 INSPECTOR: T. Leidner

\*\*Groundwater level reading obtained from existing monitoring well on east portion of site (7/8/20)  
 LOCATION OF BORING: West Side of Proposed Building Footprint

DEPTH BELOW SURFACE	CASING BLOWS/FOOT	SAMPLE DEPTH FROM - TO	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER FROM-TO				STRATA CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL & ROCK INCL. COLOR, LOSS OF WASH WATER, JOINTS IN ROCK, ETC.	SAMPLE		
				0-6	6-12	12-18	18-24			NO.	PEN.	REC.
								3"	Asphalt			
		0.5'-2.5'	D	7	7	7	6		Dry, medium dense, brown FINE TO MEDIUM SAND, little Silt, trace Gravel, trace coarse Sand, trace Asphalt (Fill)	1	24	16
		PID=1085 ppm										
5		5'-7'	D	1	1/12"	4		5'	Dry, very loose, brown FINE SAND, trace medium to coarse Sand, trace Gravel, trace Silt	2	24	14
		PID=921.3 ppm										
10		10'-12'	D	2	2	3	3		Dry, loose, brown FINE SAND, little Silt, trace medium to coarse Sand	3	24	18
		PID=266.0 ppm										
15		15'-17'	D	4	3	4	4		Dry, loose, brown FINE SAND, some Silt	4	24	20
		PID=378.9 ppm										
20		20'-22'	D	3	2	3	3		Dry, loose, gray FINE SAND, little Silt, slight gaseous odor	5	24	22
		PID=4048 ppm										
25		25'-27'	D	4	4	4	4		Dry, loose, brown FINE SAND, little Silt	6	24	20
		PID=9.7 ppm										
30		30'-32'	D	3	4	2	2		Wet, loose, brown/gray FINE SAND, little Silt	7	24	20
								32'	Bottom of Exploration = 32 feet			
35												
40												

GROUND SURFACE TO 30 FT., USED 3.25 " CASING:  
 THEN split spoon sample  
 TYPE OF SAMPLE:     PROPORTIONS USED:      
 D=DRY W=WASHED C=CORED TRACE=0-10%  
 TP=TEST PIT A=AUGER V=VANE TEST LITTLE=10-20%  
 UP=UNDISTURBED, PISTON SOME=20-35%  
 US=UNDISTURBED, SHELBY AND=35-50%

COHESIONLESS DENSITY:  
 0-4 VERY LOOSE  
 5-9 LOOSE  
 10-29 MED. DENSE  
 30-49 DENSE  
 50 + VERY DENSE

FOOTAGE IN EARTH: 32  
 FOOTAGE IN ROCK: -  
 WELL FOOTAGE: -  
 NO. OF SAMPLES: 7  
 HOLE NO.: B-3  
 TYPE: Cased

BORING CONTRACTOR:  
**SAGE Envirotech Drilling Services**  
 Pawtucket, RI  
 LOG PREPARED BY:  
 PBA TGL

**PAUL B. ALDINGER & ASSOCIATES, INC.**  
 860A WATERMAN AVENUE, SUITE 9 EAST PROVIDENCE, RI  
**BORING LOG**  
 PROJECT NAME: Roger Williams Park Gateway Center  
 TOWN, STATE: Providence, RI  
 PBA NO.: 20024 OFFICE: Prov. Redevelopment

SHEET 1 OF 2  
 LOCATION:  
 HOLE NO.: B-4  
 BORING TYPE: Dual Tube  
 LINE & STA.:  
 OFFSET:

GROUND WATER OBSERVATIONS  
 AT 31 FT AFTER     HRS\*\*  
 AT     FT AFTER     HRS

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	---	3.25"	S/S	---
SIZE, I.D.	---	---	1 3/8"	---
HAMMER WT.	---	---	140#	BIT
HAMMER FALL	---	---	30"	---

SURFACE ELEV.:  
 DATE STARTED: 07/08/20  
 DATE FINISHED: 07/08/20  
 FOREMAN: Steve Perry  
 INSPECTOR: T. Leidner

\*\*Groundwater level reading obtained from existing monitoring well on east portion of site (7/8/20)  
 LOCATION OF BORING: Middle of Proposed Building Footprint

DEPTH BELOW SURFACE	CASING BLOWS/FOOT	SAMPLE DEPTH FROM - TO	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER FROM-TO				STRATA CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL & ROCK INCL. COLOR, LOSS OF WASH WATER, JOINTS IN ROCK, ETC.	SAMPLE		
				0-6	6-12	12-18	18-24			NO.	PEN.	REC.
								3"	Asphalt			
		0.5'-2.5'	D	5	4	4	3		Dry, loose, brown FINE SAND, trace Silt, trace medium to coarse Sand, trace Brick (Fill)	1	24	16
		PID=9.8 ppm										
5		5'-7'	D	3	3	4	5	5'	Dry, loose, brown FINE TO COARSE SAND, trace Gravel, trace Silt	2	24	16
		PID=43.7 ppm										
10		10'-12'	D	5	4	5	4		Dry, loose, brown FINE SAND, some Silt, trace medium Sand	3	24	20
		PID=31.2 ppm										
15		15'-17'	D	5	4	5	4		Dry, loose, brown FINE SAND, trace Silt	4	24	18
		PID=27.0 ppm										
20		20'-22'	D	3	3	3	3		Dry, loose, brown FINE SAND, little Silt	5	24	20
		PID=7.1 ppm										
25		25'-27'	D	4	5	4	5		Dry, loose, brown FINE SAND, little Silt	6	24	18
		PID=8.6 ppm										
30		30'-32'	D	4	3	4	3		Wet, loose, brown FINE SAND, little Silt	7	24	16
35		35'-37'	D	4	3	4	2		Wet, loose, gray FINE SAND, little Silt	8	24	15
40												

GROUND SURFACE TO 50 FT., USED 3.25 " CASING:  
 THEN split spoon sample  
 TYPE OF SAMPLE:     PROPORTIONS USED:      
 D=DRY W=WASHED C=CORED TRACE=0-10%  
 TP=TEST PIT A=AUGER V=VANE TEST LITTLE=10-20%  
 UP=UNDISTURBED, PISTON SOME=20-35%  
 US=UNDISTURBED, SHELBY AND=35-50%

COHESIONLESS DENSITY:  
 0-4 VERY LOOSE  
 5-9 LOOSE  
 10-29 MED. DENSE  
 30-49 DENSE  
 50 + VERY DENSE

FOOTAGE IN EARTH: 52  
 FOOTAGE IN ROCK: -  
 WELL FOOTAGE: -  
 NO. OF SAMPLES: 11  
 HOLE NO.: B-4  
 TYPE: Cased

BORING CONTRACTOR:  
**SAGE Envirotech Drilling Services**  
 Pawtucket, RI  
 LOG PREPARED BY:  
 PBA TGL

**PAUL B. ALDINGER & ASSOCIATES, INC.**  
 860A WATERMAN AVENUE, SUITE 9 EAST PROVIDENCE, RI  
**BORING LOG**  
 PROJECT NAME: Roger Williams Park Gateway Center  
 TOWN, STATE Providence, RI  
 PBA NO.: 20024 OFFICE: Prov. Redevelopment

SHEET 2 OF 2  
 LOCATION:  
 HOLE NO.: B-4  
 BORING TYPE: Dual Tube  
 LINE & STA.:  
 OFFSET:

GROUND WATER OBSERVATIONS  
 AT 31 FT AFTER     HRS\*\*  
 AT     FT AFTER     HRS  
 \*\*Groundwater level reading obtained from existing monitoring well on east portion of site (7/8/20)

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	---	3.25"	S/S	---
SIZE, I.D.	---	---	1 3/8"	---
HAMMER WT.	---	---	140#	BIT
HAMMER FALL	---	---	30"	---

SURFACE ELEV.:  
 DATE STARTED 07/08/20  
 DATE FINISHED: 07/08/20  
 FOREMAN: Steve Perry  
 INSPECTOR: T. Leidner

LOCATION OF BORING: Middle of Proposed Building Footprint

DEPTH BELOW SURFACE	CASING BLOWS/FOOT	SAMPLE DEPTH FROM - TO	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER FROM-TO				STRATA CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL & ROCK INCL. COLOR, LOSS OF WASH WATER, JOINTS IN ROCK, ETC.	SAMPLE NO. PEN. REC.		
				0-6	6-12	12-18	18-24					
		40'-42'	D	2	3	1	1	41.5'	Wet, very loose, brown FINE SAND, little Silt	9	24	16
									Wet, gray SILT, trace fine Sand	9A		
45		45'-47'	D		1/18"		1		Wet, very loose, gray SILT, little fine to medium Sand	10	24	20
50		50'-52'	D		1/3"		1/21"	52'	Wet, very loose, gray SILT, some fine Sand	11	24	22
55									Bottom of Exploration = 52 feet			
60												
65												
70												
75												
80												

GROUND SURFACE TO 50 FT., USED 3.25 " CASING:  
 THEN split spoon sample  
 TYPE OF SAMPLE                      PROPORTIONS USED:  
 D=DRY W=WASHED C=CORED                      TRACE=0-10%  
 TP=TEST PIT A=AUGER V=VANE TEST                      LITTLE=10-20%  
 UP=UNDISTURBED, PISTON                      SOME=20-35%  
 US=UNDISTURBED, SHELBY                      AND=35-50%

COHESIONLESS DENSITY:  
 0-4 VERY LOOSE  
 5-9 LOOSE  
 10-29 MED. DENSE  
 30-49 DENSE  
 50 + VERY DENSE

FOOTAGE IN EARTH: 52  
 FOOTAGE IN ROCK: -  
 WELL FOOTAGE: -  
 NO. OF SAMPLES: 11  
 HOLE NO.: B-4  
 TYPE: Cased

BORING CONTRACTOR:  
**SAGE Envirotech Drilling Services**  
 Pawtucket, RI  
 LOG PREPARED BY:  
 PBA TGL

**PAUL B. ALDINGER & ASSOCIATES, INC.**  
 860A WATERMAN AVENUE, SUITE 9 EAST PROVIDENCE, RI  
**BORING LOG**  
 PROJECT NAME: Roger Williams Park Gateway Center  
 TOWN, STATE: Providence, RI  
 PBA NO.: 20024 OFFICE: Prov. Redevelopment

SHEET 1 OF 1  
 LOCATION:  
 HOLE NO.: P-1  
 BORING TYPE: Geoprobe  
 LINE & STA.:  
 OFFSET:

GROUND WATER OBSERVATIONS  
 AT None FT AFTER 0 HRS  
 AT \_\_\_\_\_ FT AFTER \_\_\_\_\_ HRS

AUGER CASING SAMPLER CORE BAR.  
 TYPE: --- 3.25" --- ---  
 SIZE, I.D.: --- --- --- ---  
 HAMMER WT. --- --- BIT  
 HAMMER FALL --- ---

SURFACE ELEV.:  
 DATE STARTED 07/13/20  
 DATE FINISHED: 07/13/20  
 FOREMAN: Steve Perry  
 INSPECTOR: T. Leidner

LOCATION OF BORING:

DEPTH BELOW SURFACE	CASING BLOWS/ FOOT	SAMPLE DEPTH FROM - TO	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER FROM-TO				STRATA CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL & ROCK INCL. COLOR, LOSS OF WASH WATER, JOINTS IN ROCK, ETC.	SAMPLE		
				0-6	6-12	12-18	18-24			NO.	PEN.	REC.
5		0'-5'	C					6'	Dry, brown, FINE TO COARSE SAND, little Gravel, trace Silt, with concrete in sleeve tip (Fill)	1	60	48
		PID=1.31 ppm										
10		5'-10'	C					13'	Dry, dark brown FINE TO MEDIUM SAND, trace Gravel, trace Silt (Fill)	2	60	53
		PID=4.97 ppm										
15		10'-15'	C					30'	Dry, brown FINE TO COARSE SAND, trace Gravel, trace Silt (Fill)	3	60	53
		PID=0.42 ppm										
20		15'-20'	C					30'	Dry, brown FINE SAND, little Silt	4	60	55
		PID=0.54 ppm										
25		20'-25'	C					30'	Dry, brown FINE SAND, little Silt	5	60	60
		PID=6.22 ppm										
30		25'-30'	C					30'	Dry, gray/brown FINE SAND, some Silt	6	60	53
		PID=217.8 ppm										
35								Bottom of Exploration = 30 feet				
40												

GROUND SURFACE TO 30 FT., USED 3.25 " CASING:  
 THEN \_\_\_\_\_  
 TYPE OF SAMPLE: D=DRY W=WASHED C=CORED  
 TP=TEST PIT A=AUGER V=VANE TEST  
 UP=UNDISTURBED, PISTON  
 US=UNDISTURBED, SHELBY

PROPORTIONS USED:  
 TRACE=0-10%  
 LITTLE=10-20%  
 SOME=20-35%  
 AND=35-50%

COHESIONLESS DENSITY:  
 0-4 VERY LOOSE  
 5-9 LOOSE  
 10-29 MED. DENSE  
 30-49 DENSE  
 50 + VERY DENSE

FOOTAGE IN EARTH: 30  
 FOOTAGE IN ROCK: 0  
 WELL FOOTAGE: 0  
 NO. OF SAMPLES: 6  
 HOLE NO.: P-1  
 TYPE: Geoprobe

BORING CONTRACTOR:  
**SAGE Envirotech Drilling Services**  
 Pawtucket, RI  
 LOG PREPARED BY:  
 PBA TGL

**PAUL B. ALDINGER & ASSOCIATES, INC.**  
 860A WATERMAN AVENUE, SUITE 9 EAST PROVIDENCE, RI  
**BORING LOG**  
 PROJECT NAME: Roger Williams Park Gateway Center  
 TOWN, STATE: Providence, RI  
 PBA NO.: 20024 OFFICE: Prov. Redevelopment

SHEET 1 OF 1  
 LOCATION:  
 HOLE NO.: P-2  
 BORING TYPE: Geoprobe  
 LINE & STA.:  
 OFFSET:

GROUND WATER OBSERVATIONS  
 AT None FT AFTER 0 HRS  
 AT \_\_\_\_\_ FT AFTER \_\_\_\_\_ HRS

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	---	3.25"	---	---
SIZE, I.D.	---	---	---	---
HAMMER WT.	---	---	---	BIT
HAMMER FALL	---	---	---	---

SURFACE ELEV.:  
 DATE STARTED: 07/13/20  
 DATE FINISHED: 07/13/20  
 FOREMAN: Steve Perry  
 INSPECTOR: T. Leidner

LOCATION OF BORING:

DEPTH BELOW SURFACE	CASING BLOWS/FOOT	SAMPLE DEPTH FROM - TO	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER FROM-TO				STRATA CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL & ROCK INCL. COLOR, LOSS OF WASH WATER, JOINTS IN ROCK, ETC.	SAMPLE		
				0-6	6-12	12-18	18-24			NO.	PEN.	REC.
5		0'-5'	C					11'	Dry, brown FINE TO COARSE SAND, little Gravel, trace Silt, with Asphalt (Fill)	1	60	44
		PID=0.32 ppm										
10		5'-10'	C					11'	Dry, brown FINE TO COARSE SAND, little Silt, trace Gravel, with Asphalt (Fill)	2	60	35
		PID=27.99 ppm										
15		10'-15'	C					11'	Dry, gray/black FINE TO COARSE SAND, trace Gravel, trace Silt (Fill)	3	60	46
		PID=230.8 ppm										
20		15'-20'	C					11'	Dry, brown FINE TO COARSE SAND, trace Silt Wet, gray FINE SAND AND SILT, gaseous odor	4	60	54
		PID=1230 ppm										
25		20'-25'	C					11'	Dry, gray/brown FINE SAND, little Silt, gaseous odor	5	60	58
		PID=153.7 ppm										
30		25'-30'	C					30'	Dry, gray FINE SAND, little Silt, gaseous odor	6	60	55
		PID=336.6 ppm										
35								Bottom of Exploration = 30 feet				
40												

GROUND SURFACE TO 30 FT., USED 3.25 " CASING:  
 THEN \_\_\_\_\_

TYPE OF SAMPLE: D=DRY W=WASHED C=CORED TP=TEST PIT A=AUGER V=VANE TEST UP=UNDISTURBED, PISTON US=UNDISTURBED, SHELBY

PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

COHESIONLESS DENSITY: 0-4 VERY LOOSE 5-9 LOOSE 10-29 MED. DENSE 30-49 DENSE 50+ VERY DENSE

FOOTAGE IN EARTH: 30  
 FOOTAGE IN ROCK: 0  
 WELL FOOTAGE: 0  
 NO. OF SAMPLES: 6  
 HOLE NO.: P-2  
 TYPE: Geoprobe

BORING CONTRACTOR:  
**SAGE Envirotech Drilling Services**  
 Pawtucket, RI  
 LOG PREPARED BY:  
 PBA TGL

**PAUL B. ALDINGER & ASSOCIATES, INC.**  
 860A WATERMAN AVENUE, SUITE 9 EAST PROVIDENCE, RI  
**BORING LOG**  
 PROJECT NAME: Roger Williams Park Gateway Center  
 TOWN, STATE: Providence, RI  
 PBA NO.: 20024 OFFICE: Prov. Redevelopment

SHEET 1 OF 1  
 LOCATION:  
 HOLE NO.: P-3  
 BORING TYPE: Geoprobe  
 LINE & STA.:  
 OFFSET:

GROUND WATER OBSERVATIONS  
 AT None FT AFTER 0 HRS  
 AT \_\_\_\_\_ FT AFTER \_\_\_\_ HRS

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	---	3.25"	---	---
SIZE, I.D.	---	---	---	---
HAMMER WT.	---	---	---	BIT
HAMMER FALL	---	---	---	---

SURFACE ELEV.:  
 DATE STARTED 07/13/20  
 DATE FINISHED: 07/13/20  
 FOREMAN: Steve Perry  
 INSPECTOR: T. Leidner

LOCATION OF BORING:

DEPTH BELOW SURFACE	CASING BLOWS/FOOT	SAMPLE DEPTH FROM - TO	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER FROM-TO				STRATA CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL & ROCK INCL. COLOR, LOSS OF WASH WATER, JOINTS IN ROCK, ETC.	SAMPLE NO. PEN. REC.		
				0-6	6-12	12-18	18-24					
5		0'-5'	C					0.5'	Asphalt Subgrade	1	60	44
		PID=0.00 ppm							Dry, brown, FINE TO COARSE SAND, trace Gravel, trace Silt, trace Roots (Fill)			
10		5'-10'	C					5.5'	Same as Above	2	60	50
		PID=1.09 ppm							Dry, brown FINE TO COARSE SAND, trace Gravel, trace Silt			
15		10'-15'	C					11'	Dry, brown, FINE TO COARSE SAND, trace Silt	3	60	57
		PID=0.00 ppm							Dry, brown FINE SAND, little Silt			
20		15'-20'	C					16.75'	Dry, brown FINE SAND, little Silt	4	60	54
		PID=0.12 ppm						17.25'	Wet, brown FINE SAND AND SILT			
25		20'-25'	C						Dry, light brown FINE SAND, little Silt			
		PID=0.00 ppm							Dry, light brown FINE SAND, some Silt	5	60	60
30		25'-30'	C						Dry, light brown FINE SAND, some Silt	6	60	54
		PID=0.00 ppm						30'	Bottom of Exploration = 30 feet			
35												
40												

GROUND SURFACE TO 30 FT., USED 3.25 " CASING:  
 THEN \_\_\_\_\_  
 TYPE OF SAMPLE \_\_\_\_\_ PROPORTIONS USED: \_\_\_\_\_  
 D=DRY W=WASHED C=CORED TRACE=0-10%  
 TP=TEST PIT A=AUGER V=VANE TEST LITTLE=10-20%  
 UP=UNDISTURBED, PISTON SOME=20-35%  
 US=UNDISTURBED, SHELBY AND=35-50%

COHESIONLESS DENSITY:  
 0-4 VERY LOOSE  
 5-9 LOOSE  
 10-29 MED. DENSE  
 30-49 DENSE  
 50 + VERY DENSE

FOOTAGE IN EARTH: 30  
 FOOTAGE IN ROCK: 0  
 WELL FOOTAGE: 0  
 NO. OF SAMPLES: 6  
 HOLE NO.: P-3  
 TYPE: Geoprobe

BORING CONTRACTOR:  
**SAGE Envirotech Drilling Services**  
 Pawtucket, RI  
 LOG PREPARED BY:  
 PBA TGL

**PAUL B. ALDINGER & ASSOCIATES, INC.**  
 860A WATERMAN AVENUE, SUITE 9 EAST PROVIDENCE, RI  
**BORING LOG**  
 PROJECT NAME: Roger Williams Park Gateway Center  
 TOWN, STATE: Providence, RI  
 PBA NO.: 20024 OFFICE: Prov. Redevelopment

SHEET 1 OF 1  
 LOCATION:  
 HOLE NO.: P-4  
 BORING TYPE: Geoprobe  
 LINE & STA.:  
 OFFSET:

GROUND WATER OBSERVATIONS  
 AT None FT AFTER 0 HRS  
 AT \_\_\_\_\_ FT AFTER \_\_\_\_\_ HRS

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	---	3.25"	---	---
SIZE, I.D.	---	---	---	---
HAMMER WT.	---	---	---	BIT
HAMMER FALL	---	---	---	---

SURFACE ELEV.:  
 DATE STARTED 07/13/20  
 DATE FINISHED: 07/13/20  
 FOREMAN: Steve Perry  
 INSPECTOR: T. Leidner

LOCATION OF BORING:

DEPTH BELOW SURFACE	CASING BLOWS/FOOT	SAMPLE DEPTH FROM - TO	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER FROM-TO				STRATA CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL & ROCK INCL. COLOR, LOSS OF WASH WATER, JOINTS IN ROCK, ETC.	SAMPLE		
				0-6	6-12	12-18	18-24			NO.	PEN.	REC.
5		0'-5'	C					5'	Dry, brown FINE TO COARSE SAND, little Silt, trace Gravel, trace Asphalt, trace Brick, trace Roots (Fill)	1	60	53
		PID=2.98 ppm										
10		5'-10'	C					11.5'	Dry, light brown FINE TO COARSE SAND, trace Silt	2	60	53
		PID=0.11 ppm										
15		10'-15'	C					17'	Same as Above	3	60	55
		PID=0.00 ppm										
20		15'-20'	C					17.5'	Wet, brown FINE SAND AND SILT	4	60	53
		PID=0.00 ppm										
25		20'-25'	C					26'	Dry, light brown FINE SAND, little Silt	5	60	56
		PID=0.00 ppm										
30		25'-30'	C					30'	Dry, brown FINE SAND, little Silt	6	60	55
		PID=0.00 ppm										
35								30'	Wet, brown FINE SAND AND SILT			
40								30'	Dry, brown FINE SAND, some Silt			
									Bottom of Exploration = 30 feet			

GROUND SURFACE TO 30 FT., USED 3.25 " CASING:  
 THEN \_\_\_\_\_  
 TYPE OF SAMPLE \_\_\_\_\_ PROPORTIONS USED: \_\_\_\_\_  
 D=DRY W=WASHED C=CORED TRACE=0-10%  
 TP=TEST PIT A=AUGER V=VANE TEST LITTLE=10-20%  
 UP=UNDISTURBED, PISTON SOME=20-35%  
 US=UNDISTURBED, SHELBY AND=35-50%

COHESIONLESS DENSITY:  
 0-4 VERY LOOSE  
 5-9 LOOSE  
 10-29 MED. DENSE  
 30-49 DENSE  
 50 + VERY DENSE

FOOTAGE IN EARTH: 30  
 FOOTAGE IN ROCK: 0  
 WELL FOOTAGE: 0  
 NO. OF SAMPLES: 6  
 HOLE NO.: P-4  
 TYPE: Geoprobe

**APPENDIX C**  
**SOIL EVALUATION**

From: Deb Bosworth, Class IV Soil Evaluator, D-4032  
To: Linda Steere, Applied Bio-Systems, Inc  
Date: 10 July 2020

Re: 1197 Broad Street Providence, RI  
Soil Evaluations for Stormwater Drainage

## SUMMARY OF SOIL EVALUATIONS

Excavated 8 July 2020

These two pits have been excavated in the existing paved parking area serving the building at 1197 Broad Street Providence. The plan is to demolish the building and redesign the site as a Visitor Center for Roger Williams Park. Roof runoff and other drainage from impervious surfaces will be handled by a stormwater treatment system. Both pits are near the existing chain link fence along the northerly property line. Along the southerly property line is an approximate 15-foot drop in elevation, to an asphalt parking area serving Roger Williams Park. Aerials dating back to 1939 show the site as having been in commercial use, with various changes in building locations.

Both pits have Human Transported Material (HTM) fill over native outwash soils. The USDA-NRCS mapping for this area is enclosed. The mapping shows Merrimac Urban land complex (MU) in the test pit area, and Hinkley gravelly sand, rolling (HkC) toward the southwest. The native soils found under the HTM would agree with the mapping.

Seasonal High Ground Water Table depth from existing grade (including HTM) is as follows (see notes 1 and 2):

TH # 1 = 108" +

TH # 2 = 108" +

Due to undermining of the single grain loose materials, the excavations could go no deeper. However, there were no redoximorphic features observed in the pits, and no sign of groundwater seepage in the RWP parking area 15' below the site. The groundwater is deeper than 108".

Percolation Rates (see notes 2 and 3):

Referring to the attached Soil Profile Description:

The soils encountered in TH # 1 were gravelly sandy loam (sl), sand (s), loamy sand (ls), and coarse sand (cos). The soil structures and consistencies were single grain (sg) and loose, or subangular blocky (sbk) and friable. The exception to this is the top 16 inches that include 2 layers of asphalt within a gravelly sandy loam (sl), with a massive firm structure and consistence.

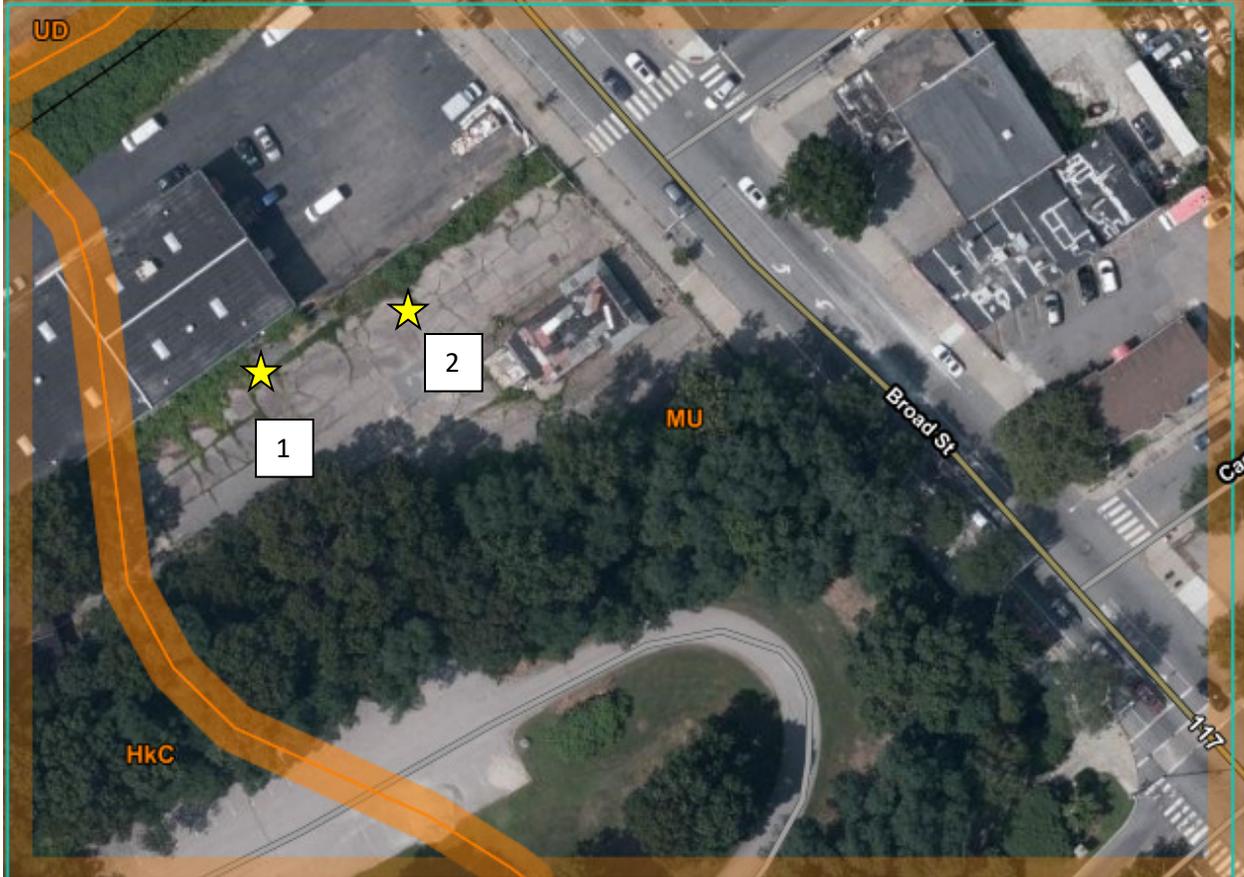
Soils encountered in the top 84 inches of TH # 2 were a gravelly sandy loam, granular and friable, however filled with great amounts of bricks, concrete slab, and other materials from a demolished building. Native soils below that were sand, single grain and loose.

(1) Note regarding Seasonal High Groundwater: During events of extreme precipitation, groundwater could rise higher than the above determined depths.

(2) Note regarding Human Transported Material (HTM or “Fill”):

HTM can be problematic when estimating water table depth. Either the HTM has not developed any consistent redoximorphic features, or those features have possibly been brought in from another site. The other possible problem is that the HTM has not developed any true structure or consistence, although these have been reported as they appeared to be in the soil profiles.

(3) Note regarding Percolation Rates: Soil texture, structure, and consistence are reported for all pits, including for HTM. Table 5-3 of the DEM Stormwater Manual amended March 2015 is enclosed. This table does not consider soil structure or consistence. The actual design infiltration rate could be different than shown in Table 5-3.



1197 Broad Street Providence

Soil Evaluation Locations 



# STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management  
Office of Water Resources  
Onsite Wastewater Treatment Systems Program



## Site Evaluation Form Part A - Soil Profile Description

Application Number STORMWATER DRAINAGE

Property Owner: CITY OF PROVIDENCE - PARKS DEPT.

Property Location: 1197 BROAD ST. PROVIDENCE

Date of Test Hole: 8 JULY 2020

Soil Evaluator: DEB BOSWORTH

License Number: D-4032

Weather: OVERCAST

Shaded: Yes  No  Time: 8-9:30 AM

TH Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
HM1	0-16	a	S	5Y3/1	-	2 layers of asphalt	gray sl	mas	fi	-
HM2	16-24	a	S	10YR4/6	-	-	S	sg	loose	-
HM3	24-38	a	w	10YR4/2	-	-	S	sg	loose	-
BAB	38-42	c	S	10YR3/6	-	-	ls	sbk	fri	-
Bwb	42-58	a	S	7.5YR4/6	-	-	ls	sbk	fri	-
C1	58-64	a	S	10YR5/3	-	-	cos	sg	loose	-
C2	64-108	-	-	10YR5/3	-	-	S	sg	loose	-
TH Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
TH Horizon	Depth	Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
HM	0-84	a	w	10YR5/3	-	2" Asphalt on top, Rubble *	gray ls	gran	fri	-
2C	84-108	-	-	10YR6/2	-	-	S	sg	loose	-

TH 1 Soil Class HTM/C Total Depth 108" Impervious/Limiting Layer Depth - (og) GW Seepage Depth - SHWT 108" (og) eg

TH 2 Soil Class HTM/C Total Depth 108" Impervious/Limiting Layer Depth - (og) GW Seepage Depth - SHWT 108" (og) eg

Comments: \* TH #2 - HTM horizon mostly Rubble of demolished building - Bricks, concrete slabs, wood, etc.

Could excavate no deeper due to undermining sides of pits

Part B

Site Evaluation - to be completed by Soil Evaluator or Class II or III Designer

Please use the area below to locate:

1. Test holes and bedrock test holes,
2. Approximate direction of due north,
3. Offsets from all test holes to fixed points such as street, utility pole, or other permanent, marked object.\*

\*OFFSETS MUST BE SHOWN

Key:

- Approximate location of test holes
- ⊕ Approximate location of bedrock test holes
- x% Estimated gradient and direction of slope
- N Approximate direction of due north



Bedrock THs	
TH	Depth

1. Relief and Slope: 20 FT RELIEF 19% SLOPE ASPHALT PARKING AREA
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes? If yes, locate on above sketch. NO  YES
3. Restrictive Layer or Bedrock within 4' below original ground within 25 feet of test hole? Provide all test hole locations & depths above. NO  YES
4. Presence of existing or proposed private drinking water wells within 200 feet of test holes? If yes, locate on above sketch. NO  YES
5. Public drinking water wells within 500 feet of test holes? If yes, locate on above sketch. NO  YES
6. Is site within the watershed of a public drinking water reservoir or other critical area defined in Rule 6.42? NO  YES
7. Has soil been excavated from or fill deposited on site? If yes, locate on above sketch. NO  YES
8. Site's potential for flooding or ponding: NONE  SLIGHT  MODERATE  SEVERE
9. Landscape position: SHOULDER OF TERRACE
10. Vegetation: WOODED AREA IS OAK, WHITE PINE, LOCUST
11. Indicate approximate location of property lines and roadways.
12. Additional comments, site constraints or additional information regarding site: RWP PARKING TO SOUTH AT TOP OF SLOPE APPROX 15-20 FT LOWER IN ELEVATION

**Certification**  
 The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: Debrah Bofwate D4032 Part B prepared by: Debrah Bofwate D4032  
 Signature License # Signature License #

DO NOT WRITE IN THIS SPACE

**Witnessed Soil Evaluation Decision:** Concur  Inconclusive  Disclaim

**Unwitnessed Soil Evaluations Decision:** Accept  Inconclusive  Disclaim

Wet Season Determination required  Additional Field Review Required

Explanation: \_\_\_\_\_

\_\_\_\_\_  
 Signature Authorized Agent Date

## Design Guidance

- The sides of infiltration chambers, trenches, and dry wells should be lined with an acceptable filter fabric that prevents soil piping.

### **5.3.4 Treatment**

#### Required Elements

- If the in-situ infiltration rate for the underlying soils is greater than 8.3 inches per hour, 100% of the  $WQ_v$  shall be treated by an acceptable water quality practice prior to entry into an infiltration facility.
- Infiltration practices shall be designed to exfiltrate the entire  $WQ_v$  through the floor of each practice (i.e., sidewalls are not considered in sizing), unless the depth is greater than  $\frac{1}{2}$  the square root of the bottom surface area.
- The construction sequence and specifications for each infiltration practice shall be precisely followed. Experience has shown that the longevity of infiltration practices is strongly influenced by the care taken during construction.
- Design infiltration rates ( $f_c$ ) shall be determined by using Table 5-3, or shall be determined by in-situ rates (using a factor of safety of 2 from the field-derived value) established by one of the approved methods listed in Appendix H.1.3 (rates derived from standard percolation tests are not acceptable).

**Table 5-3 Design Infiltration Rates for Different Soil Textures (Rawls et al., 1982)**

USDA Soil Texture	Design Infiltration Rate ( $f_c$ ) (in/hr)	Design Infiltration Rate ( $f_c$ ) (ft/min)
Sand	8.27	0.0115
Loamy Sand	2.41	0.0033
Sandy Loam	1.02	0.0014
Loam	0.52	0.0007
Silt Loam	0.27	0.0004

#### Design Guidance

- Infiltration practices are best used in conjunction with other practices, and often downstream detention is still needed to meet the  $CP_v$  and  $Q_p$  sizing criteria.
- A porosity value ( $V_v/V_t$ ) of 0.33 should be used to design stone reservoirs for infiltration practices.
- The bottom of the stone reservoir should be completely flat or nearly so (i.e., 0.5% slope) in order that infiltrated runoff will be able to infiltrate through the entire bottom surface area.
- One method to calculate the surface area of infiltration trenches is to use the following equation:

$$A_p = V / (nd_t + f_c t / 12)$$

Where:

$A_p$  = surface area at the bottom of the trench (ft<sup>2</sup>)

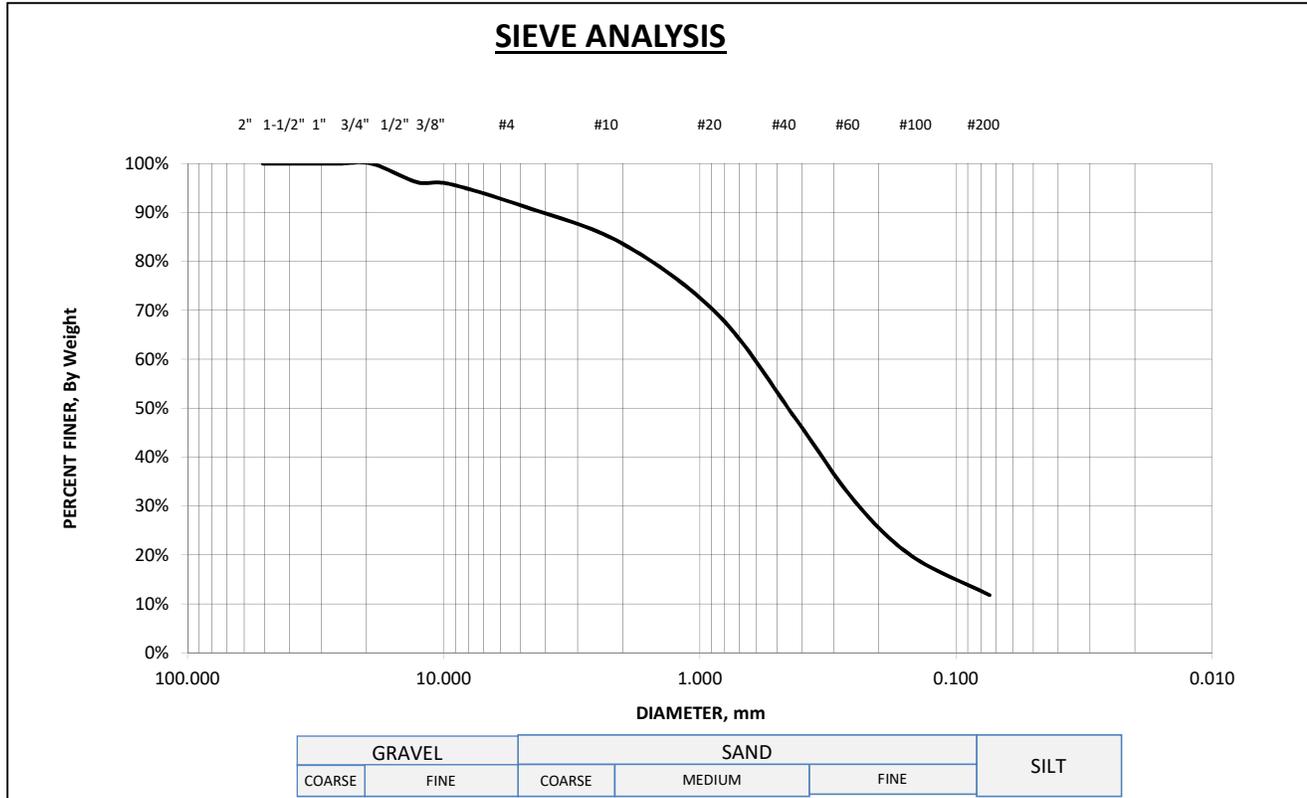
**APPENDIX D**  
**GEOTECHNICAL LABORATORY TESTING**

### SIEVE ANALYSIS

DESCRIPTION:	FINE TO MEDIUM SAND, little Silt, trace Gravel, trace coarse Sand	PROJ:	Roger Williams Park Gateway Ctr.
		LOCATION:	Providence, RI
Sample Location:	Refer to Figure 2	JOB #:	20024
		DATE:	7/17/2020
USCS:	SP-SM	CONTAINER #:	54
TEST BORING NO.:	B-3	CONT.+ WET SOIL:	454.61
DEPTH:	0.5'-2.5'	CONT.+ DRY SOIL:	436.06
SAMPLE #:	S-1	WGT WATER:	18.55
WASH SIEVE	yes	CONT WGT:	84.72
		DRY SOIL:	351.34
		% MOIST:	5.28%

SIEVE	OPENING (MM)	WEIGHT RETAINED	ACCUM. RETAINED	PERCENT RETAINED	TOTAL % FINER/WGT	PROJECT SPEC.
3"	76.2	0.00	0.00	0.00%	100.00%	
2"	50.800	0.00	0.00	0.00%	100.00%	
1 1/2"	37.500	0.00	0.00	0.00%	100.00%	
1"	25.400	0.00	0.00	0.00%	100.00%	
3/4"	19.100	0.00	0.00	0.00%	100.00%	
1/2"	12.700	13.36	13.36	3.80%	96.20%	
3/8"	9.525	1.18	14.54	4.14%	95.86%	
4	4.750	16.85	31.39	8.93%	91.07%	
10	2.000	26.10	57.49	16.36%	83.64%	
20	0.840	51.90	109.39	31.14%	68.86%	
40	0.420	74.54	183.93	52.35%	47.65%	
60	0.250	57.85	241.78	68.82%	31.18%	
100	0.149	39.87	281.65	80.16%	19.84%	
200	0.074	28.17	309.82	88.18%	11.82%	
Pan	0.000	2.86	312.68	89.00%	11.00%	
TOTAL DRY WT.			351.34			

	% GRAVEL	% SAND	% SILT & CLAY
TOTAL	8.9%	79.2%	11.8%
COARSE	0.0%	7.4%	
MEDIUM		36.0%	
FINE	8.9%	35.8%	

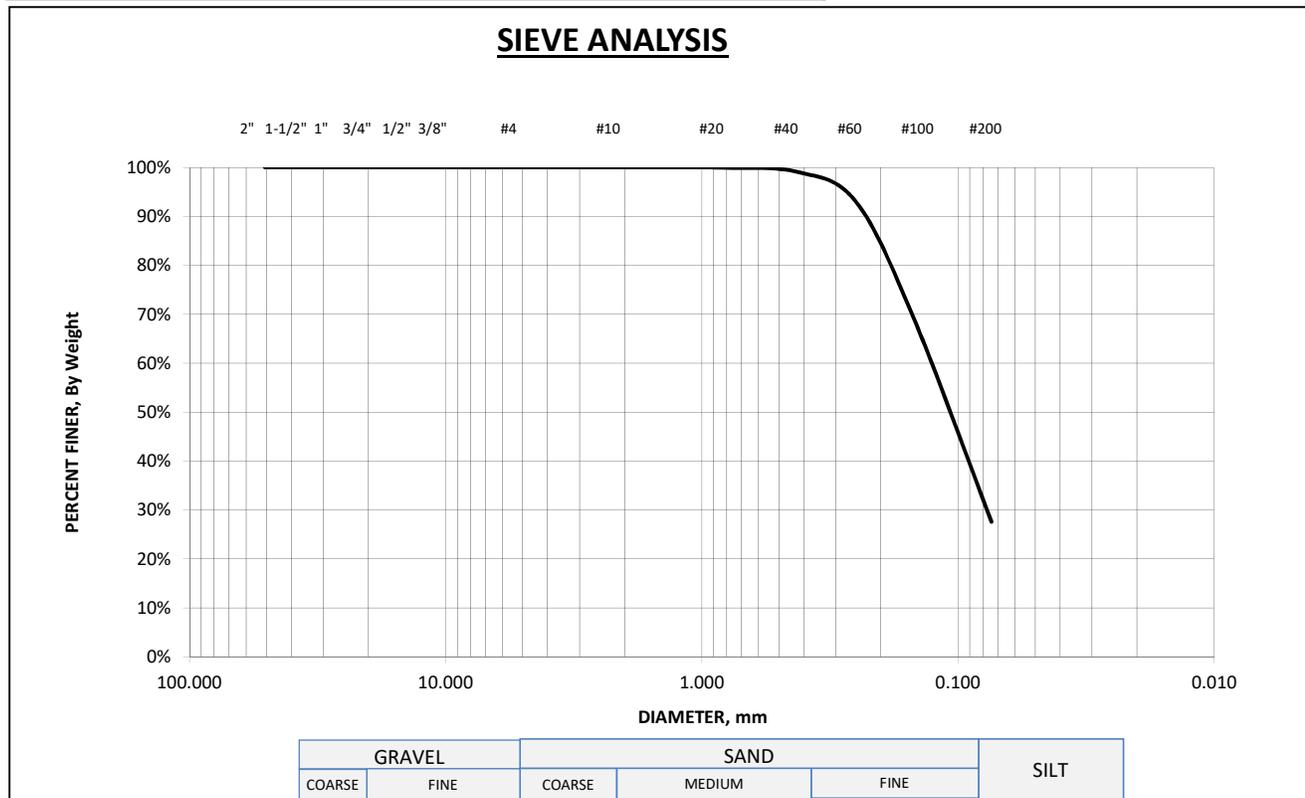


## SIEVE ANALYSIS

DESCRIPTION: FINE SAND, some Silt, trace medium Sand	PROJ: Roger Williams Park Gateway Ctr.
	LOCATION: Providence, RI
Sample Location: Refer to Figure 2	JOB #: 20024
	DATE: 7/17/2020
USCS: SM	CONTAINER #: 102
TEST BORING NO.: B-4	CONT.+ WET SOIL: 454.29
DEPTH: 10'-12'	CONT.+ DRY SOIL: 420.18
SAMPLE #: S-3	WGT WATER: 34.11
WASH SIEVE yes	CONT WGT: 108.72
	DRY SOIL: 311.46
	% MOIST: 10.95%

