Procurement #: 44682>

CITY OF PROVIDENCE, RHODE ISLAND

Department: Providence Water Supply Board

RFP Title: CMAR SERVICES FOR SERVICE WATER SYSTEM UPGRADES (EXPIRES 06/30/2026)

Opening Date: 05/20/2024

Addendum #: 2

Issue Date: 04/23/2024

Addendum No 2. provides Appendices A, B, C, and D referenced in the RFP in order in a single document. Please note these documents have been available on the OneDrive link on page 4 of the RFP. The drawings and technical specifications included in this Addendum No. 2 shall supersede those in Addendum No. 1.

Providence City Hall
25 Dorrance Street
Providence, RI 02903

PROVIDENCE WATER

ADDENDUM NO. 2

TO:	ALL CONTRACT DOCUMENT HOLDERS OF RECORD ALL PROSPECTIVE BIDDERS
FROM:	PROVIDENCE WATER 125 DUPONT DRIVE PROVIDENCE, RHODE ISLAND 02907 PHONE: (401) 521-6300
DATE ISSUED:	TUESDAY, APRIL 23, 2024
RE:	CMAR SERVICES FOR SERVICE WATER SYSTEM UPGRADES (EXPIRES 06/30/2026)
BID OPENING DATE:	MONDAY, MAY 20, 2024 AT 2:15 PM
BID OPENING LOCATION:	BOARD OF CONTRACT AND SUPPLY MEETING CITY COUNCIL CHAMBERS PROVIDENCE CITY HALL 25 DORRANCE STREET PROVIDENCE, RHODE ISLAND 02903
LAST WRITTEN QUESTIONS DUE:	FRIDAY, MAY 3, 2024

Addendum No 2. provides Appendices A, B, C, and D referenced in the RFP in order in a single document. Please note these documents have been available on the OneDrive link on page 4 of the RFP. The drawings and technical specifications included in this Addendum No. 2 shall supersede those in Addendum No. 1.

A summary of the non-mandatory pre-proposal meeting has also been included as Attachment 1 of this Addendum No. 2.

Acknowledge receipt of this Addendum by inserting its number and date on page 00 41 00 – 1 of the Bid Form. Failure to do so may subject the Bidder to disqualification.

The Contract Documents are hereby modified, amended, and supplemented as follows:

APPENDIX A

1. Service Water Tank Upgrades Drawings: Sheet C2.0 included in Addendum No. 1 has been removed from the drawing set. This work will not be included in the CMAR's scope of work.

2. Service Water Tank Project Manual and Specifications: Division 1 specifications have been added. These specifications were not included in Addendum No. 1.

3. Chemical Injection Flow Meter locations have been included in Appendix A.

APPENDIX B

1. Appendix B: Documents AIA A201, "General Conditions of the Contract for Construction" and AIA A133, "Standard Form of Agreement Between Owner and Construction Manager as Constructor" have been included.

APPENDIX C

1. Insurance Requirements: Insurance requirements have been included.

APPENDIX D

1. Bid Forms: Bid Forms have been included in Appendix D.

-END OF ADDENDUM NO. 2

ATTACHMENT 1

PROVIDENCE WATER

Meeting Report

Project:	CMAR Services for Service Water System Upgrades	**Project No.:**	3-0848-20223

Meeting Date: April 15, 2024 at 10:00 PM

Subject: Non-Mandatory Pre-Proposal Conference

Meeting Location: P.J. Holton Water Purification Plant, 61 North Road, Hope, RI 02831

Attendees:

Providence Water: Peter DiLorenzo, Ben Stoops

Pare Corporation: Andrew Hook

Dimeo Construction: Jeff Morris, Jarod Wasserman

1. **Summary of Project and Work:**

   a. Tank Upgrades: Tank will be taken out of service for upgrades. New interior/exterior coatings, sacrificial anodes, lightning protection, overflow pipe, guardrail modifications, tank vent, and tank ladder.

   b. Service Water and Chemical Injection Flow Metering: Installation of new ultrasonic flow meters on the service water mains, fluoride feed lines, orthophosphate feed lines, and lime slaker feeds. A magnetic flow meter and backflow preventor will be installed on the chlorine chemical feed line.

2. **CMAR Responsibilities:**

   a. Pre-Construction Phase Services: develop construction budget and GPM, schedule, attend design /coordination meetings, value engineering, constructability recommendations, develop project strategy.

   b. Construction Phase Services: develop bid packages, process shop drawings, project oversight, scheduling, attend progress meetings, contractor quality control, process change orders, administer safety

program, process applications for payment.

c. Close-Out Phase Servies: Develop close-out program, compile close-out documents, punch list

3. Preliminary Project Schedule:

a. Pre-Bid Meeting 04/15/2024
b. Questions Due 05/03/2024
c. CMAR Proposals due 05/20/2024
d. CMAR Award 07/01/2024
e. Notice to Proceed 07/15/2024
f. Preconstruction services 07/29/2024
g. Tank Coating Work Anticipated 09/01/2024

4. General:

a. There is lead based paint underlying the current tank coating. As a result, the soil surrounding the tank has been contaminated with lead and subsequently remediated. Soil samples surrounding the tank will be taken before/after tank construction to determine if construction activities have impacted the surrounding soil. Contractor shall be responsible for any site required site remediation post construction.

5. Allowances:

a. SCADA Integration – $200,000
b. Security – $50,000
c. Landscaping – $50,000
d. Unknown Conditions – $100,000

6. Questions/Discussion:

a. The opening to the tank vault is a 24” cast iron manhole cover. The proposed bilco hatch is 30”X30”. The tank vault opening should be modified to match the opening for the proposed Bilco hatch.

b. Question: Is a new coating on the interior of the tank riser pipe required?

Answer: Yes, a new coating or lining is required. This will be addressed in an addendum.

APPENDIX A – DESIGN DEVELOPMENT DRAWINGS AND TECHNICAL SPECIFICATIONS

(Also available on Engineer's OneDrive Website)

Providence Water Supply Board
Philip J. Holton Water Purification Plant Upgrades
Service Water Tank Upgrades

61 North Road
Scituate, Rhode Island

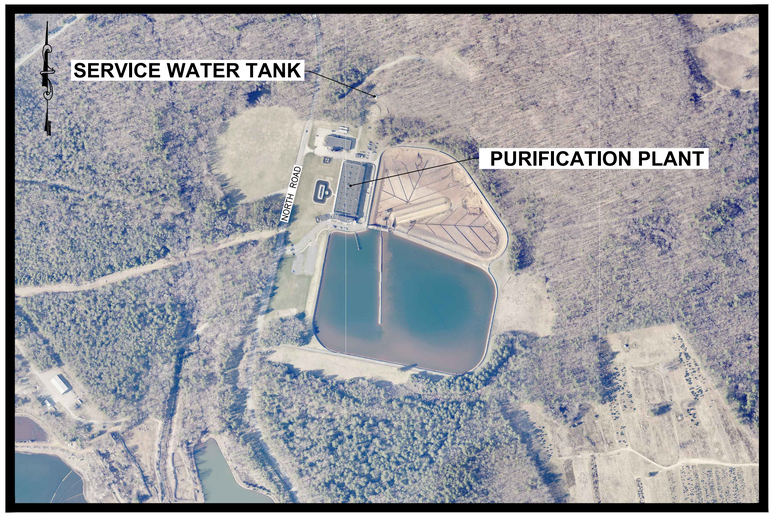
Owner

PROVIDENCE WATER

PROVIDENCE WATER SUPPLY BOARD
125 DUPONT DRIVE
PROVIDENCE, RI 02907

Civil Engineer

PARE
PARE CORPORATION
ENGINEERS - SCIENTISTS - PLANNERS
8 BLACKSTONE VALLEY PLACE, LINCOLN, RI 02865, 401-334-4100
10 LINCOLN ROAD, SUITE 210, FOXBORO, MA 02035, 508-543-1755
14 BOBALA ROAD, SUITE 2B, HOLYOKE, MA 01040, 413.507.3448



SCALE: N.T.S.

INDEX OF DRAWINGS

SHEET No.	DRAWING No.	DESCRIPTION
1	-	COVER SHEET
2	C0.1	GENERAL NOTES & LEGEND
3	C1.0	SERVICE WATER TANK SITE PLAN & PROFILE
4	C2.0	DETAILS 1
5	C2.1	DETAILS 2
6	C2.2	DETAILS 3

FEBRUARY 2024
DEPARTMENT OF HEALTH
PERMITTING SUBMISSION

Pare Project No. 14256.41
Providence Water Project No. 3-0848-20223

SITE INFORMATION:

1. PROJECT IS LOCATED ON A.P. 09-1 LOT 007-00 ALONG ROUTE 116, IN THE TOWN OF SCITUATE, RHODE ISLAND. THE SITE IS LOCATED AT PROVIDENCE WATER'S P.J. HOLTON WATER PURIFICATION PLANT.

2. SITE OWNER: PROVIDENCE WATER SUPPLY BOARD, 125 DUPONT DRIVE, PROVIDENCE, RI 02907.

GENERAL NOTES:

1. THE WORK SHOWN ON THESE DRAWINGS IS FOR UPGRADES TO THE 40,000 GALLON ELEVATED STEEL WATER STORAGE TANK AT PROVIDENCE WATER'S P.J. HOLTON WATER PURIFICATION WORKS IN SCITUATE, RHODE ISLAND. TANK UPGRADES CONSIST OF NEW INTERIOR AND EXTERIOR COATINGS, INTERIOR SACRIFICIAL ANODES, LADDER AND GUARDRAIL MODIFICATIONS, OVERFLOW DOWNSPOUT, LIGHTNING PROTECTION, AND OTHER WATER STORAGE TANK APPURTENANCES. SERVICE WATER SYSTEM UPGRADES CONSIST OF NEW VFDS ON SERVICE WATER PUMPS AND THE ADDITION OF A HYDROPNEUMATIC TANK.

2. ELEVATIONS SHOWN IN THESE PLANS ARE IN U.S. SURVEY FEET AND ARE REFERENCED TO THE PROVIDENCE RI MEAN HIGH WATER DATUM UNLESS OTHERWISE NOTED.

3. INFORMATION AS SHOWN ON THE DRAWINGS RELATING TO MATERIALS, SIZES, CONDITIONS, AND/OR LOCATIONS OF EXISTING STRUCTURES AND UTILITIES HAS BEEN COMPILED FROM THE BEST AVAILABLE INFORMATION AND IS NOT GURANTEED CORRECT OR COMPLETE. PRIOR TO BEGINNING WORK, CONTRACTOR SHALL VERIFY LOCATION OF ALL UTILITIES. IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO LOCATE ANY UTILITIES IN THE IMMEDIATE AREA OF THIS PROJECT (INCLUDING THOSE TO BE CONNECTED TO) THROUGH THE PERFORMANCE OF TEST PITS OR OTHER INVESTIGATION METHODS, TO ASSURE THAT THESE UTILITIES WILL NOT IMPACT THE WORK IN THIS PROJECT. ANY SUBSTANTIAL DISCREPANCY IN UTILITY LOCATIONS, SIZES, MATERIALS, ETC., IDENTIFIED ON THE DRAWINGS SHALL BE CALLED TO THE OWNER'S ATTENTION IMMEDIATELY. ANY DAMAGE TO UTILITIES CAUSED BY THE CONTRACTOR SHALL BE THE CONTRACTOR'S RESPONSIBILITY, AND COST FOR REPAIR OR REPLACEMENT OF SUCH DAMAGED UTILITIES SHALL BE BORNE BY THE CONTRACTOR.

4. CONTRACTOR SHALL VISIT THE SITE PRIOR TO BEGINNING WORK TO VERIFY FIELD CONDITIONS. NOTED DISCREPANCIES BETWEEN DRAWINGS AND ACTUAL FIELD CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY.

5. ALL EXISTING SIGNS, POLES, AND UTILITY STRUCTURES, BOTH ABOVE AND BELOW GROUND, SHALL BE EITHER BRACED AND PROTECTED OR TEMPORARILY REMOVED AND REPLACED TO FACILITATE CONSTRUCTION OF THIS PROJECT. CONTRACTOR SHALL COORDINATE ACTION WITH OWNER OF SIGNS, POLES, UTILITIES, AND STRUCTURES. THERE WILL BE NO SEPERATE PAYMENT FOR THIS WORK.

6. PRIOR TO THE START OF CONSTRUCTION, ALL NECESSARY EROSION AND SEDIMENTATION CONTROLS SHALL BE INSTALLED AND MAINTAINED TO MITIGATE EROSION AND SEDIMENTATION OF DOWNGRADIENT AREAS, WETLANDS, WATER COURSES, ETC. EROSION CONTROLS SHALL BE MAINTAINED AND REPLACED AS NECESSARY UNTIL DISTURBED SURFACES ARE STABILIZED AND/OR RETURNED TO THEIR ORIGINAL CONDITION.

7. CONTRACTOR SHALL PROVIDE ENGINEER WITH SUBMITTALS FOR REVIEW AND APPROVAL OF ALL MATERIALS AND EQUIPMENT PROPOSED TO BE USED FOR THE WATER STORAGE TANK UPGRADES. CONTRACTOR SHALL PROVIDE ENGINEER A MINIMUM OF 10 BUSINESS DAYS TO REVIEW AND PROCESS SUBMITTALS, UNLESS OTHERWISE AGREED UPON BETWEEN ENGINEER AND CONTRACTOR. WORK PERFORMED BY CONTRACTOR PRIOR TO APPROVAL OF ALL REQUIRED SUBMITTALS IS DONE AT CONTRACTOR'S OWN RISK.

8. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL NECESSARY MEANS AND METHODS TO CONSTRUCT ALL EXCAVATIONS FOR THIS PROJECT IN ACCORDANCE WITH APPLICABLE OSHA SAFETY REQUIREMENTS. CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL MATTERS RELATED TO SITE SAFETY AND FOR COMPLYING WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL RULES AND REGULATIONS. OPEN EXCAVATIONS SHALL BE PROTECTED AT ALL TIMES AND NO EXCAVATIONS OR OPEN BELOW GRADE STRUCTURES SHALL BE LEFT OPEN OVERNIGHT.

9. CONTRACTOR SHALL CONTACT "DIG SAFE" (TEL. #1-888-DIG-SAFE) A MINIMUM OF 72-HOURS PRIOR TO STARTING WORK. ALL OTHER UTILITY COMPANIES KNOWN TO HAVE UTILITIES IN THE AREA SHALL BE CONTACTED AT THIS TIME PRIOR TO CONSTRUCTION.

10. EXACT LOCATION OF NEW PIPES, VALVES FITTINGS, AND APPURTENANCES SHALL BE DETERMINED IN THE FIELD AND MUST BE APPROVED BY THE ENGINEER/OWNER.

11. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO OBTAIN ALL REQUIRED PERMITS, POST REQUIRED BONDS, AND SUPPLY THE NECESSARY NOTICES REGARDING CONSTRUCTION, UTILITIES, AND INCIDENTAL WORK WITH THE OWNER AND APPLICABLE UTILITY COMPANIES.

12. ALL COMPONENTS THAT COME IN CONTACT WITH POTABLE WATER SHALL BE NSF 14/60/61 CERTIFIED. THE CONTRACTOR SHALL PROVIDE APPLICABLE NSF 14/60/61 CERTIFICATION FORMS WITH THEIR SUBMITTALS FOR ALL EQUIPMENT.

SITE RESTORATION NOTES:

1. PROVIDENCE WATER HAS REMEDIATED LEAD CONTAMINATION IN SURFICIAL SOILS SURROUNDING THE TANK IN ACCORDANCE WITH RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT SITE REMEDIATION REGULATIONS. PRIOR TO MOBILIZATION BY THE CONTRACTOR AND UPON COMPLETION OF THE PROJECT, PROVIDENCE WATER WILL ANALYZE THE SURFICIAL SOILS SURROUNDING THE TANK FOR LEAD CONTAMINATION.THE REMEDIATION OF ANY NEWLY DISCOVERED LEAD IN SOIL SURROUNDING THE TANK WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.

2. ALL AREAS OF THE SITE THAT ARE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO A CONDITION EQUAL TO OR BETTER THAN WHAT EXISTED PRIOR TO CONSTRUCTION. THE LIMITS OF ALL DISTURBANCE SHALL BE KEPT TO A MINIMUM WITHIN THE PROPOSED AREA OF CONSTRUCTION. ALL AREAS DISTURBED OUTSIDE THE PROJECT LIMITS BY THE CONTRACTOR SHALL BE RESTORED TO THEIR ORIGINAL CONDITION AT NO EXTRA COST TO THE OWNER.

3. ALL DISTURBED LAWN AREAS SHALL BE RESTORED WITH A MINIMUM 6 INCHES OF LOAM AND SEED.

4. LOAM AND SEED SHALL BE FREE OF SUBSOIL, REFUSE, LITTER, STUMPS, ROOTS, BRUSH, NOXIOUS WEEDS, OR ANY OTHER DELETERIOUS MATERIALS. LARGEST PARTICLE SIZE SHALL BE $\frac{3}{4}$ INCH. LOAM SHALL CONFORM TO SECTION M.18.01 OF THE RIDOT STANDARDS (BLUE BOOK).

5. SEED SHALL CONFORM TO SECTION M.18,10,04 (RESIDENTIAL SEED MIX) OF THE RIDOT STATE STANDARDS (BLUE BOOK), UNLESS OTHERWISE SPECIFIED OR APPROVED BY ENGINEER.

EROSION & SEDIMENTATION CONTROL NOTES:

1. PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT, FOR ACCEPTANCE BY ENGINEER, A GENERAL WORK SCHEDULE AND PLAN WHICH INDICATES PLANNED IMPLEMENTATION OF TEMPORARY AND PERMANENT EROSION CONTROL MEASURES TO PROTECT THE CONSTRUCTION AREA AND ALL DOWNGRADIENT AREAS. THE PLAN SHALL INCLUDE PROCEDURES FOR WINTER WEATHER CONDITIONS AS WELL AS CONTROL OF HAUL ROADS, STOCKPILES, AND COMPLETED WORK AREAS.

2. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL EROSION CONTROLS AND STABILIZATION WITHIN THE PROJECT AREA, AND ASSOCIATED WORK ACTIVITY, FROM THE DATE CONTRACTOR STARTS WORK UNTIL END OF WARRANTY PERIOD FOLLOWING PROJECT COMPLETION. ANY COST FOR FINES IMPOSED BY REGULATING AUTHORITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OF ANY AND ALL EROSION AND SEDIMENTATION DAMAGE TO THE PROJECT AREA AND ADJOINING AREAS THROUGH COMPLETION OF CONSTRUCTION.

3. EROSION AND SEDIMENTATION CONTROLS SHOWN ON THE SITE PLAN AND ALL ADDITIONAL NECESSARY CONTROLS SHALL BE INSTALLED PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL PROVIDE ADDITIONAL CONTROLS AS REQUIRED TO PREVENT EROSION BASED ON PROJECT CONDITIONS AND METHODS OF CONSTRUCTION.

4. THE CONTRACTOR SHALL INSTALL AND MAINTAIN COMPOST FILTER SOCKS IN EFFECTIVE CONDITION THROUGHOUT THE DURATION OF THE PROJECT AND UNTIL DISTURBED AREAS HAVE BEEN STABILIZED TO PREVENT DISCHARGE AND MIGRATION OF SEDIMENT FROM THE WORK AREA. FOLLOWING SUCCESSFUL STABILIZATION OF DISTURBED AREAS, ALL COMPOST FILTER SOCKS SHALL BE REMOVED. PRIOR TO REMOVAL OF THE COMPOST FILTER SOCKS, ALL ACCUMULATED TRAPPED SEDIMENT MUST BE REMOVED TO A DESIGNATED UPLAND SITE.

5. DURING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING DRAINAGE AND RUNOFF FLOW DURING STORMS AND PERIODS OF RAINFALL THROUGHOUT THE WORK AREA.

6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SWEEPING ALL STREETS IMPACTED BY EXCAVATION WORK AND TRACKED AND DISPERSED SEDIMENT ON A DAILY BASIS. CONTRACTOR SHALL INSTALL AND MAINTAIN STABILIZED CONSTRUCTION ENTRANCE TRACK MATS TO REDUCE TRACKING OF SEDIMENT.

RECOMMENDED CONSTRUCTION SEQUENCING:

THE FOLLOWING SEQUENCE OF WORK OF CONSTRUCTION ACTIVITIES IS PROVIDED FOR CONTRACTOR'S USE AND AS A GUIDE IN PREPARING THE SCHEDULE FOR SEQUENCING OF WORK. CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTING A FORMAL CONSTRUCTION SEQUENCE AND SCHEDULE FOR WORK TO THE ENGINEER FOR APPROVAL A MINIMUM OF 10 DAYS PRIOR TO THE COMMENCEMENT OF ANY WORK AND UPDATED SCHEDULES SUBMITTED WEEKLY THROUGHOUT THE DURATION OF THE PROJECT. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE ESTABLISHED SCHEDULE AND THE CONTRACTOR, AND THEIR SUBCONTRACTORS SHALL BE RESPONSIBLE FOR COOPERATING FULLY WITH THE ENGINEER AND THE OWNER IN EFFECTIVELY UTILIZING THE SCHEDULE. THE CONSTRUCTION PHASING SCHEDULE SHALL INCLUDE LINE ITEMS FOR COORDINATION WITH APPLICABLE PUBLIC AGENCIES AND PUBLIC/PRIVATE UTILITIES, WHEN NECESSARY.

1. ISOLATE TANK, INSTALL 8" GATE VALVE ON SERVICE WATER MAIN, INSTALL WATER MAIN FOR HYDRANT. CONTRACTOR SHALL INITIALLY ISOLATE SERVICE WATER TANK FROM PLANT WATER SYSTEM VIA 8" GATE VALVE LOCATED NORTH OF PURIFICATION PLANT BUILDING AND DRAIN TANK VIA HYDRANT LOCATED EAST OF FORESTRY BUILDING.

2. PERFORM PRELIMINARY LEAKAGE TEST ON THE TANK IN ACCORDANCE WITH SPECIFICATION SECTION 02510. TANK SHALL BE FILLED VIA A TEMPORARY 2 INCH TAP INSTALLED DOWNSTREAM OF THE NEW 8" GATE VALVE CONNECTED TO THE NEW HYDRANT WITH A BACKFLOW PREVENTER. TANK SHALL BE DRAINED VIA NEW HYDRANT.

3. DEMOLISH EXISTING TANK VENT, LADDER, AND OVERFLOW PIPE. INSTALL NEW TANK VENT, AND OVERFLOW PIPE.

4. INSTALL CONTAINMENT AROUND TANK, BLAST CLEAN, AND PREPARE TANK SURFACES FOR COATING.

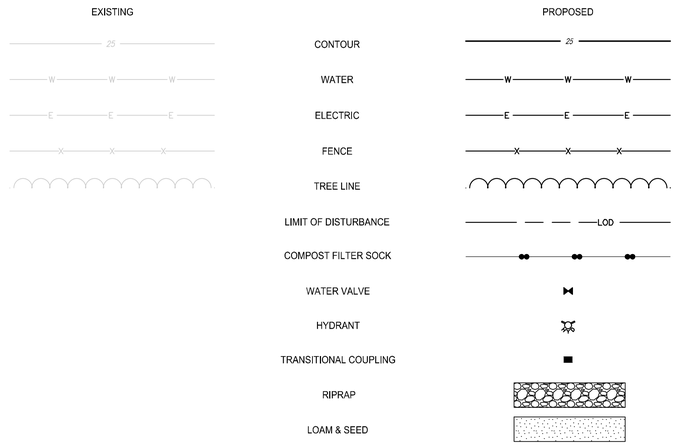
5. INSTALL INTERIOR AND EXTERIOR COATING SYSTEMS IN ACCORDANCE WITH SPECIFICATION SECTION 09970.

6. PERFORM LEAKAGE AND DISINFECTION TESTS. PROVIDENCE WATER PERSONNEL TO COLLECT SAMPLES FOR BACTERIOLOGICAL TESTING AND VOLATILE ORGANIC COMPOUND (VOC) ANALYSIS IN ACCORDANCE WITH PROJECT SPECIFICATIONS. A TEMPORARY 2 INCH TAP, BACKFLOW PREVENTER, AND NEW HYDRANT SHALL BE USED TO FILL AND DRAIN TANK.

7. INSTALL LIGHTNING PROTECTION SYSTEM, HANGERS FOR OVERFLOW PIPE, SPLASH PAD, NEW TANK LADDER.

8. INSTALL RIP RAP SWALE.

LEGEND



PARE

PROVIDENCE WATER

SCALE ADJUSTMENT GUIDE
0" 1"
BAR IS ONE INCH ON ORIGINAL DRAWING

PROVIDENCE WATER SUPPLY BOARD
P.J. HOLTON WATER PURIFICATION PLANT UPGRADES
SERVICE WATER TANK UPGRADES
61 North Road
Scituate, Rhode Island

REVISIONS:

PROJECT NO.:	14256.41
DATE:	FEBRUARY 2024
SCALE:	-
DESIGNED BY:	AJH
CHECKED BY:	SPD
DRAWN BY:	AJH
APPROVED BY:	SPD

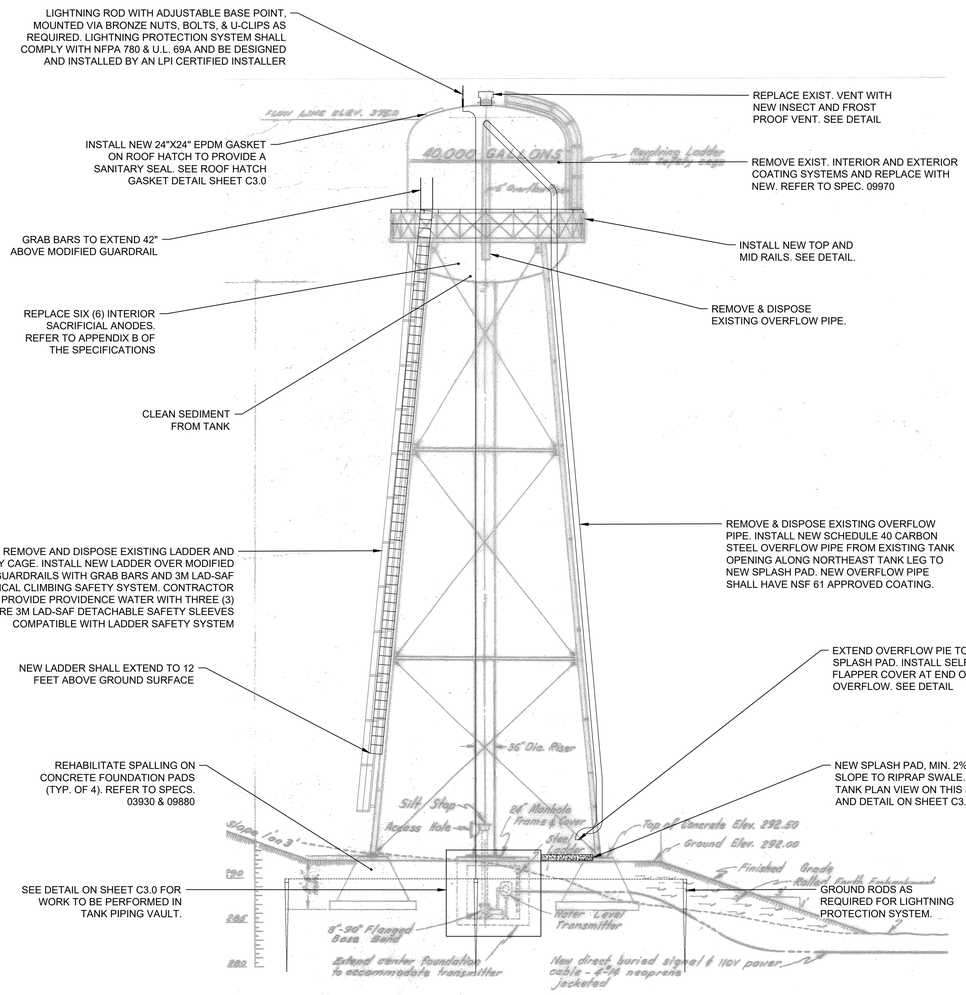
DRAWING TITLE:

GENERAL NOTES & LEGEND

DRAWING NO.:

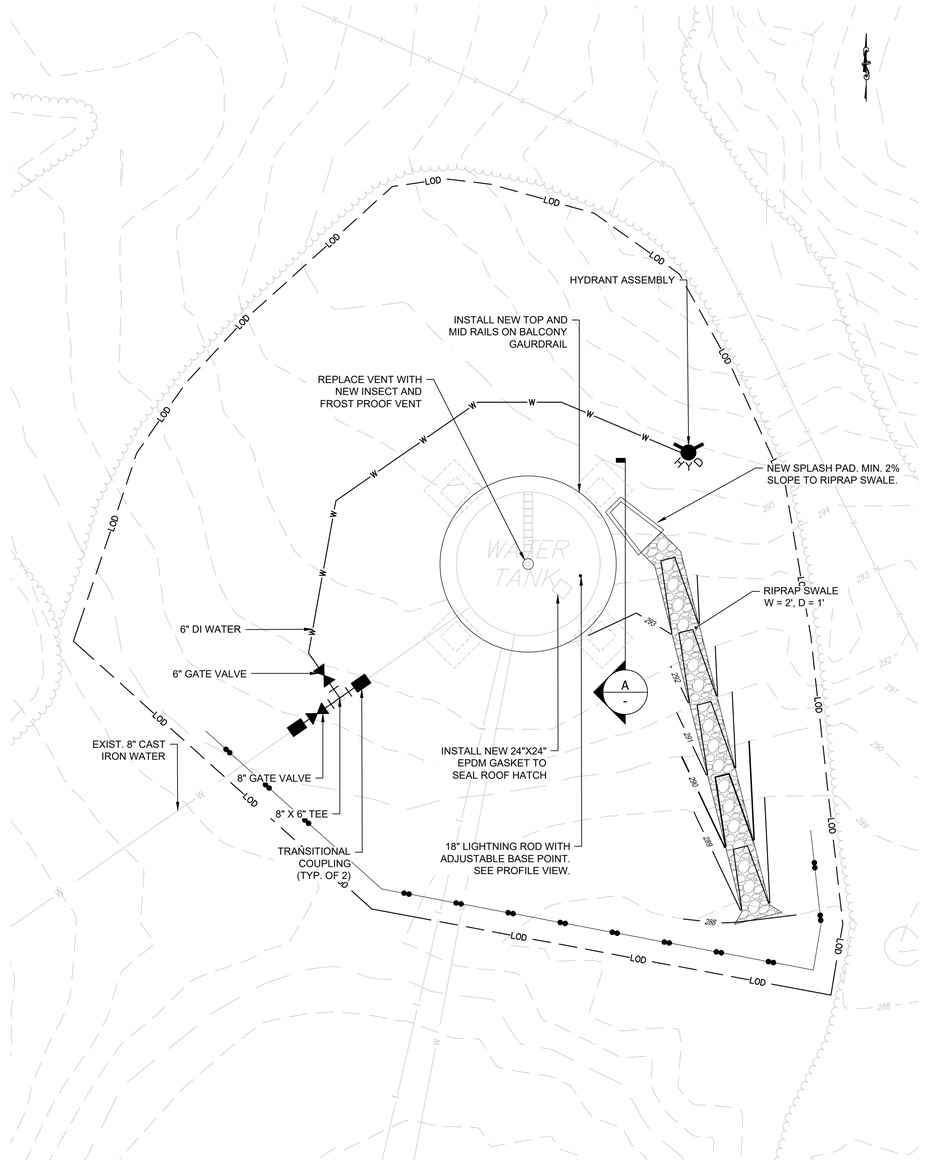
C0.1

SHEET NO. 2 OF 6



SECTION A - SERVICE WATER TANK ELEVATION

SCALE: 1/8" = 1'



PLAN

SCALE: 1" = 10'

NOTE:

1. EXISTING CONDITIONS FOR SERVICE WATER TANK UPGRADES REFERENCE DRAWING "I20 GENERAL PLAN OF REVISED WATER SERVICE SYSTEM" PREPARED BY PHILIP J. HOLTON JR. AS PART OF "ADDITIONS ALTERATIONS & IMPROVEMENTS IN ACCORDANCE WITH MASTER PLAN" DATED 19 FEBRUARY 1960.
2. ELEVATIONS ON THE PLAN VIEW ON THIS SHEET ARE REFERENCED TO THE NAVD88 DATUM.

PARE

PROVIDENCE WATER

SCALE ADJUSTMENT GUIDE
0" 1"
BAR IS ONE INCH ON ORIGINAL DRAWING

PROVIDENCE WATER SUPPLY BOARD
P.J. HOLTON WATER PURIFICATION PLANT UPGRADES
SERVICE WATER TANK UPGRADES
61 North Road
Scituate, Rhode Island

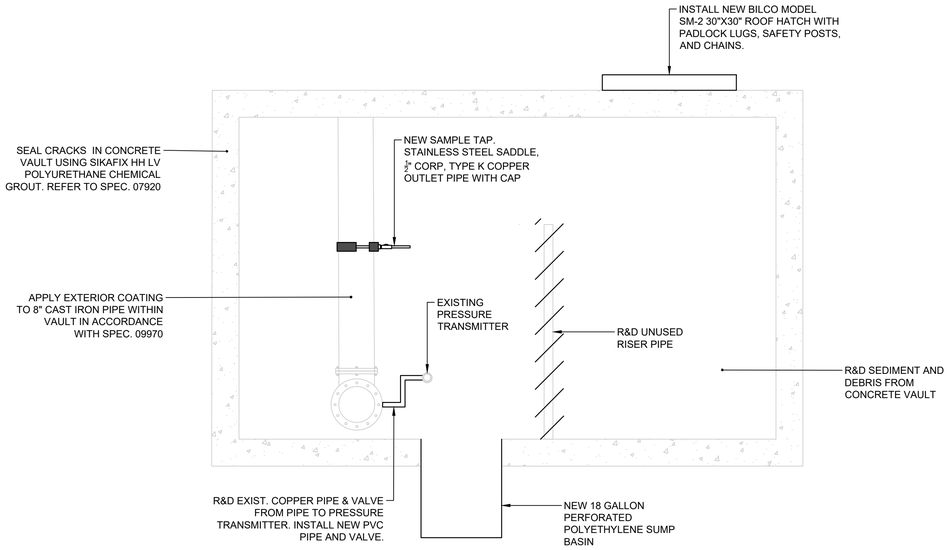
REVISIONS:

PROJECT NO.:	14256.41
DATE:	FEBRUARY 2024
SCALE:	AS NOTED
DESIGNED BY:	AJH
CHECKED BY:	SPD
DRAWN BY:	AJH
APPROVED BY:	SPD

DRAWING TITLE:
SERVICE WATER TANK SITE PLAN & PROFILE

DRAWING NO.:
C1.0

SHEET NO. 3 OF 6

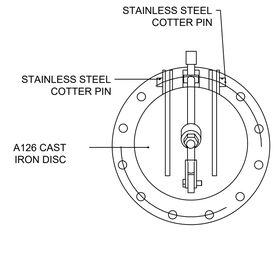


CONCRETE VAULT

NOT TO SCALE

CONCRETE VAULT

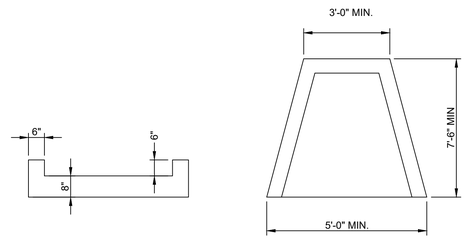
NOT TO SCALE



NOTES:
1. FLAP VALVE SHALL BE FOR AN 8 INCH DIAMETER OVERFLOW PIPE
2. FLAP VALVE SHALL BE EQUIPPED WITH A 24 MESH TYPE 316 STAINLESS STEEL INSECT SCREEN

FLAP VALVE DETAIL

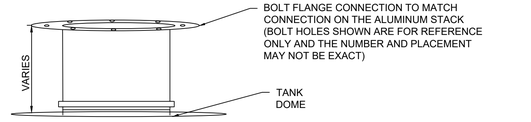
NOT TO SCALE



NOTE: CONCRETE COMPRESSIVE STRENGTH 4,000 PSI @ 28 DAYS.

SPLASH PAD

NOT TO SCALE



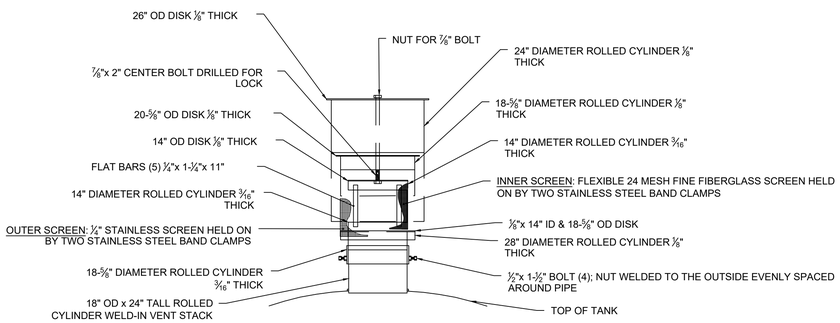
NOTE: VENT DETAIL BASED ON TOMCAT CONSULTANTS, LLC T.A.P. CO. MODEL SD 18-14 INSECT/FROST PROOF VENT.

SHORT WELD-IN STACK WITH BOLT FLANGE

NOT TO SCALE

ROOF HATCH GASKET

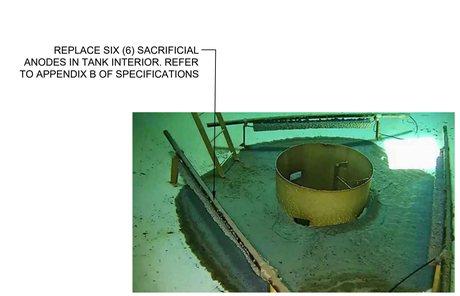
NOT TO SCALE



NOTE: WELD IN VENT STACK SHALL BE APPROPRIATELY SIZED TANK. REFER TO SPECIFICATION SECTION 11200 (2.2) (A).

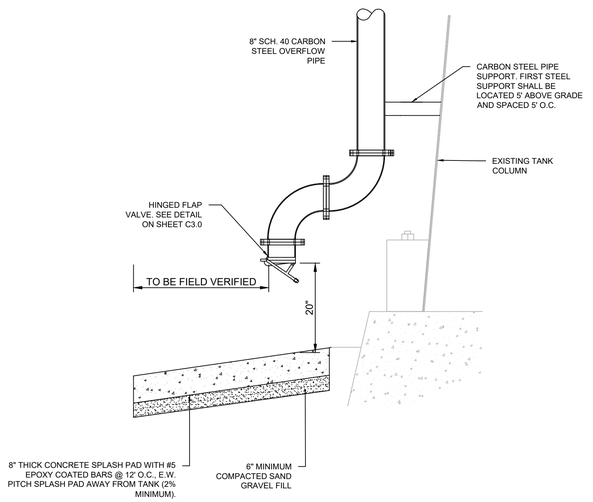
INSECT AND FROST PROOF VENT

NOT TO SCALE



SACRIFICIAL ANODES

NOT TO SCALE



TANK OVERFLOW DETAIL

NOT TO SCALE

PARE

PROVIDENCE WATER

SCALE ADJUSTMENT GUIDE
0" 1"
BAR IS ONE INCH ON ORIGINAL DRAWING

PROVIDENCE WATER SUPPLY BOARD
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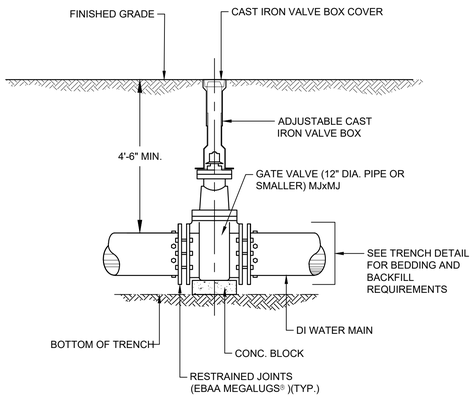
DRAWN BY:	AJH
APPROVED BY:	SPD

DRAWING TITLE:
DETAILS 1

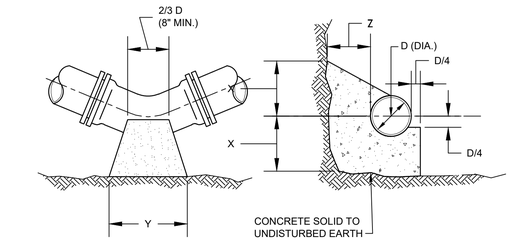
DRAWING NO.:
C2.0

SHEET NO. 4 OF 6

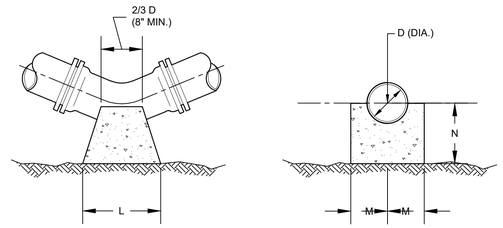


VALVE BOX DETAIL

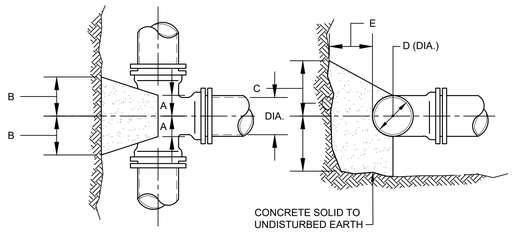
NOT TO SCALE



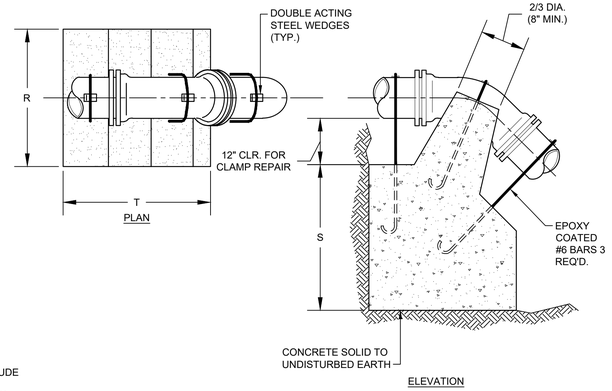
HORIZONTAL BENDS



VERTICAL BENDS



TEES



CONC. ANCHORAGE

NOTES:

1. ALL CONCRETE SHALL BE 5,000 PSI AND SHALL NOT CONTAIN CHLORIDES.
2. CONCRETE THRUST BLOCKS SHALL BEAR AGAINST UNDISTURBED EARTH AND SHALL INCLUDE RESTRAINED JOINTS.
3. ALL BENDS, TEES, MAIN TAPS, AND END CAPS SHALL REQUIRE A CONCRETE THRUST BLOCK.

TEES		PIPE SIZE-D (DIA.)				
		6"	8"	12"	16"	20"
A		8"	10"	1'-0"	1'-3"	1'-6"
B		8"	10"	1'-2"	1'-4"	1'-6"
C		10"	1'-0"	1'-3"	1'-6"	1'-8"
E		8"	10"	1'-2"	1'-6"	1'-10"

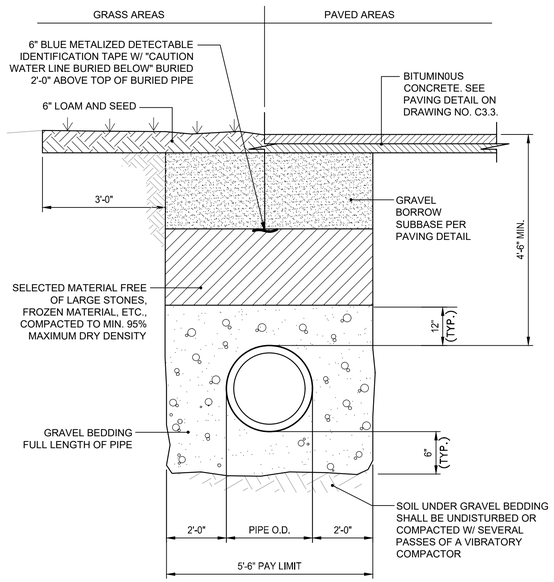
HORTIZONTAL BENDS		PIPE SIZE-D (DIA.)				
BEND		6"	8"	12"	16"	20"
1/8	X	1'-0"	1'-0"	1'-0"	1'-3"	1'-6"
	Y	1'-0"	1'-6"	2'-0"	2'-6"	3'-0"
	Z	8"	10"	1'-2"	1'-4"	1'-6"
1/16	X	1'-0"	1'-0"	1'-0"	1'-3"	1'-6"
	Y	1'-0"	1'-4"	1'-6"	1'-9"	2'-6"
	Z	8"	10"	1'-2"	1'-4"	1'-6"
1/32	X	1'-0"	1'-0"	1'-0"	1'-2"	1'-4"
	Y	1'-0"	1'-0"	1'-2"	1'-4"	1'-6"
	Z	8"	10"	1'-2"	1'-4"	1'-6"

VERTICAL BENDS		PIPE SIZE-D (DIA.)				
BEND		6"	8"	12"	16"	20"
1/8	L	1'-3"	1'-8"	2'-6"	3'-6"	4'-8"
	M	7"	8"	11"	1'-4"	1'-6"
	N	7"	8"	11"	1'-4"	1'-6"
1/16	L	9"	1'-0"	1'-9"	2'-6"	3'-0"
	M	7"	7"	10"	1'-0"	1'-2"
	N	7"	7"	8"	10"	1'-0"
1/32	L	6"	8"	1'-0"	1'-4"	1'-9"
	M	7"	7"	10"	1'-0"	1'-2"
	N	7"	7"	8"	10"	1'-0"

ANCHORAGES		PIPE SIZE-D (DIA.)				
BEND		6"	8"	12"	16"	20"
1/8	R	2'-6"	3'-0"	4'-6"	5'-4"	6'-0"
	S	2'-6"	2'-9"	3'-6"	2'-6"	5'-6"
	T	3'-0"	4'-0"	4'-9"	7'-0"	9'-6"
1/16	R	2'-0"	2'-8"	4'-0"	4'-6"	5'-0"
	S	1'-9"	2'-3"	2'-6"	3'-2"	3'-8"
	T	2'-6"	3'-4"	4'-0"	6'-0"	8'-6"
1/32	R	1'-6"	2'-0"	3'-0"	3'-8"	4'-3"
	S	1'-3"	1'-9"	2'-0"	2'-4"	2'-6"
	T	2'-0"	2'-6"	3'-0"	4'-6"	5'-9"

THRUST BLOCK DETAILS

NOT TO SCALE



WATER MAIN TRENCH DETAIL

NOT TO SCALE

PARE

PROVIDENCE WATER

SCALE ADJUSTMENT GUIDE
0" 1"
BAR IS ONE INCH ON ORIGINAL DRAWING

PROVIDENCE WATER SUPPLY BOARD
P.J. HOLTON WATER PURIFICATION PLANT UPGRADES
SERVICE WATER TANK UPGRADES
61 North Road
Scituate, Rhode Island

REVISIONS:

PROJECT NO.:	14256.41
DATE:	FEBRUARY 2024
SCALE:	AS NOTED
DESIGNED BY:	AJH
CHECKED BY:	SPD
DRAWN BY:	AJH
APPROVED BY:	SPD

DRAWING TITLE:
DETAILS 2

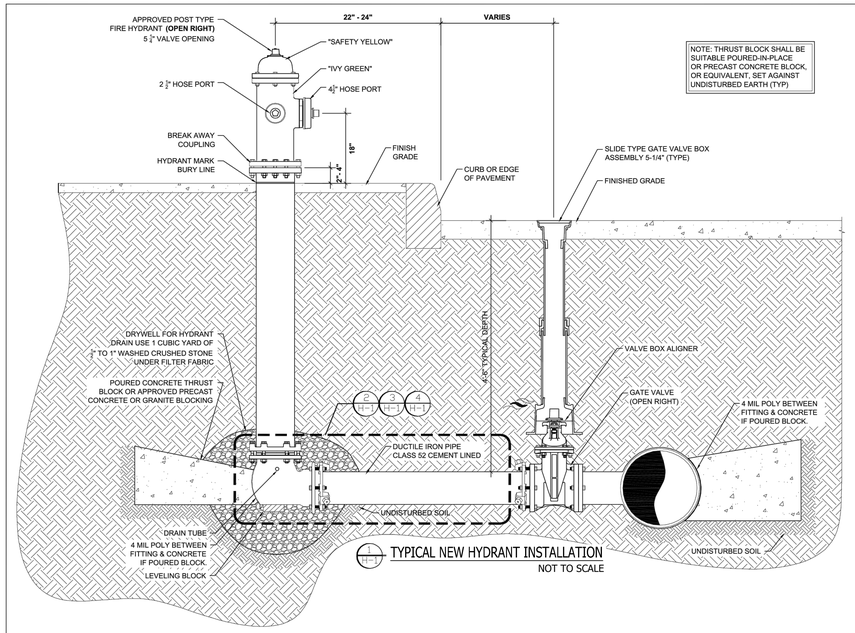
DRAWING NO.:
C2.1

SHEET NO. 5 OF 6

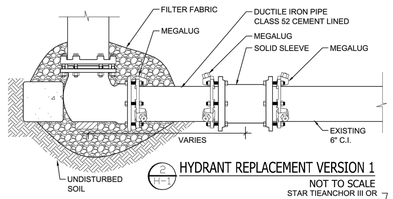
RESTRAINED PIPE LENGTHS FOR RESTRAINED JOINTS	
FITTING	FEET OF PIPE REQUIRING RESTRAINT
6" 22° BEND	2 FEET PLUS ONE JOINT ON BOTH SIDES OF BEND
6" 45° BEND	4 FEET PLUS ONE JOINT ON BOTH SIDES OF BEND
6" BRANCH ON TEE	18 FEET PLUS ONE JOINT ON TEE BRANCH
6" DEAD END	18 FEET PLUS ONE JOINT
8" X 6" REDUCER	10 FEET PLUS ONE JOINT ON THE 8" SIDE
8" 22° BEND	2 FEET PLUS ONE JOINT ON BOTH SIDES OF BEND
8" 45° BEND	4 FEET PLUS ONE JOINT ON BOTH SIDES OF BEND
8" BRANCH ON TEE	23 FEET PLUS ONE JOINT ON TEE BRANCH
8" DEAD END	23 FEET PLUS ONE JOINT
12" X 8" REDUCER	18 FEET PLUS ONE JOINT ON THE 8" SIDE
12" 22° BEND	3 FEET PLUS ONE JOINT ON BOTH SIDES OF BEND
12" 45° BEND	6 FEET PLUS ONE JOINT ON BOTH SIDES OF BEND
12" 90° BEND	14 FEET PLUS ONE JOINT ON BOTH SIDES OF BEND
12" BRANCH ON TEE	33 FEET PLUS ONE JOINT ON TEE BRANCH
12" DEAD END	33 FEET PLUS ONE JOINT
16" X 12" REDUCER	18 FEET PLUS ONE JOINT ON THE 8" SIDE
16" 22° BEND	4 FEET PLUS ONE JOINT ON BOTH SIDES OF BEND
16" 45° BEND	8 FEET PLUS ONE JOINT ON BOTH SIDES OF BEND
16" BRANCH ON TEE	43 FEET PLUS ONE JOINT ON TEE BRANCH
16" DEAD END	43 FEET PLUS ONE JOINT
20" X 16" REDUCER	19 FEET PLUS ONE JOINT ON THE 8" SIDE
20" 22° BEND	5 FEET PLUS ONE JOINT ON BOTH SIDES OF BEND
20" 45° BEND	9 FEET PLUS ONE JOINT ON BOTH SIDES OF BEND
20" BRANCH ON TEE	52 FEET PLUS ONE JOINT ON TEE BRANCH
20" DEAD END	150 FEET (POLY WRAP) OR 52 FEET (BARE), PLUS ONE JOINT
30" 22° BEND	6 FEET PLUS ONE JOINT ON BOTH SIDES OF BEND
30" 45° BEND	13 FEET PLUS ONE JOINT ON BOTH SIDES OF BEND
30" BRANCH ON TEE	74 FEET PLUS ONE JOINT ON TEE BRANCH
30" DEAD END	74 FEET PLUS ONE JOINT

NOTES:

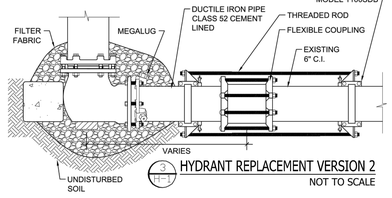
1. RESTRAINED JOINTS SHALL BE MECHANICAL OR PUSH ON WITH FIELD LOCK GASKET. TIE RODS AND FRICTION CLAMPS SHALL ONLY BE USED WHEN APPROVED BY ENGINEER.
2. TABLE ASSUMES BARE DUCTILE IRON PIPE IN A TYPE 5 TRENCH TESTED AT 150 PSI, IF CONTRACTOR SHOULD INSTALL A DIFFERNT SYTLE TRENCH, POLY WRAP DUCTILE IRON, C-900 SLEEVE, ETC. CONTRACTOR SHALL RECEIVE DIRECTION FROM THE ENGINEER ON RESTRAINED LENGTHS.