SIEVE	OPENING (MM)	WEIGHT RETAINED	ACCUM. RETAINED	PERCENT RETAINED	TOTAL % FINER/WGT	PROJECT SPEC.
3"	76.2	0.00	0.00	0.00%	100.00%	
2"	50.800	0.00	0.00	0.00%	100.00%	
1 1/2"	37.500	0.00	0.00	0.00%	100.00%	
1"	25.400	0.00	0.00	0.00%	100.00%	
3/4"	19.100	0.00	0.00	0.00%	100.00%	
1/2"	12.700	0.00	0.00	0.00%	100.00%	
3/8"	9.525	0.00	0.00	0.00%	100.00%	
4	4.750	0.00	0.00	0.00%	100.00%	
10	2.000	0.00	0.00	0.00%	100.00%	
20	0.840	0.22	0.22	0.07%	99.93%	
40	0.420	2.77	2.99	0.96%	99.04%	
60	0.250	18.95	21.94	7.04%	92.96%	
100	0.149	73.85	95.79	30.76%	69.24%	
200	0.074	129.60	225.39	72.37%	27.63%	
Pan	0.000	24.34	249.73	80.18%	19.82%	
TOTAL DRY WT.			311.46			

	% GRAVEL	% SAND	% SILT & CLAY
TOTAL	0.0%	72.4%	27.6%
COARSE	0.0%	0.0%	
MEDIUM		1.0%	
FINE	0.0%	71.4%	

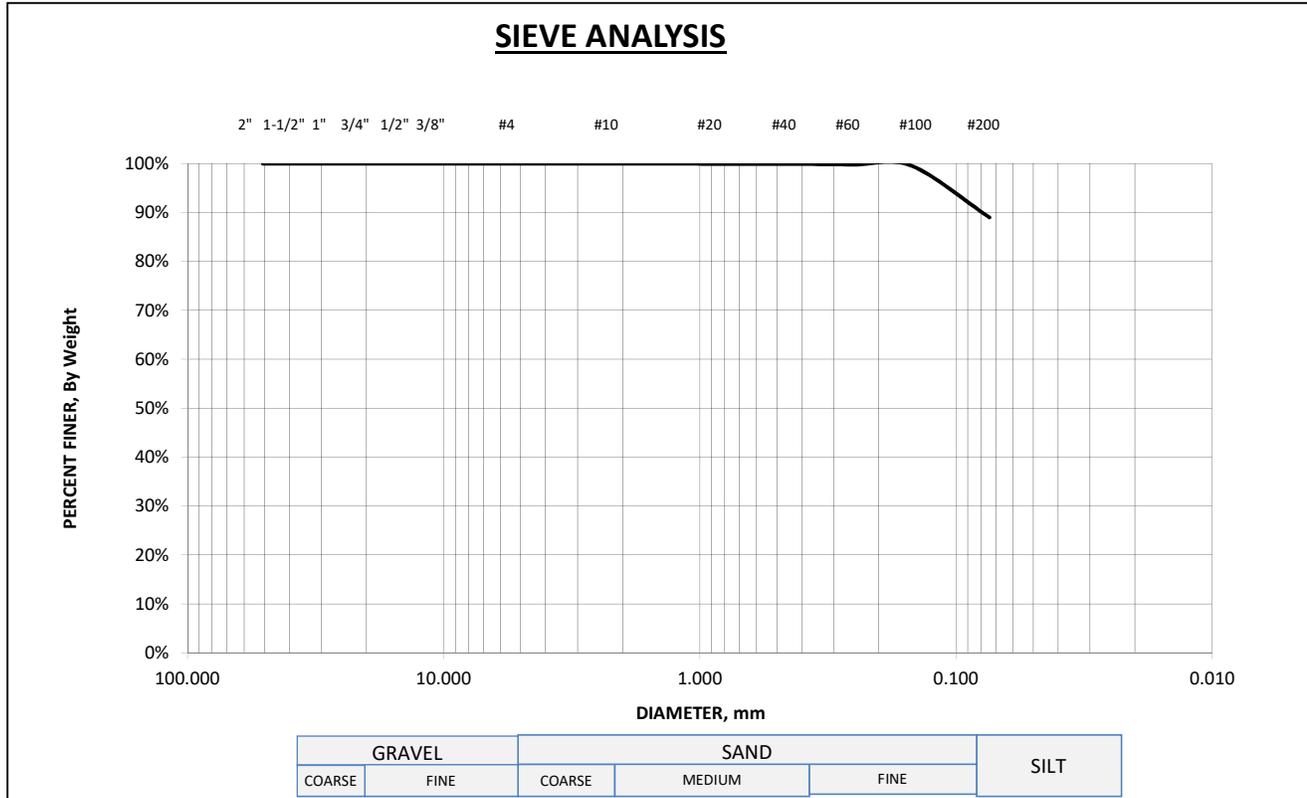


### SIEVE ANALYSIS

DESCRIPTION: SILT, little fine to medium Sand	PROJ: Roger Williams Park Gateway Ctr.
	LOCATION: Providence, RI
Sample Location: Refer to Figure 2	JOB #: 20024
	DATE: 7/17/2020
USCS: ML	CONTAINER #: 19
TEST BORING NO.: B-4	CONT.+ WET SOIL: 422.39
DEPTH: 45'-47'	CONT.+ DRY SOIL: 348.65
SAMPLE #: S-10	WGT WATER: 73.74
WASH SIEVE yes	CONT WGT: 93.56
	DRY SOIL: 255.09
	% MOIST: 28.91%

SIEVE	OPENING (MM)	WEIGHT RETAINED	ACCUM. RETAINED	PERCENT RETAINED	TOTAL % FINER/WGT	PROJECT SPEC.
3"	76.2	0.00	0.00	0.00%	100.00%	
2"	50.800	0.00	0.00	0.00%	100.00%	
1 1/2"	37.500	0.00	0.00	0.00%	100.00%	
1"	25.400	0.00	0.00	0.00%	100.00%	
3/4"	19.100	0.00	0.00	0.00%	100.00%	
1/2"	12.700	0.00	0.00	0.00%	100.00%	
3/8"	9.525	0.00	0.00	0.00%	100.00%	
4	4.750	0.00	0.00	0.00%	100.00%	
10	2.000	0.00	0.00	0.00%	100.00%	
20	0.840	0.16	0.16	0.06%	99.94%	
40	0.420	0.05	0.21	0.08%	99.92%	
60	0.250	0.32	0.53	0.21%	99.79%	
100	0.149	0.62	1.15	0.45%	99.55%	
200	0.074	26.93	28.08	11.01%	88.99%	
Pan	0.000	55.76	83.84	32.87%	67.13%	
TOTAL DRY WT.			255.09			

	% GRAVEL	% SAND	% SILT & CLAY
TOTAL	0.0%	11.0%	89.0%
COARSE	0.0%	0.0%	
MEDIUM		0.1%	
FINE	0.0%	10.9%	

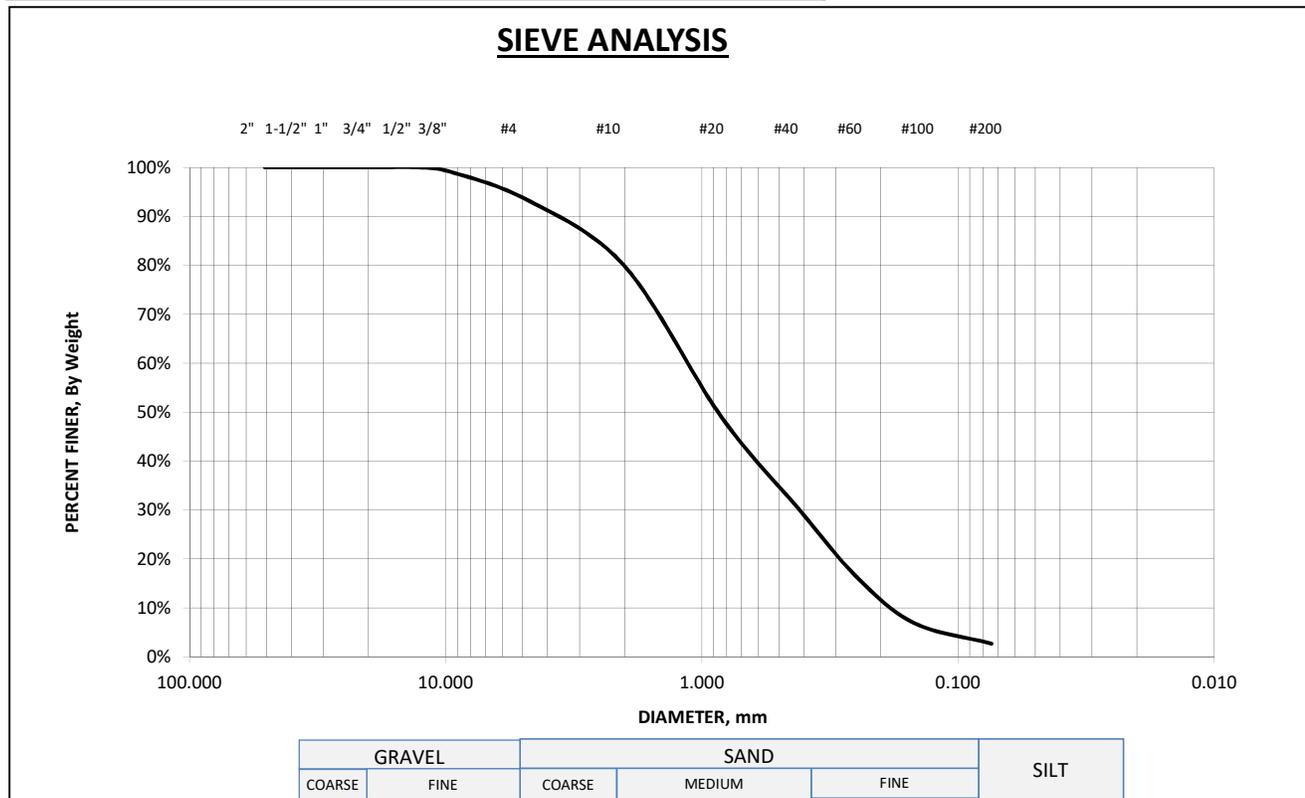


## SIEVE ANALYSIS

DESCRIPTION: FINE TO COARSE SAND, trace Gravel, trace Silt	PROJ: Roger Williams Park Gateway Ctr.
	LOCATION: Providence, RI
Sample Location: Refer to Figure 2	JOB #: 20024
	DATE: 7/17/2020
USCS: SW	CONTAINER #: 60
TEST BORING NO.: TH-1	CONT.+ WET SOIL: 1896.91
DEPTH: 6'	CONT.+ DRY SOIL: 1862.51
SAMPLE #: S-1	WGT WATER: 34.40
WASH SIEVE yes	CONT WGT: 103.06
	DRY SOIL: 1759.45
	% MOIST: 1.96%

SIEVE	OPENING (MM)	WEIGHT RETAINED	ACCUM. RETAINED	PERCENT RETAINED	TOTAL % FINER/WGT	PROJECT SPEC.
3"	76.2	0.00	0.00	0.00%	100.00%	
2"	50.800	0.00	0.00	0.00%	100.00%	
1 1/2"	37.500	0.00	0.00	0.00%	100.00%	
1"	25.400	0.00	0.00	0.00%	100.00%	
3/4"	19.100	0.00	0.00	0.00%	100.00%	
1/2"	12.700	0.00	0.00	0.00%	100.00%	
3/8"	9.525	16.26	16.26	0.92%	99.08%	
4	4.750	102.71	118.97	6.76%	93.24%	
10	2.000	235.91	354.88	20.17%	79.83%	
20	0.840	541.00	895.88	50.92%	49.08%	
40	0.420	329.83	1225.71	69.66%	30.34%	
60	0.250	243.73	1469.44	83.52%	16.48%	
100	0.149	167.08	1636.52	93.01%	6.99%	
200	0.074	74.93	1711.45	97.27%	2.73%	
Pan	0.000	8.74	1720.19	97.77%	2.23%	
TOTAL DRY WT.			1759.45			

	% GRAVEL	% SAND	% SILT & CLAY
TOTAL	6.8%	90.5%	2.7%
COARSE	0.0%	13.4%	
MEDIUM		49.5%	
FINE	6.8%	27.6%	



**APPENDIX E**

**ENVIRONMENTAL ANALYTICAL RESULTS OF SOIL TESTING**



New England Testing Laboratory, Inc.  
(401) 353-3420

## REPORT OF ANALYTICAL RESULTS

**NETLAB Work Order Number: 0G13052**  
**Client Project: Broad Street, Providence RI**

Report Date: 17-July-2020

Prepared for:

Bryan Deely  
Paul B. Aldinger & Associates  
860 Waterman Avenue  
East Providence, RI 02914

---

Richard Warila, Laboratory Director  
New England Testing Laboratory, Inc.  
59 Greenhill Street  
West Warwick, RI 02893  
rich.warila@newenglandtesting.com

**Samples Submitted :**

The samples listed below were submitted to New England Testing Laboratory on 07/13/20. The group of samples appearing in this report was assigned an internal identification number (case number) for laboratory information management purposes. The client's designations for the individual samples, along with our case numbers, are used to identify the samples in this report. This report of analytical results pertains only to the sample(s) provided to us by the client which are indicated on the custody record. The case number for this sample submission is 0G13052. Custody records are included in this report.

<b>Lab ID</b>	<b>Sample</b>	<b>Matrix</b>	<b>Date Sampled</b>	<b>Date Received</b>
0G13052-01	P-1, S-6	Soil	07/13/2020	07/13/2020
0G13052-02	P-2, S-4	Soil	07/13/2020	07/13/2020
0G13052-03	P-3, S-2	Soil	07/13/2020	07/13/2020
0G13052-04	P-4. S-1	Soil	07/13/2020	07/13/2020

## ***Request for Analysis***

At the client's request, the analyses presented in the following table were performed on the samples submitted.

### **P-1, S-6 (Lab Number: 0G13052-01)**

#### **Analysis**

Total Petroleum Hydrocarbons  
Volatile Organic Compounds

#### **Method**

EPA-8100-mod  
EPA 8260C

### **P-2, S-4 (Lab Number: 0G13052-02)**

#### **Analysis**

Total Petroleum Hydrocarbons  
Volatile Organic Compounds

#### **Method**

EPA-8100-mod  
EPA 8260C

### **P-3, S-2 (Lab Number: 0G13052-03)**

#### **Analysis**

Total Petroleum Hydrocarbons  
Volatile Organic Compounds

#### **Method**

EPA-8100-mod  
EPA 8260C

### **P-4, S-1 (Lab Number: 0G13052-04)**

#### **Analysis**

Total Petroleum Hydrocarbons  
Volatile Organic Compounds

#### **Method**

EPA-8100-mod  
EPA 8260C

## ***Method References***

*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, USEPA*

## Case Narrative

### Sample Receipt:

The samples associated with this work order were received in appropriately cooled and preserved containers. The chain of custody was adequately completed and corresponded to the samples submitted.

Exceptions: None

### Analysis:

All samples were prepared and analyzed within method specified holding times and according to NETLAB's documented standard operating procedures. The results for the associated calibration, method blank and laboratory control sample (LCS) were within method specified quality control requirements and allowances. Results for all soil samples, unless otherwise indicated, are reported on a dry weight basis.

Exceptions: None

## Results: Volatile Organic Compounds

**Sample: P-1, S-6**

**Lab Number: 0G13052-01 (Soil)**

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Acetone	ND		130	ug/kg	07/16/20	07/16/20
Benzene	ND		26	ug/kg	07/16/20	07/16/20
Bromobenzene	ND		26	ug/kg	07/16/20	07/16/20
Bromochloromethane	ND		26	ug/kg	07/16/20	07/16/20
Bromodichloromethane	ND		26	ug/kg	07/16/20	07/16/20
Bromoform	ND		26	ug/kg	07/16/20	07/16/20
Bromomethane	ND		26	ug/kg	07/16/20	07/16/20
2-Butanone	ND		130	ug/kg	07/16/20	07/16/20
tert-Butyl alcohol	ND		130	ug/kg	07/16/20	07/16/20
sec-Butylbenzene	ND		26	ug/kg	07/16/20	07/16/20
n-Butylbenzene	ND		26	ug/kg	07/16/20	07/16/20
tert-Butylbenzene	ND		26	ug/kg	07/16/20	07/16/20
Methyl t-butyl ether (MTBE)	ND		26	ug/kg	07/16/20	07/16/20
Carbon Disulfide	ND		26	ug/kg	07/16/20	07/16/20
Carbon Tetrachloride	ND		26	ug/kg	07/16/20	07/16/20
Chlorobenzene	ND		26	ug/kg	07/16/20	07/16/20
Chloroethane	ND		26	ug/kg	07/16/20	07/16/20
Chloroform	ND		26	ug/kg	07/16/20	07/16/20
Chloromethane	ND		26	ug/kg	07/16/20	07/16/20
4-Chlorotoluene	ND		26	ug/kg	07/16/20	07/16/20
2-Chlorotoluene	ND		26	ug/kg	07/16/20	07/16/20
1,2-Dibromo-3-chloropropane (DBCP)	ND		26	ug/kg	07/16/20	07/16/20
Dibromochloromethane	ND		26	ug/kg	07/16/20	07/16/20
1,2-Dibromoethane (EDB)	ND		26	ug/kg	07/16/20	07/16/20
Dibromomethane	ND		26	ug/kg	07/16/20	07/16/20
1,2-Dichlorobenzene	ND		26	ug/kg	07/16/20	07/16/20
1,3-Dichlorobenzene	ND		26	ug/kg	07/16/20	07/16/20
1,4-Dichlorobenzene	ND		26	ug/kg	07/16/20	07/16/20
1,1-Dichloroethane	ND		26	ug/kg	07/16/20	07/16/20
1,2-Dichloroethane	ND		26	ug/kg	07/16/20	07/16/20
trans-1,2-Dichloroethene	ND		26	ug/kg	07/16/20	07/16/20
cis-1,2-Dichloroethene	ND		26	ug/kg	07/16/20	07/16/20
1,1-Dichloroethene	ND		26	ug/kg	07/16/20	07/16/20
1,2-Dichloropropane	ND		26	ug/kg	07/16/20	07/16/20
2,2-Dichloropropane	ND		26	ug/kg	07/16/20	07/16/20
cis-1,3-Dichloropropene	ND		26	ug/kg	07/16/20	07/16/20
trans-1,3-Dichloropropene	ND		26	ug/kg	07/16/20	07/16/20
1,1-Dichloropropene	ND		26	ug/kg	07/16/20	07/16/20
1,3-Dichloropropene (cis + trans)	ND		52	ug/kg	07/16/20	07/16/20
Diethyl ether	ND		130	ug/kg	07/16/20	07/16/20
1,4-Dioxane	ND		13000	ug/kg	07/16/20	07/16/20
Ethylbenzene	ND		26	ug/kg	07/16/20	07/16/20
Hexachlorobutadiene	ND		26	ug/kg	07/16/20	07/16/20
2-Hexanone	ND		130	ug/kg	07/16/20	07/16/20
Isopropylbenzene	ND		26	ug/kg	07/16/20	07/16/20
p-Isopropyltoluene	ND		26	ug/kg	07/16/20	07/16/20
Methylene Chloride	ND		519	ug/kg	07/16/20	07/16/20
4-Methyl-2-pentanone	ND		130	ug/kg	07/16/20	07/16/20

## Results: Volatile Organic Compounds (Continued)

**Sample: P-1, S-6 (Continued)**

**Lab Number: 0G13052-01 (Soil)**

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Naphthalene	ND		26	ug/kg	07/16/20	07/16/20
n-Propylbenzene	ND		26	ug/kg	07/16/20	07/16/20
Styrene	ND		26	ug/kg	07/16/20	07/16/20
1,1,1,2-Tetrachloroethane	ND		26	ug/kg	07/16/20	07/16/20
Tetrachloroethene	ND		26	ug/kg	07/16/20	07/16/20
Tetrahydrofuran	ND		130	ug/kg	07/16/20	07/16/20
Toluene	ND		26	ug/kg	07/16/20	07/16/20
1,2,4-Trichlorobenzene	ND		26	ug/kg	07/16/20	07/16/20
1,2,3-Trichlorobenzene	ND		26	ug/kg	07/16/20	07/16/20
1,1,2-Trichloroethane	ND		26	ug/kg	07/16/20	07/16/20
1,1,1-Trichloroethane	ND		26	ug/kg	07/16/20	07/16/20
Trichloroethene	ND		26	ug/kg	07/16/20	07/16/20
1,2,3-Trichloropropane	ND		26	ug/kg	07/16/20	07/16/20
1,3,5-Trimethylbenzene	ND		26	ug/kg	07/16/20	07/16/20
<b>1,2,4-Trimethylbenzene</b>	<b>38</b>		26	ug/kg	07/16/20	07/16/20
Vinyl Chloride	ND		26	ug/kg	07/16/20	07/16/20
o-Xylene	ND		26	ug/kg	07/16/20	07/16/20
m&p-Xylene	ND		52	ug/kg	07/16/20	07/16/20
Total xylenes	ND		52	ug/kg	07/16/20	07/16/20
1,1,2,2-Tetrachloroethane	ND		26	ug/kg	07/16/20	07/16/20
tert-Amyl methyl ether	ND		26	ug/kg	07/16/20	07/16/20
1,3-Dichloropropane	ND		26	ug/kg	07/16/20	07/16/20
Ethyl tert-butyl ether	ND		26	ug/kg	07/16/20	07/16/20
Diisopropyl ether	ND		26	ug/kg	07/16/20	07/16/20
Trichlorofluoromethane	ND		26	ug/kg	07/16/20	07/16/20
Dichlorodifluoromethane	ND		26	ug/kg	07/16/20	07/16/20
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Surrogate(s)	Recovery%		Limits			
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<i>4-Bromofluorobenzene</i>	<i>101%</i>		<i>70-130</i>		07/16/20	07/16/20
<i>1,2-Dichloroethane-d4</i>	<i>98.8%</i>		<i>70-130</i>		07/16/20	07/16/20
<i>Toluene-d8</i>	<i>100%</i>		<i>70-130</i>		07/16/20	07/16/20

## Results: Volatile Organic Compounds

**Sample: P-2, S-4**

**Lab Number: 0G13052-02 (Soil)**

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Acetone	ND		297	ug/kg	07/16/20	07/16/20
Benzene	ND		59	ug/kg	07/16/20	07/16/20
Bromobenzene	ND		59	ug/kg	07/16/20	07/16/20
Bromochloromethane	ND		59	ug/kg	07/16/20	07/16/20
Bromodichloromethane	ND		59	ug/kg	07/16/20	07/16/20
Bromoform	ND		59	ug/kg	07/16/20	07/16/20
Bromomethane	ND		59	ug/kg	07/16/20	07/16/20
2-Butanone	ND		297	ug/kg	07/16/20	07/16/20
tert-Butyl alcohol	ND		297	ug/kg	07/16/20	07/16/20
<b>sec-Butylbenzene</b>	<b>2190</b>		59	ug/kg	07/16/20	07/16/20
<b>n-Butylbenzene</b>	<b>4940</b>		59	ug/kg	07/16/20	07/16/20
tert-Butylbenzene	ND		59	ug/kg	07/16/20	07/16/20
Methyl t-butyl ether (MTBE)	ND		59	ug/kg	07/16/20	07/16/20
Carbon Disulfide	ND		59	ug/kg	07/16/20	07/16/20
Carbon Tetrachloride	ND		59	ug/kg	07/16/20	07/16/20
Chlorobenzene	ND		59	ug/kg	07/16/20	07/16/20
Chloroethane	ND		59	ug/kg	07/16/20	07/16/20
Chloroform	ND		59	ug/kg	07/16/20	07/16/20
Chloromethane	ND		59	ug/kg	07/16/20	07/16/20
4-Chlorotoluene	ND		59	ug/kg	07/16/20	07/16/20
2-Chlorotoluene	ND		59	ug/kg	07/16/20	07/16/20
1,2-Dibromo-3-chloropropane (DBCP)	ND		59	ug/kg	07/16/20	07/16/20
Dibromochloromethane	ND		59	ug/kg	07/16/20	07/16/20
1,2-Dibromoethane (EDB)	ND		59	ug/kg	07/16/20	07/16/20
Dibromomethane	ND		59	ug/kg	07/16/20	07/16/20
1,2-Dichlorobenzene	ND		59	ug/kg	07/16/20	07/16/20
1,3-Dichlorobenzene	ND		59	ug/kg	07/16/20	07/16/20
1,4-Dichlorobenzene	ND		59	ug/kg	07/16/20	07/16/20
1,1-Dichloroethane	ND		59	ug/kg	07/16/20	07/16/20
1,2-Dichloroethane	ND		59	ug/kg	07/16/20	07/16/20
trans-1,2-Dichloroethene	ND		59	ug/kg	07/16/20	07/16/20
cis-1,2-Dichloroethene	ND		59	ug/kg	07/16/20	07/16/20
1,1-Dichloroethene	ND		59	ug/kg	07/16/20	07/16/20
1,2-Dichloropropane	ND		59	ug/kg	07/16/20	07/16/20
2,2-Dichloropropane	ND		59	ug/kg	07/16/20	07/16/20
cis-1,3-Dichloropropene	ND		59	ug/kg	07/16/20	07/16/20
trans-1,3-Dichloropropene	ND		59	ug/kg	07/16/20	07/16/20
1,1-Dichloropropene	ND		59	ug/kg	07/16/20	07/16/20
1,3-Dichloropropene (cis + trans)	ND		119	ug/kg	07/16/20	07/16/20
Diethyl ether	ND		297	ug/kg	07/16/20	07/16/20
1,4-Dioxane	ND		29700	ug/kg	07/16/20	07/16/20
<b>Ethylbenzene</b>	<b>2190</b>		59	ug/kg	07/16/20	07/16/20
Hexachlorobutadiene	ND		59	ug/kg	07/16/20	07/16/20
2-Hexanone	ND		297	ug/kg	07/16/20	07/16/20
<b>Isopropylbenzene</b>	<b>592</b>		59	ug/kg	07/16/20	07/16/20
<b>p-Isopropyltoluene</b>	<b>2310</b>		59	ug/kg	07/16/20	07/16/20
Methylene Chloride	ND		1190	ug/kg	07/16/20	07/16/20
4-Methyl-2-pentanone	ND		297	ug/kg	07/16/20	07/16/20

## Results: Volatile Organic Compounds (Continued)

**Sample: P-2, S-4 (Continued)**

**Lab Number: 0G13052-02 (Soil)**

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
<b>Naphthalene</b>	<b>22000</b>		237	ug/kg	07/16/20	07/16/20
<b>n-Propylbenzene</b>	<b>1980</b>		59	ug/kg	07/16/20	07/16/20
Styrene	ND		59	ug/kg	07/16/20	07/16/20
1,1,1,2-Tetrachloroethane	ND		59	ug/kg	07/16/20	07/16/20
Tetrachloroethene	ND		59	ug/kg	07/16/20	07/16/20
Tetrahydrofuran	ND		297	ug/kg	07/16/20	07/16/20
Toluene	ND		59	ug/kg	07/16/20	07/16/20
1,2,4-Trichlorobenzene	ND		59	ug/kg	07/16/20	07/16/20
1,2,3-Trichlorobenzene	ND		59	ug/kg	07/16/20	07/16/20
1,1,2-Trichloroethane	ND		59	ug/kg	07/16/20	07/16/20
1,1,1-Trichloroethane	ND		59	ug/kg	07/16/20	07/16/20
Trichloroethene	ND		59	ug/kg	07/16/20	07/16/20
1,2,3-Trichloropropane	ND		59	ug/kg	07/16/20	07/16/20
<b>1,3,5-Trimethylbenzene</b>	<b>5600</b>		59	ug/kg	07/16/20	07/16/20
<b>1,2,4-Trimethylbenzene</b>	<b>13000</b>		237	ug/kg	07/16/20	07/16/20
Vinyl Chloride	ND		59	ug/kg	07/16/20	07/16/20
<b>o-Xylene</b>	<b>304</b>		59	ug/kg	07/16/20	07/16/20
<b>m&amp;p-Xylene</b>	<b>2120</b>		119	ug/kg	07/16/20	07/16/20
<b>Total xylenes</b>	<b>2420</b>		119	ug/kg	07/16/20	07/16/20
1,1,2,2-Tetrachloroethane	ND		59	ug/kg	07/16/20	07/16/20
tert-Amyl methyl ether	ND		59	ug/kg	07/16/20	07/16/20
1,3-Dichloropropane	ND		59	ug/kg	07/16/20	07/16/20
Ethyl tert-butyl ether	ND		59	ug/kg	07/16/20	07/16/20
Diisopropyl ether	ND		59	ug/kg	07/16/20	07/16/20
Trichlorofluoromethane	ND		59	ug/kg	07/16/20	07/16/20
Dichlorodifluoromethane	ND		59	ug/kg	07/16/20	07/16/20
Surrogate(s)	Recovery%		Limits			
<i>4-Bromofluorobenzene</i>	<i>115%</i>		<i>70-130</i>		07/16/20	07/16/20
<i>1,2-Dichloroethane-d4</i>	<i>99.3%</i>		<i>70-130</i>		07/16/20	07/16/20
<i>Toluene-d8</i>	<i>102%</i>		<i>70-130</i>		07/16/20	07/16/20

## Results: Volatile Organic Compounds

**Sample: P-3, S-2**

**Lab Number: 0G13052-03 (Soil)**

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Acetone	ND		254	ug/kg	07/16/20	07/16/20
Benzene	ND		51	ug/kg	07/16/20	07/16/20
Bromobenzene	ND		51	ug/kg	07/16/20	07/16/20
Bromochloromethane	ND		51	ug/kg	07/16/20	07/16/20
Bromodichloromethane	ND		51	ug/kg	07/16/20	07/16/20
Bromoform	ND		51	ug/kg	07/16/20	07/16/20
Bromomethane	ND		51	ug/kg	07/16/20	07/16/20
2-Butanone	ND		254	ug/kg	07/16/20	07/16/20
tert-Butyl alcohol	ND		254	ug/kg	07/16/20	07/16/20
sec-Butylbenzene	ND		51	ug/kg	07/16/20	07/16/20
n-Butylbenzene	ND		51	ug/kg	07/16/20	07/16/20
tert-Butylbenzene	ND		51	ug/kg	07/16/20	07/16/20
Methyl t-butyl ether (MTBE)	ND		51	ug/kg	07/16/20	07/16/20
Carbon Disulfide	ND		51	ug/kg	07/16/20	07/16/20
Carbon Tetrachloride	ND		51	ug/kg	07/16/20	07/16/20
Chlorobenzene	ND		51	ug/kg	07/16/20	07/16/20
Chloroethane	ND		51	ug/kg	07/16/20	07/16/20
Chloroform	ND		51	ug/kg	07/16/20	07/16/20
Chloromethane	ND		51	ug/kg	07/16/20	07/16/20
4-Chlorotoluene	ND		51	ug/kg	07/16/20	07/16/20
2-Chlorotoluene	ND		51	ug/kg	07/16/20	07/16/20
1,2-Dibromo-3-chloropropane (DBCP)	ND		51	ug/kg	07/16/20	07/16/20
Dibromochloromethane	ND		51	ug/kg	07/16/20	07/16/20
1,2-Dibromoethane (EDB)	ND		51	ug/kg	07/16/20	07/16/20
Dibromomethane	ND		51	ug/kg	07/16/20	07/16/20
1,2-Dichlorobenzene	ND		51	ug/kg	07/16/20	07/16/20
1,3-Dichlorobenzene	ND		51	ug/kg	07/16/20	07/16/20
1,4-Dichlorobenzene	ND		51	ug/kg	07/16/20	07/16/20
1,1-Dichloroethane	ND		51	ug/kg	07/16/20	07/16/20
1,2-Dichloroethane	ND		51	ug/kg	07/16/20	07/16/20
trans-1,2-Dichloroethene	ND		51	ug/kg	07/16/20	07/16/20
cis-1,2-Dichloroethene	ND		51	ug/kg	07/16/20	07/16/20
1,1-Dichloroethene	ND		51	ug/kg	07/16/20	07/16/20
1,2-Dichloropropane	ND		51	ug/kg	07/16/20	07/16/20
2,2-Dichloropropane	ND		51	ug/kg	07/16/20	07/16/20
cis-1,3-Dichloropropene	ND		51	ug/kg	07/16/20	07/16/20
trans-1,3-Dichloropropene	ND		51	ug/kg	07/16/20	07/16/20
1,1-Dichloropropene	ND		51	ug/kg	07/16/20	07/16/20
1,3-Dichloropropene (cis + trans)	ND		102	ug/kg	07/16/20	07/16/20
Diethyl ether	ND		254	ug/kg	07/16/20	07/16/20
1,4-Dioxane	ND		25400	ug/kg	07/16/20	07/16/20
Ethylbenzene	ND		51	ug/kg	07/16/20	07/16/20
Hexachlorobutadiene	ND		51	ug/kg	07/16/20	07/16/20
2-Hexanone	ND		254	ug/kg	07/16/20	07/16/20
Isopropylbenzene	ND		51	ug/kg	07/16/20	07/16/20
p-Isopropyltoluene	ND		51	ug/kg	07/16/20	07/16/20
Methylene Chloride	ND		1020	ug/kg	07/16/20	07/16/20
4-Methyl-2-pentanone	ND		254	ug/kg	07/16/20	07/16/20

## Results: Volatile Organic Compounds (Continued)

**Sample: P-3, S-2 (Continued)**

**Lab Number: 0G13052-03 (Soil)**

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Naphthalene	ND		51	ug/kg	07/16/20	07/16/20
n-Propylbenzene	ND		51	ug/kg	07/16/20	07/16/20
Styrene	ND		51	ug/kg	07/16/20	07/16/20
1,1,1,2-Tetrachloroethane	ND		51	ug/kg	07/16/20	07/16/20
Tetrachloroethene	ND		51	ug/kg	07/16/20	07/16/20
Tetrahydrofuran	ND		254	ug/kg	07/16/20	07/16/20
Toluene	ND		51	ug/kg	07/16/20	07/16/20
1,2,4-Trichlorobenzene	ND		51	ug/kg	07/16/20	07/16/20
1,2,3-Trichlorobenzene	ND		51	ug/kg	07/16/20	07/16/20
1,1,2-Trichloroethane	ND		51	ug/kg	07/16/20	07/16/20
1,1,1-Trichloroethane	ND		51	ug/kg	07/16/20	07/16/20
Trichloroethene	ND		51	ug/kg	07/16/20	07/16/20
1,2,3-Trichloropropane	ND		51	ug/kg	07/16/20	07/16/20
1,3,5-Trimethylbenzene	ND		51	ug/kg	07/16/20	07/16/20
1,2,4-Trimethylbenzene	ND		51	ug/kg	07/16/20	07/16/20
Vinyl Chloride	ND		51	ug/kg	07/16/20	07/16/20
o-Xylene	ND		51	ug/kg	07/16/20	07/16/20
m&p-Xylene	ND		102	ug/kg	07/16/20	07/16/20
Total xylenes	ND		102	ug/kg	07/16/20	07/16/20
1,1,2,2-Tetrachloroethane	ND		51	ug/kg	07/16/20	07/16/20
tert-Amyl methyl ether	ND		51	ug/kg	07/16/20	07/16/20
1,3-Dichloropropane	ND		51	ug/kg	07/16/20	07/16/20
Ethyl tert-butyl ether	ND		51	ug/kg	07/16/20	07/16/20
Diisopropyl ether	ND		51	ug/kg	07/16/20	07/16/20
Trichlorofluoromethane	ND		51	ug/kg	07/16/20	07/16/20
Dichlorodifluoromethane	ND		51	ug/kg	07/16/20	07/16/20
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Surrogate(s)	Recovery%		Limits			
<i>4-Bromofluorobenzene</i>	<i>101%</i>		<i>70-130</i>		07/16/20	07/16/20
<i>1,2-Dichloroethane-d4</i>	<i>99.9%</i>		<i>70-130</i>		07/16/20	07/16/20
<i>Toluene-d8</i>	<i>99.3%</i>		<i>70-130</i>		07/16/20	07/16/20

## Results: Volatile Organic Compounds

**Sample: P-4. S-1**

**Lab Number: 0G13052-04 (Soil)**

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Acetone	ND		134	ug/kg	07/16/20	07/16/20
Benzene	ND		27	ug/kg	07/16/20	07/16/20
Bromobenzene	ND		27	ug/kg	07/16/20	07/16/20
Bromochloromethane	ND		27	ug/kg	07/16/20	07/16/20
Bromodichloromethane	ND		27	ug/kg	07/16/20	07/16/20
Bromoform	ND		27	ug/kg	07/16/20	07/16/20
Bromomethane	ND		27	ug/kg	07/16/20	07/16/20
2-Butanone	ND		134	ug/kg	07/16/20	07/16/20
tert-Butyl alcohol	ND		134	ug/kg	07/16/20	07/16/20
sec-Butylbenzene	ND		27	ug/kg	07/16/20	07/16/20
n-Butylbenzene	ND		27	ug/kg	07/16/20	07/16/20
tert-Butylbenzene	ND		27	ug/kg	07/16/20	07/16/20
Methyl t-butyl ether (MTBE)	ND		27	ug/kg	07/16/20	07/16/20
Carbon Disulfide	ND		27	ug/kg	07/16/20	07/16/20
Carbon Tetrachloride	ND		27	ug/kg	07/16/20	07/16/20
Chlorobenzene	ND		27	ug/kg	07/16/20	07/16/20
Chloroethane	ND		27	ug/kg	07/16/20	07/16/20
Chloroform	ND		27	ug/kg	07/16/20	07/16/20
Chloromethane	ND		27	ug/kg	07/16/20	07/16/20
4-Chlorotoluene	ND		27	ug/kg	07/16/20	07/16/20
2-Chlorotoluene	ND		27	ug/kg	07/16/20	07/16/20
1,2-Dibromo-3-chloropropane (DBCP)	ND		27	ug/kg	07/16/20	07/16/20
Dibromochloromethane	ND		27	ug/kg	07/16/20	07/16/20
1,2-Dibromoethane (EDB)	ND		27	ug/kg	07/16/20	07/16/20
Dibromomethane	ND		27	ug/kg	07/16/20	07/16/20
1,2-Dichlorobenzene	ND		27	ug/kg	07/16/20	07/16/20
1,3-Dichlorobenzene	ND		27	ug/kg	07/16/20	07/16/20
1,4-Dichlorobenzene	ND		27	ug/kg	07/16/20	07/16/20
1,1-Dichloroethane	ND		27	ug/kg	07/16/20	07/16/20
1,2-Dichloroethane	ND		27	ug/kg	07/16/20	07/16/20
trans-1,2-Dichloroethene	ND		27	ug/kg	07/16/20	07/16/20
cis-1,2-Dichloroethene	ND		27	ug/kg	07/16/20	07/16/20
1,1-Dichloroethene	ND		27	ug/kg	07/16/20	07/16/20
1,2-Dichloropropane	ND		27	ug/kg	07/16/20	07/16/20
2,2-Dichloropropane	ND		27	ug/kg	07/16/20	07/16/20
cis-1,3-Dichloropropene	ND		27	ug/kg	07/16/20	07/16/20
trans-1,3-Dichloropropene	ND		27	ug/kg	07/16/20	07/16/20
1,1-Dichloropropene	ND		27	ug/kg	07/16/20	07/16/20
1,3-Dichloropropene (cis + trans)	ND		54	ug/kg	07/16/20	07/16/20
Diethyl ether	ND		134	ug/kg	07/16/20	07/16/20
1,4-Dioxane	ND		13400	ug/kg	07/16/20	07/16/20
Ethylbenzene	ND		27	ug/kg	07/16/20	07/16/20
Hexachlorobutadiene	ND		27	ug/kg	07/16/20	07/16/20
2-Hexanone	ND		134	ug/kg	07/16/20	07/16/20
Isopropylbenzene	ND		27	ug/kg	07/16/20	07/16/20
p-Isopropyltoluene	ND		27	ug/kg	07/16/20	07/16/20
Methylene Chloride	ND		537	ug/kg	07/16/20	07/16/20
4-Methyl-2-pentanone	ND		134	ug/kg	07/16/20	07/16/20

## Results: Volatile Organic Compounds (Continued)

**Sample: P-4. S-1 (Continued)**

**Lab Number: 0G13052-04 (Soil)**

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
<b>Naphthalene</b>	<b>1060</b>		27	ug/kg	07/16/20	07/16/20
n-Propylbenzene	ND		27	ug/kg	07/16/20	07/16/20
Styrene	ND		27	ug/kg	07/16/20	07/16/20
1,1,1,2-Tetrachloroethane	ND		27	ug/kg	07/16/20	07/16/20
Tetrachloroethene	ND		27	ug/kg	07/16/20	07/16/20
Tetrahydrofuran	ND		134	ug/kg	07/16/20	07/16/20
Toluene	ND		27	ug/kg	07/16/20	07/16/20
1,2,4-Trichlorobenzene	ND		27	ug/kg	07/16/20	07/16/20
1,2,3-Trichlorobenzene	ND		27	ug/kg	07/16/20	07/16/20
1,1,2-Trichloroethane	ND		27	ug/kg	07/16/20	07/16/20
1,1,1-Trichloroethane	ND		27	ug/kg	07/16/20	07/16/20
Trichloroethene	ND		27	ug/kg	07/16/20	07/16/20
1,2,3-Trichloropropane	ND		27	ug/kg	07/16/20	07/16/20
1,3,5-Trimethylbenzene	ND		27	ug/kg	07/16/20	07/16/20
1,2,4-Trimethylbenzene	ND		27	ug/kg	07/16/20	07/16/20
Vinyl Chloride	ND		27	ug/kg	07/16/20	07/16/20
o-Xylene	ND		27	ug/kg	07/16/20	07/16/20
m&p-Xylene	ND		54	ug/kg	07/16/20	07/16/20
Total xylenes	ND		54	ug/kg	07/16/20	07/16/20
1,1,2,2-Tetrachloroethane	ND		27	ug/kg	07/16/20	07/16/20
tert-Amyl methyl ether	ND		27	ug/kg	07/16/20	07/16/20
1,3-Dichloropropane	ND		27	ug/kg	07/16/20	07/16/20
Ethyl tert-butyl ether	ND		27	ug/kg	07/16/20	07/16/20
Diisopropyl ether	ND		27	ug/kg	07/16/20	07/16/20
Trichlorofluoromethane	ND		27	ug/kg	07/16/20	07/16/20
Dichlorodifluoromethane	ND		27	ug/kg	07/16/20	07/16/20
Surrogate(s)	Recovery%		Limits			
<i>4-Bromofluorobenzene</i>	<i>100%</i>		<i>70-130</i>		07/16/20	07/16/20
<i>1,2-Dichloroethane-d4</i>	<i>101%</i>		<i>70-130</i>		07/16/20	07/16/20
<i>Toluene-d8</i>	<i>100%</i>		<i>70-130</i>		07/16/20	07/16/20

**Results: Total Petroleum Hydrocarbons****Sample: P-1, S-6****Lab Number: 0G13052-01 (Soil)**

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Total Petroleum Hydrocarbons	ND		29	mg/kg	07/15/20	07/15/20
Surrogate(s)	Recovery%		Limits			
<i>Chlorooctadecane</i>	<i>60.7%</i>		<i>56.5-114</i>		07/15/20	07/15/20

**Results: Total Petroleum Hydrocarbons****Sample: P-2, S-4****Lab Number: 0G13052-02 (Soil)**

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
<b>Total Petroleum Hydrocarbons</b>	<b>3330</b>		56	mg/kg	07/15/20	07/16/20
Surrogate(s)	Recovery%		Limits			
<i>Chlorooctadecane</i>	<i>73.7%</i>		<i>56.5-114</i>		07/15/20	07/16/20

**Results: Total Petroleum Hydrocarbons****Sample: P-3, S-2****Lab Number: 0G13052-03 (Soil)**

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Total Petroleum Hydrocarbons	ND		28	mg/kg	07/15/20	07/15/20
Surrogate(s)	Recovery%		Limits			
<i>Chlorooctadecane</i>	57.5%		56.5-114		07/15/20	07/15/20

**Results: Total Petroleum Hydrocarbons****Sample: P-4. S-1****Lab Number: 0G13052-04 (Soil)**

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
<b>Total Petroleum Hydrocarbons</b>	<b>3510</b>		140	mg/kg	07/15/20	07/16/20
Surrogate(s)	Recovery%		Limits			
<i>Chlorooctadecane</i>	<i>73.3%</i>		<i>56.5-114</i>		07/15/20	07/16/20

## Quality Control

### Volatile Organic Compounds

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch: B0G0692 - Purge-Trap</b>										
<b>Blank (B0G0692-BLK1)</b>					Prepared & Analyzed: 07/16/20					
Acetone	ND		250	ug/kg						
Benzene	ND		50	ug/kg						
Bromobenzene	ND		50	ug/kg						
Bromochloromethane	ND		50	ug/kg						
Bromodichloromethane	ND		50	ug/kg						
Bromoform	ND		50	ug/kg						
Bromomethane	ND		50	ug/kg						
2-Butanone	ND		250	ug/kg						
tert-Butyl alcohol	ND		250	ug/kg						
sec-Butylbenzene	ND		50	ug/kg						
n-Butylbenzene	ND		50	ug/kg						
tert-Butylbenzene	ND		50	ug/kg						
Methyl t-butyl ether (MTBE)	ND		50	ug/kg						
Carbon Disulfide	ND		50	ug/kg						
Carbon Tetrachloride	ND		50	ug/kg						
Chlorobenzene	ND		50	ug/kg						
Chloroethane	ND		50	ug/kg						
Chloroform	ND		50	ug/kg						
Chloromethane	ND		50	ug/kg						
4-Chlorotoluene	ND		50	ug/kg						
2-Chlorotoluene	ND		50	ug/kg						
1,2-Dibromo-3-chloropropane (DBCP)	ND		50	ug/kg						
Dibromochloromethane	ND		50	ug/kg						
1,2-Dibromoethane (EDB)	ND		50	ug/kg						
Dibromomethane	ND		50	ug/kg						
1,2-Dichlorobenzene	ND		50	ug/kg						
1,3-Dichlorobenzene	ND		50	ug/kg						
1,4-Dichlorobenzene	ND		50	ug/kg						
1,1-Dichloroethane	ND		50	ug/kg						
1,2-Dichloroethane	ND		50	ug/kg						
trans-1,2-Dichloroethene	ND		50	ug/kg						
cis-1,2-Dichloroethene	ND		50	ug/kg						
1,1-Dichloroethene	ND		50	ug/kg						
1,2-Dichloropropane	ND		50	ug/kg						
2,2-Dichloropropane	ND		50	ug/kg						
cis-1,3-Dichloropropene	ND		50	ug/kg						
trans-1,3-Dichloropropene	ND		50	ug/kg						
1,1-Dichloropropene	ND		50	ug/kg						
1,3-Dichloropropene (cis + trans)	ND		100	ug/kg						
Diethyl ether	ND		250	ug/kg						
1,4-Dioxane	ND		25000	ug/kg						
Ethylbenzene	ND		50	ug/kg						
Hexachlorobutadiene	ND		50	ug/kg						
2-Hexanone	ND		250	ug/kg						
Isopropylbenzene	ND		50	ug/kg						
p-Isopropyltoluene	ND		50	ug/kg						
Methylene Chloride	ND		1000	ug/kg						
4-Methyl-2-pentanone	ND		250	ug/kg						
Naphthalene	ND		50	ug/kg						
n-Propylbenzene	ND		50	ug/kg						
Styrene	ND		50	ug/kg						
1,1,1,2-Tetrachloroethane	ND		50	ug/kg						
Tetrachloroethene	ND		50	ug/kg						
Tetrahydrofuran	ND		250	ug/kg						

**Quality Control**  
(Continued)

**Volatile Organic Compounds (Continued)**

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch: B0G0692 - Purge-Trap (Continued)</b>										
<b>Blank (B0G0692-BLK1)</b>					Prepared & Analyzed: 07/16/20					
Toluene	ND		50	ug/kg						
1,2,4-Trichlorobenzene	ND		50	ug/kg						
1,2,3-Trichlorobenzene	ND		50	ug/kg						
1,1,2-Trichloroethane	ND		50	ug/kg						
1,1,1-Trichloroethane	ND		50	ug/kg						
Trichloroethene	ND		50	ug/kg						
1,2,3-Trichloropropane	ND		50	ug/kg						
1,3,5-Trimethylbenzene	ND		50	ug/kg						
1,2,4-Trimethylbenzene	ND		50	ug/kg						
Vinyl Chloride	ND		50	ug/kg						
o-Xylene	ND		50	ug/kg						
m&p-Xylene	ND		100	ug/kg						
Total xylenes	ND		100	ug/kg						
1,1,2,2-Tetrachloroethane	ND		50	ug/kg						
tert-Amyl methyl ether	ND		50	ug/kg						
1,3-Dichloropropane	ND		50	ug/kg						
Ethyl tert-butyl ether	ND		50	ug/kg						
Diisopropyl ether	ND		50	ug/kg						
Trichlorofluoromethane	ND		50	ug/kg						
Dichlorodifluoromethane	ND		50	ug/kg						
<i>Surrogate: 4-Bromofluorobenzene</i>			<i>49.8</i>	<i>ug/l</i>	<i>50.0</i>		<i>99.6</i>	<i>70-130</i>		
<i>Surrogate: 1,2-Dichloroethane-d4</i>			<i>50.6</i>	<i>ug/l</i>	<i>50.0</i>		<i>101</i>	<i>70-130</i>		
<i>Surrogate: Toluene-d8</i>			<i>50.1</i>	<i>ug/l</i>	<i>50.0</i>		<i>100</i>	<i>70-130</i>		
<b>LCS (B0G0692-BS1)</b>					Prepared & Analyzed: 07/16/20					
Acetone	67			ug/l	50.0		135	70-130		
Benzene	55			ug/l	50.0		109	70-130		
Bromobenzene	49			ug/l	50.0		98.5	70-130		
Bromochloromethane	49			ug/l	50.0		98.5	70-130		
Bromodichloromethane	52			ug/l	50.0		103	70-130		
Bromoform	45			ug/l	50.0		89.6	70-130		
Bromomethane	22			ug/l	50.0		44.8	70-130		
2-Butanone	53			ug/l	50.0		106	70-130		
tert-Butyl alcohol	49			ug/l	50.0		97.6	70-130		
sec-Butylbenzene	58			ug/l	50.0		116	70-130		
n-Butylbenzene	56			ug/l	50.0		112	70-130		
tert-Butylbenzene	53			ug/l	50.0		107	70-130		
Methyl t-butyl ether (MTBE)	57			ug/l	50.0		115	70-130		
Carbon Disulfide	67			ug/l	50.0		133	70-130		
Carbon Tetrachloride	52			ug/l	50.0		104	70-130		
Chlorobenzene	50			ug/l	50.0		99.3	70-130		
Chloroethane	59			ug/l	50.0		117	70-130		
Chloroform	52			ug/l	50.0		105	70-130		
Chloromethane	36			ug/l	50.0		71.9	70-130		
4-Chlorotoluene	52			ug/l	50.0		105	70-130		
2-Chlorotoluene	52			ug/l	50.0		104	70-130		
1,2-Dibromo-3-chloropropane (DBCP)	41			ug/l	50.0		82.9	70-130		
Dibromochloromethane	53			ug/l	50.0		105	70-130		
1,2-Dibromoethane (EDB)	54			ug/l	50.0		108	70-130		
Dibromomethane	52			ug/l	50.0		103	70-130		
1,2-Dichlorobenzene	51			ug/l	50.0		101	70-130		
1,3-Dichlorobenzene	52			ug/l	50.0		105	70-130		
1,4-Dichlorobenzene	51			ug/l	50.0		102	70-130		
1,1-Dichloroethane	58			ug/l	50.0		115	70-130		
1,2-Dichloroethane	51			ug/l	50.0		101	70-130		
trans-1,2-Dichloroethene	58			ug/l	50.0		117	70-130		
cis-1,2-Dichloroethene	56			ug/l	50.0		112	70-130		

**Quality Control**  
(Continued)

**Volatile Organic Compounds (Continued)**

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch: B0G0692 - Purge-Trap (Continued)</b>					Prepared & Analyzed: 07/16/20					
<b>LCS (B0G0692-BS1)</b>										
1,1-Dichloroethene	59			ug/l	50.0		118	70-130		
1,2-Dichloropropane	53			ug/l	50.0		106	70-130		
2,2-Dichloropropane	49			ug/l	50.0		97.7	70-130		
cis-1,3-Dichloropropene	50			ug/l	50.0		99.3	70-130		
trans-1,3-Dichloropropene	49			ug/l	50.0		97.9	70-130		
1,1-Dichloropropene	56			ug/l	50.0		112	70-130		
Diethyl ether	66			ug/l	50.0		131	70-130		
1,4-Dioxane	223			ug/l	250		89.4	70-130		
Ethylbenzene	52			ug/l	50.0		104	70-130		
Hexachlorobutadiene	43			ug/l	50.0		86.9	70-130		
2-Hexanone	51			ug/l	50.0		102	70-130		
Isopropylbenzene	53			ug/l	50.0		106	70-130		
p-Isopropyltoluene	57			ug/l	50.0		114	70-130		
Methylene Chloride	59			ug/l	50.0		119	70-130		
4-Methyl-2-pentanone	49			ug/l	50.0		98.0	70-130		
Naphthalene	48			ug/l	50.0		95.0	70-130		
n-Propylbenzene	58			ug/l	50.0		115	70-130		
Styrene	51			ug/l	50.0		101	70-130		
1,1,1,2-Tetrachloroethane	49			ug/l	50.0		97.1	70-130		
Tetrachloroethene	54			ug/l	50.0		108	70-130		
Tetrahydrofuran	52			ug/l	50.0		103	70-130		
Toluene	56			ug/l	50.0		112	70-130		
1,2,4-Trichlorobenzene	45			ug/l	50.0		89.0	70-130		
1,2,3-Trichlorobenzene	43			ug/l	50.0		87.0	70-130		
1,1,2-Trichloroethane	53			ug/l	50.0		107	70-130		
1,1,1-Trichloroethane	54			ug/l	50.0		108	70-130		
Trichloroethene	51			ug/l	50.0		102	70-130		
1,2,3-Trichloropropane	50			ug/l	50.0		99.4	70-130		
1,3,5-Trimethylbenzene	54			ug/l	50.0		108	70-130		
1,2,4-Trimethylbenzene	54			ug/l	50.0		108	70-130		
Vinyl Chloride	41			ug/l	50.0		82.1	70-130		
o-Xylene	51			ug/l	50.0		101	70-130		
m&p-Xylene	103			ug/l	100		103	70-130		
1,1,2,2-Tetrachloroethane	52			ug/l	50.0		104	70-130		
tert-Amyl methyl ether	45			ug/l	50.0		90.9	70-130		
1,3-Dichloropropane	53			ug/l	50.0		107	70-130		
Ethyl tert-butyl ether	56			ug/l	50.0		112	70-130		
Diisopropyl ether	60			ug/l	50.0		119	70-130		
Trichlorofluoromethane	58			ug/l	50.0		115	70-130		
Dichlorodifluoromethane	28			ug/l	50.0		55.8	70-130		
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Surrogate: 4-Bromofluorobenzene			48.8	ug/l	50.0		97.6	70-130		
Surrogate: 1,2-Dichloroethane-d4			47.3	ug/l	50.0		94.6	70-130		
Surrogate: Toluene-d8			50.4	ug/l	50.0		101	70-130		

**Quality Control**  
(Continued)

**Volatile Organic Compounds (Continued)**

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch: B0G0692 - Purge-Trap (Continued)</b>					Prepared & Analyzed: 07/16/20					
<b>LCS Dup (B0G0692-BSD1)</b>										
Acetone	61			ug/l	50.0		123	70-130	9.22	200
Benzene	53			ug/l	50.0		106	70-130	3.29	200
Bromobenzene	50			ug/l	50.0		99.1	70-130	0.607	200
Bromochloromethane	50			ug/l	50.0		99.0	70-130	0.527	200
Bromodichloromethane	51			ug/l	50.0		101	70-130	1.51	200
Bromoform	45			ug/l	50.0		90.5	70-130	1.02	200
Bromomethane	28			ug/l	50.0		56.9	70-130	23.8	200
2-Butanone	51			ug/l	50.0		103	70-130	3.24	200
tert-Butyl alcohol	47			ug/l	50.0		94.9	70-130	2.76	200
sec-Butylbenzene	57			ug/l	50.0		114	70-130	1.31	200
n-Butylbenzene	55			ug/l	50.0		109	70-130	2.37	200
tert-Butylbenzene	52			ug/l	50.0		104	70-130	2.05	200
Methyl t-butyl ether (MTBE)	56			ug/l	50.0		113	70-130	1.83	200
Carbon Disulfide	63			ug/l	50.0		126	70-130	5.21	200
Carbon Tetrachloride	50			ug/l	50.0		99.7	70-130	4.70	200
Chlorobenzene	49			ug/l	50.0		97.4	70-130	1.89	200
Chloroethane	52			ug/l	50.0		104	70-130	12.3	200
Chloroform	51			ug/l	50.0		102	70-130	2.95	200
Chloromethane	35			ug/l	50.0		69.4	70-130	3.57	200
4-Chlorotoluene	52			ug/l	50.0		104	70-130	1.36	200
2-Chlorotoluene	52			ug/l	50.0		104	70-130	0.345	200
1,2-Dibromo-3-chloropropane (DBCP)	41			ug/l	50.0		82.2	70-130	0.799	200
Dibromochloromethane	51			ug/l	50.0		102	70-130	3.09	200
1,2-Dibromoethane (EDB)	53			ug/l	50.0		105	70-130	2.76	200
Dibromomethane	51			ug/l	50.0		102	70-130	1.23	200
1,2-Dichlorobenzene	50			ug/l	50.0		99.1	70-130	2.04	200
1,3-Dichlorobenzene	52			ug/l	50.0		104	70-130	0.364	200
1,4-Dichlorobenzene	50			ug/l	50.0		101	70-130	1.42	200
1,1-Dichloroethane	56			ug/l	50.0		111	70-130	3.48	200
1,2-Dichloroethane	50			ug/l	50.0		101	70-130	0.495	200
trans-1,2-Dichloroethene	57			ug/l	50.0		114	70-130	2.43	200
cis-1,2-Dichloroethene	55			ug/l	50.0		110	70-130	1.72	200
1,1-Dichloroethene	58			ug/l	50.0		115	70-130	2.42	200
1,2-Dichloropropane	52			ug/l	50.0		105	70-130	1.67	200
2,2-Dichloropropane	48			ug/l	50.0		95.4	70-130	2.34	200
cis-1,3-Dichloropropene	49			ug/l	50.0		98.1	70-130	1.22	200
trans-1,3-Dichloropropene	49			ug/l	50.0		97.5	70-130	0.471	200
1,1-Dichloropropene	53			ug/l	50.0		106	70-130	4.62	200
Diethyl ether	67			ug/l	50.0		133	70-130	1.29	200
1,4-Dioxane	329			ug/l	250		132	70-130	38.3	200
Ethylbenzene	51			ug/l	50.0		102	70-130	2.66	200
Hexachlorobutadiene	44			ug/l	50.0		88.1	70-130	1.39	200
2-Hexanone	49			ug/l	50.0		98.9	70-130	3.13	200
Isopropylbenzene	53			ug/l	50.0		106	70-130	0.340	200
p-Isopropyltoluene	56			ug/l	50.0		113	70-130	0.902	200
Methylene Chloride	58			ug/l	50.0		117	70-130	1.70	200
4-Methyl-2-pentanone	48			ug/l	50.0		95.9	70-130	2.21	200
Naphthalene	49			ug/l	50.0		98.4	70-130	3.51	200
n-Propylbenzene	56			ug/l	50.0		112	70-130	2.36	200
Styrene	50			ug/l	50.0		101	70-130	0.297	200
1,1,1,2-Tetrachloroethane	48			ug/l	50.0		96.4	70-130	0.785	200
Tetrachloroethene	52			ug/l	50.0		104	70-130	3.59	200
Tetrahydrofuran	51			ug/l	50.0		103	70-130	0.291	200
Toluene	54			ug/l	50.0		108	70-130	2.98	200
1,2,4-Trichlorobenzene	45			ug/l	50.0		89.2	70-130	0.157	200
1,2,3-Trichlorobenzene	46			ug/l	50.0		91.9	70-130	5.52	200
1,1,2-Trichloroethane	53			ug/l	50.0		106	70-130	0.638	200

**Quality Control  
(Continued)**

**Volatile Organic Compounds (Continued)**

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch: B0G0692 - Purge-Trap (Continued)</b>										
<b>LCS Dup (B0G0692-BSD1)</b>					Prepared & Analyzed: 07/16/20					
1,1,1-Trichloroethane	52			ug/l	50.0		104	70-130	4.64	200
Trichloroethene	50			ug/l	50.0		99.3	70-130	2.90	200
1,2,3-Trichloropropane	51			ug/l	50.0		102	70-130	2.47	200
1,3,5-Trimethylbenzene	53			ug/l	50.0		106	70-130	1.47	200
1,2,4-Trimethylbenzene	54			ug/l	50.0		108	70-130	0.315	200
Vinyl Chloride	39			ug/l	50.0		77.4	70-130	5.84	200
o-Xylene	50			ug/l	50.0		101	70-130	0.436	200
m&p-Xylene	102			ug/l	100		102	70-130	1.58	200
1,1,2,2-Tetrachloroethane	53			ug/l	50.0		105	70-130	1.07	200
tert-Amyl methyl ether	45			ug/l	50.0		89.8	70-130	1.22	200
1,3-Dichloropropane	52			ug/l	50.0		105	70-130	2.23	200
Ethyl tert-butyl ether	55			ug/l	50.0		109	70-130	2.50	200
Diisopropyl ether	59			ug/l	50.0		118	70-130	1.31	200
Trichlorofluoromethane	54			ug/l	50.0		108	70-130	6.68	200
Dichlorodifluoromethane	27			ug/l	50.0		53.4	70-130	4.36	200
-----										
Surrogate: 4-Bromofluorobenzene			50.6	ug/l	50.0		101	70-130		
Surrogate: 1,2-Dichloroethane-d4			53.1	ug/l	50.0		106	70-130		
Surrogate: Toluene-d8			50.3	ug/l	50.0		101	70-130		

**Quality Control**  
(Continued)

**Total Petroleum Hydrocarbons**

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch: B0G0555 - EPA 3546</b>										
<b>Blank (B0G0555-BLK1)</b>					Prepared & Analyzed: 07/15/20					
Total Petroleum Hydrocarbons	ND		27	mg/kg						
<i>Surrogate: Chlorooctadecane</i>			4.78	mg/kg	8.33		57.4	56.5-114		
<b>LCS (B0G0555-BS1)</b>					Prepared & Analyzed: 07/15/20					
Total Petroleum Hydrocarbons	311		27	mg/kg	667		46.7	44.7-98.7		
<i>Surrogate: Chlorooctadecane</i>			6.25	mg/kg	8.33		75.0	56.5-114		
<b>LCS Dup (B0G0555-BSD1)</b>					Prepared & Analyzed: 07/15/20					
Total Petroleum Hydrocarbons	311		27	mg/kg	667		46.7	44.7-98.7	0.0195	200
<i>Surrogate: Chlorooctadecane</i>			6.05	mg/kg	8.33		72.6	56.5-114		

## Notes and Definitions

<b>Item</b>	<b>Definition</b>
Wet	Sample results reported on a wet weight basis.
ND	Analyte NOT DETECTED at or above the reporting limit.





## RHODE ISLAND

### DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

OFFICE OF LAND REVITALIZATION & SUSTAINABLE MATERIALS MANAGEMENT

235 Promenade Street, Providence, Rhode Island 02908

#### **CONDITIONAL REMEDIAL APPROVAL LETTER** **File No. SR-28-1997**

February 16, 2021

Emily Freedman, Community Development Director  
Providence Department of Planning and Development  
444 Westminister Street  
Providence, RI 02903

RE: Roger Williams Park Gateway and Visitors Center  
1197, 1197R, and 1201 Broad Street  
Providence, Rhode Island  
Plat Map 53 / Lots 511, 513, and 525

Dear Ms. Freedman:

Effective April 22, 2020, the Rhode Island Department of Environmental Management's (the Department) Office of Waste Management has changed the office name to the Office of Land Revitalization and Sustainable Materials Management (LRSMM), as reflected in the re-codified 250-RICR-140-30-1, Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (the Remediation Regulations) consistent with the RI Administrative Procedures Act. The purpose of these regulations is to create an integrated program requiring reporting, investigation, and remediation of contaminated sites in order to eliminate and/or control threats to human health and the environment in a timely and cost-effective manner. A Remedial Approval Letter (RAL) is a document used by the Department to approve remedial actions at contaminated sites that do not involve the use of complex engineered systems or techniques (e.g. groundwater pump and treat systems, soil vapor extraction systems, etc.).

In the matter of the above-referenced property (the Site), the Department's Office of LRSMM is in receipt of the following documentation submitted pursuant to the Remediation Regulations in response to the reported release at the Site:

- a. Hazardous Materials Release Notification Form, received by the Department via E-mail on June 25, 2020, and prepared by the City of Providence Department of Planning and Development;
- b. Phase I Environmental Site Assessment (ESA), received by the Department via E-mail on June 25, 2020, and prepared by Gordon R. Archibald, Inc. (GRA);
- c. Limited Site Investigation (LSI), received by the Department via E-mail on June 25, 2020, and prepared by GRA;
- d. Site Investigation Report (SIR) Cover Letter and SIR Checklist, received by the Department

via E-mail on June 25, 2020, and prepared by GRA;

- e. Response to SIR Comments and Updated Site Plan, received by the Department via E-mail on September 8, 2020, and prepared by GRA;
- f. Phase I ESA Appendices, received by the Department via E-mail on September 8, 2020, and prepared by GRA;
- g. Environmental Justice Public Notice Package, received by the Department on October 27, 2020, and prepared by GRA;
- h. Remedial Action Work Plan (RAWP), received by the Department on December 3, 2020, and prepared by GRA;
- i. RAWP Addendum Cover Letter, received by the Department on December 21, 2020, and prepared by GRA;
- j. RAWP Addendum, received by the Department on December 21, 2020, and prepared by GRA;
- k. Geotechnical Report, received by the Department on December 21, 2020, and prepared by Paul B. Aldinger & Associates, Inc. (PBA);
- l. Email Correspondence, received by the Department on December 30, 2020, and prepared by GRA;
- m. Response to PID Question, received by the Department on January 26, 2021, and prepared by PBA;
- n. RAWP Addendum Comment Letter Response, received by the Department on February 2, 2021, and prepared by GRA;
- o. Stormwater Design for Roger Williams Gateway Park Memo, received by the Department on February 2, 2021, and prepared by Green International Affiliates, Inc. (Green);
- p. Drainage & Utility Drawing and Details Drawing, received by the Department on February 2, 2021, and prepared by INFORM Studios; and
- q. RAWP February 5, 2021 Comment Letter Response, received by the Department on February 11, 2021, and prepared by GRA.

Together these documents fulfill the requirements of Section 1.9 (Risk Management) and Section 1.10 (Remedial Action Work Plan (RAWP)) of the Remediation Regulations.

The preferred remedial alternative involves:

- Bring the Site into compliance with the requirements of the Department's Underground Storage Tank (UST) Program in accordance with the *Rules and Regulations for Underground Storage Facilities Used for Regulated Substances and Hazardous Materials* (the UST Regulations).
- Any soils which remain on the Site with exceedances above the Method 1 Direct Exposure Criteria shall be encapsulated by a Department-approved engineered barrier which may consist of a minimum of two (2) feet of clean fill or an equivalent level of protection( i.e. building foundations), one (1) foot of clean fill over a geotextile fabric, and/or four (4) inches of hardscape (asphalt or concrete) over six (6) inches of clean fill.
- Soil vapor controls shall be installed in all newly constructed site buildings to include installation of a passive sub-slab depressurization system (SSDS) under onsite buildings.
- An Environmental Land Usage Restriction (ELUR) shall be recorded on the deed for the entire property (Plat Map 53 / Lots 511, 513 and 525). The ELUR shall require the performance of annual inspections to document the status of the ELUR and the condition of the engineered controls. The ELUR shall also include a Department-approved post-remediation Soil Management Plan (SMP) which will address any future activities that may disturb on-Site soils. The ELUR shall be recorded for the entire property in the Land Evidence Records for the City of Providence, and a recorded copy forwarded back to the Department within fifteen (15) days of recording.

Based upon review and consideration of the above referenced documents, the Department approves the Remedial Action Work Plan (RAWP) through this RAL provided that:

1. All investigation and remediation associated with the former UST systems will be done in accordance with the UST Regulations. A separate scope of work shall be submitted to the UST Program for their approval. The Site Remediation Program shall be CC'd on all correspondences submitted to the UST Program.
2. All work must be performed in accordance with all applicable regulations and the Department approved RAWP.
3. Start of the work described in the Department approved RAWP must be initiated within one hundred twenty (120) days of issuance of this RAL.
4. Prior to initiating any remedial activities, the Department shall be provided with a list of all contractors, and their respective contact information, that will be used on Site to complete the remedial work described in the Department approved RAWP. The Department shall be notified, when feasible, a minimum of five (5) working days in advance of any changes in contractors and/or consultants involved with the remedial work on this Site. The notification must be promptly supplied in writing with complete contact information for each new contractor or consultant (including but not limited to company name and address, contact name and address, contact telephone number and e-mail address).

5. All excavated regulated soil, if not approved for encapsulation onsite, shall be disposed of off-site at an appropriately licensed disposal facility in accordance with all local, State, and Federal laws. Copies of the material shipping records and manifests associated with the disposal of the material shall be included along with the Closure Report.
6. Areas of the site where contaminated soils are to be excavated must be staged and temporarily stored in a designated area, as proposed in the RAWP, of the site with proper polyethylene covers. Any stockpiled materials, including clean fill, must be underlain and covered with polyethylene sheeting and be secured at the end of each day with all appropriate erosion and sediment controls to limit the loss of the cover and protect against storm-water and wind erosion (i.e. hay bales, rocks, silt fencing). These appropriate sedimentation and erosion controls must be in place and in proper working order at all times until all disturbed areas are stabilized and capped as proposed. Within reason, the storage location will be selected to limit the unauthorized access to the materials (i.e. away from public roadways/walkways). No regulated soil will be stockpiled on-site for greater than thirty (30) days. In the event that stockpiled soils pose a risk or threat of leaching hazardous materials, a proper leak-proof container (i.e. drum or lined roll-off) or secondary containment will be required and utilized.
7. The Office of LRSMM no longer requires the submittal of analytical data prior to clean fill being brought to a Site. It is the sole responsibility of the Performing Party and their consultant to analyze the material, certify that the material meets the Department's Residential Direct Exposure Criteria (RDEC), as defined by the Remediation Regulations, for all constituents, and is suitable for use on the Site. The Office of LRSMM strongly suggests that enough representative samples of the clean fill are collected prior to moving the material to the Site to satisfy the Performing Party and their consultant that the material meets the RDEC. Please note that the Office of LRSMM reserves its rights to sample the fill, if suspect, to confirm compliance with the RDEC.
8. All regulated soil remaining onsite shall be encapsulated by an engineered control consistent with those described in the Department approved RAWP.
9. Dust suppression techniques (i.e. watering) must be employed at all times during all soil disturbing/handling activities at the site in order to minimize the generation of fugitive dust.
10. Please note that if soil exceeding the Department's Residential Direct Exposure Criteria (RDEC) is to remain onsite then a draft Environmental Land Usage Restriction (ELUR) and Soil Management Plan (SMP) must be submitted to the Office of LRSMM for review and approval prior to recording.
11. Within sixty (60) days of completion of the work described in the Department approved RAWP, a Closure Report detailing the remedial action and including any disposal documentation shall be submitted to the Office of LRSMM.
12. Within sixty (60) days of completion of the work described in the Department approved RAWP, the final Department approved ELUR shall be recorded in the City of Providence Land Evidence Records for the property and a stamped, certified copy returned to the Department within fifteen

(15) days of recording. Upon receipt of a copy of the recorded (stamped) ELUR, the Office of LRSMM will issue a Letter of Compliance.

13. Following recording of the ELUR, the site shall be maintained and annually inspected to evaluate the compliance status of the site with the ELUR. Within thirty (30) days of each annual inspection, an evaluation report shall be prepared and submitted to the Office of LRSMM detailing the findings of the inspection and noting any compliance violations at the site.
14. As part of the operation and maintenance of the remedy, the sub-slab pressure shall be measured and the SSDS annually inspected to ensure that the SSDS is operating properly. As part of the annual ELUR inspection of the remedy, the efficacy of the SSDS shall be documented. Within thirty (30) days of each annual inspection, an evaluation report shall be prepared and submitted to the Office of LRSMM detailing the findings of the inspection and noting any compliance violations at the site.
15. Any changes in the activities detailed in the RAWP shall be reported to the Office of LRSMM by telephone within one (1) working day and in writing within five (5) business days.
16. The Office of LRSMM shall be notified forty-eight (48) hours prior to initiating the remedial activities at the site associated with the Department approved RAWP.
17. The Office of LRSMM shall be immediately notified of any site or operation condition that results in non-compliance with this RAL.

At this time, the Office of LRSMM offers its concurrence with the proposed remedial action for the property. The Department approves the RAWP provided that all activities and procedures detailed in the RAWP and RAWP Addendum are strictly adhered to. Furthermore, this letter continues to place primary responsibility for the construction, operation, maintenance, and monitoring of the approved RAWP and its associated implementation on the Providence Redevelopment Agency, represented by the City of Providence Department of Planning and Development. As the Responsible Party and Performing Party, the Providence Redevelopment Agency is expected to implement the RAWP in an expeditious and professional manner that prevents non-compliance with this RAL and said RAWP, and is protective of human health and the environment.

Please note that at this time the Department does not approve the ELUR for recording in the Land Evidence Records with the City of Providence. Please forward an electronic version of the draft ELUR and the post-construction SMP in red line / strikeout format for Department review and approval. The draft ELUR and SMP shall be reviewed and approved by the Department, followed by recording of the approved ELUR, at the completion of all remedial work.

This RAL does not remove your obligation to obtain any other necessary permits from other local, State, or Federal agencies.

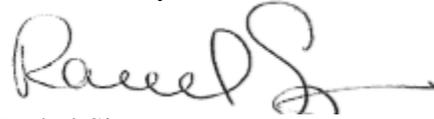
If you have any questions regarding this letter or would like the opportunity to meet with Department personnel, please contact me by telephone at (401) 222-2797, ext. 72030, or by E-mail at [Stephanie.Cappelli@dem.ri.gov](mailto:Stephanie.Cappelli@dem.ri.gov).

Sincerely,



Stephanie Cappelli  
Environmental Engineer I  
Office of Land Revitalization &  
Sustainable Materials Management

Authorized by,



Rachel Simpson  
Senior Environmental Engineer  
Office of Land Revitalization &  
Sustainable Materials Management

cc: Kelly Owens, LRSMM-Site Remediation  
Kevin Gillen, LRSMM-UST  
Andrew Hook, LRSMM-LUST  
Mike Cote, LRSMM-LUST  
Steve Cadorette, Gordon R. Archibald, Inc.  
Richard Sullivan, Gordon R. Archibald, Inc.

# REMEDIAL ACTION WORK PLAN

**Roger Williams Park Gateway and Visitors Center  
1197, 1197R, 1201 Broad Street  
Providence, Rhode Island  
Plat Map 53/Lots 511, 513, 525**

**November 2020  
Revised December 2020**

## **Prepared for:**

City of Providence  
Department of Planning and Development  
444 Westminister Street  
Providence, Rhode Island 02903

## **Submitted to:**

Rhode Island Department of Environmental Management  
Office of Land Revitalization and Sustainable Materials Management

## **Prepared by:**

Gordon R. Archibald, Inc.  
200 Main Street  
Pawtucket, Rhode Island



**Gordon R. Archibald, Inc.**  
Civil and Environmental Engineers

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## Appendices

Appendix A	RIDEM RDL
Appendix B	RIDEM ELUR and SMP Templates

## 1.0 Introduction (Rule 1.10.1)

On behalf of the City of Providence Department of Planning and Development, Gordon R. Archibald, Inc. (GRA) has prepared this *Remedial Action Work Plan* (RAWP) for the property identified as 1197, 1197R, 1201 Broad Street, Plat Map 53, Lots 511, 513, and 525 in Providence, Rhode Island (Site). The Site's location is shown on **Figure 1**.

This RAWP has been prepared to address applicable requirements of Section 1.10 of the Rhode Island Department of Environmental Management's (RIDEM) *Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases (Remediation Regulations)*.

## 2.0 Background (Rule 1.10.1)

GRA has prepared this RAWP for the Site to address the impacts to soil and groundwater identified during the completion of a site investigation. The RIDEM – Office of Land Revitalization and Sustainable Materials Management (RIDEM-OLRSMM) identifies the site as SR-28-1997. A Remedial Decision Letter (RDL) dated November 13, 2020 was issued by the RIDEM for the project. The proposed remedial alternative that was forwarded to the RIDEM-OLRSMM in the Site Investigation Report package submitted in May 2020 and approved by the RIDEM-OLRSMM in its RDL included the following:

- It is expected that the RIDEM will approve the recommendation of the future development of the facility to act as the cap for eliminating potential exposure to the site soils.
- Site soils containing jurisdictional material at concentrations equal to or greater than the applicable Method 1 Direct Exposure Criteria (R-DEC) will be encapsulated by a Department approved engineering control consisting of two (2) feet of clean fill or the equivalent (i.e., existing concrete building foundations, one (1) foot of clean fill over a geotextile fabric, and/or four (4) inches of asphalt concrete over six (6) inches of clean fill).
- The fill material will be sampled prior to it being brought to the site as required to confirm it is compliant with the Remediation Regulations R-DEC and GA-L.

A copy of the RIDEM-OWM's November 13, 2020 RDL is provided in **Appendix A**.

## 3.0 Remedial Objectives (Rule 1.10.2)

The Site is a general commercial zoned property which most recently was occupied by a restaurant and storage building. The property is being developed by the City of Providence Department of Planning and Development as the Roger Williams Park Gateway and Visitors Center. The site is abutted by commercial properties to the west, Broad Street and commercial properties to the north, and Roger Williams Park to the east and south. Therefore, the current and foreseeable future use of the site is consistent with the RIDEM *Remediation Regulations* residential use definition. The soil remedial goal is compliance with the residential direct exposure criteria.

A review of RIDEM Environmental Resource Map indicates the groundwater at the subject property is classified as GB. The site's groundwater is not used and there is no future expectation of use. Therefore, the groundwater remedial objective will be the *Remediation Regulations* GB groundwater objectives (GB-O).

### **3.1 Proposed Remedy – Soils (Rule 1.10.3)**

The RIDEM November 13, 2020 RDL approved encapsulating the non-compliant soils and recording an Environmental Land Usage Restriction and Soil Management Plan at the property. Non-compliant site soils will be capped by a RIDEM approved engineered control consisting of any combination of the following: future building foundations, one (1) foot of clean fill over a geotextile fabric, two (2) feet of clean fill, and/or four (4) inches of pavement (concrete or asphalt) over six (6) inches of clean gravel fill.

After the site non-compliant soils are encapsulated an Environmental Land Usage Restriction (ELUR) shall be recorded. The ELUR shall require the performance of annual inspections to document that status of the ELUR and the condition of the engineered controls. The ELUR shall also include a Department-approved post-remediation Soil Management Plan (SMP) which will address any future activities that may disturb on-site soils. The ELUR shall be recorded for the entire property in the Land Evidence Records for the Town of Providence, and a recorded copy forwarded back to the Department within fifteen (15) days of recording.

A detailed description of the proposed soil remedial measures follows.

#### **3.1.1 Soil Remediation – City of Providence Map 53 Lots 511, 513, and 525 (Rule 1.10.3)**

The site encompasses lots shown on City of Providence Tax Assessors Map 53 and includes lot 511, 513, and 525. The site development will include the construction of the Roger Williams Park Gateway and Visitors Center. The site will include a building, concrete walkways and landscaped areas which will serve as the cap which will prevent exposure to non-compliant soils below. The site work will be constructed in accordance with the requirements listed in Section 3.1.

Engineered control construction details are provided on the attached RAWP plan set.

Excess site soils, if any, resulting from site development and cap construction activities, will be stockpiled. Soils will be temporarily stockpiled on 6-mil polysheeting and covered by same. Soils will be sampled for disposal characteristics and disposed of properly at a licensed facility.

#### **3.1.2 Imported Gravel Fill Testing Requirement**

Soil imported to the Site for use under pavement, concrete or buildings or as common borrow shall be shown to have a contaminant level below the RIDEM Remediation Regulations Method 1 RIDEM R-DEC for TPH, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) (16 PAH priority pollutants only), RCRA 8 Metals, and PCBs prior to delivery to the Project. It shall be required that each type of fill material that will be imported to the site shall be sampled and tested as specified in the following section.

Soil imported from a non-developed borrow source shall be tested at a frequency of 1 sample for every 5,000 cubic yards of in situ soil with a minimum of 2 samples per borrow source. Soil imported from another project or development borrow source shall be tested at a frequency of 1 sample for every 2,000 cubic yards with a minimum of 2 samples per borrow source. Contaminants to be tested, the test methods and acceptance shall be as outlined in the following table:

Imported Fill Testing Requirement		
Constituent	Test Method	Minimum Detection Level
TPH	EPA Method 8100M	Below RIDEM Method 1 R-DEC
VOC	EPA Method 8260B	Below RIDEM Method 1 R-DEC
Semi-VOCs (16 PAHs only)	EPA Method 8270C	Below RIDEM Method 1 R-DEC
RCRA Eight Metals <sup>1</sup>	EPA Methods 6010 and 7471A	Below RIDEM Method 1 R-DEC
PCBs	EPA Method 8082	Below RIDEM Method 1 R-DEC

### 3.1.4 Soil Remediation – ELUR / SMP (Rule 1.10.3)

The RIDEM’s November 13, 2020 RDL approved placing an ELUR and with a Post Remediation SMP on the capped properties. A legal description and plan will be prepared for the ELUR restricted areas.

Each ELUR will include the following restrictions:

- No residential use of the Property shall be permitted that is contrary to Department approvals and restrictions contained herein;
- No groundwater at the Property shall be used as potable water.
- The engineered controls will be inspected annually to confirm their conformance with the RIDEM approved engineered control design;
- An annual inspection report will be submitted to the RIDEM.

A post-remediation SMP which will address any future activities that may disturb the on-site soils will be appended to each ELUR. The RIDEM ELUR and SMP templates will be used to prepare the project’s ELURs and SMPs. The RIDEM templates are provided in **Appendix B**.

### 3.2 Proposed Remedy – Groundwater (Rule 1.10.4)

The identified groundwater impacts associated with the former underground storage tanks at the site will be remediated under a Corrective Action Plan and managed by the RIDEM – Underground Storage Tank Group and the *Rules and Regulations for Underground Storage Facilities Used for Regulated Substances and Hazardous Materials*.

### 3.3 Proposed Remedy – Soil Vapor Controls

The Liquid Boot requirement has been replaced with a sub-slab depressurization system. Please refer to the contractual drawings for specifics.

The potential for soil vapors to impact the indoor air of onsite buildings will be addressed by the installation of a vapor barrier, Liquid Boot. This requirement has been included in the contractual drawings and specifications for the public bid. Installation of this material will be confirmed during the site construction and detailed in the RAWP closure report.

#### 4.0 Limited Design Investigation (Rule 1.10.5)

A limited design investigation is not required at this site.

#### 5.0 Points of Compliance

No compliance soil sampling is required under this RAWP. Periodic inspections will be completed during site development to confirm compliance with the RAWP design plans and specifications provided as part of this submittal. Inspections will be completed at four locations in each of the building, pavement and concrete areas. Proper cap installation will be documented in each location and be summarized in the RAWP closure report.

#### 6.0 Project Schedule (Rule 1.10.7)

The project will be completed as part of the development of the property as the Roger Williams Park Gateway and Visitors Center construction. This will be a public bid project. It is expected that the project will be put out to bid in the first quarter of 2021. It is expected that the project will be completed by the end of 2021. The following RAWP submittal and implementation schedule is proposed.

Project Schedule	
Task	Completion Date
Abutter Notification	October 2020 (completed)
Submission of Remedial Action Approval Fee	Attached to this submittal
Initiation of Site Development	April 2021
Completion of Site Development	March 2022
Submission of <i>Remedial Action Closure Report</i> and draft ELURs and SMPs	April 2022
Filing of ELUR / SMP	Completed within 30 days of the RIDEM's approval of the draft ELURs and SMPs

#### 7.0 Contractors and/or Consultants (Rule 1.10.8)

The City of Providence will be going to public bid for the site development work in January 2021. Therefore, no contractor has been assigned at this time.

The awarded Contractor will be responsible for completing the remedial measures as outlined in this RAWP. Future construction work will be completed in accordance with the engineered controls capping measures approved in the RDL November 13, 2020 and described in the RAWP.

GRA will serve as the environmental consultant. GRA will assist the City of Providence in reviewing all submittals related to RAWP activities. GRA will oversee the implementation of the RAWP remedial measures. GRA will prepare the RAWP Closure Report and draft ELUR/SMP submittals and forward those documents to the RIDEM.

## **8.0 Site Plan (Rule 1.10.9) and Technical Specifications (Rule 1.10.10)**

The attached RAWP Figures 3 and 4 depict the various proposed cap construction specifics for the site. Detail sheets showing the RIDEM approved capping methods are also provided the RAWP drawing set.

## **9.0 Set-Up Plans (Rule 1.10.11)**

This site is located within an Environmental Justice Zone as defined by the RIDEM. Appropriate public notification was made to all abutting property owners and tenants on October 26, 2020. A sign template detailing appropriate contact information and site information was provided to the RIDEM on October 28, 2020. Slight revisions were requested by RIDEM and accepted. The sign will be posted prior to initiating site activities. The sign measuring at least 4x6 feet must be posted at the site providing site information and RIDEM contact.

## **10.0 Effluent Disposal (Rule 1.10.12)**

There is no effluent disposal required for this project.