1 H-1 TYPICAL NEW HYDRANT INSTALLATION
NOT TO SCALE



2 H-1 HYDRANT REPLACEMENT VERSION 1
NOT TO SCALE
STAR TIEANCHOR III OR MEGALUG MID SPAN RESTRAINT MODEL 1100SDB



3 H-1 HYDRANT REPLACEMENT VERSION 2
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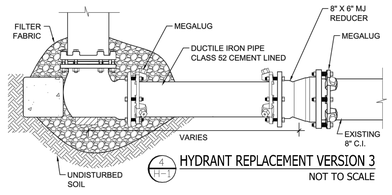


4 H-1 HYDRANT REPLACEMENT VERSION 3
NOT TO SCALE

GENERAL NOTES

1. OTHER UTILITIES ARE NOT SHOWN. CONTRACTOR SHALL NOTIFY "DIG-SAFE" & PWSB PRIOR TO COMMENCING WORK.
2. NEW WATER PIPE SHALL BE TESTED AND CHLORINATED IN ACCORDANCE WITH PROVIDENCE WATER STANDARDS AND AS DIRECTED BY PROVIDENCE WATER.
3. NEW WATER PIPE SHALL BE CEMENT-LINED DUCTILE IRON PIPE, CLASS 52, CONFORMING TO THE LATEST AWWA STANDARDS.
4. PIPE FITTINGS SHALL BE CEMENT-LINED DUCTILE IRON, CLASS 350, WITH MECHANICAL JOINT ENDS.
5. UNLESS OTHERWISE NOTED, EARTH COVER OVER PIPE SHALL NOT BE LESS THAN 4'-6".
6. GATE VALVES SHALL BE RESILIENT SEAT TYPE WITH MECHANICAL JOINT ENDS AND SHALL OPEN "RIGHT" (CLOCKWISE).
7. METALLIZED, DETECTABLE, IDENTIFICATION TAPE SHALL BE 2-INCHES WIDE, BLUE IN COLOR, AND IMPRINTED WITH THE WORDS "CAUTION - WATER LINE BURIED BELOW", AND SHALL BE INSTALLED OVER ALL MAINS AND HYDRANT RUN-OUTS AT A DEPTH OF 12-INCHES BELOW FINISHED GRADE.
8. UNLESS OTHERWISE NOTED, BREAKAWAY TYPE HYDRANTS, SHALL BE INSTALLED WITH OPERATING NUT POSITIONED 22-24 INCHES BEHIND FACE OF CURB OR EDGE OF PAVEMENT. THE BREAKAWAY FLANGE SHALL BE SET 2-INCHES TO 4-INCHES ABOVE FINISHED GRADE. HYDRANTS SHALL OPEN "RIGHT" (CLOCKWISE).
9. PROPERLY SIZED CONCRETE THRUST BLOCKS SHALL BE INSTALLED AT CHANGES OF PIPE DIRECTION (TEES, BENDS, ETC) AND/OR DEAD ENDS IN ACCORDANCE WITH PROVIDENCE WATER STANDARDS. FURTHERMORE, MECHANICAL JOINT THRUST RESTRAINTS SHALL BE PLACED ON EACH SIDE OF FITTINGS AND AT PIPE JOINTS TO SUFFICIENTLY RESTRAIN AN ADEQUATE LENGTH OF PIPE AWAY FROM FITTINGS AT 1-1/2 TIMES THE STATIC PRESSURE, OR NOT LESS THAT 150 PSI.

GENERAL NOTES

APPROVED HYDRANTS

- KENNEDY GUARDIAN HYDRANT - K81D
- MUELLER SUPER CENTURION - A423

HYDRANTS MUST BE "HYDRA-SHIELD CUSTODIAN" READY.

HYDRANT EXTENSION KITS AND TRAFFIC REPAIR KITS MUST BE AVAILABLE FROM THE MANUFACTURER BY THE ORIGINAL HYDRANT MANUFACTURER & CONSIDERED "ORIGINAL EQUIPMENT", SUBSTITUTES ARE NOT ALLOWED.

TYPICAL LOW SERVICE HYDRANT WOULD HAVE A DEPTH OF 5 FEET

TYPICAL HIGH SERVICE HYDRANT WOULD HAVE A DEPTH OF 5 FEET 6 INCHES

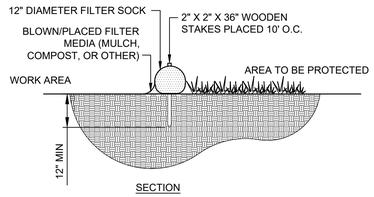
NOTE: FOR REPLACEMENT OF EXISTING HYDRANTS THE DEPTH SHOULD BE DETERMINED PRIOR TO INSTALLATION TO ASSURE THAT NEW HYDRANT IS OF PROPER DEPTH

FOR NEW HYDRANTS WITH A LATERAL LONGER THAN 10 FT, THE HYDRANT ASSEMBLY SHALL INCLUDE 8" DI PIPE LATCHAL. AN 8" GATE VALVE, AND AN 8" X 6" REDUCER

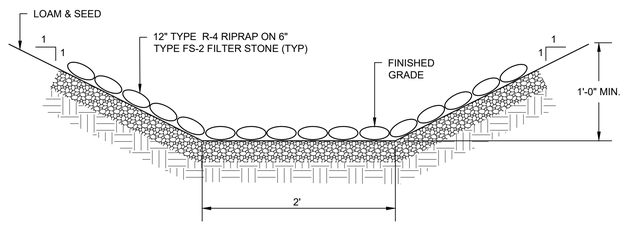
Providence Water

PWSB NEW HYDRANT INSTALLATION & REPLACEMENTS

DRAWN BY	CHECKED BY	TYPICAL DETAILS
SCALE	DATE	H-1 SHEET NUMBER 1 of 1
DIRECTOR OF ENGINEERING		



FILTER SOCK SEDIMENTATION CONTROLS
NOT TO SCALE



NOTE:

1. MINIMUM LONGITUDINAL SLOPE IS 0.01FT/FT.

RIPRAP SWALE
NOT TO SCALE

PARE

PROVIDENCE WATER

SCALE ADJUSTMENT GUIDE
0" 1"
BAR IS ONE INCH ON ORIGINAL DRAWING

PROVIDENCE WATER SUPPLY BOARD
P.J. HOLTON WATER PURIFICATION PLANT UPGRADES
SERVICE WATER TANK UPGRADES
61 North Road
Scituate, Rhode Island

REVISIONS:

PROJECT NO.:	14256.41
DATE:	FEBRUARY 2024
SCALE:	AS NOTED
DESIGNED BY:	AJH
CHECKED BY:	SPD
DRAWN BY:	AJH
APPROVED BY:	SPD

DRAWING TITLE:
DETAILS 3

DRAWING NO.:
C2.2

SHEET NO. 6 OF 6

PROJECT MANUAL AND SPECIFICATIONS

Providence Water Supply Board

Phillip J. Holton Water Purification Plant Upgrades

Service Water Tank Upgrades

Scituate, Rhode Island

Prepared for:

PROVIDENCE WATER

Providence Water
125 Dupont Drive
Providence, RI 02907

Project No. 3-0848-20223

Prepared by:

PARE CORPORATION

Pare Corporation
8 Blackstone Valley Place
Lincoln, RI 02865

FEBRUARY 2024
RI Dept. of Health Submission

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

DIVISION 1

GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 DESCRIPTION

A. Work will primarily include the rehabilitation of the 40,000 gallon elevated steel water storage tank located at Providence Water's P.J. Holton Water Purification Plant in Scituate, RI. The rehabilitation work includes new interior and exterior coatings, interior sacrificial anodes, ladder, overflow downspout, lightning protection, and other water storage tank appurtenances.

B. Upon completion of the work, all disturbed areas shall be restored to a condition equivalent to or better than that which existed prior to construction.

1.2 LIMITS OF WORK/COORDINATION

A. The Contractor shall access the site from abutting rights-of-way as required to facilitate construction. Areas for construction staging, storage, and construction shall be coordinated with the Owner or the Engineer.

1.3 CONSTRUCTION SEQUENCE/SCHEDULE

A. Contractor shall be responsible for submitting a preliminary progress schedule and a preliminary schedule of values to the Engineer for approval ten (10) days prior to the commencement of any work and in accordance with Article 2 of the General Conditions.

B. The sequence and schedule, submitted by the Contractor shall be acceptable to the Engineer as providing for an orderly progression of the work to completion. Acceptance of such will neither impose on Engineer or Owner, responsibility for construction sequencing, schedule, or progress of work nor interfere with or relieve Contractor for Contractor's full responsibility thereof.

C. Following the initial approved schedule, the Contractor shall provide updated weekly schedules to the Engineer for review and approval.

D. Schedule of work shall be coordinated by Contractor such that:

1. Contractor shall be responsible for scheduling and for integrity of partially completed work during performance of other work on site.
2. It shall be the Contractor's responsibility for damage or disruption to partially completed work, and for repair thereof, during performance of all project work.
3. Prior to commencement of construction activities, the contractor shall submit a detailed construction and phasing schedule.
4. Construction and phasing schedule shall include line items for coordination with applicable public agencies and public/private utilities, when necessary.

PART 2 PRODUCTS

2.1 MATERIALS

A. All materials, supplies, or equipment incorporated into the work shall be new and shall conform to the requirements of the applicable sections of these specifications.

PART 3 EXECUTION

3.1 The General Contractor and subcontractors performing work under this contract shall execute such work in a professional manner, consistent with the industry's standards for quality workmanship.

3.2 The General Contractor shall provide a representative to be present at all tests required by these Specifications.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

A. Extent of Work: This Section applies to situations in which the Contractor or their representatives including, but not necessarily limited to, suppliers, subcontractors, employees, and field engineers, enter upon the Owner's property or occupy the public rights-of-way.

B. Related Work Specified Elsewhere:

Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and sections of these Specifications.

1.2 QUALITY ASSURANCE

A. Promptly upon award of the Contract, notify all pertinent personnel regarding requirements of this section.

B. Require that all personnel who will enter upon the Owner's property certify their awareness and familiarity with the requirements of this Section.

1.3 TRANSPORTATION FACILITIES

A. Truck and Equipment Access:

1. Where materials are transported in the execution of the Work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer for the vehicle or prescribed by any Federal, State, or Local law or regulation.
2. Provide adequate protection for curbs and sidewalks over which trucks and equipment pass to reach the job site. Any damaged roads, bridges, structures, curbing, or sidewalks shall be repaired by, or at the expense of the Contractor.

B. Contractor's Vehicles:

1. Require Contractor's vehicles and vehicles belonging to employees of the Contractor or leased by the Contractor or subcontractor, and all other vehicles entering upon the Owner's property in performance of the Work of the Contract, to use only the access routes designated by the Owner or the Engineer.

1.4 NONEXCLUSIVE USE

A. Nothing herein contained or shown on the Drawings shall be construed as giving the Contractor exclusive occupancy of the work area. The Owner or any other contractors employed by the Owner, the various utility companies, contractors, or subcontractors employed by State or Federal agencies, or any other 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 the area as is directed or necessary.

B. The Owner reserves the right to do any other work that may be connected with, or become a part of, or be adjacent to the work embraced by this Contract, at any time, by contractor or otherwise. The Contractor shall not interfere with the work of such others as the Owner may employ, and shall execute their own work in such a manner as to aid in the execution of the work of others as may be required. No backfilling of trenches or excavations will be permitted until such work by the Owner is completed.

C. When the territory of one contract is the convenient means of access to the other, the Contractor shall arrange their working in such a manner as to permit such access to the other and prevent unnecessary delay to the work as a whole.

1.5 WORKING HOURS

A. Regular working hours shall consist of a period established between 7 a.m. and 4 p.m., Monday through Friday, excluding holidays. The Contractor shall make application for work outside regular working hours five (5) calendar days prior to such work in accordance with the paragraph entitled "Work Outside Regular Hours".

1.6 WORK OUTSIDE REGULAR HOURS

A. If the Contractor desires to carry on work outside regular hours, including Saturdays, Sundays, and holidays observed by Providence Water; an application shall be delivered to the Owner and Engineer. The Contractor shall allow ample time to enable satisfactory arrangements to be made by the Engineer for inspecting the work in progress. During periods of darkness, the different parts of the work shall be lighted in a manner approved by the Engineer. All utility cutovers shall be made through coordination with Owner’s on-site representative.

1.7 ORDER OF WORK

A. The Contractor shall schedule their work so as to cause the least amount of interference with traffic. Permission to interrupt any roads, and/or utility service shall be requested in writing a minimum of five (5) calendar days prior to the desired date of interruption.

1.8 EXISTING WORK

A. The removal or altering in any way of existing work shall be carried out in such a manner as to prevent injury or damage to any portion(s) of the existing work which remain(s).

B. All portions of existing work, which have been altered in any way during construction operations shall be repaired or replaced in kind and in a manner to match existing or adjoining work, as, approved by the Engineer. All work of this nature shall be performed by the Contractor at the Contractor’s expense and shall be performed as directed by the Engineer. At the completion of all operations, existing work shall be in a condition equivalent to or better than that which existed before the new work started.

1.9 SANITATION

A. Adequate sanitary conveniences of a type approved for the use of persons employed on the work shall be constructed, properly secluded from public observation, and maintained by the Contractor in such a manner as required or approved by the Engineer. These conveniences shall be maintained at all times without nuisance. Upon completion of the work, the conveniences shall be removed by the Contractor from the premises, leaving the premises clean and free from nuisance.

1.10 SAFETY

A. Contractor is solely responsible for site safety on all project related matters. Contractor shall comply with all applicable Federal, State, and local laws, ordinances, rules and regulations and lawful orders of all authorities having jurisdiction for the safety of persons and protection of property.

1.11 TEMPORARY UTILITIES AND SERVICES

A. Contractor is responsible and shall pay all fees required for any temporary services required to complete the scope of work for this project. All connections shall be performed in accordance with applicable codes.

1.12 CONTAINMENT/STAGING AREA

A. Contractor shall be responsible for the proper storage and handling of equipment, fuel, materials, and waste related to the work. Contractor shall store and secure any fuel, waste, and hazardous materials in containment to prevent a release to the surrounding environment. Any remediation as a result of a release by the contractor shall be at the contractor’s expense.

B. Providence Water has remediated lead contamination in surficial soils surrounding the project site in accordance with Rhode Island Department of Environmental Management Site Remediation Regulations. Prior to mobilization by the contractor and upon completion of the project, Providence Water personnel will analyze the surficial soils surrounding the tank for lead contamination. The remediation of any newly discovered lead in the soil surrounding the tank will be the responsibility of the contractor.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Inspection and Testing

B. Application for Payment

C. Change Procedures

1.2 INSPECTION AND TESTING

A. The Contractor shall pay all costs of engaging an inspection or testing firm, execution of inspection or tests, and reporting results.

B. Costs Included:

1. Incidental labor and facilities required to assist inspection or testing firm.
2. Costs of testing laboratory services required by the Contractor separate from Contract Document requirements.
3. Costs of retesting upon failure of previous tests as determined by Engineer.

C. Payment Procedures:

1. Submit a copy of the inspection or testing firm's invoice with next application for payment.
2. Pay invoice on approval by Engineer.

1.3 APPLICATIONS FOR PAYMENT

A. Submit three copies of each application on EJCDC C-620. See Section 01152 - Application for Payment Form.

B. For each item, provide a column listing: Item Number; Description of Work; Scheduled Value; Previous Applications; Work in Place and Stored Materials under this Application; Authorized Change Orders; Total Completed and Stored to Date of Application; Percentage of Completion; Balance to Finish; and Retainage.

C. Present required information in typewritten form.

D. Execute certification by signature of authorized officer.

E. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

F. List each authorized Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as for an original item of work.

1.4 CHANGE ORDER PROCEDURES

A. The Engineer will advise of minor changes in the work not involving an adjustment to Contract Sum/Price or Contract Time, as authorized by the Engineer, by issuing written supplemental instructions.

B. The Engineer may issue a Notice of Change which includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor will prepare and submit an estimate within seven (7) days.

C. The Contractor may propose a change by submitting request for change to the Engineer, describing the proposed change and its full effect on the work. Include a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time with full documentation and a statement describing the effect on work by separate or other contractors. No change will be allowed except under written approval and Notice of Change of the Engineer, verbal orders are not binding.

D. Stipulated Sum/Price Change Order: Based on Notice of Change and Contractor's estimated price quotation.

E. Unit Price Change Order: For pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of work, which are not pre-determined, execute work under a Work Directive Change. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.

F. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract. The Engineer will determine the change allowable in Contract Sum/Price and Contract Time as provided in the Contract Documents.

G. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the work.

H. Execution of Change Orders: The Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

PART 2 PRODUCTS

2.1 PROJECT MANAGEMENT SOFTWARE

A. The Contractor shall utilize Providence Water's Project Management Software for change orders. All submittals and approvals shall be performed via that software. Email and/or paper submissions will not be allowed.

PART 3 EXECUTION

NOT USED

END OF SECTION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section covers the cutting, coring, and rough and finish patching of holes and openings in existing and proposed structures (manholes, pipes, etc.).

B. The Contractor shall see that all such cuts, cores, and openings are located accurately and are of proper size and shape and shall consult with the Engineer and the contractors and subcontractors concerned in reference to this work.

C. In case the contractor's failure to leave or cut all such openings or have all such sleeves provided and set in proper time, the contractor shall cut them or set them afterwards at their own expense. In so doing, the contractor shall confine the cutting to the smallest extent possible consistent with the work to be done. In no case shall piers or structural members be cut without the written consent of the Engineer.

D. The Contractor shall not cut or alter the work of any subcontractor or any other contractor, nor permit any of their subcontractors to cut or alter the work of any other contractor or subcontractor, except with the written consent of the contractor or subcontractor whose work is to be cut or altered or with the written consent of the Engineer. All cutting and patching or repairing made necessary by the negligence, carelessness, or incompetence of the Contractor or any of their subcontractors shall be done by or at the expense of the Contractor and shall be the responsibility of the Contractor.

PART 2 PRODUCTS

2.01 MATERIALS

A. Concrete rough patching shall be as specified in Division 3.

PART 3 EXECUTION

3.01 GENERAL

A. All cutting and coring shall be performed in such a manner as to limit the extent of patching.

B. All holes cut through concrete, existing or proposed manholes, and existing or proposed pipes shall be core drilled unless otherwise approved. No structural members shall be cut without approval of the Engineer. No holes may be drilled in/through structural members or supports without obtaining prior approval. All work shall be performed by mechanics skilled in this type of work.

C. Rough patching shall be such as to bring the cut or cored area flush with existing construction unless otherwise shown. Finish patching shall match existing surfaces as approved.

D. Prior to coring and cutting, rebar shall be located using a Rebar Locator. If possible, relocate to avoid rebar.

3.02 CORING

A. Coring shall be performed with an approved non-impact rotary tool with diamond core drills. Size of holes shall be suitable for pipe, conduit, sleeves, equipment, or mechanical seals to be installed.

B. All equipment shall conform to OSHA standards and specifications pertaining to plugs, noise and fume pollution, wiring and maintenance.

C. Provide protection for existing equipment, utilities and critical areas against water or other damage caused by drilling operation.

D. Slurry or tailings resulting from coring operations shall be vacuumed or otherwise removed from the area following drilling.

3.03 CUTTING

A. Cutting shall be performed with a concrete wall saw and diamond saw blades of proper size.

B. Provide for control of slurry generated by sawing operation on both sides of wall.

C. When cutting a reinforced concrete wall, the cutting shall be done so as not damage bond between the concrete and reinforcing steel left in structure. Cut shall be made so that steel neither protrudes nor is recessed from face of the cut.

D. Adequate bracing of area to be cut shall be installed prior to start of cutting. Check area during sawing operations for partial cracking and provide additional bracing as required to prevent a partial release of cut area during sawing operations.

E. Provide equipment of adequate size to remove cut panel.

END OF SECTION

PART 1 GENERAL

1.1 PRECONSTRUCTION CONFERENCE

A. Prior to the start of the construction there will be a preconstruction conference to discuss the phasing and scheduling of the construction project. The specific time and place of the conference will be arranged by the Engineer after the contract has been awarded.

1.2 PROGRESS MEETINGS

A. During the course of the construction project, the Contractor shall attend progress meetings as scheduled by the Engineer at the field office of the Engineer. The attendance of subcontractors and suppliers may be required during the progress of the work. The Contractor's delegate to the meeting shall be prepared and authorized to discuss the following items:

1. Progress of Work in relation to Contract Schedule.
2. Proposed Work activities for forthcoming period.
3. Resources committed to Contract.
4. Coordination of Work with others.
5. Status of procurement of equipment and materials.
6. Status of Submittals.
7. Outstanding actions, decisions, or approvals that affect Work activities.
8. Security issues.
9. Quality Issues
10. Potential Claims
11. Contract Changes
12. Costs & Budget
13. Mitigation Measures

1.3 CPM MEETINGS

A. CPM meetings will be scheduled as detailed in Section 01311.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittal Procedures

B. Construction Progress Schedules

C. Proposed Products List

D. Shop Drawings

E. Product Data

F. Manufacturers' Instructions

G. Manufacturers' Certificates

1.2 SUBMITTAL PROCEDURES

A. Transmit each submittal through Providence Water's Project Management software.

B. Sequentially number the transmittal forms. Re-submittals to have original number with an alphabetic suffix.

C. Identify Project, Contractor, subcontractor or supplier; pertinent drawing sheet and detail number(s), and specification section number, as appropriate.

D. Apply Contractor's stamp, signed or initialed certifying that review, verification of products required, field dimensions, adjacent construction work, and coordination of information, is in accordance with the requirements of the work and Contract Documents.

E. Schedule submittals to expedite the Project, and deliver to Engineer at business address. Coordinate submission of related items.

F. Identify variations from Contract Documents and product or system limitations, which may be detrimental to successful performance of the completed work.

G. Provide space for Contractor and Engineer review stamps.

H. Revise and resubmit submittals as required, identify all changes made since previous submittal.

I. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.3 CONSTRUCTION PROGRESS SCHEDULES

A. Transmit each submittal through Providence Water's Project Management software.

B. Submit initial progress schedule in duplicate within ten (10) days after date established in Notice to Proceed for Engineer review.

C. Revise and resubmit as required.

D. Submit revised schedules with each Application for Payment, identifying changes since previous version.

E. Submit a horizontal bar chart with separate line for each major section of work or operation identifying first workday of each week.

F. Show complete sequence of construction by activity, identifying work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

G. Indicate estimated percentage of completion for each item of work at each submission.

H. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and under Allowances.

1.4 PROPOSED PRODUCTS LIST

A. Transmit each submittal through Providence Water's Project Management software.

B. Within ten (10) days after date of Notice to Proceed, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

C. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation and reference standards.

1.5 SHOP DRAWINGS

A. Transmit each submittal through Providence Water's Project Management software.

B. Submit the number of opaque reproductions, which Contractor requires, plus copies which will be retained by Architect/Engineer.

1.6 PRODUCT DATA

A. Transmit each submittal through Providence Water's Project Management software.

B. Submit the number of copies, which the Contractor requires, plus copies which will be retained by the Engineer.

C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this project.

1.7 SAMPLES

A. Submit samples to illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

B. Submit samples of finish from the full range of manufacturers' standard colors, textures and patterns for Engineer's selection.

C. Include identification on each sample, with full project information.

D. Submit the number of samples specified in individual specification sections.

E. Reviewed samples, which may be used in the work, are indicated in individual specification sections.

1.8 MANUFACTURERS' INSTRUCTIONS

A. When specified in individual specification sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for product data.

B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.9 MANUFACTURERS' CERTIFICATES

A. When specified in individual specification sections, submit manufacturers' certificate to Engineer for review, in quantities specified for product data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect/Engineer.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01311 CONSTRUCTION SCHEDULING

PART 1 GENERAL

1.1 PROGRAM DESCRIPTION

A. The Contractor shall produce and submit a construction sequence and schedule to the engineer for approval a minimum of 10 days prior to the commencement of work. All work shall be done in accordance with the established schedule and the Contractor, and their subcontractors shall be responsible for cooperating fully with the Engineer and the Owner in effectively utilizing the schedule.

B. Approval of the schedule by the Engineer is advisory only and shall not relieve the Contractor of responsibility for accomplishing the work within the contract completion date. Omissions and errors in the approved schedule shall not excuse performance less than that required by the Contract. Approval by the Engineer in no way makes the Engineer an insurer of the schedule's success or liable for time or cost overruns flowing from its shortcomings.

PART 2 PRODUCTS

2.1 PROJECT MANAGEMENT SOFTWARE

A. The Contractor shall be issued a license to utilize Providence Water's Project Management Software for this project. All schedule submittals shall be performed via that software. Email and/or paper submissions will not be allowed.

2.2 SCHEDULE SOFTWARE

A. The Contractor shall utilize industry standard scheduling software to produce the construction schedule. Software shall be at least MS Project, latest edition or equivalent.

PART 3 EXECUTION

3.1 SCHEDULE REVIEW PROCESS

A. Contractor shall be responsible for submitting a preliminary progress schedule and a preliminary schedule of values to the Engineer for approval ten (10) days prior to the commencement of any work and in accordance with Article 2 of the General Conditions.

B. Following the initial approved schedule, the Contractor shall provide updated weekly schedules to the Engineer for review and approval.

C. Failure of the Contractor to provide weekly schedules will result in liquated damages of $1000/week, which is the anticipated cost for the Engineer to produce the Contractor's schedule.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Quality Assurance and Control of Installation

B. References

C. Field samples

D. Inspection and testing laboratory services

E. Manufacturers' field services and reports

1.2 RELATED SECTIONS

A. Section 01300 - Submittals

B. Section 01600 - Material and Equipment

1.3 QUALITY ASSURANCE AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce work of specified quality.

B. Comply fully with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

D. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes or specified requirements indicate higher standards or more precise workmanship.

E. Perform work by persons qualified to produce workmanship of specified quality.

F. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.4 REFERENCES

A. Conform to reference standard by date of issue current on date of Contract Documents.

B. Obtain copies of standards when required by Contract Documents.

C. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention of inference otherwise in any reference document.

1.5 FIELD SAMPLES

A. Install field samples at the site for review, as required by individual specification sections.

B. Acceptable samples represent a quality level for the work.

C. Where field sample is specified in individual sections to be removed, clear area after field sample has been accepted by Engineer.

1.6 INSPECTION AND TESTING LABORATORY SERVICES

A. The Contractor shall submit names of all the firms to be utilized for testing and analytical services for approval by the Engineer. No results or observations will be accepted unless performed by an approved testing firm.

B. The testing firm will perform inspections, tests and other services specified in individual specification sections and as required by the Engineer.

C. Reports will be submitted by the testing firm to the Engineer, in duplicate, indicating observations and results of tests, and compliance or non-compliance with Contract Documents.

D. Cooperate with testing firm, furnish samples of materials, design mix, equipment, tools, storage, access, and assistance as requested.

1. Notify Engineer and testing firm seven (7) days prior to expected time for operations requiring services.
2. All costs associated with testing will be paid by the Contractor.

E. Re-testing required due to non-conformance to specified requirements, shall be performed by the same testing firm per instructions by the Engineer. Payment for re-testing will be paid by the Contractor with no additional cost to the Owner.

1.7 MANUFACTURER'S FIELD SERVICES AND REPORTS

A. Submit qualifications of observer to Engineer thirty (30) days in advance of required observations. Observer subject to approval of Engineer.

B. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, testing, adjusting and balance of equipment as applicable, and to initiate

instructions when necessary.

C. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

D. Submit report in duplicate to Engineer for review via Providence Water's Project Management software within twenty-four (24) hours of observation.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Controls: Fencing, Barriers

B. Control and Diversion of Water and Dewatering

C. Erosion and Sediment Control

D. Dust Control

E. Noise Control

F. Pollution Control

G. Traffic Control

H. Progressive Cleaning

1.2 BARRIERS AND FENCING

A. Provide barriers to prevent unauthorized entry to construction areas to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing buildings.

C. Provide protection for plant life designated to remain. Replace damaged plant life.

D. Protect non-owned vehicular traffic, stored materials, site and structure from damage and to minimize hazards to general public (i.e., curious nuisance).

1.3 CONTROL AND DIVERSION OF WATER AND DEWATERING

A. The Contractor shall be responsible for providing and maintaining all ditching, grading, sheeting and bracing, pumping and appurtenant work for the temporary diversion of water courses and protection from flooding as necessary to permit the construction of work in the dry.

1.4 EROSION AND SEDIMENT CONTROL

A. Baled hay shall be placed as shown on the plans or as directed by the Owner or the Engineer. They shall be held in place by two wooden stakes in each bale. Baled hay shall be maintained or replaced as they are disturbed, or until they are no longer necessary for the purpose intended, or are ordered removed by the Owner or the

Engineer.

B. The Contractor shall be responsible for installing and maintaining erosion and sedimentation control measures in accordance with applicable sections of the Rhode Island Soil Erosion and Sediment Control Handbook.

1.5 DUST CONTROL

A. Execute work by methods to minimize raising dust from construction operations.

B. Provide positive means to prevent airborne dust from dispersing into atmosphere, such as spraying water and/or calcium chloride.

1.6 NOISE CONTROL

A. The Contractor shall coordinate and schedule all work, which will contribute to increased noise levels in residential areas with the Owner. This shall be done with sufficient time to allow the Owner to notify the residents.

B. The Contractor shall work utilizing methods to minimize excess background noise whenever possible.

C. In no case shall work resulting in increased noise levels be performed prior to 7:00 a.m. or after 6:00 p.m., without written authorization of the Owner.

1.7 POLLUTION CONTROL

A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

1.8 TRAFFIC CONTROL

A. The Contractor shall be responsible for the procurement of traffic people to control and protect pedestrians and traffic during the construction of the Contractor Work when so directed by the Engineer or when working on public rights-of-way.

B. The Contractor shall not be compensated for traffic people when the requirement for such has been made by the Owner, Engineer, or local public safety official. This shall be included in the Contractor's bid price.

C. Traffic control shall be provided in accordance with the Rhode Island Department of Transportation Manual on Uniform Traffic Control Devices.

1.9 PROGRESSIVE CLEANING

A. As project progresses, maintain areas free of waste materials, debris and rubbish. Interim measures shall be undertaken to maintain a clean site while work progresses.

B. Sweep all paved surfaces disturbed by construction activity daily and prior to opening to vehicular or pedestrian traffic.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

A. The Contractor shall provide all temporary facilities necessary for the proper completion of the work, as necessary and as specified.

1.2 CONTRACTOR'S FIELD OFFICE

A. The Contractor may maintain a temporary field office near the work for use during the period of construction at which readily accessible copies of all contract documents shall be kept. The office shall be located where it will not interfere with the progress of the work as approved by the Engineer. In charge of this office there shall be a competent superintendent of the Contract as specified in the Agreement, under Article CA 5.

1.4 WATER FOR CONSTRUCTION PURPOSES

A. The Contractor shall make arrangements with the Owner of the Utility to use available water supplies for construction purposes. The Contractor shall coordinate with Providence Water on how to obtain Potable Water to the site.

B. The express approval of the Owner shall be obtained before water is used. Waste of water by the Contractor shall be sufficient cause for withdrawing the privilege of unrestricted use. Hydrants shall only be operated under the supervision of the Owner's personnel.

C. The Contractor is required to meter all water use and the Contractor will be charged for this use.

D. If a water ban is instituted, the Owner reserves the right to discontinue the Contractor's use of City water.

1.5 TEMPORARY HEAT

A. If temporary heat is required for the protection of the Work, the Contractor shall provide and install suitable heating apparatus, shall provide adequate and proper fuel, and shall maintain heat as required.

1.6 TEMPORARY ELECTRICAL

A. The Contractor shall make all necessary applications and arrangements and pay all fees and charges for electrical energy for power and light necessary for the proper completion of the Work and during its entire progress. The Contractor shall provide and pay for all temporary wiring, switches, connections, and meters.

B. The Contractor shall provide sufficient electric lighting so that all work may be done in a workmanlike manner when there is not sufficient daylight.

1.7 TEMPORARY FENCING

A. Provide commercial grade chain link fence to prevent trespass by workmen and suppliers onto private property and the public from the construction site. The contractor shall provide the Owner and the Engineer with copies of keys to enter the site.

1.8 PROJECT SIGNS

A. The Contractor shall provide signs constructed in accordance with other portions of the specifications (i.e. RIDEM permit signs). These signs shall be erected in a location selected by the Engineer. The Contractor shall maintain the signs throughout the duration of the project and remove them from the site when the Contract has been completed.

1.9 FIRE EXTINGUISHERS

A. Provide portable UL-rated, Class A fire extinguishers for all temporary offices and similar spaces. In other locations, provide portable UL-rated Class ABC dry chemical extinguishers a combination of NEPA recommended Classes for the exposure. Comply with NEPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products

B. Transportation and Handling

C. Storage and Protection

D. Product Options

E. Substitutions

1.2 PRODUCTS

A. Means new material, machinery, components, equipment, fixtures, and systems forming the work. Does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the work. Products may also include existing materials or components required for reuse.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

C. Provide interchangeable components of the same manufacturer for similar components.

1.3 TRANSPORTATION AND HANDLING

A. Transport and handle products in accordance with manufacturers' instructions.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 STORAGE AND PROTECTION

A. Store and protect products in accordance with manufacturers' instructions, with seals and labels intact and legible. Store sensitive products in weather-tight climate-controlled enclosures.

B. For exterior storage of fabricated products, place on sloped supports, above ground.

C. Provide off-site storage and protection when site does not permit on-site storage or protection.

D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.

E. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

G. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

H. All pipe shall be stored with both ends covered with plastic sheeting, secured in place against wind and precipitation.

1.5 PRODUCT OPTIONS

A. Products specified by reference standards or by description only shall mean any product meeting those standards or description.

B. Products specified by naming one or more manufacturers shall mean products of manufacturers named and meeting specifications; no options or substitutions allowed.

C. Products specified by naming one or more manufacturers, with a provision for substitutions, means that the Contractor shall submit a request for substitution for any manufacturer not named.

1.6 SUBSTITUTIONS

A. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

B. Document each request with complete data, substantiating compliance of proposed substitution with Contract Documents.

D. A request constitutes a representation that the Contractor:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product;
2. Will provide the same warranty for the substitution as for the specified product;
3. Will coordinate installation and make changes to other work which may be required for the work to be complete, with no additional cost to the Owner;
4. Waives claims for additional costs or time extension which may subsequently become apparent; and
5. Will reimburse Owner for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawings or product data submittals, without separate written request, or when acceptance will

require revision to the Contract Documents.

F. Substitution Submittal Procedure:

1. Transmit each submittal through Providence Water's Project Management software.
2. Submit copies or request for substitution for consideration. Limit each request to one proposed substitution.
3. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
4. The Engineer will notify Contractor, using Providence Water's project Management Software, of decision to accept or reject request.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Closeout Procedures

B. Final Cleaning

C. Adjusting

D. Project Record Documents

E. Warranties

F. Waiver & Release of Liens

G. Consent of Surety to Final Payment

H Spare Parts and Maintenance Materials

1.2 RELATED SECTIONS

A. Section 01400 - Quality Control

1.3 CLOSEOUT PROCEDURES

A. Using Providence Water's Project Management software, submit certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Engineer's inspection.

B. Provide submittals to Engineer that are required by governing, or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.4 FINAL CLEANING

A. The Contractor shall leave all project areas in a condition equivalent to that prior to construction.

B. Clean debris from storage and staging.

C. Clean site, sweep paved areas, rake clean landscaped surfaces.

D. Remove waste and surplus materials, rubbish, and construction facilities from the site.

E. Remove erosion control material upon complete surface stabilization as determined by the Engineer.

1.5 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

1.6 PROJECT RECORD DOCUMENTS

A. Specifications: Contractor shall legibly record at each product section, description of actual products installed, including the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by addenda and modifications.

B. Contractor shall provide as-builts using Providence Water's Project Management software, with but not limited to the following information:

1. Measured depths of structures in relation to datum on drawings.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
4. Field changes of dimension and detail.
5. Details not on original Contract Drawings.

1.7 WARRANTIES

A. Provide all documents using Providence Water's Project Management software.

B. Execute and assemble documents from subcontractors, suppliers, and manufacturers.

C. Provide Table of Contents and assemble in order of specification section numbers.

D. Submit prior to final Application for Payment.

E. For items of work delayed beyond date of Substantial Completion, provide updated submittal within ten (10) days after acceptance, listing date of acceptance as start of warranty period.

1.8 WAIVER AND RELEASE OF LIENS

A. Contractor shall furnish to the Owner a Final Waiver and Release of Liens statement for the contract upon payment of the amount due for the Final Payment Application. The Final Waiver and Release of Liens shall accompany the final payment application upon submittal to the Owner.

1.9 CONSENT OF SURETY TO FINAL PAYMENT

A. The Contractor's surety shall provide a completed and executed "Consent of Surety to Final Payment" form as part of the contract closeout documents.

B. Deliver to the Owner with the Final Payment Application.

1.10 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification sections and contract drawings.

B. Deliver to the Owner; obtain receipt prior to Final Payment.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

DIVISION 2

SITE CONSTRUCTION

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work under this section includes providing approved earth borrow, sand, bank run gravel, and gravel bedding, when directed for backfills and refills of excavations; excavation and disposal at approved locations of pavements, surplus and unsuitable materials; installation of underground water main piping; protection of new work; compaction of trench bottom, backfills and subgrades; excavation and backfilling of all other appurtenant work as required or as directed.

B. This work also includes the furnishing of all labor, equipment and materials, and performing all operations in connection with excavating rock/ledge less than 1 c.y. in volume.

C. The work also includes excavation and backfill relating to demolition work.

1.02 REFERENCES

A. Within this section, the State of Rhode Island Department of Transportation "Standard Specifications for Road and Bridge Construction", latest edition, shall be referred to as the State Standards.

B. American Society for Testing and Materials (ASTM) publications:

C136-76	Sieve or Screen Analysis of Fine and Coarse Aggregates
D422-63 (R 1972)	Particle Size Analysis of Soils
D1140-54 (R 1971)	Amount of Material in Soils Finer than No. 200 (74 micrometer) sieve
D1556-82	Density of Soil in Place by the Sand Cone Method
D1557-78	Moisture Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54 kg) Rammer and 18-in (457mm) Drop
D2167-66 (R1977)	Density of Soil in Place by the Rubber Balloon Method
D2419-74 (1979)	Test for Sand Equivalent Value of Soils and Fine Aggregates
D2487-83	Classification of Soils for Engineering Purposes
D2922-81	Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

D3017-78 Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

1.03 RELATED WORK SPECIFIED ELSEWHERE

Section 02211 – Rock Removal

1.04 LAWS AND REGULATIONS

A. All work under this Contract shall be accomplished in accordance with regulations of local, county, and State and Federal agencies, and national or utility company standards as they apply.

1.05 SUBSURFACE DATA

A. Test pits have been performed and the information is available to the Bidders. Upon notification to the Owner, the Bidders will be allowed the right to make any subsurface explorations they deem necessary to satisfy themselves of the existing ground conditions. Any subsurface investigation made by the Bidder shall be at their expense.

1.06 QUALITY ASSURANCE

A. Qualification of Workmen

Provide at least one person who shall be thoroughly trained and experienced in the skills required, who shall be completely familiar with the design and application of work described for this section, and who shall be present at all times during progress of the work of this section, and who shall direct all work performed under this section.

1.07 JOB CONDITIONS

A. All excavated earth materials approved by the Owner or the Engineer as suitable for reuse shall be used for backfilling excavations and for rough grading as necessary for the completion of the contract work. All surplus or unsuitable materials, rock from rock excavation, and boulders and pavement materials, shall be removed and legally disposed of off-site by the Contractor at no additional expense to the Owner.

B. Unsuitable Materials:

1. Unsuitable materials are herein defined as organic material, peat, organic silt or combinations thereof; and any existing materials of such gradation that more than 40% of its total weight passes the No. 200 sieve in a standard gradation analysis (ASTM D422). All materials of whatever description, which are too loose or saturated for use as backfill to provide satisfactory bearing, shall also be considered as unsuitable. Tests required to evaluate such conditions shall be made at the Contractor's expense. If unsuitable material is encountered at the depths indicated on the drawings for bottom limit of excavation, the Contractor shall immediately notify the Owner or the Engineer and shall not proceed further until instructions are given.
2. The Contractor shall satisfactorily excavate and remove all unsuitable material to lines, grades and limits indicated on the drawings or as directed in writing by the Owner or the Engineer, and shall legally dispose of such material off-site. All resulting below

grade excavations shall be refilled with compacted common earth borrow.

C. Disposition of Existing Utilities:

1. Call Dig Safe seventy-two (72) hours before commencing with any excavation, in order that all pertinent utility companies become informed of such work.
2. If active utilities existing on the site are encountered they shall be carefully protected from damage. When an active utility line is exposed during construction, the Contractor shall document its location and elevation and notify in writing both the Engineer and the utility Owner notified in writing.
3. Active utility lines damaged in the course of construction operations shall be repaired or replaced at no additional cost to the Owner.

1.8 SUBMITTALS

A. Certified Laboratory Test Reports: Before delivery of materials, five (5) certified copies of the reports of all tests required herein, under materials and in referenced publications, shall be submitted to the Owner. These reports shall be submitted a minimum of ten (10) working days prior to the intended use of the materials on-site. The testing shall have been performed in an independent laboratory retained by the Contractor and approved by the Owner or the Engineer. Additional testing shall be submitted when the source of materials is changed.

PART 2 PRODUCTS

2.01 MATERIALS

A. Common borrow shall be a well-graded granular material of which at least 80 percent by weight shall be retained on the No. 200 sieve. It shall be free from peat, organic matter and debris, and shall not contain any stones or clay lumps in excess of 8 inches in their greatest dimensions. The Contractor shall submit a sample of the material he proposes to use as borrow backfill, together with results from an approved laboratory showing grain size analysis and proctor density relationships for those soils. Any materials of whatever description, are too uniformly graded or saturated to be readily compactable, shall be not utilized for earth borrow.

B. Structural backfill shall be composed of hard, durable stone and coarse to fine sand, free of peat, vegetable or organic matter, clay lumps and other debris. The gravel refill shall be readily compactable and shall not contain any stones that are in excess of two-thirds of the depth of the layer to be compacted. Structural backfill shall conform to the following gradation requirements:

U.S. Standard Sieve Size	Percent Passing by Weight
1"	55 – 100
No. 4	20 – 95
No. 40	0 – 50
No. 200	0 – 10

C. Sand Gravel Fill placed directly under structure based slabs and foundations to indicated thicknesses be imported material forming to Item M.01.02.1 of the State Standrds, modified such that the maximum particle size does not exceed 3 inches.

D. Pipe bedding shall conform to the requirements for State Standard "Gravel Borrow" with the exception that 100 percent shall pass the 1-1/2 inch mesh sieve or shall be approved 1-inch commercial grade crushed stone or gravel. Filter stone shall conform to all requirements of the State Standards for filter stone. Filter stone shall conform to the following gradation limits:

U.S. Standard Sieve Size	Percent Passing by Weight
1"	100
3/4"	75 – 85
1/2"	10 – 40
3/8"	0 – 20
No. 4	0 – 5

D. Crushed stone for pipe bedding shall consist of clean, hard, durable fragments of crushed rock and shall be free from clay, organic matter, or other objectionable material. Crushed stone shall conform to the following gradation limits:

U.S. Standard Sieve Size	Percent Passing by Weight
1"	100
3/4"	90 - 100
1/2"	20 – 50
3/8"	0 – 20
No. 4	0 – 5

E. Sand shall consist of clean, hard, durable particles not frozen, and conform to the following gradation requirements:

U.S. Standard Sieve Size	Percent Passing by Weight
3/8"	100
No. 4	80 – 100
No. 10	30 – 50
No. 40	5 – 25
No. 100	0 – 5

F. Except as otherwise specified, all fills, refills, and backfills within the project area, and for utilities and appurtenances, shall be made with gravel borrow or structural fill as hereinafter specified.

Gravel borrow sub-base for gravel roadways, utilities and pipe backfill, shall be composed of hard, durable stone and coarse to fine sand, not frozen and free from loam and undesirable organic matter, containing no stone having any dimension greater than two-thirds of the depth of layer to be compacted. Gravel borrow or bank-run gravel shall conform to the following gradation requirements:

U.S. Standard Sieve Size	Percent Passing by Weight
1"	55 – 100
No. 4	20 – 95
No. 40	0 – 50
No. 200	0 – 10

G. Initial backfill over pipes shall consist of a well-graded granular material of up to 1 inch in size. All material is to be devoid of stones (greater than 1 in.), sharp stones and crushed rock (larger than ¾ in.), lumps or frozen ground, and clayey materials that can be sensitive to water. Initial backfill material is to be placed to a minimum depth of 12 inches over the top of the pipe.

H. Final backfill over pipes shall be of good quality and be free of cinders, frozen materials, ashes, refuse, boulders, rocks, or organic material. Excavated native granular material free from perishable and objectionable objects and containing no stones larger than 6 inches in diameter shall be used for backfilling the trench as required.

I. Gravel for under structure base slabs shall conform to the following gradation:

U.S. Standard Sieve Size	Percent Passing by Weight
3/4"	100
3/8"	50 – 85
No. 4	25 – 75
No. 10	5 – 35
No. 40	0 – 10
No. 100	0 – 5

J. All refills and fills not supporting or influencing structures, pavement or utilities, shall be made with approved granular material containing sound stone, gravel and sand, free of frozen materials, silt, clay, vegetation, roots, peat, muck or other unsuitable matter.

K. The use of on-site materials for fills, refills or backfills within the building area will not be permitted unless representative samples have been tested and material meets the above gradation requirements. Additional material required for structure fill shall be provided from off-site sources and shall meet the above gradation requirements.

L. Cost for sampling, transporting and making all laboratory tests required to obtain characteristics of materials proposed to be used for fills, refills, backfills, including gradation tests and determination of moisture density relationships, will be borne by the Contractor.

PART 3 EXECUTION

3.01 GENERAL

A. All topsoil and unsuitable or excess materials shall be stripped to their entire depths from areas of new construction or regrading. Materials suitable for reuse shall be stored in approved locations that will not interfere with construction operations. Topsoil shall be stripped and stored before any underlying excavating is begun. Stripped topsoil to be reused shall be free from clay, large stones and debris. All unsuitable materials shall be excavated and legally disposed of off-site by the Contractor.

B. Earth excavation shall include the excavation, removal and satisfactory disposal of all materials of whatever nature encountered from within the limits indicated or specified or as directed by the Engineer or Owner in writing. It shall include, but not be limited to, earth materials such as peats, organic or inorganic silts, clay, sand and gravel, cobbles and boulders less than 1 cubic yard in volume, soft or disintegrated rock which, in the opinion of the Owner or the Engineer, can be removed without blasting or drilling, pavement, and all obstructions not specifically included in another section.

C. Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace, if required, to ensure the safety of workers and the general public. Dewater as needed for construction. Barricade all open excavations when not actively working in

them.

D. All excavation operations shall be accomplished to prevent the undermining or disturbance of existing pipelines, utilities and structures, of any completed construction.

E. All excavations shall be backfilled as specified.

3.02 EXCAVATION FOR STRUCTURES

A. Excavation under slabs shall be to the exact elevations required except as otherwise indicated on the drawings.

B. Additional Excavation. When excavation has reached required subgrade elevations, notify Engineer who will make an inspection of conditions.

1. If the "assumed" bearing materials, as shown on the drawings and specifications, are not encountered at the subgrade elevations indicated, carry excavations deeper and replace excavated material as directed by the Engineer.
2. Removal of unsuitable material and its replacement as directed will be paid on the basis of contract conditions relative to changes in work.

C. Excavation for Structures - Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet, and extending a sufficient distance from footings to permit placing and removal of concrete formwork, other construction and for inspection.

1. In excavating for footings, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.

D. Frost Protection:

1. Make no excavations to full depth indicated when freezing temperature may be expected. Protect the bottom so excavated areas remain free from frost if progress is delayed. Protect the subgrade of in-place footings from frost. Should protection fail, remove frozen materials and replace with concrete or gravel fill as directed, at no cost to the Owner.

3.03 EXCAVATION FOR UTILITIES

A. Excavation shall be made to the alignment, invert and finish grades shown on the drawings, or as modified by the Owner or the Engineer. Excavations shall be accurately graded to allow satisfactory construction of the contract work.

B. The bottoms of excavations shall be thoroughly compacted and in approved condition prior to placing gravel bedding. Gravel bedding shall be placed in layers not exceeding 6 inches in loose depth and each layer shall be compacted by at least two (2) passes of an approved plate-type vibratory compactor. The moisture content of the gravel shall be adjusted by moistening or drying so that proper compaction will be obtained. Where crushed stone bedding is used for pipe bedding, the Owner or the Engineer may waive the compaction requirement.

C. Bell holes and depressions for joints shall be dug after the trench bottom has been graded and

compacted, and after gravel bedding, if required, has been placed and compacted. The bottom quadrant of each pipe barrel shall have complete and uniform bearing for the full length of each pipe. The trench bottom shall again be thoroughly compacted just prior to final shaping for bedding and installation of pipe.

D. Excavation operations adjacent to and below existing structures and utilities shall be done manually and in a manner to prevent disturbance of, or damage to, the existing structures and utilities.

E. The Contractor shall be responsible for keeping all excavated and construction material a safe distance back from the edge of excavations to avoid overloading the sides of excavations and to prevent slides or cave-ins.

F. If an excavation is made deeper or wider than that shown on the drawings, there will be no extra payment for such unauthorized excavation, unless directed in writing by the Owner or the Engineer. Backfill of all unauthorized excavations shall be made by the Contractor with either selected materials from excavations or from borrow, as directed by the Owner or the Engineer, and at no expense to the Owner.

G. If a pipe is to be placed in fill, or the top of the pipe is within 2 feet of existing ground surface, the fill shall first be placed as specified herein to a height of not less than 2 feet over the top of the pipe and for a width of 5 feet beyond each side of the pipeline. Following placement of such fill, excavation and backfill shall proceed as specified herein.

H. Where the Contractor elects to use shoring installed as the excavation progresses, to maintain or otherwise protect the sides of the excavation from cave-ins or loss of ground, shoring shall be adequately braced to prevent cave-ins or loss of ground, and portions of the shoring or bracing shall be left in place as directed by the Engineer to maintain stability as backfilling progresses.

I. No excessive trench widths will be allowed to avoid the use of sheeting or shoring and bracing. The trench width for unbraced excavations at, and below, a level 1-foot above the top of the pipe, shall not exceed the maximum trench width indicated on the drawings for the size pipe being installed.

J. Where existing subsurface utilities, structures or other facilities adjacent to or crossing through the excavation require temporary support or protection, such temporary support or protection shall be satisfactorily provided by the Contractor at no additional expense to the owner. All necessary measures shall be taken by the Contractor to prevent lateral movement or settlement of existing facilities or of work in progress.

K. Grading shall be done as necessary to prevent surface water from flowing into excavations and, any water accumulating therein shall be removed by pumping or other approved method. The pipelines shall not, at any time, be used for trench drainage.

L. Excavations shall be adequately sheeted, shored and braced, as required, to permit proper excavation of the work and to protect all slopes and earth banks. Sheeting shall be installed as required to prevent cave-ins or settlement and to protect workmen, adjacent structures and utilities. Shoring and sheeting may be removed as the backfilling progresses, but only when banks are safe against caving. The Engineer may direct that sheeting, shoring and bracing be left in place at any time during the progress of the work, and direct that timber be used for

sheeting and bracing and authorized to be left in place and cut off at a specified elevation. In removing sheeting or bracing, care shall be taken to prevent voids. Voids, if formed, shall immediately be filled with sand. The installation of sheeting, shoring and bracing shall comply with the safety precautions as outlined in the Associated General Contractors of America, Manual of Accident Prevention in Construction, and all local, county, state and federal regulations. Dewatering shall be performed, as required, for all excavations below groundwater level.

3.04 ROCK EXCAVATION (over 1 c.y.)

A. All rock encountered with the limits of excavation shall be removed as may be required by the Owner or the Engineer to complete the work of this contract as shown on the drawings and as specified herein. No blasting will be permitted. Excavate for and remove rock by mechanical means.

B. Rock excavation shall include the excavation, removal and disposal of all boulders, 1 cubic yard or more in volume, and shall be in accordance with Section 02211, Rock Removal.

C. No separate or additional compensation shall be allowed for over breakage in rock excavation, nor for excavations in rock carried below the depths or beyond the lines indicated and/or specified, unless such additional excavation is specifically directed by the Engineer.

D. Where rock is encountered, it will be measured in cubic yards in its original position, prior to excavation, computed to the payment lines indicated or directed by the Owner or the Engineer.

E. When rock is encountered, the Contractor shall then notify the Engineer that the rock surface is ready for measurement. If the Contractor fails to give such notice, the Engineer will assume that the measurements taken at the time he first sees the material in questions will give the true quantity of excavation.

3.05 DEWATERING

A. Excavations may, to some extent, be below existing groundwater levels, causing the site to be subject to surface water and groundwater flow during the course of construction.

B. The Contractor shall control and pitch the grading to prevent water from running into the excavated areas of the structures or to prevent damage to other structures or work already accomplished.

C. The Contractor shall furnish all pumping and other dewatering equipment to keep excavated areas dry during construction. The groundwater shall be pumped adequately so that it is maintained a minimum of two (2) feet below the bottom of the excavation at all times. Filters shall be used on the dewatering devices to prevent the removal of fines from the soil. Water shall not be directed onto adjacent property.

D. Operation and Performance: Operate the dewatering system continuously, 24 hours per day, 7 days per week, until such time as construction work below existing water levels is complete, unless directed otherwise by the Engineer or Owner. Measure and record the performance of the dewatering system at the same time each day by use of suitable observation wells or piezometers installed in conjunction with the dewatering system. After placement of initial

slabs and backfill, the water level may be allowed to rise, but at no time is it to be higher than one (1) foot below the prevailing level of excavation or backfill.

3.06 BACKFILLING OF UTILITY TRENCHES

A. Unless directed otherwise by the Engineer, excavations shall not be backfilled until all work has been satisfactorily performed, and not until the work as installed conforms to all requirements specified in these sections. Each layer of backfill material shall be compacted in such a manner as to permit the proper and desired compaction of the filled excavation.

B. All excavations shall be backfilled as soon as practicable with approved excavated material. If suitable material as approved by the Engineer is not available from the excavations in the quantities required for proper backfilling of excavations, the Contractor shall provide approved bank-run gravel or earth borrow for backfills from off-site sources, as required.

C. Placement of gravel bedding shall be done in accordance with the following procedure:

1. The bottoms of excavations shall be thoroughly compacted and in approved conditions prior to placing gravel bedding. Gravel bedding shall be placed in layers not exceeding 4 inches in loose depth and each layer shall be compacted by at least two (2) passes of an approved plate-type vibratory compactor. The moisture content of the gravel bedding shall be adjusted by moistening or drying so that proper compaction will be obtained.
2. Gravel bedding shall be graded, compacted and shaped so that the full length of pipe barrel has complete and uniform bearing for the bottom quadrant of each pipe. Bell holes and depressions for joints shall be dug after the gravel bedding has been graded and compacted, and shall be the proper clearance for joining of pipes.
3. The Contractor shall exercise care in all operations to prevent disturbing joints, displacement of or damage to the pipes already installed. As the work progresses, the pipelines will be checked by the Engineer to determine whether any disturbance, displacement or damage has occurred. If inspection shows poor alignment, displaced or damaged pipe, disturbed joints or other defects, the Engineer shall require that all designated defects be remedied in a satisfactory manner by the Contractor at no additional expense to the Owner.

D. All other backfill placed in trenches below a level 12 inches above the top of pipe shall consist of selected backfill placed in layers not exceeding 4 inches in loose depths. Selected backfill shall be compatible materials as approved by the Engineer, not frozen, and free of clods or earth, stones larger than 2 inches in diameter, or unsuitable materials. The selected backfill shall be deposited uniformly on both sides of the pipe and shall be thoroughly compacted by tamping under and on each side of the pipe to provide uniform support around the pipe, free from voids.

E. The balance of backfill in trenches shall be compatible materials as approved by the Engineer, not frozen, and without any stones larger than 8 inches in their greatest dimension. All trench backfilling shall be carefully placed to avoid disturbance of new work and of existing utilities or structures. The moisture content of backfill shall be such that proper compaction will be obtained. Trench backfill shall be compacted to the minimum densities specified hereinafter. Unless otherwise approved by the Engineer in writing, the trench backfill shall be spread in layers not exceeding 12 inches in loose depth, and each layer shall be compacted by at least four (4) passes of an approved plate-type vibratory compactor. It is the responsibility of the

Contractor to assure that the minimum specified densities are obtained. Puddling or jetting of backfill with water will not be permitted.

F. During filling and backfilling operations, pipelines will be checked by the Engineer to determine whether any displacement of the pipe has occurred. If the inspection of the pipelines shows poor alignment, displaced pipe or any other defects, the defects designated by the Engineer shall be remedied in a satisfactory manner by the Contractor at no additional expense to the Owner.

G. Any backfill that fails to comply with the minimum density requirements specified hereinafter shall be re-compacted or, if necessary, removed to the limits directed by the Engineer. The trench shall then be refilled with approved materials and by approved methods. The backfill shall be compacted by approved methods to the minimum requirements specified hereinafter. The Contractor at no additional expense to the Owner shall perform all of this work.

H. After backfilling trenches the Contractor shall maintain the filled surfaces in good condition, with a smooth surface level with adjacent undisturbed surfaces. Any subsequent settling shall be immediately repaired by the Contractor in a manner satisfactory to the Owner and the Engineer, and such maintenance shall be provided by the Contractor for the remainder of this contract at no additional expense to the Owner.

I. The finished surfaces of filled excavations shall be compacted and reasonably smooth, and free from surface irregularities. Subgrade upon which either topsoil is to be placed, or pavements are to be constructed, shall be maintained in a satisfactory condition until the finish courses are placed. The storage or stockpiling of materials on finished subgrade will not be permitted.

J. Prior to placing base course material in areas to be paved, all soft or unsuitable material shall be removed and replaced with suitable material from excavation or earth borrow, as approved by the Engineer. All low sections, holes or depressions shall be brought to the required grade with material approved by the Engineer. The entire surface shall be shaped to line, grade and cross-section and thoroughly compacted.

3.07 COMPACTION

A. Fills placed under pavements such as roadways, parking lot subbase and utilities, shall be compacted to not less than 95 percent of the ASTM maximum dry density.

B. Backfill material shall be placed in lifts no greater than 6 inches and compacted to 95 percent of maximum density under slabs and 95 percent of maximum density under footings. Maximum density will be determined by AASHTO T-180 Method A or D. Density of soil in place will be determined by AASHTO T-191 or by a nuclear moisture density gauge approved by the Engineer. The method of correcting for oversize particles in soil compaction test results shall conform to AASHTO T-224-671.

C. All disturbed in-situ material shall be compacted to 95 percent of maximum density under slabs and footings. Maximum density will be determined by AASHTO - T-180 Method A or D. Density of soil in place will be determined by AASHTO T-191 or by a nuclear moisture density gauge approved by the Engineer.

D. All percentages of compaction specified herein shall be related to the maximum dry density as established by Method D, ASTM D1557-70, and verified in the field by ASTM D1556-68, D2167-66 or an approved nuclear density testing device. Prior to placing, at least one (1) laboratory test shall be made on a representative sample of each of the fill and backfill materials proposed to be furnished for the earthwork operations to determine gradation and moisture density characteristics. The Contractor shall arrange and provide the services of a geotechnical engineer, approved by the Engineer, to perform laboratory tests on samples of fill an backfill material proposed to be used by the Contractor for earthwork operations, and to perform field density tests.

E. Field density tests to determine the actual in-place densities being attained will be made at no additional expense to the Owner and in sufficient quantity to determine that the required compaction is being attained, but in no case less than the following frequency:

1. Trench bedding and backfill: One test for each compacted backfill layer in each section of trench. For trenches greater than 50 feet in length, provide one test every 50 feet for each compacted backfill layer.
2. Under foundation slabs or paved areas: One test per 5,000 square feet but no less than 3 tests per lift.

All retesting necessitated due to failure of the backfill to comply with the minimum percent of compaction shall be performed at no additional expense to the Owner.

F. Where vibratory compaction equipment is specified herein, or is directed to be used by the Engineer, all such equipment whether plate-type or roller shall be furnished with a vibrating surface at least 24-inches in width and capable of operating at a minimum of 2,000 blows per minute. Equipment not specifically designed as vibrating compaction equipment shall not be permitted for compaction of either existing in-place materials or of fills, refills and backfills. Jackhammers, rubber-tired vehicles and similar equipment not specifically designed and manufactured for the compaction of granular materials will not be approved for use.

G. Surfaces to be compacted, unless otherwise specified, shall be compacted by not less than six (6) complete passes of the approved vibratory compactors in order to obtain the required percentage of compaction. A complete pass shall consist of the entire coverage of the surface area to be compacted with one trip of the equipment. Each trip of the equipment shall overlap the previous trip by at least one (1) foot.

H. Dumping, spreading, preparing and compacting of several layers of fill material across the site may be performed simultaneously, providing there is sufficient total area to permit these operations to proceed in a systematic manner.

I. No rolling equipment shall be used to compact fill, refill or backfill material within four (4) feet of the vertical faces of any concrete walls or utility pipes. Plate vibratory tampers shall be used in these restricted areas and in other areas too confined to satisfactorily use rolling equipment.

J. It is the intent of these compaction requirements that the minimum in-place dry density of the compacted materials resulting from the specified minimum number of passes of the compaction equipment will be equal to or greater than the minimum percentages specified herein. Additional passes of the specified equipment shall be required if the minimum in-

place dry densities, as specified, are not obtained with the minimum passes indicated.

3.08 PROTECTION OF EXISTING UTILITIES AND STRUCTURES

A. Excavation and backfill operations shall be done in such a manner to prevent cave-ins of excavations or the undermining, damage or disturbing of existing utilities and structures or of new work. Backfill shall be placed and compacted so as to prevent future settlement or damage to existing utilities and structures and new work.

B. Any excavations improperly backfilled or where settlement occurs shall be reopened to the depth required then refilled with approved materials and compacted, and the surface restored to the required grade and condition, at no additional expense to the Owner.

C. Any damage due to excavation, backfilling or settlement of the backfill, or injury to persons or damage to property occurring as a result of such damage shall be the responsibility of the Contractor. All costs to repair such damage, in a manner satisfactory to the Owner and the Engineer, shall be borne by the Contractor at no additional expense to the Owner.

3.09 TEST PITS

A. Test pits shall be dug by the Contractor at the locations selected, and to the dimensions directed by the Engineer, for compaction testing or to establish locations of existing pipelines or any other buried item for which the exact location is to be determined. The excavation, protection and backfilling of test pits shall be in accordance with the provisions of this section. Test pits shall be backfilled with approved materials and compacted to the densities specified.

END OF SECTION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Removal and disposal of identified rock, ledge, and boulders previously identified and discovered during excavation for utilities and structures.

B. Mechanical trench rock removal.

1.02 RELATED WORK

A. Section 02200 – Earthwork

1.03 SHOP DRAWINGS

A. Submit shop drawings under provisions of Section 01300, Submittals.

1.04 UNIT PRICES

A. Rock Measurement: Volume of rock actually removed, measured in original position, but not to exceed the following:

1. 24 inches outside of concrete forms other than at footings.
2. 12 inches outside of concrete forms at footings.
3. 12 inches outside of minimum required dimensions of concrete cast against grade.
4. 6 inches beneath bottom of concrete slabs on grade.
5. 12 inches beneath water mains.

B. Unit prices for rock excavation include replacement with approved materials.

C. Rock and Boulders less than one (1) cubic yard in size that require removal and replacement with common borrow and/or imported material shall not be considered for payment. The cost for removal and replacement of rock and boulders less than one (1) cubic yard in size is considered incidental to the work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material exceeding 1 c.y. for bulk excavation, footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping or blasting:

1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch wide, short-tip-radius rock bucket; rated at not less than 120-hp flywheel power with bucket-curling force of not less than 25,000 lbf and stick-crowd force of not less than 18,700 lbf; measured according to SAE J-1179.

2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp flywheel power and developing a minimum of 45,000-lbf breakout force; measured according to SAE J-732.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify site conditions and note irregularities affecting work of this section.

B. Beginning work of this section means acceptance of existing conditions.

3.02 ROCK AND BOULDER REMOVAL

A. Where rock or boulders are exposed on the sides, or in the bottom, of excavations, they shall be wholly or partially removed as specified or directed. Rock and boulders shall be removed to not less than the trench width payment lines indicated, to not less than two (2) feet outside structure walls, and to not less than twelve (12) inches below the underside of pipes or six (6) inches below the underside structure foundation slabs.

B. Depressions resulting from the removal of boulders shall be refilled with approved compacted gravel bedding, earth borrow or other excavated material as directed. Unauthorized excavations in rock or excavations made beyond the indicated or directed limits, shall be refilled with approved compacted gravel bedding or earth borrow as directed by, and at no expense to, the Owner.

3.03 ROCK REMOVAL – MECHANICAL METHOD

A. Excavate for and remove rock by the mechanical method.

B. Cut away rock at excavation bottom to form level bearing.

C. Remove shaled layers to provide sound and unshattered base for footings and base slabs.

D. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.

E. Remove excavated material from site and stockpile at location determined by Owner.

F. Correct unauthorized rock removal in accordance with backfilling and compaction requirements of Section 02200.

3.05 FIELD QUALITY CONTROL

A. Provide for visual inspection of bearing surfaces and cavities formed by removed rock.

B. The Contractor is to notify the Engineer prior to construction of any structures within the rock excavation for approval.

END OF SECTION

PART 1 GENERAL

1.1 WORK INCLUDED

A. The work included for erosion control shall include but not necessarily be limited to:

1. Furnishing and installation of straw bales, silt fence, erosion netting, fiber rolls (straw wattles), compost filter socks, swales, soil berms, mulches, grasses, channels, crushed stone, riprap, grading to control runoff, and all other devices required to control erosion from the limits of the contract areas onto adjacent downgradient areas.
2. Continual maintenance of all installed devices to control erosion.
3. Removal and cleanup.

1.2 RELATED WORK

A. Section 02200 – Earthwork

1.3 APPLICABLE REGULATIONS

A. In order to prevent erosion and sedimentation from construction activities related to the performance of this project, the Contractor and his subcontractors shall comply with permits issued for the project, all applicable Federal, State and local laws and regulations concerning erosion and sediment control, as well as the specific requirements stated in this Section and elsewhere in the Specifications.

1.4 DESIGN CRITERIA

A. Conduct all construction in a manner and sequence that causes the least practical disturbance of the physical environment.

B. Stabilize disturbed earth surfaces in the shortest practical time and employ any and all such temporary erosion control devices as may be necessary until such time as adequate soil stabilization has been achieved or permanent erosion control devices are operational.

C. The erosion control devices specified herein represent the minimum required work for erosion control. The Contractor shall add to these minimum devices any and all measures to effectively prevent migration of sediment from the limits of the work area.

D. Within this section, the Rhode Island Soil Erosion and Sediment Control Handbook prepared by the U.S. Department of Agriculture Soil Conservation Service and the Rhode Island Department of Environmental Management shall be the guideline of analysis and the standard source for control measures.

1.5 SUBMITTALS

A. Implementation Plan

Prior to commencement of the work, the Contractor shall:

1. Meet with the Engineer to develop mutual understandings relative to compliance with the provisions of this Section and administration of the erosion and sediment control program.
2. Should the Contractor desire to change or modify the specified erosion controls then they shall submit in writing plans to the Engineer for implementing erosion and sediment control including, but not limited to, placement of straw bales, silt fence, containment berms, temporary channels, and settling ponds, as well as a description of all construction techniques intended to minimize erosion and sedimentation, and a program for maintenance of these facilities throughout the performance of construction activities.
3. The Contractor, should he desire to modify the specified plan, shall submit to the Owner and Engineer his detailed erosion and sedimentation plan for approval at least two (2) weeks prior to initiation of work.

PART 2 PRODUCTS

2.1 STRAW BALES

A. Bales shall be made of straw or hay with forty pounds (40 lbs) minimum weight and one hundred and twenty pounds (120 lbs) maximum weight. They should be either wire bound or string tied. Wood stakes shall be a minimum of two inches by two inches (2” x 2”) nominal size by a minimum of three feet (3’) long. As an alternate, one inch (1”) diameter steel rods or steel reinforcing bars may be used.

2.2 SILT FENCE

A. Silt fences or sedimentation barriers shall consist of wood posts with industrial support netting and sediment control filter fabric attached. It shall be placed as shown on the Contract Drawings. The cost of this work shall include the periodic maintenance of these materials and the ultimate removal upon completion of the project.

B. The filter fabric material shall be Type #3401 as manufactured by E.I. Dupont de Nemours & Co., Mirafi #100 as manufactured by Celanese Fibers Marketing Co. Inc., Bidim C-28 or C-34 manufactured by Monsanto Co. or approved equivalent. The posts shall be at least four and one-half feet (4½’) long and control fabric shall be at least three feet (3’) wide.

2.3 EROSION NETTING

A. Erosion netting of erosion control blanket shall be a machine-produced one hundred percent (100%) biodegradable mat with an agricultural straw fiber matrix with a typical functional longevity of approximately twelve (12) months. The blanket shall be of consistent thickness with the straw evenly distributed over the entire area of the mat. The

blanket shall be covered on the top and bottom sides with one hundred percent (100%) biodegradable natural woven fiber netting.

B. The straw erosion control blanket shall be S150BN as manufactured by North American Green or approved equivalent.

2.4 FIBER ROLLS (STRAW WATTLES)

A. Fiber rolls shall consist of wood excelsior, rice or wheat straw, or coconut fibers that are rolled or bound into a tight tubular roll. Fiber rolls shall be either prefabricated rolls or rolled tubes of erosion netting.

2.5 COMPOST FILTER SOCKS

A. Compost filter socks shall consist of a biodegradable mesh tube filled with sanitized, mature compost with no identifiable feedstock constituents or offensive odors. Compost used in filter socks shall meet all local, State, and Federal quality requirements.

B. The compost filter socks shall be Filtrexx Siltsoxx, Rexius Ecoberm, or approved equivalent.

PART 3 EXECUTION

3.1 GENERAL EROSION CONTROL REQUIREMENTS

A. All materials and installation shall be in accordance with the Contract Drawings.

B. The Owner and the Engineer have the authority to control the surface area of each material exposed by construction operations and to direct the Contractor to immediately provide permanent or temporary erosion control measures to prevent contamination of adjacent streams, watercourses, lakes, ponds, or other areas of water impoundment. Every effort shall be made by the Contractor to prevent erosion on the site and abutting properties.

C. All slopes shall be stabilized by mulching, seeding, or otherwise protected as the work progresses to comply with the intent of this specification. All damaged slopes shall be repaired as soon as possible. The Owner and Engineer shall limit the surface area of earth material exposed if the Contractor fails to sufficiently protect the slopes to prevent pollution.

D. The Contractor shall at all times have on hand the necessary materials and equipment to provide for early slope stabilization and corrective measures to damaged slopes.

E. The erosion control features installed by the Contractor shall be maintained by the Contractor, and he shall remove such installations upon completion of the Work or if ordered by the Owner or the Engineer.

F. The Contractor shall operate all equipment and perform all construction operations so as to minimize pollution. The Contractor shall cease any of his operations, which will

increase pollution during rainstorms.

G. The Contractor shall place additional erosion and sedimentation controls as required by laws and regulations.

3.2 STRAW BALE INSTALLATION

A. Bales shall be set lengthwise on the contour for sheet flow applications. They shall be held in place by two wooden stakes in each bale as detailed on the Contract Drawings. Bales shall be maintained or replaced until they are no longer necessary for the purpose intended or are ordered removed by the Owner or the Engineer.

B. Bales shall be set with bindings parallel to grade and entrenched to a minimum depth of four inches (4”). Stakes shall be driven a minimum of twelve inches (12”) into the ground and cut off flush with the top of the bale.

C. After the bale lines are staked, the end joints shall be chinked with loose straw to close any gaps. Excavated soil shall then be backfilled against the uphill side of the barrier to a depth of four inches (4”) above the downhill grade.

D. Following compaction of the backfill, loose straw shall be scattered over the surface directly behind the barrier.

E. Straw bale checks should be placed in diversions generally at fifty-foot (50’) intervals and in accordance with the RIDOT Standard Details. Sediment shall be removed from behind the checks when it has accumulated to one-half (½) the original height of the dam measured at the low point.

3.3 SILT FENCE INSTALLATION

A. Silt fence shall be installed utilizing posts four and one-half feet (4½’) long minimum staked at least eight feet (8’) on center. Prior to installation, a six inch by six inch (6” x 6”) anchor trench shall be installed at the base of the fence and the final height will be at minimum two feet (2’).

3.4 FIBER ROLL (STRAW WATTLE) INSTALLATION

A. For assembly of fiber rolls in the field, roll length of erosion control blanket into a tube of minimum eight inches (8”) in diameter. Bind roll at each end and every four feet (4’) along length of roll with jute-type twine. Stake fiber rolls into a two to four inch (2” - 4”) trench. Drive stakes at the end of each fiber roll and space four feet (4) maximum on center. Use wood stakes with a nominal classification of three-quarter inch by three-quarter inch (¾” x ¾”) and a minimum length of two feet (2’). If more than one (1) fiber roll is placed in a row, the rolls shall be overlapped, not abutted.

3.5 COMPOST FILTER SOCK INSTALLATION

A. Compost filter socks shall be installed and maintained in accordance with the manufacturer’s recommendations. Filter socks shall be anchored to the slope with 1” x 1” x 3’-0” (min.) wooden stakes driven through the center of the sock at regular intervals.

The ends of filter socks shall be directed upslope to prevent stormwater from bypassing the erosion control barrier.

3.6 DIVERSIONS

A. Diversions for directing surface runoff away from and/or around trenching and other construction operations shall be installed and stabilized in advance of new work. The Contractor shall select the cross-section shape (parabolic, vee-shaped or trapezoidal) such that the equipment he has on-site will be available for as needed maintenance.

B. The minimum capacity of the diversion shall be sized to accommodate a two-year (2-yr) design storm.

C. Periodic cleaning shall be done to maintain capacity.

3.7 REMOVAL AND CLEANUP

A. All temporary erosion control facilities and accumulated sediments shall be removed in a neat and workmanlike manner when all disturbed areas have been satisfactorily stabilized.

B. All debris removed, sediments and other earth materials shall not leave the project site, but shall be hauled to and stockpiled at the location designated by the Owner or the Engineer. All loading, hauling and stockpiling shall be performed by the contractor at no additional expense.

3.8 DEWATERING DISCHARGES

A. All pumped discharges and surface water flow from work areas shall be passed through a filter barrier of straw bales before being discharged into gutters, ditches, drainage swales, storm sewer systems, wetlands, natural water bodies, streams or rivers. The method of all such discharges shall be subject to the approval of the Owner or the Engineer. The sizing of sedimentation basins, if required, shall provide for a maximum velocity of one foot per second (1 ft./s).

END OF SECTION

PART 1 - GENERAL

1.1 SCOPE

A. This section specifies requirements for the testing of potable water systems. The work covered under this section includes, but is not necessarily limited to:

1. Leakage tests

NOTE: Testing will be performed prior to commencement of any demolition, blasting, surface preparation, and/or coating work, and prior to reconnecting the tank to the plant water system following tank upgrades. No physical connections (temporary or permanent) between new pipe and existing pipe will be allowed during the test without the use of an approved backflow prevention device.

B. All materials included in this section that are to come into contact with potable water shall be either NSF 61 or NSF 60 approved as applicable.

1.2 REFERENCES

A. American Water Works Association (AWWA):

1. AWWA C652: Standard for Disinfection of Water Storage Facilities

1.3 SUBMITTALS

A. Submittals shall be provided in accordance with the requirements as specified in Section 01300 – Submittal Procedures

B. Certified reports for all the required tests shall be provided from an approved qualified independent testing laboratory.

C. Shop drawing of temporary connection backflow preventer.

1.4 QUALITY CONTROL

A. Provide in accordance with requirements as specified in Section 01400 – Quality Control.

PART 2 - PRODUCTS

2.1 BACKFLOW PREVENTER

A. Backflow prevention devices required to fill the tanks with the existing water system prior to acceptance of pressure test, disinfections, and flushing, shall be of the appropriate size as required and shall be reduced pressure double check type as manufactured by Watts, Febco, Hersey, Zurn Wilkinson, or approved equivalent.

PART 3 - EXECUTION

3.1 TANK HYDROSTATIC LEAKAGE TESTING

A. The preliminary leakage test shall be performed following installation of the 8-inch gate valve on the service water main and hydrant as shown on the drawings and prior to any demolition, blasting, surface preparation, and/or coating work. The final leakage test shall be performed prior to reconnecting the tank to the plant water system. The tank shall be filled via a temporary 2-inch tap installed downstream of the new 8-inch gate valve on the service water main connected to the new hydrant with an approved backflow preventer. The contractor shall fill the tank to the maximum working level. The test shall consist of taking a measurement of the initial water height and allowing the water to sit over 24 hours. If at the end of the 24 hours the water level has dropped, then the Contractor shall identify the source of the leak and repair it, accordingly. Any leaks in the shell or bottom shall be repaired by chipping, gouging, or oxygen gouging to remove any defective welds, and rewelded. No repair work shall be done on any joints unless the water in the tank is at least two (2) feet below the joint being repaired. Damp spots will not be permitted at any location on the tank wall. Damp spots are defined as spots where moisture can be picked up on a dry hand. All such areas shall be repaired as necessary.

END OF SECTION

SECTION 02511 DISINFECTION OF WATER UTILITY STORAGE TANKS

PART 1 - GENERAL

1.1 SCOPE

A. This section specifies requirements for the testing and disinfection of potable water tanks.

NOTE: Testing will be performed prior to connecting the tank to the existing potable water system. No physical connections (temporary or permanent) between the tank and the system will be allowed during the test without the use of an approved backflow prevention device.

B. All materials included in this section that are to come into contact with potable water shall be either NSF 61 or NSF 60 approved as applicable.

1.2 REFERENCES

A. American Water Works Association (AWWA):

1. AWWA B300: Standards for Hypochlorites
2. AWWA B301: Standard for Liquid Chlorine
3. AWWA C600: Standard for Installation of Ductile Iron Water Mains and Their Appurtenances
4. AWWA C652: Standard for Disinfection of Water Storage Tanks

1.3 SUBMITTALS

A. Submittals shall be provided in accordance with the requirements as specified in Section 01300.

B. Certified reports for all the required test shall be provided from an approved qualified independent testing laboratory.

C. Shop drawing of temporary connection backflow preventer.

D. Detail of temporary connection between existing and new water pipelines.

1.4 QUALITY CONTROL

A. Provide in accordance with requirements as specified in Section 01400.

B. Sampling for laboratory analysis following disinfection shall be conducted by qualified personnel familiar with sampling procedures and protocols.

C. Reference Standards: Except as modified or supplemented herein, the testing of the pipeline system shall meet the requirements of the following standard specifications:

1. American Water Works Association (AWWA) C600, Latest Revision – Pressure and Leakage Tests; and C651 – Latest Revision, Disinfection Water Mains.

2. NSF/ANSI 60: National Sanitation Foundation Standard for Drinking Water Treatment Chemicals
3. NSF/ANSI 61: National Sanitation Foundation Standard for Drinking Water System Components

PART 2 - PRODUCTS

2.1 LIQUID CHLORINE

A. Liquid chlorine shall conform to AWWA Standard B301, current edition. Liquid chlorine shall be NSF 60 certified for potable water use.

2.2 HYPOCHLORITE

A. Hypochlorite shall conform to AWWA Standard B300, current edition. Hypochlorite shall be NSF 60 certified for potable water use.

2.3 BACKFLOW PREVENTER

A. Backflow prevention device for any connection between the existing water system and new water pipes prior to acceptance of pressure test, disinfections and flushing, shall be of the appropriate size as required and shall be double check-reduced pressure type as manufactured by Watts, Febco, Hersey, or approved equivalent.

B. Backflow prevention device shall be NSF-61 certified.

PART 3 - EXECUTION

3.1 PREPARATION

A. Cleaning and Inspection: The interior of all tank components shall be thoroughly cleaned of all foreign material and inspected for cracks, flaws, or other defects before installation, and shall be kept clean until the work is accepted.

3.2 DISINFECTION AND WATER QUALITY TESTING OF POTABLE WATER TANK

A. An approved backflow prevention device shall be installed at any connections between the existing water system and new water pipes and utilized prior to acceptance of pressure test, disinfections, and flushing.

B. The Contractor shall submit a tank disinfection procedure in accordance with AWWA C652 Chlorination Method 1, Method 2 or Method 3 to Providence Water Supply Board and the Engineer for review prior to chlorinating the tank. Please note that the Engineer will have to submit the tank disinfection procedure to HEALTH for review and approval. Disinfection shall meet with the approval of the Engineer, AWWA C652, and the requirements of HEALTH.

B. The Contractor shall provide all labor, material and facilities required to chlorinate and disinfect the tank.

C. Two (2) consecutive sets of acceptable samples taken at least 24 hours apart shall be collected by Providence Water personnel. Each sample shall be analyzed for total coliform and heterotrophic plate count (HPC). Providence Water personnel shall take single samples to be analyzed for volatile organic compounds (VOCs), pH, chlorine, fluoride, and iron. Following collection and analysis of samples, Providence Water personnel shall notify the contractor when the tank can be drained and put in service.

D. If the tank does not pass the VOC, HPC, or coliform sampling and it is required that the tank be drained and refilled, the Contractor will be billed for the water used at the water rates in place at that time.

E. After the required retention period, any water discharged from tank and mains shall be dechlorinated per AWWA C651 to meet Rhode Island Department of Environmental Management Water Quality Regulations (250-RICR-150-05-1) instream standard of 0.019 ppm. The Contractor shall be responsible for satisfactory disposal of all flushed water and chlorinated water at no additional expense to the Owner.

F. The samples shall be collected from a sample tap on the outlet piping from the storage facility or from a sample tap connected directly to the storage facility, or sampling from the top of the tank or hatch may be required. In any case, the operation shall be such to ensure that the sample collected is actually from water that has been in the storage facility. Sample equipment and methods shall follow aseptic techniques for bacteria sampling.

G. Recommended Additional Samples: During the disinfection operation and the required sampling of water from the storage facility it is recommended that samples be taken from water inflowing to the storage facility to determine if coliforms and VOCs are present in the typical potable water.

H. The water quality test results shall be submitted to the RI Department of Health Office of Drinking Water Quality on official reporting forms, for review and approval. Subject to satisfactory bacteriological and VOC testing and acceptable aesthetic quality, such water may be served to the distribution system.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

A. This section specifies requirements for furnishing and installing ductile iron pipelines complete and in place for water distribution systems.

B. All materials to come in contact with potable water shall be NSF 60 or 61 certified as appropriate.

1.02 REFERENCES

A. American Water Works Association (AWWA):

1. AWWA C104: Standard for Cement Mortar Lining
2. AWWA C110: Standard for Ductile Iron and Gray Iron Fittings for Water
3. AWWA C111: Standard for Rubber Gasket Joints
4. AWWA C150: Standard for the Thickness Design of Ductile Iron Pipe
5. AWWA C151: Standard for Ductile Iron Pipe, Centrifugally Cast
6. AWWA C153: Standard for Ductile Iron Compact Fittings
7. AWWA C600: Standard for Installation of Ductile Iron Water Mains and Their Appurtenances
8. AWWA C651: Standard for Disinfecting Water Mains
9. Providence Water – Requirements for Water Mains, Services, and Appurtenances (Latest Edition)

1.03 MARKING

A. Marking of all pipe shall conform to the requirements of AWWA C151, latest revision, and marking of all fittings shall conform to the requirements of AWWA C153 or C110, latest revision.

1.04 MANUFACTURER'S REPRESENTATIVE

A. The Contractor shall furnish at no additional expense to the Owner, the services of pipe manufacturer's representatives for instruction of the Contractor's personnel who will be installing the pipe. The instruction shall include proper handling, installation, and jointing and other construction areas, and shall be for such lengths of time required to fully familiarize the Contractor's personnel with the proper techniques.

1.05 QUALITY CONTROL

A. Manufacturers' Recommendations:

1. Using Providence Water’s Project Management software, The Contractor shall submit for approval of the manufacturer's recommendations for the storage, protection, handling and installation of the ductile iron pipe, pipe fittings and appurtenances, which shall be strictly adhered to by the Contractor.

B. Certificate of Compliance:

1. Each shipment of pipe, pipe fittings, and appurtenances, shall be accompanied by the manufacturer's notarized certificate certifying conformance with all requirements of these specifications.

PART 2 PRODUCTS

2.01 GENERAL

A. All materials to be incorporated into the work shall be new and purchased specifically for this contract.

B. All hardware shall be Corten as manufactured by Romac Industries.

2.02 DUCTILE IRON PIPE

A. Buried ductile iron pipe shall be Class 52 or 53, as indicated on the Contract Drawings, and shall conform to AWWA specifications C150 and C151, latest revision. Ductile iron pipe shall have push-on type joints. Push-on type joints shall be used with the exception that mechanical joints shall be used at all fittings and along straight pipe sections where mechanical joint restraint is required. Ductile iron pipe shall be restrained with Field Lok 350 Gaskets as manufactured by US Pipe or approved equivalent, where required by the drawings or as required by the Engineer. All mechanical type joints shall be restrained with MEGALUGS Series 1100. All pipe shall have a double bituminous seal coating on all exterior surfaces.

B. All buried ductile iron pipe shall be zinc coated in conformance with ISO 8179-1 “Ductile Iron Pipes – External Zinc-based coating - Part 1” Metallic Zinc with Finishing Layer, latest edition.

D. Interior ductile iron pipe shall be Class 53, with flanged joints, and shall conform to AWWA specifications C150 and C151, latest revision.

2.03 FITTINGS

A. Fittings shall be ductile iron, mechanical joint, class 350 cement-mortar lined and provided with an asphaltic coating 1 mil +/- thick on the exterior. Buried fittings shall be zinc coated. Fittings and plugs for use with the ductile iron pipe specified shall be ductile iron, with a working pressure rating of not less than 350 psi, class 350 conforming to AWWA C153, for buried ductile iron pipe.

B. Sleeve couplings and accessories shall be pressure rated to at least equal to that of the pipe. Couplings shall be ductile iron.

2.04 JOINTS

A. Push-on and mechanical type joints for pipe as specified above shall conform to AWWA C111, latest revision. Gasket material for all jointing requirements shall be styrene butadiene (SBR). All lubricants shall be certified NSF approved for use in potable water systems. All mechanical joint types shall be restrained by the Megalug restraining system.

2.05 CEMENT MORTAR LINING

A. The interior of all ductile iron pipe shall be covered with a double cement-mortar continuous lining not less than 1/8" thick for 12" pipe and smaller, and applied in accordance with AWWA/ANSI C104/A21.4, latest revision.

2.06 STORAGE OF MATERIALS

A. Pipe and related materials shall be stored in locations and in a manner approved by the Owner or the Engineer. The locations and manner of storage shall be as to minimize handling of the materials.

B. All pipe shall be stored with a plastic covering over each end of the pipe. The purpose of the covering is to prevent deleterious material from entering the pipe during storage. The covering shall be secured in-place with a cord or cable and each pipe opening shall be provided with its own covering.

C. The Contractor shall, at all times, be solely responsible for the safe storage of all materials.

2.07 TESTING

A. Manufacturer Testing:

1. Testing of ductile iron pipe shall be done in accordance with AWWA C151, latest revision.
2. Testing of ductile iron fittings shall be done in accordance with AWWA C153 or C110, latest revision.
3. Testing of jointing material shall be done in accordance with AWWA C111, latest revision.
4. Testing of the interior coating shall be done in accordance with AWWA C104, latest revision.
5. Certified test reports shall be submitted by the pipe manufacturer.
6. The Owner and the Engineer shall be notified at least ten (10) days in advance of the date and location of the testing in order to witness the tests.
7. The Contractor shall furnish to the Owner and the Engineer notarized test reports by an independent testing laboratory, which show compliance of all materials furnished to the requirements specified herein. The test reports shall indicate results and methods employed.

B. Field Testing

1. Field-testing of ductile iron pipe installed for water service shall be performed according to the requirements as specified in Technical Specification 02704, Pipeline Pressure, Leakage, and Disinfection.

2.08 IDENTIFICATION

A. Provide 6" blue metalized detection tape with white printing reading "CAUTION WATER LINE BURIED BELOW" for water pipes, as manufactured by Seton.

2.09 BURIED PIPE INSULATION

A. Insulation to be installed as directed by the engineer.

PART 3 EXECUTION

3.01 PIPE INSTALLATION

A. General:

1. All pipe shall be installed in accordance with AWWA C151, latest revision and manufacturer requirements.
2. All pipe and accessories shall be carefully inspected by the Contractor for defects before installation and all defective unsound or damaged materials shall be rejected.
3. The Engineer will make such additional inspections as he deems necessary and the Contractor shall furnish all necessary assistance for such inspection.
4. Proper implements, tools, and facilities satisfactory to the Owner and the Engineer shall be provided by the Contractor for the proper and satisfactory execution of the work.
5. At no time will work be allowed to proceed without the Owner's representative present to inspect the work.

B. Pipe, accessories, and appurtenances shall be new and unused, and shall be of the types and materials specified, as indicated or as directed.

C. The interior of pipe and fittings shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations.

D. Pipelines shall be constructed in dry trenches and shall not be laid when the conditions of the trench or the weather is unsuitable for such work.

E. The trench bottom and gravel bedding shall be shaped and compacted to give substantially uniform unyielding circumferential support to the lower fourth of the full length of each pipe.

F. Holes for the bells shall be excavated so that after placement the pipe and coupling receive uniform bearing pressure from the trench bottom. No blocking shall be allowed.

G. Each pipe shall be laid to the line and grade and in such a manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets of the flow line.

H. As the work progresses, the interior and exterior of the pipes and couplings shall be cleaned of all dirt and superfluous material of every description.

I. When required to keep interior of pipe clean, a suitable drag shall be kept in the pipe and pulled forward past each joint immediately after the jointing has been completed.

J. At times when work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth or other substance will enter the pipe or fitting.

K. Any pipe that has been disturbed after laying shall be taken up and re-laid at no additional expense to the owner.

L. All materials found to be defective during the progress of the work will be rejected by the Engineer and the Contractor shall promptly remove such defective material from the site of the work and replace with new material at no additional expense to the Owner.

M. The Contractor shall be responsible for the safe storage and proper handling of all materials.

N. No shims or mounds of earth shall be used to raise the pipe to grade.

O. All pipe shall be maintained accurately to the required line and grade.

P. No pipe shall be covered until the Engineer has inspected the joints.

Q. The pipeline shall not be used to convey trench drainage during construction.

R. Pipes shall be protected at all times during construction against flotation. They shall be thoroughly secured, properly supported and bedded to prevent settlement or disturbance. Compaction of bedding and backfill material shall be in strict accordance with Section 02200, Earthwork.

S. Bends, crosses, tees, caps, plugs, valves, and other appurtenances shall be strapped and clamped where indicated and/or as directed. Steel bars, rods and plates shall be of structural steel. Straps, bridle rods, clamps, anchors and such other parts shall be provided to the details as directed and as approved. After installation, all parts of the strapping and clamping devices shall be given two (2) heavy coats of an approved coal-tar base protective coating.

3.02 JOINTING

A. No pipes shall be jointed until couplings and ends of pipe have been inspected to determine that the joint surfaces are free from any defects in materials or workmanship, and free from dirt or other foreign matter.

B. Pipe, pipe fittings and accessories shall be stored, installed, joined and protected by the Contractor in strict accordance with the printed recommendations of the manufacturer of the piping material, and as approved.

C. Field assembled joints shall be checked with a suitable gauge as recommended by the manufacturer to ensure that the rubber rings are properly located.

D. Jointing by pushing the pipe home with a backhoe bucket or other heavy equipment will not be permitted. Utilizing the backhoe and a sling to suspend pipe while pushed home by bar or jack is permitted.

E. Protect the end of the pipe from damage at all times by using a timber header between the end of the pipe and the bar or jack.

F. If inspection indicates that the rings are improperly located, the Contractor shall disassemble, and properly reinstall the pipe.

G. Pipe stoppers shall be installed, sealed and blocked in such a manner as to prevent any leakage and so as to withstand an internal hydrostatic pressure of not less than 5 psi.

1. Timber blocking shall be of adequate size and arrangement to prevent the stopper from being blown off the line.
2. Timber bracing shall extend back to the undisturbed end of the trench.

H. Ductile iron pipe and fittings shall be provided with two brass wedges for 12" and smaller diameter pipe and four brass wedges for larger diameter pipe at each joint.

I. Bolts and nuts used with all mechanical joints shall be tightened to the manufactures specified torque with a torque wrench to verify that all bolts and nuts receive the same tightening. Under no conditions shall extension wrenches or pipe over handle of ordinary ratchet or wrench be used to secure greater leverage.

3.03 PIPE REMOVAL

A. Where old pipe conflicts with new pipe, old pipe shall be cut and capped on both ends and the caps shall be secured. No fitting or pipe deflections will be allowed on new pipe to go over or under old pipe. In areas where water mains are to be removed, the contractor shall disconnect each service lateral from the main at the corporation prior to removal of the main. The contractor shall be responsible for the legal disposal of the removed water main pipe.

3.04 IDENTIFICATION MARKERS

A. The line markers shall be installed two feet above the top of the buried pipeline. Where this is not possible, line markers shall be installed as close to two feet above the top of the buried pipeline as possible.

END OF SECTION

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included:

The work under this Section includes the furnishing, installation and testing of all valves, tapping sleeves, transition couplings, hydrants, and appurtenances as indicated on the Drawings or as may be required by the Owner or the Engineer.

B. All materials included in this section that are to come into contact with potable water shall be either NSF 61 or NSF 60 approved as applicable.

C. Related Work Described Elsewhere:

02200 – Earthwork
02616 – Ductile Iron Pipe and Fittings

D. Reference Providence Water – Requirements for Water Mains, Services, and Appurtenances

1.02 QUALITY ASSURANCE

1. Manufacturer's Recommendations:

Using Providence Water's Project Management software, The Contractor shall submit for approval of the manufacturer's recommendations for the storage, protection, handling and installation of the valves, hydrants and appurtenances, which shall be strictly adhered to by the Contractor.

2. Certificate of Compliance:

Each shipment of valves, tapping sleeves, transition couplings, hydrants and appurtenances shall be accompanied with the manufacturer's notarized certificate certifying conformance with all requirements of the Specifications.

1.03 MARKING

A. Marking of all tapping sleeves shall conform to the requirements of AWWA 110 latest revision, marking of all valves shall conform to the requirements of AWWA 515 latest revision, and marking of all hydrants shall conform to the requirements of AWWA 502 latest revision.

1.04 MANUFACTURER'S REPRESENTATIVE

A. The Contractor shall furnish at no additional expense to the Owner, the services of the manufacturer's representative for instruction of the Contractor personnel who will be installing the tapping sleeves, transition couplings, valves and hydrants. The instruction shall include proper handling, installation and jointing, and other construction areas and

shall be for such lengths of time required to fully familiarize the Contractor's personnel with proper techniques. This information shall be bound and indexed for each type of unit as herein specified.

PART 2 PRODUCTS

2.01 GENERAL

A. All materials to be incorporated into the work shall be new and purchased specifically for this Contract. All material shall be made in the United States of America and shall be provided with documentation indicating the location of the foundry and/or place of origin, unless otherwise approved.

B. All coatings and/or protective oils used on materials that will eventually be in contact with potable water must be ANSI/NSF approved.

C. All hardware for valves, tapping sleeves, and appurtenances shall be stainless steel for corrosion resistance.

2.02 TAPPING SLEEVES AND TAPPING VALVES

A. All tapping sleeves shall comply in all respects to AWWA Standard C-110 and the following design standards:

1. Tapping sleeve shall be installed at the locations shown on the plans and details.
2. The tapping sleeve shall be a mechanical type joint to provide pressure-tight installation and be suitable for use with the existing pressurized pipe material. Outlet flange shall be Class 125C, ANSI B16.1.
3. Mechanical joint tapping sleeves shall have totally confined end gaskets and be designed to withstand a minimum of 200 psi working pressure. Nuts and bolts shall be Type 304 stainless steel. Nuts shall be coated per manufacturer’s recommendations to prevent galling.
4. The test plug shall be ¾” NPT, type 304 stainless steel.
5. Mechanical joint tapping sleeve body and outlet shall be thick gauge ASTM A240 type 304/304L stainless steel.
6. Tapping valves shall comply with Section 2.03 - Gate Valves except one end shall be flanged and the other end shall be mechanical.
7. Tapping valves shall be provided with an oversized opening to allow the use of full size cutters.
8. Mechanical tapping sleeves shall be ROMAC Industries, Inc. Model STS420, or approved equivalent.

2.03 BURIED GATE VALVES

A. Resilient seated gate valves shall meet AWWA C-515 and be UL listed and FM approved. Valves shall be ductile iron-body, stainless steel mounted, non-rising stem, 3-inch through 16-inch in diameter as shown on plans. All valves shall OPEN RIGHT. All valves shall be mechanical joint.

B. Sizes 3-inch through 16-inch shall be suitable for 250 psig maximum working pressure and 400 psig test pressure.

C. Manganese bronze stem material shall have a minimum tensile strength of 70,000 psi, yield strength of 35,000 psi and maximum elongation of 15 percent. Valve shall have a minimum of two O-ring stem seals.

D. Operating nuts shall be 2-inch square at the base, tapering to 1-15/16 inches square at the top and shall be manufactured of cast or ductile iron and attached to the stem with a nut or pin at the factory. Nuts shall be painted red and marked with an "arrow" to indicate direction of opening.

E. All hardware shall be Corten as manufactured by Romac Industries.

F. Rubber seats shall be new and of a compound natural or synthetic – designated for water service application. Reclaimed rubber is not acceptable. Seats shall be either bonded or mechanically attached to the gate. When mechanically attached, all exposed hardware shall be 18-8 Type 304 stainless steel.