## **11.0 Contingency Plan (Rule 1.10.13)**

The Contractor shall alert the City of Providence if an unexpected incident involving hazardous materials occurs. These types of incidents could include but are not be limited to encountering non-compliant soils and/or unexpected conditions in areas other than those defined in the project specifications and plans, a hazardous material release from on-site equipment, and an accidental petroleum release from the on-site construction equipment station.

Appropriate regulatory agency personnel must also be notified, if required. Prior to this project commencing City of Providence will identify RIDEM personnel that will be responsible for regulatory agency notification. The regulatory contact information is provided below.

- Rhode Island Department of Environmental Management 24-hour response number 401-222-3070
- National Response Center (NRC) at 1-800-424-8802 or 1-202-426-2675

The following information shall be communicated when reporting to outside agencies:

- a. Name, title, telephone number and address of reporter;
- b. Name, telephone number and address of the site/spill;
- c. Time, type and amount of material involved;
- d. Extent of injuries/illnesses, if known;
- e. Possible hazards to human health and the environment;
- f. Any body of water involved;
- g. The cause of the accident/spill; and
- h. The action taken or proposed by the site personnel.

City of Providence will contact and coordinate emergency response action with an emergency response contractor if required.

## **12.0 Operating Log (Rule 1.10.14)**

An Operating Log which clearly and completely records activities on-site and shows how the implementation and installation of the Remedial Action is progressing will be maintained at the site by the City of Providence environmental consultant or its on-site personnel. This Operating Log shall include, at a minimum, the following information:

- A. Time periods of operation of the remedial construction;
- B. Records of any analyses conducted as part of the Remedial Action;
- C. Instances of implementation of the Contingency Plan; and
- D. An inspection plan designed to insure the proper operation of the proposed remediation.

Documentation of these inspections and any problems found and/or repairs made shall be included in the log.

The Operating Log shall be readily available at the Site during implementation of the Remedial Action. A copy of this log shall be submitted to the Department as part of the quarterly remedial action status report, if one is required. It is not anticipated that this site will require a remedial action status report.

Fugitive dust control measures will be instituted during the site development. Fugitive dust control measure implementation will be recorded in the Operating Log by a person designated by the contractor per the project bid specifications.

The Operating Log shall be kept for at least three (3) years following completion of the Remedial Action.

## **13.0 Security Procedures (Rule 1.10.15)**

During site development activities access will be restricted to the site with either the existing fencing or additional temporary fencing. This will limit site access to the gated entry points.

## **14.0 Shutdown, Closure, and Post-Closure Requirements (Rule 1.10.16)**

The site remedial work will be completed when:

The site development activities have been completed including final grading, paving, and landscaping activities. An ELUR will be filed for the site restricting and limiting exposure to site soils. A SMP will be attached to the ELUR that outline post-closure soil management issues.

## **15.0 Institutional Controls and Notices (Rule 1.10.17)**

Draft ELUR will be submitted to the RIDEM-OWM when the RAWP Closure Report is submitted. The draft ELURs will be revised as required by the RIDEM-OWM. The final ELURs will then be filed in the City of Providence land evidence records and copies of the filed ELURs will be submitted to the RIDEM-OWM.

## **16.0 Compliance Determination (Rule 1.10.17)**

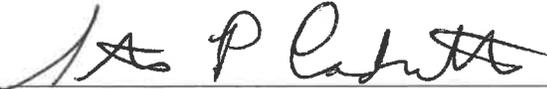
The compliance inspection is described in 5.0 Points of Compliance. The compliance determination for Map 53 Lots 511, 513, and 525 will be a visible inspection completed in accordance with the Section 5.0 inspection procedure that confirms the proposed cap has been installed in accordance with the plans and specifications provided in the RAWP.

## 17.0 Certification Statements

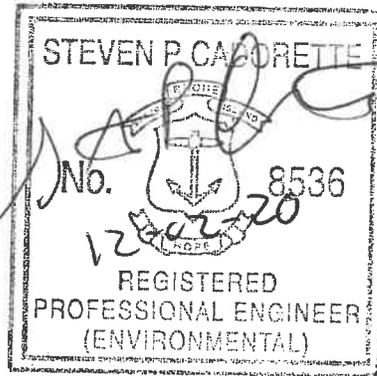
### Statement of Certification by the Remedial Action Work Plan Preparer Remedial Action Work Plan

City of Providence, Department of Planning and Development, 1201 Broad Street, Providence, Rhode Island

I prepared this Remedial Action Work Plan and certify the information contained in the Remedial Action Work Plan is accurate to the best of my knowledge.



Steven P. Cadorette, P.E., Senior Civil Engineer  
Gordon R. Archibald, Inc.  
200 Main Street  
Pawtucket, Rhode Island 02860



### Statement of Certification by the Performing Party Authorized Representative Remedial Action Work Plan

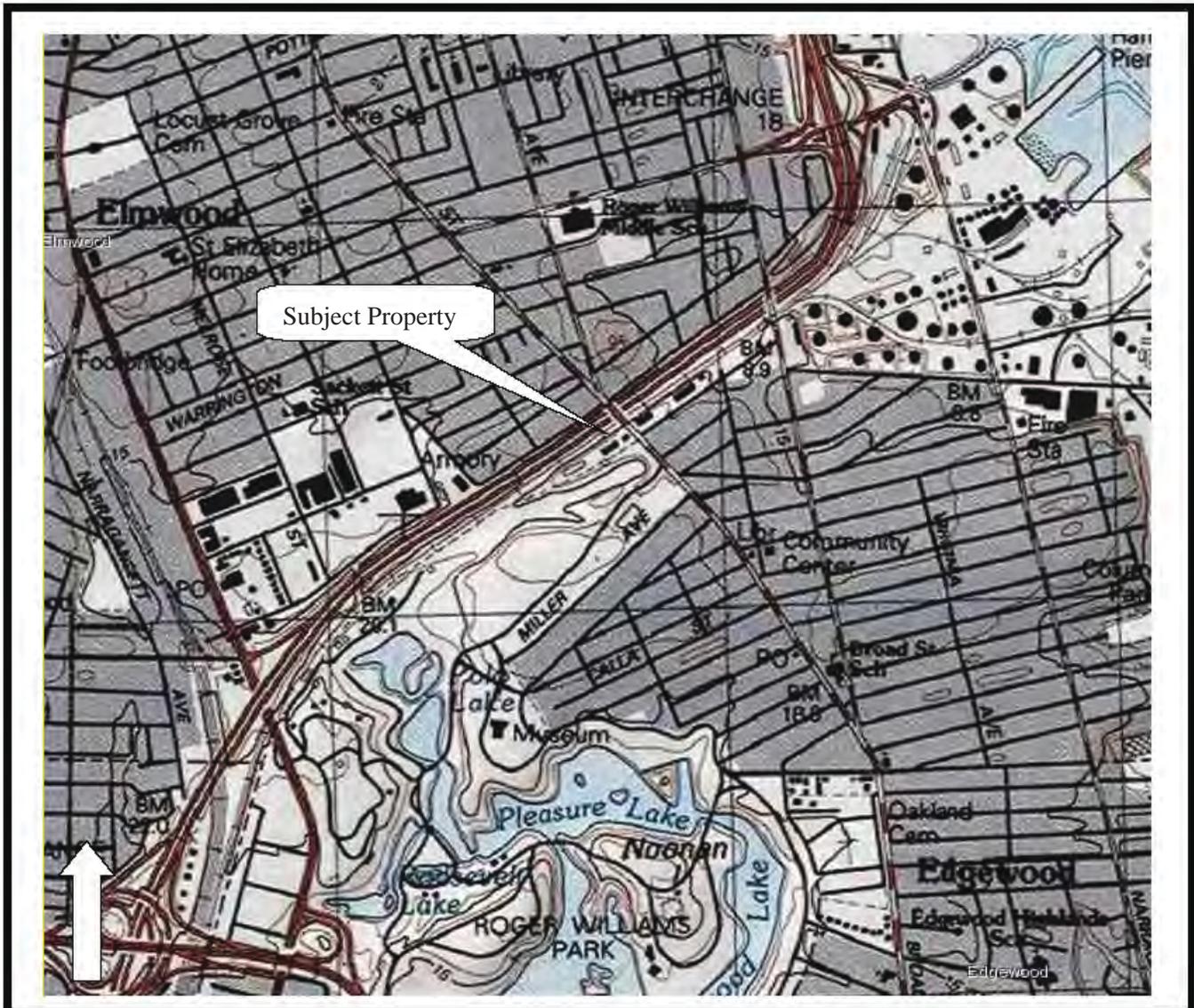
City of Providence, Department of Planning and Development, 1201 Broad Street, Providence, Rhode Island

I certify that this Remedial Action Work Plan is a complete and accurate representation of the contaminated site and the release and contains all known facts surrounding the release to the best of my knowledge.



Emily Freedman  
Director of Community Development  
City of Providence, Department of Planning and Development  
444 Westminster Street  
Providence, RI 02903

## **FIGURES**



**Figure 1: Historic Locus Map**  
1197, 1197R, & 1201 Broad Street  
Providence, Rhode Island

Source: RIDEM Environmental Resources Map



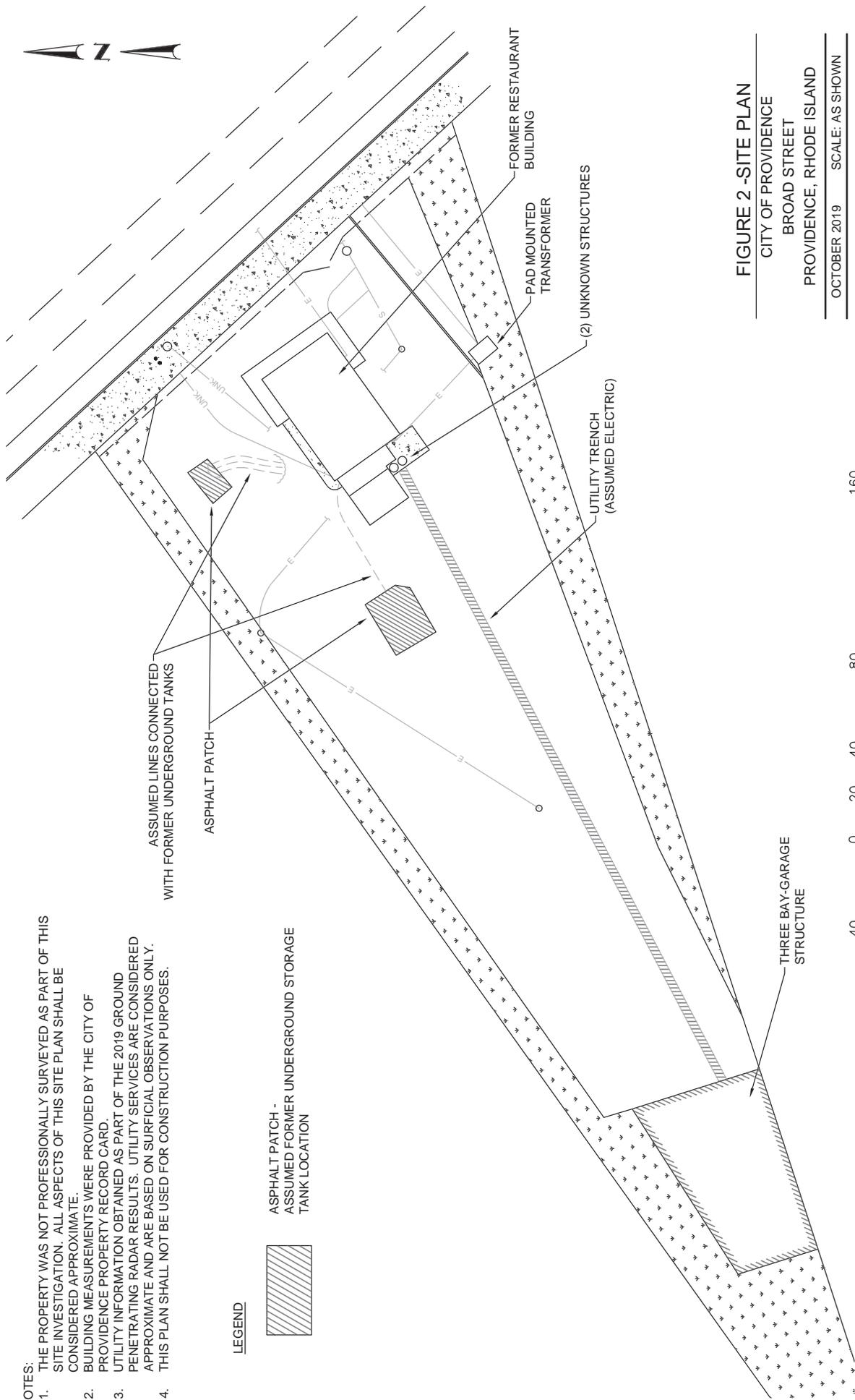
**NOTES:**

1. THE PROPERTY WAS NOT PROFESSIONALLY SURVEYED AS PART OF THIS SITE INVESTIGATION. ALL ASPECTS OF THIS SITE PLAN SHALL BE CONSIDERED APPROXIMATE.
2. BUILDING MEASUREMENTS WERE PROVIDED BY THE CITY OF PROVIDENCE PROPERTY RECORD CARD.
3. UTILITY INFORMATION OBTAINED AS PART OF THE 2019 GROUND PENETRATING RADAR RESULTS. UTILITY SERVICES ARE CONSIDERED APPROXIMATE AND ARE BASED ON SURFICIAL OBSERVATIONS ONLY.
4. THIS PLAN SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.

**LEGEND**



ASPHALT PATCH -  
ASSUMED FORMER UNDERGROUND STORAGE  
TANK LOCATION



GRAPHIC SCALE

**FIGURE 2 -SITE PLAN**

CITY OF PROVIDENCE

BROAD STREET

PROVIDENCE, RHODE ISLAND

OCTOBER 2019

SCALE: AS SHOWN



**Gordon R. Archibald, Inc.**  
Civil and Environmental Engineers  
Pawtucket, Rhode Island

**NOTE:**  
 THIS PLAN IS BASED ON THE  
 THE INFORMATION PROVIDED BY  
 THE PROPERTY OWNER AND  
 THE INFORMATION FROM  
 RECORD DATED 10/10/2009



AP 53 LOT 704  
 N/F W ASSOCIATES INC  
 1197 BROADWAY  
 PROVIDENCE, R.I.

- LEGEND**
- PERENNIAL PLANTS AND NINE SEED MIX
  - STABILIZED STONE DUST
  - BORSTEDTIC AREA
  - STABILIZED WOOD MULCH
  - INSECT HOTEL
  - RIVER STONE
  - NATURAL PLAY TIMBERS

LIMIT OF WORK

AP 53 LOT 302  
 N/F W ASSOCIATES INC  
 (1195 BROAD ST)

BROAD STREET  
 (80 FT WIDE - PUBLIC)

CASS STREET

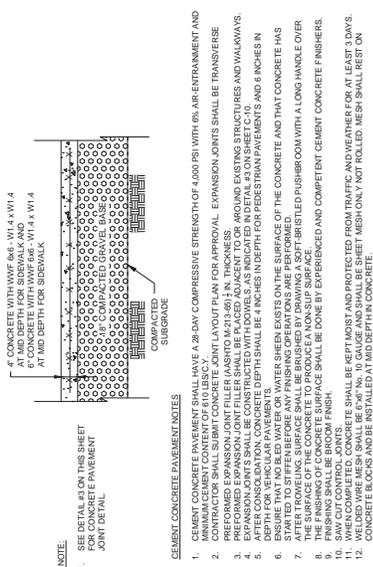
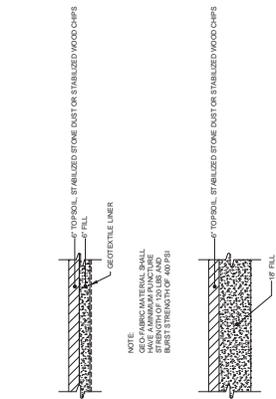
ALDRICH STREET



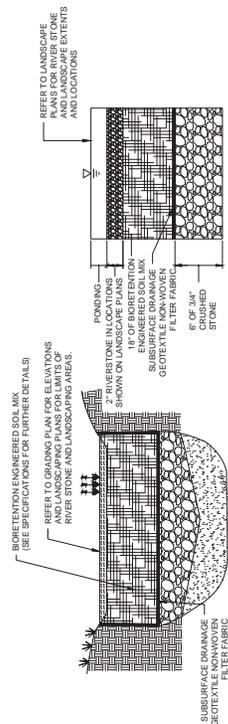
**NOTE:**  
 CONDITIONS ON THIS  
 PLAN ARE SHOWN ONLY FOR  
 INFORMATION. REFER TO  
 RECORD FOR EXISTING PLAN.

NO.	DATE	REVISIONS

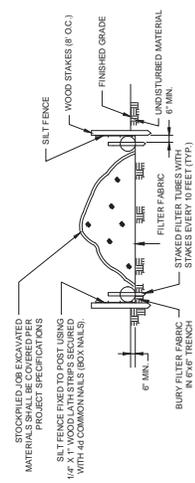
PROJECT NO. 9915
DATE: DECEMBER, 2009
SCALE: AS SHOWN
DRAWN BY: M.F.
CHECKED BY: R.W.S.
DRAWING NUMBER
4
SHEET OF



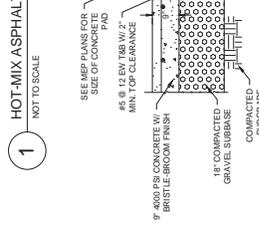
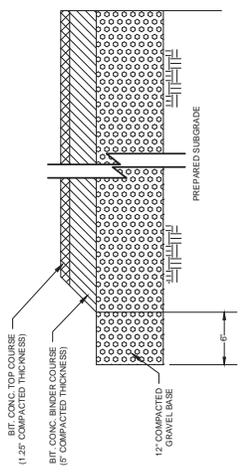
**2 CEMENT CONCRETE PAVEMENT**  
NOT TO SCALE



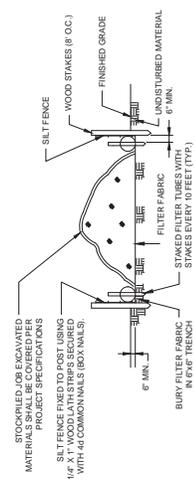
**4 CONCRETE PAD FOR CONDENSER UNIT**  
NOT TO SCALE



**5 STOCKPILED MATERIAL**  
NOT TO SCALE



**4 CONCRETE PAD FOR CONDENSER UNIT**  
NOT TO SCALE



**5 STOCKPILED MATERIAL**  
NOT TO SCALE

## **APPENDICES**

**APPENDIX A**

**RIDEM REMEDIAL DECISION LETTER**



## RHODE ISLAND

### DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

OFFICE OF LAND REVITALIZATION & SUSTAINABLE MATERIALS MANAGEMENT  
235 Promenade Street, Providence, Rhode Island 02908

#### REMEDIAL DECISION LETTER

File No. SR-28-1997

November 13, 2020

Emily Freedman, Community Development Director  
Providence Department of Planning and Development  
444 Westminster Street  
Providence, RI 02903

RE: Roger Williams Park Gateway and Visitors Center  
1197, 1197R, and 1201 Broad Street  
Providence, Rhode Island  
Plat Map 53 / Lots 511, 513, and 525

Dear Ms. Freedman:

Effective April 22, 2020, the Rhode Island Department of Environmental Management's (the Department) Office of Waste Management has changed the office name to the Office of Land Revitalization and Sustainable Materials Management (LRSMM), as reflected in the re-codified 250-RICR-140-30-1, Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (the Remediation Regulations). The purpose of these regulations is to create an integrated program requiring reporting, investigation, and remediation of contaminated sites in order to eliminate and/or control threats to human health and the environment in a timely and cost-effective manner. A Remedial Decision Letter (RDL) is a formal, written communication from the Department that approves a site investigation, identifies the preferred remedial alternative and authorizes the development of a Remedial Action Work Plan (RAWP) in order to achieve the objectives of the environmental clean-up.

In the matter of the above-referenced property (the Site), the Department's Office of LRSMM is in receipt of the following documentation submitted pursuant to the Remediation Regulations in response to the reported release at the Site:

- a. Hazardous Materials Release Notification Form, received by the Department via E-mail on June 25, 2020, and prepared by the City of Providence Department of Planning and Development;
- b. Phase I Environmental Site Assessment (ESA), received by the Department via E-mail on June 25, 2020, and prepared by Gordon R. Archibald, Inc. (GRA);
- c. Limited Site Investigation (LSI), received by the Department via E-mail on June 25, 2020, and prepared by GRA;
- d. Site Investigation Report (SIR) Cover Letter and SIR Checklist, received by the

Department via E-mail on June 25, 2020, and prepared by GRA;

- e. Response to SIR Comments and Updated Site Plan, received by the Department via E-mail on September 8, 2020, and prepared by GRA;
- f. Phase I ESA Appendices, received by the Department via E-mail on September 8, 2020, and prepared by GRA; and
- g. Environmental Justice Public Notice Package, received by the Department on October 27, 2020, and prepared by GRA.

Collectively, these documents define “Existing contamination” at the Site and fulfill the requirements of a Site Investigation Report (SIR) as described in Section 1.8.8 of the Remediation Regulations. In addition, according to our records, public notice was conducted to all abutting property owners, tenants, easement holders, the municipality and Environmental Justice Focus Area, regarding the substantive findings of the completed investigation in accordance with Sections 1.8.7(A)(2) and 1.8.9 of the Remediation Regulations. The Department has received documentation demonstrating that the requirements of Rhode Island General Laws (R.I.G.L.), Title 23, Health and Safety, Chapter 23-19.14, Industrial Property Remediation and Reuse Act, 23-19.14-5, Environmental Equity and Public Participation, have been fulfilled. The opportunity for public review and comment on the technical feasibility of the proposed remedial alternatives commenced on October 28, 2020 and the period closed on November 12, 2020. No comments were received.

The preferred remedial alternative, as stated in the SIR, consists of the following conceptual measures:

- Bring the Site into compliance with the requirements of the Department’s Underground Storage Tank (UST) Program.
- Any soils which remain on the Site with exceedances above the Method 1 Direct Exposure Criteria shall be encapsulated by a Department-approved engineered barrier which may consist of a minimum of two (2) feet of clean fill or an equivalent level of protection i.e. building foundations, one (1) foot of clean fill over a geotextile fabric, and/or four (4) inches of hardscape (asphalt or concrete) over six (6) inches of clean fill.
- Soil vapor controls shall be installed in all newly constructed site buildings to include application of a sealant such as liquid boot, or other appropriate vapor barrier, or installation of a passive sub-slab depressurization system (SSDS) under onsite buildings.
- An Environmental Land Usage Restriction (ELUR) shall be recorded on the deed for the entire property (Plat Map 53 / Lots 511, 513 and 525). The ELUR shall require the performance of annual inspections to document the status of the ELUR and the condition of the engineered controls. The ELUR shall also include a Department-approved post-remediation Soil Management Plan (SMP) which will address any future activities that may disturb on-Site soils. The ELUR shall be recorded for the entire property in the Land Evidence Records for the City of Providence, and a recorded copy forwarded back to the

Department within fifteen (15) days of recording.

The Department hereby approves the SIR, with the above identified preferred remedial alternative, and requires a RAWP be submitted for review and approval, and implemented, to achieve the objectives of the environmental clean-up, in accordance with the following conditions:

1. In accordance with Sections 1.9 and 1.10 of the Remediation Regulations, a RAWP, ELUR, and SMP shall be submitted for Department review and approval within sixty (60) days from the date of this letter. The RAWP shall describe all of the technical details, engineer design elements, and schedules associated with the implementation of the proposed remedy. All of the subsections outlined in Section 1.10 of the Remediation Regulations must be included in order to facilitate the review and approval of the RAWP. If an item is not applicable to this Site, simply state that it is not applicable and provide an explanation in the RAWP.
2. Pursuant to Section 1.11.2 of the Remediation Regulations, an application fee for Remedial Action Approvals in the amount of one thousand (\$1,000.00) dollars shall be made payable to the State of Rhode Island General Treasurer and remitted to the Office of Management Services with the attached Remedial Action Approval Application Fee Form. Receipt of this Remedial Action Approval Application Fee is required prior to the Department's RAWP review.
3. Once the Department reviews the RAWP for consistency with Sections 1.9 and 1.10 of the Remediation Regulations, any written comments generated and forwarded as a result of the review(s) shall be incorporated forthwith into a RAWP Addendum, to be submitted for final approval.
4. Upon finalization of the RAWP, the Department will issue a Remedial Approval Letter (RAL), signifying Department approval. All remedial measures required by the Department shall be implemented, in accordance with the approved schedule, to ensure all applicable exposure pathways at the site are appropriately addressed.

**Please be advised that the Department reserves the right to require additional actions under the aforementioned Remediation Regulations at the Property should any of the following occur:**

- Conditions at the Site previously unknown to the Department are discovered;
- Information previously unknown to the Department becomes available;
- Policy and/or regulatory requirements change; and/or
- Failure by Providence Department of Planning and Development or any future holder of any interest in the Property to adhere to the terms and conditions of the Department approved RAWP, schedule, RAL, ELUR and/or SMP for the Property.

If you have any questions regarding this letter or would like the opportunity to meet with Department personnel, please contact me by telephone at (401) 222-2797, ext. 2030, or by E-mail at Stephanie.Cappelli@dem.ri.gov.

Sincerely,

A handwritten signature in black ink, appearing to read 'Stephanie Cappelli', written in a cursive style.

Stephanie Cappelli  
Environmental Engineer I  
Office of Land Revitalization &  
Sustainable Materials Management

cc: Kelly Owens, LRSMM-Site Remediation  
Rachel Simpson, LRSMM-Site Remediation  
Andrew Hook, LRSMM-LUST  
Mike Cote, LRSMM-LUST  
Steve Cadorette, Gordon R. Archibald, Inc.  
Richard Sullivan, Gordon R. Archibald, Inc.

Attachment: Remedial Action Approval Application Fee Form



**RHODE ISLAND**

**DEPARTMENT OF ENVIRONMENTAL MANAGEMENT**

OFFICE OF LAND REVITALIZATION & SUSTAINABLE MATERIALS MANAGEMENT  
235 Promenade Street, Providence, Rhode Island 02908

**REMEDIAL ACTION APPROVAL APPLICATION FEE FORM**

Rule 1.11.2 of the Department's Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases, requires an application fee for Remedial Action Approvals in the amount of one thousand (\$1,000) dollars. Please submit this form and check, made payable to the State of Rhode Island General Treasurer, directly to:

**R.I. Department of Environmental Management  
Office of Management Services - Rm 340  
235 Promenade Street  
Providence, RI 02908**

Please complete this page and attach it to the check or money order. This information must be provided to coordinate your fee with the application submitted.

Site Name: Roger Williams Park Gateway and Visitors Center

Address: 1197, 1197R, and 1201 Broad Street

Town/City: Providence

File Number: SR-28-1997

Contact Person: \_\_\_\_\_

Phone No: \_\_\_\_\_

RIDEM Project Manager: Stephanie Cappelli

**FOR RIDEM OFFICE USE ONLY:**

Fee Amount Received: \_\_\_\_\_

Date Received: \_\_\_\_\_

Check#: \_\_\_\_\_

Receipt Account:

10.074.3765103.03.461043

cc:74:3481 Leg.17-18-841

**APPENDIX B**

**RIDEM ENVIRONMENTAL LAND USE RESTRICTION TEMPLATE**

**RIDEM SOIL MANAGEMENT PLAN TEMPLATE**

**Post Remediation Soil Management Plan  
Roger Williams Park Gateway and Visitor Center  
1197, 1197R, and 1201 Broad Street Providence, RI  
Map 53, Lot 511, 513, and 525**

This Soil Management Plan (SMP) has been prepared to establish procedures that will be followed should future construction/maintenance activities at the Roger Williams Park Gateway and Visitors Center property require the need to manage soils excavated from the subsurface or when existing site surfaces / Department approved engineered controls (asphalt, concrete, landscaping and/or foundations) are disturbed. The plan serves to supplement, and will be initiated by, the RIDEM notification requirement established by the Environmental Land Use Restriction (ELUR) for the property.

*Background*

The Property, located at 1201 Broad Street, Providence, formerly housed a gas station from 1925 to 1983, a restaurant from 1984 to present, and an auto supply facility 1938 to 1978. The property was found to contain polyaromatic hydrocarbons and total petroleum hydrocarbons during a site investigation performed at the property. More recently, the site has been developed with RWP Gateway and Visitors Center. The Department approved remedy included engineered controls including capping with clean imported soils, pavement and concrete. The regulated site soils are covered with Department approved engineered controls, consisting of building foundations, asphalt pavement, concrete walkways and landscaping in order to prevent direct exposure to regulated soils and/or infiltration through soils which exceed the Department's Method 1 (GA or GB) Leachability Criteria.

*Applicable Area*

This SMP and affiliated ELUR, which restricts the property to Industrial/Commercial use, pertains to the entire Property. See attached site figure.

*Soil Management*

The direct exposure pathway is the primary concern at the site. Individuals engaged in activities at the site may be exposed through incidental ingestion, dermal contact, or inhalation of vapors or entrained soil particles if proper precautions are not taken. Therefore, the following procedures will be followed to minimize the potential of exposure.

During site work, the appropriate precautions will be taken to restrict unauthorized access to the property.

During all site/earth work, dust suppression (e.g. watering, etc) techniques must be employed at all times. If it is anticipated due to the nature of the contaminants of concern

that odors may be generated during site activities, air monitoring and means to control odors will be utilized, as appropriate (e.g. odor-suppressing foam, etc).

In the event that an unexpected observation or situation arises during site work, such activities will immediately stop. Workers will not attempt to handle the situation themselves but will contact the appropriate authority for further direction.

In the event that certain soils on site were not previously characterized, these soils are presumed to be regulated until such time that it is demonstrated to the Department, through sampling and laboratory analysis that they are not regulated. (For example, presumptive remedies or locations of previously inaccessible soil.)

If excess soil is generated / excavated from the Property, the soil is to remain on-site for analytical testing, to be performed by an environmental professional, in order to determine the appropriate disposal and/or management options. The soil must be placed on and covered with polyethylene/plastic sheeting during the entire duration of its staging and secured with appropriate controls to limit the loss of the cover and protect against storm-water and / or wind erosion (e.g. hay bales, silt fencing, rocks, etc).

Excavated soils will be staged and temporarily stored in a designated area of the property. Within reason, the storage location will be selected to limit the unauthorized access to the materials (e.g., away from public roadways/walkways). No regulated soil will be stockpiled on-site for greater than 60 days without prior Department approval.

In the event that stockpiled soils pose a risk or threat of leaching hazardous materials, a proper leak-proof container (e.g. drum or lined roll-off) or secondary containment will be utilized.

Soils excavated from the site may not be re-used as fill on residential property. Excavated fill material shall not be re-used as fill on commercial or industrial properties unless it meets the Department's Method 1 Residential Direct Exposure Criteria for all constituents listed in Table 1 of the Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Remediation Regulations). Copies of the laboratory analysis results shall be maintained by the site owner and included in the annual inspection report for the site, or the closure report if applicable. In the event that the soil does not meet any of these criteria, the material must be properly managed and disposed of off site at a licensed facility.

Site soils, which are to be disposed of off-site, must be done so at a licensed facility in accordance with all local, state, and federal laws. Copies of the material shipping records associated with the disposal of the material shall be maintained by the site owner and included in the annual inspection report for the site.

Best soil management practices should be employed at all times and regulated soils should be segregated into separate piles (or cells or containers) as appropriate based upon the results of analytical testing, when multiple reuse options are planned (e.g. reuse on-

site, reuse at a Department approved Industrial/Commercial property, or disposal at a Department approved licensed facility).

All non-disposable equipment used during the soil disturbance activities will be properly decontaminated as appropriate prior to removal from the site. All disposable equipment used during the soil disturbance activities will be properly containerized and disposed of following completion of the work. All vehicles utilized during the work shall be properly decontaminated as appropriate prior to leaving the site.

At the completion of site work, all exposed soils are required to be recapped with Department approved engineered controls (2 ft of clean fill or equivalent: building foundations, 4 inches of pavement/concrete underlain with 6 inches of clean fill, and/or 1 foot of clean fill underlain with a geotextile liner) consistent or better than the site surface conditions prior to the work that took place. These measures must also be consistent with the Department approved ELUR recorded on the property. Any clean fill material brought on site is required to meet the Department's Method 1 Residential Direct Exposure Criteria or be designated by an Environmental Professional as Non-Jurisdictional under the Remediation Regulations. The Annual Inspection Report for the site, or Closure Report if applicable, should include either analytical sampling results from the fill demonstrating compliance or alternatively include written certification by an Environmental Professional that the fill is not jurisdictional.

*Groundwater Management*  
(if applicable)

*Worker Health and Safety*

To ensure the health and safety of on-site workers, persons involved in the excavation and handling of the material on site are required to wear a minimum of Level D personal protection equipment, including gloves, work boots and eye protection. Workers are also required to wash their hands with soap and water prior to eating, drinking, smoking, or leaving the site.

*Department Approval*

In accordance with Section A iii of the ELUR, no soil at the property is to be disturbed in any manner without prior written permission of the Department's Office of Land Revitalization & Sustainable Materials Management, except for minor inspections, maintenance, and landscaping activities that do not disturb the contaminated soil at the Site. As part of the notification process, the site owner shall provide a brief written description of the anticipated site activity involving soil excavation. The notification should be submitted to the Department no later than 60 days prior to the proposed initiation of the start of site activities. The description shall include an estimate of the volume of soil to be excavated, a list of the known and anticipated contaminants of concern, a site figure clearly identifying the proposed areas to be excavated/disturbed, the duration of the project and the proposed disposal location of the soil.

Following written Notification, the Department will determine the post closure reporting requirements. Significant disturbances of regulated soil will require submission of a Closure Report for Department review and approval documenting that the activities were performed in accordance with this SMP and the Department approved ELUR. Minor disturbances of regulated soil may be documented through the annual certification submitted in accordance with Section H (Inspection & Non-Compliance) of the Department approved ELUR. The Department will also make a determination regarding the necessity of performing Public Notice to abutting property owners/tenants concerning the proposed activities. Work associated with the Notification will not commence until written Department approval has been issued. Once Department approval has been issued, the Department will be notified a minimum of two (2) days prior to the start of activities at the site. Shall any significant alterations to the Department approved plan be necessary, a written description of the proposed deviation, will be submitted to the Department for review and approval prior to initiating such changes.

## ENVIRONMENTAL LAND USAGE RESTRICTION

This Declaration of Environmental Land Usage Restriction (“Restriction”) is made on this \_\_\_\_ day of \_\_\_\_\_, 20\_\_ by City of Providence, and its successors and/or assigns (hereinafter, the “Grantor”).

### WITNESSETH:

WHEREAS, the Grantor City of Providence is the Owner in fee simple of certain real property identified as Map 53, Lots 511, 513, 525 in the City of Providence, Rhode Island (the “Property”), more particularly described in Exhibit A (Legal Description) which is attached hereto and made a part hereof;

WHEREAS, the Property (or portion thereof identified in the Class I survey which is attached hereto as Exhibit 2A and is made a part hereof) has been determined to contain soil and/or groundwater which is contaminated with certain Hazardous Materials and/or petroleum in excess of applicable residential and industrial/commercial Direct Exposure Criteria and applicable groundwater objective criteria pursuant to the Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (“Remediation Regulations”);

WHEREAS, the Grantor and the Rhode Island Department of Environmental Management (“Department”) have determined that the environmental land use restrictions set forth below are consistent with the regulations adopted by the Department pursuant to R.I.G.L. § 23-19.14-1 and that this restriction shall be a Conservation Restriction pursuant to R.I.G.L. § 34-39-1 et. seq. and shall not be subject to the 30-year limitation provided in R.I.G.L. § 34-4-21;

WHEREAS, the Department's written approval of this Restriction is contained in the document entitled: Remedial Decision Letter issued pursuant to the Remediation Regulations;

WHEREAS, to prevent exposure to or migration of Hazardous Substances and to abate hazards to human health and/or the environment, and in accordance with the Remedial Decision Letter, the Grantor desires to impose certain restrictions upon the use, occupancy, and activities of and at the Contaminated-Site;

WHEREAS, the Grantor believes that this Restriction will effectively protect public health and the environment from such contamination; and

WHEREAS, the Grantor intends that such restrictions shall run with the land and be binding upon and enforceable against the Grantor and the Grantor’s successors and assigns.

NOW, THEREFORE, Grantor agrees as follows:

- A. Restrictions Applicable to the 1197, 1197R, 1201 Broad Street property: In accordance with the Remedial Decision Letter, the use, occupancy and activity of and at the Property is

restricted as follows:

- i. No residential use of the Property shall be permitted that is contrary to Department approvals and restrictions contained herein;
- ii. No groundwater at the Property shall be used as potable water;
- iii. No soil at the Property shall be disturbed in any manner without written permission of the Department's Office of Land Revitalization & Sustainable Materials Management, except as permitted in the Remedial Action Work Plan (RAWP) or Soil Management Plan (SMP), Exhibit B and attached hereto, approved by the Department in a written approval letter dated \_\_\_\_\_(date);
- [iv. Humans engaged in activities at the Property shall not be exposed to soils containing Hazardous Materials and/or petroleum in concentrations exceeding the applicable Department approved Direct Exposure Criteria set forth in the Remediation Regulations;
- [v. Water at the Property shall be prohibited from infiltrating soils containing Hazardous Materials and/or petroleum in concentrations exceeding the applicable Department approved leachability criteria set forth in the Remediation Regulations;
- [vi. No subsurface structures shall be constructed on the Property over groundwater containing Hazardous Materials and/or petroleum in concentrations exceeding the applicable Department approved GA or GB Groundwater Objectives set forth in the Remediation Regulations;
- [vii. The engineered controls at the Property described in the RAWP contained in Exhibit B attached hereto shall not be disturbed and shall be properly maintained to prevent humans engaged in residential or industrial/commercial activity from being exposed to soils containing Hazardous Materials and/or petroleum in concentrations exceeding the applicable Department-approved residential or industrial/commercial Direct Exposure Criteria in accordance with the Remediation Regulations; and
- [viii. The engineered controls at the Property described in the RAWP contained in Exhibit B attached hereto shall not be disturbed and shall be properly maintained so that water does not infiltrate soils containing Hazardous Materials and/or petroleum in concentrations exceeding the applicable Department-approved leachability criteria set forth in the Remediation Regulations.

**B. No action shall be taken, allowed, suffered, or omitted at the Property if such action or omission is reasonably likely to:**

- i. Create a risk of migration of Hazardous Materials and/or petroleum;
- ii. Create a potential hazard to human health or the environment; or
- iii. Result in the disturbance of any engineering controls utilized at the Property, except as

permitted in the Department-approved RAWP contained in Exhibit B.

**C. Emergencies:** In the event of any emergency which presents a significant risk to human health or to the environment, including but not limited to, maintenance and repair of utility lines or a response to emergencies such as fire or flood, the application of Paragraphs A (iii.-viii.) and B above may be suspended, provided such risk cannot be abated without suspending such Paragraphs and the Grantor complies with the following:

- i. Grantor shall notify the Department's Office of Land Revitalization & Sustainable Materials Management in writing of the emergency as soon as possible but no more than three (3) business days after Grantor's having learned of the emergency. (This does not remove Grantor's obligation to notify any other necessary state, local or federal agencies.);
- ii. Grantor shall limit both the extent and duration of the suspension to the minimum period reasonable and necessary to adequately respond to the emergency;
- iii. Grantor shall implement reasonable measures necessary to prevent actual, potential, present and future risk to human health and the environment resulting from such suspension;
- iv. Grantor shall communicate at the time of written notification to the Department its intention to conduct the Emergency Response Actions and provide a schedule to complete the Emergency Response Actions;
- v. Grantor shall continue to implement the Emergency Response Actions, on the schedule submitted to the Department, to ensure that the Property is remediated in accordance with the Remediation Regulations (or applicable variance) or restored to its condition prior to such emergency. Based upon information submitted to the Department at the time the ELUR was recorded pertaining to known environmental conditions at the Property, emergency maintenance and repair of utility lines shall only require restoration of the Property to its condition prior to the maintenance and repair of the utility lines; and
- vi. Grantor shall submit to the Department, within ten (10) days after the completion of the Emergency Response Action, a status report describing the emergency activities that have been completed.

**D. Release of Restriction; Alterations of Subject Area:** The Grantor shall not make, or allow or suffer to be made, any alteration of any kind in, to, or about any portion of the Property inconsistent with this Restriction unless the Grantor has received the Department's prior written approval for such alteration. If the Department determines that the proposed alteration is significant, the Department may require the amendment of this Restriction. Alterations deemed insignificant by the Department will be approved via a letter from the Department. The Department shall not approve any such alteration and shall not release the Property from the provisions of this Restriction unless the Grantor demonstrates to the

Department's satisfaction that Grantor has managed the Property in accordance with applicable regulations.

- E. Notice of Lessees and Other Holders of Interests in the Property:** The Grantor, or any future holder of any interest in the **Property**, shall cause any lease, grant, or other transfer of any interest in the **Property** to include a provision expressly requiring the lessee, grantee, or transferee to comply with this Restriction. The failure to include such provision shall not affect the validity or applicability of this Restriction to the **Property**.
- F. Enforceability:** If any court of competent jurisdiction determines that any provision of this Restriction is invalid or unenforceable, the Grantor shall notify the Department in writing within fourteen (14) days of such determination.
- G. Binding Effect:** All of the terms, covenants, and conditions of this Restriction shall run with the land and shall be binding on the Grantor, its successors and assigns, and each Owner and any other party entitled to control, possession or use of the **Property** during such period of Ownership or possession.
- H. Inspection & Non-Compliance:** It shall be the obligation of the Grantor, or any future holder of any interest in the **Property**, to provide for annual inspections of the **Property** for compliance with the ELUR in accordance with Department requirements.

**[An officer or Director of the company with direct knowledge of past and present conditions of the [Property/Contaminated-Site] (the “Company Representative”), or]** A qualified environmental professional will, on behalf of the Grantor or future holder of any interest in the **[Property/Contaminated-Site]**, evaluate the compliance status of the **[Property/Contaminated-Site]** on an annual basis. Upon completion of the evaluation, the **[Company Representative or]** environmental professional will prepare and simultaneously submit to the Department and to the Grantor or future holder of any interest in the **[Property/Contaminated-Site]** an evaluation report detailing the findings of the inspection , and noting any compliance violations at the **[Property/Contaminated-Site]**. If the **[Property/Contaminated-Site]** is determined to be out of compliance with the terms of the ELUR, the Grantor or future holder of any interest in the **[Property/Contaminated-Site]** shall submit a corrective action plan in writing to the Department within ten (10) days of receipt of the evaluation report, indicating the plans to bring the **[Property/Contaminated-Site]** into compliance with the ELUR, including, at a minimum, a schedule for implementation of the plan.

In the event of any violation of the terms of this Restriction, which remains uncured more than ninety (90) days after written notice of violation, all Department approvals and agreements relating to the **[Property/Contaminated-Site]** may be voided at the sole discretion of the Department.

- I. Terms Used Herein:** The definitions of terms used herein shall be the same as the definitions contained in Section 3 (DEFINITIONS) of the Remediation Regulations.

IN WITNESS WHEREOF, the Grantor has hereunto set (his/her) hand and seal on the day and year set forth above.

**[Name of Person(s), company, LLC or LLP]**

By: \_\_\_\_\_  
Grantor (signature) \_\_\_\_\_ Grantor (typed name)

STATE OF RHODE ISLAND  
COUNTY OF \_\_\_\_\_

In (CITY/TOWN), in said County and State, on the \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_,  
before me Personally appeared \_\_\_\_\_, to me known and known by me to be the  
party executing the foregoing instrument and (he/she) acknowledged said instrument by  
(him/her) executed to be (his/her) free act and deed.