G. The interior and exterior of valves shall be fully epoxy coated 8 mils thick. Epoxy shall be certified NSF approved for use in potable water systems. Field touch-up of the bonded epoxy within the body of the valve will be allowed; however, touch-up kit must be provided by the manufacturer of the valve and must meet the same NSF approval as the original bonded epoxy.

H. Valves sized 3-inch to 12-inch shall be by Mueller or approved equivalent.

I. Valves sized 16-inch shall be by American Flow Control and shall have a gear actuator with a minimum 2:1 gear ratio.

2.04 STRAIGHT AND TRANSITION PIPE COUPLINGS

A. Straight and Transition Couplings shall be restrained, couplings to be Romac Alpha or approved equal.

2.05 FLANGED COUPLING ADAPTERS

A. Flanged coupling adapters shall be Romac Restrained Flanged Coupling Adapter or approved equivalent. All nuts, washers and bolts shall be stainless steel.

B. Mechanical restraint shall be an integral part of the follower gland utilizing multiple single tooth wedges. Each follower gland shall incorporate cam action, independent wedge engagement and meet applicable requirements of ANSI/AWWA C111/A21.11.

2.06 VALVE BOXES AND COVERS

A. A gate valve box shall consist of three pieces – over, upper section, and lower section – all of which are manufactured of cast iron. The lower section shall have an inside diameter of not less than 5 1/4 – inches and a length of at least 36-inches. It shall be designed to telescope into the upper section. Upper section length shall be 26-inches. Covers shall have the word "WATER" cast upon them.

B. An approved operating Key shall be provided.

2.07 THRUST RESTRAINTS

A. Restraining devices shall be utilized on all mains under the following conditions:

1. Pipeline direction changes (tees, bends)
2. Dead end lines (caps or plugs)
3. Transition pieces (reducers)
4. Couplings
5. All mechanical joints

B. Thrust blocks shall be designed to withstand the force imparted by the main with a minimum 1½ times the anticipated working pressure but not less than 150 p.s.i. Maximum lateral bearing capacity shall be 1,500 lb/sf. Sizing guidelines for thrust blocks are detailed on the project Drawings.

C. Thrust restraint shall also be provided via restrained joint, ductile iron pipe meeting AWWA C151/A21.512 and AWWA C111/A21.11. Restrained joint pipe lengths (restrained length) shall be sufficient to restrain thrust imparted by 1½ times the anticipated working pressure but not less than 150 psi. Pipe restrained joints shall be manufactured by EBAA Iron Sales, Inc. Series 1100 Megalug restraining system.

D. Thrust restraint utilizing tie-rods shall not be utilized unless approved by the Engineer or specifically indicated. Tie-rod diameters shall be 2 times the diameter required to restrain the main. All rods, nuts and other appurtenances shall be stainless steel.

2.09 HYDRANTS

A. All fire hydrants shall comply in all respects to AWWA C-502 and the following design standards:

1. Hydrants shall be dry-barrel, post-type. The main hydrant valve shall be of the compression type that opens against pressure in the main and be constructed of solid rubber that may be reinforced with steel. The connecting line or hydrant lateral shall be 6 inches in diameter, as per AWWA Standard M17.
2. The depths of bury shall have a typical bury of 5 feet, but at all times be installed to meet manufacturer's specifications for proper operation of the traffic breakaway feature. Hydrant extensions, which may be required, shall be manufactured by the same manufacturer of the hydrants being installed. Contractor shall field verify exact bury depths of all proposed hydrants prior to ordering. Should extensions be necessary on new hydrants, the contractor shall not be entitled to additional compensation or time.
3. Hydrant shall be furnished with a sealed reservoir located in the bonnet so that all threaded and bearing surfaces are lubricated each time the hydrant is operated.
4. The bottom nut is to be bronze or fusion-bonded epoxy coasted ductile or cast iron. An O-ring seal shall be provided in the main valve assembly to insure that water cannot leak from the hydrant shoe, or elbow, into the hydrant barrel of drain way. O-ring seals in the main valve area shall seat against bronze or fusion-bonded epoxy coated cast iron. Hydrants shall have a bronze seat ring threaded to a bronze sub-set.
6. Hydrant shall be equipped with 5-¼ inch main valve opening.
7. Hydrants shall have a 150 PSI working pressure. Each hydrant shall be able to deliver

500 gallons per minute through its two hose nozzles when opened together with a loss of not more than 2 psi through hydrant.

8. Hydrant shall have at least two (2) bronze or copper lined drain outlets with a minimum net diameter of ¼-inch. The shoe of the hydrant shall be 6 inch mechanical joint D-150, suitable for use either with centrifugally cast pipe or Class D Pit Cast Pipe. Lugs will be case on either side shoe, securely anchoring the hydrant. Hydrants shall be furnished with a breakable feature that will break cleanly upon impact. This shall consist of a 2-part breakable safety flange with a breakable stem coupling. Hydrant nozzles must be able to be rotated to any position without disassembly of ground-line flange.
9. Hydrants shall open to the RIGHT (clockwise) and shall have a direction-to open arrow with the word "OPEN" imprinted on the hydrant and utilize a breakaway design. Each hydrant shall have two 2 ½ inch nozzles, 180-degrees apart, and one 4 ½ - inch steamer port nozzle. All nozzle threads are to be National Standard Threat. Lead shall not be used to secure nozzles to the hydrant barrel. Nozzle caps shall be cast iron and shall be secured to the hydrant barrel with rustproof steel chains.
10. The above grade stem shall be factory-coated with “Caution” yellow enamel.
11. Hydrant exteriors, above the ground line, shall be painted with on coat of primer and two finish coats of “Ivy Green” paint that will produce a surface to which subsequent coasts of paint, having a linseed oil base, will readily adhere. Bonnets shall be painted, in the same manner, to match existing colors (“Safety Yellow”)
12. Hydrants shall be so arranged that the direction of outlets may be turned 90 degrees without interference with the drip mechanism or obstructing the discharge from any outlet.
13. Hydrants shall be furnished with caps, double galvanized steel hose cap chain, galvanized steel pumper hose cap chain, a galvanized steel chain holder and any other hooks and/or appurtenances required for proper use.
14. All hydrants shall be equipped with a 6" gate valve, or 8” gate valves and 8” lateral when tee to hydrant distances are greater than 10 feet, in accordance with Section 2.3 above, and be fully restrained as shown on the drawings. Restrained joints shall be by Megalug Thrust Restraint Wedge manufactured and sold by EBAA Iron Sales Inc. In the event a bell and spigot joint is located between the tee and hy6drant, the bell and spigot joint shall be restrained with a Field Lok gasket or approved equivalent (from Providence Water’s approved manufacturer’s list)
15. Hydrants shall be Mueller A423 or Kennedy K81D. No substitutions will be allowed.
16. Hydrants shall be installed with sufficient height that when installed a 15-inch hydrant wrench will not contact the ground when making a full 360-degree turn on any nozzle cap.
17. A drainage pit with a volume of 10 cubic feet shall be provided at the base of the fire hydrant barrel. The pit shall be filled with gravel or crushed stone to a depth of 6 inches above the hydrant drain opening and covered with filter fabric prior to backfilling. The gravel or crushed stone aggregate shall provide void space greater than the volume of the hydrant barrel.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:

1. All tapping sleeves, valves, hydrants, and accessories shall be carefully inspected by

the Contractor for defects before installation and all defective, unsound or damaged materials shall be rejected.

2. The Owner or the Engineer will make such additional inspections as deemed necessary and the Contractor shall furnish all necessary assistance for such inspection.
3. Proper implements, tools and facilities satisfactory to the Owner or the Engineer shall be provided by the Contractor for the proper and satisfactory execution of the work.

B. Tapping sleeves, valves, couplings and appurtenances shall be new and unused and shall be of the types and materials specified as indicated or as directed.

C. The interior of tapping sleeves, valves, and fittings shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operation.

D. Tapping sleeves, valves, and fittings shall be constructed in dry trenches and shall not be laid when the conditions of the trench or the weather are unsuitable for such work.

E. Tapping sleeves, valves, and couplings shall be laid to the line and grade in such a manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets of the flow line.

F. At times when work is not in progress, open ends of tapping sleeves, valves and fittings shall be securely closed so that no trench water, earth or other substances will enter.

G. Any tapping sleeves, valves or fittings that have been disturbed after laying shall be taken up and re-laid.

H. All materials found to be defective during the progress of the work will be rejected by the Engineer and the Contractor shall promptly remove such defective material from the site of the work and replace with new material at no additional expense to the Owner.

I. The Contractor shall be responsible for the safe storage and proper handling of all materials.

J. No shims or mounds of earth shall be used to raise the equipment to grade.

K. No tapping sleeve, valve, or appurtenance shall be covered until the joints have been inspected.

L. Installed materials shall be protected at all times during construction against flotation; they shall be thoroughly secured, properly supported and bedded to prevent settlement or disturbance. Compaction of bedding and backfill material shall be in accordance with Section 02200, EARTHWORK.

M. Tapping sleeves shall be installed where indicated or as directed by the Owner or the Engineer and shall be installed according to the manufacturer's recommended procedures.

N. Valves and joint restraints shall be installed where indicated or as directed by the Owner or the Engineer and shall be installed according to the manufacturer’s recommended procedures.

3.02 SETTING VALVES AND VALVE BOXES

A. Valves shall be set in the pipelines as directed. Blocking or supports of a permanent nature shall be placed under each valve to ensure against settlement.

B. Each valve shall be tightly closed before being placed in the line and shall remain so until the joints on each side are completely tightened.

C. Valve boxes shall be set for all valves and shall be locking type. They shall be carefully fitted together and to the valve and securely held during backfilling. They shall be centered over the valve-operating nut. The bedding material around them shall be thoroughly tamped in place and the box cover set to the finished grade.

3.3 TESTING

A. All materials shall be tested for tightness as soon after installation as possible in accordance with Section 02704, PIPELINE PRESSURE, LEAKAGE, AND DISINFECTION.

B. All materials found to be defective during testing shall be replaced with new and approved material at no additional expense to the Owner.

3.4 TEST REPORTS AND CERTIFICATES

A. In addition to other requirements specified herein, the Contractor shall furnish to the Engineer notarized test reports and methods of test by an approved independent testing laboratory to show compliance of all materials furnished under this section of the Specifications with all the requirements herein.

A. Each shipment of tapping sleeves, valves, and other appurtenances shall be accompanied by the manufacturer's notarized certificate of conformance certifying that materials to be furnished under these items meet all requirements herein.

B. All testing of materials furnished under this section of the Specifications shall be provided by the Contractor at no additional expense to the Owner.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

A. This section specifies requirements for the testing and disinfections of underground potable water pipelines. The work covered under this section includes, but is not necessarily limited to:

1. Leakage tests
2. Disinfection

NOTE: Testing will be performed prior to connecting new pipeline sections to any existing potable water system piping. No physical connections (temporary or permanent) between new pipe and existing pipe will be allowed during the test without the use of an approved backflow prevention device.

1.02 REFERENCES

A. American Water Works Association (AWWA):

1. AWWA B300: Standards for Hypochlorites
2. AWWA C600: Standard for Installation of Ductile Iron Water Mains and Their Appurtenances
3. AWWA C651: Standard for Disinfecting Water Mains
4. Providence Water: Requirements for Water Mains, Services, and Appurtenances (latest edition).

1.03 SUBMITTALS

A. Certified reports for all required tests shall be provided from an approved, qualified, independent testing laboratory.

B. Shop drawing of temporary connection backflow preventer.

C. Detail of temporary connection between existing and new water pipelines.

PART 2 PRODUCTS

2.01 HYPOCHLORITE

A. Hypochlorite shall conform to AWWA Standard B300, current edition. Hypochlorite shall be NSF 60 certified for potable water use.

2.02 BACKFLOW PREVENTER

A. Backflow prevention device for any connection between the existing water system and new water pipes prior to acceptance of pressure test, disinfections and flushing, shall be of the appropriate size as required and shall be double check type as manufactured by Watts, Febco, Hersey, or approved equivalent.

B. Backflow prevention device shall be NSF-61 certified.

2.03 GAUGES

A. Gauges used by the contractor in performance of the leakage tests shall be NIST certified and certification shall be traceable back to NIST.

PART 3 EXECUTION

3.01 PREPARATION

A. Cleaning and Inspection: The interior of all pipe, fittings, valves and appurtenances shall be thoroughly cleaned of all foreign material and inspected for cracks, flaws, or other defects before installation, and shall be kept clean until the work is accepted.

3.02 FIELD QUALITY CONTROL

A. Alignment Tests: Each section of pipe will be checked by the Owner or the Engineer in order to determine whether any displacement of the pipe has occurred. The Contractor shall provide suitable assistance to the Owner or the Engineer. The Contractor shall repair any poor alignment, displaced pipe or other defects discovered, as directed by the Engineer.

B. Hydrostatic Tests: After the pipe has been laid and the trench has been backfilled, all newly laid pipe or any valve section thereof, shall be subjected to a pressure and leakage test in accordance with AWWA C600-latest edition, Providence Water standards, and as approved by the Engineer. The Contractor shall provide all pumps, pipe, connections, gages, measuring devices, and all other apparatus necessary for the test and shall conduct the test in the presence of and to the satisfaction of the Engineer. The Owner will supply water to the Contractor for testing purposes at no expense to the Contractor.

1. Test Pressure - The required minimum test pressure shall be 1-1/2 times the working pressure measured at the point of lowest elevation of the pipeline and corrected to the elevation of the test gauge, but shall not be less than 150 psi. Test pressures shall not vary by more than plus or minus 5 psi for the duration of the test.
2. Duration of Test - two (2) hours minimum.
3. Air Removal - Prior to performance of the test the pipeline shall be completely filled with water for a period of 72 hours. Expel air by means of air relief valves, hydrants or other means as required. If permanent air vents or taps are not located at all high points, the Contractor shall install corporation stops at such points so air can be expelled. After the tests are completed, plug all temporary taps.
4. Allowable Leakage:
    a. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valve section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. Leakage shall not be measured by a drop in pressure in a test section over a period of time.
    b. No pipe installation will be accepted if the leakage is greater than that determined by the following formula in which "L" is the allowable leakage in gallons per hour; "S" is the length of pipe tested in feet; "P" is the average test pressure during the leakage test in pounds per square inch (gauge); and "D" as the nominal diameter of the pipe in inches.

$$L = \frac{SD\sqrt{P}}{133{,}200}$$

5. Repair of Leaks - If the test discloses leakage greater than the allowable leakage the Contractor shall, at his own expense, locate and repair the defective joints until leakage is within the specified allowable. The Contractor shall repair any specific leaks regardless of the test results if, in the opinion of the Engineer, they are serious enough to endanger the future serviceability of the pipeline.

3.03 DISINFECTIONS OF POTABLE WATER LINES

A. General:

1. Flushing and disinfections of potable waterlines shall be done in accordance with the procedure set forth in AWWA C651 - Disinfecting Water Mains, latest edition, and shall be witnessed by the Engineer unless otherwise approved. The Contractor shall provide all temporary blowoffs, pumps, chlorination equipment, chlorine and all other necessary apparatus required. The Owner will supply water to the Contractor for disinfections purposes at no expense to the Contractor.
2. All valves on the new main shall be operated during the disinfections procedure in order to ensure complete disinfections.
3. The form of chlorine proposed by the Contractor for disinfections shall be approved by the Engineer.
4. The Contractor shall take adequate measures to prevent backflow of flushing water and chlorinated water into the existing water distribution system.
5. Contractor shall not make physical connection to the existing water main prior to satisfactory results of chlorination. An approved backflow prevention device shall be utilized to transfer water from the existing system to the new piping network.
6. Unless precluded by unexpected events, the Contractor shall notify the Owner at least three (3) working days prior to a water main shutdown. The Owner shall determine if the operation of valves will be performed by The Owner’s work forces, the Contractor, or a Owner Subcontractor. The immediacy of water main shutdowns or valve operation is not warranted by the Owner. In the operation of valves, for the purpose of shutting down existing mains, the Owner does not guarantee or imply that shut down will be completely effective in stopping the flow of water to open ends. If so directed by the Owner, the Contractor shall operate all valves required to shut down (and subsequently reopen) existing water mains. If the Contractor is unable to shut down a valve after two (2) hours of attempting to do so, the Owner will direct the Contractor as to how to proceed.

B. Pipe Cleaning:

1. If the pipe contains dirt or heavy encrusted matter that, in the opinion of the Engineer, will not be removed during the flushing operation, the Contractor shall clean and swab the interior of the pipe with a one (1) percent hypochlorite disinfecting solution.
2. The pipeline shall be flushed to remove all remaining foreign material prior to disinfections, except when the tablet method is used. The flushing operation shall develop a minimum velocity of 3.0 ft/sec. It will be the Contractor's responsibility to properly size and locate corporations within test sections to adequately flush all piping

at least 2 times its volume at the desired velocity. A minimum of a six-inch (6") supply line will be required to adequately flush all piping for this project.

3. Main line valves shall not be utilized to fill, flush, test or chlorinate water mains unless authorized and supervised by the Engineer.

C. Chlorine Application:

1. In general, chlorine shall be applied using the continuous feed method, as specified in AWWA C651.
2. Introduce water into the line at a constant rate while adding chlorine to the water at a constant rate, such that the water will have not less than 25 mg/L free chlorine. Maintain the chlorinated water in the pipeline for a minimum of 24 hours, after which period the treated water shall have a free chlorine residual of not less than 10 mg/L throughout the entire length. Repeat the above procedure if the residual, at the end of the 24 hours, fails to meet the minimum concentration. Chlorinated water, above the normal system prevailing concentration, shall not be allowed to remain in the pipeline for a period longer than 5 days.
3. Fire hydrants may not be used for sampling points but may be utilized as a feed source if properly flushed and the Owner's required temporary piping system installed.

D. Final Flushing:

1. After the required retention period, flush all heavily chlorinated water from the main until the chlorine concentration is no higher than that prevailing in the system, or is acceptable for domestic use. The Contractor shall be responsible for satisfactory disposal of all flushing water and chlorinated water at no additional expense to the Owner.
2. Prior to discharging, a reducing agent shall be applied to the water to be wasted, to neutralize thoroughly the chlorine residual remaining in the water. (See Appendix C of AWWA C651 for neutralizing chemicals).

E. Analytical Tests:

1. After completion of the final flushing and prior to placing the pipeline in service, two (2) consecutive sets of acceptable samples taken at least 24 hours apart shall be collected by Providence Water personnel. Each sample shall be analyzed for total coliform and heterotrophic plate count (HPC). Providence Water personnel shall take single samples to be analyzed for pH, chlorine, and iron.
2. No VOC samples will be taken for water mains.
3. All samples must meet Providence Water Standards.

F. Repetition of Procedure - If the original disinfections fails to produce satisfactory samples, repeat the disinfections procedure until satisfactory results are obtained at no additional expense to the Owner. The Owner reserves the right to charge for the cost of additional water and cost to preform additional sampling, should the first round of sampling fail to produce satisfactory results.

END OF SECTION

DIVISION 3

CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. This specification describes the patching and overlay of damaged/spalled elevated tank foundations using portland cement concrete.

1.02 QUALITY ASSURANCE

A. Manufacturing qualifications: The manufacturer of the specified product shall be ISO 9001/9002 certified and have in existence a recognized ongoing quality assurance program independently audited on a regular basis.

B. Contractor qualifications: Contractor shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. Contractor shall maintain qualified personnel who have received product training by a manufacturer's representative

C. Install materials in accordance with all safety and weather conditions required by manufacturer or as modified by applicable rules and regulations of local, state and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

1.03 DELIVERY, STORAGE, AND HANDLING

A. All materials must be delivered in original, unopened containers with the manufacturer’s name, labels, product identification, and batch numbers. Damaged material must be removed from the site immediately.

B. Store all materials off the ground and protect from rain, freezing or excessive heat until ready for use.

C. Condition the specified product as recommended by the manufacturer.

1.04 JOB CONDITIONS

A. Environmental Conditions: Do not apply material if it is raining or snowing or if such conditions appear to be imminent. Minimum application temperature 45ºF (7ºC) and rising.

B. Protection: Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified material.

1.05 SUBMITTALS

A. Submit two copies of manufacturer’s literature, to include: Product Data Sheets, and appropriate Material Safety Data Sheets (MSDS).

1.06 WARRANTY

A. Provide a written warranty from the manufacturer against defects of materials for a period of one (1) year, beginning with date of substantial completion of the project.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. **Sikacrete 211 SCC Plus**, as manufactured by Sika Corporation, is considered to conform to the requirements of this specification.

2.02 MATERIALS

A. Portland cement concrete:

1. The repair concrete shall be self consolidating and polymer modified. It shall be comprised of selected portland cements, specially graded aggregates, admixtures for controlling setting time and plasticizers for workability as well as silica fume and a migrating corrosion inhibitor.
2. The materials shall be non-combustible, both before and after cure.
3. The materials shall be supplied as a factory-blended unit.
4. The portland cement concrete must be placeable from 1 in. to 8 in. in depth and appropriate for full-slab depth repair and replacement.

B. The portland cement concrete aggregate shall conform to ASTM C-33. (similar to No.8 distribution per ASTM C-33, Table II) and be clean, well-graded, having low absorption and high density.

2.03 PERFORMANCE CRITERIA

A. Typical Properties of the mixed portland cement concrete:

1. Initial spread: SCC, 27-33 in. approx.
2. Spread at 30 min: > 15 in.
3. Application time: 60 min.

B. Typical Properties of the cured portland cement concrete:

1. Compressive Strength (ASTM C-39 modified)
   a. 1 day: 2,000 psi min. (13.8 MPa)
   b. 7 day: 6,000 psi min. (41.4 MPa)
   c. 28 day: 7,000 psi min. (48.3 MPa)
2. Flexural Strength (ASTM C-78) @ 28 days: 1,000 psi (6.9 MPa)
3. Splitting Tensile Strength (ASTM C-496) @ 28 days: 1,000 psi (6.9 MPa)
4. Bond Strength (ASTM C-882 modified) @ 28 days: 2,500 psi (17.2 MPa)
5. Shrinkage (ASTM C-157): < 0.05%
6. Chloride ion permeability (ASTM C-1202): < 650 Coloumbs
7. The portland cement concrete shall not produce a vapor barrier.

Note: Above tests performed with curing conditions @ 71ºF – 75ºF and 45-55% relative humidity.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Areas to be repaired must be clean, sound, and free of contaminants. All loose and deteriorated concrete shall be removed by mechanical means. Mechanically prepare the concrete substrate to obtain an exposed aggregate surface with a minimum surface profile of +/- 1/8 in. (CSP 7-8 per ICRI Guidelines). Saturate surface with clean water. Substrate should be saturated surface dry (SSD) with no standing water during application. Area to be patched shall not be less than 1 in. in depth.

B. Where reinforcing steel with active corrosion is encountered, sandblast the steel to a white metal finish to remove all contaminants and rust. Where corrosion has occurred due to the presence of chlorides, the steel shall be high pressure washed after mechanical cleaning. Prime steel with 2 coats of Sika Armatec 110 EpoCem as directed by manufacturer. (See Spec Component SC-201-0699)

3.02 MIXING AND APPLICATION

A. Start mixing with 5.5 pints of water. An additional 0.5 pint can be added if needed. **Do not overwater**, as excess water will cause segregation. Add entire contents of one bag of Sikacrete 211 SCC Plus while continuing to mix to a uniform consistency, maximum 3 minutes. Mechanically mix with a low-speed (400-600 rpm) drill or in an appropriate-size mortar mixer or concrete mixer.

B. Placement Procedure: Pre-wet surface to SSD (Saturated Surface Dry) with no standing water. Ensure good intimate contact with the substrate is achieved. To accomplish this, material should be scrubbed into substrate filling all pores and voids. While the scrub coat is still plastic, force material against edge of repair, working toward center. If repair area is too large to fill while scrub coat is still wet use Sika Armatec 110 EpoCem in lieu of scrub coat (See Spec Component SC-200). After filling, consolidate, then screed. Allow concrete to set to desired stiffness, then finish with trowel, manual or power, for smooth surface. Broom or burlap drag for rough surface.

C. Alternatively the material may be poured or pumped into formed areas. To ensure proper filling and adhesion vibrate the material during placement or pump the repair material under pressure. Vibrate form while pouring or pumping. Pump with a variable pressure pump. Continue pumping untial a 3 to 5 psi increase in normal line pressure is evident then STOP pumping. Form should not deflect. Vent to be capped when steady flow is evident, and forms stripped when appropriate.

D. As per ACI recommendations for portland cement concrete, curing is required. Moist cure with wet burlap and polyethylene, a fine mist of water or a water-based* compatible curing compound. Moist curing should commence immediately after finishing. Protect newly applied material from rain, sun, and wind until compressive strength is 70% of the 28-day compressive strength. To prevent from freezing cover with insulating material. Setting time is dependent on temperature and humidity.

*Pretesting of curing compound is recommended.

E. Adhere to all procedures, limitations and cautions for the portland cement mortar in the manufacturers current printed technical data sheet and literature.

3.03 CLEANING

A. The uncured portland cement mortar can be cleaned from tools with water. The cured portland cement mortar can only be removed mechanically.

B. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

END OF SECTION

DIVISION 5

METALS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Structural steel repair of elevated water storage tank, including, but not limited to, the following:
   a. modification to catwalk guardrail to meet OSHA requirements;
   b. modifications to storage tank overflow pipe; and
   c. installation of a new tank access ladder with grab bars and fall protection system.

2. Drawings and general provisions of the Contract, including Division 00 and 01, apply to this Section.

1.2 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard American Welding Society (AWS) symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
5. For structural-steel connections indicated to comply with design loads, include structural analysis data signed and sealed by the qualified Professional Engineer registered in the State of Rhode Island responsible for their preparation. This shall include, at a minimum, the modifications to the guardrail.

C. Welding certificates.

D. Qualification Data: For installer, fabricator, professional engineer, and testing agency.

E. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:

1. Structural steel including chemical and physical properties.
2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
3. Direct-tension indicators.
4. Tension-control, high-strength bolt-nut-washer assemblies.

5. Shop primers.

F. Source quality-control test reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

B. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category Sbd.

C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code-Steel."

D. Comply with applicable provisions of the following specifications and documents:

1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
3. AISC's "Specification for the Design of Steel Hollow Structural Sections."
4. AISC's "Specification for Allowable Stress Design of Single-Angle Members."
5. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.5 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 erosion and deterioration.

1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
2. 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.

1.6 COORDINATION

A. Furnish 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.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. Channels, Angle Shapes: ASTM A 36/A 36M.

B. Plate and Bar: ASTM A 36/A 36M.

C. Welding Electrodes: Comply with AWS requirements.

1. E60 series electrodes shall be used for field welding to existing steel.
2. E70 series electrodes shall be used for shop fabrication of new steel components.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: Plain.
2. Direct-Tension Indicators: ASTM F 959, Type 325 compressible-washer type:
   a. Finish: Plain.

B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy hex or round head steel structural bolts with splined ends; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: Plain.

2.3 PRIMER

A. Surface Preparation, Priming, and Painting shall be according to the requirements of Section 09970 Steel Water Storage Tank Painting.

2.4 FABRICATION

A. Structural Steel: Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings-Allowable Stress Design and Plastic Design".

B. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Base-Plate 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.

2.5 SHOP PRIMING

A. All shop fabricated structural steel components shall be shop primed except for the following:

1. Surfaces to be field welded.
2. Surfaces to be high-strength bolted with slip-critical connections.

B. Surface Preparation, priming, and painting shall be according to the requirements of section 09970.

2.6 SOURCE QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify dimensions, member sizes, and plate sizes for all tank components to be repaired or replaced.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during removal and replacement of deteriorated tank components and during the erection of new components to maintain stability of all tank components and 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.

3.3 ERECTION

A. Set structural steel components accurately in locations and to elevations indicated on the approved Shop Drawing and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings-Allowable Stress Design and Plastic Design".

B. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

C. Align and adjust various members forming part of complete structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

D. Splice members only where indicated on the approved Shop Drawings.

E. Do not use thermal cutting during erection.

F. 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 according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened, Pre-tensioned, or Slip critical as specified on the approved Shop Drawings.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings-Allowable Stress Design and Plastic Design" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Welded Connections: Field welds will be visually inspected according to AWS D1.1.

1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

C. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

A. Touchup Painting: Cleaning and touchup painting are specified in Section 09970 Steel Water Storage Tank Painting.

END OF SECTION

DIVISION 7

THERMAL & MOISTURE PROTECTION

SECTION 07920 FLUID APPLIED WATERPROOFING

PART 1 GENERAL

1.01 SUMMARY

A. This specification describes the injection of cracks and joints with infiltrating water with a low viscosity hydrophobic polyurethane resin chemical grout in the underground tank piping vault as shown on the drawings.

1.02 QUALITY ASSURANCE

A. Manufacturing qualifications: The manufacturer of the specified product shall be ISO 9001:2008 certified and have in existence a recognized ongoing quality assurance program independently audited on a regular basis.

B. Contractor qualifications: Contractors shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. Contractor shall maintain qualified personnel who have received product training by the manufacturer's representative.

C. Install materials in accordance with all safety and weather conditions required by manufacturer or as modified by applicable rules and regulations of local, state and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Deliver the specified product in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers.

B. Store and condition the specified product as recommended by the manufacturer.

1.04 JOB CONDITIONS

A. Environmental Conditions: Do not apply material if it is raining or snowing or if they appear to be imminent.

B. Protection: Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified repair material.

1.05 SUBMITTALS

A. Submit two copies of manufacturer's literature, to include: Product Data Sheets, and appropriate Material Safety Data Sheets (MSDS).

1.06 WARRANTY

A. Provide a written warranty from the manufacturer against defects of materials for a period of one (1) year, beginning with date of substantial completion of the project.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Hydrophobic Polyurethane Chemical Grout:

a. SikaFix HH LV as manufactured for Sika Corporation, Lyndhurst, New Jersey, is considered to conform to the requirements of this specification.

B. Substitution: The use of other than the specified products will be considered providing the contractor requests their use in writing to the Engineer. This request shall be accompanied by (a) A certificate of compliance from an approved independent testing laboratory that the proposed substitute products meet or exceed the specified performance criteria, tested in accordance with the specified test standards; and (b) Documented proof that the proposed substitute products have a two year proven record of performance of the chemical injection grouting of a crack, confirmed by actual field tests and five successful installations that the Engineer can investigate.

2.02 MATERIALS

A. Expanding Polyurethane Chemical Grout

1. The grouting compound shall be a non-toxic, non-flammable, high flash point (270 F) hydrophobic polymer of the type which is applied in a crack or open joint by use of a packer. When the grout is mixed with water the material will expand up to 2 to 5 times its original volume and cure to a pale yellow closed cell polyurethane foam.

B. The use of injection packers is usually required for the application of the polyurethane chemical grout.

2.03 PERFORMANCE CRITERIA

A. Properties of the mixed polyurethane chemical grout.

1. Pot Life: approximately 5 hours, providing no moisture enters the system
2. Mixed Viscosity: 450 - 850 cps ASTM D- 2196 A
3. Color: pale yellow
4. Flash point 270F
5. Density 8.7 – 9.2 lbs./gal. ASTM D 3754- 95
6. Solids 100%
7. Corrosiveness - non- corrosive

B. Properties of the cured polyurethane chemical grout

1. Tensile Strength: 150 psi ASTM D-190-63
   a. Elongation: 250%
2. Absorption 10% After 6 months immersion
3. Shrinkage: Less than 4% ASTM D-1042
4. Density 8.70 – 9.17 lbs./gal ASTM D3574

Note: Above tests performed with curing conditions @ 71°F – 75°F and 45-55% relative humidity.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Expanding polyurethane chemical grout - When crack (s) is contaminated on the outside it will be necessary to clean the crack surface to exactly locate the crack. If the crack encounter high water flow, it will be necessary to seal the surface of the crack with a surface sealing material. The surface sealing can be done before or after drilling the injection holes. Then, begin drilling 5/8" diameter holes along the side of the crack at 45 angles. Drill the hole to intersect the crack midway through the substrate. Install the injection packers in holes. Prior to product application moisture must be present. If concrete being injected contains insufficient moisture to activate the grout, inject the crack with a small amount of water prior to the application of the chemical grout.

3.02 MIXING AND APPLICATION

A. Mixing the polyurethane chemical grout for the injection of cracks:

1. The material can be agitated vigorously shaking the 5 gallon pail or by mixing thoroughly for about 2 minutes max. with low speed (400-600 rpm), drill and paddle, bung mixer.

   Caution: Do not allow water to enter this mix and avoid “whipping” air into the material.

B. Placement procedure: set packers as required by the manufacturer.

1. Begin by drilling 5/8" diameter holes along the side of the crack at a 45° degree angle. Drill the hole to intersect the crack midway through the substrate. Spacing of the injection ports depends on crack width, but normal spacing varies from 6” to 36”. It is necessary to flush the drilled holes with water to remove drill dust from the holes and cracks, and insure that the crack is wet enough to react with the grout when introduced to the crack. On structures open on both sides, provide packers on opposite sides at staggered elevations. Install the injection packers in the holes.

   If the crack or joint to be injected is ½” or greater at surface, pack an open cell polyurethane foam saturated with the mixed polyurethane chemical grout into the crack/ joints. Spray the saturated foam with a small amount of water to activate the grout and create a surface seal.

   Injection pressure will vary from 200 psi to 2500 psi depending on the width of the crack, thickness of the concrete and condition of the concrete.

C. Placement Procedure: The polyurethane chemical grout for the pressure injection grouting.

1. Inject the prepared cracks with a minimum of 250 psi in order to achieve maximum filling and penetration without the inclusion of air pockets or voids in the polyurethane chemical grout. Begin the pressure injection at the lowest packer and continue until there is the

appearance of the polyurethane chemical grout at an adjacent packer, thus indicating travel. When travel is indicated, a decision to discontinue or continue the pressure injection from that packer should be made by the contractor, based on his experience, with the approval of the engineer. Continue the procedure until all pressure-inject able cracks have been filled.

2. Pump polyurethane chemical grout for 45 seconds and then pause to allow the material to flow into all of the cracks and crevices. Watch for material flow and water movement to appear on the surface. When movement stops, begin injection into the next packer. When sealing vertical cracks, begin injecting at the bottom of the crack and work vertically. If site temperatures are extremely low, heat bands or heated water baths may be used on the pails, before and during use to maintain the products temperature. Re-inject to assure that all voids are properly sealed off.

3. If penetration of any cracks is impossible, consult the engineer before discontinuing the injection procedure. If modification of the proposed procedure is required to fill the cracks, submit said modification in writing to the engineer for acceptance prior to proceeding.

4. Adhere to all limitations and cautions for the polyurethane chemical grout as stated in the manufacturers current printed literature.

Caution: Expanding chemical grout is exerting outward pressures of up to 450 psi. The review of drawings of the area to be repaired is desirable.

3.03 CLEANING

A. Clean-up: Completely flush pump and hoses with SikaFix Pump Flush. Use sharp sided tool such as putty knife or trowel to remove excess material from walls, floors, etc. Wait for material to cure before removing. May be sanded off if necessary.

B. The uncured polyurethane chemical grout can be cleaned from tools with an approved solvent. The cured polyurethane chemical grout can only be removed mechanically.

C. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

Note: Tests were performed with material and curing conditions at 71-75F and 45-55% relative humidity.

END OF SECTION

DIVISION 9

FINISHES

PART 1 GENERAL

1.01 SUMMARY

A. This specification describes the coating of storage tank concrete foundations with an anti-carbonation, protective coating following concrete rehabilitation in accordance with section 03930.

1.02 QUALITY ASSURANCE

A. Manufacturing qualifications: The manufacturer of the specified product shall be ISO 9001:2008 certified and have in existence a recognized ongoing quality assurance program independently audited on a regular basis.

B. Contractor qualifications: Contractor shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. Contractor shall maintain qualified personnel who have received product training by manufacturer's representative

C. Install materials in accordance with all safety and weather conditions required by manufacturer or as modified by applicable rules and regulations of local, state and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

1.03 DELIVERY, STORAGE, AND HANDLING

A. All materials must be delivered in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers. Damaged material must be removed from the site immediately.

B. Store all materials off the ground and protect from rain, freezing or excessive heat until ready for use.

C. Condition the specified product as recommended by the manufacturer.

1.04 JOB CONDITIONS

A. Environmental Conditions: Do not apply material if it is raining or snowing or if such conditions appear to be imminent. Minimum application temperature 45ºF (7ºC) and rising.

B. Protection: Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified material.

1.05 SUBMITTALS

A. Submit two copies of manufacturer's literature, to include: Product Data Sheets, and appropriate Material Safety Data Sheets (MSDS).

B. Submit copy of Certificate of Approved Contractor status by manufacturer.

1.06 WARRANTY

A. Provide a written warranty from the manufacturer against defects of materials for a period of one (1) year, beginning with date of substantial completion of the project.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. **Sikagard 670W**, as manufactured by Sika Corporation, 1682 Marion Williamsport Road, Marion, Ohio, 43302 is considered to conform to the requirements of this specification.

2.02 MATERIALS

A. Protective Acrylic Coating:

1. Product shall be 100% Acrylic Emulsion with the following properties:

   a. Non-vapor barrier

   b. Must resist ingress of chlorides

   c. Must resist ingress of carbon dioxide

   d. The material shall be non-combustible, both before and after cure.

2.03 PERFORMANCE CRITERIA

A. Properties of the protective acrylic coating:

1. Pot Life: indefinite
2. Tack Free Time 1 Hour @ 73°F, 50% Relative Humidity. Final Cure < 24 Hours
3. Carbon Dioxide Diffusion: μCO_2 1,100,000 Carbon Dioxide Diffusion Resistance at 5 mils (120 microns) $SdCO_2$ = 433 ft (132 m) equivalent air thickness. i.e. Approx. 13-in. of standard concrete cover.
4. Water Vapor Diffusion: μH_2O 13,140. Water Vapor Diffusion Resistance at 5 mils (120 microns) SdH_2O = 1.3 ft (0.4 m) equivalent air thickness.
5. Moisture Vapor permeability (ASTM E96) 17.9 perms
6. Solids content: By weight: 60% By Volume: 46%
7. Flame spread and smoke development (ASTM E-84-94)
   a. Flame Spread 0
   b. Smoke Development 5
   c. Class Rating A
8. Resistance to wind driven rain (TT-C-555B): No passage of water through coating.

Note: Tests above were performed with the material and curing conditions @ 71°F – 75°F and 45-55% relative humidity.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Substrate must be clean, sound, and free of surface contaminants. Remove dust, laitance, grease, oils, curing compounds, form release agents and all foreign particles by mechanical means. Substrate shall be in accordance with ICRI Guideline No. 03732 for coatings and fall within CSP1 to CSP3.

3.02 MIXING AND APPLICATION

A. Mixing: Stir materials to ensure uniformity using a low speed (400-600 rpm) drill and paddle. To minimize color variation, blend two batches of material.(boxing)

B. Coating Application: Apply by brush, roller, or spray over entire area moving in one direction. A minimum of two coats are required. Each coat should be applied at a rate not to exceed 250-sq. ft. per gallon. Total dry film thickness shall be a minimum 2.5 – 3 dry mils per coat. Allow a minimum of 1 hour prior to re-coating.

C. When applying the coating, never stop the application until the entire surface has been coated. Always stop application at an edge, corner, or joint. Never let a previously coated film dry; always coat into a wet film. Always apply the coating at a 45^{o} angle to an edge, corner, or joint.

D. If substrate has been previously coated and presents a “chalky” condition, apply 1 coat of Sikagard 552W or Sika Latex R, primer/surface conditioner by brush, roller, or spray at a rate not to exceed 300 sq. ft. per gallon.

E. Adhere to all limitations and cautions for the acrylic coating in the manufacturer's printed literature.

3.03 CLEANING

A. The uncured acrylic coating can be cleaned from tools with water. The cured acrylic coating can only be removed mechanically.

B. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

END OF SECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Divisions 00 and 01, apply to this Section.

1.2 SUMMARY

A. The Contractor shall supply all labor, materials and equipment necessary for the blast cleaning, containment, surface preparation, and the spot cleaning and painting of the interior and exterior surfaces of the rehabilitated tank structures. Work to include all required sampling and testing, and the final disinfection of the water storage facility, as specified herein.

B. All materials that are to come in contact with potable water shall be NSF 60 or 61 approved.

C. Related Sections:

1. Section 05120 – Structural Steel Framing
2. Section 11200 – Water Storage Tank Appurtenances

1.3 REFERENCE STANDARDS

A. The latest edition of the following standards and specifications shall be used with regard to materials, design, construction, inspection and testing to the extent specified herein:

1. ANSI/NSF 61 - Drinking Water System Components - Health Effects.
2. NSF/ANSI 600 - Health Effects Evaluation and Criteria for Chemicals in Drinking Water
3. Recommended Standards for Water Works (Ten States), 2012 Edition
4. ASTM D 16 - Terminology Relating to Paint, Varnish, Lacquer, and Related Products.
5. ASTM D 4263 - Indicating Moisture in Concrete by the Plastic Sheet Method.
6. ASTM F 1869 - Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
7. AWWA C 652 - Disinfection of Water-Storage Facilities.
8. AWWA D 102 - Coating Steel Water Storage Tanks.
9. International Concrete Repair Institute (ICRI) Guideline No. 03732 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.
10. OSHA 1926
11. SSPC-SP 1 - Solvent Cleaning.
12. SSPC-SP 2 - Hand Tool Cleaning.
13. SSPC-SP 3 - Power Tool Cleaning.
14. SSPC-SP 6/NACE 3 - Commercial Blast Cleaning.
15. SSPC-SP 7 – Brush-Off Blast Cleaning.

16. SSPC-SP 10/NACE 2 - Near-White Metal Blast Cleaning.
17. SSPC-SP 11 - Power Tool Cleaning to Bare Metal.
18. SSPC-SP 12 – Water Jetting Prior to Recoating
19. SSPC-SP 13/NACE 6 - Surface Preparation of Concrete.
20. SSPC-PA 1 – Painting Application Specification.
21. SSPC-PA 3 – Painting Application Guide for Safety in Paint Application.
22. SSPC Vis-1 - Pictorial Surface Preparation Standards for Painting Steel Structures.

1.4 DEFINITIONS

A. Definitions of Painting Terms:ASTM D 16, unless otherwise specified.

B. Dry Film Thickness (DFT): Thickness of a coat of paint in fully cured state measured in mils (1/1000 inch).

1.5 QUALITY ASSURANCE

A. Qualifications: Prospective Contractors shall sufficiently demonstrate experience in the rehabilitation of similar tank structures and shall have specific experience in lead-paint removal and disposal. Contractors shall use only thoroughly trained and experienced workers completely familiar with the work required for the tank rehabilitation work. All cleaning, surface preparation and painting work shall be performed by a qualified company having at least ten (10) years of experience and shall have performed steel tank cleaning and painting work for at least twenty (20) steel water storage tanks. In addition, this shall include at least 5 projects completed in the New England area in the last 5 years. The Contractor shall not sell, transfer or otherwise dispose of the Contract to any third party.

B. The Contractor shall be a qualified rigger or shall engage the services of a qualified rigger on the job at all times when rigging is being used. The foreman in charge shall have all rigging inspected by the rigger prior to use.

C. The Contractor shall abide by all local, state and federal laws for confined space entry.

D. All colors, unless specified herein, shall be selected by the Owner. The color selected will not necessarily conform to the manufacturer's color chart and any tinting required shall be done by the paint manufacturer to conform to the approved sample.

E. Only non-lead-based pigmentation shall be allowed for both interior and exterior primers and top coats.

1.6 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 – “Submittals”:

1. Product Data: Submit manufacturer's product data for each coating, including generic description, product line number, complete technical data, surface

preparation, and application instructions.

2. Product Data: Submit technical data sheets for each coating, giving descriptive data. Curing times, mixing, thinning, and application requirements.

    a. Provide material analysis, including vehicle type and percentage by weight and by volume of vehicle, resin and pigment.
    b. Provide upon request of the Engineer, specific ASTM Performance Criteria for the submitted materials.

3. Product Data: Provide verification from the coating manufacturer that the interior coatings to be in contact with potable water do not contain any of the following Per- and Polyfluoroalkyl Substances (PFAS):

    a. Properfluorooctanoic acid (PFOA);
    b. Perfluorooctane sulfonic acid (PFOS);
    c. Perfluorononanoic acid (PFNA);
    d. Hexafluoropropylene oxide dimer acid (HFPO-DA, GenX Chemicals);
    e. Perfluorohexane sulfonic acid (PFHxS); and
    f. Perfluorobutane sulfonic acid (PFBS).

4. Product Data: Submit manufacturer's Safety Data Sheets (SDS) and other safety requirements.

5. Color Samples: Submit manufacturer's color samples showing full range of standard colors.

    a. Submit three (3) samples of each coating and color selected, showing bare, prepared surface and each successive coat.
    b. Samples shall be submitted on hardboard or metal as appropriate to coating system (size not less then 5" x 11"). Label samples on back identifying manufacturer, product name, and color number.

6. Manufacturer's Quality Assurance: Submit manufacturer's certification that coatings comply with specified requirements and are suitable for intended application.

7. Applicator's Quality Assurance: Submit list of a minimum of twenty (20) completed projects of similar size and complexity to this Work. Include for each project, including projects where the specified coating system has been successfully applied.

    a. Project name and location.
    b. Name of Owner.
    c. Name of Contractor.
    d. Name of Engineer.
    e. Name of coating manufacturer.
    f. Approximate area of coatings applied.
    g. Date of completion.

8. Applicator's Quality Assurance: Provide certification that specialized equipment as may be required by manufacturer for proper application of coating materials shall be utilized.

9. Warranty:

    a. Submit manufacturer's 15-year corrosion, color, and gloss warranty for the exterior coating system.
    b. Submit manufacturer's 10-year corrosion, color, and gloss warranty for the interior coating system.

10. Containment system design details including materials of construction, methods of support, and any other equipment or appurtenances that is required for the stability and maintenance of the containment system.

11. Worker safety plan as it pertains to the OSHA and environmental regulations associated with confined space entry; air emissions associated with cleaning, blasting, or painting operations; and residual blast waste handling.

12. A plan for providing adequate cross ventilation and containment during any welding, abrasive blasting, painting and curing of the interior of the tank.

13. A certified test report shall be submitted indicating results from the dry film thickness and holiday tests.

14. A plan for chlorinating method to be used shall be submitted with the calculation for the amount of chlorine to be added to the tank.

B. Pre-Installation meetings:

1. Schedule a conference and inspection to be held on-site before field application of coating systems begins.

2. Conference shall be attended by Contractor, Engineer, Owner's representative, coating applicators and a representative from the coating material manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying:

1. Coating or material name.
2. Manufacturer.
3. Color name and number.
4. Batch or lot number.
5. Date of manufacture.
6. Mixing and thinning instructions.

B. Storage:

1. Store materials in a clean dry area and within temperature range in accordance with manufacturer's instructions.
2. Keep containers sealed until ready for use.
3. Do not use materials beyond manufacturer's shelf life limits.
4. Comply with all health and fire safety regulations.

C. Handling: Protect materials during handling and application to prevent damage or contamination.

1.8 ADDITIONAL REQUIREMENTS

A. Weather:

1. Air and Surface Temperatures: Prepare surfaces and apply and cure coatings within air and surface temperature range in strict accordance with manufacturer's instructions.

2. Surface Temperature: Minimum of 5 degrees F (3 degrees C) above dew point, or in accordance with manufacturer's instructions if more stringent.

3. Relative Humidity: Prepare surfaces and apply and cure coatings within relative humidity range in accordance with manufacturer's instructions.

4. Precipitation: Do not prepare surfaces or apply coatings in rain, snow, fog, or mist.

5. Wind: Do not spray coatings if wind velocity is above manufacturer's limit.

B. Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with AWWA D102.

C. Dust and Contaminants:

1. Schedule coating work to avoid excessive dust and airborne contaminants.

2. Protect work areas from excessive dust and airborne contaminants during coating application and curing.

3. The Contractor shall furnish all materials, equipment and labor for the design, fabrication, and erection of a Class 1A containment system for the containment and management of abrasive blast residuals in accordance with SSPC Guide 6 (Con). This temporary system shall include all suitable dust collectors, ventilators, decontamination trailers, air quality monitors, personal monitors, and any other incidental equipment necessary for the safe and effective removal of lead-based paints.

4. Work to be performed in accordance with RIDEM regulations for fugitive dust

(250-RICR-120-05-5).

D. Existing Conditions

1. Phillip J. Holton Service Water Tank
   a. Constructed in 1959
   b. Last Painted – 1990s
   c. Last Inspected – May 2022
   d. Exterior and interior paint chip analysis performed by Phoenix Environmental Laboratories in June 2022 confirmed that lead is present in the exterior and interior coatings.

E. Worker Protection

1. Contractor shall be responsible for all employee health and safety in accordance with Federal, State and local requirements.

2. Contractor will conform to the applicable OSHA requirements for the workers' protection as stipulated in 29CFR 1910.1025. Sanitary facilities shall include change rooms and shower facilities.

3. Shower facilities shall be those specifically designed for decontamination purposes and shall be equipped with a wastewater filtration system rendering wastewater non-hazardous. The Contractor shall maintain the filtration system in accordance with manufacturer's instructions and shall properly dispose of all filtered residuals and spent filter media.

4. The Contractor shall monitor the concentrations of lead with suitable air monitoring devices relative to the permissible exposure limits and the action levels associated with worker protection.

5. The Contractor shall provide OSHA approved respiratory and other protective equipment for worker protection during the cleaning and blasting operations required for this project. Protective clothing may be required if lead concentrations exceed the action or permissible levels of lead concentrations.

6. Contractor shall certify to the Owner that all employees or other subcontractor employees, as applicable, are medically qualified to perform the proposed tank cleaning and associated lead paint removal work, and that there are no pre-existing medical conditions relating to lead exposure.

7. The Contractor shall furnish and display appropriate warning signs in the designated work areas when the lead exposure levels exceed the permissible exposure limits in accordance with OSHA and State Health regulations.

PART 2 PRODUCTS

2.1 GENERAL

A. All tank painting shall be in accordance with the latest edition of AWWA D102, the Steel Structures Painting Council Specification SSPC-PA1, approved paint manufacturer specifications, and as specified herein.

B. Each paint system shall be from a single manufacturer. Materials specified are those that have been evaluated for the specific service. Products of the Tnemec Company, Inc. are listed to establish a standard of performance and quality. Equivalent materials of other manufacturer's may be submitted on written approval of the Engineer. Requests for substitution shall include manufacturer's literature for each product giving name, product number, generic type, descriptive information, solids by volume, recommended dry film thickness and certified lab test reports showing results to equal the performance criteria of the products specified herein. In addition, a list of a minimum 15 water tank projects located in the New England Region in the last 10 years shall be submitted in which each product has been used and rendered satisfactory service.

C. All paint systems shall be environmentally (VOC) compliant in accordance with all Federal and Rhode Island regulations and the latest OTC (Ozone Transport Commission) VOC regulations.

D. The interior paint system shall conform to Inside Coating System No. 5 as defined in AWWA D102 and shall be NSF approved. The Rhode Island Department of Health has a zero (0) VOC extractable requirement for potable water in contact with new lining systems. The interior finish lining shall be 100% solids by volume and contain no Xylene, Xylol and/or MEK solvents.

E. All materials in contact with potable water shall not contain the following per- and polyfluoroalkyl substances (PFAS):

1. Properfluorooctanoic acid (PFOA);
2. Perfluorooctane sulfonic acid (PFOS);
3. Perfluorononanoic acid (PFNA);
4. Hexafluoropropylene oxide dimer acid (HFPO-DA, GenX Chemicals);
5. Perfluorohexane sulfonic acid (PFHxS); and
6. Perfluorobutane sulfonic acid (PFBS).

F. The exterior paint system shall conform to Outside Coating System No. 4 or No. 6 as defined in AWWA D102.

G. "Or Equivalent": The Contractor shall furnish the required exterior and interior painting systems as specified herein. All paint coating and other related products, such as solvents and thinners, shall be supplied by the same paint manufacturer. The specified painting systems are based on products manufactured by the Tnemec Company in Kansas City, Missouri. "Or Equivalent" systems may be considered as an alternative product.

2.2 EXTERIOR COATING SYSTEM

A. The exterior coating system shall be a three-coat zinc, epoxy, polyurethane, and fluoropolymer coating system applied to all exterior surfaces of the tank, including all appurtenances such as railings, columns, structural support systems and members,

overflow pipe, steel riser pipe, vent pipes, vents, frames, hatch covers, ladders, ladder safety cage, panels, cabinets, etc.

B. Coating System (product and dry film thickness):

Surface Preparation:	SSPC-SP-6 to Commercial Blast Standard	
First Coat:	Tnemec Series 94-H_20 Hydro-Zinc	2.5-3.5 mils
Stripe Coat:	Tnemec Series 21 Epoxoline	3.0-3.5 mils
Third Coat:	Tnemec Series 1095 Endura-shield (100g/litre)	2.5-3.0 mils
Fourth Coat:	Tnemec Series V701 HydroFlon (100g/litre)	2.5-3.0 mils

C. No substitutions from the specified coating system will be allowed.

D. Stripe coat shall be applied to weld seams and leading edges.

E. The finish color of the top coat for the tank shall be selected by the Owner.

F. Furnish to the Owner two (2) gallons of exterior top coat of the same type and color used on the work.

2.3 INTERIOR COATING SYSTEM

A. The interior coatings shall be a urethane zinc rich primer followed by a one-coat (plus stripe coat) epoxy coating system applied to all interior surfaces of the tank including the floor, roof, hatches, column pipe, steel riser pipe, structural support systems, and other appurtenances.

B. Coating System (product and dry film thickness):

Surface Preparation:	SSPC-SP-10 to Near-White Standard	
First Coat:	Tnemec Series 94-H_20 Hydro-Zinc	2.5-4.0 mils
Pit Filling:	Tnemec Series 215 Surfacing Epoxy, as required	
Stripe Coat:	Tnemec Series 21 Epoxoline	3.0-4.0 mils
Finish Coat:	Apply ONE full finish coat of Tnemic Series FC22 Epoxoline, WH08-White	25-30 mils

C. No substitutions from the specified coating system will be allowed.

D. Pit filling shall be completed with Tnemec Series 215 Surfacer or approved equivalent.

E. Stripe coat shall be applied to weld seams and leading edges at 3.0-4.0 mils DFT.

F. Interior ceiling weld seam openings shall be sealed with De-Neef DeneSeal P-2235 100% solids and shall be an NSF 600 Standard Sealant.

2.4 DEHUMIDIFICATION AND HEATING

A. As required to perform the work within the paint manufacturers specifications or other

project requirements, the Contractor shall furnish and maintain on site a dehumidification and indirect hot-air heating system that is capable of maintaining a controlled atmosphere for the interior of the tank during the surface preparation, coating application procedures, and full cure of the interior coating system. The systems shall include all equipment, materials, labor, and power supply for operation. The specified surface preparation standard (SSPC SP 10) must be maintained with the use of this equipment. While this equipment is in use, and prior to coating, should the surface preparation quality fall below the specified standard, the Contractor shall re-clean the affected surfaces, at his own expense, to the specified standard prior to coating. The Contractor shall utilize dehumidification and heating equipment to maintain minimum surface temperatures and minimum dew point requirements for the interior coating system on an as needed basis throughout the application and cure-to-immersion service time frames, as established by the coating manufacturer.

B. The Contractor shall submit detailed information to include the manufacturer of the unit, dimensions, power requirements, flow rates, and moisture removal.

C. The Contractor shall submit a plan indicating the location of all proposed equipment.

PART 3 EXECUTION

3.1 GENERAL

A. After the tank has been drained, Contractor shall ensure that all sediment has been removed from the tank floor and inlet/outlet piping, as necessary and determined by the Engineer.

B. No paint shall be applied when the temperature of the surface to be painted is below the minimum temperature specified by the paint manufacturer, or less than 5 degrees above the dew point temperature. Paint shall not be applied to wet or damp surfaces or when the relative humidity exceeds 85%. Follow paint manufacturer’s recommendations for the specific paint system used.

C. The Contractor shall remove and legally dispose of all sediment, including the debris from the tank interior visible after the tank has been drained, prior to any coating.

D. Before painting, remove slag, weld metal splatter and sharp edges by chipping or grinding. All surfaces that have been welded, abraded or otherwise damaged shall be cleaned and primed in the field in accordance with the paint system requirements.

E. All areas blasted in the field shall be coated the same day before any oxidation occurs.

F. Take precautionary measures to prevent fire hazards and spontaneous combustions. Remove empty paint containers from site.

G. Place cotton waste, cloths, and hazardous material in containers, and remove from site daily.

H. Protect elements surrounding work of this section from damage or disfiguration.

I. During application of coating materials, post 'Wet Paint' signs.

J. During application of solvent based materials, post 'No Smoking' signs.

3.2 EXAMINATION

A. Site Verification of Conditions:

1. Examine areas and conditions under which application of coating systems shall be performed for conditions that will adversely affect execution, permanence, or quality of coating system application.

2. Correct conditions detrimental to timely and proper execution of Work.

3. Do not proceed until unsatisfactory conditions have been corrected.

4. Commencement of installation constitutes acceptance of conditions and responsibility for satisfactory performance.

3.3 TANK DRAINING COORDINATION

A. Owner will be responsible for draining the elevated water storage tank. The Contractor shall pump out and remove any remaining water within the bottom of the tank and remove any sediment as part of the initial cleaning of the tank's interior.

3.4 SITE MOBILIZATION AND PREPARATION

A. The Contractor may be required to temporarily remove any existing chain-link fence around the tanks to facilitate the installation of the proper containment system required for the performance of the contract work.The Contractor shall make this determination during the bidding phase at the time of the site examination in order to include the cost of the temporary removal and re-attachment of the existing chain-linking fencing, if required, upon completion of the contract work.

B. Contractor shall complete any site clearing or tree trimming necessary to perform the project scope of work.

C. The Contractor shall furnish and install other temporary fencing around the limit of work, including staging areas for equipment and stored materials around the immediate grounds, to secure the work and equipment during the course of the contract.

D. The Contractor shall adjust scaffolding as required to protect existing enclosures and antennas that are to remain.

3.5 PREPARATION

A. Interior surfaces shall be abrasive blast cleaned in accordance with SSPC SP-10, Near-White Blast Cleaning. Exterior surfaces shall be abrasive blast cleaned in accordance with SSPC-SP-6, Commercial Blast Cleaning. Entire tank exterior must be shrouded during abrasive blast cleaning. The coatings to be removed contain lead, therefore acceptable coating removal methods include wet abrasive blast cleaning, water jetting with or without abrasives, vacuum abrasive blast cleaning, and chemical stripping.Certain coating removal methods require subsequent dry abrasive blasting to achieve the specified surface preparation. Should these methods be selected, the Contractor shall ensure that no fugitive dust escapes the containment system during dry abrasive blasting. This is to be accomplished by the use of negative air and/or dust collection systems adequately sized to effectively control dust.

B. The ground surface shall be protected from exposure to water and debris from surface preparation.Paint chips and water to be collected and disposed offsite in accordance with applicable laws and regulations.

C. It is acknowledged that the water storage tank was painted with lead-based paint. As such, it is possible that over time, this paint may have contaminated the soils surrounding the tank. However, it is expected that the Contractor follow the specifications and take all reasonable measures to protect the surrounding soils from impacts due to the surface preparation and painting of the water tanks.

D. Surface preparation shall not be done simultaneously with priming. An entire area or section shall be cleaned and inspected by the Engineer before primer is applied to that area.No primer is to be applied until the entire area has been viewed and approved by the Engineer. Any defect not properly cleaned as specified will be cause for rejection of the entire area in question and no priming shall be done on this area until satisfactory corrections are made and approved by the Engineer.

E. The blast cleaning procedure shall use angular grit abrasive. The size and gradation shall be such as to produce a 2.0-3.0 mils angular anchor profile that is sharp and clean with no embedded spent abrasive material.

F. The abrasive blast cleaning shall be effective in removing corrosion deposits and scale as defined in the surface preparation SSPC SP-10 specification and as shown in the visual standards SSPC Vis-1.

G. Maintain ambient conditions prior to, during the coating application, and through full cure to immersion service for the interior painting process. The use of dehumidification and heating equipment shall be required to maintain the coating manufacturer’s minimum curing conditions criteria.

H. Surface Preparation:

1. General Requirements:

a. Prior to application of primer, surfaces shall be prepared to receive specified coating system in compliance with manufacturer's

recommendations and specifications of Steel Structures Painting Council (SSPC).

b. Clean surfaces of residual deposits of grease, scale, rust, oil, dirt, and other foreign matter, immediately prior to priming. Surfaces to be coated shall be clean, dry, smooth and free from dust and foreign matter which will adversely affect adhesion or appearance.

2. Ferrous Metal Surfaces:

a. Surfaces shall be free of residual deposits of grease, rust, scale, dirt, dust, and oil.

b. Surfaces shall be cleaned in compliance with specifications of Steel Structures Painting Council.

I. The Contractor shall repair all pitted areas of the tank surfaces that show loss of 35% or more of existing plate thickness and/or any areas of severe undercut or reduction of weldment below the surface of the shell plates, or as directed by the Engineer. Pitted areas of the tank surfaces that show loss of 50% or more of the existing plate thickness or areas on the tank that are concentrated with pits shall be repaired by an approved welding method, such as plating. All pits and plating shall be welded in such a manner as to ensure 100% fusion with the parent metal and to bring pits or plating flush with original plate surface. All pits and plating shall be free of surface porosity and ground flush to ensure continuity of the applied coatings. All welding will be at the direction of the on-site inspector and is to be in accordance with AWWA D-100 Standards, latest revision thereof.

J. Pit welded areas are to be re-cleaned and spot blasted prior to applying coating systems. Surfaces that are damaged by pit welding shall be sand blasted and spot painted to match surrounding undamaged surfaces.

3.6 ABRASIVE BLASTING RESIDUAL WASTE PROVISIONS

A. General: The Contractor is responsible for the collection, handling, storage, testing and legal disposal of the abrasive blasting materials and residual waste generated as part of the tank rehabilitation. The cost for transporting and legal disposal of materials categorized as hazardous waste shall be paid as bid items 4 and 5 (Blast/Paint Exterior Coating System, Blast/Paint Interior Coating System) as shown in the Bid Form of these Contract Specifications.

B. The Contractor shall collect all abrasive blasting residual waste daily. These residuals shall be collected using a vacuum system with suitable HEPA filters. Blast residuals shall be stored in suitable storage containers in accordance with federal and state regulations and be properly secured and protected within the enclosed project area.

3.7 APPLICATION

A. All coatings materials shall be stored, mixed, applied and cured within ambient temperature ranges identified by the painting manufacturer. Application and curing shall

also be accomplished within the relative humidity range. Natural ambient conditions for curing periods shall be anticipated by the Contractor and have Engineer's approval.

B. No coating work shall be done if the ambient temperatures (air, coating materials and substrate) are not within the allowable ranges unless the Contractor is able to control these conditions using effective equipment.

C. The coating materials shall be applied in strict accordance with the respective coating manufacturer's written recommendations.

D. Spot field prime coat materials shall be applied to the surface after blast cleaning before any rust back occurs or before the end of each day of surface preparation effort, whichever comes first.

E. The full intermediate prime coat shall be applied to the entire tank surface (interior and exterior). Unprimed areas, abraded areas and areas considered in an advanced state of deterioration by the Engineer shall be blast cleaned and the remaining shop primed areas shall be brush cleaned prior to application of the full intermediate prime coat.

F. Spray guns shall be held perpendicular to the surface being coated in such a manner that all dry overspray is kept at a minimum. All spray application of coatings shall utilize a cross spray technique to maximize coverage of all irregular surfaces.

G. All coating material for interior surfaces shall be applied by airless spray equipment of a type and size suitable for the respective material. Coating material shall be applied around rivets, welds, edges and inside angles by use of a brush.

H. All coating material for exterior surfaces shall be applied by brush, roller or airless spray equipment of a type and size suitable for the respective material. Use of airless spray equipment shall be allowed only if adequate containment is provided to minimize overspray and emissions to the surrounding areas meeting the approval of the Engineer. Application of prime coat to the base and six inches up the side walls shall be by brush, as well as to all rivets, welds, edges and inside angles to ensure proper coverage and application.

I. After surface preparation, interior weld seams, leading edges and nut and bolt assemblies shall be “stripe-coated” by brush method with one coat of primer. Application may be performed prior to or following the application of the full prime coat on prepared surfaces. “Stripe-coat” shall be the same as the full prime coat but be a contrasting color for inspection purposes.

J. Make edges of paint adjoining other materials or colors sharp and clean, without overlapping.

K. Apply coatings in accordance with manufacturer's instructions.

L. Mix and thin coatings, including multi-component materials, in accordance with manufacturer’s instructions.

M. Keep containers closed when not in use to avoid contamination.

N. Do not use mixed coatings beyond pot life limits.

O. Use application equipment, tools, pressure settings, and techniques in accordance with manufacturer's instructions.

P. Uniformly apply coatings at spreading rate required to achieve specified DFT.

Q. Apply coatings to be free of film characteristics or defects that would adversely affect performance or appearance of coating systems.

R. Stripe paint with brush critical locations on steel such as welds, corners, and edges using specified primer.

S. The exterior prime coat is the only coat that will be permitted to be sprayed. The other coats on the tank exterior must be applied by roller. Paint application methods shall be approved by the Engineer.

3.8 VENTILATION

A. During application of coatings inside the tank, adequate ventilation shall be provided, and all equipment shall be nonsparking and explosion-proof. Necessary precautions shall be taken to ensure safe working conditions are maintained during use of paints which contain toxic and flammable solvents.

B. Effectiveness of the ventilation system shall be checked by making periodic explosive meter readings, in which the concentration of volatile material shall not exceed 20 percent of the lower explosive limit.

C. Continuous forced ventilation at a rate of at least one complete air change every 4 hours shall be provided for at least 48 hours after coating application is completely cured in accordance with the paint manufacturer's recommendations. Tank manholes shall be kept open for an additional 7 days. The Contractor may use heat to obtain proper curing and to ensure that the painting is completed within the project schedule.

3.9 CONTAINMENT SYSTEMS

A. General

1. A containment system will be employed at this tank site that meets the Class 1A Standard as outlined within the SSPC-SP Guide 6 (Guide for Containing Surface Preparation Debris Generated During Paint Preparation Operations). This may be accomplished by modular containment systems that isolate work areas or by encapsulating the entire tank.

2. The Contractor shall be fully responsible for the design and support system associated with the containment system. Full decking and associated handrails are required at each work level and stairs and handrails are required as per

OSHA regulations.

3. Engineered drawings of the scaffold and containment complying with OSHA regulations and stamped by a Registered Professional Structural Engineer licensed in the State of Rhode Island.

4. The scaffold design shall be such that no excessive loads or forces are applied to the tank, which could cause damage during various weather conditions that could be experienced while the scaffold/containment system is in place. The Contractor shall spread the load of the roof containment system over a large area to eliminate any steel deflection greater than 1-inch. The scaffolding/containment design is to include the weight of containment materials and decking as well as all cell coax cables and antennae.

5. Scaffolding system shall be designed and installed in accordance with OSHA 1926.

6. The Containment structure shall be properly grounded.

7. Cost for hazardous material collection, storage and disposal will be included in the Base Bid and all lead-based waste material will be handled in accordance with all State and Federal requirements.

B. Air Quality Monitoring

1. During the surface preparation phase on the tank's exterior, air quality monitoring shall be conducted. The Contractor shall pay for the services of a State licensed testing laboratory to set up, monitor, maintain, and remove air quality monitoring stations at the tank site.

2. The air quality monitoring will be used to determine the background air quality before work commences, during the blasting and substrate preparation period and upon completion of the surface preparation.

3. If during the monitoring of air quality, the data collected indicates that a breach of containment occurred, and material escaped the containment area the Contractor will be responsible for all cleanup costs necessary to return the affected area to its original condition.

4. In addition to the initial air quality monitoring with instruments, if during the daily observations dust or debris is seen escaping the containment area by the Engineer, the work shall be halted to correct the problem.

3.10 ACCEPTANCE

A. The base for acceptance of the coating work are listed below. Deviations beyond these parameters shall, at the Engineer's discretion, be corrected by the Contractor at his own

expense and in accordance with the manufacturer's recommendations.

1. No runs or sags
2. No overspray or roughness
3. No holidays or pinholes
4. No color or gloss variations
5. Allowable film thickness +2.0 mils over specified thickness.

B. Wet and dry film thickness measurements shall be made for each 100 square feet of surface painted. Additional coats shall be applied as required to attain the minimum dry film thickness specified for the painting system.

C. The paint on all interior surfaces below the overflow shall be tested with a High Voltage holiday detector after the paint has cured for at least 5 days. The holiday testing shall be in accordance with NACE SP0188-2016. Locations where holidays are detected shall be repaired and retested.

3.11 REPAIR

A. Damaged Materials: Repair or replace damaged materials and surfaces not scheduled to be coated.

B. Damaged Coatings: Touch-up or repair damaged coatings. Touch-up of minor damage shall be acceptable where result is not visibly different from adjacent surfaces. Recoat entire surface where touch-up result is visibly different, either in sheen, texture, or color.

C. Coating Defects: Repair in accordance with manufacturer’s instructions coatings that exhibit film characteristics or defects that would adversely affect performance or appearance of coating systems.

3.12 CLEANING

A. At completion of day’s work, remove from site rubbish and accumulated materials.

B. Leave storage area clean and in same condition indicated for equivalent spaces in Project.

C. The Contractor shall at all times keep the premises free from accumulation of waste materials and rubbish caused by his employees or work. At the completion of the painting, the Contractor shall remove all tools, scaffolding, surplus materials, and rubbish from and about the tanks.

3.13 WASTE MANAGEMENT

A. Place materials defined as hazardous or toxic waste in designated containers.

B. Do not dispose of paints or solvents by pouring on the ground. Place in designated containers for proper disposal.

C. Contractor shall be responsible for all costs associated with containment, sediment and waste disposal that may result from execution of this project.

3.14 FIRST ANNIVERSARY INSPECTION

A. The Contractor shall perform a first anniversary inspection of the tank and make repairs to the paint system in accordance with AWWA D102.

B. Contractor shall inspect the interior tank by means of a human licensed underwater diver. The inspection shall be documented via photographs and video recording.

C. The Contractor shall coordinate and schedule the inspection with the Owner and provide at least 30 days advance notice.

END OF SECTION

DIVISION 11

EQUIPMENT

SECTION 11200 WATER STORAGE TANK APPURTENANCES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section pertains to the replacement of select structural components and appurtenances to the existing service water tank.

1.2 SUBMITTALS

A. Product Data: Include rated capacities, accessories, appurtenances, and furnished specialties for all tank rehabilitation items.

B. Shop Drawings: Signed and sealed by a Professional Engineer registered in the State of Rhode Island. Show fabrication and installation details for all tank rehabilitation items, including the following:

1. Plans, elevations, sections, details, and attachments to other work.
2. Structural analysis data signed and sealed by the Professional Engineer registered in the State of Rhode Island responsible for their preparation.

C. Welding certificates.

D. See Section 01300 – Submittal Requirements for other contract submittal requirements.

1.3 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code--Steel."
2. AWS D1.3, "Structural Welding Code--Sheet Steel."

B. Pipe Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

PART 2 - PRODUCTS

2.1 PAINT MATERIALS

A. See Section 09970 – Steel Water Storage Tank Painting, for painting and material requirements.

2.2 ROOF VENT

A. A properly sized aluminum vent assembly shall be furnished and installed to replace the existing roof vents. Each vent shall conform to AWWA D100 and vent shall open downward and be fitted with four mesh outer and twenty-four mesh inner non-corrodible screens. Roof vent model shall be Model SD 18-24 (18” OD x 24” tall weld-in vent stack) as manufactured by Tomcat Consultants/T.A.P Co. of Rosebud, MO, or approved equivalent.

Each vent shall be installed along with an adequately sized short weld-in vent stack with bolt flange, as manufactured by Tomcat Consultants/T.A.P. Co of Rosebud, MO.

2.3 OVERFLOW

A. Existing overflow pipe on the existing service water tank shall be modified as shown on the drawings. Overflow pipe extension shall be 8" in diameter. Overflow pipe shall be schedule 40 carbon steel pipe and have a minimum wall thickness of ¼". The new overflow pipe shall extend from the end of the existing overflow pipe down the exterior of the tank terminated approximately 20" above grade and discharge onto a concrete splash pad. The point of discharge shall have a 90° bend and be equipped with a 24-mesh Type 316 stainless steel screen and a weighted flap valve.

2.4 WEIGHTED FLAP VALVE

A. The flap valve shall have a cast iron body and cover. The valve shall have resilient to bronze seats and the hinge pin and cotter pins shall be stainless steel.
B. The valve shall be constructed with a 10° offset from vertical to ensure positive closure. The weighted flap shall have a weight attached to the lid and allow adjustment.
C. The valve lid shall have a mechanical stop to ensure the lid cannot over rotate.
D. The flange shall be drilled using ANSI 125# template.
E. All iron parts shall be coasted with a two-part epoxy with 3-4 mils dry film thickness to prevent rusting or corrosion.
F. The valve shall be machined, assembled, and tested in the USA for quality assurance.
G. The manufacturer shall show proof of ISO 9001:2008 certification.
H. The valve and accessories shall be manufactured by Troy Valve, Model A2540, or approved equivalent.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION OF NEW TANK COMPONENTS

A. See Section 09970 – Steel Water Storage Tank Painting for surface requirements.

B. Field Cleaning: After completion of tank structural appurtenances, remove burrs, dirt, and construction debris and repair damaged finishes. Remove weld splatter, sharp edges on weld seams, scabs and slivers by grinding. Remove weld flux, slag, fins, and laminations.

C. Field Surface Preparation: After field cleaning, prepare steel surfaces where shop prime coat has been damaged according to the Specifications listed above for shop cleaning, and remove dust or residue from cleaned surfaces.

D. If surface develops rust before prime coat is applied, repeat field surface preparation.

3.2 FIELD PAINTING

A. See Section 09970 – Steel Water Storage Tank Painting of these Contract Specifications.

3.3 FIELD QUALITY CONTROL

A. Testing: The Contractor, overseen by the Engineer, will engage a qualified testing agency to perform the following field quality control testing:

1. Tank Weld Test: See Specification Section 05120 – Structural Steel Framing for weld testing provisions.
2. Leakage Test: See Specification Section 02510 – Leakage Detection for leakage and other final testing associated with completed tank restoration.

B. Remove and replace malfunctioning units and retest as specified above.

3.4 CLEANING AND DISINFECTION

A. See Section 09970 – Steel Water Storage Tank Painting and Section 02511 – Disinfection of Water Utility Storage Tanks for final cleaning and disinfection requirements of the elevated storage tank upon completion of restoration and painting work.

END OF SECTION

APPENDIX A

PROVIDENCE WATER SERVICE WATER TANK INSPECTION REPORT

Interior and Exterior Inspection Report
Philip J. Horton - Elevated Tank
CorrTech Report No. 15746-FOR-01-1

Prepared For:

Providence Water Supply Board
125 Dupont Drive
Providence, RI 02907

CORRTECH
CORROSION UNDERSTOOD

25 South Street
Hopkinton, MA 01748

6/3/2022

STATEMENT OF LIMITATION

Conclusions presented in this document are based on the services described and performed and not on tasks or procedures beyond the scope of the contracted services or time and budgetary constraints imposed by contract limitations.

CorrTech, Inc. has performed this assessment in a professional manner using the degree of skill and care exercised for similar projects under similar conditions by reputable and competent consultants, and in accordance with the procedures established within CorrTech's quality assurance, quality control protocol.

CorrTech, Inc. shall not be responsible for conditions or consequences arising from relevant facts that were concealed, withheld or not fully disclosed at the time the evaluation was performed.

Report Prepared by: Max Miezejeski
Corrosion Technician

Report Reviewed by: Gary M. Roberts
Project Manager

TABLE OF CONTENTS

INTRODUCTION

On May 20, 2022, CorrTech representatives, Max Miezejeski, Scott Leighton, and Sanskriti Tripathi performed a corrosion and structural assessment of the exterior and interior of a drinking water storage tank for Providence Water Supply Board. The inspection was conducted to establish the current condition of the tank's coatings and steel substrate. The tank inspected included:

Philip J. Holton WTP 40,000-gallon Elevated Tank

For applicable standards used in this inspection, please see below.

The interior of the reservoir was inspected with the TankRover remotely operated vehicle, while full. The TankRover is the only piece of equipment like it in the United States and was developed by CorrTech. By using the TankRover the interior of the tank was inspected with no special preparation, confined space entry, no additional disinfection and no downtime.

The TankRover is equipped with a surface-cleaning tool used to remove loose rust or debris in order to view the potential metal loss under the coating. The unit has high-powered thrusters, which are used to maneuver throughout the tank and are used to wash away bottom sediment for observations. Video is recorded with audio narration on site with digital stills captured for the report.

The TankRover and all tether were prepared for the inspection by disinfecting equipment with a 200 ppm chlorine spray in accordance with AWWA C652.

The exterior portions of the tank were inspected by walking the roof and shell portions that were accessible from the ground.

The objectives of the assessment were to:

1. Perform field inspections and tests to assess the structural integrity of the tank.
2. Assess condition of any protective coatings present
3. Review the safety compliance of tank ladders and access.
4. Review sanitary protection equipment
5. Provide recommendations for rehabilitation.

APPLICABLE STANDARDS

- American Water Works Association (AWWA) Standard D100, Welded Carbon Steel Tanks for Water Storage
- AWWA Standard D101, Inspecting Steel Tanks, Standpipes, Reservoirs, and Elevated Tanks for Water Storage
- AWWA Standard D106, Sacrificial Anode Cathodic Protection Systems for the Interior submerged Surfaces of Steel Water Storage Tanks
- AWWA Standard D652, Disinfection of Water Storage Facilities
- AWWA Manual M42, Steel Water Storage Tanks
- Rhode Island Department of Public Heath Regulation R46-13-DWQ, Rules and Regulations Pertaining to Public Drinking Water

EXECUTIVE SUMMARY

The condition and recommendations for the tank are briefly summarized in this section. For detailed information regarding tank conditions and specific recommendations please refer to the designated section for the tank.

The exterior coating was in poor condition with significant delamination along the bottom of the legs and risers. More moderate delamination was observed on the shell and roof of the tank.

The interior was in better condition with only localized areas of corrosion along the weld seams of patch plates. The six (6) anodes installed in the tank were intact and potential readings indicated that they were protecting the interior submerged surfaces.

The following recommendations are included in this report:

- Install an AWWA complaint pressure/vacuum vent
- Install a gasket on the roof hatch
- Modify the overflow pipe so that it discharged 16-in. to 24-in. above grade
- Install a splash pad under the modified overflow pipe, once complete
- Modify the roof railings to meet current OSHA standards
- Install a self-closing swing gate at the top of the ladder
- Recoat the tank exterior surfaces
- Clean tank foundation pads and make repairs, as necessary
- Conduct the next tank inspection in 2027

TANK DATA FOR PHILIP J. HOLTON SERVICE TANK

Site Information	Fencing In Place:	Yes						Locks on Gates:	Yes		
Address:	61 N Rd, Hope, Road							Vault Lock in Place:	N/A		
Tank Information	Tank Name:	Philip J. Holton Service Water Tank						Tank Diameter:	24 -ft		
Tank Height:	10-ft	Tank Capacity:	40,000			Previous Cleaning Date:			Unknown		
Previous Inspect. Date:	2014					Previous Coating Application:			Unknown		
Foundation	Height:	5-in	Adequate Drainage:	Yes				Chime Plate Size:	N/A		
# of Anchors:	4	Anchor Bolt Diameter:	1-in					Chair Thickness	0.5-in		
Anchor Chair Dimensions:	3-in x 3-in										
Shell Manhole	# of Manholes	1				Dimensions:		18 x 14-in			
Ladder	Height from Ground:	10-ft						Safety Cage:	Yes		
Anti Climb Lock :	Yes					Climbing Safety System Style:		Rail			
Rung to Rung Dim:	12-in	Distance from Shell:	11-in					Width:	14-in		
Overflow	Diameter:	8-in	Air Gap	Approx. 68-ft				Overflow Protection	Screen		
Screen Condition:	Intact	Screen Type:	Coarse					Splash Pad	No		
Roof Hatch	Dimensions:	24 x 24-in				Sanitary Neck		4-in.			
# of Hatches:	1	Hatch Cover Overlap	2-in					Lock	Yes		
Roof Vent	Style:	Mushroom				Diameter:		8-in			
Cap to Roof Distance:	10-in	Screen Condition:	Damaged					Type:	Coarse		
Roof Handrail Hts	Top Rail:	37-in	Mid Rail:	19-in				Toe Kick Plate:	4-in		
Interior	Sediment Depth:	2-3-in around riser				Sediment Coverage:		10%			
Inlet/Outlet Pipe:	Combined		Sediment Ring:			Yes					
Interior Ladder	Climbing Safety System:		None			Style:		Fixed			
Columns:	No		Column Number:		N/A		Interior Column Style		N/A		

OBSERVATIONS

Photos provided in the report were created from a digital camera and interior pictures were captured in digital format from the interior video. The interior images are as clear as our printed technology will allow. The copies in the report provide a reference for our comments. Keep in mind that for underwater video snaps, the video provides the greatest detail and should be viewed as part of the report.

Narration on the video is done in the field and some of the comments may be different than the written report.

TESTING

Cathodic Protection Survey

This tank was equipped with six (6) sacrificial anodes, three (3) at the bottom of the bowl around the riser pipe, and three (3) attached to the ladder inside the riser pipe. A silver/silver chloride reference electrode was lowered into the tank from the roof hatch to collect tank-to-electrolyte potential measurements.

Position	Potential Measurements
Top	-1.1 V
Middle	-1.2 V
Bottom	-1.21 V

All tank-to-electrolyte potential measurements indicate adequate levels of cathodic protection are being provided to submerged steel portions of the tank interior at this time.

Dry Film Thickness Readings

A Positector 6000 gauge was used to take dry film coating thickness readings on the exterior shell and roof. These reading measure the thickness of the paint remaining on the substrate. For complete data, see APPENDIX II.

Location	Number of Readings	Average	Minimum	Maximum
Shell - Batch	45	8.4	5.1	12.4
Roof – Batch	45	11.4	4.2	30.3
Riser/Legs	45	9.8	5.3	19.6

(All measurements taken in mils)

INTERIOR

Roof Structure:

The roof is a self-supporting domed structure. There were no signs of significant metal loss and no visible light penetrations.

Roof Coating:

The coating was mostly intact with corrosion bush and delamination across approximately 5% of the roof plates.

Shell Structure:

There were no signs of deformations, bowing or buckling, in the shell plates. No metal loss was apparent during this inspection.

Shell Coating:

The shell was 99% intact with a few spots of minor corrosion development. There were 4-5 patch plates along the shell and all of them had minor corrosion in some part of their welds.

Floor Structure:

There were no deformations, bowing or buckling, in the floor plates. There were no signs of metal loss.

Sediment:

Sediment has accumulated at the center of the tank around the riser pipe as well as at the bottom of the riser. It is difficult to make an accurate measurement of the sediment depth, but it is estimated to be approximately 2-3-in deep at the center of the tank and roughly 6-in at the bottom of the riser.

Floor Coating:

From what was visible of the floor coating no corrosion or delamination was observed.

Piping:

The inlet and outlet pipes are combined into a single pipe at the bottom of the riser pipe. The pipe had a solid cover on top of it.

EXTERIOR

Foundation:

The concrete foundations for the legs are showing significant spalling and cracking.

Manholes:

There is one manway on the riser pipe. It has moderate corrosion blush around its outer edge and the bolts. The manway neck had significant coating delamination.

Ladder:

The ladder was in acceptable condition to climb, free from any major deformations or corrosion. It was equipped with a safety cage and a rail climb.

Overflow:

The overflow pipe has an internal weir funnel that exits through the top of the shell, goes through the balcony, and discharges immediately below, approximately 68-feet above grade. The overflow was protected with an intact screen.

Shell Coating:

The shell coating was approximately 85% intact with several areas of delamination and some minor biological growth. No significant corrosion was found on the shell.

Roof Hatch:

The hatch was initially blocked by the rotating roof ladder. The ladder was movable, but required significant effort to do so.

The hatch was intact but had no gasket.

Roof Vent:

A mushroom style vent was located at the center of the roof. A coarse screen is present inside of the cap but has been damaged.

Handrails:

Handrails enclose the balcony but there are none on the roof. The handrails do not meet OSHA standards of a top rail height of 42-in. The top rail was measured at 37-in.

Roof Coating:

20% of the roof has corrosion and delamination coverage. Corrosion is mostly focused along the weld seams and is more severe closer to the center of the roof.

RECOMMENDATIONS

The roof vent does not meet current AWWA D100 standard or the generally accepted Ten States standard for sanitary protection. Fine mesh screens are subject to clogging due to freeze up in the winter so a special vent assembly is needed. Vents should be installed which can relieve both a positive or negative pressure should the fine mesh screen become clogged. An AWWA vacuum/pressure relief vent provides for the safe use of insect screen and should be designed for easy inspection and maintenance of the screens.

A gasket should be installed on the roof hatch to provide a sanitary seal.

Overflow pipe needs to be replaced or modified to meet current standards:

Per AWWA D100, the overflow pipe should extend down to within 16-24-in above ground for maintenance and be fitted with a corrosion resistant 24-mesh screen with or without a self-closing flapper cover. Rubber type duck bill check valves can be used in lieu of the flapper cover. Discharge point must be onto a splash pad or drainage structure to prevent erosion of the tank foundation. In areas where freezing is common rubber duckbill check valves may need to be protected against freeze up.

In accordance with the requirements of AWWA D100, overflows must discharge over a drain inlet or splash pad to prevent erosion of material from around the tank. A suitable method of erosion protection should be installed at this site.

During the next tank rehabilitation project modifications to the roof hand railings should be considered to bring the railing into compliance with current OSHA and AWWA requirements. Per AWWA D100 handrails on balconies, around roof hatches and rest platforms are required to be 42-in high with a 21-in high mid-rail and 4-in toe kick. These safety features allow safe access to roof surfaces to safely inspect and maintain vent screens and collect water samples.

Self-Closing Swing Gate

In order to be in compliance with OSHA Standard 1910.23(a)(2) all railing openings or platform pass through openings should be equipped with a self-closing swing gate. Although this standard strictly addresses new construction after November 19, 2018 it is advisable to modify existing tanks with this safety device. If existing ladders are substantially modified or replaced on an existing tank, then this new standard would apply.

Exterior Coating should be replaced:

Tank exterior should be fully blasted and coated in the next 2-3-years using a properly written job specification and certified coating inspection. To ensure longest possible service life from the new coating, contractors should follow the AWWA D102 standard and use a full-time coatings inspector to ensure proper surface preparation and application.

Concrete Foundation Repair Required

Repairs should be made to the exposed portion of the foundation pads due to cracking and spalling that was noted during the inspection. Cracking or spalling of the concrete foundation allows for water intrusion, freeze thaw damage and vegetation intrusion. Long term degradation could lead to structural stability issues. Repairing the concrete foundation with proper materials and techniques will prolong the lifespan of the structure.

Per AWWA guidelines it is recommended that this tank be inspected again in 2027.

Appendix I: Photographs

1) 1-Tank overview

4) 4-Engaged turnbuckle with corrosion blush

2) 2-Site overview

5) 5-Spalling on concrete foundation pad

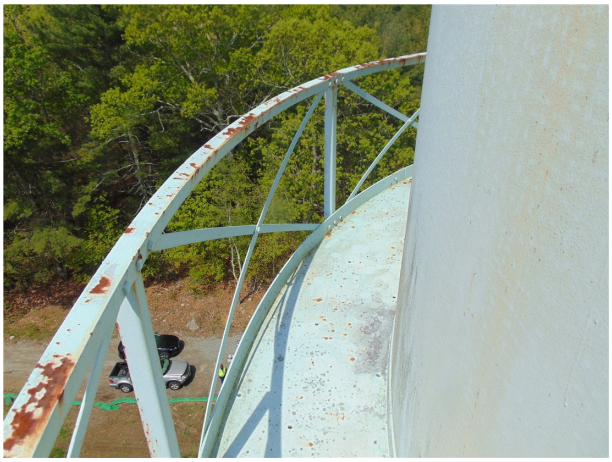
3) 3-Tank leg base

6) 6-Corrosion on anchor chair

7) 7-Bottom of bowl with corrosion

8) 8-Overflow pipe

9) 9-Ladder with safety cage



10) 10-Tank balcony with minor delamination

11) 11-Delamination on shell

12) 12-Corrosion on overflow pipe

13) 13-Biological growth on shell

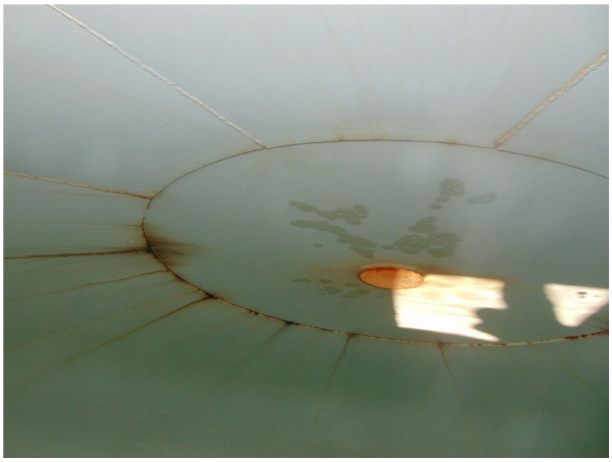
16) 16-Typical condition of roof and vent overview

14) 14-Corrosion and delamination on the roof

17) 17-Corrosion on vent and damaged screen

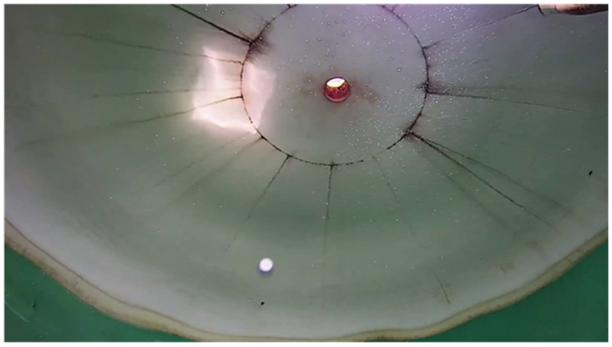
15) 15-Rotating roof ladder

18) 18-Roof hatch



19) 19-Corrosion on interior weld seams

20) 20-Overflow weir funnel

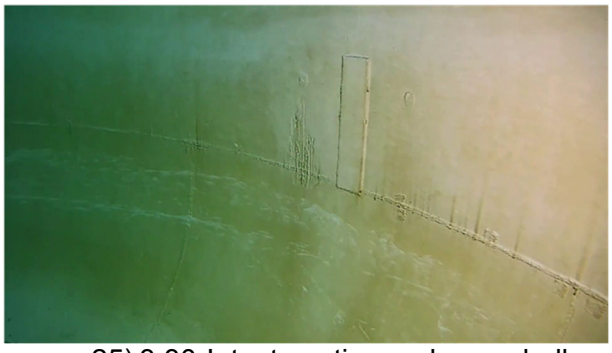


21) 0:16-Interior roof

22) 1:51-Corrosion cell on roof

23) 2:05-Interior ladder

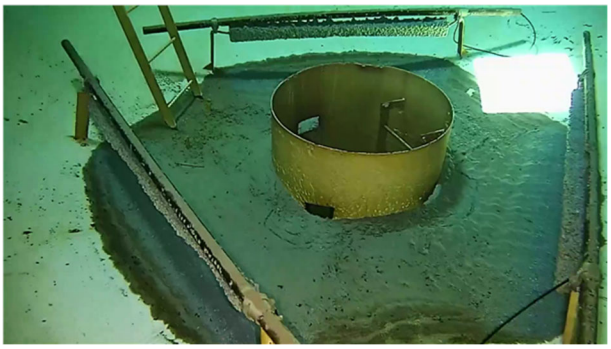
24) 3:15-Corrosion around patch plates



25) 3:30-Intact coating on lower shell

26) 4:54-Sacrifical anode

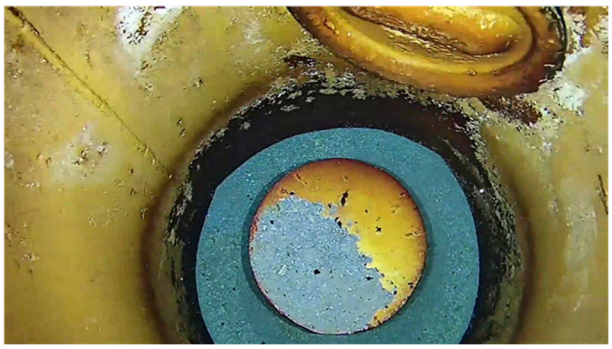
27) 5:14-Intact coating on bowl



28) 5:47-Riser pipe opening and anode overview

29) 6:32-Interior of riser pipe

30) 6:47-Delamination inside riser pipe



31) 8:18-Bottom of riser pipe with inlet/outlet

32) 8:34-Riser Manway

Appendix II
Exterior Paint Thickness Readings

B9

Created:	2022-05-20 08:51:32
PosiTector Body S/N:	871573
Probe Type:	PosiTector 6000 F
Probe S/N:	423385
CAL:	Cal 1

Exterior legs & riser

Summary

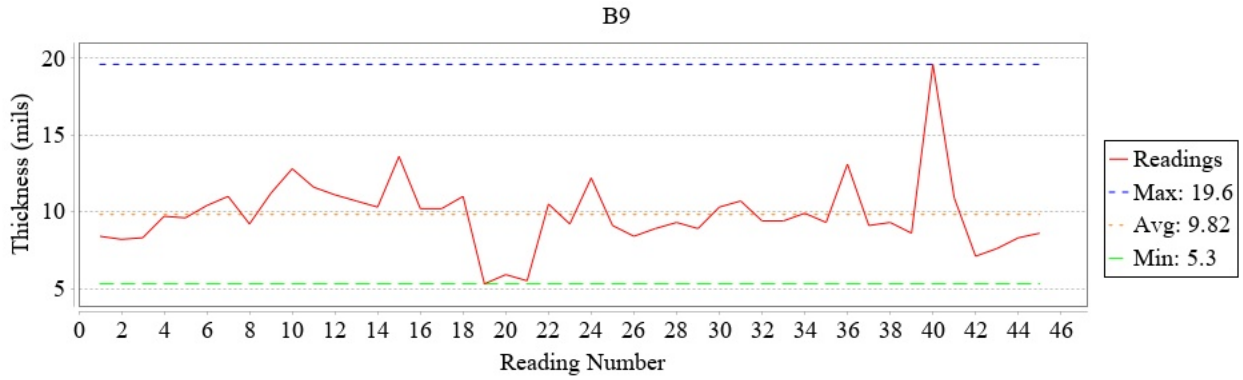
	#	x	σ	↓	↑
Thickness (mils)	45	9.82	2.31	5.3	19.6

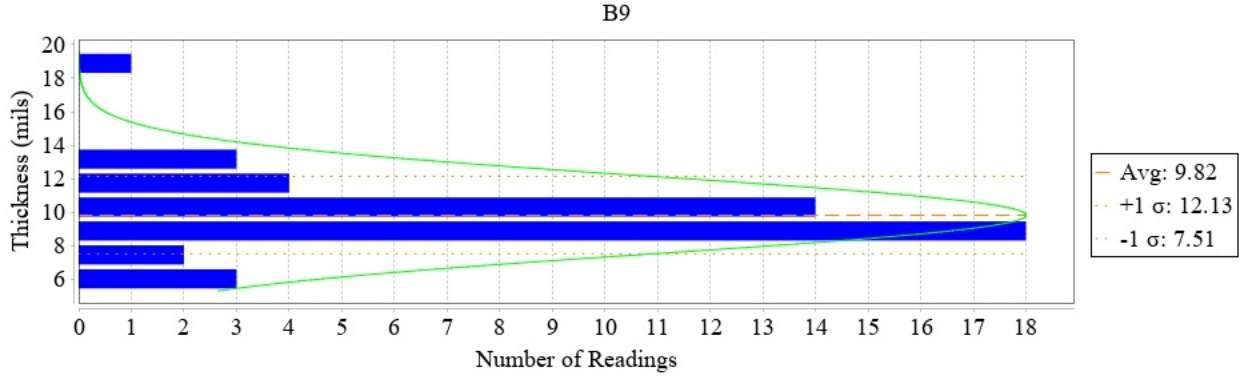
Readings

#	Thickness (mils)	Time
1	8.4	2022-05-20 08:51:43
2	8.2	08:51:48
3	8.3	08:51:49
4	9.7	08:51:53
5	9.6	08:51:54
6	10.4	08:51:55
7	11.0	08:51:59
8	9.2	08:52:00
9	11.2	08:52:01
10	12.8	08:52:10
11	11.6	08:52:11
12	11.1	08:52:12
13	10.7	08:52:28
14	10.3	08:52:29
15	13.6	08:52:30
16	10.2	08:52:31
17	10.2	08:52:32
18	11.0	08:52:33
19	5.3	08:52:44
20	5.9	08:52:45
21	5.5	08:52:46
22	10.5	08:52:56
23	9.2	08:52:57
24	12.2	08:52:59
25	9.1	08:53:10
26	8.4	08:53:11
27	8.9	08:53:13
28	9.3	08:53:23
29	8.9	08:53:24
30	10.3	08:53:25
31	10.7	08:53:33
32	9.4	08:53:35
33	9.4	08:53:35
34	9.9	08:53:37

B9 Readings

#	Thickness (mils)	Time
35	9.3	08:53:38
36	13.1	08:53:39
37	9.1	08:53:42
38	9.3	08:53:43
39	8.6	08:53:45
40	19.6	08:53:46
41	10.9	08:53:47
42	7.1	08:53:48
43	7.6	08:53:50
44	8.3	08:53:51
45	8.6	08:53:52





B11

Created:	2022-05-20 11:02:19
PosiTector Body S/N:	871573
Probe Type:	PosiTector 6000 F
Probe S/N:	423385
CAL:	Cal 1

Exterior roof

Summary

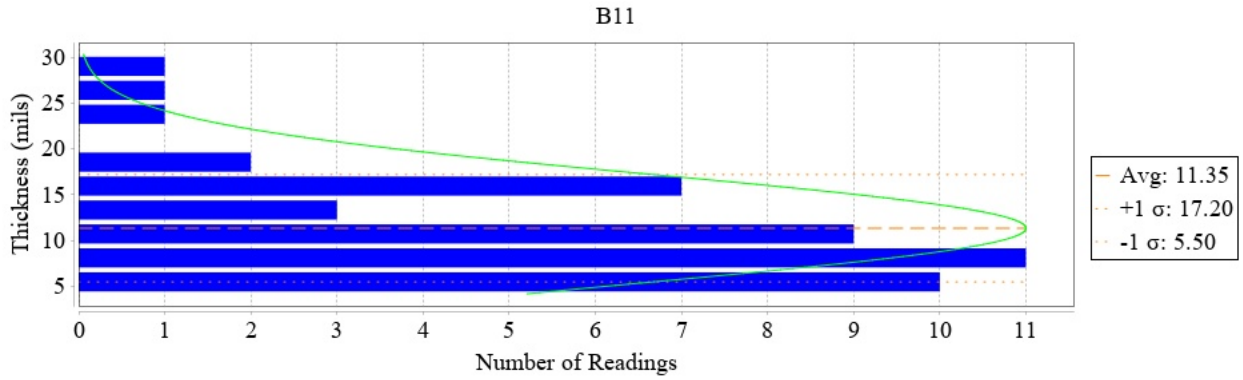
	#	x	σ	↓	↑
Thickness (mils)	45	11.35	5.85	4.2	30.3

Readings

#	Thickness (mils)	Time
1	16.9	2022-05-20 11:40:38
2	18.5	11:40:40
3	25.1	11:40:41
4	5.6	11:40:43
5	15.3	11:40:44
6	11.7	11:40:45
7	4.2	11:40:47
8	4.7	11:40:48
9	7.1	11:40:49
10	13.0	11:40:51
11	12.0	11:40:52
12	12.2	11:40:53
13	14.0	11:40:55
14	30.3	11:40:56
15	16.6	11:40:57
16	7.0	11:40:59
17	8.0	11:41:00
18	9.9	11:41:00
19	9.7	11:41:02
20	6.3	11:41:03
21	5.7	11:41:03
22	9.3	11:41:05
23	16.2	11:41:06
24	5.6	11:41:07
25	7.3	11:41:08
26	7.2	11:41:09
27	6.5	11:41:11
28	11.7	11:41:15
29	11.9	11:41:16
30	7.4	11:41:17
31	9.4	11:41:18
32	8.5	11:41:19
33	24.9	11:41:20
34	16.1	11:41:22

B11 Readings

#	Thickness (mils)	Time
35	19.5	11:41:23
36	14.9	11:41:24
37	6.7	11:41:39
38	9.8	11:41:42
39	10.1	11:41:43
40	6.8	11:41:45
41	8.7	11:41:46
42	10.1	11:41:47
43	16.8	11:41:48
44	7.0	11:41:49
45	4.5	11:41:50



B10

Created:	2022-05-20 11:01:06
PosiTector Body S/N:	871573
Probe Type:	PosiTector 6000 F
Probe S/N:	423385
CAL:	Cal 1

Exterior shell

Summary

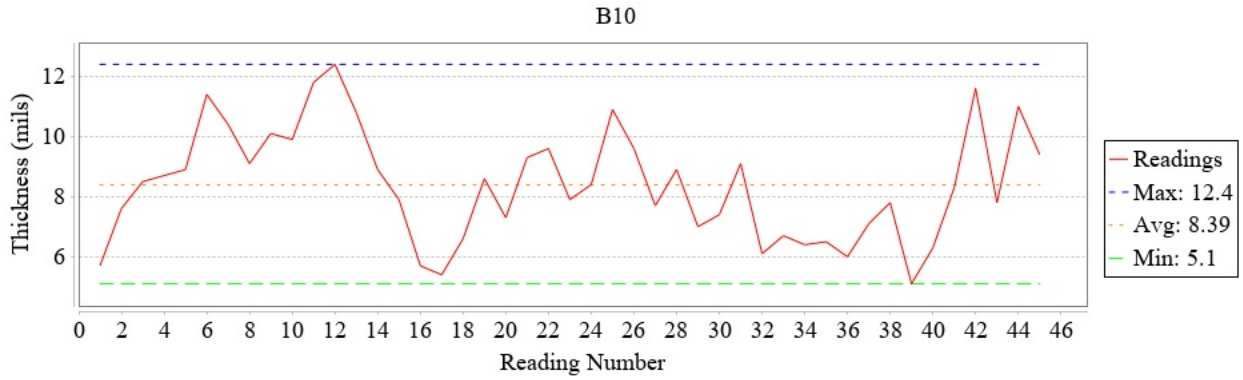
	#	x	σ	↓	↑
Thickness (mils)	45	8.39	1.87	5.1	12.4

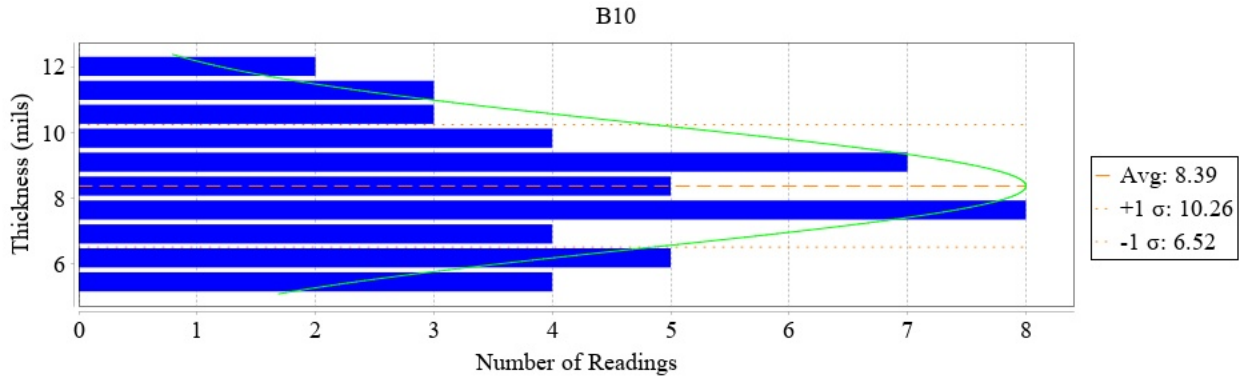
Readings

#	Thickness (mils)	Time
1	5.7	2022-05-20 11:01:09
2	7.6	11:01:10
3	8.5	11:01:11
4	8.7	11:01:13
5	8.9	11:01:14
6	11.4	11:01:15
7	10.4	11:01:17
8	9.1	11:01:17
9	10.1	11:01:18
10	9.9	11:01:20
11	11.8	11:01:20
12	12.4	11:01:21
13	10.8	11:01:23
14	8.9	11:01:24
15	7.9	11:01:25
16	5.7	11:01:28
17	5.4	11:01:28
18	6.6	11:01:29
19	8.6	11:01:34
20	7.3	11:01:35
21	9.3	11:01:36
22	9.6	11:01:37
23	7.9	11:01:38
24	8.4	11:01:39
25	10.9	11:01:46
26	9.6	11:01:47
27	7.7	11:01:48
28	8.9	11:01:49
29	7.0	11:01:50
30	7.4	11:01:51
31	9.1	11:01:54
32	6.1	11:01:55
33	6.7	11:01:56
34	6.4	11:01:57

B10 Readings

#	Thickness (mils)	Time
35	6.5	11:01:58
36	6.0	11:01:59
37	7.1	11:02:06
38	7.8	11:02:07
39	5.1	11:02:08
40	6.3	11:02:11
41	8.3	11:02:12
42	11.6	11:02:13
43	7.8	11:02:16
44	11.0	11:02:17
45	9.4	11:02:18





Appendix III
Paint Sample Laboratory Results

PHOENIX
Environmental Laboratories, Inc.