Notary Public: \_\_\_\_\_

My Comm. Expires: \_\_\_\_\_

# SITU/**Fabrication**

**Proposal for Design Build  
Roger Williams Park  
Gateway Canopy**

December 30, 2020

**Cory Lavigne**  
**INFORM Studio**  
235 East Main Street, 102B  
Northville, Michigan 48167  
(248) 982-8193  
clavigne@in-formstudio.com



**Project Summary**

This proposal is for Design Build services related to the fabrication, delivery and installation of gateway canopy fins at Roger Williams Park in Providence, RI. Proposal is based on the files '2717-00\_ROGER WILLIAMS PARK - PROVIDENCE\_export', 'RWP\_STRUCTURAL.pdf', and 'RWP\_ARCH.pdf' transmitted on 11/20/2020.

**SITU Fabrication**  
Brooklyn Navy Yard, 63 Flushing Ave  
Bldg 132, Brooklyn, NY 11205  
(718) 855-2170  
situ.nyc/fabrication

# SITU/**Fabrication**

## Scope of Work

The (40) gateway canopy fins are composed of painted aluminum sheets attached to an aluminum substructure. The fins range from 66”H x 38”W x 2” and 89”H x 270” x 2” with a total project area of approximately 3,840 sqft. Each fin will be composed of two parts: (1) 2” x 4” beam that mechanically attaches to the top of the structural beams by others and (1) single fin structure that connects to the aluminum beam and structural steel from below. The fin structure is composed of welded 2” x 2” aluminum tubing. Custom fastening plates and mechanical attachment points will be considered around the openings in the structure where the fin will connect to the structural beams. Vertical members in the structure will be considered to account for wind loads and deflection, pending engineering review. The fins will be sheathed in 3/16” aluminum sheet cut to specified geometry, with vertical seams every 4’-8’, and mechanically fastened using flathead screws. The sheathing will not wrap around the 2” edge and will instead be exposed painted aluminum tubing. Lower fin sections will have leakage holes, pending design review. All fins will be painted with 2-part epoxy primer and paint. Pricing accounts for (7) colors amongst the (40) fins.

Pricing excludes the structural beams, cross braces between fins, and base building outriggers. Fins structures are based on provided structural drawings ‘RWP\_STRUCTURAL.pdf. Pending structural review, pricing may vary if drastic additions to the fin framework is necessary to maintain structural integrity. Bracing between fins has not been considered but should be reviewed by an engineer to determine if additional structure between the lower portions of fins is necessary.

Pricing includes signed and stamped drawings by engineers subcontracted through SITU.

SITU will create shop drawings for approval and fabricate the project. The project components will be packed and delivered to the jobsite and installed.

## Schedule

The anticipated schedule is set for a mid Q4 2021 installation, and the project will take approximately 6-8 months to complete upon approval of shop drawings. This estimate is subject to change based on the timeliness of approvals, material lead times, the construction schedule, and trade sequencing.

# SITU/**Fabrication**

**Fee** Based on the above-outlined scope and understanding of the project at this time, SITU proposes the following fixed fee structure to be invoiced monthly.

(40) Canopy Fins	\$709,000.00
<b>Total</b>	<b>\$709,000.00</b>

- Exclusions**
- Sales tax (an exemption certificate will need to be provided)
  - Overtime and acceleration costs
  - Union labor
  - Fireproofing or other preservative treatments
  - Local fees and permits
  - Sprinklers, plumbing, drainage, HVAC, lighting or electrical work
  - Structural steel, cross craving and base building outriggers
  - Demolition
  - Storage of finished goods more than 2 weeks beyond anticipated delivery/install date
  - Security, Fire, Data, A/V and any other specialty elements integrated into installation
  - Rough bucks and in-wall blocking
  - Installation, maintenance or replacement of any protective coverings or barricades
  - Any cleaning beyond broom clean condition of areas within our scope
  - Any millwork not specified in the above proposal

**Payment Terms** 20% deposit due upon signing prior to commencing work, followed by monthly invoices based upon a mutually agreed upon schedule of values.

- Terms & Conditions**
- This estimate is based upon our interpretation of the drawings provided and is subject to a mutually agreeable scope review.
  - SITU Fabrication reserves the right to negotiate terms outlined in the sample subcontract agreement whether or not provided prior to bid time.
  - Final schedule to be negotiated and is subject to change based on award date, availability of materials, field dimensions, sequencing of trades, acts of God, etc.
  - Estimates are based on non-union labor.
  - Any additional services beyond those outlined above will be discussed and agreed to prior to proceeding.
  - All pricing are subject to escalation fees up to 8% per year based on the time of estimation to the time of procurement and/or fabrication.
  - Pricing is based on the assumption that SITU's current insurance coverage will meet the requirements for the scope of work. Increased fees for additional coverage has not been accounted for. COI can be delivered, upon request.

# SITU/**Fabrication**

**Agreement**

Thank you for considering SITU Fabrication for this project. Should the terms of this proposal be acceptable to you, kindly indicate by signing and dating this proposal below and remit one copy.

Sincerely,



Michael Brotherton, President

[mbrotherton@situ.nyc](mailto:mbrotherton@situ.nyc)

---

Signature

---

Accepted by

---

Title

---

Date

# APPENDIX E

CERTIFICATION REGARDING LOBBYING

(This Certification is required pursuant to 31 U.S.C. 1352)

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.
- (3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$11,000 and not more than \$110,000 for each such failure.

Please check appropriate box:

No nonfederal funds have been used or are planned to be used for lobbying in connection with this application/award/contract.

or

Attached is Standard Form LLL, "Disclosure of Lobbying Activities," which describes the use (past or planned) of nonfederal funds for lobbying in connection with this application/award/contract.

Executed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

by \_\_\_\_\_  
(Type or Print Name)

\_\_\_\_\_  
(Title of Executing Official)

\_\_\_\_\_  
(Signature of Executing Official)

\_\_\_\_\_  
(Name of organization/applicant)

# APPENDIX F

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CERTIFICATE OF CORPORATE AUTHORITY  
CONSTRUCTION SERVICES FOR  
ROGER WILLIAMS PARK GATEWAY PROJECT

P R O V I D E N C E , R H O D E I S L A N D

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CERTIFICATE AS TO CORPORATE PRINCIPAL

I, \_\_\_\_\_, certify that I am the \_\_\_\_\_ of the Corporation named as Contractor in the within submission; that, \_\_\_\_\_ who signed the submission on behalf of the Contractor was then \_\_\_\_\_ of said corporation; that I know his/her signature, and his/her signature thereto is genuine; and that said submission was duly signed, sealed, and attested to for and on behalf of said Corporation by its own authority.

\_\_\_\_\_(Corporate Seal)

\_\_\_\_\_  
Title

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**NON-COLLUSION AFFIDAVIT of PRIME BIDDER  
CONSTRUCTION SERVICES FOR  
ROGER WILLIAMS PARK GATEWAY PROJECT**

P R O V I D E N C E , R H O D E I S L A N D

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State of \_\_\_\_\_ )  
County of \_\_\_\_\_ ) ss

\_\_\_\_\_, being first duly sworn, deposes and says that:

- (1) He is the \_\_\_\_\_ of \_\_\_\_\_, the Bidder that has submitted the attached Bid:
- (2) He is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid:
- (3) Such Bid is genuine and is not a collusive or sham Bid;
- (4) Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement, any advantage against the Providence Redevelopment Agency or any person interested in the proposed Contract; and
- (5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

(Signed) \_\_\_\_\_

\_\_\_\_\_  
Title

Subscribed and sworn to before me this

\_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
Title

My Commission expires \_\_\_\_\_

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**CERTIFICATION OF NON-SEGREGATED FACILITIES  
CONSTRUCTION SERVICES FOR  
ROGER WILLIAMS PARK GATEWAY PROJECT**

P R O V I D E N C E , R H O D E I S L A N D

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**CERTIFICATION OF NON-SEGREGATED FACILITIES**

The Bidder certifies that he/she does not maintain or provide for his/her employees any segregated facilities at any of his establishments, and that he/she does not permit his/her employees to perform their services at any location, under his/her control, where segregated facilities are maintained. The Bidder agrees that a breach of this certification will be a violation of the Equal Opportunity Clause in any contract resulting from acceptance of this Bid. As used in this certification, the term "segregated facilities" means any waiting rooms, work rooms, restrooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or otherwise. The Bidder agrees that (except where he/she has obtained identical certification from proposed subcontractors for specific time periods) he/she will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000.00 which are not exempt from provisions of the Equal Opportunity Clause, and that he/she will retain such certifications in his/her files.

Note: The penalty for making false statements in offers is prescribed in 18 U.S.C. & 1001.

DATE \_\_\_\_\_, 20\_\_\_\_\_

Official Address:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Name of Bidder (Firm):

\_\_\_\_\_  
By \_\_\_\_\_  
(Signature)  
Title \_\_\_\_\_

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**BIDDER'S CERTIFICATION for  
EQUAL EMPLOYMENT OPPORTUNITY  
CONSTRUCTION SERVICES FOR  
ROGER WILLIAMS PARK GATEWAY PROJECT  
PROVIDENCE, RHODE ISLAND**

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In compliance with Executive Order 11246 Equal Opportunity (GC II, Section 210, or latest publication) the Bidder hereby certifies he shall comply with Bid Conditions, Affirmative Action Requirements, Equal Employment Opportunity, as provided in the attachment Shown on pages GC II - 47a to GC II - 47f, or latest publication.

Full name and address of individual or concern submitting this Bid:

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Signed \_\_\_\_\_ Title

\_\_\_\_\_ Date

\_\_\_\_\_

Notice: Bid should be signed in ink by a person having proper legal authority, and the person's title should be given, such as "Owner" in the case of an individual, "Partner" in the case of a general partnership, "President", Treasurer, or other authorized officer in the case of a corporation.

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**SPECIAL REQUIREMENT for  
ALL OUT-OF-STATE CONTRACTORS and FIRMS  
CONSTRUCTION SERVICES FOR  
ROGER WILLIAMS PARK GATEWAY PROJECT  
P R O V I D E N C E , R H O D E I S L A N D**

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It is the understanding of any and all out-of-state firms and companies must be registered to do business in the State of Rhode Island with the Secretary of State's Office. Any false statements made in this regard will cause this Contract to become null and void at the option of the Agency, therefore, in accordance with this requirement the following statement is made:

I (we) being duly sworn officers of said company or firm, hereby declare and affirm that this company or firm is registered with the Rhode Island Secretary of State's Office to do business in Rhode Island.

\_\_\_\_\_  
Company or Firm

Attest:

\_\_\_\_\_

By \_\_\_\_\_

Title \_\_\_\_\_

Note: If proposal is being made by an in-state contractor or firm, this form may be left blank.

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**CERTIFICATION with Regard to PERFORMANCE  
of PREVIOUS CONTRACTS and SUBCONTRACTS  
CONSTRUCTION SERVICES FOR  
ROGER WILLIAMS PARK GATEWAY PROJECT  
P R O V I D E N C E , R H O D E I S L A N D**

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The Bidder \_\_\_\_\_, proposed Subcontractor \_\_\_\_\_, hereby certifies that he has \_\_\_\_\_ has not \_\_\_\_\_, participated in a previous contract or subcontract subject to the Equal Opportunity Clause, as required by Executive Orders 10924, 11114, or 11246 and that he has \_\_\_\_\_, has not \_\_\_\_\_, filled with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance, a Federal Government contracting or administering agency, or the former President's Committee on Equal Employment Opportunity, all reports due under the applicable filing requirements:

\_\_\_\_\_  
(Company)

By \_\_\_\_\_

Date \_\_\_\_\_

Title \_\_\_\_\_

NOTE: The above certification is required by the Equal Employment Opportunity Regulations of the Secretary of Labor (41 CFR 60-1.7 (b)(1), and must be submitted by bidders and proposed subcontractors any in connection with the contracts and subcontracts which are subject to the Equal Opportunity Clause. Contracts and subcontracts which are exempt from the Equal Opportunity Clause are set forth in 41 CFR 60-15. Generally, only contracts or subcontracts of \$10,000.00 or under are exempt.

Currently, Standard Form 100 (EEO-11) is the only report required by the Executive Orders or their implementing regulations.

Proposed prime contractors and subcontractors who have participated in a previous contract or subcontract subject to the Executive Orders and have filed the required reports should note that 41 CFR 60-1.7(b)(1) prevents the award of contracts and subcontracts unless such contractor submits a report covering the delinquent period or such other period specified by the Federal Highway Administration or by the Director, Office of Federal Contract Compliance, U.S. Department of Labor.

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**AFFIDAVIT of NON-DISCRIMINATION**  
**CONSTRUCTION SERVICES FOR**  
**ROGER WILLIAMS PARK GATEWAY PROJECT**  
P R O V I D E N C E , R H O D E I S L A N D

---

State of \_\_\_\_\_ ss.  
County of \_\_\_\_\_

\_\_\_\_\_, being first duly sworn, deposes and says  
that:

He is the \_\_\_\_\_ of \_\_\_\_\_  
a corporation organized and existing under the Laws of \_\_\_\_\_ and the  
Contractor for the \_\_\_\_\_

Project No. \_\_\_\_\_ that he makes this affidavit for and on behalf of said Corporation; that during the period  
\_\_\_\_\_, 20\_\_ to \_\_\_\_\_, 20\_\_, the said corporation has maintained the

practices of employment as required by federal, state, and city laws in regards to the hiring of employees for the  
aforementioned project and that in employment, upgrading, the demotion or transfer, recruitment or recruitment  
advertising; layoffs or termination, rates of pay or other forms of compensation; and selection for training  
including apprenticeship, that it has not discriminated against any employee or applicant for employment on the  
work covered by this contract because of race, religion, color or national origin.

(Signed) \_\_\_\_\_

\_\_\_\_\_  
Title

Subscribed and sworn to before me this

\_\_\_\_\_ day of \_\_\_\_\_, 20\_\_

(Signed) \_\_\_\_\_

\_\_\_\_\_  
Title

(Seal)

My Commission Expires \_\_\_\_\_, 20\_\_

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CERTIFICATION OF NON-DISCRIMINATION IN  
EQUAL EMPLOYMENT OPPORTUNITY  
CONSTRUCTION SERVICES FOR  
ROGER WILLIAMS PARK GATEWAY PROJECT

P R O V I D E N C E , R H O D E I S L A N D

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CERTIFICATION OF NON-DISCRIMINATION IN EQUAL EMPLOYMENT OPPORTUNITY

The bidder represents the he/she has, \_has not, participated in a previous contract or subcontract to either the equal opportunity clause contracted in Section 202 of the Executive Order 11246; that he/she has, has not, filed with the Joint Reporting Committee, the Director of OFCC, any Federal agency, or the former President's Committee on Equal Employment Opportunity, all reports due under the applicable filing requirements of those organizations; and that representations indicating submission of required compliance reports, signed by proposed subcontractors will be obtained prior to subcontract awards.

\_\_\_\_\_  
Company Name

BY: \_\_\_\_\_

Title: \_\_\_\_\_

\_\_\_\_\_  
Date

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**PROPOSED SUBCONTRACTORS  
CONSTRUCTION SERVICES FOR  
ROGER WILLIAMS PARK GATEWAY PROJECT**  
P R O V I D E N C E , R H O D E I S L A N D

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I, \_\_\_\_\_ the BIDDER, hereby propose to utilize the following named SUBCONTRACTORS for the CONSTRUCTION SERVICES FOR ROGER WILLIAMS PARK GATEWAY PROJECT, Providence, RI. for the work items and/or estimated prices stated below and understand that the Owner reserves the right to reject any subcontractor if investigation determines they do not meet federal requirements or are otherwise unacceptable for the Project.

1. WORK ITEM/DESCRIPTION:

\_\_\_\_\_  
\_\_\_\_\_

Estimated Value of Work     \$ \_\_\_\_\_  
Subcontractor: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip-Code: \_\_\_\_\_  
Telephone No.: \_\_\_\_\_

2. WORK ITEM/DESCRIPTION:

\_\_\_\_\_  
\_\_\_\_\_

Estimated Value of Work:     \$ \_\_\_\_\_  
Subcontractor: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip-Code: \_\_\_\_\_  
Telephone No.: \_\_\_\_\_

3. WORK ITEM/DESCRIPTION:

\_\_\_\_\_  
\_\_\_\_\_

Estimated Value of Work:     \$ \_\_\_\_\_  
Subcontractor: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip-Code: \_\_\_\_\_  
Telephone No.: \_\_\_\_\_

4. WORK ITEM/DESCRIPTION:

\_\_\_\_\_  
\_\_\_\_\_

Estimated Value of Work:     \$ \_\_\_\_\_  
Subcontractor: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip-Code: \_\_\_\_\_  
Telephone No.: \_\_\_\_\_

PROPOSED SUBCONTRACTORS

Page 2

5. WORK ITEM/DESCRIPTION:

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Estimated Value of Work     \$ \_\_\_\_\_  
Subcontractor: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip-Code: \_\_\_\_\_  
Telephone No.: \_\_\_\_\_

6. WORK ITEM/DESCRIPTION:

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Estimated Value of Work:     \$ \_\_\_\_\_  
Subcontractor: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip-Code: \_\_\_\_\_  
Telephone No.: \_\_\_\_\_

7. WORK ITEM/DESCRIPTION:

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Estimated Value of Work:     \$ \_\_\_\_\_  
Subcontractor: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip-Code: \_\_\_\_\_  
Telephone No.: \_\_\_\_\_

8. WORK ITEM/DESCRIPTION:

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Estimated Value of Work:     \$ \_\_\_\_\_  
Subcontractor: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip-Code: \_\_\_\_\_  
Telephone No.: \_\_\_\_\_

9. WORK ITEM/DESCRIPTION:

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Estimated Value of Work:     \$ \_\_\_\_\_  
Subcontractor: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip-Code: \_\_\_\_\_  
Telephone No.: \_\_\_\_\_

# APPENDIX G

[RESERVED]

# APPENDIX H

"General Decision Number: RI20210001 03/05/2021

Superseded General Decision Number: RI20200001

State: Rhode Island

Construction Types: Building, Heavy (Heavy and Marine) and Highway

Counties: Rhode Island Statewide.

BUILDING CONSTRUCTION PROJECTS (does not include residential construction consisting of single family homes and apartments up to and including 4 stories) HEAVY, HIGHWAY AND MARINE CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at [www.dol.gov/whd/govcontracts](http://www.dol.gov/whd/govcontracts).

Modification Number	Publication Date
0	01/01/2021
1	01/22/2021
2	03/05/2021

ASBE0006-006 12/01/2019

	Rates	Fringes
HAZARDOUS MATERIAL HANDLER (Includes preparation, wetting, stripping, removal scrapping, vacuuming, bagging & disposing of all insulation materials, whether they contain asbestos or not, from mechanical systems).....	\$ 36.60	22.40

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ASBE0006-008 09/01/2019

	Rates	Fringes
Asbestos Worker/Insulator Includes application of all insulating materials, protective coverings, coatings & finishes to all types of mechanical systems.	\$ 43.60	29.90

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BOIL0029-001 01/01/2017

	Rates	Fringes
BOILERMAKER.....	\$ 42.42	24.92

-----  
BRII0003-001 06/01/2020

	Rates	Fringes
Bricklayer, Stonemason, Pointer, Caulker & Cleaner.....	\$ 42.55	28.02

-----  
BRII0003-002 03/01/2020

	Rates	Fringes
Marble Setter, Terrazzo Worker & Tile Setter.....	\$ 40.78	28.92

-----  
BRII0003-003 03/01/2020

	Rates	Fringes
Marble, Tile & Terrazzo Finisher.....	\$ 34.10	27.88

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\* CARP0330-001 01/01/2021

	Rates	Fringes
CARPENTER (Includes Soft Floor Layer).....	\$ 39.72	28.66
Diver Tender.....	\$ 40.72	28.66
DIVER.....	\$ 51.47	28.66
Piledriver.....	\$ 39.72	28.66
WELDER.....	\$ 40.72	28.66

FOOTNOTES:

When not diving or tending the diver, the diver and diver tender shall receive the piledriver rate. Diver tenders shall receive \$1.00 per hour above the pile driver rate when tending the diver.

Work on free-standing stacks, concrete silos & public utility electrical power houses, which are over 35 ft. in height when constructed: \$.50 per hour additional.

Work on exterior concrete shear wall gang forms, 45 ft. or more above ground elevation or on setback: \$.50 per hour additional.

The designated piledriver, known as the ""monkey"": \$1.00 per hour additional.

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 CARP1121-002 01/06/2020

	Rates	Fringes
MILLWRIGHT.....	\$ 39.07	29.15

-----  
 ELEC0099-002 06/01/2020

	Rates	Fringes
ELECTRICIAN.....	\$ 41.61	57.24%
Teledata System Installer.....	\$ 31.21	13.10%+14.93

FOOTNOTES:

Work of a hazardous nature, or where the work height is 30 ft. or more from the floor, except when working OSHA-approved lifts: 20% per hour additional.

Work in tunnels below ground level in combined sewer outfall: 20% per hour additional.

-----  
ELEV0039-001 01/01/2021

	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 55.03	35.825+A+B

FOOTNOTES:

A. PAID HOLIDAYS: New Years Day; Memorial Day; Independence Day; Labor Day; Veterans' Day; Thanksgiving Day; the Friday after Thanksgiving Day; and Christmas Day.

B. Employer contributes 8% basic hourly rate for 5 years or more of service of 6% basic hourly rate for 6 months to 5 years of service as vacation pay credit.

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ENGI0057-001 12/01/2020

	Rates	Fringes
Operating Engineer: (power plants, sewer treatment plants, pumping stations, tunnels, caissons, piers, docks, bridges, wind turbines, subterranean & other marine and heavy construction work)		
GROUP 1.....	\$ 42.55	27.70+a
GROUP 2.....	\$ 40.55	27.70+a
GROUP 3.....	\$ 36.17	27.70+a
GROUP 4.....	\$ 33.32	27.70+a
GROUP 5.....	\$ 39.60	27.70+a
GROUP 6.....	\$ 30.40	27.70+a
GROUP 7.....	\$ 24.40	27.70+a
GROUP 8.....	\$ 36.25	27.70+a
GROUP 9.....	\$ 40.17	27.70+a

a. BOOM LENGTHS, INCLUDING JIBS:

- 150 feet and over + \$ 2.00
- 180 feet and over + \$ 3.00
- 210 feet and over + \$ 4.00
- 240 feet and over + \$ 5.00
- 270 feet and over + \$ 7.00
- 300 feet and over + \$ 8.00
- 350 feet and over + \$ 9.00

400 feet and over + \$10.00

a. PAID HOLIDAYS:

New Year's Day, President's Day, Memorial Day, July Fourth, Victory Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day, Christmas Day. a: Any employee who works 3 days in the week in which a holiday falls shall be paid for the holiday.

a. FOOTNOTES:

Hazmat work: \$2.00 per hour additional.  
Tunnel/Shaft work: \$5.00 per hour additional.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Cranes, lighters, boom trucks and derricks

GROUP 2: Digging machine, Ross Carrier, locomotive, hoist, elevator, bidwell-type machine, shot & water blasting machine, paver, spreader, graders, front end loader (3 yds. and over), vibratory hammer & vacuum truck, roadheaders, forklifts, economobile type equipment, tunnel boring machines, concrete pump and on site concrete plants.

GROUP 3: Oilers on cranes.

GROUP 4: Oiler on crawler backhoe.

GROUP 5: Bulldozer, bobcats, skid steer loader, tractor, scraper, combination loader backhoe, roller, front end loader (less than 3 yds.), street and mobile-powered sweeper (3-yd. capacity), 8-ft. sweeper minimum 65 HP).

GROUP 6: Well-point installation crew.

GROUP 7: Utility Engineers and Signal Persons

GROUP 8: Heater, concrete mixer, stone crusher, welding machine, generator and light plant, gas and electric driven pump and air compressor.

GROUP 9: Boat & tug operator.

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ENGI0057-002 11/01/2020

Rates                      Fringes

Power Equipment Operator

(highway construction projects; water and sewerline projects which are incidental to highway construction projects; and bridge projects that do not span water)

GROUP 1.....	\$ 35.70	27.70+a
GROUP 2.....	\$ 30.40	27.70+a
GROUP 3.....	\$ 24.40	27.70+a
GROUP 4.....	\$ 30.98	27.70+a
GROUP 5.....	\$ 34.68	27.70+a
GROUP 6.....	\$ 34.30	27.70+a
GROUP 7.....	\$ 29.95	27.70+a
GROUP 8.....	\$ 31.33	27.70+a
GROUP 9.....	\$ 33.28	27.70+a

a. FOOTNOTE: a. Any employee who works three days in the week in which a holiday falls shall be paid for the holiday.

a. PAID HOLIDAYS: New Year's Day, President's Day, Memorial Day, July Fourth, Victory Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day & Christmas Day.

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Digging machine, crane, piledriver, lighter, locomotive, derrick, hoist, boom truck, John Henry's, directional drilling machine, cold planer, reclaimer, paver, spreader, grader, front end loader (3 yds. and over), vacuum truck, test boring machine operator, veemere saw, water blaster, hydro-demolition robot, forklift, economobile, Ross Carrier, concrete pump operator and boats

GROUP 2: Well point installation crew

GROUP 3: Utility engineers and signal persons

GROUP 4: Oiler on cranes

GROUP 5: Combination loader backhoe, front end loader (less than 3 yds.), forklift, bulldozers & scrapers and boats

GROUP 6: Roller, skid steer loaders, street sweeper

GROUP 7: Gas and electric drive heater, concrete mixer, light plant, welding machine, pump & compressor

GROUP 8: Stone crusher

GROUP 9: Mechanic & welder

BUILDING CONSTRUCTION

	Rates	Fringes
Power Equipment Operator		
GROUP 1.....	\$ 41.82	27.70+a
GROUP 2.....	\$ 39.82	27.70+a
GROUP 3.....	\$ 39.60	27.70+a
GROUP 4.....	\$ 35.60	27.70+a
GROUP 5.....	\$ 32.75	27.70+a
GROUP 6.....	\$ 38.90	27.70+a
GROUP 7.....	\$ 38.47	27.70+a
GROUP 8.....	\$ 35.79	27.70+a

a. BOOM LENGTHS, INCLUDING JIBS:

- 150 ft. and over: + \$ 2.00
- 180 ft. and over: + \$ 3.00
- 210 ft. and over: + \$ 4.00
- 240 ft. and over: + \$ 5.00
- 270 ft. and over: + \$ 7.00
- 300 ft. and over: + \$ 8.00
- 350 ft. and over: + \$ 9.00
- 400 ft. and over: + \$10.00

a. PAID HOLIDAYS: New Year's Day, President's Day, Memorial Day, July Fourth, Victory Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day & Christmas Day. a: Any employee who works 3 days in the week in which a holiday falls shall be paid for the holiday.

- a. FOOTNOTE: Hazmat work: \$2.00 per hour additional.  
Tunnel/Shaft work: \$5.00 per hour additional.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Cranes, lighters, boom trucks and derricks.

GROUP 2: Digging machine, Ross carrier, locomotive, hoist, elevator, bidwell-type machine, shot & water blasting machine, paver, spreader, front end loader (3 yds. and over), vibratory hammer and vacuum truck

GROUP 3: Telehandler equipment, forklift, concrete pump & on-site concrete plant

GROUP 4: Fireman & oiler on cranes

GROUP 5: Oiler on crawler backhoe

GROUP 6: Bulldozer,skid steer loaders,bobcats, tractor, grader, scraper,combination loader backhoe, roller, front end loader (less than 3 yds.), street and mobile powered sweeper (3 yds. capacity), 8-ft. sweeper (minimum 65 hp)

GROUP 7: Well point installation crew

GROUP 8: Heater, concrete mixer, stone crusher, welding machine, generator for light plant, gas and electric driven pump & air compressor

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IRON0037-001 09/16/2020

	Rates	Fringes
IRONWORKER.....	\$ 37.43	29.62

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LAB00271-001 06/02/2019

BUILDING CONSTRUCTION

	Rates	Fringes
LABORER		
GROUP 1.....	\$ 31.80	25.05
GROUP 2.....	\$ 32.05	25.05
GROUP 3.....	\$ 32.55	25.05
GROUP 4.....	\$ 32.80	25.05
GROUP 5.....	\$ 33.80	25.05

LABORERS CLASSIFICATIONS

GROUP 1: Laborer, Carpenter Tender, Mason Tender, Cement Finisher Tender, Scaffold Erector, Wrecking Laborer, Asbestos Removal [Non-Mechanical Systems]

GROUP 2: Asphalt Raker, Adzemen, Pipe Trench Bracer, Demolition Burner, Chain Saw Operator, Fence & Guard Rail Erector, Setter of Metal Forms for Roadways, Mortar Mixer, Pipelayer, Riprap & Dry Stonewall Builder, Highway Stone Spreader, Pneumatic Tool Operator, Wagon Drill Operator, Tree Trimmer, Barco-Type Jumping Tamper, Mechanical Grinder Operator

GROUP 3: Pre-Cast Floor & Roof Plank Erectors

GROUP 4: Air Track Operator, Hydraulic & Similar Self-Powered Drill, Block Paver, Rammer, Curb Setter, Powderman & Blaster

GROUP 5: Toxic Waste Remover

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 LAB00271-002 06/02/2019

HEAVY AND HIGHWAY CONSTRUCTION

	Rates	Fringes
LABORER		
COMPRESSED AIR		
Group 1.....	\$ 49.23	23.50
Group 2.....	\$ 38.75	23.50
Group 3.....	\$ 51.23	23.50
FREE AIR		
Group 1.....	\$ 41.30	23.50
Group 2.....	\$ 38.75	23.50
Group 3.....	\$ 43.30	23.50
LABORER		
Group 1.....	\$ 31.80	23.05
Group 2.....	\$ 32.05	23.05
Group 3.....	\$ 32.80	23.05
Group 4.....	\$ 25.30	23.05
Group 5.....	\$ 33.80	23.05
OPEN AIR CAISSON, UNDERPINNING WORK AND BORING CREW		
Bottom Man.....	\$ 37.80	23.05
Top Man & Laborer.....	\$ 36.85	23.05
TEST BORING		
Driller.....	\$ 38.25	23.05
Laborer.....	\$ 36.85	23.05

LABORER CLASSIFICATIONS

GROUP 1: Laborer; Carpenter tender; Cement finisher tender; Wrecking laborer; Asbestos removers [non-mechanical systems]; Plant laborer; Driller in quarries

GROUP 2: Adzeperson; Asphalt raker; Barcotype jumping tamper; Chain saw operators; Concrete and power buggy operator; Concrete saw operator; Demolition burner; Fence and guard rail erector; Highway stone spreader; Laser beam operator; Mechanical grinder operator; Mason tender; Mortar mixer; Pneumatic tool operator; Riprap and dry stonewall

builder; Scaffold erector; Setter of metal forms for roadways; Wagon drill operator; Wood chipper operator; Pipelayer; Pipe trench bracer

GROUP 3: Air track drill operator; Hydraulic and similar powered drills; Brick paver; Block paver; Rammer and curb setter; Powderperson and blaster

GROUP 4: Flagger & signaler

GROUP 5: Toxic waste remover

LABORER - COMPRESSED AIR CLASSIFICATIONS

GROUP 1: Mucking machine operator, tunnel laborer, brake person, track person, miner, grout person, lock tender, gauge tender, miner: motor person & all others in compressed air

GROUP 2: Change house attendant, powder watchperson, top person on iron

GROUP 3: Hazardous waste work within the ""HOT"" zone

LABORER - FREE AIR CLASSIFICATIONS

GROUP 1: Grout person - pumps, brake person, track person, form mover & stripper (wood & steel), shaft laborer, laborer topside, outside motorperson, miner, conveyor operator, miner welder, heading motorperson, erecting operator, mucking machine operator, nozzle person, rodperson, safety miner, shaft & tunnel, steel & rodperson, mole nipper, concrete worker, form erector (wood, steel and all accessories), cement finisher (this type of work only), top signal person, bottom person (when heading is 50' from shaft), burner, shield operator and TBM operator

GROUP 2: Change house attendant, powder watchperson

GROUP 3: Hazardous waste work within the ""HOT"" zone

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PAIN0011-005 06/01/2020

	Rates	Fringes
PAINTER		
Brush and Roller.....	\$ 35.62	22.55
Epoxy, Tanks, Towers,		

Swing Stage & Structural Steel.....	\$ 37.62	22.55
Spray, Sand & Water Blasting.....	\$ 38.62	22.55
Taper.....	\$ 36.37	22.55
Wall Coverer.....	\$ 36.12	22.55

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PAIN0011-006 06/01/2020

	Rates	Fringes
GLAZIER.....	\$ 39.18	22.55

FOOTNOTES:

SWING STAGE: \$1.00 per hour additional.

PAID HOLIDAYS: Labor Day & Christmas Day.

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PAIN0011-011 06/01/2020

	Rates	Fringes
Painter (Bridge Work).....	\$ 52.25	22.55

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PAIN0035-008 06/01/2011

	Rates	Fringes
Sign Painter.....	\$ 24.79	13.72

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PLAS0040-001 06/03/2019

BUILDING CONSTRUCTION

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 36.00	27.15

FOOTNOTE: Cement Mason: Work on free swinging scaffolds under 3 planks width and which is 20 or more feet above ground and any offset structure: \$.30 per hour additional.

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PLAS0040-002 07/01/2019

HEAVY AND HIGHWAY CONSTRUCTION

	Rates	Fringes
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CEMENT MASON/CONCRETE FINISHER...\$ 32.85 22.20

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PLAS0040-003 07/01/2019

Rates Fringes

PLASTERER.....\$ 37.55 27.50

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PLUM0051-002 08/31/2020

Rates Fringes

Plumbers and Pipefitters.....\$ 44.69 31.20

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ROOF0033-004 12/01/2020

Rates Fringes

ROOFER.....\$ 39.40 28.06

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SFRI0669-001 01/01/2021

Rates Fringes

SPRINKLER FITTER.....\$ 45.92 26.60

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SHEE0017-002 12/01/2020

Rates Fringes

Sheet Metal Worker.....\$ 38.58 36.73

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TEAM0251-001 05/01/2019

HEAVY AND HIGHWAY CONSTRUCTION

Rates Fringes

TRUCK DRIVER

GROUP 1.....	\$ 27.96	26.8525+A+B+C
GROUP 2.....	\$ 27.61	26.8525+A+B+C
GROUP 3.....	\$ 27.66	26.8525+A+B+C
GROUP 4.....	\$ 27.71	26.8525+A+B+C
GROUP 5.....	\$ 27.81	26.8525+A+B+C
GROUP 6.....	\$ 28.21	26.8525+A+B+C
GROUP 7.....	\$ 28.41	26.8525+A+B+C
GROUP 8.....	\$ 27.91	26.8525+A+B+C
GROUP 9.....	\$ 28.16	26.8525+A+B+C
GROUP 10.....	\$ 27.96	26.8525+A+B+C

FOOTNOTES:

A. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, plus Presidents' Day, Columbus Day, Veteran's Day & V-J Day, providing the employee has worked at least one day in the calendar week in which the holiday falls.

B. Employee who has been on the payroll for 1 year or more but less than 5 years and has worked 150 Days during the last year of employment shall receive 1 week's paid vacation; 5 to 10 years - 2 weeks' paid vacation; 10 or more years - 3 week's paid vacation.

C. Employees on the seniority list shall be paid a one hundred dollar (\$100.00) bonus for every four hundred (400) hours worked, up to a maximum of five hundred dollars (\$500.00)

All drivers working on a defined hazard material job site shall be paid a premium of \$2.00 per hour over applicable rate.

TRUCK DRIVER CLASSIFICATIONS

GROUP 1: Pick-up trucks, station wagons, & panel trucks

GROUP 2: Two-axle on low beds

GROUP 3: Two-axle dump truck

GROUP 4: Three-axle dump truck

GROUP 5: Four- and five-axle equipment

GROUP 6: Low-bed or boom trailer.

GROUP 7: Trailers when used on a double hook up (pulling 2 trailers)

GROUP 8: Special earth-moving equipment, under 35 tons

GROUP 9: Special earth-moving equipment, 35 tons or over

GROUP 10: Tractor trailer

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WELDERS - Receive rate prescribed for craft performing

operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at [www.dol.gov/whd/govcontracts](http://www.dol.gov/whd/govcontracts).

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

#### Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number

where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

#### Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

#### Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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## WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board

U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

# APPENDIX I

---

**FORM OF BID**  
**CONSTRUCTION SERVICES FOR**  
**ROGER WILLIAMS PARK GATEWAY PROJECT**  
P R O V I D E N C E , R H O D E I S L A N D

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IN RESPONSE TO REQUEST FOR PROPOSALS  
FOR CONSTRUCTION SERVICES RELATED TO  
THE ROGER WILLIAMS PARK GATEWAY PROJECT

DATE:

TO: PROVIDENCE REDEVELOPMENT AGENCY c/o  
Bonnie Nickerson, Executive Director  
444 Westminster Street, Suite 3A  
Providence, RI 02903

PROJECT: 1197 Broad St., Providence, RI

SUBMITTED BY:

The undersigned, having familiarized (himself) (herself) (themselves) (itself) with existing conditions at the CONSTRUCTION SERVICES FOR ROGER WILLIAMS PARK GATEWAY PROJECT site affecting the cost of work, and with the Contract Documents (which includes the Invitation for Bids, Instructions to Bidders, Form of Bid, Form of Bid Bond, Form of Agreement, Form of Non-Collusive Affidavit, Addenda (if any), Drawings, Technical Specifications, Surety Bond(s); as prepared by the Providence Redevelopment Agency, and on file in the office of the Providence Redevelopment Agency at 444 Westminister Street, Suite 3A, Providence, RI 02903, hereby proposes to furnish all supervision, technical personnel, labor, materials, machinery, tools, equipment and services including utility and transportation services, and to perform and complete all required work for the CONSTRUCTION SERVICES FOR ROGER WILLIAMS PARK GATEWAY PROJECT and such other required and incidental work, complete, all in accordance with the above listed documents and for the unit prices for work in- place for the following items and quantities.

Total of Bid - For the sum of: \$ \_\_\_\_\_  
\_\_\_\_\_ Dollars

In submitting this Bid, the Bidder understands that the right is reserved by the Providence Redevelopment Agency to reject any and all Bids. If written notice of acceptance of this Bid is mailed, telegraphed or delivered to the undersigned within ninety (90) days after the opening thereof, or at any time thereafter before this Bid is withdrawn, the undersigned agrees to execute and deliver an Agreement in the prescribed form and furnish the required bond within ten (10) days after the Agreement is presented to him/her for signature.

Security in the sum of \_\_\_\_\_ Dollars  
(\$ \_\_\_\_\_), in the form of \_\_\_\_\_ is  
submitted herewith in accordance with the Instructions to Bidders.

**Alternates:**

**Add Alternate No. 1:**

**Base Bid Item:** PER PLANS - Provide NanaWall NW Aluminum 840 with integrated swing door (*SECTION 08 43 33 THERMALLY BROKEN ALUMINUM FRAMED FOLDING GLASS STOREFRONT*), including all associated hardware and materials required for installation, at SW elevation of Gallery 100 as indicated on drawings.

**Alternate No. 1 Bid Item:** Provide alternate pricing for substitution of a Tubelite TU24650 Series Storefront system (*SECTION 08 43 13 – ALUMINUM FRAMED STOREFRONTS*) with a pair of (2) 3'-0"W x 7'-0"H Tubelite ThermBlock Entrances (*SECTION 08 42 13 – ALUMINUM FRAMED ENTRANCES*) including all system components and installation accessories, in lieu of a NanaWall NW Aluminum 840 system with integrated swing door (*SECTION 08 43 33 THERMALLY BROKEN ALUMINUM FRAMED FOLDING GLASS STOREFRONT*) at the SW elevation of Gallery 100 as indicated on drawings.

**Add Alternate # 1 – Add Tubelite I.L.O. Nana Wall as Described Above:**

\$ \_\_\_\_\_00/100

\_\_\_\_\_Dollars

**Alternate No. 2:**

**Base Bid Item:** PER PLANS – Provide photovoltaic panels, including all associated mounting hardware along top of gateway canopy, gateway center building and rear outbuilding including, but not limited to, electrical wiring, connections, inverters and combiner boxes

**Alternate No. 2 Bid Item:** Provide deduct alternate for removal of the photovoltaic panels, combiner boxes, inverters and all wiring and connections pertaining to the photovoltaic system including all mounting hardware to structural beam and thru-roof connections.

**Deduct Alternate # 2 – Delete Photovoltaic Panels as Described Above:**

\$ \_\_\_\_\_00/100

\_\_\_\_\_Dollars

**Alternate No. 3:**

**Base Bid Item:** PER PLANS - Provide translucent glass panels (Carvart Glazing 02-WL25-TW) mounted in glass WALLS framing system, inclusive of aluminum angle jamb conditions and continuous LED Lumafilm light sheet at interior wall cavity along south elevation of Sales Counter 101 as indicated in the drawings.

**Alternate No. 3 Bid Item:** Delete translucent glass panels, glass WALLS framing system, aluminum angle jambs and continuous LED Lumafilm light sheet indicated on plans at Sales Counter 101 and paint gypsum board P-1 with base RB-1 at this location.

**Deduct Alternate # 3 – Delete Translucent Glass Panels as Described Above:**

\$ \_\_\_\_\_00/100

\_\_\_\_\_Dollars

**Add Alternate No. 4:**

**Base Bid Item:** PER PLANS - Provide specified finish and lighting for reflected ceiling plan as indicated on the drawings.

**Alternate No. 4 Bid Item:** Provide Add Alternate for Velo Concave & Convex Suspended Acoustic Panels by 3Form as indicated on the drawings. Substitute specified linear recessed track light fixture (FLOS Lighting) with a suspended linear track light fixture (FLOS Lighting) at the location of the suspended acoustic panels only.

**Add Alternate # 4 – Add Suspended Acoustic Panels as Described Above:**

\$ \_\_\_\_\_00/100

\_\_\_\_\_ Dollars

Attached hereto is an affidavit in proof that the undersigned has not colluded with any person in respect to this Bid or any Bids for the Contract for which this Bid is submitted. Also attached is a Statement of Bidder's Qualifications. The Bidder is prepared to submit a financial and experience statement upon request.

If applicable unit prices are contained in the Agreement (established as the result of either a Unit Price, the Agency may order the Contractor to proceed with desired changes in the work, the value of such changes to be determined by the measured quantities involved and the applicable unit prices specified in the Contract; provided that in case of a unit price contract the net value of all changes does not increase or decrease the original total amount shown in the Agreement by more than twenty-five percent (25%).

Bidder Signature and Acknowledgement of Addenda:

DATE \_\_\_\_\_, 20 \_\_\_\_

Official Address:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Name of Bidder (Firm):

\_\_\_\_\_

By \_\_\_\_\_  
(Signature)

Title \_\_\_\_\_

Bidder shall indicate, in space provided, the earliest possible Project Start-up Date:

\_\_\_\_\_, 20 \_\_\_\_

# APPENDIX J

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**GENERAL CONDITIONS**  
**CONSTRUCTION SERVICES FOR**  
**ROGER WILLIAMS PARK GATEWAY PROJECT**  
P R O V I D E N C E , R H O D E I S L A N D

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100. BRIEF SCOPE OF WORK

This project entails the development of a 1700 SF (GROSS) visitor center and gateway canopy structure to a 32,000 SF recreational plaza and park. The building will be used as a ticketing and information center for the Roger Williams Park and Zoo. The plaza and park will include recreational landscapes and inclusive plazas for gatherings and leisure in all seasons. Project includes demolition of some existing structures in accordance with drawings, plans, and specifications in Appendix D to Request for Proposals for said project.