Tuesday, June 21, 2022

Attn:
Corrtech
25 South Street
Hopkinton MA 01748

Project ID: **PROVIDENCE WATER 15746**
SDG ID: **GCL53711**
Sample ID#s: **CL53711 - CL53713**

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B
NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
UT Lab Registration #CT00007
VT Lab Registration #VT11301

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Sample Id Cross Reference

June 21, 2022

SDG I.D.: GCL53711

Project ID: PROVIDENCE WATER 15746

Client Id	Lab Id	Matrix
A-EXT SHELL	CL53711	BULK
B-LEG/RISER	CL53712	BULK
C-INTERIOR	CL53713	BULK

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

June 21, 2022

FOR: Attn:
Corrtech
25 South Street
Hopkinton MA 01748

Sample Information		Custody Information		Date	Time
Matrix:	BULK	Collected by:		05/21/22	
Location Code:	CORRT-MA	Received by:	SW	06/10/22	11:14
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.□:	15746-1				

Laboratory Data

SDG ID: GCL53711
Phoenix ID: CL53711

Project ID: PROVIDENCE WATER 15746
Client ID: A-EXT SHELL

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Chromium	2.8	1.5	mg/Kg	1	06/18/22	CPP	SW6010D
Lead	14100	15	mg/Kg	10	06/18/22	CPP	SW6010D
Total Metals Digest	Completed				06/10/22	B/AG	SW3050B

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

Results are reported on an ``as received`` basis, and are not corrected for dry weight.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
June 21, 2022
Reviewed and Released by: Helen Geoghegan, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

June 21, 2022

FOR: Attn:
Corrtech
25 South Street
Hopkinton MA 01748

Sample Information		Custody Information		Date	Time
Matrix:	BULK	Collected by:		05/21/22	
Location Code:	CORRT-MA	Received by:	SW	06/10/22	11:14
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.□:	15746-1				

Laboratory Data

SDG ID: GCL53711
Phoenix ID: CL53712

Project ID: PROVIDENCE WATER 15746
Client ID: B-LEG/RISER

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Chromium	10600	110	mg/Kg	100	06/21/22	EK	SW6010D
Lead	72200	110	mg/Kg	100	06/21/22	EK	SW6010D
Total Metals Digest	Completed				06/10/22	B/AG	SW3050B

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

Results are reported on an ``as received`` basis, and are not corrected for dry weight.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
June 21, 2022
Reviewed and Released by: Helen Geoghegan, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

June 21, 2022

FOR: Attn:
Corrtech
25 South Street
Hopkinton MA 01748

Sample Information		Custody Information		Date	Time
Matrix:	BULK	Collected by:		05/21/22	
Location Code:	CORRT-MA	Received by:	SW	06/10/22	11:14
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.□:	15746-1				

Laboratory Data

SDG ID: GCL53711
Phoenix ID: CL53713

Project ID: PROVIDENCE WATER 15746
Client ID: C-INTERIOR

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Chromium	452	11	mg/Kg	10	06/15/22	EK	SW6010D
Lead	530	1.1	mg/Kg	1	06/15/22	EK	SW6010D
Total Metals Digest	Completed				06/11/22	B/AG	SW3050B

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

Results are reported on an ``as received`` basis, and are not corrected for dry weight.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
June 21, 2022
Reviewed and Released by: Helen Geoghegan, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

QA/QC Report

June 21, 2022

QA/QC Data

SDG I.D.: GCL53711

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
QA/QC Batch 628525 (mg/kg), QC Sample No: CL53429 (CL53711, CL53712)														
ICP Metals - Soil														
Chromium	BRL	0.33	14.4	14.4	0	98.7	103	4.3	92.2			75 - 125	35	
Lead	BRL	0.33	5.29	5.07	4.20	98.8	100	1.2	96.7			75 - 125	35	
Comment:														
Additional Criteria: LCS acceptance range is 80-120% MS acceptance range 75-125%.														
QA/QC Batch 628566 (mg/kg), QC Sample No: CL54454 (CL53713)														
ICP Metals - Soil														
Chromium	BRL	0.33	24.7	27.2	9.60	110	101	8.5	121			75 - 125	35	
Lead	BRL	0.33	114	165	36.6	107	99.7	7.1	112			75 - 125	35	r
Comment:														
Additional Criteria: LCS acceptance range is 80-120% MS acceptance range 75-125%.														

r = This parameter is outside laboratory RPD specified recovery limits.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller, Laboratory Director
June 21, 2022

Tuesday, June 21, 2022

Criteria: RI: Com

State: RI

Sample Criteria Exceedances Report

GCL53711 - CORRT-MA

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units
CL53711	PB-SM	Lead	RI / Direct Exposure Criteria / Inorganics (Com)	14100	15	500	500	mg/Kg
CL53712	PB-SM	Lead	RI / Direct Exposure Criteria / Inorganics (Com)	72200	110	500	500	mg/Kg
CL53713	PB-SM	Lead	RI / Direct Exposure Criteria / Inorganics (Com)	530	1.1	500	500	mg/Kg

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Comments

June 21, 2022 SDG I.D.: GCL53711

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

Cooler: Yes ☐ No ☒
Coolant: IPK ☐ ICE ☐ No ☒

CHAIN OF CUSTODY RECORD

Temp 19.3 C Pg of

PHOENIX
Environmental Laboratories, Inc.

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email Makrina Nolan: makrina@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-1102

Data Delivery/Contact Options:
☐ Fax:
☐ Phone:
☒ Email: mmiezejeski@corrtech-inc.com

Customer: 25 South Street Unit E
Address: Hopkinton, MA 01748
CorrTech Inc.

Project: Providence Water 15746
Report to:
Invoice to: CorrTech
QUOTE #

Project P.O: 15746 - 1

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature: [signature] Date: 6-3-22

Matrix Code:
DW=Drinking Water **GW**=Ground Water **SW**=Surface Water **WW**=Waste Water
RW=Raw Water **SE**=Sediment **SL**=Sludge **S**=Soil **SD**=Solid **W**=Wipe **OIL**=Oil
B=Bulk **L**=Liquid **X** = _____(Other)

Analysis Request

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	Lead	Chromium	Ray	MS/MSD*	GL Amber 8 oz. [ ] H3PO4 [ ] NAHSO4	Soil VOA Vials [ ] methanol [ ] H2O	GL Soil container ( )oz	GL Soil container ( )oz	40 ml VOA Vial [ ] As is [ ] HCL	GL Amber 1000ml [ ] As is [ ] H2SO4	PL As is [ ] 250ml [ ] 500ml [ ] 1000ml	PL H2SO4 [ ] 250ml [ ] 500ml	PL HNO3 250ml	PL NaOH 250ml	Bacteria Bottle w/thio	Bacteria Bottle as is
53711	A-Ext. Shell	~~SW~~ B	5/21		✓	✓							1							
53712	B-leg/riser	~~SW~~ B	5/21		✓	✓							1							
53713	C-Interior	~~SW~~ B	5/21		✓	✓							1							

Relinquished by:	Accepted by:	Date:	Time:
Max Miezejeski			
UPS	Kupsum	6/10/22	11:14

Comments, Special Requirements or Regulations:

Turnaround Time:
☐ 1 Day*
☐ 2 Days*
☐ 3 Days*
☒ Standard
☐ Other
* SURCHARGE APPLIES

RI
☐ (Residential)
☒ (Comm/Industrial) Direct Exposure
☐ GA Leachability
☐ GB Leachability
☐ GA-GW Objectives
☐ GB-GW Objectives

CT
☐ RCP Cert
☐ GW Protection
☐ SW Protection
☐ GA Mobility
☐ GB Mobility
☐ Residential DEC
☐ I/C DEC
☐ Other

MA
☐ MCP Certification
☐ GW-1 ☐ MWRA eSMART
☐ GW-2 ☐ S-1 10% CALC
☐ GW-3
☐ S-1 GW-1 ☐ S-1 GW-2 ☐ S-1 GW-3
☐ S-2 GW-1 ☐ S-2 GW-2 ☐ S-2 GW-3
☐ S-3 GW-1 ☐ S-3 GW-2 ☐ S-3 GW-3
☐ SW Protection

State where samples were collected: RI

Data Format
☐ Excel
☒ PDF
☐ GIS/Key
☐ EQuIS
☐ Other

Data Package
☐ Tier II Checklist
☐ Full Data Package*
☒ Phoenix Std Report
☐ Other
* SURCHARGE APPLIES

*MS/MSD are considered site samples and will be billed as such in accordance with the prices quoted.

GLOSSARY OF TERMS FOR STEEL/CONCRETE TANKS

Adhesion- State in which two surfaces are held together by interfacial forces which may consist off valence forces or interlocking action or both

Aggregate- Granular material, such as sand, gravel, crushed stone, crushed hydraulic-cement concrete, or iron blast-furnace slag used with a hydraulic cementing medium to produce either concrete or mortar.

Bugholes- Small regular or irregular cavities, usually not exceeding 15 mm in diameter, resulting from entrapment of air bubbles in the surface of formed concrete during placement and compaction.

Cathodic Protection - The use of a sacrificial metal or energized substance to polarize the structures surfaces and prevents corrosion.

Chalking - The degradation of a paint binders when exposed to ultra-violet light which creates a loose residue on the surface.

Chemical Attack- Decomposition of a coating or concrete due to the action of a chemical.

Chime- Portion of tank floor plate that extends outside the tank shell and rests on top of the foundation.

Contraction Joint- Formed, sawed, or tooled groove in a concrete structure to create a weakened plane and regulate the location of cracking resulting

Corrosion Cell - A concentrated localized site of accelerated corrosion that creates pitting.

Disbondment- The loss of adhesion between a coating and the substrate.

Dry Film Thickness - Total thickness of a paint film when completely cured.

Efflorescence- A white crystalline or powdery deposit on the surface of concrete. Efflorescence results from leaching of lime or calcium hydroxide out of a permeable concrete mass over time by water, followed by reaction with carbon dioxide and acidic pollutants.

Finish- The texture of a concrete surface after compaction and finishing operations have been performed.

Finial Vent - The central roof vent on top of a water tank.

Grout- A plastic mixture of cementitious materials and water used as a filler for cracks, or other void spaces, in concrete surfaces to be coated.

Holiday - A hole or void in a protective coating that may be invisible to the unaided eye that extends to the substrate.

Honey Comb- Voids left in concrete due to failure of the mortar to effectively fill the spaces among coarse aggregate particles.

Hydraulic, Hydrostatic Pressure- A force exerted on the concrete/coating interface due to the level of the ground water.

Isolation Joint- A separation between adjoining parts of a concrete structure

Joint Sealant- Compressible material used to exclude water and solid foreign materials from joints.

Lap Joint Seam- Overlapping seam between roof plates that is open and un-welded on the interior.

Laitance- A thin, weak brittle layer of cement and aggregate fines on a concrete surface. The amount of laitance is influenced by the degree of working or the amount of water in the concrete.

Lead Abatement - The removal of a lead bearing paint system.

Lead Encapsulation - The covering over of a lead based paint by applying a compatible topcoat.

Osmotic Blister - Raised coating area created by buildup of fluid under the coating. Fluid moves through coating in response to water/solvent concentrations between coating and tank water.

Osmotic Pressure- A force exerted on the concrete /coating interface through the capillaries in the concrete due to a moisture differential across the coating.

Overflow Weir Box- internal or external box that captures water above the operating height of the tank and directs it to an overflow pipe.

Pack Rust/Crevice Corrosion- Advanced form of steel corrosion that forms visible layers of oxidized steel swollen larger than the original steel plate thickness, usually found between steel plates or surfaces.

Pinholes- Film defect characterized by small pore-like flaws in a coating which extend entirely through the applied film and have the general appearance of pinpricks, fine holes, or voids when viewed by reflected light.

Plastic Cracking or Shrinkage- Cracking that occurs in the surface of fresh concrete soon after it is placed and while it is still plastic,

Porosity- The ratio usually expressed as a percentage, of the volume of voids in a material to the total volume of the material, including the voids.

Reflective Cracking-Cracking that develops in a coating directly over a dynamic crack in concrete.

Rigging plug- Thread steel nipple welded to a tank roof for the purposes of rigging painting cables. Usually sealed with a threaded plug when not in use.

ROV - Remotely operated vehicle, underwater inspection device "TankRover" by CorrTech

Screen Mesh- Number of openings per linear inch of screen.

Silt - Material that accumulates in the bottom of a water tank originating from treatment by products, raw water particles and distribution system debris.

Silt Stop- Solid cylinder installed on a floor inlet or outlet pipe to extend the pipe above the floor. Pipe prevents floor sediment from being stirred up or sucked out of the tank during flow.

Static Cracks- A crack in the concrete surface whose width does not change.

GLOSSARY OF TERMS FOR STEEL/CONCRETE TANKS

Stich or Skip Weld- Method of welding two pieces of steel together with intermittent short sections of weld bead. Leaves open lap joints along the unwelded sections.

Tubercle - Domed shaped buildup of corrosion products over an active corrosion site. Promotes metal loss through pitting due to differential oxygen concentrations.

Ultrasonic Measurement - The use of high frequency sound waves passed through a material to measure the time required to return. The time required to pass through the material is correlated to the speed of sound in the substrate to yield an actual thickness at a specific location.

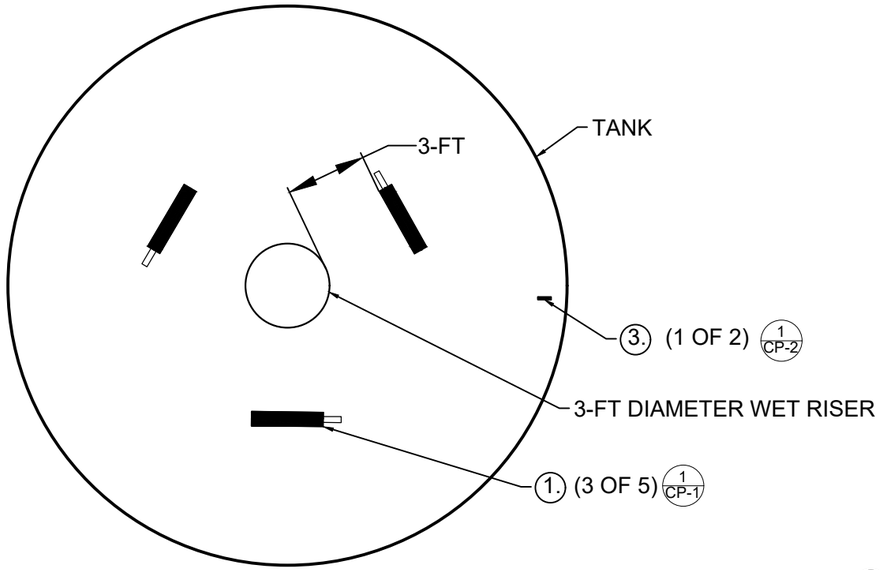
Vapor Barrier- Waterproof membrane placed under concrete floor slabs that are placed on grade.

APPENDIX B

CATHODIC PROTECTION SYSTEM

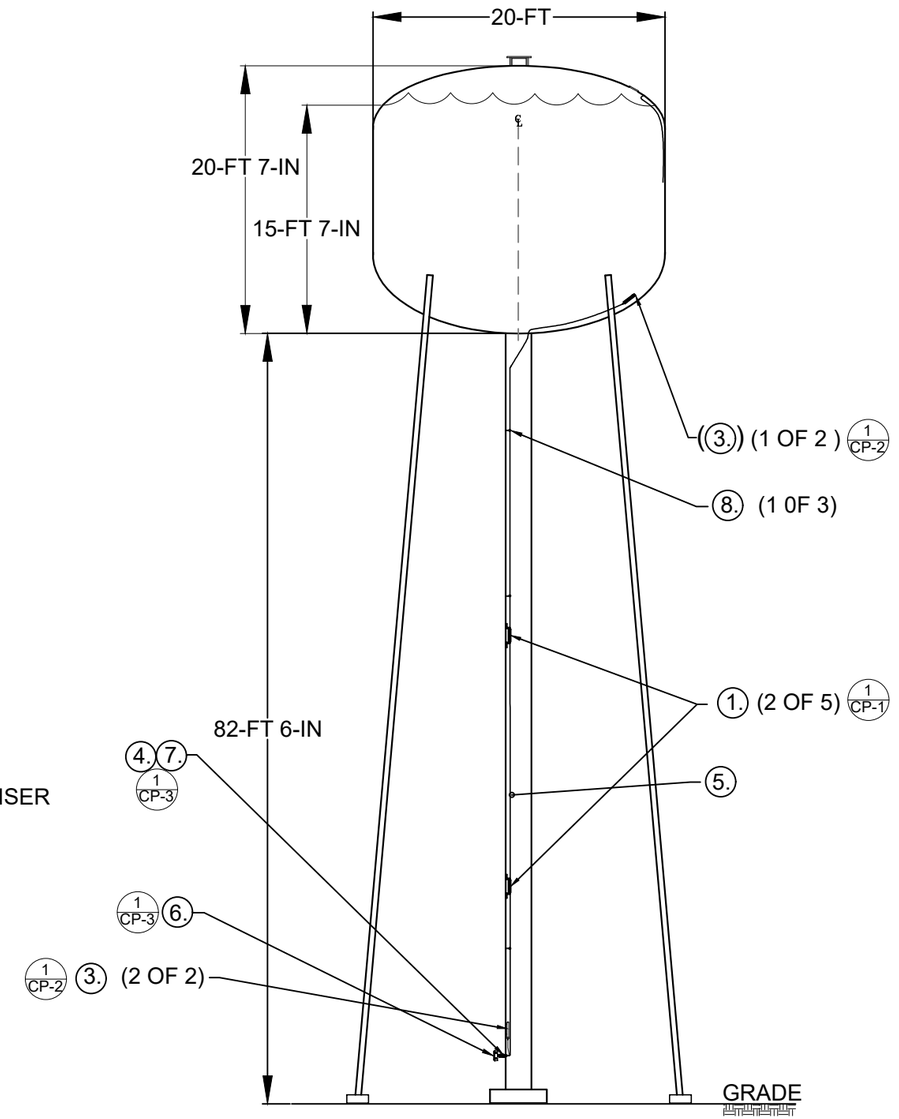
NOTES:

1. REFER TO BOM/PARTS LIST FOR ALL FNS (FIND NUMBERS.) PARENTHESIS SURROUNDING FNS REPRESENT PREVIOUS CALL OUT REFERENCE.



FLOOR ANODE LAYOUT

- 3 ANODES, TRIANGULAR LAYOUT PATTERN.



40,000-GALLON ELEVATED
WATER STORAGE TANK

CATHODIC PROTECTION SYSTEM
LAYOUT: PROFILE

NO.	DATE	DESCRIPTIONS	BY	APP'D
		REVISIONS		
00	11/17/23	INITIAL CP DESIGN	RHG	SHP

CORRTECH CORROSION UNDERSTOOD
25 SOUTH STREET
HOPKINTON, MA 01748
(508) 435-0090
www.corrtech-inc.com

DESIGNED SHP
DRAWN RHG
CHECKED JBP

ENGINEER-IN-CHARGE

DIRECTOR

CLIENT:
PROVIDENCE WATER SUPPLY BOARD
125 DUPONT DRIVE
PROVIDENCE, RI 02907

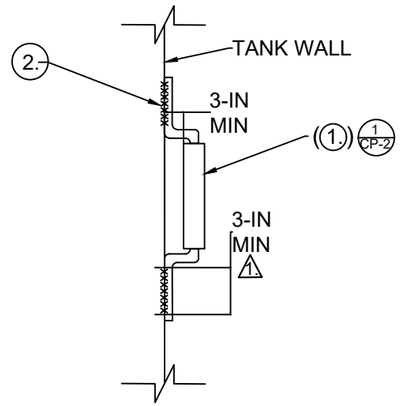
PROJECT:
PROVIDENCE WATER
40,000 GAL WATER STORAGE TANK,
JOB NO. 16753

CATHODIC PROTECTION SYSTEM
GENERAL ARRANGEMENT

DATE:	DRAWING NUMBER:	SHEET NUMBER:	REV.
11/21/23	16753-CAD-01-1	1 OF 4	00

NOTES:

1. REFER TO BOM/PARTS LIST FOR ALL FNS (FIND NUMBERS.) PARENTHESIS SURROUNDING FNS REPRESENT PREVIOUS CALL OUT REFERENCE.



ANODE WELDMENT DETAILS

- REMOVE COATING TO BARE STEEL, WELD 3–IN MINIMUM OF WIRE CORE ON BOTH ENDS, AND RE–COAT WIRE CORE. DO NOT COAT ANODES.

1
CPD–1

BOM/PARTS LIST				
FN	QTY	ITEM	NOTES	P/N
1	5	ANODE, 36LB, MAGNEZIUM		
2	AR	FILLET WELD		
3	2	REFERENCE CELL, SILVER CHLORIDE		
4	1	3/4" NPT FITTING		
5	AR	CABLE, HMWPE		
6	1	JUNCTION BOX, NEMA 4X, 8" X 6" X 4" W/ LATCH		
7	1	WALL PENETRATION GLAND (CONAX)		
8	3	3/8" X 3" CARBON STEEL EYELETS		

NO.	DATE	DESCRIPTIONS	BY	APPR'D
00	11/17/23	INITIAL CP DESIGN	RHG	SHP

REVISIONS

CORRTECH CORROSION UNDERSTOOD

25 SOUTH STREET
HOPKINTON, MA 01748
(508) 435-0090
www.corrtech-inc.com

DESIGNED SHP
DRAWN RHG
CHECKED JBP

NACE CERTIFIED SPECIALIST SCOTT H. PAUL 4183

ENGINEER-IN-CHARGE

DIRECTOR

CLIENT:
PROVIDENCE WATER SUPPLY BOARD
125 DUPONT DRIVE
PROVIDENCE, RI 02907

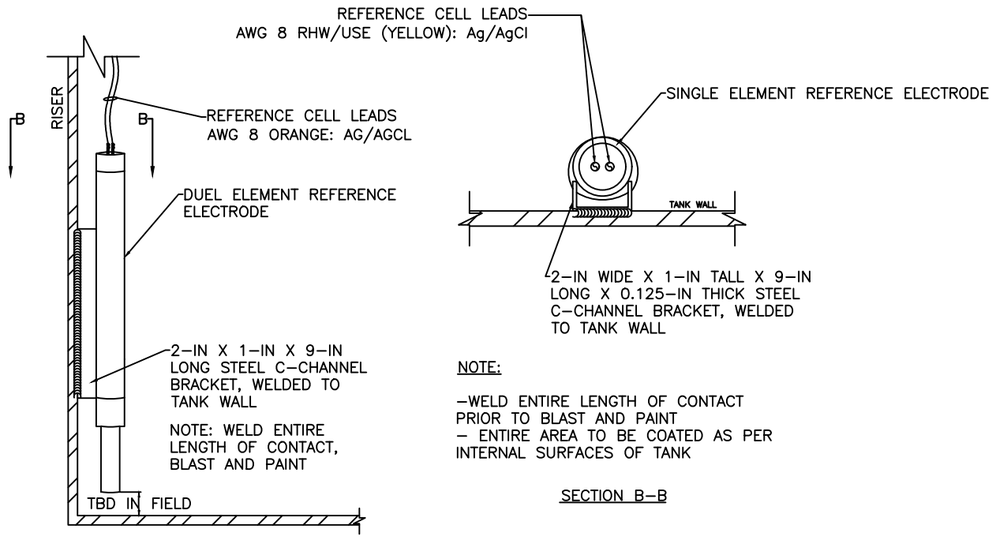
PROJECT:
PROVIDENCE WATER
40,000 GAL WATER STORAGE TANK,
JOB NO. 16753

CATHODIC PROTECTION SYSTEM
GENERAL ARRANGEMENT

DATE:	DRAWING NUMBER:	SHEET NUMBER:	REV.
11/21/23	16753-CAD-01-1	2 OF 4	00

NOTES:

1. REFER TO BOM/PARTS LIST FOR ALL FNS (FIND NUMBERS.) PARENTHESIS SURROUNDING FNS REPRESENT PREVIOUS CALL OUT REFERENCE.



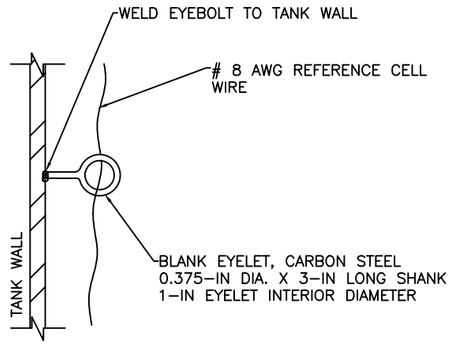
NOTE:

-WELD ENTIRE LENGTH OF CONTACT PRIOR TO BLAST AND PAINT
- ENTIRE AREA TO BE COATED AS PER INTERNAL SURFACES OF TANK

SECTION B-B

REFERENCE ELECTRODE

1
CP-2



NOTE:

-WELD ENTIRE LENGTH OF CONTACT PRIOR TO BLAST AND PAINT
- ENTIRE AREA TO BE COATED AS PER INTERNAL SURFACES OF TANK

EYELET

2
CP-2

NO.	DATE	DESCRIPTIONS	BY	APPR'D
00	11/17/23	INITIAL CP DESIGN	RHG	SHP

REVISIONS

CORRTECH CORROSION UNDERSTOOD
25 SOUTH STREET
HOPKINTON, MA 01748
(508) 435-0090
www.corrtech-inc.com

DESIGNED SHP
DRAWN RHG
CHECKED JBP

NACE CORROSION SPECIALIST SCOTT H. PAUL 4183

ENGINEER-IN-CHARGE

DIRECTOR

CLIENT:
PROVIDENCE WATER SUPPLY BOARD
125 DUPONT DRIVE
PROVIDENCE, RI 02907

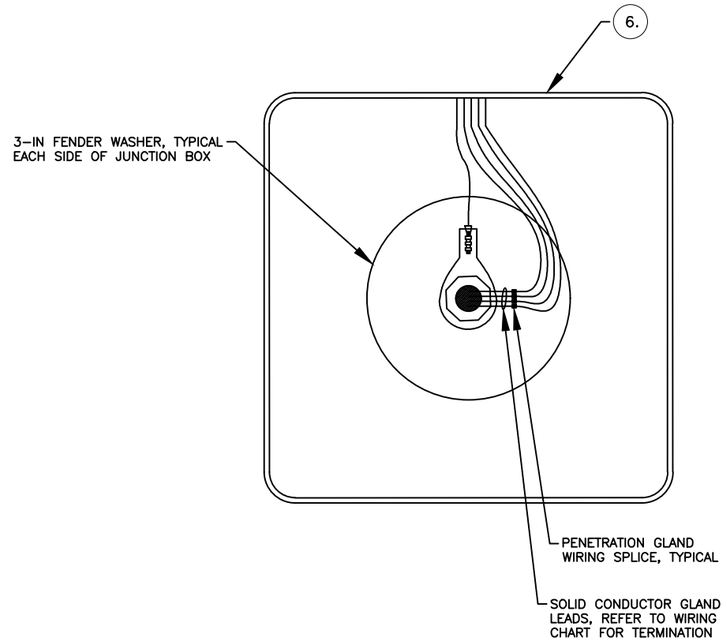
PROJECT:
PROVIDENCE WATER
40,000 GAL WATER STORAGE TANK,
JOB NO. 16753

CATHODIC PROTECTION SYSTEM
GENERAL ARRANGEMENT

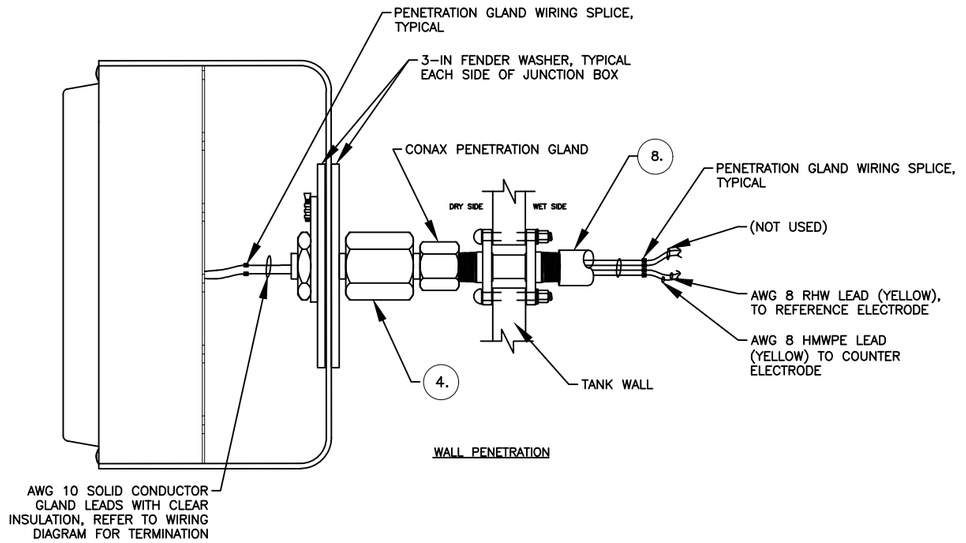
DATE:	DRAWING NUMBER:	SHEET NUMBER:	REV.
11/21/23	16753-CAD-01-1	3 OF 4	00

NOTES:

1. REFER TO BOM/PARTS LIST FOR ALL FNS (FIND NUMBERS.) PARENTHESIS SURROUNDING FNS REPRESENT PREVIOUS CALL OUT REFERENCE.



PLAN VIEW



WALL PENETRATION

PROFILE VIEW

CP TEST STATION

1
CP–3

Wire No.	Dry–Side Designation (Wire Gauge/Color)	Wet–Side Designation (Wire Gauge/Color)	Wire Termination
1	12/BLACK	8/BLACK	REFERENCE CELL 1
2	12/BLACK	8/BLACK	REFERENCE CELL 2
3			NOT USED
4			NOT USED

WIRING DIAGRAM

NO.	DATE	DESCRIPTIONS	BY	APPR'D
00	11/17/23	INITIAL CP DESIGN	RHG	SHP

REVISIONS

CORRTECH CORROSION UNDERSTOOD

25 SOUTH STREET
HOPKINTON, MA 01748
(508) 435-0090
www.corrtech-inc.com

DESIGNED SHP
DRAWN RHG
CHECKED JBP

REGISTERED PROFESSIONAL ENGINEER
STATE OF MINNESOTA
SCOTT H. PAUL
41613

ENGINEER-IN-CHARGE

DIRECTOR

CLIENT:
PROVIDENCE WATER SUPPLY BOARD
125 DUPONT DRIVE
PROVIDENCE, RI 02907

PROJECT:
PROVIDENCE WATER
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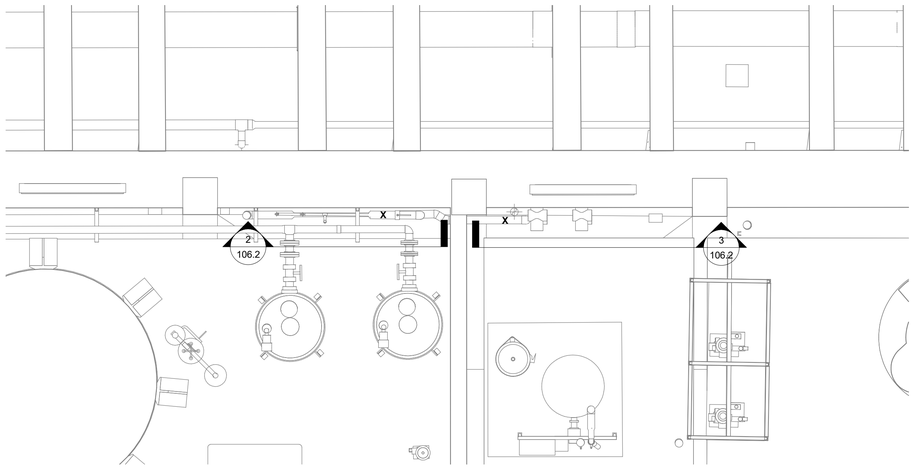
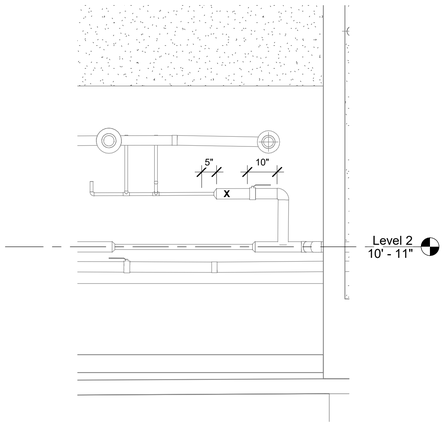
CATHODIC PROTECTION SYSTEM
GENERAL ARRANGEMENT

DATE:	DRAWING NUMBER:	SHEET NUMBER:	REV.
11/21/23	16753-CAD-01-1	4 OF 4	00

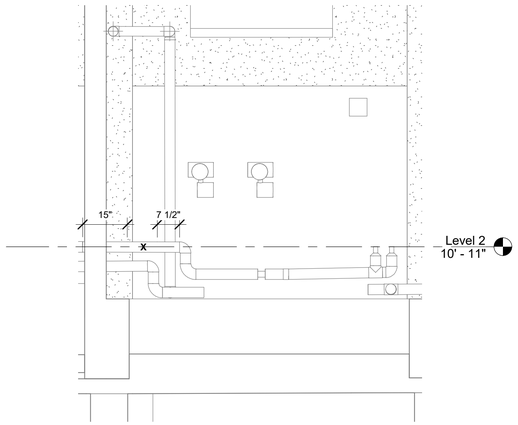


1 CHEMICAL STORAGE PARTIAL PLAN
SCALE: 3/8" = 1'-0"

LEGEND
"**X**" INDICATES PLACEMENT OF ULTRASONIC FLOW METERS



2 ORTHOPHOSPHATE FEED LINE
SCALE: 1/2" = 1'-0"



3 FLUORIDE FEED LINE
SCALE: 1/2" = 1'-0"

PARE

No.	Description	Date

PROVIDENCE WATER

CHEMICAL INJECTION METERING PROJECT

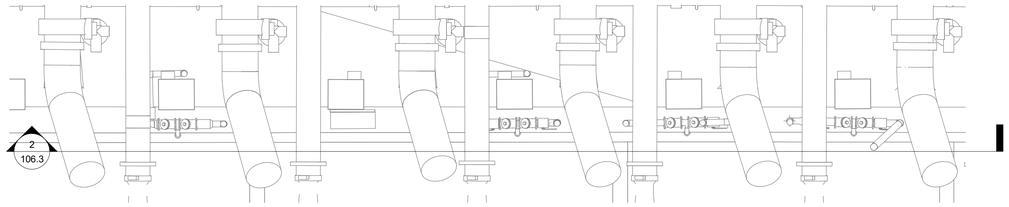
CHEMICAL STORAGE PLAN

Project Number	14256.41
Date	06/28/2023
Drawn By	JDB
Checked By	SPD

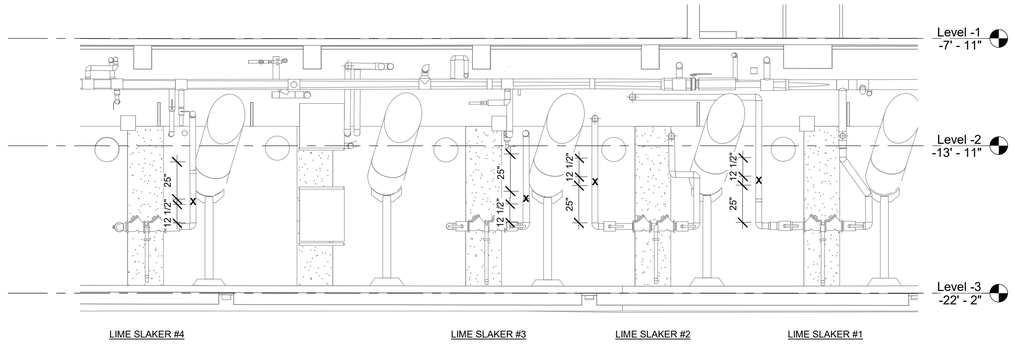
106.2

Scale: As indicated

6/28/2023 8:32:53 AM



1 PIPE GALLERY OVERVIEW - LIME SLAKER FEED
SCALE: 1/4" = 1'-0"



2 LIME SLAKER FEED LINES
SCALE: 1/4" = 1'-0"

PARE

No.	Description	Date

PROVIDENCE WATER

CHEMICAL INJECTION METERING PROJECT

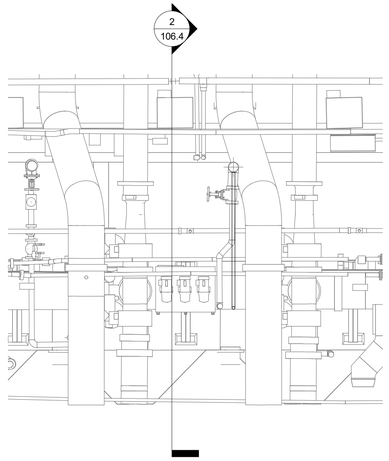
LIME SLAKER FEED

Project Number	14256.41
Date	06/28/2023
Drawn By	JDB
Checked By	SPD

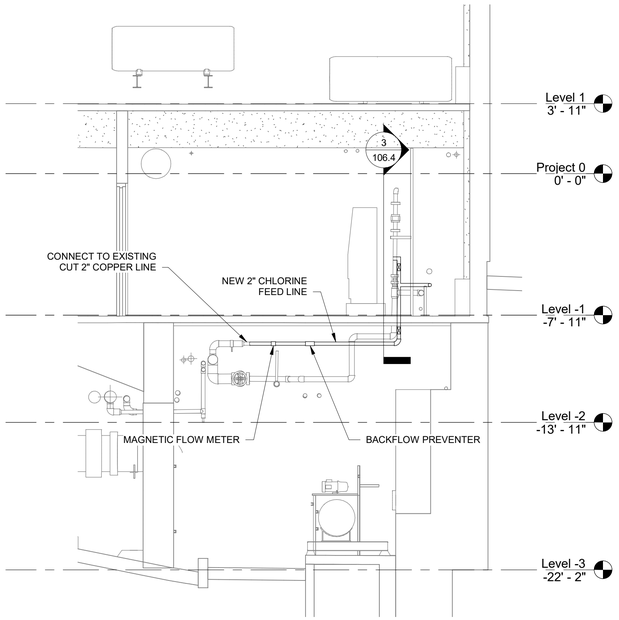
106.3

Scale 1/4" = 1'-0"

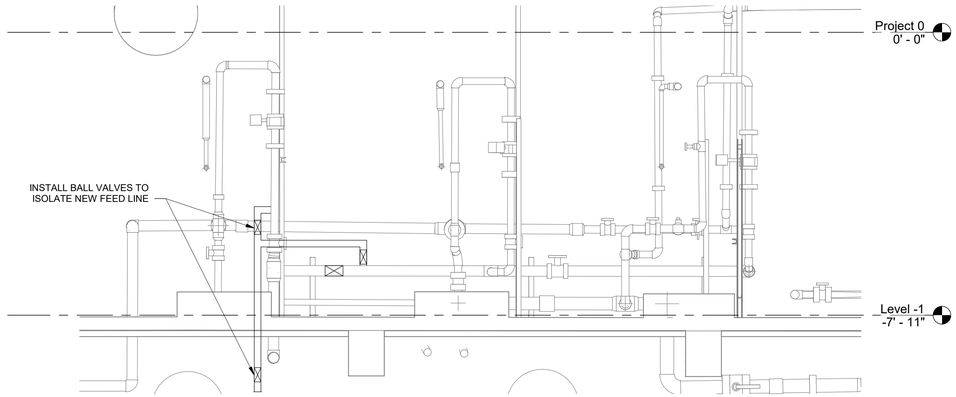
6/28/2023 8:32:53 AM



1 PIPE GALLERY OVERVIEW - CHLORINE FEED
SCALE: 1/4" = 1'-0"



2 CHLORINE FEED LINE
SCALE: 1/4" = 1'-0"



3 CHLORINE INJECTION ROOM PIPING PLAN
SCALE: 1/2" = 1'-0"

PARE

No.	Description	Date

PROVIDENCE WATER

CHEMICAL INJECTION METERING PROJECT

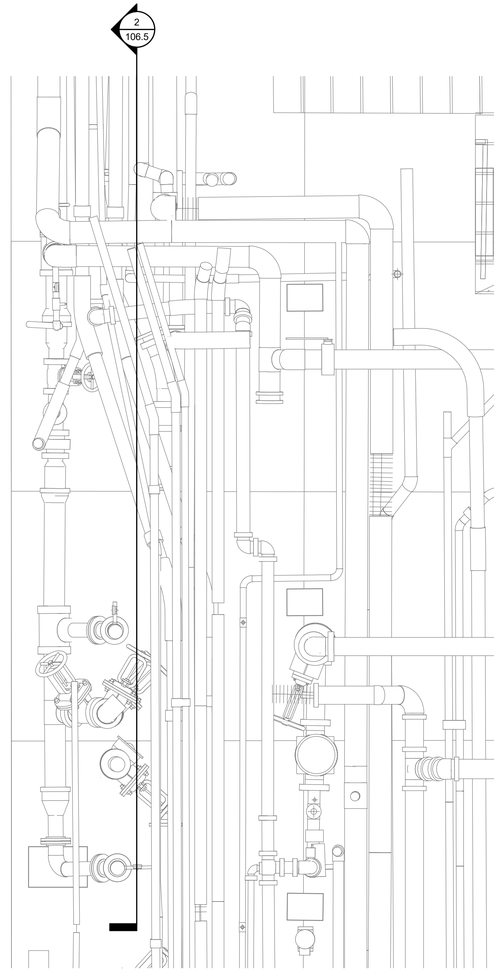
CHLORINE INJECTION FEED

Project Number	14256.41
Date	06/28/2023
Drawn By	JDB
Checked By	SPD

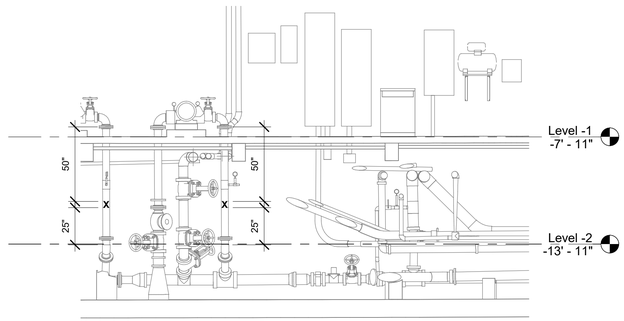
106.4

Scale	As indicated

6/28/2023 8:32:54 AM



1 SERVICE WATER ROOM PARTIAL PLAN
SCALE: 1/2" = 1'-0"



2 SECTION
SCALE: 1/4" = 1'-0"

PARE

No.	Description	Date

PROVIDENCE WATER

CHEMICAL INJECTION METERING PROJECT

SERVICE WATER MAIN FEED

Project Number	14256.41
Date	06/28/2023
Drawn By	JDB
Checked By	SPD

106.5

Scale: As indicated

6/28/2023 8:32:54 AM

APPENDIX B – AIA A201 - 2007 GENERAL CONDITIONS; AIA Document A133-2009 – CMAR AGREEMENT

DRAFT

AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

-

THE OWNER:
(Name and address)

THE ARCHITECT:
(Name and address)

TABLE OF ARTICLES

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

INDEX
(Numbers and Topics in Bold are Section Headings)

ARTICLE 1 GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

2.1 GENERAL

2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or

the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

3.1 GENERAL

 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

3.4 LABOR AND MATERIALS

3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other

facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume

the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

3.8 ALLOWANCES

3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

3.9 SUPERINTENDENT

3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be

required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

3.18 INDEMNIFICATION

3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 3.18.

3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

4.1 GENERAL

4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

4.2 ADMINISTRATION OF THE CONTRACT

4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate For Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

5.1 DEFINITIONS

5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may

be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

6.2 MUTUAL RESPONSIBILITY

6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that

the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner, separate contractors as provided in Section 10.2.5.

6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

7.1 GENERAL

7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

7.2 CHANGE ORDERS

7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

- **.1** The change in the Work;
- **.2** The amount of the adjustment, if any, in the Contract Sum; and
- **.3** The extent of the adjustment, if any, in the Contract Time.

7.3 CONSTRUCTION CHANGE DIRECTIVES

7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- **.1** Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- **.2** Unit prices stated in the Contract Documents or subsequently agreed upon;
- **.3** Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.7.

7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

8.1 DEFINITIONS

8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

8.1.2 The date of commencement of the Work is the date established in the Agreement.

8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

8.2 PROGRESS AND COMPLETION

8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

8.3 DELAYS AND EXTENSIONS OF TIME

8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

9.3 APPLICATIONS FOR PAYMENT

9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2., for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

9.4 CERTIFICATES FOR PAYMENT

9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

9.5 DECISIONS TO WITHHOLD CERTIFICATION

9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

.5 damage to the Owner or a separate contractor;

.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

.7 repeated failure to carry out the Work in accordance with the Contract Documents.

9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

9.6 PROGRESS PAYMENTS

9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect,

stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

9.8 SUBSTANTIAL COMPLETION

9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

9.9 PARTIAL OCCUPANCY OR USE

9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

9.10 FINAL COMPLETION AND FINAL PAYMENT

9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the

Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents; or
- **.3** terms of special warranties required by the Contract Documents.