101. DEFINITIONS

Whenever used in any of the Contract Documents, the following meanings shall be given to the terms defined:

- A. The term "Contract" means the Contract executed by the Local Public Agency and the Contractor, of which these GENERAL CONDITIONS form a part thereof.
- B. The terms "Local Public Agency" and "LPA" mean the PROVIDENCE REDEVELOPMENT AGENCY - CITY OF PROVIDENCE which is authorized to undertake this Contract.
- C. The term "Contractor" means the person, firm or corporation entering into the Contract with the Local Public Agency to construct and install the improvements embraced in this Contract.
- D. The term "Project Area" means the site of the CONSTRUCTION SERVICES FOR ROGER WILLIAMS PARK GATEWAY PROJECT within the City of Providence which are the specified Contract limits of the improvements contemplated to be constructed in whole or in part under this Contract. The Project Area shall be considered the City of Providence boundaries.
- E. The term "Design Engineer" means Inform Studio, P.C., 235 E. Main Street, Suite 102B, Northville, MI 48167. The term "Engineer" means any qualified person or persons, employed by the Local Public Agency for the purpose of directing or having in charge the work of Site Improvements embraced in this Contract, the said Engineer acting directly or indirectly through any Assistant Engineer having general charge of the work or through any assistant having immediate charge of a portion thereof limited by the particular duties entrusted to him.
- F. The term "Local Government" means the City of Providence, a municipal corporation, in City of Providence, Rhode Island, within which the Project Area is situated.
- G. The term "Contract Documents" means and shall include the following: Executed Agreement, Addenda, (if any), Invitation for Bids, Instructions to Bidders, Signed Copy of Bid, General Conditions, Special Conditions, General Contract Provisions, Technical Specifications, and Drawings.
- H. The term "Drawings" means the drawings found attached to the Scope of Work.
- I. The term "Technical Specifications" means that part of the Contract Documents which describes, outlines and stipulates: the quality of the materials to be furnished; the quality of workmanship required; and the methods to be used in carrying out the construction work to be performed under this Contract.
- J. The term "Addendum" or "Addenda" means any and all appendices found or referenced in the Contract and or the request for proposals upon which submissions are proposed.
- K. Wherever in the specifications or upon the contract drawings the words directed, required, permitted, ordered instructed, designated, considered necessary, or words of like import are used, it shall be understood that the direction, requirement, permission, order, instructions, designation or decision of the Engineer is intended; where as shown, as indicated, as detailed or words of similar import are used, it shall be understood that reference to the drawings accompanying these specifications is made unless otherwise stated; and similarly the words approved, acceptable, satisfactory, or words of like import shall mean approved by, or acceptable, or satisfactory to the Engineer. As used herein "provided" shall be understood to mean "provided complete in place", that is "furnished and installed complete".

102. SUPERINTENDENCE BY CONTRACTOR

- A. Except where the Contractor is an individual and gives his personal superintendence to the work, the Contractor shall provide a competent superintendent, satisfactory to the Local Public Agency and the Engineer, on the work at all times during working hours with full authority to act for him. The Contractor shall also provide an adequate staff for the proper coordination and expediting of his work.
- B. The Contractor shall lay out his own work and he shall be responsible for all work executed by him under the Contract. He shall verify all figures and elevations before proceeding with the work and will be held responsible for any error resulting from his failure to do so.

103. SUBCONTRACTS

- A. The Contractor shall not execute an agreement with any subcontractor or permit any subcontractor to perform any work included in this contract until he has submitted a non-collusion affidavit from the subcontractor in substantially the form shown below and has received written approval of such subcontractor from the Local Public Agency. (See Non-Collusion Affidavit for Subcontractor in Bidding Documents section)
- B. No proposed subcontractor shall be disapproved by the Local Public Agency except for cause.
- C. The Contractor shall be as fully responsible to the Local Public Agency for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them as he is for the acts and omissions of persons directly employed by him.
- D. The Contractor shall cause appropriate provision to be inserted in all subcontracts relative to the work to require compliance by each subcontractor with the applicable provisions of the Contract for the improvements embraced in the Site Preparation.
- E. Nothing contained in the Contract shall create any contractual relation between any subcontractor and the Local Public Agency.

104. OTHER CONTRACTS

The Local Public Agency may award, or may have awarded other contracts for additional work, and the Contractor shall cooperate fully with such other Contractor, by scheduling his own work with that to be performed under other Contracts as may be directed by the Local Public Agency. The Contractor shall not commit or permit any act, which will interfere with the performance of work by any other Contractor as scheduled.

105. FITTING AND COORDINATION OF THE WORK

The Contractor shall be responsible for the proper fitting of all work and for the coordination of the operations of all trades, subcontractors, or materialmen engaged upon this Contract. He shall be prepared to guarantee to each of his subcontractors the locations and measurements which they may require for the fitting of their work to all surrounding work.

106. MUTUAL RESPONSIBILITY OF CONTRACTORS

If, through acts or neglect on the part of the Contractor, any other Contractor or any subcontractor shall suffer loss or damage on the work, the Contractor shall settle with such other Contractor or subcontractor by agreement or arbitration, if such other Contractor or subcontractor will so settle. If such other Contractor or subcontractor shall assert any claim against the Local Public Agency on account of any damage alleged to have been so sustained, the Local Public Agency will notify this Contractor, who shall defend at his own expense any suit based upon such claim, and, if any judgment or claims against the Local Public Agency shall be allowed, the Contractor shall pay or satisfy such judgment or claim and pay all costs and expenses in connections therewith.

107. PROGRESS SCHEDULE

The Contractor shall submit for approval immediately after execution of the Agreement, a carefully prepared Progress Schedule, showing the proposed dates of starting and completing each of the various sections of the work, the anticipated monthly payments to become due the Contractor, and the accumulated percent of progress each month. Every two weeks, the Contractor shall update and submit the progress schedules for review by the City. Failure to maintain the progress schedule will be cause to withhold payments due to the Contractor.

108. COMPENSATION AND PAYMENTS TO CONTRACTOR

Compensation:

- A. The Local Public Agency will pay and the Contractor shall receive as full compensation for everything furnished and done by the Contractor under this contract, including all work required but not specifically included in any items herein mentioned, and also for all loss or damage arising out of the nature of the work

aforesaid, or from the action of the elements, or from any unforeseen obstruction or difficulty encountered in the prosecution of the work, and for all risks of every description connected with the work, and for all expenses incurred by or in consequence of the suspension or discontinuance of the work as herein specified, and for assuming all duties and liabilities required herein, and for well and faithfully completing the work, and the whole thereof, and herein provided, the unit prices and lump sum prices set opposite the respective items in the accepted bid form herein contained and payment for extra work as herein provided.

- B. Unit prices shall be based on a schedule dividing the project into component parts, together with a quantity and price for each part such that the sum of the product prices and quantities will equal the Base Bid total. A final schedule shall be submitted by the Contractor for the approval of the Local Public Agency before the first estimate becomes due.
- C. The amount of the contract (accepted bid prices) listed in the bid is based on the estimated quantities and the unit and/or lump sum bid prices as set forth in the bid. It is understood and agreed that the Contractor will accept as payment the actual measured quantities at the unit and/or lump sum bid prices as set forth in the accepted bid.
- D. The estimated quantities given in the bid (proposal) for the various items of work are given for the purpose of comparing proposals offered for the work under this contract and if it is found in the performance of the contract work that any or all of the said estimated quantities are not even approximately correct, the Contractor shall have no claim for anticipated profits, or for loss of profits or for increase in prices as listed in the accepted bid because of the difference between the quantities of the various items of work actually done and the estimated quantities stated in the accepted bid (proposal) except as provided for in Section 109 hereof.
- E. It is understood that, except as otherwise specifically stated in the contract documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendence, temporary construction of every nature, and all other services and facilities of every nature whatsoever necessary to protect, execute, complete and deliver the work within the specified time.
- F. Any work necessary to be performed after regular working hours, on Saturdays, Sundays and legal holidays, shall be performed by the Contractor without additional expense to the Local Public Agency.

#### Partial Payments:

- A. The Contractor shall prepare his requisition for partial payment monthly, at a date to be specified by the Local Public Agency, and submit it, with the required number of copies to the Engineer for his approval. The amount of the payment due the Contractor shall be determined by adding to the total value of work completed to date, the value of materials properly stored on the site and deducting (1) five percent (5%) of the total amount, to be retained until final payment and (2) the amount of all previous payments. The total value of work completed to date shall be based on the actual quantities of work completed and on the unit prices contained in the agreement. For lump sum items the value of the work completed to date will be based on the actual amount of the work done and the schedule required to be submitted by the Contractor in paragraph 108-1.b. above. The value of materials properly stored on the site shall be based upon the estimated quantities of such materials and the invoice prices. Copies of all invoices shall be available for inspection of the Engineer.
- B. Monthly or partial payments made by the Local Public Agency to the Contractor are monies advanced for the purpose of assisting the Contractor to expedite the work of construction. The Contractor shall be responsible for the care and protection of all materials and work upon which payments have been made until final acceptance of such work and materials by the Local Public Agency. Such payments shall not constitute a waiver of the right of the Local Public Agency to require the fulfillment of all terms of the Contract and the delivery of all improvements embraced in this Contract complete and satisfactory to the Local Public Agency.

THE LOCAL PUBLIC AGENCY, PRIOR TO MAKING EACH PAYMENT TO THE CONTRACTOR, may require the Contractor to furnish releases or receipts from any or all persons / firms performing work and supplying material or services to the Contractor, or any subcontractor, if this is deemed necessary to protect its interest. Additionally, the Contractor may be required to submit certified payrolls for any and all employees, including subcontractors.

#### Final Payment:

- A. After final inspection and acceptance by the Local Public Agency of all work under the Contract, the Contractor shall prepare his requisition for final payment which shall be based upon the carefully measured or computed quantity of each item of work at the applicable unit prices stipulated in the Agreement. The total amount of the final payment due the Contractor under this contract shall be the amount computed as described above less all previous payments. Final payment to the Contractor shall be made subject to his furnishing the Local Public Agency with a release in satisfactory form of all claims against the Local Public Agency arising under and by virtue of his contract, other than such claims, if any as may be specifically excepted by the Contractor from the operation of the release as provided under Section 113 hereof.
- B. The Local Public Agency, before paying the final estimate, may require the Contractor to furnish releases or receipts from all subcontractors having performed any work and all persons having supplied materials, equipment (installed on the Project) and services to the Contractor, if the Local Public Agency deems the same necessary in order to protect its interest. The Local Public Agency, however, may if it deems such action advisable, make payment in part or in full to the Contractor without requiring the furnishing of such releases or receipts and any payments so made shall in nowise impair the obligations of any surety or sureties furnished under this Contract.

- C. Withholding of any amount due the Local Public Agency under Section 403, entitled "Liquidated Damages", under SPECIAL CONDITIONS, shall be deducted from the final payment due the Contractor.

**Withholding Payments:**

The Local Public Agency may withhold from any payment otherwise due the Contractor so much as may be necessary to protect the Local Public Agency and if it so elects may also withhold any amounts due from the Contractor to any subcontractors or material dealers, for work performed or material furnished by them. The foregoing provisions shall be construed solely for the benefit of the Local Public Agency and will not require the Local Public Agency to determine or adjust any claims or disputes between the Contractor and his subcontractors or material dealers, or to withhold any monies for their protection unless the Local Public Agency elects to do so. The failure or refusal of the Local Public Agency to withhold any monies from the Contractor shall in no wise impair the obligations of any surety or sureties under any bond or bonds furnished under this Contract.

**Payments Subject to Submission of Materials Certificates and Materials Testing:**

Each payment to the Contractor by the Local Public Agency shall be made subject to submission by the Contractor of all written certifications required of him and his subcontractors. Materials and associated bid items found to be deficient by the City's Design Engineer will not be paid until defective materials have been replaced.

**Payments Subject to Reporting Requirements:**

Each payment to the Contractor by the Local Public Agency (LPA) shall be made after satisfactory reporting is submitted for federal and state requirements and any other reporting as stated at the pre-construction meeting or not stated but required by LPA by any funders or regulatory authority. Payment to the Contractor by the LPA is also contingent upon receipt of updated and accurate project construction schedules.

**Payments Subject to Certified Payroll Requirements:**

Complete and executed certified payroll statements are required to be submitted with all invoice requests. Failure to do so will result in non-payment until certified payrolls are received.

**Payments Subject to Progress Schedule**

Each payment to the Contractor by the Local Public Agency shall be made subject to submission of a current, accurate and reasonable progress schedule. Failure to do so will result in non-payment until a progress schedule is received and accepted.

109. **CHANGES IN THE WORK**

- A. The Local Public Agency may make changes in the scope of the work required to be performed by the Contractor under the Contract or making additions thereto, or by omitting work therefrom, without invalidation of the Contract, and without relieving or releasing the Contractor from any of his obligations under the Contract or any guarantee given by him pursuant to the Contract provisions, and without affecting the validity of the guaranty bonds, and without relieving or releasing the surety or sureties of said bonds. All such work shall be executed under the terms of the original Contract unless it is expressly provided otherwise.
- B. Except for the purpose of affording protection against any emergency endangering health, life, limb or property, the Contractor shall make no change in the materials used or in the specified manner of constructing and/or installing the improvements or supply additional labor, services or materials beyond that actually required for the execution of the Contract, unless in pursuance of a written order from the Local Public Agency authorizing the Contractor to proceed with the change. No claim for an adjustment of the Contract Price will be valid unless so ordered.
- C. If applicable unit prices are contained in the Contract (established as a result of either a unit price bid or a Supplemental Schedule of Unit Prices) the Local Public Agency may order the Contractor to proceed with desired changes in the work, the value of such changes to be determined by the measured quantities involved and the applicable unit prices specified in the Contract; provided that in case of a unit price contract the net value of all changes does not increase or decrease the original total amount shown in the Agreement by more than twenty-five percent (25%) in accordance with the Contract Documents.
- D. If applicable unit prices are not contained in the Contract or if the total net change increases or decreases the total Contract Price more than twenty-five percent (25%) the Local Public Agency shall, before ordering the Contractor to proceed with desired changes, request an itemized proposal from him covering the work involved in the change after which the procedure shall be as follows:
- (1) If the proposal is acceptable the Local Public Agency will prepare the change order in accordance therewith for acceptance by the Contractor and
  - (2) If the proposal is not acceptable and prompt agreement between the two parties cannot be reached, the Local Public Agency may order the Contractor to proceed with the work on a cost-plus basis, defined as the net cost of the Contractor's labor, materials and insurance plus fifteen percent (15%) of said net cost to cover overhead and profit, the total cost not to exceed a

specified limit.

- E. Each change order shall include in its final form:
  - (1) A detailed description of the change in the work.
  - (2) The Contractor's proposal (if any) or a conformed copy thereof.
  - (3) A definite statement as to the resulting change in the contract price and/or time.
  - (4) The statement that all work involved in the change shall be performed in accordance with contract requirements except as modified by the change order.

#### 110. CLAIMS FOR EXTRA COST

- A. If the Contractor claims that any instructions by Drawings or otherwise involve extra cost or extension of time, he shall, within ten days after the receipt of such instructions, and in any event before proceeding to execute the work, submit his protest thereto in writing to the Local Public Agency, stating clearly and in detail the basis of his objections. No such claim will be considered unless so made.
- B. Claims for additional compensation for extra work, due to alleged errors in ground elevations, contour lines, or bench marks, will not be recognized unless accompanied by certified survey data, made prior to the time the original ground was disturbed, clearly showing that errors exist which resulted, or would result, in handling more material, or performing more work, than would be reasonably estimated from the Drawings and maps issued.
- C. Any discrepancies which may be discovered between actual conditions and those represented by the Drawings and maps shall at once be reported to the Local Public Agency and work shall not proceed except at the Contractor's risk, until written instructions have been received by him from the Local Public Agency.
- D. If, on the basis of the available evidence, the Local Public Agency determines that an adjustment of the Contract Price and/or Time is justifiable, the procedure shall be as provided in Section 109 hereof.

#### 111. TERMINATION, DELAYS, AND LIQUIDATED DAMAGES

- A. Termination of Contract: If the Contractor or any of his subcontractors refuses or fails to prosecute the work with such diligence as will insure its completion within the time specified in these Contract Documents, or as modified as provided in these Contract Drawings, or violates any other Provisions of this Contract, the Local Public Agency, by written notice to the Contractor, may terminate the Contractor's right to proceed with the work. Upon such termination, the Local Public Agency may take over the work and prosecute the same to completion, by contract or otherwise, and the Contractor and his sureties shall be liable to the Local Public Agency for any additional cost incurred by the Local Public Agency in its completion of the work and they shall also be liable to the Local Public Agency for liquidated damages for any delay in the completion of the work as provided below. If the Contractor's right to proceed is so terminated, the Local Public Agency may take possession of and utilize in completing the work such materials, tools, equipment, and plant as may be on the site of the work and necessary therefor.
- B. Liquidated Damages for Delays: If the work is not completed within the time stipulated in the SPECIAL CONDITIONS, Section 402, including any extensions of time for excusable delays as herein provided, the Contractor shall pay to the Local Public Agency as fixed, agreed, and liquidated damages (it being impossible to determine the actual damages occasioned by the delay) for each calendar day of delay, until the work is completed, the amount as set forth in SPECIAL CONDITIONS, Section 403, and the Contractor and his sureties shall be liable to the Local Public Agency for the amount thereof.
- C. Excusable Delays: The right of the Contractor to proceed shall not be terminated nor shall the Contractor be charged with liquidated damages for any delays in the completion of the work due:
  - (1) To any acts of the Government, including controls or restrictions upon or requisitioning of materials, equipment, tools, or labor by reason of war, National Defense, or any other national emergency;
  - (2) To any acts of the Local Public Agency;
  - (3) To causes not reasonably foreseeable by the parties to this Contract at the time of the execution of the Contract which are beyond the control and without the fault or negligence of the Contractor, including, but not restricted to acts of God or of the public enemy, acts of another Contractor in the performance of some other contract with the Local Public Agency, fires, floods, epidemics, quarantine, restriction, strikes, freight embargoes, and weather of unusual severity such as hurricanes, tornadoes, cyclones, and other extreme weather conditions; and
  - (4) To any delay of any subcontractor occasioned by any of the causes specified in subparagraphs (1), (2) and (3) of this paragraph "C". Provided, however, that the Contractor promptly notify the Local Public Agency within ten (10) days in writing of the cause of the delay. Upon receipt of such notification the Local Public Agency shall ascertain the facts and the cause and extent of delay. If, upon the basis of the facts and the terms of this contract, the delay is properly excusable, the Local Public Agency shall extend the time for completing the work for a period of time commensurate with the period of excusable delay.

#### 112. ASSIGNMENT OR NOVATION

The Contractor shall not assign or transfer, whether by an assignment or novation, any of its rights, duties, benefits, obligations, liabilities, or responsibilities under this Contract without the written consent of the Local Public Agency; provided, however, that assignments to banks, trust companies, or other financial institutions may be made without the consent of the Local Public Agency. No assignment or novation of this Contract shall be valid unless the assignment or novation expressly provides that the assignment of any of the Contractor's rights or benefits under the Contract is subject to a prior lien for labor performed, services rendered, and materials, tools, and equipment supplied for the performance of the work under this Contract in favor of all persons, firms, or corporations rendering such labor or services or supplying such materials, tools, or equipment.

#### 113. DISPUTES

- A. All disputes arising under this contract or its interpretation except those disputes covered by U.S. EDA Contracting Provisions for Construction Projects, whether involving law or fact or both, or extra work, and all claims for alleged breach of contract shall within ten (10) days of commencement of the dispute be presented by the Contractor to the Local Public Agency for decision. All papers pertaining to claims shall be filed in quadruplicate. Such notice need not detail the amount of the claim but shall state the facts surrounding the claim in sufficient detail to identify the claim, together with its character and scope. In the meantime, the Contractor shall proceed with the work as directed. Any claim not presented within the time limit specified this paragraph shall be deemed to have been waived, except that if the claim is of a continuing character and notice of the claim is not given within ten (10) days of its commencement, the claim will be considered only for a period commencing ten (10) days prior to the receipt by the Local Public Agency of notice thereof.
- B. The Contractor shall submit in detail his claim and his proof thereof. Each decision by the governing body of the Local Public Agency will be in writing and will be mailed to the Contractor by registered or certified mail, return receipt requested, directed to his last known address.
- C. If the Contractor does not agree with any decision of the Local Public Agency, he shall in no case allow the dispute to delay the work but shall notify the Local Public Agency promptly that he is proceeding with the work under protest and he may then except the matter in question from the final release.

#### 114. TECHNICAL SPECIFICATIONS AND DRAWINGS

Anything mentioned in the Technical Specifications and not shown on the Drawings or shown on the Drawings and not mentioned in the Technical Specifications, shall be of like effect as if shown on or mentioned in both. In case of difference between Drawings and Technical Specifications, the Technical Specifications shall govern. In case of any discrepancy in Drawings, or Technical Specifications, the matter shall be immediately submitted to the Local Public Agency, without whose decision, said discrepancy shall not be adjusted by the Contractor, save only at his own risk and expense.

#### 115. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

It shall be the responsibility of the Contractor to make timely requests of the Local Public Agency for any additional information not already in his possession which should be furnished by the Local Public Agency under the terms of this Contract, and which he will require in the planning and execution of the work. Such requests may be submitted from time to time as the need is approached, but each shall be filed in ample time to permit appropriate action to be taken by all parties involved so as to avoid delay. The additional drawings and instructions thus supplied to the Contractor will coordinate with the Contract and instructions thus supplied to the Contractor will coordinate with the Contract Documents and will be so prepared so that they can be reasonably interpreted as part thereof. The Contractor shall carry out the work in accordance with the additional detail drawings and instructions. The Contractor and the Engineer will prepare jointly a schedule, fixing the dates at which special detail drawings will be required, such drawings if any, to be furnished by the Engineer in accordance with said schedule, and a schedule fixing the respective dates for the submission of shop drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment, and the completion of the various parts of the work; each such schedule to be subject to change from time to time in accordance with the progress of the work. The Contractor shall, if requested, furnish promptly any assistance and information the Engineer may require in responding to these requests of the Contractor. The Contractor shall be fully responsible for any delay in his work or to others arising from his failure to comply fully with the provisions of this Section.

#### 116. SHOP DRAWINGS

- A. The Contractor shall submit promptly to the Design Engineer three (3) copies of each shop drawing, machinery or equipment details, layout drawings, or setting drawing, etc., prepared in accordance with the schedule predetermined as aforesaid. After examination of such drawings by the Design Engineer and the return one (1) thereof, the Contractor shall make such corrections to the drawings as have been indicated and shall furnish additional copies. Regardless of corrections made in or approval given to such drawings by the Design Engineer, the Contractor will nevertheless be responsible for the accuracy of such drawings and for their conformity to the drawings and specifications, unless he notifies the Design Engineer in writing of any deviations at

the time he furnishes such drawings.

- B. Shop drawings of all fabricated work shall be submitted to the Design Engineer for approval and no work shall be fabricated by the Contractor save at his own risk until approval has been given.
- C. The Contractor shall submit all shop and setting drawings and dates sufficiently in advance of requirements to enable the Design Engineer ample time for checking same, including time for correction, resubmission and recheck if necessary, and no claim for delay will be granted the Contractor by reason of his failure in this respect.
- D. All shop drawings submitted must bear the stamp of approval of the Contractor as evidence that the drawings have been checked by the Contractor. Any drawings submitted without this stamp of approval will not be considered and will be returned to the Contractor for resubmission. If the shop drawings show variations from the requirements of the contract documents because of standard shop practice or other reason, the Contractor shall make specified mention of such variation in his letter of transmittal in order that, if acceptable, suitable action may be taken for proper adjustment; otherwise the Contractor will not be relieved of the responsibility for executing the work in accordance with the contract documents even though such shop drawings have been approved.
- E. Where shop drawings are submitted by the Contractor that indicate a departure from the contract which the Design Engineer deems to be a minor adjustment in his interest and not involving a change in the contract price or extension of time, the Design Engineer may approve the drawings by the approval will contain, in substance, the following:

The modification shown on the attached drawings is approved in the interest of the Local Public Agency to effect an improvement for the Project and is ordered with the understanding that it does not involve any change in the Contract price or time; that it is subject generally to all Contract stipulations and covenants; and that it is without prejudice to any and all rights of the Local Public Agency under the contract and surety bond or bonds.
- F. The approval of shop drawings will be general and shall not relieve the Contractor from the responsibility for adherence to the contract nor shall it relieve him of the responsibility for any error which may exist.
- G. The Contractor agrees to hold the Design Engineer and the Local Public Agency harmless and defend them against damages or claims for damages arising out of injury to others or property of third persons which result from errors on shop, working or setting drawings whether or not the same have been approved by the Design Engineer and/or the Local Public Agency.

#### 117. MATERIALS AND WORKMANSHIP

- A. Unless otherwise specifically provided for in the Technical Specifications, all workmanship, equipment, materials and articles incorporated in the work shall be new and the best grade of the respective kinds for the purpose. Where equipment, materials, articles or workmanship are referred to in the Technical Specifications as "equal to" any particular standard, the Engineer shall decide the question of equality. Whenever a material or article required is specified or shown on the drawings by using the name of the proprietary product or of a particular manufacturer or vendor, any material or article which will perform adequately the duties imposed by the general design may be considered equal and satisfactory providing the material or article so proposed is of equal substance and function in the opinion of the Engineer. It shall not be purchased or installed without his written approval. In all cases, new material shall be used in the project. If two or more brands, makes or material, devices or equipment are shown or specified, each should be regarded as the approved equal of the other. Any other brand, make of material, device or equipment, which in the opinion of the Engineer or his authorized agent, is the recognized approved equal of that specified, considering quality, workmanship and economy of operation and is suitable for the purpose intended, may be accepted.
- B. The Contractor shall furnish to the Local Public Agency for approval the manufacturer's detailed specifications for all machinery, mechanical and other special equipment, which he contemplates installing together with full information as to type, performance characteristics, and all other pertinent information as required, and shall likewise submit for approval as required full information concerning all other materials or articles which he proposes to incorporate in the work. (See Section 118 hereof).
- C. Machinery, mechanical and other equipment, materials or articles installed or used without such prior approval shall be at the risk of subsequent rejection.
- D. Materials specified by reference to the number or symbol of a specific standard, such as an A.S.T.M. Standard, a Federal Specification or other similar standard, shall comply with requirements in the latest revision thereof any amendment or supplement thereto in effect on the date of the invitation for Bids, except as limited to type, class or grade, or modified in such reference. The Standards referred to, except as modified in the Technical Specifications shall have full force and effect as though printed therein.
- E. The Local Public Agency may require the Contractor to dismiss from the work such employee or employees as the Local Public Agency or the Engineer may deem incompetent, or careless, or insubordinate.

#### 118. SAMPLES, CERTIFICATIONS AND TESTS

- A. The Contractor shall submit all material or equipment samples, certificates, affidavits, etc., as called for in the contract documents, or required by the Engineer, promptly after award of the contract and acceptance of the

Contractor's bond. No such material or equipment shall be manufactured or delivered to the site, except at the Contractor's own risk, until the required samples or certificates have been approved in writing by the Engineer. Any delay in the work caused by late or improper submission of samples or certificates for approval shall not be considered just cause for an extension of the contract time.

Each sample submitted by the Contractor shall carry a label giving the name of the Contractor, the project for which it is intended, and the name of the producer. The accompanying certificate or letter from the Contractor shall state that the sample complies with contract requirements, shall give the name and brand of the product, its place of origin, the name and address of the producer and all specifications or other detailed information which will assist the Engineer in passing upon the acceptability of the sample promptly. It shall also include the statement that all materials or equipment furnished for use in the project will comply with the samples and/or certified statements.

- B. Approval of any materials shall be general only, and shall not constitute a waiver of the Local Public Agency's right to demand full compliance with the contract documents after actual deliveries, the Engineer will have such check tests made as he deems necessary in each instance and may reject materials and equipment and accessories for cause, even though such materials and articles have been given general approval. If materials, equipment or accessories which fail to meet check tests have been incorporated in the work, the Engineer will have the right to cause their removal and replacement by proper materials or to demand and secure such reparation by the Contractor as is equitable.
- C. Except as otherwise specifically stated in the Contract, the costs of sampling and testing will be divided as follows:
  - (1) The Contractor shall furnish without extra cost, including packing and delivery charges, all samples required for testing purposes, except those samples taken on the project by the Engineer or testing agency, however, the Contractor shall cooperate with and assist the Engineer or testing agency in the taking of samples on the project where the taking of samples is deemed necessary by the Engineer.
  - (2) The Contractor shall assume all costs of retesting materials which fail to meet contract requirements;
  - (3) The Contractor shall assume all costs of testing materials offered in substitution for those found deficient;
  - (4) All other expenses for testing of materials will be paid for by the Local Public Agency.
- D. Testing and inspection of the various materials, equipment, or articles, etc., heretofore mentioned shall be performed by testing agency or agencies selected by the Local Public Agency.
- E. Payments to the testing agency or agencies shall be paid for by the Local Public Agency.

#### 119. PERMITS AND LICENSES

- A. The Contractor shall give all notices required by and comply with all applicable laws, ordinances, standard requirements, and codes of the Local Government. All construction work and/or utility installation shall comply with all applicable ordinances, standard requirements, and codes including all written waivers. Before installing any work, the Contractor shall examine the Drawings and Technical Specifications for compliance with applicable ordinances, standard requirements and codes and shall immediately report any discrepancy to the Local Public Agency. Where the requirements of the Drawings and Technical Specifications fail to comply with such applicable ordinances, standard requirements, or codes, the Local Public Agency will adjust the Contract by Change Order to conform to such ordinances, standard requirements, or codes (unless waivers in writing covering the difference have been granted by the governing body or department) and make appropriate adjustment in the Contract Price or stipulated prices. Should the Contractor fail to observe the foregoing provisions and proceed with the construction and/or install any utility at variance with any applicable ordinance, standard requirement, or code, including any written waivers (notwithstanding the fact that such installation is in compliance with the Drawings and Technical Specifications), the Contractor shall remove such work without cost to the Local Public Agency, but a Change Order will be issued to cover only the excess cost the Contractor would have been entitled to receive if the change had been made before the Contractor commenced work on the items involved.
- B. The Contractor shall, at his own expense, secure and pay to the appropriate department of the Local Government the fees or charges for all permits for street pavement, sidewalks, sheds, removal of abandoned water taps, sealing of house connection drains, pavement cuts, buildings, electrical, plumbing, water, gas and sewer permits required by the local regulatory body or any of its agencies.
- C. The Contractor shall comply with applicable local laws and ordinances governing the disposal of surplus excavation, materials, debris and rubbish on or off the Project Area and commit no trespass on any public or private property in any operation due to or connected with the Improvements embraced in this Contract.

#### 120. CARE OF WORK

- A. The Contractor shall be responsible for all damages to person or property that occur as a result of his fault or negligence in connection with the prosecution of the work and shall be responsible for the proper care and protection of all materials delivered and work performed until completion and final acceptance, whether or not the same has been covered in whole or in part by payments made by the Local Public Agency.
- B. The Contractor shall provide at his own expense sufficient competent watchmen, both day and night, including Saturday, Sundays, and holidays, from the time the work is commenced until final completion and

acceptance.

- C. In an emergency affecting the safety of life, limb or property, including adjoining property, the Contractor, without special instructions or authorization from the Local Public Agency, is authorized to act at his discretion to prevent such threatened loss or injury, and he shall so act. He shall likewise act if instructed to do so by the Local Public Agency. Any compensation claimed by the Contractor on account of such emergency work will be determined by the Local Public Agency as provided in the General Conditions, Section 109.
- D. The Contractor shall avoid damage as a result of his operations to existing sidewalks, streets, curbs, pavements, utilities (except those which are to be replaced or removed), adjoining property, etc., and he shall at his own expense completely repair any damage thereto caused by his operations.
- E. The Contractor shall shore up, brace, underpin, secure, and protect as may be necessary, all foundations and other parts of existing structures adjacent to, adjoining, and in the vicinity of the site, which may be in any way affected by the excavations or other operations connected with the construction of the Improvements embraced in this Contract. The Contractor shall be responsible for giving of any and all required notices to any adjoining or adjacent property owner or other party before the commencement of any work. The Contractor shall indemnify and save harmless the Local Public Agency from any damages on account of settlements or the loss of lateral support of adjoining property and from all loss or expense and all damages for which the Local Public Agency may become liable in consequence of such injury or damage to adjoining and adjacent structures and their premises.

#### 121. ACCIDENT PREVENTION AND JOB SAFETY

- A. The Contractor shall exercise proper precaution at all times for the protection of persons and property and shall be responsible for all damages to persons or property, either on or off the site, which occur as a result of his prosecution of the work. The safety provisions of applicable laws and building and construction codes shall be observed and the Contractor shall take or cause to be taken such additional safety and health measures as the Local Public Agency may determine to be reasonable necessary. Further, the Contractor shall comply, and shall cause all subcontractors to comply with all applicable provisions of the U.S. Department of Labor "Williams-Steiger Occupational Safety and Health Act of 1970."
- B. The Contractor shall maintain an accurate record of all cases of death, occupational disease, or injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under the Contract. The Contractor shall promptly furnish the Local Public Agency with reports concerning these matters.
- C. The Contractor shall indemnify and save harmless the Local Public Agency and the Engineer from any claims for damages resulting from property damage, personal injury and/or death suffered or alleged to have been suffered by any person as a result of any work conducted under this contract.

#### 122. SANITARY FACILITIES

The Contractor shall furnish, install, and maintain ample sanitary facilities for the workmen. As the needs arise, a sufficient number of enclosed temporary toilets shall be conveniently placed as required by the sanitary codes of the State and Local Government. Drinking water shall be provided from an approved source, so piped or transported as to keep it safe and fresh and served from single service containers or satisfactory types of sanitary drinking stands or fountains. All such facilities and services shall be furnished in strict accordance with existing and governing health regulations.

Sanitary facilities shall not be placed in the Public Right-of-Way.

#### 123. USE OF PREMISES

- A. The Contractor shall confine his equipment, storage of materials, and construction operations to the Contract Limits as shown on the Drawings and as prescribed by ordinances or permits, or as may be desired by the Local Public Agency, and shall not unreasonably encumber the site or public rights-of-way with his materials and construction equipment.
- B. The Contractor shall comply with all reasonable instructions of the Local Public Agency and the ordinances and codes of the Local Government, regarding signs, advertising, traffic, fires, explosives, danger signals and barricades.
- C. The Contractor is not permitted to store equipment or stockpiles in the Public Right-of-Way.

#### 124. REMOVAL OF DEBRIS, CLEANING, ETC.

The Contractor shall, periodically or as directed during the progress of the work, remove and legally dispose of all surplus excavated material and debris, and keep the Project Area and public rights-of-way reasonably clear. Upon completion of the work, he shall remove all temporary construction facilities, debris and unused materials provided for the work and put the whole site to the work and public rights-of-way in a neat and clean condition. No trash burning will be permitted on the site of the work. The Contractor shall obey all Local Public Agency and existing State and local

regulations.

## 125. INSPECTION

- A. All materials and workmanship shall be subject to inspection, examination, or test by the Local Public Agency and the Engineer at any and all times during manufacture or construction and at any and all places where such manufacture or construction is carried on. The Local Public Agency shall have the right to reject defective material and workmanship or require its correction. Unacceptable workmanship shall be satisfactorily corrected. Rejected material shall be promptly segregated and removed from the Project Area and replaced with material of specified quality without charge therefor. If the Contractor fails to proceed at once with the correction of rejected workmanship or defective material, the Local Public Agency may by contract or otherwise have the defects remedied or rejected materials removed from the Project Area and charge the cost of the same against any monies which may be due the Contractor, without prejudice to any other rights or remedies of the Local Public Agency.
- B. The Contractor shall furnish promptly all materials reasonably necessary for any tests which may be required. (See Section 118 hereof.) All tests by the Local Public Agency will be performed in such manner as not to delay the work unnecessarily and will be made in accordance with the provisions of the Technical Specifications.
- C. The Contractor shall notify the Local Public Agency sufficiently in advance of backfilling or concealing any facilities to permit proper inspection. If any facilities are concealed without approval or consent of the Local Public Agency, the Contractor shall uncover for inspection and recover such facilities all at his own expense, when so requested by the Local Public Agency. Should it be considered necessary or advisable by the Local Public Agency at any time before final acceptance of the entire work to make an examination of work already completed by uncovering the same, the Contractor shall on request promptly furnish all necessary facilities, labor, and material. If such work is found to be defective in any important or essential respect, due to fault of the Contractor or his subcontractors the Contractor shall defray all the expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the actual cost of labor and material necessarily involved in the examination and replacement, plus 15% of such costs to cover superintendence, general expenses and profit, shall be allowed the Contractor and he shall, in addition, if completion of the work of the entire Contract has been delayed thereby, be granted a suitable extension of time on account of the additional work involved.
- D. Inspection of materials and appurtenances to be incorporated in the Improvements embraced in this Contract may be made at the place of production, manufacture or shipment, whenever the quantity justifies it, and such inspection and acceptance, unless otherwise stated in the Technical Specifications, shall be final except as regards (1) latent defects, (2) departures from specific requirements of the Contract, (3) damage or loss in transit, or (4) fraud or such gross mistakes as amount to fraud. Subject to the requirements contained in the preceding sentence, the inspection of materials as a whole or in part will be made at the Project Site.
- E. Neither inspection, testing, approval nor acceptance of the work in whole or in part, by the Local Public Agency or its agents shall relieve the Contractor or his sureties of full responsibility for materials furnished or work performed not in strict accordance with the Contract.

## 126. REVIEW BY LOCAL PUBLIC AGENCY

The Local Public Agency, its authorized representatives and agents and the Representative for the Secretary shall at all times have access to and be permitted to observe and review all work, materials, equipment, payrolls, personnel records, employment conditions, material invoices, and other relevant data and records pertaining to this Contract, provided, however, that all instructions and approval with respect to the work will be given to the Contractor only by the Local Public Agency through its authorized representatives or agents.

## 127. FINAL INSPECTION

When the Improvements embraced in this Contract are substantially completed, the Contractor shall notify the Local Public Agency in writing that the work will be ready for final inspection on a definite date which shall be stated in the notice. The notice will be given at least ten (10) days prior to the date stated for final inspection, and bear the signed concurrence of the representative of the Local Public Agency having charge of inspection. If the Local Public Agency determines that the status of the improvements is as represented, it will make the arrangements necessary to have final inspection commenced on the date stated in the notice, or as soon thereafter as is practicable. The inspection party will also include the representatives of each department of the Local Government.

## 128. CORRECTION OF WORK

All work, all materials, whether incorporated in the work or not, all processes of manufacture, and all methods of construction shall be at all times and places subject to the inspection of the Design Engineer who shall be the final judge of the quality and suitability of the work, materials, processes of manufacture and methods of construction for the purposes for which they are used. Should they fail to meet his approval they shall be forthwith reconstructed, made good, replaced and/or corrected, as the case may be, by the Contractor, at his own expense. Rejected material shall

immediately be removed from the site. If, in the opinion of the Design Engineer and the Local Public Agency, it is undesirable to replace any defective or damaged materials or to reconstruct or correct any portion of the work injured or not performed in accordance with the contract documents, the compensation to be paid to the Contractor hereunder shall be reduced by such amount as in the judgment of the Local Public Agency shall be equitable. The Contractor shall be responsible for all costs associated with correction of work, including but not limited to police details, construction management/inspection, Traffic Engineering fees and materials testing.

## 129. INSURANCE

Unless otherwise stated in the request for proposals or elsewhere in the Contract Documents, Contractor shall maintain at least the following insurance limits:

- A. Workmen's Compensation Insurance: The Contractor shall provide adequate statutory WORKMEN'S COMPENSATION INSURANCE for all labor employed on the project who may come within the protection of such laws and shall provide, where practicable, Employers' General Liability insurance for the benefit of his employees not protected by such compensation laws, and proof of such insurance satisfactory to the Local Public Agency shall be given. Said insurance shall be written with such company as may be acceptable to the Local Public Agency and the policy shall be submitted to the Local Public Agency for examination. Satisfactory certificates of said insurance shall be filed with the Engineer for the Local Public Agency in QUADRUPPLICATE prior to the commencement of operations by the Contractor. The Contractor will be charged with the responsibility for proper and adequate Workmen's Compensation coverage for all his subcontract operations and in the event the Contractor's policy does not cover each and every subcontractor, certificates of insurance issued on policies by companies that may be acceptable to the Local Public Agency covering each and every subcontractor shall be filed with the Local Public Agency prior to the commencement of such subcontract operations.
- B. Contractor's Comprehensive General Public Liability and Property Damage Liability Insurances:
  - (1) The Contractor shall carry Comprehensive General Liability insurance providing for a limit of not less than Five Hundred Thousand Dollars (\$500,000.00) for all damage arising out of bodily injuries to or death of one person, and subject to that limit for each person, a total limit of One Million Dollars (\$1,000,000.00) for all damages arising out of bodily injuries to or death of two or more persons in any one accident; and Contractor's Comprehensive Property Liability insurance providing for a limit of Five Hundred Thousand Dollars (\$500,000.00) for all damages arising out of injury to or destruction of property in any one accident, and subject to that limit per accident, a total (or aggregate) limit of One Million Dollars (\$1,000,000.00) for all damages arising out of injury to or destruction of property during the policy period.
  - (2) The insurance shall be placed with such company as may be acceptable to the Local Public Agency. The policy shall be submitted to the Local Public Agency through the Engineer for examination and satisfactory certificates of said insurance shall be filed with the Local Public Agency in QUADRUPPLICATE prior to the commencement of operations by the Contractor. The Contractor will be charged with the responsibility for similar Public Liability protection for all his subcontract operations, and in the event that the Contractor's policy does not cover each and every subcontractor, certificates of insurance issued on policies by companies that may be acceptable to the Local Public Agency covering each and every subcontractor shall be filed with the Engineer prior to the commencement of such contract operations.
  - (3) Insurance covering special hazards: Special hazards shall be covered by rider or riders to the Public Liability and Property Damage insurance policy or policies hereinabove required to be furnished by the Contractor or by separate policies of insurance. The Contractor shall require similar insurance in such amounts to be taken out and maintained by each subcontractor.
    - a. Property Damage Liability arising out of the collapse of or structural injury to any building or structure due to excavation (including borrowing, filling or backfilling in connection therewith), tunneling, pile driving, cofferdam work or caisson work; or to moving, shoring, underpinning, raising or demolition of any building or structure or removal or rebuilding or any structural support thereof.
    - b. Property Damage Liability for injury to or destruction of property arising, directly or indirectly, from blasting or explosions however caused, other than explosions of air or steam vessels, piping under pressure, prime movers, machinery or power transmitting equipment.
    - c. Property Damage Liability for injury to or destruction of wires, conduits, pipes, mains, sewers or other similar property, or any apparatus in connection therewith, below the surface of the ground arising from and during the use of mechanical equipment for the purpose of excavating or drilling within project limits; injury to or destruction of property at any time resulting therefrom.
  - (4) Indemnification Clause:
    - a. The Contractor will indemnify and hold harmless the Local Public Agency, and their agents and employees from and against all claims damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense (a) is attributable to bodily injury,

sickness, disease, or death, or to injury to or destruction of tangible property (other than the work itself) including the loss of use resulting therefrom and (b) is caused in whole or in part by any negligent act or omission of the Contractor, and Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable regardless of whether or not it is caused in part by a party indemnified hereunder.