9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

10.3 HAZARDOUS MATERIALS

10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- **.1** Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- **.2** Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- **.3** Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- **.4** Claims for damages insured by usual personal injury liability coverage;
- **.5** Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- **.6** Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- **.7** Claims for bodily injury or property damage arising out of completed operations; and
- **.8** Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction

of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's Consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

11.3 PROPERTY INSURANCE

11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or

otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the

Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

11.4 PERFORMANCE BOND AND PAYMENT BOND

11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

12.1 UNCOVERING OF WORK

12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

12.2 CORRECTION OF WORK

12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

12.2.2 AFTER SUBSTANTIAL COMPLETION

12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

13.2 SUCCESSORS AND ASSIGNS

13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

13.4 RIGHTS AND REMEDIES

13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

13.5 TESTS AND INSPECTIONS

13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR

14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

14.2 TERMINATION BY THE OWNER FOR CAUSE

14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

15.1 CLAIMS

15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

15.1.5 CLAIMS FOR ADDITIONAL TIME

15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

15.2 INITIAL DECISION

15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

15.3 MEDIATION

15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

15.4 ARBITRATION

15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

15.4.4 CONSOLIDATION OR JOINDER

15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an

additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

SUPPLIMENTAL GENERAL CONDITIIONS

AIA DOCUMENT A201 – 2007

3.9.2 Delete the entire paragraph. Contractor shall furnish with his Bid the name and qualifications of the proposed superintendent.

3.10.1 Delete this paragraph. The Contractor shall furnish a construction schedule with his Bid.

11.1.1 Additional Insurance and Payment Performance Bond Requirements which supersede this paragraph are included in Appendix H.

11.3.1 Additional Insurance requirements shall supersede this paragraph are included in Appendix H.

13.6 No Interest shall be paid.

DRAFT

AIA® Document A133™ – 2009

Standard Form of Agreement Between Owner and Construction Manager as Constructor where the basis of payment is the Cost of the Work Plus a Fee with a Guaranteed Maximum Price

AGREEMENT made as of the « » day of « » in the year « »
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status and address)

« »« »
« »

and the Construction Manager:
(Name, legal status and address)

« »« »
« »

for the following Project:
(Name and address or location)

« »
« »

The Architect:
(Name, legal status and address)

« »« »
« »

The Owner's Designated Representative:
(Name, address and other information)

« »
« »
« »
« »
« »
« »

The Construction Manager's Designated Representative:
(Name, address and other information)

« »
« »
« »
« »
« »
« »

The Architect's Designated Representative:

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

AIA Document A201™–2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

(Name, address and other information)

« »
« »
« »
« »
« »
« »

The Owner and Construction Manager agree as follows.

TABLE OF ARTICLES

ARTICLE 1 GENERAL PROVISIONS

1.1 The Contract Documents

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to the execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract and are as fully a part of the Contract as if attached to this Agreement or repeated herein. Upon the Owner's acceptance of the Construction Manager's Guaranteed Maximum Price proposal, the Contract Documents will also include the documents described in Section 2.2.3 and identified in the Guaranteed Maximum Price Amendment and revisions prepared by the Architect and furnished by the Owner as described in Section 2.2.8. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. If anything in the other Contract Documents, other than a Modification, is inconsistent with this Agreement, this Agreement shall govern.

1.2 Relationship of the Parties

The Construction Manager accepts the relationship of trust and confidence established by this Agreement and covenants with the Owner to cooperate with the Architect and exercise the Construction Manager's skill and judgment in furthering the interests of the Owner; to furnish efficient construction administration, management services and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with the Owner's interests. The Owner agrees to furnish or approve, in a timely manner, information required by the Construction Manager and to make payments to the Construction Manager in accordance with the requirements of the Contract Documents.

1.3 General Conditions

For the Preconstruction Phase, AIA Document A201™–2007, General Conditions of the Contract for Construction, shall apply only as specifically provided in this Agreement. For the Construction Phase, the general conditions of the contract shall be as set forth in A201–2007, which document is incorporated herein by reference. The term "Contractor" as used in A201–2007 shall mean the Construction Manager.

ARTICLE 2 CONSTRUCTION MANAGER'S RESPONSIBILITIES

The Construction Manager's Preconstruction Phase responsibilities are set forth in Sections 2.1 and 2.2. The Construction Manager's Construction Phase responsibilities are set forth in Section 2.3. The Owner and

Construction Manager may agree, in consultation with the Architect, for the Construction Phase to commence prior to completion of the Preconstruction Phase, in which case, both phases will proceed concurrently. The Construction Manager shall identify a representative authorized to act on behalf of the Construction Manager with respect to the Project.

2.1 Preconstruction Phase

2.1.1 The Construction Manager shall provide a preliminary evaluation of the Owner's program, schedule and construction budget requirements, each in terms of the other.

2.1.2 Consultation

The Construction Manager shall schedule and conduct meetings with the Architect and Owner to discuss such matters as procedures, progress, coordination, and scheduling of the Work. The Construction Manager shall advise the Owner and the Architect on proposed site use and improvements, selection of materials, and building systems and equipment. The Construction Manager shall also provide recommendations consistent with the Project requirements to the Owner and Architect on constructability; availability of materials and labor; time requirements for procurement, installation and construction; and factors related to construction cost including, but not limited to, costs of alternative designs or materials, preliminary budgets, life-cycle data, and possible cost reductions.

2.1.3 When Project requirements in Section 3.1.1 have been sufficiently identified, the Construction Manager shall prepare and periodically update a Project schedule for the Architect's review and the Owner's acceptance. The Construction Manager shall obtain the Architect's approval for the portion of the Project schedule relating to the performance of the Architect's services. The Project schedule shall coordinate and integrate the Construction Manager's services, the Architect's services, other Owner consultants' services, and the Owner's responsibilities and identify items that could affect the Project's timely completion. The updated Project schedule shall include the following: submission of the Guaranteed Maximum Price proposal; components of the Work; times of commencement and completion required of each Subcontractor; ordering and delivery of products, including those that must be ordered well in advance of construction; and the occupancy requirements of the Owner.

2.1.4 Phased Construction

The Construction Manager shall provide recommendations with regard to accelerated or fast-track scheduling, procurement, or phased construction. The Construction Manager shall take into consideration cost reductions, cost information, constructability, provisions for temporary facilities and procurement and construction scheduling issues.

2.1.5 Preliminary Cost Estimates

2.1.5.1 Based on the preliminary design and other design criteria prepared by the Architect, the Construction Manager shall prepare preliminary estimates of the Cost of the Work or the cost of program requirements using area, volume or similar conceptual estimating techniques for the Architect's review and Owner's approval. If the Architect or Construction Manager suggest alternative materials and systems, the Construction Manager shall provide cost evaluations of those alternative materials and systems.

2.1.5.2 As the Architect progresses with the preparation of the Schematic Design, Design Development and Construction Documents, the Construction Manager shall prepare and update, at appropriate intervals agreed to by the Owner, Construction Manager and Architect, estimates of the Cost of the Work of increasing detail and refinement and allowing for the further development of the design until such time as the Owner and Construction Manager agree on a Guaranteed Maximum Price for the Work. Such estimates shall be provided for the Architect's review and the Owner's approval. The Construction Manager shall inform the Owner and Architect when estimates of the Cost of the Work exceed the latest approved Project budget and make recommendations for corrective action.

2.1.6 Subcontractors and Suppliers

The Construction Manager shall develop bidders' interest in the Project.

2.1.7 The Construction Manager shall prepare, for the Architect's review and the Owner's acceptance, a procurement schedule for items that must be ordered well in advance of construction. The Construction Manager shall expedite and coordinate the ordering and delivery of materials that must be ordered well in advance of construction. If the Owner agrees to procure any items prior to the establishment of the Guaranteed Maximum Price, the Owner shall procure the items on terms and conditions acceptable to the Construction Manager. Upon the

establishment of the Guaranteed Maximum Price, the Owner shall assign all contracts for these items to the Construction Manager and the Construction Manager shall thereafter accept responsibility for them.

2.1.8 Extent of Responsibility

The Construction Manager shall exercise reasonable care in preparing schedules and estimates. The Construction Manager, however, does not warrant or guarantee estimates and schedules except as may be included as part of the Guaranteed Maximum Price. The Construction Manager is not required to ascertain that the Drawings and Specifications are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Construction Manager shall promptly report to the Architect and Owner any nonconformity discovered by or made known to the Construction Manager as a request for information in such form as the Architect may require.

2.1.9 Notices and Compliance with Laws

The Construction Manager shall comply with applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to its performance under this Contract, and with equal employment opportunity programs, and other programs as may be required by governmental and quasi governmental authorities for inclusion in the Contract Documents.

2.2 Guaranteed Maximum Price Proposal and Contract Time

2.2.1 At a time to be mutually agreed upon by the Owner and the Construction Manager and in consultation with the Architect, the Construction Manager shall prepare a Guaranteed Maximum Price proposal for the Owner's review and acceptance. The Guaranteed Maximum Price in the proposal shall be the sum of the Construction Manager's estimate of the Cost of the Work, including contingencies described in Section 2.2.4, and the Construction Manager's Fee.

2.2.2 To the extent that the Drawings and Specifications are anticipated to require further development by the Architect, the Construction Manager shall provide in the Guaranteed Maximum Price for such further development consistent with the Contract Documents and reasonably inferable therefrom. Such further development does not include such things as changes in scope, systems, kinds and quality of materials, finishes or equipment, all of which, if required, shall be incorporated by Change Order.

2.2.3 The Construction Manager shall include with the Guaranteed Maximum Price proposal a written statement of its basis, which shall include the following:

.1 A list of the Drawings and Specifications, including all Addenda thereto, and the Conditions of the Contract;

.2 A list of the clarifications and assumptions made by the Construction Manager in the preparation of the Guaranteed Maximum Price proposal, including assumptions under Section 2.2.2, to supplement the information provided by the Owner and contained in the Drawings and Specifications;

.3 A statement of the proposed Guaranteed Maximum Price, including a statement of the estimated Cost of the Work organized by trade categories or systems, allowances, contingency, and the Construction Manager's Fee;

.4 The anticipated date of Substantial Completion upon which the proposed Guaranteed Maximum Price is based; and

.5 A date by which the Owner must accept the Guaranteed Maximum Price.

2.2.4 In preparing the Construction Manager's Guaranteed Maximum Price proposal, the Construction Manager shall include its contingency for the Construction Manager's exclusive use to cover those costs considered reimbursable as the Cost of the Work but not included in a Change Order.

2.2.5 The Construction Manager shall meet with the Owner and Architect to review the Guaranteed Maximum Price proposal. In the event that the Owner and Architect discover any inconsistencies or inaccuracies in the information presented, they shall promptly notify the Construction Manager, who shall make appropriate adjustments to the Guaranteed Maximum Price proposal, its basis, or both.

2.2.6 If the Owner notifies the Construction Manager that the Owner has accepted the Guaranteed Maximum Price proposal in writing before the date specified in the Guaranteed Maximum Price proposal, the Guaranteed Maximum Price proposal shall be deemed effective without further acceptance from the Construction Manager. Following

acceptance of a Guaranteed Maximum Price, the Owner and Construction Manager shall execute the Guaranteed Maximum Price Amendment amending this Agreement, a copy of which the Owner shall provide to the Architect. The Guaranteed Maximum Price Amendment shall set forth the agreed upon Guaranteed Maximum Price with the information and assumptions upon which it is based.

2.2.7 The Construction Manager shall not incur any cost to be reimbursed as part of the Cost of the Work prior to the commencement of the Construction Phase, unless the Owner provides prior written authorization for such costs.

2.2.8 The Owner shall authorize the Architect to provide the revisions to the Drawings and Specifications to incorporate the agreed-upon assumptions and clarifications contained in the Guaranteed Maximum Price Amendment. The Owner shall promptly furnish those revised Drawings and Specifications to the Construction Manager as they are revised. The Construction Manager shall notify the Owner and Architect of any inconsistencies between the Guaranteed Maximum Price Amendment and the revised Drawings and Specifications.

2.2.9 The Construction Manager shall include in the Guaranteed Maximum Price all sales, consumer, use and similar taxes for the Work provided by the Construction Manager that are legally enacted, whether or not yet effective, at the time the Guaranteed Maximum Price Amendment is executed.

2.3 Construction Phase

2.3.1 General

2.3.1.1 For purposes of Section 8.1.2 of A201–2007, the date of commencement of the Work shall mean the date of commencement of the Construction Phase.

2.3.1.2 The Construction Phase shall commence upon the Owner's acceptance of the Construction Manager's Guaranteed Maximum Price proposal or the Owner's issuance of a Notice to Proceed, whichever occurs earlier.

2.3.2 Administration

2.3.2.1 Those portions of the Work that the Construction Manager does not customarily perform with the Construction Manager's own personnel shall be performed under subcontracts or by other appropriate agreements with the Construction Manager. The Owner may designate specific persons from whom, or entities from which, the Construction Manager shall obtain bids. The Construction Manager shall obtain bids from Subcontractors and from suppliers of materials or equipment fabricated especially for the Work and shall deliver such bids to the Architect. The Owner shall then determine, with the advice of the Construction Manager and the Architect, which bids will be accepted. The Construction Manager shall not be required to contract with anyone to whom the Construction Manager has reasonable objection.

2.3.2.2 If the Guaranteed Maximum Price has been established and when a specific bidder (1) is recommended to the Owner by the Construction Manager, (2) is qualified to perform that portion of the Work, and (3) has submitted a bid that conforms to the requirements of the Contract Documents without reservations or exceptions, but the Owner requires that another bid be accepted, then the Construction Manager may require that a Change Order be issued to adjust the Contract Time and the Guaranteed Maximum Price by the difference between the bid of the person or entity recommended to the Owner by the Construction Manager and the amount and time requirement of the subcontract or other agreement actually signed with the person or entity designated by the Owner.

2.3.2.3 Subcontracts or other agreements shall conform to the applicable payment provisions of this Agreement, and shall not be awarded on the basis of cost plus a fee without the prior consent of the Owner. If the Subcontract is awarded on a cost-plus a fee basis, the Construction Manager shall provide in the Subcontract for the Owner to receive the same audit rights with regard to the Subcontractor as the Owner receives with regard to the Construction Manager in Section 6.11 below.

2.3.2.4 If the Construction Manager recommends a specific bidder that may be considered a "related party" according to Section 6.10, then the Construction Manager shall promptly notify the Owner in writing of such relationship and notify the Owner of the specific nature of the contemplated transaction, according to Section 6.10.2.

2.3.2.5 The Construction Manager shall schedule and conduct meetings to discuss such matters as procedures, progress, coordination, scheduling, and status of the Work. The Construction Manager shall prepare and promptly distribute minutes to the Owner and Architect.

2.3.2.6 Upon the execution of the Guaranteed Maximum Price Amendment, the Construction Manager shall prepare and submit to the Owner and Architect a construction schedule for the Work and submittal schedule in accordance with Section 3.10 of A201–2007.

2.3.2.7 The Construction Manager shall record the progress of the Project. On a monthly basis, or otherwise as agreed to by the Owner, the Construction Manager shall submit written progress reports to the Owner and Architect, showing percentages of completion and other information required by the Owner. The Construction Manager shall also keep, and make available to the Owner and Architect, a daily log containing a record for each day of weather, portions of the Work in progress, number of workers on site, identification of equipment on site, problems that might affect progress of the work, accidents, injuries, and other information required by the Owner.

2.3.2.8 The Construction Manager shall develop a system of cost control for the Work, including regular monitoring of actual costs for activities in progress and estimates for uncompleted tasks and proposed changes. The Construction Manager shall identify variances between actual and estimated costs and report the variances to the Owner and Architect and shall provide this information in its monthly reports to the Owner and Architect, in accordance with Section 2.3.2.7 above.

2.4 Professional Services

Section 3.12.10 of A201–2007 shall apply to both the Preconstruction and Construction Phases.

2.5 Hazardous Materials

Section 10.3 of A201–2007 shall apply to both the Preconstruction and Construction Phases.

ARTICLE 3 OWNER'S RESPONSIBILITIES

3.1 Information and Services Required of the Owner

3.1.1 The Owner shall provide information with reasonable promptness, regarding requirements for and limitations on the Project, including a written program which shall set forth the Owner's objectives, constraints, and criteria, including schedule, space requirements and relationships, flexibility and expandability, special equipment, systems sustainability and site requirements.

3.1.2 Prior to the execution of the Guaranteed Maximum Price Amendment, the Construction Manager may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Construction Manager may only request such evidence if (1) the Owner fails to make payments to the Construction Manager as the Contract Documents require, (2) a change in the Work materially changes the Contract Sum, or (3) the Construction Manager identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Construction Manager and Architect.

3.1.3 The Owner shall establish and periodically update the Owner's budget for the Project, including (1) the budget for the Cost of the Work as defined in Section 6.1.1, (2) the Owner's other costs, and (3) reasonable contingencies related to all of these costs. If the Owner significantly increases or decreases the Owner's budget for the Cost of the Work, the Owner shall notify the Construction Manager and Architect. The Owner and the Architect, in consultation with the Construction Manager, shall thereafter agree to a corresponding change in the Project's scope and quality.

3.1.4 Structural and Environmental Tests, Surveys and Reports. During the Preconstruction Phase, the Owner shall furnish the following information or services with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Construction Manager's performance of the Work with reasonable promptness after receiving the Construction Manager's written request for such information or services. The Construction Manager shall be entitled to rely on the accuracy of information and services furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

3.1.4.1 The Owner shall furnish tests, inspections and reports required by law and as otherwise agreed to by the parties, such as structural, mechanical, and chemical tests, tests for air and water pollution, and tests for hazardous materials.

3.1.4.2 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The surveys and legal information shall include, as applicable, grades and lines of streets, alleys, pavements and adjoining property and structures; designated wetlands; adjacent drainage; rights-of-way, restrictions, easements, encroachments, zoning, deed restrictions, boundaries and contours of the site; locations, dimensions and necessary data with respect to existing buildings, other improvements and trees; and information concerning available utility services and lines, both public and private, above and below grade, including inverts and depths. All the information on the survey shall be referenced to a Project benchmark.

3.1.4.3 The Owner, when such services are requested, shall furnish services of geotechnical engineers, which may include but are not limited to test borings, test pits, determinations of soil bearing values, percolation tests, evaluations of hazardous materials, seismic evaluation, ground corrosion tests and resistivity tests, including necessary operations for anticipating subsoil conditions, with written reports and appropriate recommendations.

3.1.4.4 During the Construction Phase, the Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Construction Manager's performance of the Work with reasonable promptness after receiving the Construction Manager's written request for such information or services.

3.2 Owner's Designated Representative

The Owner shall identify a representative authorized to act on behalf of the Owner with respect to the Project. The Owner's representative shall render decisions promptly and furnish information expeditiously, so as to avoid unreasonable delay in the services or Work of the Construction Manager. Except as otherwise provided in Section 4.2.1 of A201–2007, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

3.2.1 Legal Requirements. The Owner shall furnish all legal, insurance and accounting services, including auditing services, that may be reasonably necessary at any time for the Project to meet the Owner's needs and interests.

3.3 Architect

The Owner shall retain an Architect to provide services, duties and responsibilities as described in AIA Document B103™–2007, Standard Form of Agreement Between Owner and Architect, including any additional services requested by the Construction Manager that are necessary for the Preconstruction and Construction Phase services under this Agreement. The Owner shall provide the Construction Manager a copy of the executed agreement between the Owner and the Architect, and any further modifications to the agreement.

ARTICLE 4 COMPENSATION AND PAYMENTS FOR PRECONSTRUCTION PHASE SERVICES

4.1 Compensation

4.1.1 For the Construction Manager's Preconstruction Phase services, the Owner shall compensate the Construction Manager as follows:

4.1.2 For the Construction Manager's Preconstruction Phase services described in Sections 2.1 and 2.2:
(Insert amount of, or basis for, compensation and include a list of reimbursable cost items, as applicable.)

« »

4.1.3 If the Preconstruction Phase services covered by this Agreement have not been completed within « » (« ») months of the date of this Agreement, through no fault of the Construction Manager, the Construction Manager's compensation for Preconstruction Phase services shall be equitably adjusted.

4.1.4 Compensation based on Direct Personnel Expense includes the direct salaries of the Construction Manager's personnel providing Preconstruction Phase services on the Project and the Construction Manager's costs for the mandatory and customary contributions and benefits related thereto, such as employment taxes and other statutory employee benefits, insurance, sick leave, holidays, vacations, employee retirement plans and similar contributions.

4.2 Payments

4.2.1 Unless otherwise agreed, payments for services shall be made monthly in proportion to services performed.

4.2.2 Payments are due and payable upon presentation of the Construction Manager's invoice. Amounts unpaid « » (« ») days after the invoice date shall bear interest at the rate entered below, or in the absence thereof at the legal rate prevailing from time to time at the principal place of business of the Construction Manager.
(Insert rate of monthly or annual interest agreed upon.)

« » % « »

ARTICLE 5 COMPENSATION FOR CONSTRUCTION PHASE SERVICES

5.1 For the Construction Manager's performance of the Work as described in Section 2.3, the Owner shall pay the Construction Manager the Contract Sum in current funds for the Construction Manager's performance of the Contract. The Contract Sum is the Cost of the Work as defined in Section 6.1.1 plus the Construction Manager's Fee.

5.1.1 The Construction Manager's Fee:
(State a lump sum, percentage of Cost of the Work or other provision for determining the Construction Manager's Fee.)

« »

5.1.2 The method of adjustment of the Construction Manager's Fee for changes in the Work:

« »

5.1.3 Limitations, if any, on a Subcontractor's overhead and profit for increases in the cost of its portion of the Work:

« »

5.1.4 Rental rates for Construction Manager-owned equipment shall not exceed « » percent (« » %) of the standard rate paid at the place of the Project.

5.1.5 Unit prices, if any:
(Identify and state the unit price; state the quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit (0.00)

5.2 Guaranteed Maximum Price

5.2.1 The Construction Manager guarantees that the Contract Sum shall not exceed the Guaranteed Maximum Price set forth in the Guaranteed Maximum Price Amendment, as it is amended from time to time. To the extent the Cost of the Work exceeds the Guaranteed Maximum Price, the Construction Manager shall bear such costs in excess of the Guaranteed Maximum Price without reimbursement or additional compensation from the Owner.
(Insert specific provisions if the Construction Manager is to participate in any savings.)

« »

5.2.2 The Guaranteed Maximum Price is subject to additions and deductions by Change Order as provided in the Contract Documents and the Date of Substantial Completion shall be subject to adjustment as provided in the Contract Documents.

5.3 Changes in the Work

5.3.1 The Owner may, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions. The Owner shall issue such changes in writing. The

Architect may make minor changes in the Work as provided in Section 7.4 of AIA Document A201–2007, General Conditions of the Contract for Construction. The Construction Manager shall be entitled to an equitable adjustment in the Contract Time as a result of changes in the Work.

 5.3.2 Adjustments to the Guaranteed Maximum Price on account of changes in the Work subsequent to the execution of the Guaranteed Maximum Price Amendment may be determined by any of the methods listed in Section 7.3.3 of AIA Document A201–2007, General Conditions of the Contract for Construction.

 5.3.3 In calculating adjustments to subcontracts (except those awarded with the Owner's prior consent on the basis of cost plus a fee), the terms "cost" and "fee" as used in Section 7.3.3.3 of AIA Document A201–2007 and the term "costs" as used in Section 7.3.7 of AIA Document A201–2007 shall have the meanings assigned to them in AIA Document A201–2007 and shall not be modified by Sections 5.1 and 5.2, Sections 6.1 through 6.7, and Section 6.8 of this Agreement. Adjustments to subcontracts awarded with the Owner's prior consent on the basis of cost plus a fee shall be calculated in accordance with the terms of those subcontracts.

 5.3.4 In calculating adjustments to the Guaranteed Maximum Price, the terms "cost" and "costs" as used in the above-referenced provisions of AIA Document A201–2007 shall mean the Cost of the Work as defined in Sections 6.1 to 6.7 of this Agreement and the term "fee" shall mean the Construction Manager's Fee as defined in Section 5.1 of this Agreement.

 5.3.5 If no specific provision is made in Section 5.1.2 for adjustment of the Construction Manager's Fee in the case of changes in the Work, or if the extent of such changes is such, in the aggregate, that application of the adjustment provisions of Section 5.1.2 will cause substantial inequity to the Owner or Construction Manager, the Construction Manager's Fee shall be equitably adjusted on the same basis that was used to establish the Fee for the original Work, and the Guaranteed Maximum Price shall be adjusted accordingly.

ARTICLE 6 COST OF THE WORK FOR CONSTRUCTION PHASE

6.1 Costs to Be Reimbursed

 6.1.1 The term Cost of the Work shall mean costs necessarily incurred by the Construction Manager in the proper performance of the Work. Such costs shall be at rates not higher than the standard paid at the place of the Project except with prior consent of the Owner. The Cost of the Work shall include only the items set forth in Sections 6.1 through 6.7.

 6.1.2 Where any cost is subject to the Owner's prior approval, the Construction Manager shall obtain this approval prior to incurring the cost. The parties shall endeavor to identify any such costs prior to executing Guaranteed Maximum Price Amendment.

6.2 Labor Costs

 6.2.1 Wages of construction workers directly employed by the Construction Manager to perform the construction of the Work at the site or, with the Owner's prior approval, at off-site workshops.

 6.2.2 Wages or salaries of the Construction Manager's supervisory and administrative personnel when stationed at the site with the Owner's prior approval.
(If it is intended that the wages or salaries of certain personnel stationed at the Construction Manager's principal or other offices shall be included in the Cost of the Work, identify in Section 11.5, the personnel to be included, whether for all or only part of their time, and the rates at which their time will be charged to the Work.)

 6.2.3 Wages and salaries of the Construction Manager's supervisory or administrative personnel engaged at factories, workshops or on the road, in expediting the production or transportation of materials or equipment required for the Work, but only for that portion of their time required for the Work.

 6.2.4 Costs paid or incurred by the Construction Manager for taxes, insurance, contributions, assessments and benefits required by law or collective bargaining agreements and, for personnel not covered by such agreements, customary benefits such as sick leave, medical and health benefits, holidays, vacations and pensions, provided such costs are based on wages and salaries included in the Cost of the Work under Sections 6.2.1 through 6.2.3.

 6.2.5 Bonuses, profit sharing, incentive compensation and any other discretionary payments paid to anyone hired by the Construction Manager or paid to any Subcontractor or vendor, with the Owner's prior approval.

 6.3 Subcontract Costs

Payments made by the Construction Manager to Subcontractors in accordance with the requirements of the subcontracts.

 6.4 Costs of Materials and Equipment Incorporated in the Completed Construction

 6.4.1 Costs, including transportation and storage, of materials and equipment incorporated or to be incorporated in the completed construction.

 6.4.2 Costs of materials described in the preceding Section 6.4.1 in excess of those actually installed to allow for reasonable waste and spoilage. Unused excess materials, if any, shall become the Owner's property at the completion of the Work or, at the Owner's option, shall be sold by the Construction Manager. Any amounts realized from such sales shall be credited to the Owner as a deduction from the Cost of the Work.

 6.5 Costs of Other Materials and Equipment, Temporary Facilities and Related Items

 6.5.1 Costs of transportation, storage, installation, maintenance, dismantling and removal of materials, supplies, temporary facilities, machinery, equipment and hand tools not customarily owned by construction workers that are provided by the Construction Manager at the site and fully consumed in the performance of the Work. Costs of materials, supplies, temporary facilities, machinery, equipment and tools that are not fully consumed shall be based on the cost or value of the item at the time it is first used on the Project site less the value of the item when it is no longer used at the Project site. Costs for items not fully consumed by the Construction Manager shall mean fair market value.

 6.5.2 Rental charges for temporary facilities, machinery, equipment and hand tools not customarily owned by construction workers that are provided by the Construction Manager at the site and costs of transportation, installation, minor repairs, dismantling and removal. The total rental cost of any Construction Manager-owned item may not exceed the purchase price of any comparable item. Rates of Construction Manager-owned equipment and quantities of equipment shall be subject to the Owner's prior approval.

 6.5.3 Costs of removal of debris from the site of the Work and its proper and legal disposal.

 6.5.4 Costs of document reproductions, facsimile transmissions and long-distance telephone calls, postage and parcel delivery charges, telephone service at the site and reasonable petty cash expenses of the site office.

 6.5.5 That portion of the reasonable expenses of the Construction Manager's supervisory or administrative personnel incurred while traveling in discharge of duties connected with the Work.

 6.5.6 Costs of materials and equipment suitably stored off the site at a mutually acceptable location, subject to the Owner's prior approval.

 6.6 Miscellaneous Costs

 6.6.1 Premiums for that portion of insurance and bonds required by the Contract Documents that can be directly attributed to this Contract. Self-insurance for either full or partial amounts of the coverages required by the Contract Documents, with the Owner's prior approval.

 6.6.2 Sales, use or similar taxes imposed by a governmental authority that are related to the Work and for which the Construction Manager is liable.

 6.6.3 Fees and assessments for the building permit and for other permits, licenses and inspections for which the Construction Manager is required by the Contract Documents to pay.

 6.6.4 Fees of laboratories for tests required by the Contract Documents, except those related to defective or nonconforming Work for which reimbursement is excluded by Section 13.5.3 of AIA Document A201–2007 or by other provisions of the Contract Documents, and which do not fall within the scope of Section 6.7.3.

6.6.5 Royalties and license fees paid for the use of a particular design, process or product required by the Contract Documents; the cost of defending suits or claims for infringement of patent rights arising from such requirement of the Contract Documents; and payments made in accordance with legal judgments against the Construction Manager resulting from such suits or claims and payments of settlements made with the Owner's consent. However, such costs of legal defenses, judgments and settlements shall not be included in the calculation of the Construction Manager's Fee or subject to the Guaranteed Maximum Price. If such royalties, fees and costs are excluded by the last sentence of Section 3.17 of AIA Document A201–2007 or other provisions of the Contract Documents, then they shall not be included in the Cost of the Work.

6.6.6 Costs for electronic equipment and software, directly related to the Work with the Owner's prior approval.

6.6.7 Deposits lost for causes other than the Construction Manager's negligence or failure to fulfill a specific responsibility in the Contract Documents.

6.6.8 Legal, mediation and arbitration costs, including attorneys' fees, other than those arising from disputes between the Owner and Construction Manager, reasonably incurred by the Construction Manager after the execution of this Agreement in the performance of the Work and with the Owner's prior approval, which shall not be unreasonably withheld.

6.6.9 Subject to the Owner's prior approval, expenses incurred in accordance with the Construction Manager's standard written personnel policy for relocation and temporary living allowances of the Construction Manager's personnel required for the Work.

6.7 Other Costs and Emergencies

6.7.1 Other costs incurred in the performance of the Work if, and to the extent, approved in advance in writing by the Owner.

6.7.2 Costs incurred in taking action to prevent threatened damage, injury or loss in case of an emergency affecting the safety of persons and property, as provided in Section 10.4 of AIA Document A201–2007.

6.7.3 Costs of repairing or correcting damaged or nonconforming Work executed by the Construction Manager, Subcontractors or suppliers, provided that such damaged or nonconforming Work was not caused by negligence or failure to fulfill a specific responsibility of the Construction Manager and only to the extent that the cost of repair or correction is not recovered by the Construction Manager from insurance, sureties, Subcontractors, suppliers, or others.

6.7.4 The costs described in Sections 6.1 through 6.7 shall be included in the Cost of the Work, notwithstanding any provision of AIA Document A201–2007 or other Conditions of the Contract which may require the Construction Manager to pay such costs, unless such costs are excluded by the provisions of Section 6.8.

6.8 Costs Not To Be Reimbursed

6.8.1 The Cost of the Work shall not include the items listed below:

.1 Salaries and other compensation of the Construction Manager's personnel stationed at the Construction Manager's principal office or offices other than the site office, except as specifically provided in Section 6.2, or as may be provided in Article 11;

.2 Expenses of the Construction Manager's principal office and offices other than the site office;

.3 Overhead and general expenses, except as may be expressly included in Sections 6.1 to 6.7;

.4 The Construction Manager's capital expenses, including interest on the Construction Manager's capital employed for the Work;

.5 Except as provided in Section 6.7.3 of this Agreement, costs due to the negligence or failure of the Construction Manager, Subcontractors and suppliers or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable to fulfill a specific responsibility of the Contract;

.6 Any cost not specifically and expressly described in Sections 6.1 to 6.7;

.7 Costs, other than costs included in Change Orders approved by the Owner, that would cause the Guaranteed Maximum Price to be exceeded; and

.8 Costs for services incurred during the Preconstruction Phase.

6.9 Discounts, Rebates and Refunds

6.9.1 Cash discounts obtained on payments made by the Construction Manager shall accrue to the Owner if (1) before making the payment, the Construction Manager included them in an Application for Payment and received payment from the Owner, or (2) the Owner has deposited funds with the Construction Manager with which to make payments; otherwise, cash discounts shall accrue to the Construction Manager. Trade discounts, rebates, refunds and amounts received from sales of surplus materials and equipment shall accrue to the Owner, and the Construction Manager shall make provisions so that they can be obtained.

6.9.2 Amounts that accrue to the Owner in accordance with the provisions of Section 6.9.1 shall be credited to the Owner as a deduction from the Cost of the Work.

6.10 Related Party Transactions

6.10.1 For purposes of Section 6.10, the term "related party" shall mean a parent, subsidiary, affiliate or other entity having common ownership or management with the Construction Manager; any entity in which any stockholder in, or management employee of, the Construction Manager owns any interest in excess of ten percent in the aggregate; or any person or entity which has the right to control the business or affairs of the Construction Manager. The term "related party" includes any member of the immediate family of any person identified above.

6.10.2 If any of the costs to be reimbursed arise from a transaction between the Construction Manager and a related party, the Construction Manager shall notify the Owner of the specific nature of the contemplated transaction, including the identity of the related party and the anticipated cost to be incurred, before any such transaction is consummated or cost incurred. If the Owner, after such notification, authorizes the proposed transaction, then the cost incurred shall be included as a cost to be reimbursed, and the Construction Manager shall procure the Work, equipment, goods or service from the related party, as a Subcontractor, according to the terms of Sections 2.3.2.1, 2.3.2.2 and 2.3.2.3. If the Owner fails to authorize the transaction, the Construction Manager shall procure the Work, equipment, goods or service from some person or entity other than a related party according to the terms of Sections 2.3.2.1, 2.3.2.2 and 2.3.2.3.

6.11 Accounting Records

The Construction Manager shall keep full and detailed records and accounts related to the cost of the Work and exercise such controls as may be necessary for proper financial management under this Contract and to substantiate all costs incurred. The accounting and control systems shall be satisfactory to the Owner. The Owner and the Owner's auditors shall, during regular business hours and upon reasonable notice, be afforded access to, and shall be permitted to audit and copy, the Construction Manager's records and accounts, including complete documentation supporting accounting entries, books, correspondence, instructions, drawings, receipts, subcontracts, Subcontractor's proposals, purchase orders, vouchers, memoranda and other data relating to this Contract. The Construction Manager shall preserve these records for a period of three years after final payment, or for such longer period as may be required by law.

ARTICLE 7 PAYMENTS FOR CONSTRUCTION PHASE SERVICES

7.1 Progress Payments

7.1.1 Based upon Applications for Payment submitted to the Architect by the Construction Manager and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Construction Manager as provided below and elsewhere in the Contract Documents.

7.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

7.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the certified amount to the Construction Manager not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment.

(Federal, state or local laws may require payment within a certain period of time.)

7.1.4 With each Application for Payment, the Construction Manager shall submit payrolls, petty cash accounts, receipted invoices or invoices with check vouchers attached, and any other evidence required by the Owner or Architect to demonstrate that cash disbursements already made by the Construction Manager on account of the Cost of the Work equal or exceed progress payments already received by the Construction Manager, less that portion of those payments attributable to the Construction Manager's Fee, plus payrolls for the period covered by the present Application for Payment.

7.1.5 Each Application for Payment shall be based on the most recent schedule of values submitted by the Construction Manager in accordance with the Contract Documents. The schedule of values shall allocate the entire Guaranteed Maximum Price among the various portions of the Work, except that the Construction Manager's Fee shall be shown as a single separate item. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Construction Manager's Applications for Payment.

7.1.6 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment. The percentage of completion shall be the lesser of (1) the percentage of that portion of the Work which has actually been completed, or (2) the percentage obtained by dividing (a) the expense that has actually been incurred by the Construction Manager on account of that portion of the Work for which the Construction Manager has made or intends to make actual payment prior to the next Application for Payment by (b) the share of the Guaranteed Maximum Price allocated to that portion of the Work in the schedule of values.

7.1.7 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

.1 Take that portion of the Guaranteed Maximum Price properly allocable to completed Work as determined by multiplying the percentage of completion of each portion of the Work by the share of the Guaranteed Maximum Price allocated to that portion of the Work in the schedule of values. Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201–2007;

.2 Add that portion of the Guaranteed Maximum Price properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work, or if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing;

.3 Add the Construction Manager's Fee, less retainage of « » percent (« » %). The Construction Manager's Fee shall be computed upon the Cost of the Work at the rate stated in Section 5.1 or, if the Construction Manager's Fee is stated as a fixed sum in that Section, shall be an amount that bears the same ratio to that fixed-sum fee as the Cost of the Work bears to a reasonable estimate of the probable Cost of the Work upon its completion;

.4 Subtract retainage of « » percent (« » %) from that portion of the Work that the Construction Manager self-performs;

.5 Subtract the aggregate of previous payments made by the Owner;

.6 Subtract the shortfall, if any, indicated by the Construction Manager in the documentation required by Section 7.1.4 to substantiate prior Applications for Payment, or resulting from errors subsequently discovered by the Owner's auditors in such documentation; and

.7 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.

7.1.8 The Owner and Construction Manager shall agree upon (1) a mutually acceptable procedure for review and approval of payments to Subcontractors and (2) the percentage of retainage held on Subcontracts, and the Construction Manager shall execute subcontracts in accordance with those agreements.

7.1.9 Except with the Owner's prior approval, the Construction Manager shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

7.1.10 In taking action on the Construction Manager's Applications for Payment, the Architect shall be entitled to rely on the accuracy and completeness of the information furnished by the Construction Manager and shall not be deemed to represent that the Architect has made a detailed examination, audit or arithmetic verification of the documentation submitted in accordance with Section 7.1.4 or other supporting data; that the Architect has made

exhaustive or continuous on-site inspections; or that the Architect has made examinations to ascertain how or for what purposes the Construction Manager has used amounts previously paid on account of the Contract. Such examinations, audits and verifications, if required by the Owner, will be performed by the Owner's auditors acting in the sole interest of the Owner.

7.2 Final Payment

7.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Construction Manager when

.1 the Construction Manager has fully performed the Contract except for the Construction Manager's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment;

.2 the Construction Manager has submitted a final accounting for the Cost of the Work and a final Application for Payment; and

.3 a final Certificate for Payment has been issued by the Architect.

The Owner's final payment to the Construction Manager shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

« »

7.2.2 The Owner's auditors will review and report in writing on the Construction Manager's final accounting within 30 days after delivery of the final accounting to the Architect by the Construction Manager. Based upon such Cost of the Work as the Owner's auditors report to be substantiated by the Construction Manager's final accounting, and provided the other conditions of Section 7.2.1 have been met, the Architect will, within seven days after receipt of the written report of the Owner's auditors, either issue to the Owner a final Certificate for Payment with a copy to the Construction Manager, or notify the Construction Manager and Owner in writing of the Architect's reasons for withholding a certificate as provided in Section 9.5.1 of the AIA Document A201–2007. The time periods stated in this Section supersede those stated in Section 9.4.1 of the AIA Document A201–2007. The Architect is not responsible for verifying the accuracy of the Construction Manager's final accounting.

7.2.3 If the Owner's auditors report the Cost of the Work as substantiated by the Construction Manager's final accounting to be less than claimed by the Construction Manager, the Construction Manager shall be entitled to request mediation of the disputed amount without seeking an initial decision pursuant to Section 15.2 of A201–2007. A request for mediation shall be made by the Construction Manager within 30 days after the Construction Manager's receipt of a copy of the Architect's final Certificate for Payment. Failure to request mediation within this 30-day period shall result in the substantiated amount reported by the Owner's auditors becoming binding on the Construction Manager. Pending a final resolution of the disputed amount, the Owner shall pay the Construction Manager the amount certified in the Architect's final Certificate for Payment.

7.2.4 If, subsequent to final payment and at the Owner's request, the Construction Manager incurs costs described in Section 6.1.1 and not excluded by Section 6.8 to correct defective or nonconforming Work, the Owner shall reimburse the Construction Manager such costs and the Construction Manager's Fee applicable thereto on the same basis as if such costs had been incurred prior to final payment, but not in excess of the Guaranteed Maximum Price. If the Construction Manager has participated in savings as provided in Section 5.2.1, the amount of such savings shall be recalculated and appropriate credit given to the Owner in determining the net amount to be paid by the Owner to the Construction Manager.

ARTICLE 8 INSURANCE AND BONDS

For all phases of the Project, the Construction Manager and the Owner shall purchase and maintain insurance, and the Construction Manager shall provide bonds as set forth in Article 11 of AIA Document A201–2007.
(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

Type of Insurance or Bond	Limit of Liability or Bond Amount (0.00)

ARTICLE 9 DISPUTE RESOLUTION

9.1 Any Claim between the Owner and Construction Manager shall be resolved in accordance with the provisions set forth in this Article 9 and Article 15 of A201–2007. However, for Claims arising from or relating to the Construction Manager's Preconstruction Phase services, no decision by the Initial Decision Maker shall be required as a condition precedent to mediation or binding dispute resolution, and Section 9.3 of this Agreement shall not apply.

9.2 For any Claim subject to, but not resolved by mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:
(Check the appropriate box. If the Owner and Construction Manager do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)

[ ] Arbitration pursuant to Section 15.4 of AIA Document A201–2007

[ ] Litigation in a court of competent jurisdiction

[ ] Other: *(Specify)*

« »

9.3 Initial Decision Maker
The Architect will serve as the Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007 for Claims arising from or relating to the Construction Manager's Construction Phase services, unless the parties appoint below another individual, not a party to the Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »
« »

ARTICLE 10 TERMINATION OR SUSPENSION

10.1 Termination Prior to Establishment of the Guaranteed Maximum Price

10.1.1 Prior to the execution of the Guaranteed Maximum Price Amendment, the Owner may terminate this Agreement upon not less than seven days' written notice to the Construction Manager for the Owner's convenience and without cause, and the Construction Manager may terminate this Agreement, upon not less than seven days' written notice to the Owner, for the reasons set forth in Section 14.1.1 of A201–2007.

10.1.2 In the event of termination of this Agreement pursuant to Section 10.1.1, the Construction Manager shall be equitably compensated for Preconstruction Phase services performed prior to receipt of a notice of termination. In no event shall the Construction Manager's compensation under this Section exceed the compensation set forth in Section 4.1.

10.1.3 If the Owner terminates the Contract pursuant to Section 10.1.1 after the commencement of the Construction Phase but prior to the execution of the Guaranteed Maximum Price Amendment, the Owner shall pay to the Construction Manager an amount calculated as follows, which amount shall be in addition to any compensation paid to the Construction Manager under Section 10.1.2:

.1 Take the Cost of the Work incurred by the Construction Manager to the date of termination;

.2 Add the Construction Manager's Fee computed upon the Cost of the Work to the date of termination at the rate stated in Section 5.1 or, if the Construction Manager's Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed-sum Fee as the Cost of the Work at the time of termination bears to a reasonable estimate of the probable Cost of the Work upon its completion; and

.3 Subtract the aggregate of previous payments made by the Owner for Construction Phase services.

The Owner shall also pay the Construction Manager fair compensation, either by purchase or rental at the election of the Owner, for any equipment owned by the Construction Manager which the Owner elects to retain and which is not otherwise included in the Cost of the Work under Section 10.1.3.1. To the extent that the Owner elects to take legal assignment of subcontracts and purchase orders (including rental agreements), the Construction Manager shall, as a condition of receiving the payments referred to in this Article 10, execute and deliver all such papers and take all such steps, including the legal assignment of such subcontracts and other contractual rights of the Construction Manager, as the Owner may require for the purpose of fully vesting in the Owner the rights and benefits of the Construction Manager under such subcontracts or purchase orders. All Subcontracts, purchase orders and rental agreements entered into by the Construction Manager will contain provisions allowing for assignment to the Owner as described above.

If the Owner accepts assignment of subcontracts, purchase orders or rental agreements as described above, the Owner will reimburse or indemnify the Construction Manager for all costs arising under the subcontract, purchase order or rental agreement, if those costs would have been reimbursable as Cost of the Work if the contract had not been terminated. If the Owner chooses not to accept assignment of any subcontract, purchase order or rental agreement that would have constituted a Cost of the Work had this agreement not been terminated, the Construction Manager will terminate the subcontract, purchase order or rental agreement and the Owner will pay the Construction Manager the costs necessarily incurred by the Construction Manager because of such termination.

10.2 Termination Subsequent to Establishing Guaranteed Maximum Price
Following execution of the Guaranteed Maximum Price Amendment and subject to the provisions of Section 10.2.1 and 10.2.2 below, the Contract may be terminated as provided in Article 14 of AIA Document A201–2007.

10.2.1 If the Owner terminates the Contract after execution of the Guaranteed Price Amendment, the amount payable to the Construction Manager pursuant to Sections 14.2 and 14.4 of A201–2007 shall not exceed the amount the Construction Manager would otherwise have received pursuant to Sections 10.1.2 and 10.1.3 of this Agreement.

10.2.2 If the Construction Manager terminates the Contract after execution of the Guaranteed Maximum Price Amendment, the amount payable to the Construction Manager under Section 14.1.3 of A201–2007 shall not exceed the amount the Construction Manager would otherwise have received under Sections 10.1.2 and 10.1.3 above, except that the Construction Manager's Fee shall be calculated as if the Work had been fully completed by the Construction Manager, utilizing as necessary a reasonable estimate of the Cost of the Work for Work not actually completed.

10.3 Suspension
The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007. In such case, the Guaranteed Maximum Price and Contract Time shall be increased as provided in Section 14.3.2 of AIA Document A201–2007, except that the term "profit" shall be understood to mean the Construction Manager's Fee as described in Sections 5.1 and 5.3.5 of this Agreement.

ARTICLE 11 MISCELLANEOUS PROVISIONS

11.1 Terms in this Agreement shall have the same meaning as those in A201–2007.

11.2 Ownership and Use of Documents
Section 1.5 of A201–2007 shall apply to both the Preconstruction and Construction Phases.

11.3 Governing Law
Section 13.1 of A201–2007 shall apply to both the Preconstruction and Construction Phases.

11.4 Assignment
The Owner and Construction Manager, respectively, bind themselves, their agents, successors, assigns and legal representatives to this Agreement. Neither the Owner nor the Construction Manager shall assign this Agreement without the written consent of the other, except that the Owner may assign this Agreement to a lender providing financing for the Project if the lender agrees to assume the Owner's rights and obligations under this Agreement. Except as provided in Section 13.2.2 of A201–2007, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

 11.5 Other provisions:

« »

ARTICLE 12 SCOPE OF THE AGREEMENT

 12.1 This Agreement represents the entire and integrated agreement between the Owner and the Construction Manager and supersedes all prior negotiations, representations or agreements, either written or oral. This Agreement may be amended only by written instrument signed by both Owner and Construction Manager.

 12.2 The following documents comprise the Agreement:

.1 AIA Document A133–2009, Standard Form of Agreement Between Owner and Construction Manager as Constructor where the basis of payment is the Cost of the Work Plus a Fee with a Guaranteed Maximum Price

.2 AIA Document A201–2007, General Conditions of the Contract for Construction

.3 AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed, or the following:

« »

.4 AIA Document E202™–2008, Building Information Modeling Protocol Exhibit, if completed, or the following:

« »

.5 Other documents:
(List other documents, if any, forming part of the Agreement.)

« »

This Agreement is entered into as of the day and year first written above.

OWNER *(Signature)*	**CONSTRUCTION MANAGER** *(Signature)*
« »« »	« »« »
(Printed name and title)	*(Printed name and title)*

APPENDIX C – INSURANCE REQUIREMENTS

Certificate of Insurance

1. The Original Certificate of Insurance must be sent to the Providence Water Supply Board, 125 Dupont Drive, Providence, RI 02907 ATTN: **Purchasing**

2. Certificate must be completely filled out listing all Insurance Companies, Coverages, and Limits. The Providence Water Supply Board (PWSB) requires the following insurance requirements.

A) Worker's Compensation and Occupational Disease Insurance:
Worker's Compensation and Occupational Disease Insurance, In statutory amounts, Covering all employees of the contractor. Employer's liability coverage with limits of not less than $500,000 each accident or illness shall be included.

B) Commercial General Liability Insurance:
Commercial Liability Insurance with limits of not less than $2,000,000 per occurrence, for bodily injury and/or property damage liability $1,000,000 in the aggregate. Products/completed operation, independent contractors, and contractual liability coverages are to be included. No exclusions for rigging, hoisting, explosions, collapse and/or underground. Completed operations coverage must remain in effect for a period not less than 2 years after the completion of all work. **"The City of Providence, Providence Water Supply Board, its officers and agents are to be named as an additional insured".**

C) Automobile Liability Insurance:
When any motor vehicles are used in connection with the work to be performed the Contractor shall maintain Automobile Liability Insurance with limits of not less $1,000,000 per occurrence, combined single limit, for bodily injury and property damage. **"The City of Providence, Providence Water Supply Board are to be named as additionally insured".**

D) Builders Risk Policy:
When a free standing unit is to be constructed or any addition to our facilities made in connection with the work specified, the Contractor must provide Builder's Risk Insurance or an Installation Floater covering all risks with limits equal to the award of the contract. $2,000,000

E) Professional Liability Insurance:
When any architects, engineers, or consulting firms perform work in connection with any contract, the Contractor shall maintain Professional Liability Insurance with limits not less than $2,000,000 per occurrence and aggregate.

N/A

3. The insured name must be the same name as the name on the bid submitted.

4. Insurance Certificates should state the Title of Project to be performed. **(PLEASE SEE THE ATTACHED SAMPLE)**

5. Certificate must read that **■The City of Providence, Providence Water Supply Board, its Officers and Agents are named as additional insured.•**

6. Certificate Holder provision of the certificates must list **■The City of Providence and the Providence Water Supply Board.•**

7. Cancellation and/or reduction in coverage must provide **30 days** written notice.

8. The successful bidder must produce a satisfactory Certificate of Insurance within 10 days after award. No work will begin or contract signed unless all these requirements are met. Failure to do so may result in the cancellation of the award and award to another bidder.