- b. In any and all claims against the Local Public Agency, or any of their agents or employees by any employee of the Contractor, any Subcontractor, anyone directly or Indirectly employed by any of them or anyone for whose acts any of them may be held liable, the indemnification obligation under Paragraph 129 INSURANCE, Subparagraph b(4)A, shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under Workmen's Compensation Acts, disability benefit acts or other employee benefit acts.
  - c. The obligation of the Contractor under Paragraph 129 INSURANCE, Subparagraph b(4)A, shall not extend to the liability of the Local Public Agency, the their agents or employees arising out of (a) the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications or (b) the giving of or the failure to give directions or instructions by the Local Public Agency, their agents or employees provided such giving or failure to give is the primary cause of injury or damage.
- C. Comprehensive Automobile Liability and Property Damage Insurance: The Contractor shall carry Comprehensive Automobile Liability insurance covering all owned vehicles, hired vehicles or non-owned vehicles in the amount of Five Hundred Thousand Dollars (\$500,000.00) for all damages arising out of bodily injuries to or death of one person and subject to that limit for each person, a total of One Million Dollars (\$1,000,000.00) for all damages arising out of bodily injuries to or death of two or more persons in any one accident and Property Damage coverage in the amount of Five Hundred Thousand Dollars (\$500,000.00) for all damages arising out of injury to or destruction of property.
- D. Owner's Protective Liability and Property Damage: The Contractor shall provide the Local Public Agency through the Engineer an insurance policy written in the name of the Local Public Agency and extended to include the interests of the Local Public Agency and protect the Local Public Agency from any liability which might be incurred against them as a result of any operation of the Contractor or his subcontractors or their employees. Such insurance shall provide for a limit of not less than Five Hundred Thousand Dollars (\$500,000.00) for all damages arising out of bodily injuries to or death of one person, and subject to that limit for each person, a total limit of One Million Dollars (\$1,000,000.00) for all damages arising out of bodily injuries to or death of two or more persons in any one accident; and not less than Five Hundred Thousand Dollars (\$500,000.00) for all damages arising out of injury to or destruction of property in any one accident and subject to that limit per accident, a total (or aggregate) limit of not less than One Million Dollars (\$1,000,000.00) for all damages arising out of injury to or destruction of property during the policy period.
- E. Other Data: In the event the form of any policy or certificate or the amount of the insurance of the companies writing same are not satisfactory to the Local Public Agency and the Engineer, the Contractor shall secure other policies or certificates in form and amount and with companies satisfactory to the Local Public Agency. The Contractor shall not cause policies to be canceled or permit them to lapse and all insurance policies shall include a clause to the effect that the policy shall not be subject to cancellation or a reduction in the required limits of liability or amount of insurance until notice has been sent by registered mail to the Local Public Agency and Engineer stating when, not less than ten (10) days thereafter, such cancellation or reduction shall be effective. All certificates of insurance shall contain true transcripts from the policy, authenticated by the proper officer of the insurer evidencing in particular those insured, the extent of the insurer, the location and operations to which the insurance applies, the expiration date and the above-mentioned notice of cancellation clause. All policies and certificates in QUADRUPPLICATE by approved successful bidder shall be delivered to the Local Public Agency through the Engineer before any preparation of the construction contracts.

If any part of the work is sublet, similar insurance shall be provided by and on behalf of the subcontractors to cover their operations and in the event that the Contractor's policy does not cover each and every subcontractor, certificates of insurance issued on Policies by companies that may be acceptable to the Local Public Agency covering each and every subcontractor shall be filed with the Engineer prior to the preparation of any construction contracts and prior to the commencement of contract operations.

All the insurance specified in this contract shall be provided at no additional expense to the Local Public Agency. The Local Public Agency and the City of Providence shall be named insureds on all certificates of insurance and the Local Public Agency shall be a holder of the certificate.

- F. The Contractor shall be responsible for the proper and adequate insurance coverage for all his subcontract operations. It is his responsibility to receive certificates covering all subcontract operations from his subcontractors before such operations are begun. Failure to comply with this provision shall render the Contractor liable for any loss incurred.

130. PATENTS

The Contractor shall hold and save the Local Public Agency, its officers and employees, harmless from liability of any nature or kind, including costs and expenses, for, or on account of, any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of the Contract, including its use by the Local Public Agency, unless otherwise specifically stipulated in the Technical Specifications.

131. WARRANTY OF TITLE

No material, supplies, or equipment to be installed or furnished under this Contract shall be purchased subject to any chattel mortgage or under a conditional sale, lease-purchase or other agreement by which an interest therein or in any part thereof is retained by the seller or supplier. The Contractor shall warrant good title to all materials, supplies, and equipment installed or incorporated in the work and upon completion of all work, shall deliver the same together with all improvement and appurtenances constructed or placed thereon by him to the Local Public Agency free from any claims, liens, or charges. Neither the Contractor nor any person, firm or corporation furnishing any material or labor for any work covered by this Contract shall have any right to a lien upon any improvement or appurtenance thereon. Nothing contained in this paragraph, however, shall defeat or impair the right of persons furnishing materials or labor to recover under any bond given by the Contractor for their protection or any rights under any law permitting such persons to look to funds due the Contractor in the hands of the Local Public Agency. The provisions of this paragraph shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing materials for the work when no formal contract is entered into for such materials.

132. GENERAL GUARANTY

Neither the final certificate of payment nor any provision in the Contract nor partial or entire use of the Improvements embraced in this Contract by the Local Public Agency or the public shall constitute an acceptance of work not done in accordance with the Contract or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall promptly remedy any defects in the work and pay for any damage to other work resulting therefrom which shall appear within a period of 24 months from the date of final acceptance of the work. Final acceptance shall be defined as the date in which all outstanding punch list items are completed and when all work items identified during the final inspection are completed The Local Public Agency will give notice of defective materials and work with reasonable promptness.

133. REPRESENTATIONS OF CONTRACTOR

The Contractor represents and warrants:

- A. That he is financially solvent and that he is experienced and competent to perform the type of work or furnish the plant, material, supplies, or equipment to be performed or furnished by him; and
- B. That he is familiar with all Federal, State, municipal and department laws, ordinances, orders and regulations which may in any way effect the work of those employed therein, including but not limited to any special, acts relating to the work or to the project of which it is a part; and
- C. That such temporary and permanent work required by the contract documents to be done by him can be satisfactorily constructed and used for the purpose for which it is intended, and that such construction will not injure any person or damage any property; and
- D. That he has carefully examined the drawings, specifications and addendum (or addenda), if any, and the site of the work, and that from his own investigation he has satisfied himself as to the nature and location of the work, the character, quality and quantity of surface and subsurface materials likely to be encountered, the character of equipment and other facilities needed for the performance of the work, the general and local conditions, and all other materials which may in any way affect the work or its performance.

134. WEATHER CONDITIONS

In the event of temporary suspension of work, or during inclement weather, or whenever the Engineer shall direct, the Contractor shall, and shall cause his subcontractors to protect carefully his and their work and materials against damage or injury from the weather at no additional cost to the Local Public Agency. If, in the opinion of the Engineer, any work or material shall have been damaged or injured by reason of failure on the part of the Contractor or any of his subcontractors so to protect his work, or otherwise damaged by the negligence of the Contractor, subcontractors or their agents or servants, or is otherwise defective, such materials shall be removed and replaced at the expense of the Contractor. Special attention shall be given to the winter shutdown period. All temporary patching to make the roads passable or to keep driveways open and safe, shall be done at no additional cost to the DEPARTMENT of PUBLIC WORKS.

135. QUANTITIES OF ESTIMATE

Wherever the estimated quantities of work to be done and materials to be furnished under this contract are shown in any of the documents including the bid (proposal), they are given for use in comparing bids and the right is especially reserved by the Local Public Agency to increase or diminish them as may be deemed reasonably necessary or desirable by the Local Public Agency, and such increase or diminution shall in no way vitiate claims or liability for damages except as provided for in Section 109 hereof.

136. [RESERVED]

137. PAYMENTS BY CONTRACTOR

The Contractor shall pay (a) for all transportation and utility services not later than the 20th day of the calendar month following that in which services are rendered, (b) for all materials, tools and other expendable equipment to the extent of 90 percent of the cost thereof, not later than the 20th day of the calendar month following that in which such materials, tools and equipment are delivered at the site of the project, and the balance of the cost thereof not later than the 30th day following the completion of that part of the work in or on which such materials, tools and equipment are incorporated or used, and (c) to each of his subcontractors, not later than the 5th day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the work performed by his subcontractors to the extent of such subcontractors interest therein.

138. NOTICE AND SERVICE THEREOF

- A. The service of any notice, letter or other communication shall be deemed to have been made to one of the contracting parties on the other party to the contract when such letter, notice or other communication has been delivered to the legal office address of the addressee, by a duly authorized representative of the address or in person, or when such notice, letter or other communication has been deposited in any regularly maintained mailbox of the United States Postal Service in a properly addressed, postpaid wrapper. The date of such service shall be considered to be the date of such personal delivery or mailing.
- B. The address of the Contractor noted in his bid (proposal) and/or the address of his field office on or near the site of the work hereunder shall be considered as his legal address for the purposes as above set forth.

139. PROVISIONS REQUIRED BY LAW DEEMED INSERTED

Each and every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein and the contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party the contract shall forthwith be physically amended to make such insertion or correction.

140. LIENS

Neither the final payment nor any part of the retained percentage shall become due until the Contractor delivers to the Local Public Agency a complete release of all liens arising out of this contract, or receipts in full in lieu thereof, and an affidavit that so far as he has knowledge or information the releases and receipts include all the labor and material for which a lien could be filed, but the Contractor may, if any subcontractor refuses to furnish a release or receipt in full, furnish a bond satisfactory to the Local Public Agency to indemnify him against any liens. If any liens remain unsatisfied after all payments are made, the Contractor shall refund to the Local Public Agency all monies that the latter may be compelled to pay in discharging such a lien, including all costs and a reasonable attorney's fee.

THE LOCAL PUBLIC AGENCY, PRIOR TO MAKING EACH PAYMENT TO THE CONTRACTOR, may require the Contractor to furnish releases or receipts from any or all persons / firms performing work and supplying material or services to the Contractor, or any subcontractor, if deemed necessary to protect its interest.

141. CONTRACTOR'S OBLIGATIONS

- A. The Contractor shall and will in good workmanlike manner, do and perform all work and furnish all supplies and materials, machinery, equipment, facilities and means, except as herein otherwise expressly specified, necessary or proper to perform and complete all the work required by this contract, within the time herein specified, in accordance with the provisions of this contract and said specifications and in accordance with the plans and drawings covered by this contract and any and all supplemental plans and drawings, and in accordance with the directions of the Engineer as given from time to time during the progress of the work as may be required. He alone shall be responsible for the safety, efficiency and adequacy of his plant, appliances and methods and for any damage which may result from their failure or their improper construction, maintenance or operation. The Contractor shall observe, comply with and be subject to all terms, conditions, requirements and limitations of

the contract specifications, and shall do, carry on, and complete the entire work to the satisfaction of the Engineer and the Local Public Agency.

- B. The Contractor shall be solely responsible for all the work and shall provide all precautionary measures necessary for preventing injury to persons or damage to property. All injury or damage of whatever nature resulting from the work or resulting to persons, property or the work during its progress, from whatever cause, shall be the responsibility of and shall be borne and sustained by the Contractor. The Contractor shall hold the Engineer, the Local Public Agency or their agents harmless and defend and indemnify the Engineer and the Local Public Agency or their agents against damages or claims for damages due to injuries to persons or to property arising out of the execution of the work and for damages to materials furnished for the work, infringement of inventions, patents and patent rights used in doing the work, or damages arising out of the use of any improper materials, equipment, or labor used in the work, and for any act, omission or neglect of the Contractor, his agents, employees and his subcontractors therein. He shall bear all losses resulting to him including but not limited to losses sustained on account of character, quality or quantity of any part or all of the work, or because the nature of the land in or on which the work done being different from what was estimated or indicated, or on account of the weather, elements or other causes.

#### 142. ENGINEER'S AUTHORITY

The Engineer shall give all orders and directions contemplated under this contract and specifications relative to the execution of the work. The Engineer shall determine the amount, quality, acceptability and fitness of the several kinds of work and materials which are to be paid for under this contract and shall decide all questions which may arise in relation to said work and construction thereof. The Engineer's estimates and decisions shall be final and conclusive, except as herein otherwise expressly provided. In case any question shall arise between the parties hereto relative to said contract or specifications, the determination or decision of the Engineer shall be a condition precedent to the right of the Contractor to receive any money or payment for work under this contract affected in any manner or to any extent by such question. The Engineer shall decide the meaning and intent of any portion of the specifications and of any plans or drawings where the same may be found obscure or be in dispute. Any differences or conflicts in regard to their work which may arise between the Contractor under this contract and other contractors performing work for the + Local Public Agency shall be adjusted and determined by the Engineer.

#### 143. ALL WORK SUBJECT TO CONTROL BY ENGINEER

- A. In the performance of the work, the Contractor shall abide by all orders, directions and requirements of the Engineer or his designee, and shall perform all work to the satisfaction of the Engineer, and at such time and places, by such methods and in such manner and sequence as he may require. The Engineer shall determine the amount, quality, acceptability and fitness of all parts of the work. The Engineer shall interpret the drawings, specifications, contract, all other documents and the extra work orders. The Engineer shall also decide all other questions in connection with the work. The Contractor shall employ no plant, equipment, materials, methods or men to which the Engineer objects and shall remove no plant, materials, equipment or other facilities from the site of the work without the Engineer's permission. Upon request, the Engineer will confirm in writing any oral order, direction, requirement or determination.
- B. Inspectors shall be authorized to inspect all work done and material furnished. Such inspection may extend to all or any part of the work, and to the preparation or manufacture of the materials to be used. The presence or absence of an inspector shall not relieve the Contractor from any requirements of the Contract. In case of any dispute arising between the Contractor and the Inspector as to materials furnished or the manner of performing the work, the inspector shall have the authority to reject material or suspend the work until the question at issue can be referred to and decided by the Engineer. The Inspector shall not be authorized to revoke, alter, enlarge, relax or release any requirement of these specifications, nor to approve or accept any portion of the work, nor to issue instructions contrary to the drawings and specifications. The Inspector shall in no case act as foreman or perform other duties for the Contractor, or interfere with the management of the work by the latter. Any advice which the inspector may give the Contractor shall in no wise be construed as binding the Local Public Agency or the Engineer in any way nor releasing the Contractor from the fulfillment of the terms of the contract.

#### 144. INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

- A. Except the Contractor's executed set, all drawings and specifications are the property of the Local Public Agency. The Local Public Agency will furnish the Contractor without charge three (3) sets of the drawings and specifications. Additional sets will be furnished upon request at a cost as determined by the Local Public Agency. Such drawings and specifications are not to be used on other work and those sets in usable condition shall be returned to the Local Public Agency upon request at the completion or cessation of the work or termination of the contract.
- B. The Contractor shall keep at the site of the work one copy of the drawings and specifications, and shall at all times give the Local Public Agency and the Engineer and their representatives access thereto. Anything shown on the drawings and not mentioned in the specifications, or mentioned in the specifications and not shown on the

drawings, shall have the same effect as if shown or mentioned in both. In case of any conflict or inconsistency between the drawings and specifications, the specifications shall take precedence. Any discrepancy in the figures and the drawings shall be immediately submitted by the Contractor to the Engineer for decision and the decision thereon by the Engineer shall be final. In case of differences between small and large scale drawings, the larger scale drawings shall take precedence.

145. ENGINEER'S CONTROL NOT LIMITED

The enumeration in this contract of particular instances in which the opinion, judgment, discretion or determination of the Engineer shall control or in which work shall be performed to his satisfaction or subject to his approval or inspection, shall not imply that only matters similar to those enumerated shall be so governed and performed, but without exception all the work shall be so governed and performed.

146. CONTRACT AND CONTRACT DOCUMENTS

The Drawings, the Specifications and Addendum (or Addenda), the Advertisement, the Information for and Notice To Bidders, and the Bid (Proposal) as accepted by the Owner as evidenced by the City's Notice to Award to the Contractor, which Notice is made a part of this Contract. Special Provisions, and the General Provisions shall form a part of this Contract and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth. The table of contents, titles, headings, running headlines and marginal references to various provisions of the Contract Documents are in no way to affect, limit or cast light on the interpretation of the provisions to which they refer. Whenever the term "Contract Documents" is used, it shall mean and include this Contract, the enumerated Drawings, Special Provisions, General Provisions, the Technical Specifications, the Advertisement, the enumerated Addendum (or Addenda), Information for Bidders, the Bid (Proposal) as accepted by the City. The City shall interpret his own requirements. In case of any conflict or inconsistency between the provisions or this signed portion of the Contract and those of the Specifications, the provisions of this signed portion of the Contract shall govern.

147. DRAWINGS:

Drawings are contained in Appendix D entitled "Scope of Work".

148. COOPERATION WITH UTILITIES

The Contractor shall arrange and cooperate with the various utility corporations or other parties interested in connection with the relocation and maintenance of all public fixtures when necessary and appurtenances or service connections within or adjacent to the limits of construction, as directed by the Engineer.

The Contractor will be responsible for any damage done to any utility poles or lines, curbing, basins, hydrants, water and sewer lines, conduits and other accessories and appurtenances of a similar nature which are fixed or controlled by the City Public Utility Company or Corporation. He shall perform any carry out his work in such a manner as not to interfere with or damage fixtures mentioned herein, or as shown on the Plans or discovered during construction.

149. MAINTENANCE OF FIRE LANES

Fire lanes designated by the Bureau of Police and Fire must be accessible at all times for firefighting equipment, other emergency apparatus and traffic crossing.

150. "OR APPROVED EQUAL" CLAUSE

Whenever a material or article required is specified or shown on the Drawings by using the name of the proprietary product or of a particular manufacturer or vendor, any material or article which will perform adequately the duties imposed by the general design will be considered equal and satisfactory providing the material or article so proposed is of equal substance and function in the Engineer's and City's opinion. It shall not be purchased or installed without the Owner's written approval. In all cases new material shall be used on the project.

151. REPORTS, RECORDS AND DATA

The Contractor and each of his subcontractors shall submit to the Owner such schedules of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as the Engineer may request concerning work performed or to be performed under this Contract.

152. CONFLICTING CONDITIONS

Any and all terms or provisions in conflict with or inconsistent with the federal and state contracting laws which the Project's funding is subject to ("Controlling Provisions") shall be subject to said Controlling Provisions. In case the Controlling Provisions are silent as to any particular issue resulting from further conflicting or inconsistent provisions, the General Contract Provisions contained in Appendix J shall control.

#### 153. SAFETY AND HEALTH REGULATIONS

These construction documents, and the joint and several phases of construction hereby contemplated are to be governed, at all times, by applicable provisions of the Federal law(s), including but not limited to the latest amendments of the following:

- A. Williams-Steiger Occupational Safety and Health Act of 1970, Public Law 91-596;
- B. Part 1910 - Occupational Safety and Health Standards, Chapter XVII of Title 29, Code of Federal Regulations;
- C. Part 1518 - Safety and Health Regulations for Construction, Chapter XIII of Title 29, Code of Federal Regulations.

#### 154. PROTECTION OF LIVES AND HEALTH

In order to protect the lives and health of his employees under the Contract, the Contractor shall comply with all pertinent provisions of the "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Incorporated, and shall maintain an accurate record of all cases of death, occupational disease, and injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under this Contract.

The Contractor alone shall be responsible for the safety, efficiency and adequacy of his plant, appliances and methods., and for any damage which may result from their failure or their improper construction, maintenance or operation.

The Contractor shall be solely responsible for the acts and omissions of his agents, employees and his subcontractors and their agents and employees and shall hold the Engineers and the Owner harmless and defend the injuries to others or property of others which result from said acts or omissions.

#### 155. CONTRACTOR TO LAY OUT HIS OWN WORK

The LPA will establish such general reference points as in its judgement will enable the Contractor to proceed with the work. The Contractor, at his own expense, shall provide all materials and equipment and such qualified helpers as the LPA may require for setting the general reference points and shall protect and preserve all stakes, benches and other markers used to identify the reference points. The Contractor shall lay out all the contract work from the above and shall be responsible for the accuracy of all lines, grades and measurements, conforming to the American's with Disabilities Act. In the event the general reference points established by the LPA are subsequently damaged or destroyed by the Contractor, the reference points will be reestablished by the LPA at the Contractor's expense.

#### 156. SUBSURFACE DATA

The Contractor shall be aware that some buildings in the City have basements and/or utility vaults under the sidewalks. The Contractor shall be solely responsible to verify the presence of building/utility vaults and use extreme care when working within or adjacent to sidewalks in front of buildings that may contain vaults. Any basement or utility vaults damaged by the Contractor while carrying out this Contract shall be repaired by the Contractor to the satisfaction of the Engineer at no additional charge to the LPA. The Contractor is solely responsible for the investigation of subsurface basement vaults.

Pavement cores have been obtained by the Design Engineer. The core logs are included in the Contract Documents with their locations shown on the plans.

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**SPECIAL CONDITIONS**  
**CONSTRUCTION SERVICES FOR**  
**ROGER WILLIAMS PARK GATEWAY PROJECT**  
P R O V I D E N C E , R H O D E I S L A N D

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401. PROJECT AREA

The Project Area for CONSTRUCTION SERVICES FOR ROGER WILLIAMS PARK GATEWAY PROJECT is within the City of Providence, County of Providence, State of Rhode Island.

402. TIME FOR COMPLETION

The work which the Contractor is required to perform under this Contract shall be commenced at the time stipulated by the Local Public Agency in the Notice to Proceed to the Contractor and shall be fully completed, including all punchlist items by December 1, 2021.

403. LIQUIDATED DAMAGES

Liquidated damages shall be as set forth in the General Contract Provisions in Appendix J to the Request for Proposals.

404. RESPONSIBILITIES OF CONTRACTOR

Except as otherwise specifically stated in the Contract Documents and Technical Specifications, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, heat, power, transportation, superintendence, temporary construction of every nature, charges, levies, fee or other expenses and all other services and facilities of every nature whatsoever necessary for the performance of the Contract and to deliver all improvements embraced in the Contract for Site Preparation complete in every respect within the specified time.

405. COMMUNICATIONS

- A. All notices, demands, requests, instructions, approvals, proposals, and claims must be in writing.
- B. Any notice to or demand upon the Contractor shall be sufficiently given if delivered at the office of the Contractor stated on the signature page of the Agreement (or at such other office as the Contractor may from time to time designate in writing to the Local Public Agency (LPA)), or if deposited in the United States mail in a sealed, postage-prepaid envelope, or delivered with charges prepaid to any telegraph company for transmission, in each case addressed to such office.
- C. All papers required to be delivered to the Local Public Agency shall unless otherwise specified in writing to the Contractor, be delivered to the Providence Redevelopment Agency, 444 Westminster Street, Suite 3A, Providence, Rhode Island 02903, and any notice to or demand upon the Local Public Agency shall be sufficiently given if so delivered, or if deposited in the United States mail in a sealed, postage-prepaid envelope, or delivered with charges prepaid to any telegraph company for transmission to said Local Public Agency at such address, or to such other representatives of the Local Public Agency or to such other address as the Local Public Agency may subsequently specify in writing to the Contractor for such purpose.
- D. Any such notice shall be deemed to have been given as of the time of actual delivery or (in the case of mailing) when the same should have been received in due course of post, or in the case of telegrams, at the time of actual receipt, as the case may be.

406. [RESERVED]

407. JOB OFFICES

- A. The Contractor shall furnish and maintain during construction of the improvements embraced in this Contract, adequate facilities on the Project Area or adjacent thereto, for the use of the Local Public Agency and its Engineers, as follows:
1. The Contractor shall provide a suitable, weather tight building or trailer for a field office in a location in the vicinity of the project for use of the field engineering staff. The building or trailer shall be approximately 400 square feet in area and a suitable inside height. The Contractor shall install windows to provide sufficient light. The doors required to be locked shall be equipped with cylinder locks. The office shall be provided within 30 days after the award of the contract.
  2. The field office shall be divided into at least two rooms as directed by the Local Public Agency.
  3. Telephone service shall be provided in the principal office. The Local Public Agency and his representatives shall be allowed the use of the telephone for purposes relating to the project throughout the duration of the Contract without cost to the Engineer or the Local Public Agency. Artificial light, heat during cold weather maintained at a minimum temperature of 70 degrees F., screens, cabinets, shelves, lockers, tables, racks, chairs, storage compartments and any other items required to completely equip each office and room for the intended purpose shall be furnished.
  4. Toilet facilities are to include one bowl, one urinal and two washstands; all suitably enclosed and connected into the City water and sanitary systems and approved by the Local Public Agency and the City of Providence Water and Sanitary Departments, shall be provided.
  5. The cabinets and lockers shall be provided with locks. The furniture mentioned above or any other furniture or facilities required for each particular office and room, shall be furnished by the Contractor regardless of whether or not it is specified.
  6. The Contractor shall confer with the Local Public Agency and submit for approval, the proposed field office to be provided hereunder, before proceeding with the layout of the field office. A building constructed by the Contractor shall be of wood frame or acceptable equal, with walls, roof and ground floor insulated. As an alternate, the Contractor may supply field office trailers or trailers, providing substantially equivalent space and facilities.
  7. The field office shall be maintained by the Contractor for the duration of the construction period of the contract and for such additional time as may be required by the engineering force for a further period of time not exceeding 60 consecutive days thereafter, as may be required by the Local Public Agency. Such maintenance should include general watchman service during all periods work is not in progress at the site. The field office and all the furnishing and equipment shall then be the property of the Contractor. In case of a field office under rental by the Contractor, he shall be relieved of any further costs of rental, heating, lighting, telephone, service and maintenance.
  8. The cost of providing, furnishing and maintaining the field office together with all the facilities will not be paid for separately but shall be included in the price bid for the work under the Contract.
  9. The field office and furnishings will become the property of the Contractor and it shall be his responsibility to remove them from the site, clear and make the premises neat and presentable so the site will match the surrounding area.
  10. If the Contractor fails or neglects to provide all the specified items or work within the time specified, the Local Public Agency may purchase or secure the missing items or have work accomplished and the cost thereof shall be deducted from any money then or thereafter due the Contractor.
  11. In addition to the requirements for the Field Office specified above, the Contractor will be required to provide for the use of the Engineer the following: (a) An indoor-outdoor thermometer; (b) An air conditioner capable of maintaining a temperature of 72 F in the summertime; (c) A printing calculator capable of performing addition, subtraction, multiplication and division.
  12. The Contractor and his subcontractors may maintain such office and storage facilities on the site as are necessary for the proper conduct of the work. These shall be located so as to cause no interference to any work to be performed on the site. The Local Public Agency shall be consulted with regard to locations.
  13. Upon completion of the Improvements, or as directed by the Local Public Agency the Contractor shall remove all such temporary structures and facilities from the site, some to become his property, and leave the entire site of the work in the condition required by the Contract.

#### 408. PARTIAL USE OF SITE IMPROVEMENTS

The Local Public Agency, at its election, may give notice to the Contractor and place in use those sections of the improvements which have been completed, inspected and can be accepted as complying with the Technical Specifications and if in its opinion, each such section is reasonably safe, fit and convenient for the use and accommodation for which it was intended, provided:

- A. The use of such sections of the improvements shall in no way impede the completion of the remainder of the work by the Contractor.
- B. The Contractor shall not be responsible for any damages or maintenance costs due directly to the use of such sections.

- C. The use of such sections shall in no way relieve the Contractor of his liability due to having used defective materials or to poor workmanship.
- D. The period of guarantee stipulated under GENERAL CONDITIONS, SECTION 132, shall not begin to run until the date of the final acceptance of all work which the Contractor is required to construct under this Contract.

409. WORK BY OTHERS

The Contractor will consult and cooperate with the utility companies to permit their work to proceed coincidentally with the work under this contract so as not to delay Completion of the project.

410. CONTRACT DOCUMENTS AND DRAWINGS

The Local Public Agency will furnish the Contractor with an electronic storage device containing the Contract Documents, Plans, Drawings and Addenda without charge.

411. DISPOSAL OF SALVAGED MATERIALS

- A. All salvaged material such as granite curbing; manhole frames and covers; catch basin frames, grates, covers and traps; etc., not required to be installed in the work shall be removed and transported to the City of Providence, Department of Public Works storage yards located in the vicinity of 700 Allens Avenue, Providence, Rhode Island.
- B. All salvaged materials that are part of the existing water distribution system of the City of Providence Water Supply Board shall be removed and transported to the Water Supply Board Headquarters which are located at 552 Academy Avenue, Providence, Rhode Island.
- C. The above work shall be accomplished at no additional expense to the Local Public Agency, but the cost of the work shall be included in the submitted unit price for the applicable items of work.

The Contractor shall be responsible for arranging salvaged materials delivery and obtaining signed receipt(s) from responsible personnel at the above agencies listing material types and quantities salvaged and delivered. Copies of receipt(s) shall be provided said agencies and the Local Public Agency on the date of delivery.

412. AS-BUILT DRAWINGS

- A. The Contractor shall provide for the obtaining and recording of "as built" information as prescribed herein. No separate payment will be made for this work, but compensation, therefore, shall be considered as having been included in the prices stipulated for the appropriate items of work as listed in the Bid.
- B. The Contractor shall set aside a complete set of drawings expressly for the recording of "As-Built" information in the field. Required information shall be obtained and recorded daily by the Contractor.
- C. Once each month the Contractor shall transfer the "As-Built" information from the field prints to reproducible transparencies supplied by the Local Public Agency and two copies thereof shall be submitted with the monthly requisition for payment. These monthly submissions shall be certified each month by a Professional Engineer or Land Surveyor registered in the State of Rhode Island as to their accuracy and completeness.
- D. Payment requisitions will not be considered for approval unless complete "As-Built" information is submitted as required above.
- E. Minimum "As-Built" information shall be provided for the work as herein indicated, including but not limited to: (Requirements to be provided by agency prior to commencement of work).
- F. At the completion of the work and as a requirement precedent to the final payment, the Contractor shall submit to the Local Public Agency the set of reproducible transparencies upon which the "As-Built" information has been recorded and upon which has been affixed a certificate bearing the signature and registration seal of a Professional Engineer, registered in the State of Rhode Island, hired by or in the employ of the Contractor, attesting to the accuracy and completeness of the "As-Built" drawings.

413. PROVISION FOR FLOW OF PRESENT DRAINAGE

Provision for the flow of all sewers, drains and watercourses that are met or altered during construction shall be provided by the Contractor and all the connections shall be restored without extra charge. All offensive matter shall be removed immediately with such precautions as may be directed. If required, the Contractor shall install temporary bypass connections for surface or pipe drainage facilities to provide uninterrupted or continuous service during the work of construction.

414. WORK TO BE ACCOMPLISHED IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS

The work, during its progress and at its completion, shall conform to the lines and grades shown on the drawings and to the directions given by the Design Engineer from time to time, subject to such modifications or additions as he shall determine to be necessary during the execution of the work; and in no case, will any work be paid for in excess of such requirements. The work shall also be accomplished in accordance with the date in these specifications.

415. CONTRACTOR TO CHECK DIMENSIONS AND SCHEDULES

The Contractor will be required to check all dimensions and quantities shown on the drawings or schedules given to him by the Design Engineer, and shall notify the Design Engineer of all errors therein which he may discover by examining and checking them. The Contractor shall not take advantage of any error or omissions in these specifications, drawings or schedules. The Design Engineer will furnish all instructions should such errors or omissions be discovered, and the Contractor shall carry out such instructions as if originally specified.

416. PROTECTION OF TREES

The Contractor shall take special care to preserve and protect from injury all trees and other plant material to remain along the lines of construction. No such trees or plant material shall be removed or cut down, trimmed or otherwise cut without permission from the Engineer. Failure to comply may result in a fine by the City Forester.

417. REMOVAL OF WATER AND PROTECTION FROM FLOODING

The Contractor shall construct and maintain, at no additional expense to the Local Public Agency, all pumps, drains, well points or any other facility for the control and collection of groundwater and/or surface water and provide all pumps and piping for the removal of water from the trenches and excavations so that all trenches and excavations may be kept, at all times, free from water and so that all construction work may be performed in the dry. Any damage resulting from the failure of the dewatering operations of the Contractor and any damage resulting from the failure of the Contractor to maintain the areas of all work in a suitable dry condition, shall be repaired by the Contractor as directed by the Engineer, at no additional expense to the Local Public Agency. The Contractor's pumping and dewatering operations shall be carried out in such a manner as to prevent damage to existing structures and utilities and the contract work, and so that no loss of ground will result from these operations. Precautions shall be taken to protect new and existing work from flooding during storms or from other causes. Pumping shall be continuous where directed by the Engineer, to protect the work and/or maintain satisfactory progress. All pipe lines or structures not stable against uplift during construction or prior to completion shall be thoroughly braced or otherwise protected. Water from the trenches, excavations and drainage operations shall be disposed of in such a manner as will neither cause public nuisance, nor cause injury to public health nor to public or private property nor to the work completed, nor to the work in progress. No extra payment will be made for the removal of water, protection from flooding, drainage work, diversion of existing water courses and such other work; but, compensation therefor shall be considered as having been included in the prices stipulated for the appropriate items of work as listed in the Bid.

418. HURRICANE PROTECTION

Should hurricane warnings be issued, the Contractor shall take every practicable precaution to minimize danger to persons, to the work and to adjacent property. These precautions shall include closing all openings, removing all loose materials, tools and/or equipment from exposed locations, and removing or securing scaffolding and other temporary work.

419. FIRST-AID TO INJURED

The Contractor shall keep in his office, ready for immediate use, all articles necessary for giving first aid to injured employees. He shall also provide arrangements for the immediate removal and hospital treatment of any employee injured on the work who may require the same.

420. CONFORMANCE WITH DIRECTIONS

The Design Engineer may make alterations in the line, grade, plan, form, dimensions or materials of the work, or any part thereof, either before or after the commencement of construction. If such alterations diminish the quantity included in any item of work to be done and paid for at a Unit Price, the Contractor shall have no claim for damages or for anticipated profits and the work that may thus be dispensed with. If they increase the quantity included in any such item, such increase shall be paid for at the stipulated price, but no such alteration shall increase shall be paid for at the stipulated price, but no such alteration shall be made without the consent of the City of Providence.

421. PROTECTION AGAINST HIGH WATER AND STORM

- A. The Contractor shall take all precautions to prevent damage to the work or equipment by high waters or by storms. The Engineer may prohibit the carrying out of any work at any time when, in his judgment, high waters or storm conditions are unfavorable or not suitable, or at any time, regardless of the weather, when proper precautions are not being taken to safeguard previously constructed work or work in progress.
- B. In case of damage caused by the failure of the Contractor to take adequate precautions, the Contractor shall repair or replace equipment damaged and shall make such repairs or rebuild such parts of the damaged work, as the Engineer may require, at no additional expense to the Local Public Agency.

422. SEQUENCE OF WORK

The Contractor shall be required to prosecute his work in accordance with a schedule prepared by him in advance in accordance with additional requirements specified herein and approved by the Engineer. This schedule shall state the methods and shall forecast the times for doing each portion of the work. Before beginning any portion of the work, the Contractor shall give the Engineer advance notice and ample time for making the necessary preparations.

423. COMPETENT HELP TO BE EMPLOYED

The Contractor shall employ experienced foremen, craftsmen and other workmen competent in the work in, which they are to be engaged, and whenever the Engineer shall notify the Contractor in writing that any person employed on the project is, in his opinion, incompetent, unfaithful, disorderly, or otherwise unsatisfactory, or not employed in accordance with the provisions of this contract, such person shall be discharged from the project and shall not be again employed on it.

424. STREETS AND SIDEWALKS TO BE KEPT OPEN

- A. The Contractor shall at all times keep the streets, highways, roads, private walks and sidewalks in which he may be at work, open for pedestrian and vehicular traffic at his own expense, unless otherwise authorized by the Engineer in writing. If, in the opinion of the Engineer, the interest of abutters and public requires it, the Contractor shall bridge or construct plank crossings over the trenches at street crossings, roads, or private ways, or provide such temporary means of crossing and guarding as shall be acceptable to the Engineer. The Contractor shall conduct his work for this objective in such manner as the Engineer may direct from time to time. No sidewalk shall be obstructed where it is possible to avoid it. The closing of any traffic lanes shall be done only with the approval of the Providence Traffic Engineering Department.
- B. The Contractor shall provide at his own expense, all necessary fire crossings at principal intersections or ways usually traveled by fire apparatus.

425. LIGHTS, BARRIERS, WATCHMEN AND INDEMNITY

- A. The Contractor shall put up and maintain such barriers, lighting and warning lights, danger warning signals and signs that will prevent accidents during the construction work and protect the work and insure the safety of personnel and the public at all times and places, and the Contractor shall indemnify and protect the Local Public Agency and the Engineer in every respect from any injury or damage whatsoever caused by any act or neglect of the Contractor or his subcontractors, or their servants or agents.
- B. In addition to the above, when and as needed, or when required by the Engineer, the Contractor shall post signs and employ watchmen for excluding at all times unauthorized persons from the work, for which the Contractor will not be paid additional compensation.
- C. The Contractor shall be responsible for excluding at all times from lands within easement areas, all persons not directly connected with the work or authorized by the Local Public Agency to be in the work areas.

426. TRAFFIC CONTROL

- A. Approval of any street closure, lane closure, sidewalk closure or detour must be coordinated with City of Providence Traffic Engineer before it is put into operation. All proper Traffic Engineering permits must be approved prior to work starting.
- B. The Contractor shall make himself aware of all City regulations governing construction, and their effect on vehicular and pedestrian traffic.
- C. Whenever necessary, or whenever directed by the Engineer, the Contractor shall employ traffic control devices to insure a safe, orderly routing of traffic around or across the work. No separate payment shall be made for this work, but compensation, therefore, shall be considered as having been included in the prices stipulated for the appropriate items of work as listed in the bid.
- D. Where deemed necessary by the Engineer, supplementary traffic control shall be provided by off-duty, City of Providence Police Officers.
- E. The Contractor shall request for use of off-duty, City of Providence Police Officers for supplementary traffic control in accordance with the unit price for this work submitted as part of the Bid. Invoices shall be billed directly to the Providence Redevelopment Agency. Police details and supplementary traffic control flagpersons MUST be coordinated and approved by the City's Design Engineer.
- F. The Contractor shall be solely responsible for the safe passage of traffic and shall indemnify and protect the Local Public Agency and the Design Engineer in every respect from any injury or damage whatsoever caused by any act or neglect of the Contractor or his subcontractors, or their servants or agents.

427. NIGHT WORK

- A. Night work, or work on Saturdays, Sundays and legal holidays may be required in order to perform certain construction operations without causing excessive interference with or disruption of traffic flow, water service, etc.
- B. All water work operations requiring the closing or shutdown of existing water service facilities will be conducted at those times as directed by the Engineer that will minimize the interference with, or disruption of service.
- C. All trenching, pipe laying, paving operations, etc., shall be conducted at times as directed by the Engineer that will minimize the interference with normal and emergency vehicular traffic flow.
- D. No work shall be scheduled by the Contractor on nights, Saturdays, Sundays or legal holidays unless directed or approved by the Director of Public Works. The Contractor will receive no extra payment for work at these times and compensation shall be considered as having been included in the prices stipulated for the appropriate items of work as listed in the Proposal.
- E. All necessary lighting, safety precautions, and other requirements for night, Saturday, Sunday and holiday work shall be provided at no extra cost to the Local Public Agency.

428. BUS LINE INTERFERENCE

Whenever it may be necessary to interfere with any bus lines, notice shall be given to the corporation owning the same, and reasonable time shall be given to said corporation to arrange the schedule for operation of same, as may be necessary.

429. WORK IN COLD WEATHER

- A. The Engineer will determine when conditions are unfavorable for work and may order the work or any portion of it suspended whenever, in his opinion, the conditions are not such as will insure

first class work. In general, work shall be prosecuted throughout the year and the Contractor will be expected to keep work going and employment of labor as continuous as possible.

- B. All methods and materials used for concrete or masonry work in cold weather shall be subject to the approval of the Engineer. The Contractor shall take the necessary precautions to protect the work from damage and for removing ice and frost from materials, including heating the water, sand and coarse aggregate and for protecting the newly laid masonry. This protection shall also include the covering of work with tarpaulins and the heating by salamanders or steam pipes or other suitable method. The Contractor will receive no extra payment or any labor, apparatus, tools or materials necessary to comply with the above requirements, but compensation shall be considered to be included in the prices stipulated for the appropriate items of work as listed in the bid.
- C. In the event of temporary suspension of work, or during inclement weather, or whenever the Engineer shall direct, the Contractor will, and will cause his subcontractors to protect carefully his and their work and materials against damage or injury from the weather. If in the opinion of the Engineer, any work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or any of his subcontractors to so protect his work, such materials shall be removed and replaced at the expense of the Contractor.
- D. In the event that the project is shut down during the winter months, the Contractor will be required to install, maintain and remove such temporary materials as may be required to protect completed work and to provide safe vehicular and pedestrian access. No separate payment shall be made to the Contractor for such temporary materials and labor.

430. BLASTING AND EXPLOSIVES

- A. Blasting or use of explosives will not be permitted on this project.
- B. Rock, boulders, ledge, concrete foundations, etc., shall be removed by the use of pneumatic tools; drilling and splitting mechanically or by hand; or by other means not requiring the use of explosives.

431. [RESERVED]

432. RESERVED MATERIALS

- A. Materials found on the work suitable for any special use shall be reserved for that purpose without charge to the Local Public Agency.
- B. Where permitted, the Contractor may use in the various parts of the work, without charge to the local public agency, therefore, any materials taken from the excavations.

433. DISPOSAL OF MATERIALS. ACCESS TO HYDRANTS AND GATES AND MATERIALS TRIMMED- UP FOR CONVENIENCE OF PUBLIC TRAVEL OR ADJOINING TENANTS

The materials from the trench and excavations and those used in the construction of the work shall be deposited in such a manner so they will not endanger persons or the work, and so that free access may be had at any time to all hydrants and gates in the vicinity of the work. The materials shall be kept trimmed-up so as to be of as little inconvenience as possible to the public travel or the adjoining tenants. All excavated materials not approved for backfill and fill, all surplus material and all rock resulting from the excavations shall be removed and satisfactorily disposed of off the site by the Contractor at no additional expense to the Local Public Agency.

434. LENGTH OF TRENCH TO BE OPENED, MAINTAINING PREMISES FREE FROM OBSTRUCTIONS, CROSSOVERS, DIRECTIONAL SIGNS AND LIGHTS

- A. The length of trench opened at any time from point where ground is being broken to completed backfill and also the amount of space in streets or public and private lands occupied by equipment, trench and supplies, shall not exceed the length or space considered reasonably necessary and expedient by the Engineer. In determining the length of open trench or spaces for equipment, materials, supplies and other necessities, the Engineer will consider the nature of the construction and equipment being used, inconvenience to the public or to private parties, possible dangers and other proper matters. All work must be constructed with a minimum of inconvenience and danger to the public and all other parties concerned.
- B. Whenever any trench obstructs pedestrian and vehicular traffic in or to any, public street, private driveway or property entrance, or on private property, the Contractor shall take such means as may

be necessary to maintain pedestrian and vehicular traffic and access. Until such time as the work may have attained sufficient strength to support backfill, or if for any other reason it is not expedient to backfill the trench immediately the Contractor shall construct and maintain suitable plank crossings and bridges to carry essential traffic in or to the street, driveway or property in question as specified or directed.

- C. Suitable signs, lights and such required items to direct traffic shall be furnished and maintained by the Contractor.
- D. The Contractor must keep streets and premises free from unnecessary obstructions, debris and all other materials. The Engineer may, at any time, order all equipment, materials, surplus from excavations, debris and all other materials lying outside that length of working space promptly removed and should the Contractor fail to remove such material within 24 hours after notice to remove the same, the Engineer may cause any part or all of such materials to be removed by such persons as he may employ, at the Contractor under the contract. In special cases, where public safety urgently demands it, the Engineer may cause such materials to be removed without prior notice.

#### 435. INTERFERENCE WITH EXISTING STRUCTURES

- A. Whenever it may be necessary to cross or interfere with existing culverts, drains, sewers, water pipes or fixtures, guardrails, fences, gas pipes or fixtures, or other structures needing special care, due notice shall be given to the Engineer and to the various public and private agencies or individuals responsible for the utility or structure that is interfered with. Whenever required, all objects shall be strengthened to meet any additional stress that the work herein specified may impose upon it, and any damage caused shall be thoroughly repaired. The entire work shall be the responsibility of the Contractor and the work shall be performed at no additional expense to the Local Public Agency.
- B. The Contractor shall be responsible for all broken mains or utilities encountered during the progress of the work and shall repair and be responsible for correcting all damages to existing utilities and structures at no additional expense to the Local Public Agency. The Contractor shall contact the proper utility or authority to correct or make any changes due to utility or other obstructions encountered during the work, but the entire responsibility and expense shall be with the Contractor.
- C. All damaged items of work or items required to be removed and replaced due to construction shall be replaced or repaired by the Contractor to the complete satisfaction of the property owners and/or the Engineer at no additional expense to the Local Public Agency.

#### 436. [RESERVED]

#### 437. MATERIALS

All materials furnished and used in the completed work shall be new, of best quality workmanship and design and recognized as standard in good construction practices. Whenever a specification number or reference is given, the subsequent amendments (if any) shall be included. The standards set forth in the selection of materials and supplies are intended to conform with those standards adopted by the Local Public Agency. Preference in manufacture shall be given to adopted standards and the Contractor shall further familiarize himself with the requirements of the Local Public Agency when the occasion or choice of materials or supplies so demands.

#### 438. DEFECTIVE MATERIALS, INSPECTION AND TESTING OF MATERIALS FURNISHED, SAMPLES AND ORDERING LISTS

- A. No materials shall be laid or used which are known, or may be found to be in any way defective. Any materials found to be defective at the site of the work or upon installation shall be replaced by the Contractor at his expense. Notice shall be given to the Engineer of any defective or imperfect material. Defective or unfit material found to have been laid shall be removed and replaced by the Contractor with sound and unobjectionable material without additional expense to the Local Public Agency.

The Contractor shall also be responsible to compensate the Local Public Agency, its Engineer, its Design Engineer, and police details for errors, defective work or damage caused by the Contractor. This will be done by direct invoice to the Contractor or monies deducted through invoices.

- B. All materials furnished by the Contractor are subject to thorough inspections and tests by the Engineer.
- C. All ordering lists shall be submitted by the Contractor to the Engineer for approval and shall be approved before the ordering of the materials.

439. CONTRACTOR'S OFFICE AT THE WORK

The Contractor shall maintain, separately and detached from the "Office for the Local Public Agency", during the performance of this contract, an office at the site of the work at which he or his authorized agent shall be present at all times while the work is in progress. The Contractor shall be responsible for equipping his office at the work with all office facilities which he may require at the site. Instructions from the Engineer left at this office shall be considered as delivered to the Contractor. Copies of the contract, drawings and specifications shall be kept at said office ready for use at any time. The obtaining of a suitable site for the location of the office shall be the responsibility of the Contractor; however, the location and site shall be subject to the approval of the Local Public Agency; all costs in connection with the obtaining and use of a suitable office site shall be the responsibility of the Contractor.

440. SANITARY REGULATIONS

- A. Adequate sanitary conveniences for use of workmen on the premises, properly secluded from the public observation, shall be provided and maintained by the Contractor in accordance with the requirements of local and State health authorities and in such manner and at such points as shall be approved and their use shall be strictly enforced. Sanitary waste shall be treated and disposed of in a manner satisfactory to and as directed by the Engineer and the local and State health authorities; under no circumstances shall sanitary wastes be allowed to flow on the surface of the ground.
- B. The Contractor shall rigorously prohibit the committing of nuisances upon the lanes or rights-of-way of the Local Public Agency, about the work or upon adjacent public or private property.
- C. The cost of the sanitary convenience and maintaining same will not be paid for separately, but compensation shall be considered to be included in the prices stipulated for the appropriate items of work as listed in the bid.

441. ALCOHOL

The Contractor shall neither permit nor suffer the introduction or use of alcohol for consumption upon the work embraced in this contract.

442. FINISHING AND CLEANING UP

In completing the backfilling of the trenches, etc. the Contractor shall replace all surface material to the satisfaction of the Engineer, and shall then immediately remove all surplus material, and all tools and other property belonging to him, leaving the entire street or surroundings free and clean and in good order, at no additional expense to the Local Public Agency. The backfilling and removing of the surplus materials shall follow closely upon the completion of the work. The Contractor shall exercise special care in keeping rights-of-way and private lands, upon which work is to be performed, clean and free of debris at all times and to remove tools and other property belonging to the Contractor when they are not being used.

443. CLEAN-UP AT CONTRACTOR'S EXPENSE

In case the Contractor shall fail or neglect, after backfilling, to promptly remove all surplus materials, tools and other incidentals, or promptly do the required repaving when ordered, the Engineer may, after 24 hours notice, cause the work to be done and the cost thereof shall be deducted from any monies then or thereafter due the Contractor.

444. RIGHTS OF ACCESS

Nothing herein contained or shown on the drawings shall be construed as giving the Contractor exclusive occupancy of the work areas involved. The Local Public Agency or any other contractor employed by him, the various utilities companies, contractors or subcontractors employed by the Federal, State or

Local governmental agencies or other utility firms or agencies involved in the general project or upon public rights-of-way, may enter upon or cross the area of work or occupy portions of it as directed or permitted. When the territory of one contract is the convenient means of access to the other, each contractor shall arrange his work in such manner as to permit such access to the other and prevent unnecessary delay to the work as a whole.

445. LOADING

No part of the structures involved in this contract shall be loaded during construction with a load greater than is calculated to carry with safety. Should any accidents or damage occur through any violation of this requirement, the Contractor will be held responsible under his contract and bond.

446. EXISTING UTILITIES OR CONNECTIONS

- A. The Location of existing underground pipes, conduits and structures, as may be shown in the project drawings, has been collected from the best available sources and the Engineer and the Local Public Agency together with its agents does not guarantee, expressly or by implication, the data and information in connection with underground pipes, conduits, structures, electric and telephone ducts and lines, vault and such other parts as to their completeness nor their locations as indicated. The Contractor shall assume that there are existing water, gas, electric, and other utility connections to each and every building enroute, whether they appear on the drawings or not. Any expense and/or delay occasioned by utilities and structures or damage thereto, including those not shown, shall be the responsibility of the Contractor, at no additional expense to the Local Public Agency.
- B. Before proceeding with construction operations, the Contractor shall make such supplemental investigations, including exploratory excavations by hand digging, as he deems necessary to uncover and determine the exact locations of utilities and structures and shall have no claims for damages due to encountering subsurface structures or utilities in locations other than shown on the drawings, or which are made known to the Contractor prior to construction operations. The Contractor shall be responsible and liable for all damages to the existing utilities and structures.

447. POLLUTION OF WATERS

Special care shall be taken to prevent contamination or muddying up or interfering in any way with the stream flows along the line of work. No waste matter of any kind will be allowed to discharge into the stream flows or impounded waters of any ponds or other bodies of water.

448. COMPLETENESS OF WORK

In addition to the specified or described portions, all other work and all other materials, equipment and labor of whatever description which are necessary or required to complete the work, or for carrying out the full intent of the drawings and specifications, as interpreted by the Engineer, such work, labor, materials, and equipment shall be provided by the Contractor, and payment therefor shall be considered as having been included in the prices stipulated for the appropriate items of work as listed in the bid.

449. VEHICLE CROSSINGS

As required or directed by the Engineer, the Contractor shall install in selected locations suitable plank, timber or steel crossings substantially bound and reinforced to sustain vehicular traffic across trench or other excavations. Crossings shall be constructed with side and usable approaches for use by the traveling public, private property owners or firefighting equipment. No separate payment will be made for this work, but the cost shall be included in the prices stipulated for the appropriate items of work as listed in the bid.

450. CLEANING FINISHED WORK

After the work is completed, the sewers, manholes, and structures shall be carefully cleaned free of dirt, broken masonry, mortar, construction and other debris and left in first class condition ready for use. All temporary or excess materials shall be disposed of and the work left broom-clean to the

satisfaction of the Engineer.

451. DUST CONTROL

At all times during the progress of the work under this contract and when directed, the Contractor shall furnish and apply calcium chloride at the sites of the work over the surfaces of all earth piles along excavations, earth stockpiles and surfaces of refilled trenches, and as directed by the Engineer. Payment will be made for furnishing and applying calcium chloride for dust control in accordance with the unit price for this work submitted as part of the bid.

452. CARE OF THE WORK

The Contractor shall be responsible for all damages to persons or property that occur as a result of his fault or negligence in connection with the prosecution of the work and shall be responsible for the proper care and protection of all material delivered and work performed until completion and final acceptance, whether or not the same has been covered by partial payments made by the Local Public Agency.

453. INDEMNITY

See General Contract Provisions in Appendix J.

454. CONSTRUCTION SCHEDULE

In addition to the other requirements specified and prior to issuance of the Notice to Proceed, the Contractor shall confer with the Local Public Agency and the Engineer for the purpose of drafting a construction schedule satisfactory to the Local Public Agency and the Engineer which is to include all the work of this contract. The Contractor shall perform the work of this contract to conform to the construction schedule as approved by the Local Public Agency, except the Local Public Agency reserves the right to amend and alter the construction schedule, as approved, at any time, in a manner which it deems to be in the best interests of the Local Public Agency to do so.

The Contractor shall arrange his work under this Contract to conform with the construction schedule as it shall be revised biweekly by the Contractor, at no additional expense to the Local Public Agency. The Contractor shall notify the Engineer immediately of any circumstances which may affect the performance of the work in accordance with the current construction schedule. Failure to maintain schedule will delay in processing pay applications.

455. OTHER WORK

The Local Public Agency reserves the right to do any other work which may connect with, or become a part of, or be adjacent to the work embraced by this contract, at any time, by contract work or otherwise. The Contractor shall not interfere with or obstruct in any way the work of such other persons as the Local Public Agency may employ, and shall execute his own work in such manner as to aid in the executing of work by others as may, be required. No backfilling of trenches or excavations will be permitted until such work by the Local Public Agency is completed.

456. CHANGES AND MODIFICATIONS

The Local Public Agency reserves the right to delete or cancel any item or items or parts thereof as listed in the bid, without recourse by the Contractor. The Local Public Agency also reserves the right to add to any item or part thereof as listed in the Bid. The compensation to be paid the Contractor for such additional extension, appurtenance or item shall be made under the applicable items as listed in the bid. Where no applicable items are provided in the bid for such additional extension, appurtenance or item, the compensation to be paid the Contractor shall be as set forth under Article entitled "CHANGES IN THE WORK, GENERAL CONDITIONS, SECTION 109". No further mobilization charges shall be considered for changes or modifications in the work.

457. LAYOUT OF WORK

A. The Contractor shall provide all materials, labor, equipment, etc., necessary to layout the work and

- shall be responsible for all lines, grades, elevations, measurements, etc. conforming to the American'
- B. The Contractor shall employ a Professional Engineer or Land Surveyor, registered in the State of Rhode Island, for establishing all lines, levels, grades, elevations, measurements, dimensions, locations, etc. The Engineer or Land Surveyor proposed for this work must be approved by the Engineer and the Local Public Agency. In addition, as part of the layout of work, he shall be placed at the disposal of the Engineer and Local Public Agency, from time to time as required, for checking purposes.
  - C. The Contractor shall establish control points, at the direction of the Engineer suitable for the layout of all utility work, both public and private.
  - D. No separate payment will be made for this work, but the cost shall be included in the prices stipulated for the appropriate items of work as listed in the Bid.
  - E. To assist in the layout of the work, survey data prepared by the Engineer, which has been submitted to the Local Public Agency, will be made available to the Contractor.

458. PROTECTION OF LIVES AND HEALTH

- A. In order to protect the lives and health of his employees under the Contract, the Contractor shall comply with all pertinent provisions of the U.S. Department of Labor, "Williams-Steiger Occupational Safety and Health Act of 1970", and shall maintain an accurate record of all cases of death, occupational disease, and injury requiring medical attention or Causing loss of time from work, arising out of and in the course of employment on work under the contract.
- B. The Contractor alone shall be responsible for the safety, efficiency and adequacy of his plant, appliances and methods, and for any damage which may result from their failure or their improper construction, maintenance or operation.
- C. The Contractor shall be solely responsible for the acts and omissions of his agents, employees and his subcontractors and their agents and employees and shall hold the Engineer, and the Local Public Agency harmless and defend the Engineer, and the Local Public Agency against damage or claims for damages arising out of injuries to others or property of others which result from said acts or omissions.

459. SUBSURFACE STRUCTURES AND UTILITIES

- A. Available information of the location of existing substructures and utilities has been collected from various sources but the results of the investigations shown on the drawings are not guaranteed to be accurate complete.
- B. The Contractor shall make all supplemental investigations including exploratory excavations, by hand digging, as he seems necessary to uncover and determine the exact locations of utilities and structures and shall have no claims for damages due to encountering subsurface structures or utilities in locations other than shown on the drawings, or which are made known to the Contractor prior to construction operations.

460. PROTECTION OF CONSTRUCTION FEATURES

The Contractor shall take adequate precautions to protect existing sidewalks, curbs, pavements, utilities, building vaults, adjoining property and such incidentals and to avoid damage thereto. The Contractor shall completely repair the damage caused by his operations at no additional expense to the Local Public Agency.

461. TEST PITS

At locations where new utilities are to connect to existing utilities, the Contractor shall not proceed with the work until a test pit has been dug to determine existing conditions such as inverts of sanitary or storm sewers; outside diameter of water pipes so that sleeves or couplings can be correctly purchased, etc.

462. LOCATION OF WORK

The Contractor's attention is directed to the fact that work under this contract is performed strictly within the City of Providence.

463. PRE-CONSTRUCTION CONFERENCE

- A. Within ten (10) days after award of Contract, a preconstruction conference shall be held between the Local Public Agency, the City of Providence Department of Public Works, the Contractor, the Engineer, the Design Engineer, and other City of Providence or other regulatory agencies having jurisdiction over the project area.
- B. No work of any nature shall be performed by the Contractor until the pre-construction conference has been held, and all required permits have been obtained.

464. NOTIFICATION PRIOR TO CONSTRUCTION

Not less than ten (10) calendar days prior to the start of any work under this contract the Contractor shall send written notification of his intentions to the following:

PROVIDENCE DEPARTMENT OF PUBLIC WORKS

700 Allens Avenue  
Providence, RI 02905 Michael D. Borg  
Director  
(401) 467-7950

DEPARTMENT OF PLANNING AND DEVELOPMENT

444 Westminster Street  
Providence, RI 02903  
Robert Azar  
Deputy Director  
(401) 680-8524

RIPTA

705 Elmwood Avenue  
Providence, RI 02907  
(401) 781-9400

RIDOT

Two Capitol Hill  
Providence, RI 02903  
Robert Rocchio,  
Chief Engineer  
(401) 222-2023

NATIONAL GRID

280 Melrose Street  
Providence, RI 02907-2152  
Thomas Capobianco  
Lead Program Manager, City/State Construction, New England South  
(401) 784-7248

NATIONAL GRID – GAS

40 Sylvan Road, Third Floor, West Wing  
Waltham, MA 02451 - 1120  
Ms. Laeyeng Hunt, PE  
Manager of New England Public Works  
(781) 907-2821

VERIZON

85 High Street  
Pawtucket, RI 02865  
Peter DeCosta  
State Highway Coordinator  
(774) 409-3177

COX COMMUNICATIONS

9 J.P. Murphy Hwy.  
West Warwick, RI 02893  
David Velilla

Right Of Way Agent II  
(401) 615-1284

PROVIDENCE WATER SUPPLY BOARD  
552 Academy Avenue  
Providence, RI 02808  
Mr. Peter LePage, Sr., P.E.  
Manager of Engineering  
(401) 521-6300 Ext. 7242

PROVIDENCE DEPARTMENT OF COMMUNICATIONS  
1 Communications Place, West Exchange Street  
Providence, RI 02903  
Ms. Carolyn Arias  
Administrative Crew Chief  
(401) 243-6005

NARRAGANSETT BAY COMMISSION  
1 Service Road  
Providence, RI 02905  
David Bowens  
Engineering Manager  
461-6540

This notification shall set forth the Contractor's proposed sequence of construction and shall give the approximate dates of when each street or phase of the work is expected to begin. The sequence of construction shall also state the expected completion dates of each street or phase of the work.

Copies of each notification shall be sent to the Providence Redevelopment Agency, 444 Westminster Street, Suite 3A, Providence, Rhode Island, 02903. The notifications shall reference the Project, include a description of the work to be performed, including street names, and shall indicate when the construction will start. Additionally, the contractor shall request the name and telephone number of the person or department to be contacted when assistance is required, copies of all replies shall be forwarded to the Design Engineer.

465. NON-INTERFERENCE WITH ADJACENT PROPERTIES

All work under this Contract shall be performed in a manner which will minimize interference with the normal neighborhood operations.

466. [RESERVED]

467. WORK OUTSIDE REGULAR HOURS

Night work or work on Saturdays, Sundays or legal holidays requiring the presence of an engineer or inspector, will not be permissible except in case of emergency, and only upon the approval of the Local Public Agency. Should it be desired or required by the city to operate an organization for continuous night work or for emergency night work, the lighting, safety and other facilities which are deemed necessary by the Engineer and/or Design Engineer for performing such night work shall be provided by the Contractor. For night work, work on Saturdays, Sundays, or legal holidays, if any be performed, the Contractor will receive no extra payment, but compensation shall be considered as having been included in the prices stipulated for the appropriate items of work as listed in the bid. All night work must be approved in writing by the Local Public Agency.

468. FIRE PREVENTION AND PROTECTION

Federal laws (Occupational Safety and Health Act) and all State and municipal rules and regulations with respect to fire prevention, fire-resistant construction and fire protection shall be strictly adhered to and all work and facilities necessary therefore shall be provided and maintained by the Contractor in an approved manner.

All fire protection equipment such as water tanks, hoses, pumps, extinguishers, and other materials and

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apparatus shall be provided for the protection of the contract work, temporary work and adjacent property. Trained personnel experienced in the operation of all fire protection equipment and apparatus shall be available on the sites whenever work is in progress and at such other times as may be necessary for the safety of the public and the work.

469. PLANIMETER

For estimating quantities in which the computation of areas by analytic and geometric methods would be comparatively laborious, it is stipulated and agreed that the planimeter shall be considered an instrument of precision adapted to the measurement of such areas.

470. DAILY REPORTS

The Contractor shall submit, on an approved form, daily activity reports for the duration of the project. The reports shall indicate all personnel currently employed on the work including each trade and every subcontractor; all equipment and whether such equipment was idle for the particular day; a general description of all work accomplished; any authorized extra work (time and material reports shall be submitted on separate forms).

471. OTHER PROHIBITED INTERESTS

No official of the City who is authorized in such capacity and on behalf of the City to negotiate, make, accept or approve, or to take part in negotiating, making, accepting or approving any architectural, engineering, inspection, construction or material supply contract or any subcontract in connection with the construction of the project, shall become directly or indirectly interested personally in this Contract or in any part hereof. No officer, employee, architect, attorney, engineer or inspector of or for the City who is authorized in such capacity and on behalf of the City to exercise any legislative, executive, supervisory or other similar functions in connection with the construction of the project, shall become directly or indirectly interested personally in this contract or in any part thereof, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the project.

472. WATER

The Contractor shall provide and maintain at his own expense an adequate supply of water for his use for construction and domestic consumption, and to install and maintain necessary supply connections and piping for same, but only at such locations and in such manner as may be approved by the City. All water shall be carefully conserved. Before final acceptance, temporary connections and piping installed by the Contractor shall be removed in a manner satisfactory to the City.

473. ELECTRICITY

All electric current required by the Contractor shall be furnished at his own expense and all temporary connections for electricity shall be subject to approval of the Engineer. All temporary lines shall be furnished, installed, connected and maintained by the Contractor in a workmanlike manner satisfactory to the Engineer and shall be removed by the Contractor in like manner at his own expense prior to completion of the construction.

474. DRAWINGS

- A. The Contractor shall use the dimensions of the Drawings as shown. Measurements shall not be by scale. Full size details have preference over scale details, and large-scale details and photographs have preference over small.
- B. If discrepancies exist between Drawings and Specifications, or if necessary measurements and work specified or shown is obviously incorrect or impossible to execute, and/or if figures fail to check, the Contractor shall bring these facts to the attention of the Design Engineer. The decision of the Design Engineer as to the intention of the Contract Documents shall be final. No work shall start until all such problems have been resolved.

475. PERMITS

CONTRACTOR TO OBTAIN ALL REQUIRED PERMITS NOT ALREADY OBTAINED BY THE LOCAL PUBLIC AGENCY, THE ENGINEER, AND/OR THE DESIGN ENGINEER.

476. [RESERVED]

477. COORDINATION WITH OTHER CONTRACTS

The Contractor is hereby notified that multiple construction projects may be ongoing throughout the construction period. The contractor shall attend meetings as required by the Local Public Agency, at a location to be determined, to assure cooperation between all involved parties.

478. JOB SITE POSTERS

The contractor must comply with US Department of Labor requirements for job site posters per Exhibit A at the end of this Section.

## Exhibit A

The following list of Job Site Posters shows the required posters that should be displayed:

### Job Site Posters

Required US Department of Labor posters are available on the USDOL website at <http://www.dol.gov/osbp/sbrefa/poster/matrix.htm>. FHWA posters are available at <http://www.fhwa.dot.gov/programadmin/contracts/coreloc.cfm>. The revision dates shown in this listing were current as of 11/27/2007.

OFCCP 1420 Revised 2008	Equal Opportunity is the Law	Required by Executive Order 11246, as amended; Section 503 of the Rehabilitation Act of 1973, as amended; 38 U.S.C. 4212 of the Vietnam Era Veterans' Readjustment Assistance Act of 1974, as amended; 41 CFR Chapter 60-42; 41 CFR 60-250.4(k); 41 CFR 60-74 1.5(a); and FHWA-1273, §II(3)(d). Available at USDOL website in English, Spanish, and Chinese by telephone at 1 888 9 SBREFA, or by email at <a href="mailto:Contact.OSBP@dol.gov">Contact.OSBP@dol.gov</a> .
	Contractor's EEO policy statement	Required by 41 CFR 60-741.44 through FHWA-1273, §II(1)(b).
	Letter appointing contractor's EEO officer for project	Required by 41 CFR 60-741.44 through FHWA-1273, §II(1)(b).
FHWA-1022 Revised 9/1994	Notice - Federal Aid Projects	False statements notice Required by 18 CFR 1020 and 23 CFR 635.119 Available on FHWA website.
FHWA-1495 Revised 1981	Wage Rate Information	May be substituted for WH-1321 per FHWA-1273, §IV(1)(a). Available on FHWA website.
WH-1321 Revised 1/1986	Notice to Employees	Davis-Bacon wage rate poster Required by 29 CFR 5.5(a)(1) and FHWA-1273, §IV(1)(a) Enforcement by STA and/or USDOL. Available at USDOL website, by telephone at 1-888-9-SBREFA, or by email at <a href="mailto:Contact.OSBP@dol.gov">Contact.OSBP@dol.gov</a> .
	Actual wage rates	Required by both FHWA-1495 and WH-1321.
OSHA-3165 Revised 2006	Job Safety & Health Protection	Required by 29 USC 657(c), 29 CFR 1903.2 through FHWA-1273, §VIII(1). Enforcement through OSHA. Available at USDOL website in English and Spanish, by telephone at 1-888-9-SBREFA, or by email at <a href="mailto:Contact.OSBP@dol.gov">Contact.OSBP@dol.gov</a> .
	Emergency phone numbers	Required by 29 CFR 1926.50(f) through FHWA-1273, §VIII(1) except on areas with 911 for emergencies
WH-1088 Revised 6/2007	Your Rights - Federal Minimum Wage	Needed on projects where Davis-Bacon rates do not apply per 29 USC 211, 29 CFR 516.4 posting of notices. Enforcement by USDOL. Available at USDOL website in English and Spanish, by telephone at 1-888-9-SBREFA, or by email at <a href="mailto:Contact.OSBP@dol.gov">Contact.OSBP@dol.gov</a>
WH-1284 Revised 7/2007	Notice to Workers with Disabilities Paid at Special Minimum Wages	Required by 29 CFR 525.14 Enforcement by USDOL. Available at USDOL website in English and Spanish, by telephone at 1-888-9-SBREFA, or by email at <a href="mailto:Contact.OSBP@dol.gov">Contact.OSBP@dol.gov</a>
WH-1420 Revised 8/2001	Your Rights under the Family and Medical Leave Act of 1993	Required by 29 CFR 825.300 and 825.400 for employers of more than 50 people. Enforcement by USDOL. Available at USDOL website in English and Spanish, by telephone at 1-888-9-SBREFA, or by email at <a href="mailto:Contact.OSBP@dol.gov">Contact.OSBP@dol.gov</a>
WH-1462 Revised 6/2003	Notice; Employee Polygraph Protection Act	Required by 29 CFR 801.6. Enforcement by USDOL. Available at USDOL website in English and Spanish, by telephone at 1-888-9-SBREFA, or by email at <a href="mailto:Contact.OSBP@dol.gov">Contact.OSBP@dol.gov</a>
	Water quality related information (Example: NPDES Notice of Intent)	Project specific. Need to check with the agency administering the NPDES program in the project area for posting requirements. Enforcement by that agency.

## GENERAL CONTRACT PROVISIONS

“Owner” shall mean the Providence Redevelopment Agency, its assigns, heirs, successors-in-interest, agents, and/or representatives.

“Contractor” shall mean the entity titled as such on the Contract to which these provisions are appended.

### SECTION 1 - OWNERSHIP OF DOCUMENTS:

All documents created, modified, supplemented, reproduced, altered pursuant to this Contract, including but not limited to those documents mentioned or envisioned in herein are the sole property of the Owner, whether or not the work for which they are made be executed. Use of the plans and specifications included as part of this Contract shall be in accordance with the terms of this Contract, and for any use not in connection with this Contract, shall be only with the written authorization of the Owner.

### SECTION 2 - MINIMUM INSURANCE REQUIREMENTS

The CONTRACTOR shall, prior to commencing performance under the contract, attach and submit appropriate certificates of insurance, naming the Owner and the City of Providence as additional insureds, to include:

- (A) General Commercial Liability coverage with limits of \$1,000,000 per each occurrence and \$5,000,000 in the Aggregate (for the Project). Such coverage shall protect the CONTRACTOR and any of its Subcontractors from any and all claims which may arise out of the CONTRACTOR’s operations and completed operations under the Contract for which the CONTRACTOR, its Subcontractors or any persons employed by them shall be liable, including but not limited to any such claims for bodily injury, death, disability, sickness, and damage or destruction to equipment, to property, or to the Work.
- (B) Workers Compensation – Statutory coverage.
- (C) Automobile Liability – owned, non-owned, and hired automobile coverage with a combined single limit of \$1,000,000.
- (D) Umbrella – with limit of \$5,000,000 over General Liability and Automobile Liability.
- (E) Property Coverage – The Contractor shall purchase and maintain during the life of this contract “All Risk” insurance coverage for their own equipment and property, with provision for Waiver of Subrogation against the Owner.

The above-listed coverage must be provided on policies and on ACORD certificates from insurance companies that are financially rated A-VI or better by A.N. Best, by which the successful bidder will indemnify and hold harmless the Owner from and against all loss or damages arising from the performance under the Contract, including all claims for personal injury or damage to property sustained by third persons, or their agents, servants and/or those claimed under them, as specified above. The CONTRACTOR shall provide a waiver of subrogation in favor of the Owner on a primary noncontributory basis.

### SECTION 3 - MATERIALS AND EQUIPMENT:

The CONTRACTOR shall only prepare specifications that clearly establish the type and quality of materials/equipment, or application of each item in the Project, without writing a closed specification, and shall prepare them in a manner which encourages competitive bidding.

### SECTION 4 - OWNER'S REPRESENTATIVE:

For the purpose of the Contract, the Executive Director, Providence Redevelopment Agency, City of Providence, is hereby designated as the representative of the Owner with full authority to act in all matters pertaining to this Contract for and in the name of the Owner, and may delegate such authority to such other representatives of the City of Providence and/or Providence Redevelopment Agency as he/she deems in the best interest of the Owner for the proper administration of this Project.

### SECTION 5 - REGULATIONS

The CONTRACTOR shall conduct all work funded under this Contract in compliance with the following:

- (A) General and Special Conditions related to the work underlying this Contract;
- (B) 2 CFR Part 200 - Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards;
- (C) Applicable federal and state Standard Terms and Conditions for Construction Projects;
- (D) All local, state, and federal laws; and
- (E) Any subsequent federal, state and/or local policy memos, regulations, communications, and guidance.

### SECTION 6 - DRUG FREE WORKPLACE

The CONTRACTOR shall comply with the applicable provisions of the Drug-Free Work Place Act of 1988 (Public Law 100-690, Title V, Subtitle D; 41 USC § 701 et seq.) and maintain a drug-free work environment; and the final rule, government-wide requirements for drug-free work place (grants), issued by the Office of Management and Budget and the Department of Defense (32 CFR part 280, subpart F) to implement the provisions of the Drug-Free Work Place Act of 1988 is incorporated by reference and the Subrecipient shall comply with the relevant provisions thereof, including any amendments to the final rule that may hereafter be issued which are made apart of this Contract.

### SECTION 7 - CONTRACTOR AND COVERED ENTITIES

All services supported under this Contract must be in compliance with the following regulations:

- (A) Federal Labor Standards Provisions - All projects with more than \$2,000 in EDA funding for construction shall comply with EDA requirements pertaining to such contracts and the applicable requirements of the regulations of the Department of Labor under 29 CFR parts 3, 5, and 5a, governing the payment of wages and the ratio of apprentices and trainees to journeymen. The CONTRACTOR shall cause or require to be inserted in full, to the extent applicable, in all such contracts subject to such regulations, provisions meeting the requirements of 29 CFR 5.5.
- (B) The Copeland Anti-Kickback Act (40 USC, Chapter 3, Section 276c and 18 USC, Part 1, Chapter 41, Section 874; and 29 CFR part 3) requires that workers be paid weekly, that deductions from workers' pay be permissible, and that contractors maintain and submit weekly payrolls.
- (C) The Contract Work Hours and Safety Standards Act (40 USC, Chapter 5, Sections 326-332; and 29 CFR Part 4, 5, 6 and 8; 29 CFR parts 70 to 240) applies to contracts over \$100,000 and requires that workers receive overtime compensation (time and one-half pay) for hours they have worked in excess of 40 hours in one week. Violations under this Act carry a liquidated damages penalty (\$10 per day per violation).
- (D) Executive Order 11246 as amended by Executive Order 11375 – The CONTRACTOR hereby agree to place in every contract and subcontract for construction exceeding \$10,000 the Notice of Requirement for Affirmative Action to ensure Equal Employment Opportunity. The CONTRACTOR furthermore agrees to insert the appropriate Goals and Timetables issued by the Department of Labor in such contracts and subcontracts. The Executive Orders also require contractors with 51 or more employees and contracts of \$50,000 or more to implement affirmative action plans to increase the participation of minorities and women in the workplace if a workforce analysis demonstrates their under-representation, meaning that there are fewer minorities and women than would be expected given the numbers of minorities and women qualified to hold the positions available.
- (E) Debarred and Suspended Contractors – The CONTRACTOR shall not enter into any agreement, written or oral, with any contractor, subcontractor, consultant, or sub-consultant without the prior determination by the Owner of said entity's eligibility pursuant to 2 CFR 180 and Executive Orders 12549 and 12689. An entity is not eligible to receive funds if the entity is listed on the Federal Consolidated List of Debarred, Suspended, and Ineligible Contractors.
- (F) Byrd Anti-Lobbying Amendment – The CONTRACTOR shall file a required certification stating that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal

contract, grant or any other award covered by 31 U.S.C. 1352. In addition, the CONTRACTOR will ensure that all contracts executed as a result of this Contract include provisions that each tier in contracting must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the Owner.

#### SECTION 8 - RIGHT TO MONITOR

Owner shall have the right to monitor CONTRACTOR's compliance with all applicable requirements by whatever means the Owner deems appropriate. This right shall continue throughout and until Owner's grant closeout with EDA.

#### SECTION 9 - RIGHT TO INSPECT

Owner, its agents and designees, shall have the right, from time to time, to inspect the Project site for purposes of ensuring compliance with the terms and conditions of this Contract and EDA's Rules and Regulations.

#### SECTION 10 - RECORD RETENTION AND ACCESS TO RECORDS

The CONTRACTOR agrees that the Owner, its agents, funders, representatives, and the Comptroller General of the United States or any of their authorized representatives, has the right to access the Project and any books, documents, papers or other records of the CONTRACTOR or the Project, which are pertinent to this Contract in order to make audits, examinations, excerpts or transcripts. The CONTRACTOR will maintain all books and records pertaining to this Contract throughout and until Owner's closeout of any funding reporting or for a three (3) year period following the final payment under this Contract, whichever period is longer in duration.

#### SECTION 11 - LIMITATION OF LIABILITY

The CONTRACTOR acknowledges that the Owner shall not be liable to the CONTRACTOR for the completion of, or the failure to complete, any activities, which are a part of CONTRACTOR's services under the Project contemplated by this Contract. The CONTRACTOR acknowledges that should the Owner find a material default or noncompliance with this Contract, as determined by Owner in its sole discretion and, as a result thereof, cease disbursement of funds, the Owner shall incur no liability to the CONTRACTOR.

#### SECTION 12 - NO DELEGATION OF DUTIES

The CONTRACTOR shall remain fully obligated under the provisions of this Contract notwithstanding its designation of any third party or parties for the undertaking of all or any part of the Project. Any party or parties so designated shall also be obligated to perform such duties under the same restrictions and requirements as if the CONTRACTOR were performing them.

#### SECTION 13 - NO THIRD PARTY BENEFICIARIES:

Nothing contained herein shall create any relationship, contractual or otherwise, with, or any rights in favor of, any third party.

#### SECTION 14 - SUCCESSORS AND ASSIGNS:

Neither the Owner nor the CONTRACTOR shall assign its rights hereunder. Subject to the provision of the immediately preceding sentence, each party hereto binds itself, its successors, assigns and legal representatives to the other and to the successors, assigns and legal representatives of such other party.

#### SECTION 15 - MINORITY/WOMEN'S BUSINESS ENTERPRISES

The CONTRACTOR agrees to develop and implement an outreach program for minority and women business enterprises. Furthermore, the CONTRACTOR will maintain the records of such outreach program, including the data indicating the racial/ethnic or gender character of each business entity receiving a contract or subcontract under this Project, as well as additional details regarding the amount of the contract, subcontract, and documentation of CONTRACTOR's steps to assure that minority business and women's business enterprises have an equal opportunity to compete for contracts and subcontracts as sources of supplies, equipment, construction and services. The goal of the MBE/WBE participation for this Project is ten percent (10%).

#### SECTION 16 - AUDIT STANDARDS

To the extent applicable, the CONTRACTOR agrees to comply with the audit standards outlined in Subpart F of 2 CFR Part 200-Audit Requirements, and to prepare an audit within two hundred seventy (270) days after the close of any fiscal year in which the CONTRACTOR expends federal awards of at least \$750,000 (or such other amount as specified by the Director of the Office of Management and Budget). Audits must comply with the provisions of OMB Uniform Guidance 2 CFR Part 200, must be conducted by an independent certified public accountant ("CPA"), and must include a management letter and any responses thereto and CPA-prepared financial statements. Such financial statements must include a balance sheet, operating statements, source and use of funds statement, Schedule of Expenditures of Federal Awards and sufficient supporting schedules and notes as may be necessary for the Owner to determine the financial status of CONTRACTOR's activities. If such audit contains material findings, the CONTRACTOR must provide a copy of the audit, together with any comments and plans for correction, to the Owner. If such audit contains no material findings, the CONTRACTOR is not required to submit a copy to the Owner unless otherwise required by the terms of this Contract; provided, however, that upon request the CONTRACTOR must provide a copy of any and all audits performed during the term of this Contract to the Owner, or any designee thereof. The Owner reserves the right, in its sole discretion, to require an audit of any CONTRACTOR that expends federal funds during its fiscal year, regardless of amount. The CONTRACTOR acknowledges that, in the event the Owner requires an audit, Owner funds may not be used to offset the costs associated with the audit. The CONTRACTOR assumes full responsibility for compliance with this paragraph.

## SECTION 17 - FINANCIAL MANAGEMENT SYSTEM

The CONTRACTOR will establish and maintain a financial management system pursuant to 2 CFR Part 200, Subpart D, that will provide for a) accurate, current and complete disclosure of the financial results of the functions and services performed under this Contract; and b) record and identify the source and application of funds for the activities, functions and services performed pursuant to this Contract. These records will contain information pertaining to federal and state funds received, and assets, liabilities, expenditures, and income; c) effective control over and accountability for all funds, property, and other assets. The CONTRACTOR will safeguard all such assets and will assure that they are used solely for authorized purposes as provided in this Contract; and d) accounting records that are supported by source documentation.

## SECTION 18 - INDEMNIFICATION

The CONTRACTOR shall hold harmless and indemnify the Owner from and against any and all claims, costs and/or damages (including reasonable attorneys' fees and costs) arising from (i) any injury or damage to persons or property that may occur as a result of work performed in connection with its services under this Project, (ii) any third party, including without limitation, development professionals and contractors who may be engaged by the CONTRACTOR; and (iii) any third party claiming that a third party beneficiary relationship has been established between the Owner and such third party, it being the intention of the parties hereto that no such relationships be created or established.

## SECTION 19 - CONTRACTOR'S REPRESENTATIONS

CONTRACTOR represents to the Owner as follows:

- (A) It has no knowledge of any notices or violations of federal or state statutes or regulations or municipal ordinances or orders, or requirements of any governmental body or authority to whose jurisdiction any of the real estate making up the Project is subject;
- (B) Its execution, delivery and carrying out of the terms and conditions of this Contract have been duly authorized and will not conflict with or result in a breach of its Articles of Incorporation or by-laws, or any vote of members or directors or of the terms or provisions of any existing law, regulation or order of any court or government body or authority or agreement to which it is a party or by which it is bound;
- (C) There has been no material adverse change in its financial condition since the submitting of its bid proposal;
- (D) The representations, warranties and statements of fact of the CONTRACTOR as set forth in its bid proposal and this Contract are true, accurate and complete in all material respects as of the date hereof;

- (E) It has not failed to provide the Owner with any material information necessary to make the representations, warranties, and statements contained herein; and are not misleading, in light of the circumstances under which they were made;
- (F) The CONTRACTOR has duly authorized the officer executing this Contract to execute, in its name and on its behalf, this Contract and all such other documents and instruments as the Owner may request in connection therewith; and
- (G) The CONTRACTOR has no knowledge of any existing, threatened or pending actions by any person or governmental authority against it which would have a material adverse effect on its ability to acquire and complete any necessary construction or renovations to the proposed activity.

#### SECTION 20 - EVENTS OF DEFAULT AND PURSUIT OF REMEDIES

The occurrence of any one or more of the following events shall constitute an Event of Default hereunder:

- (A) Any breach or non-compliance by the CONTRACTOR with the conditions, provisions, obligations, duties, agreements, covenants, representations and warranties made and set forth in this Contract and any/all accompanying documents, any documents incorporated by reference in Section 5 above, as the same may be amended from time to time, as determined by the Owner in its sole discretion; or
- (B) Any representation or warranty made herein or in any/all CONTRACTOR submissions or documents related hereto, accompanying closing documents, addenda, exhibits, amendment, binder, and/or other instruments executed in connection with this Contract is proven to be false or misleading in any respect, whether through commission or omission.

Upon the occurrence of an Event of Default, the Owner may, at its option, send the CONTRACTOR a Notice of Default stating that CONTRACTOR has thirty (30) days to cure said default. In the event CONTRACTOR fails to cure said default within thirty days, the Owner may, upon ten (10) business days' notice, terminate or suspend this Contract, without presentment, demand, protest or notice of any kind, all of which are hereby expressly waived by CONTRACTOR.

The CONTRACTOR agrees to pay all costs and expenses, including reasonable attorneys' fees, incurred by the Owner in collection of the moneys due hereunder or in the exercise or defense of its rights and powers under this Contract. In addition, the Owner may pursue any other remedies, legal or equitable, available to it in the event of CONTRACTOR's default, fraud or misrepresentation, whether through commission or omission.

#### SECTION 21 - TERMINATION

This Contract Agreement shall remain in effect until the Owner's grant closeout or the CONTRACTOR's final payment is received, whichever is longer in duration.

In accordance with 2 CFR 200, the Owner may suspend or terminate this Contract if the CONTRACTOR materially fails to comply with any terms of this Contract Agreement, which include (but are not limited to) the following:

- (A) Failure to comply with the terms and conditions herein, or the terms and conditions found in the documents incorporated by reference in Section 5 above;
- (B) Failure, for any reason, of the CONTRACTOR to fulfill in a timely and proper manner its obligations under this Contract;
- (C) Ineffective or improper use of funds provided under this Contract; or
- (D) Submission by the CONTRACTOR to the Owner of reports that are incorrect or incomplete in any material respect.

In accordance with 2 CFR 200, this Contract may also be terminated for convenience by either the Owner or the CONTRACTOR, in whole or in part, by setting forth the reasons for such termination, the effective date, and, in the case of partial termination, the portion to be terminated.

#### SECTION 22 - DISPUTE RESOLUTION

In the event of any dispute or disagreement between the parties with respect to this Contract, the parties shall make a good faith effort to resolve the dispute within thirty (30) days of written notice by either party requesting a meeting to resolve the dispute. If the parties are unable to resolve the dispute within thirty (30) days, unless otherwise agreed to by the parties, the parties agree to engage in mediation of the dispute in Providence, Rhode Island by an independent and neutral person qualified to act as a mediator.

If the parties are unable to reach a mutually acceptable resolution to the dispute within thirty (30) days following an initial mediation conference, or within sixty (60) days following the written request for mediation, the parties agree that the matter may, upon written agreement, be submitted to arbitration in Providence by three (3) impartial arbitrators, who shall be experienced in mediation and arbitration and knowledgeable regarding any and all matters related to this agreement, one to be chosen by each party and the third by the two so chosen.

If not submitted to arbitration upon written agreement, each party submits to the jurisdiction of the courts situated in Providence County, State of Rhode Island.

#### SECTION 23 - NO WAIVER

No delay or omission by the Owner to exercise any of its rights hereunder shall constitute an assent or waiver by it to or of CONTRACTOR's breach of or noncompliance with the terms of this Contract, whether the Owner has knowledge of such breach or noncompliance, and no other

assent or waiver, express or implied, by the Owner to or of any such breach or noncompliance shall be deemed as assent or waiver of any other or succeeding breach or noncompliance.

SECTION 24 - BENEFIT

This Contract shall inure to the benefit of and shall be binding upon the parties hereto and their respective successors and assigns; provided, however, that no assignment by CONTRACTOR of its rights under this Contract shall be of any effect unless the prior written consent of the Owner and in accordance with the terms herein.

SECTION 25 - SEVERABILITY

If any provision of this Contract shall be deemed unenforceable or invalid, such provision shall not affect, impair or invalidate any other provision of this Contract. Any provision of this Contract held invalid or unenforceable only in part or degree will remain in full force and effect to the extent not held invalid or unenforceable.

SECTION 26 - GOVERNING LAW

This Contract is being executed and delivered in the State of Rhode Island and shall in all respects be governed, construed, applied and enforced in accordance with the laws of the State of Rhode Island, the City of Providence Home Rule Charter, the Providence Code of Ordinances, and the Providence Redevelopment Agency By-laws, as amended.

SECTION 27 - SECTION HEADINGS AND SUBHEADINGS

The section headings and subheadings contained in this Contract are included for convenience only and shall not limit or otherwise affect the terms of this Contract.

SECTION 28 - NOTICES

All notices to be given pursuant to this Contract shall be in writing and shall be deemed given when mailed by certified, registered mail, return receipt requested, or a commercially-acceptable overnight service, to the parties hereto at the addresses set forth below, or to such other place as a party may from time to time designate in writing:

To the Owner:

Providence Redevelopment Agency  
City of Providence  
444 Westminster Street, Suite 3A  
Providence RI 02903

To the CONTRACTOR:

XXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXX  
XXXXXXXXXXXXXXXXXXXX

SECTION 29 - ENTIRE AGREEMENT

This Contract and all attachments, addendums, and/or exhibits attached hereto shall represent the entire agreement between the Owner and the CONTRACTOR and may not be amended or modified except in writing signed by each party hereto and in accordance with this section.

Amendments shall make specific reference to this Contract, will be executed in writing, and signed by duly authorized representatives of each party. Such amendments shall not invalidate this Contract, nor relieve or release the Owner or the CONTRACTOR from its obligations under this Contract.

The Owner may, in its discretion, amend this Contract to conform with federal, state, or local governmental guidelines, policies, and available funding amounts, or for other reasons. If such amendments result in a change in the funding, services, or Project schedule of the activities to be undertaken as part of this Contract, such modifications will be incorporated only by written amendment signed by both the Owner and the CONTRACTOR.