   The insurances specified shall be carried until all work required to be performed under the terms of the CONTRACTOR•s services are satisfactorily completed and for a period of at least two years after the date when final payment becomes due. Failure to carry or keep such insurance in force shall constitute a violation of the contract, and the Providence Water Supply Board maintains the right to stop work and/or withhold payment until proper evidence is provided.

   The insurance shall provide for 30 days prior written notice to be given to the Providence Water Supply Board in the event coverage is substantially changed, canceled, or not renewed.

   In no case shall the coverage limits stated for Commercial General Liability, Automobile Liability, or Professional Liability insurance stated above be less than the total contract amount. If the total contract amount exceeds any stated limit the limit shall be adjusted to the satisfaction of the OWNER to the next highest $1,000,000 exceeding the total contract amount.

   The Providence Water Supply Board maintains the rights to modify, delete, alter or change these requirements.

   The successful bidder understands and agrees that any insurance protection furnished by the Contractor hereunder shall in no way limit its responsibility to indemnify and save harmless the Providence Water Supply Board.

   For additional information contact Elizabeth Paquin at (401) 521-6300 ext. 7257.

(SAMPLE ATTACHED)

APPENDIX D – FEE PROPOSAL

SECTION 00410
BID FORM

CMAR SERVICES FOR WATER SYSTEM UPGRADES

BID FROM:

Company Name: _____ (SEAL)

If incorporated, State of Incorporation: _____

Date of Incorporation: _____

Type of Business (from incorporation papers): _____

By: _____
(Signature - attach evidence of authority to sign if not an individual submitting Bid)

Name (typed or printed): _____

Title: _____

Date: _____

Business Address: _____

_____

Phone No. _____ Fax No. _____

Bidder State of Rhode Island License Information:

License No.	Type of License/Trade Licensed
_____	_____
_____	_____
_____	_____
_____	_____

CITY OF PROVIDENCE
STATE OF RHODE ISLAND
BOARD OF CONTRACT AND SUPPLY

BIDDER'S BLANK

Name of Company	
agrees to bid on: (item to be bid)	**CONSTRUCTION MANAGEMENT AT-RISK SERVICES FOR PROVIDENCE WATER SERVICE WATER SYSTEM UPGRADES**
Date of Award:	
Total Amount in Writing:	Referenced Statement Below
Total Amount in Figures:	Referenced Statement Below

Additional Bidding Details
Specifications
(Use Additional Pages if Necessary)

( ) Acknowledge receipt of all Addenda to the
( ) Conforms to Specifications
( ) Modifications to Specifications. If yes, Please note
( ) Required MBE/WBE Forms submitted with Bid

Only Bids in which the Bid Schedule is completed and submitted in full will be considered.

Federal ID# or Social Security:	
SIGNATURE:	
Title of Person Signing:	
Firm Name:	
Address:	
Phone Number:	
Delivery Date:	
Name of Surety Company:	

CITY OF PROVIDENCE
STATE OF RHODE ISLAND
BOARD OF CONTRACT AND SUPPLY

BIDDER'S BLANK ATTACHMENT 1

Construction Management At-Risk Services
For the Providence Water
Service Water System Upgrades Project

KEY PERSONNEL
HOURLY RATES

Principle in Charge	$ _____ per hour
Project Executive	$ _____ per hour
Senior Project Manager	$ _____ per hour
Project Superintendent	$ _____ per hour
Lead Estimator	$ _____ per hour
Inspector	$ _____ per hour
Safety Manager	$ _____ per hour
Scheduler	$ _____ per hour
CADD Drafter	$ _____ per hour
Clerical/Typist	$ _____ per hour

In addition to the minimum positions and rates listed above, proposers shall provide with their proposal, a supplemental list and hourly rates of all positions they deem necessary to effectively complete the work described herein.

CITY OF PROVIDENCE
STATE OF RHODE ISLAND
BOARD OF CONTRACT AND SUPPLY

1) **CMAR Pre-Construction Phase Fee.** Please state the amount of the proposed CMAR fee at a fixed lump Sum amount for the Pre-construction Phase services which have been outlined in this Proposal.

   Construction Management At-Risk Lump Sum Pre-construction Fee:

   $_____

2) **CMAR Construction Phase Fee**. Please state the amount of the proposed CMAR fee as a fixed, Lump Sum fee. The fee shall be considered to be the CMAR's overhead and profit for the project. If items in addition to overhead and profit are included in this fee, the proposer shall identify these items in an attachment to this fee proposal. Note that the proposer shall base their fee upon the Construction Cost Estimate inclusive of contingencies, therefore no increase in fees or markups will be allowed on change orders.

   Construction Management At-Risk Professional Fixed Fee: $_____

3) Provide a construction cost estimate as an attachment to this fee proposal based on the design documents provided. Include a breakdown of the estimate, utilizing CSI 16 division breakdown at a minimum. The construction cost estimate will be one of the criterion upon which the overall responsiveness of the bidder's proposal will be weighed. If mutually agreed upon by Providence Water and the successful proposer, the construction cost estimate may be used as the basis for the development of the GMP. Given that the drawings included in the design are not complete, the construction cost estimate shall include design and construction contingencies in amounts deemed appropriate by the proposer. These amounts shall be clearly identified in the estimate. Each proposer shall also carry the following allowances in the construction cost estimate:

a)	SCADA Integration – (Performed by R.E. Erikson Co./Avanceon)	$200,000
b)	Security – (Performed by BCM Controls, Corporation)	$50,000
c)	Landscaping	$50,000
d)	Unknown Conditions	$100,000

   Construction Cost Estimate $_____

4) BONDS & INSURANCE

Total of CMAR Direct Costs for Bonds and Insurance

Please state separately the direct cost in dollars for all bonds and insurance anticipated for this project. The amount to be paid for the costs of bonds and insurance shall be adjusted to reflect the actual GMP amount. Providence Water will reimburse only actual costs without any markup.

Proposed Cost for Bond* $_____

Proposed Cost for Insurance* $_____

*Please specify if the amounts included the cost of bonds or insurance for subcontractors. If so, please provide details including the CMAR's policy for bonding subcontractors and suppliers.

5) General Conditions/General Requirements

Please state the amount of the lump sump fee for general conditions/general requirements as outlined in the attached spreadsheet. Proposers may add/subtract items and categories as deemed necessary. If any item is deemed not necessary the proposer shall show a strike-through the applicable item description and also a zero in the bid amount. Proposers must complete the attached detailed breakdown of labor titles, hourly rate, and number of estimated hours through completion of the project. Note that general conditions/general requirements amounts will be finalized when the GMP is developed. A construction contingency will be included in the GMP, therefore markups on change orders will not be allowed. It is Providence Water's intent to use the entire contingency during construction.

BIDDER'S BLANK ATTACHMENT 1

Construction Management At-Risk Services

for the Providence Water

Service Water System Upgrades Project

PROVIDENCE WATER
SERVICE WATER SYSTEM UPGRADES PROJECT
GENERAL CONDITIONS / GENERAL REQUIREMENTS SPREADSHEET

SUBMITTED BY:

DATE:

Item Description	Bid Amount	Quantity	Unit	Unit Price	Total Bid Amount
GENERAL CONDITIONS:					
General Requirements:					
Field Office Communications					
Field Office Equipment					
Field Office Supplies					
Blueprints, Printing & Photocopying					
Postage / Courier					
Drinking Water					
Hoist / Operator					
Temp Lighting					
Temp Electric Usage					
Temp Heating Equipment					
Temp Heating Fuel					
Web Cam					
PM and Super Vehicles					
Cell Phones					
Construction Signs					
Sidewalk & Street Permits					
Meter Rentals					
Site Security					
Temp Safety - Material & Labor					
Rubbish Removal / Dumpster Service					
Dumpsters					
Surveying & Field Eng. Labor for Bldg Control					
Pest Control					
Construction Fence					
Equipment Rentals by GV					
Staging & Scaffolding					
Dust Control & Street Sweeping Services					
Interim Cleaning - Material & Labor					
Final Cleaning - SUB					
Weather Protection					
Window Clean Interior / Exterior					
Travel & Mileage					
General Liability Insurance					
Sub Guard Bonds					
CM Payment & Performance Bond					
C of O Fees					
Expeditor Cost					
Building Permit					
Other General Requirements - List Separately					
Subtotal - General Requirements (a)					

BIDDER'S BLANK ATTACHMENT 1

Construction Management At-Risk Services

for the Providence Water

Service Water System Upgrades Project

PROVIDENCE WATER **SERVICE WATER SYSTEM UPGRADES PROJECT** **GENERALCONDITIONS/GENERAL REQUIREMENTS SPREADSHEET**					
SUBMITTED BY:					
DATE:					
Item Description	**Bid Amount**	**Quantity**	**Unit**	**Unit Price**	**Total Bid Amount**
GENERAL CONDITIONS (continued)					
Labor: **Name:**					
Project Executive					
Project Manager					
Asst. Project Manager					
General Superintendent					
Field Superintendent					
Asst. Field Superintendent					
Project Engineer					
MEP/FP Coordinator					
Cost Estimating					
BIM/CAD					
Scheduling Engineer					
Safety Manager					
EEO officer					
Accounting Administration					
Other CM Labor (specify all other CM labor to be billed to Project)					
Subtotal - Labor (b)					
Total General Requirements & Labor (a) + (b)					
Assumed No. of Weeks of General Conditions/Project					

PROJECT MANUAL AND SPECIFICATIONS

Providence Water Supply Board

Phillip J. Holton Water Purification Plant Upgrades

Service Water Tank Upgrades

Scituate, Rhode Island

Prepared for:

PROVIDENCE WATER

Providence Water
125 Dupont Drive
Providence, RI 02907

Project No. 3-0848-20223

Prepared by:

PARE CORPORATION

Pare Corporation
8 Blackstone Valley Place
Lincoln, RI 02865

FEBRUARY 2024
RI Dept. of Health Submission

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

DIVISION 1

GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 DESCRIPTION

A. Work will primarily include the rehabilitation of the 40,000 gallon elevated steel water storage tank located at Providence Water's P.J. Holton Water Purification Plant in Scituate, RI. The rehabilitation work includes new interior and exterior coatings, interior sacrificial anodes, ladder, overflow downspout, lightning protection, and other water storage tank appurtenances.

B. Upon completion of the work, all disturbed areas shall be restored to a condition equivalent to or better than that which existed prior to construction.

1.2 LIMITS OF WORK/COORDINATION

A. The Contractor shall access the site from abutting rights-of-way as required to facilitate construction. Areas for construction staging, storage, and construction shall be coordinated with the Owner or the Engineer.

1.3 CONSTRUCTION SEQUENCE/SCHEDULE

A. Contractor shall be responsible for submitting a preliminary progress schedule and a preliminary schedule of values to the Engineer for approval ten (10) days prior to the commencement of any work and in accordance with Article 2 of the General Conditions.

B. The sequence and schedule, submitted by the Contractor shall be acceptable to the Engineer as providing for an orderly progression of the work to completion. Acceptance of such will neither impose on Engineer or Owner, responsibility for construction sequencing, schedule, or progress of work nor interfere with or relieve Contractor for Contractor's full responsibility thereof.

C. Following the initial approved schedule, the Contractor shall provide updated weekly schedules to the Engineer for review and approval.

D. Schedule of work shall be coordinated by Contractor such that:

1. Contractor shall be responsible for scheduling and for integrity of partially completed work during performance of other work on site.
2. It shall be the Contractor's responsibility for damage or disruption to partially completed work, and for repair thereof, during performance of all project work.
3. Prior to commencement of construction activities, the contractor shall submit a detailed construction and phasing schedule.
4. Construction and phasing schedule shall include line items for coordination with applicable public agencies and public/private utilities, when necessary.

PART 2 PRODUCTS

2.1 MATERIALS

A. All materials, supplies, or equipment incorporated into the work shall be new and shall conform to the requirements of the applicable sections of these specifications.

PART 3 EXECUTION

3.1 The General Contractor and subcontractors performing work under this contract shall execute such work in a professional manner, consistent with the industry's standards for quality workmanship.

3.2 The General Contractor shall provide a representative to be present at all tests required by these Specifications.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

A. Extent of Work: This Section applies to situations in which the Contractor or their representatives including, but not necessarily limited to, suppliers, subcontractors, employees, and field engineers, enter upon the Owner's property or occupy the public rights-of-way.

B. Related Work Specified Elsewhere:

Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and sections of these Specifications.

1.2 QUALITY ASSURANCE

A. Promptly upon award of the Contract, notify all pertinent personnel regarding requirements of this section.

B. Require that all personnel who will enter upon the Owner's property certify their awareness and familiarity with the requirements of this Section.

1.3 TRANSPORTATION FACILITIES

A. Truck and Equipment Access:

1. Where materials are transported in the execution of the Work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer for the vehicle or prescribed by any Federal, State, or Local law or regulation.
2. Provide adequate protection for curbs and sidewalks over which trucks and equipment pass to reach the job site. Any damaged roads, bridges, structures, curbing, or sidewalks shall be repaired by, or at the expense of the Contractor.

B. Contractor's Vehicles:

1. Require Contractor's vehicles and vehicles belonging to employees of the Contractor or leased by the Contractor or subcontractor, and all other vehicles entering upon the Owner's property in performance of the Work of the Contract, to use only the access routes designated by the Owner or the Engineer.

1.4 NONEXCLUSIVE USE

A. Nothing herein contained or shown on the Drawings shall be construed as giving the Contractor exclusive occupancy of the work area. The Owner or any other contractors employed by the Owner, the various utility companies, contractors, or subcontractors employed by State or Federal agencies, or any other 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 the area as is directed or necessary.

B. The Owner reserves the right to do any other work that may be connected with, or become a part of, or be adjacent to the work embraced by this Contract, at any time, by contractor or otherwise. The Contractor shall not interfere with the work of such others as the Owner may employ, and shall execute their own work in such a manner as to aid in the execution of the work of others as may be required. No backfilling of trenches or excavations will be permitted until such work by the Owner is completed.

C. When the territory of one contract is the convenient means of access to the other, the Contractor shall arrange their working in such a manner as to permit such access to the other and prevent unnecessary delay to the work as a whole.

1.5 WORKING HOURS

A. Regular working hours shall consist of a period established between 7 a.m. and 4 p.m., Monday through Friday, excluding holidays. The Contractor shall make application for work outside regular working hours five (5) calendar days prior to such work in accordance with the paragraph entitled "Work Outside Regular Hours".

1.6 WORK OUTSIDE REGULAR HOURS

A. If the Contractor desires to carry on work outside regular hours, including Saturdays, Sundays, and holidays observed by Providence Water; an application shall be delivered to the Owner and Engineer. The Contractor shall allow ample time to enable satisfactory arrangements to be made by the Engineer for inspecting the work in progress. During periods of darkness, the different parts of the work shall be lighted in a manner approved by the Engineer. All utility cutovers shall be made through coordination with Owner’s on-site representative.

1.7 ORDER OF WORK

A. The Contractor shall schedule their work so as to cause the least amount of interference with traffic. Permission to interrupt any roads, and/or utility service shall be requested in writing a minimum of five (5) calendar days prior to the desired date of interruption.

1.8 EXISTING WORK

A. The removal or altering in any way of existing work shall be carried out in such a manner as to prevent injury or damage to any portion(s) of the existing work which remain(s).

B. All portions of existing work, which have been altered in any way during construction operations shall be repaired or replaced in kind and in a manner to match existing or adjoining work, as, approved by the Engineer. All work of this nature shall be performed by the Contractor at the Contractor’s expense and shall be performed as directed by the Engineer. At the completion of all operations, existing work shall be in a condition equivalent to or better than that which existed before the new work started.

1.9 SANITATION

A. Adequate sanitary conveniences of a type approved for the use of persons employed on the work shall be constructed, properly secluded from public observation, and maintained by the Contractor in such a manner as required or approved by the Engineer. These conveniences shall be maintained at all times without nuisance. Upon completion of the work, the conveniences shall be removed by the Contractor from the premises, leaving the premises clean and free from nuisance.

1.10 SAFETY

A. Contractor is solely responsible for site safety on all project related matters. Contractor shall comply with all applicable Federal, State, and local laws, ordinances, rules and regulations and lawful orders of all authorities having jurisdiction for the safety of persons and protection of property.

1.11 TEMPORARY UTILITIES AND SERVICES

A. Contractor is responsible and shall pay all fees required for any temporary services required to complete the scope of work for this project. All connections shall be performed in accordance with applicable codes.

1.12 CONTAINMENT/STAGING AREA

A. Contractor shall be responsible for the proper storage and handling of equipment, fuel, materials, and waste related to the work. Contractor shall store and secure any fuel, waste, and hazardous materials in containment to prevent a release to the surrounding environment. Any remediation as a result of a release by the contractor shall be at the contractor’s expense.

B. Providence Water has remediated lead contamination in surficial soils surrounding the project site in accordance with Rhode Island Department of Environmental Management Site Remediation Regulations. Prior to mobilization by the contractor and upon completion of the project, Providence Water personnel will analyze the surficial soils surrounding the tank for lead contamination. The remediation of any newly discovered lead in the soil surrounding the tank will be the responsibility of the contractor.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Inspection and Testing

B. Application for Payment

C. Change Procedures

1.2 INSPECTION AND TESTING

A. The Contractor shall pay all costs of engaging an inspection or testing firm, execution of inspection or tests, and reporting results.

B. Costs Included:

1. Incidental labor and facilities required to assist inspection or testing firm.
2. Costs of testing laboratory services required by the Contractor separate from Contract Document requirements.
3. Costs of retesting upon failure of previous tests as determined by Engineer.

C. Payment Procedures:

1. Submit a copy of the inspection or testing firm's invoice with next application for payment.
2. Pay invoice on approval by Engineer.

1.3 APPLICATIONS FOR PAYMENT

A. Submit three copies of each application on EJCDC C-620. See Section 01152 - Application for Payment Form.

B. For each item, provide a column listing: Item Number; Description of Work; Scheduled Value; Previous Applications; Work in Place and Stored Materials under this Application; Authorized Change Orders; Total Completed and Stored to Date of Application; Percentage of Completion; Balance to Finish; and Retainage.

C. Present required information in typewritten form.

D. Execute certification by signature of authorized officer.

E. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

F. List each authorized Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as for an original item of work.

1.4 CHANGE ORDER PROCEDURES

A. The Engineer will advise of minor changes in the work not involving an adjustment to Contract Sum/Price or Contract Time, as authorized by the Engineer, by issuing written supplemental instructions.

B. The Engineer may issue a Notice of Change which includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor will prepare and submit an estimate within seven (7) days.

C. The Contractor may propose a change by submitting request for change to the Engineer, describing the proposed change and its full effect on the work. Include a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time with full documentation and a statement describing the effect on work by separate or other contractors. No change will be allowed except under written approval and Notice of Change of the Engineer, verbal orders are not binding.

D. Stipulated Sum/Price Change Order: Based on Notice of Change and Contractor's estimated price quotation.

E. Unit Price Change Order: For pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of work, which are not pre-determined, execute work under a Work Directive Change. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.

F. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract. The Engineer will determine the change allowable in Contract Sum/Price and Contract Time as provided in the Contract Documents.

G. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the work.

H. Execution of Change Orders: The Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

PART 2 PRODUCTS

2.1 PROJECT MANAGEMENT SOFTWARE

A. The Contractor shall utilize Providence Water's Project Management Software for change orders. All submittals and approvals shall be performed via that software. Email and/or paper submissions will not be allowed.

PART 3 EXECUTION

NOT USED

END OF SECTION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section covers the cutting, coring, and rough and finish patching of holes and openings in existing and proposed structures (manholes, pipes, etc.).

B. The Contractor shall see that all such cuts, cores, and openings are located accurately and are of proper size and shape and shall consult with the Engineer and the contractors and subcontractors concerned in reference to this work.

C. In case the contractor's failure to leave or cut all such openings or have all such sleeves provided and set in proper time, the contractor shall cut them or set them afterwards at their own expense. In so doing, the contractor shall confine the cutting to the smallest extent possible consistent with the work to be done. In no case shall piers or structural members be cut without the written consent of the Engineer.

D. The Contractor shall not cut or alter the work of any subcontractor or any other contractor, nor permit any of their subcontractors to cut or alter the work of any other contractor or subcontractor, except with the written consent of the contractor or subcontractor whose work is to be cut or altered or with the written consent of the Engineer. All cutting and patching or repairing made necessary by the negligence, carelessness, or incompetence of the Contractor or any of their subcontractors shall be done by or at the expense of the Contractor and shall be the responsibility of the Contractor.

PART 2 PRODUCTS

2.01 MATERIALS

A. Concrete rough patching shall be as specified in Division 3.

PART 3 EXECUTION

3.01 GENERAL

A. All cutting and coring shall be performed in such a manner as to limit the extent of patching.

B. All holes cut through concrete, existing or proposed manholes, and existing or proposed pipes shall be core drilled unless otherwise approved. No structural members shall be cut without approval of the Engineer. No holes may be drilled in/through structural members or supports without obtaining prior approval. All work shall be performed by mechanics skilled in this type of work.

C. Rough patching shall be such as to bring the cut or cored area flush with existing construction unless otherwise shown. Finish patching shall match existing surfaces as approved.

D. Prior to coring and cutting, rebar shall be located using a Rebar Locator. If possible, relocate to avoid rebar.

3.02 CORING

A. Coring shall be performed with an approved non-impact rotary tool with diamond core drills. Size of holes shall be suitable for pipe, conduit, sleeves, equipment, or mechanical seals to be installed.

B. All equipment shall conform to OSHA standards and specifications pertaining to plugs, noise and fume pollution, wiring and maintenance.

C. Provide protection for existing equipment, utilities and critical areas against water or other damage caused by drilling operation.

D. Slurry or tailings resulting from coring operations shall be vacuumed or otherwise removed from the area following drilling.

3.03 CUTTING

A. Cutting shall be performed with a concrete wall saw and diamond saw blades of proper size.

B. Provide for control of slurry generated by sawing operation on both sides of wall.

C. When cutting a reinforced concrete wall, the cutting shall be done so as not damage bond between the concrete and reinforcing steel left in structure. Cut shall be made so that steel neither protrudes nor is recessed from face of the cut.

D. Adequate bracing of area to be cut shall be installed prior to start of cutting. Check area during sawing operations for partial cracking and provide additional bracing as required to prevent a partial release of cut area during sawing operations.

E. Provide equipment of adequate size to remove cut panel.

END OF SECTION

PART 1 GENERAL

1.1 PRECONSTRUCTION CONFERENCE

A. Prior to the start of the construction there will be a preconstruction conference to discuss the phasing and scheduling of the construction project. The specific time and place of the conference will be arranged by the Engineer after the contract has been awarded.

1.2 PROGRESS MEETINGS

A. During the course of the construction project, the Contractor shall attend progress meetings as scheduled by the Engineer at the field office of the Engineer. The attendance of subcontractors and suppliers may be required during the progress of the work. The Contractor's delegate to the meeting shall be prepared and authorized to discuss the following items:

1. Progress of Work in relation to Contract Schedule.
2. Proposed Work activities for forthcoming period.
3. Resources committed to Contract.
4. Coordination of Work with others.
5. Status of procurement of equipment and materials.
6. Status of Submittals.
7. Outstanding actions, decisions, or approvals that affect Work activities.
8. Security issues.
9. Quality Issues
10. Potential Claims
11. Contract Changes
12. Costs & Budget
13. Mitigation Measures

1.3 CPM MEETINGS

A. CPM meetings will be scheduled as detailed in Section 01311.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittal Procedures

B. Construction Progress Schedules

C. Proposed Products List

D. Shop Drawings

E. Product Data

F. Manufacturers' Instructions

G. Manufacturers' Certificates

1.2 SUBMITTAL PROCEDURES

A. Transmit each submittal through Providence Water's Project Management software.

B. Sequentially number the transmittal forms. Re-submittals to have original number with an alphabetic suffix.

C. Identify Project, Contractor, subcontractor or supplier; pertinent drawing sheet and detail number(s), and specification section number, as appropriate.

D. Apply Contractor's stamp, signed or initialed certifying that review, verification of products required, field dimensions, adjacent construction work, and coordination of information, is in accordance with the requirements of the work and Contract Documents.

E. Schedule submittals to expedite the Project, and deliver to Engineer at business address. Coordinate submission of related items.

F. Identify variations from Contract Documents and product or system limitations, which may be detrimental to successful performance of the completed work.

G. Provide space for Contractor and Engineer review stamps.

H. Revise and resubmit submittals as required, identify all changes made since previous submittal.

I. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.3 CONSTRUCTION PROGRESS SCHEDULES

A. Transmit each submittal through Providence Water's Project Management software.

B. Submit initial progress schedule in duplicate within ten (10) days after date established in Notice to Proceed for Engineer review.

C. Revise and resubmit as required.

D. Submit revised schedules with each Application for Payment, identifying changes since previous version.

E. Submit a horizontal bar chart with separate line for each major section of work or operation identifying first workday of each week.

F. Show complete sequence of construction by activity, identifying work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

G. Indicate estimated percentage of completion for each item of work at each submission.

H. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and under Allowances.

1.4 PROPOSED PRODUCTS LIST

A. Transmit each submittal through Providence Water's Project Management software.

B. Within ten (10) days after date of Notice to Proceed, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

C. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation and reference standards.

1.5 SHOP DRAWINGS

A. Transmit each submittal through Providence Water's Project Management software.

B. Submit the number of opaque reproductions, which Contractor requires, plus copies which will be retained by Architect/Engineer.

1.6 PRODUCT DATA

A. Transmit each submittal through Providence Water's Project Management software.

B. Submit the number of copies, which the Contractor requires, plus copies which will be retained by the Engineer.

C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this project.

1.7 SAMPLES

A. Submit samples to illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

B. Submit samples of finish from the full range of manufacturers' standard colors, textures and patterns for Engineer's selection.

C. Include identification on each sample, with full project information.

D. Submit the number of samples specified in individual specification sections.

E. Reviewed samples, which may be used in the work, are indicated in individual specification sections.

1.8 MANUFACTURERS' INSTRUCTIONS

A. When specified in individual specification sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for product data.

B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.9 MANUFACTURERS' CERTIFICATES

A. When specified in individual specification sections, submit manufacturers' certificate to Engineer for review, in quantities specified for product data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect/Engineer.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01311 CONSTRUCTION SCHEDULING

PART 1 GENERAL

1.1 PROGRAM DESCRIPTION

A. The Contractor shall produce and submit a construction sequence and schedule to the engineer for approval a minimum of 10 days prior to the commencement of work. All work shall be done in accordance with the established schedule and the Contractor, and their subcontractors shall be responsible for cooperating fully with the Engineer and the Owner in effectively utilizing the schedule.

B. Approval of the schedule by the Engineer is advisory only and shall not relieve the Contractor of responsibility for accomplishing the work within the contract completion date. Omissions and errors in the approved schedule shall not excuse performance less than that required by the Contract. Approval by the Engineer in no way makes the Engineer an insurer of the schedule's success or liable for time or cost overruns flowing from its shortcomings.

PART 2 PRODUCTS

2.1 PROJECT MANAGEMENT SOFTWARE

A. The Contractor shall be issued a license to utilize Providence Water's Project Management Software for this project. All schedule submittals shall be performed via that software. Email and/or paper submissions will not be allowed.

2.2 SCHEDULE SOFTWARE

A. The Contractor shall utilize industry standard scheduling software to produce the construction schedule. Software shall be at least MS Project, latest edition or equivalent.

PART 3 EXECUTION

3.1 SCHEDULE REVIEW PROCESS

A. Contractor shall be responsible for submitting a preliminary progress schedule and a preliminary schedule of values to the Engineer for approval ten (10) days prior to the commencement of any work and in accordance with Article 2 of the General Conditions.

B. Following the initial approved schedule, the Contractor shall provide updated weekly schedules to the Engineer for review and approval.

C. Failure of the Contractor to provide weekly schedules will result in liquated damages of $1000/week, which is the anticipated cost for the Engineer to produce the Contractor's schedule.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Quality Assurance and Control of Installation

B. References

C. Field samples

D. Inspection and testing laboratory services

E. Manufacturers' field services and reports

1.2 RELATED SECTIONS

A. Section 01300 - Submittals

B. Section 01600 - Material and Equipment

1.3 QUALITY ASSURANCE AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce work of specified quality.

B. Comply fully with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

D. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes or specified requirements indicate higher standards or more precise workmanship.

E. Perform work by persons qualified to produce workmanship of specified quality.

F. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.4 REFERENCES

A. Conform to reference standard by date of issue current on date of Contract Documents.

B. Obtain copies of standards when required by Contract Documents.

C. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention of inference otherwise in any reference document.

1.5 FIELD SAMPLES

A. Install field samples at the site for review, as required by individual specification sections.

B. Acceptable samples represent a quality level for the work.

C. Where field sample is specified in individual sections to be removed, clear area after field sample has been accepted by Engineer.

1.6 INSPECTION AND TESTING LABORATORY SERVICES

A. The Contractor shall submit names of all the firms to be utilized for testing and analytical services for approval by the Engineer. No results or observations will be accepted unless performed by an approved testing firm.

B. The testing firm will perform inspections, tests and other services specified in individual specification sections and as required by the Engineer.

C. Reports will be submitted by the testing firm to the Engineer, in duplicate, indicating observations and results of tests, and compliance or non-compliance with Contract Documents.

D. Cooperate with testing firm, furnish samples of materials, design mix, equipment, tools, storage, access, and assistance as requested.

1. Notify Engineer and testing firm seven (7) days prior to expected time for operations requiring services.
2. All costs associated with testing will be paid by the Contractor.

E. Re-testing required due to non-conformance to specified requirements, shall be performed by the same testing firm per instructions by the Engineer. Payment for re-testing will be paid by the Contractor with no additional cost to the Owner.

1.7 MANUFACTURER'S FIELD SERVICES AND REPORTS

A. Submit qualifications of observer to Engineer thirty (30) days in advance of required observations. Observer subject to approval of Engineer.

B. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, testing, adjusting and balance of equipment as applicable, and to initiate

instructions when necessary.

C. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

D. Submit report in duplicate to Engineer for review via Providence Water's Project Management software within twenty-four (24) hours of observation.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Controls: Fencing, Barriers

B. Control and Diversion of Water and Dewatering

C. Erosion and Sediment Control

D. Dust Control

E. Noise Control

F. Pollution Control

G. Traffic Control

H. Progressive Cleaning

1.2 BARRIERS AND FENCING

A. Provide barriers to prevent unauthorized entry to construction areas to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing buildings.

C. Provide protection for plant life designated to remain. Replace damaged plant life.

D. Protect non-owned vehicular traffic, stored materials, site and structure from damage and to minimize hazards to general public (i.e., curious nuisance).

1.3 CONTROL AND DIVERSION OF WATER AND DEWATERING

A. The Contractor shall be responsible for providing and maintaining all ditching, grading, sheeting and bracing, pumping and appurtenant work for the temporary diversion of water courses and protection from flooding as necessary to permit the construction of work in the dry.

1.4 EROSION AND SEDIMENT CONTROL

A. Baled hay shall be placed as shown on the plans or as directed by the Owner or the Engineer. They shall be held in place by two wooden stakes in each bale. Baled hay shall be maintained or replaced as they are disturbed, or until they are no longer necessary for the purpose intended, or are ordered removed by the Owner or the

Engineer.

B. The Contractor shall be responsible for installing and maintaining erosion and sedimentation control measures in accordance with applicable sections of the Rhode Island Soil Erosion and Sediment Control Handbook.

1.5 DUST CONTROL

A. Execute work by methods to minimize raising dust from construction operations.

B. Provide positive means to prevent airborne dust from dispersing into atmosphere, such as spraying water and/or calcium chloride.

1.6 NOISE CONTROL

A. The Contractor shall coordinate and schedule all work, which will contribute to increased noise levels in residential areas with the Owner. This shall be done with sufficient time to allow the Owner to notify the residents.

B. The Contractor shall work utilizing methods to minimize excess background noise whenever possible.

C. In no case shall work resulting in increased noise levels be performed prior to 7:00 a.m. or after 6:00 p.m., without written authorization of the Owner.

1.7 POLLUTION CONTROL

A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

1.8 TRAFFIC CONTROL

A. The Contractor shall be responsible for the procurement of traffic people to control and protect pedestrians and traffic during the construction of the Contractor Work when so directed by the Engineer or when working on public rights-of-way.

B. The Contractor shall not be compensated for traffic people when the requirement for such has been made by the Owner, Engineer, or local public safety official. This shall be included in the Contractor's bid price.

C. Traffic control shall be provided in accordance with the Rhode Island Department of Transportation Manual on Uniform Traffic Control Devices.

1.9 PROGRESSIVE CLEANING

A. As project progresses, maintain areas free of waste materials, debris and rubbish. Interim measures shall be undertaken to maintain a clean site while work progresses.

B. Sweep all paved surfaces disturbed by construction activity daily and prior to opening to vehicular or pedestrian traffic.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

A. The Contractor shall provide all temporary facilities necessary for the proper completion of the work, as necessary and as specified.

1.2 CONTRACTOR'S FIELD OFFICE

A. The Contractor may maintain a temporary field office near the work for use during the period of construction at which readily accessible copies of all contract documents shall be kept. The office shall be located where it will not interfere with the progress of the work as approved by the Engineer. In charge of this office there shall be a competent superintendent of the Contract as specified in the Agreement, under Article CA 5.

1.4 WATER FOR CONSTRUCTION PURPOSES

A. The Contractor shall make arrangements with the Owner of the Utility to use available water supplies for construction purposes. The Contractor shall coordinate with Providence Water on how to obtain Potable Water to the site.

B. The express approval of the Owner shall be obtained before water is used. Waste of water by the Contractor shall be sufficient cause for withdrawing the privilege of unrestricted use. Hydrants shall only be operated under the supervision of the Owner's personnel.

C. The Contractor is required to meter all water use and the Contractor will be charged for this use.

D. If a water ban is instituted, the Owner reserves the right to discontinue the Contractor's use of City water.

1.5 TEMPORARY HEAT

A. If temporary heat is required for the protection of the Work, the Contractor shall provide and install suitable heating apparatus, shall provide adequate and proper fuel, and shall maintain heat as required.

1.6 TEMPORARY ELECTRICAL

A. The Contractor shall make all necessary applications and arrangements and pay all fees and charges for electrical energy for power and light necessary for the proper completion of the Work and during its entire progress. The Contractor shall provide and pay for all temporary wiring, switches, connections, and meters.

B. The Contractor shall provide sufficient electric lighting so that all work may be done in a workmanlike manner when there is not sufficient daylight.

1.7 TEMPORARY FENCING

A. Provide commercial grade chain link fence to prevent trespass by workmen and suppliers onto private property and the public from the construction site. The contractor shall provide the Owner and the Engineer with copies of keys to enter the site.

1.8 PROJECT SIGNS

A. The Contractor shall provide signs constructed in accordance with other portions of the specifications (i.e. RIDEM permit signs). These signs shall be erected in a location selected by the Engineer. The Contractor shall maintain the signs throughout the duration of the project and remove them from the site when the Contract has been completed.

1.9 FIRE EXTINGUISHERS

A. Provide portable UL-rated, Class A fire extinguishers for all temporary offices and similar spaces. In other locations, provide portable UL-rated Class ABC dry chemical extinguishers a combination of NEPA recommended Classes for the exposure. Comply with NEPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products

B. Transportation and Handling

C. Storage and Protection

D. Product Options

E. Substitutions

1.2 PRODUCTS

A. Means new material, machinery, components, equipment, fixtures, and systems forming the work. Does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the work. Products may also include existing materials or components required for reuse.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

C. Provide interchangeable components of the same manufacturer for similar components.

1.3 TRANSPORTATION AND HANDLING

A. Transport and handle products in accordance with manufacturers' instructions.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 STORAGE AND PROTECTION

A. Store and protect products in accordance with manufacturers' instructions, with seals and labels intact and legible. Store sensitive products in weather-tight climate-controlled enclosures.

B. For exterior storage of fabricated products, place on sloped supports, above ground.

C. Provide off-site storage and protection when site does not permit on-site storage or protection.

D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.

E. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

G. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

H. All pipe shall be stored with both ends covered with plastic sheeting, secured in place against wind and precipitation.

1.5 PRODUCT OPTIONS

A. Products specified by reference standards or by description only shall mean any product meeting those standards or description.

B. Products specified by naming one or more manufacturers shall mean products of manufacturers named and meeting specifications; no options or substitutions allowed.

C. Products specified by naming one or more manufacturers, with a provision for substitutions, means that the Contractor shall submit a request for substitution for any manufacturer not named.

1.6 SUBSTITUTIONS

A. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

B. Document each request with complete data, substantiating compliance of proposed substitution with Contract Documents.

D. A request constitutes a representation that the Contractor:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product;
2. Will provide the same warranty for the substitution as for the specified product;
3. Will coordinate installation and make changes to other work which may be required for the work to be complete, with no additional cost to the Owner;
4. Waives claims for additional costs or time extension which may subsequently become apparent; and
5. Will reimburse Owner for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawings or product data submittals, without separate written request, or when acceptance will

require revision to the Contract Documents.

F. Substitution Submittal Procedure:

1. Transmit each submittal through Providence Water's Project Management software.
2. Submit copies or request for substitution for consideration. Limit each request to one proposed substitution.
3. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
4. The Engineer will notify Contractor, using Providence Water's project Management Software, of decision to accept or reject request.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Closeout Procedures

B. Final Cleaning

C. Adjusting

D. Project Record Documents

E. Warranties

F. Waiver & Release of Liens

G. Consent of Surety to Final Payment

H Spare Parts and Maintenance Materials

1.2 RELATED SECTIONS

A. Section 01400 - Quality Control

1.3 CLOSEOUT PROCEDURES

A. Using Providence Water's Project Management software, submit certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Engineer's inspection.

B. Provide submittals to Engineer that are required by governing, or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.4 FINAL CLEANING

A. The Contractor shall leave all project areas in a condition equivalent to that prior to construction.

B. Clean debris from storage and staging.

C. Clean site, sweep paved areas, rake clean landscaped surfaces.

D. Remove waste and surplus materials, rubbish, and construction facilities from the site.

E. Remove erosion control material upon complete surface stabilization as determined by the Engineer.

1.5 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

1.6 PROJECT RECORD DOCUMENTS

A. Specifications: Contractor shall legibly record at each product section, description of actual products installed, including the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by addenda and modifications.

B. Contractor shall provide as-builts using Providence Water's Project Management software, with but not limited to the following information:

1. Measured depths of structures in relation to datum on drawings.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
4. Field changes of dimension and detail.
5. Details not on original Contract Drawings.

1.7 WARRANTIES

A. Provide all documents using Providence Water's Project Management software.

B. Execute and assemble documents from subcontractors, suppliers, and manufacturers.

C. Provide Table of Contents and assemble in order of specification section numbers.

D. Submit prior to final Application for Payment.

E. For items of work delayed beyond date of Substantial Completion, provide updated submittal within ten (10) days after acceptance, listing date of acceptance as start of warranty period.

1.8 WAIVER AND RELEASE OF LIENS

A. Contractor shall furnish to the Owner a Final Waiver and Release of Liens statement for the contract upon payment of the amount due for the Final Payment Application. The Final Waiver and Release of Liens shall accompany the final payment application upon submittal to the Owner.

1.9 CONSENT OF SURETY TO FINAL PAYMENT

A. The Contractor's surety shall provide a completed and executed "Consent of Surety to Final Payment" form as part of the contract closeout documents.

B. Deliver to the Owner with the Final Payment Application.

1.10 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification sections and contract drawings.

B. Deliver to the Owner; obtain receipt prior to Final Payment.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

DIVISION 2

SITE CONSTRUCTION

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work under this section includes providing approved earth borrow, sand, bank run gravel, and gravel bedding, when directed for backfills and refills of excavations; excavation and disposal at approved locations of pavements, surplus and unsuitable materials; installation of underground water main piping; protection of new work; compaction of trench bottom, backfills and subgrades; excavation and backfilling of all other appurtenant work as required or as directed.

B. This work also includes the furnishing of all labor, equipment and materials, and performing all operations in connection with excavating rock/ledge less than 1 c.y. in volume.

C. The work also includes excavation and backfill relating to demolition work.

1.02 REFERENCES

A. Within this section, the State of Rhode Island Department of Transportation "Standard Specifications for Road and Bridge Construction", latest edition, shall be referred to as the State Standards.

B. American Society for Testing and Materials (ASTM) publications:

C136-76	Sieve or Screen Analysis of Fine and Coarse Aggregates
D422-63 (R 1972)	Particle Size Analysis of Soils
D1140-54 (R 1971)	Amount of Material in Soils Finer than No. 200 (74 micrometer) sieve
D1556-82	Density of Soil in Place by the Sand Cone Method
D1557-78	Moisture Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54 kg) Rammer and 18-in (457mm) Drop
D2167-66 (R1977)	Density of Soil in Place by the Rubber Balloon Method
D2419-74 (1979)	Test for Sand Equivalent Value of Soils and Fine Aggregates
D2487-83	Classification of Soils for Engineering Purposes
D2922-81	Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

D3017-78 Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

1.03 RELATED WORK SPECIFIED ELSEWHERE

Section 02211 – Rock Removal

1.04 LAWS AND REGULATIONS

A. All work under this Contract shall be accomplished in accordance with regulations of local, county, and State and Federal agencies, and national or utility company standards as they apply.

1.05 SUBSURFACE DATA

A. Test pits have been performed and the information is available to the Bidders. Upon notification to the Owner, the Bidders will be allowed the right to make any subsurface explorations they deem necessary to satisfy themselves of the existing ground conditions. Any subsurface investigation made by the Bidder shall be at their expense.

1.06 QUALITY ASSURANCE

A. Qualification of Workmen

Provide at least one person who shall be thoroughly trained and experienced in the skills required, who shall be completely familiar with the design and application of work described for this section, and who shall be present at all times during progress of the work of this section, and who shall direct all work performed under this section.

1.07 JOB CONDITIONS

A. All excavated earth materials approved by the Owner or the Engineer as suitable for reuse shall be used for backfilling excavations and for rough grading as necessary for the completion of the contract work. All surplus or unsuitable materials, rock from rock excavation, and boulders and pavement materials, shall be removed and legally disposed of off-site by the Contractor at no additional expense to the Owner.

B. Unsuitable Materials:

1. Unsuitable materials are herein defined as organic material, peat, organic silt or combinations thereof; and any existing materials of such gradation that more than 40% of its total weight passes the No. 200 sieve in a standard gradation analysis (ASTM D422). All materials of whatever description, which are too loose or saturated for use as backfill to provide satisfactory bearing, shall also be considered as unsuitable. Tests required to evaluate such conditions shall be made at the Contractor's expense. If unsuitable material is encountered at the depths indicated on the drawings for bottom limit of excavation, the Contractor shall immediately notify the Owner or the Engineer and shall not proceed further until instructions are given.
2. The Contractor shall satisfactorily excavate and remove all unsuitable material to lines, grades and limits indicated on the drawings or as directed in writing by the Owner or the Engineer, and shall legally dispose of such material off-site. All resulting below

grade excavations shall be refilled with compacted common earth borrow.

C. Disposition of Existing Utilities:

1. Call Dig Safe seventy-two (72) hours before commencing with any excavation, in order that all pertinent utility companies become informed of such work.
2. If active utilities existing on the site are encountered they shall be carefully protected from damage. When an active utility line is exposed during construction, the Contractor shall document its location and elevation and notify in writing both the Engineer and the utility Owner notified in writing.
3. Active utility lines damaged in the course of construction operations shall be repaired or replaced at no additional cost to the Owner.

1.8 SUBMITTALS

A. Certified Laboratory Test Reports: Before delivery of materials, five (5) certified copies of the reports of all tests required herein, under materials and in referenced publications, shall be submitted to the Owner. These reports shall be submitted a minimum of ten (10) working days prior to the intended use of the materials on-site. The testing shall have been performed in an independent laboratory retained by the Contractor and approved by the Owner or the Engineer. Additional testing shall be submitted when the source of materials is changed.

PART 2 PRODUCTS

2.01 MATERIALS

A. Common borrow shall be a well-graded granular material of which at least 80 percent by weight shall be retained on the No. 200 sieve. It shall be free from peat, organic matter and debris, and shall not contain any stones or clay lumps in excess of 8 inches in their greatest dimensions. The Contractor shall submit a sample of the material he proposes to use as borrow backfill, together with results from an approved laboratory showing grain size analysis and proctor density relationships for those soils. Any materials of whatever description, are too uniformly graded or saturated to be readily compactable, shall be not utilized for earth borrow.

B. Structural backfill shall be composed of hard, durable stone and coarse to fine sand, free of peat, vegetable or organic matter, clay lumps and other debris. The gravel refill shall be readily compactable and shall not contain any stones that are in excess of two-thirds of the depth of the layer to be compacted. Structural backfill shall conform to the following gradation requirements:

U.S. Standard Sieve Size	Percent Passing by Weight
1"	55 – 100
No. 4	20 – 95
No. 40	0 – 50
No. 200	0 – 10

C. Sand Gravel Fill placed directly under structure based slabs and foundations to indicated thicknesses be imported material forming to Item M.01.02.1 of the State Standrds, modified such that the maximum particle size does not exceed 3 inches.

D. Pipe bedding shall conform to the requirements for State Standard "Gravel Borrow" with the exception that 100 percent shall pass the 1-1/2 inch mesh sieve or shall be approved 1-inch commercial grade crushed stone or gravel. Filter stone shall conform to all requirements of the State Standards for filter stone. Filter stone shall conform to the following gradation limits:

U.S. Standard Sieve Size	Percent Passing by Weight
1"	100
3/4"	75 – 85
1/2"	10 – 40
3/8"	0 – 20
No. 4	0 – 5

D. Crushed stone for pipe bedding shall consist of clean, hard, durable fragments of crushed rock and shall be free from clay, organic matter, or other objectionable material. Crushed stone shall conform to the following gradation limits:

U.S. Standard Sieve Size	Percent Passing by Weight
1"	100
3/4"	90 - 100
1/2"	20 – 50
3/8"	0 – 20
No. 4	0 – 5

E. Sand shall consist of clean, hard, durable particles not frozen, and conform to the following gradation requirements:

U.S. Standard Sieve Size	Percent Passing by Weight
3/8"	100
No. 4	80 – 100
No. 10	30 – 50
No. 40	5 – 25
No. 100	0 – 5

F. Except as otherwise specified, all fills, refills, and backfills within the project area, and for utilities and appurtenances, shall be made with gravel borrow or structural fill as hereinafter specified.

Gravel borrow sub-base for gravel roadways, utilities and pipe backfill, shall be composed of hard, durable stone and coarse to fine sand, not frozen and free from loam and undesirable organic matter, containing no stone having any dimension greater than two-thirds of the depth of layer to be compacted. Gravel borrow or bank-run gravel shall conform to the following gradation requirements:

U.S. Standard Sieve Size	Percent Passing by Weight
1"	55 – 100
No. 4	20 – 95
No. 40	0 – 50
No. 200	0 – 10

G. Initial backfill over pipes shall consist of a well-graded granular material of up to 1 inch in size. All material is to be devoid of stones (greater than 1 in.), sharp stones and crushed rock (larger than ¾ in.), lumps or frozen ground, and clayey materials that can be sensitive to water. Initial backfill material is to be placed to a minimum depth of 12 inches over the top of the pipe.

H. Final backfill over pipes shall be of good quality and be free of cinders, frozen materials, ashes, refuse, boulders, rocks, or organic material. Excavated native granular material free from perishable and objectionable objects and containing no stones larger than 6 inches in diameter shall be used for backfilling the trench as required.

I. Gravel for under structure base slabs shall conform to the following gradation:

U.S. Standard Sieve Size	Percent Passing by Weight
3/4"	100
3/8"	50 – 85
No. 4	25 – 75
No. 10	5 – 35
No. 40	0 – 10
No. 100	0 – 5

J. All refills and fills not supporting or influencing structures, pavement or utilities, shall be made with approved granular material containing sound stone, gravel and sand, free of frozen materials, silt, clay, vegetation, roots, peat, muck or other unsuitable matter.

K. The use of on-site materials for fills, refills or backfills within the building area will not be permitted unless representative samples have been tested and material meets the above gradation requirements. Additional material required for structure fill shall be provided from off-site sources and shall meet the above gradation requirements.

L. Cost for sampling, transporting and making all laboratory tests required to obtain characteristics of materials proposed to be used for fills, refills, backfills, including gradation tests and determination of moisture density relationships, will be borne by the Contractor.

PART 3 EXECUTION

3.01 GENERAL

A. All topsoil and unsuitable or excess materials shall be stripped to their entire depths from areas of new construction or regrading. Materials suitable for reuse shall be stored in approved locations that will not interfere with construction operations. Topsoil shall be stripped and stored before any underlying excavating is begun. Stripped topsoil to be reused shall be free from clay, large stones and debris. All unsuitable materials shall be excavated and legally disposed of off-site by the Contractor.

B. Earth excavation shall include the excavation, removal and satisfactory disposal of all materials of whatever nature encountered from within the limits indicated or specified or as directed by the Engineer or Owner in writing. It shall include, but not be limited to, earth materials such as peats, organic or inorganic silts, clay, sand and gravel, cobbles and boulders less than 1 cubic yard in volume, soft or disintegrated rock which, in the opinion of the Owner or the Engineer, can be removed without blasting or drilling, pavement, and all obstructions not specifically included in another section.

C. Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace, if required, to ensure the safety of workers and the general public. Dewater as needed for construction. Barricade all open excavations when not actively working in

them.

D. All excavation operations shall be accomplished to prevent the undermining or disturbance of existing pipelines, utilities and structures, of any completed construction.

E. All excavations shall be backfilled as specified.

3.02 EXCAVATION FOR STRUCTURES

A. Excavation under slabs shall be to the exact elevations required except as otherwise indicated on the drawings.

B. Additional Excavation. When excavation has reached required subgrade elevations, notify Engineer who will make an inspection of conditions.

1. If the "assumed" bearing materials, as shown on the drawings and specifications, are not encountered at the subgrade elevations indicated, carry excavations deeper and replace excavated material as directed by the Engineer.
2. Removal of unsuitable material and its replacement as directed will be paid on the basis of contract conditions relative to changes in work.

C. Excavation for Structures - Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet, and extending a sufficient distance from footings to permit placing and removal of concrete formwork, other construction and for inspection.

1. In excavating for footings, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.

D. Frost Protection:

1. Make no excavations to full depth indicated when freezing temperature may be expected. Protect the bottom so excavated areas remain free from frost if progress is delayed. Protect the subgrade of in-place footings from frost. Should protection fail, remove frozen materials and replace with concrete or gravel fill as directed, at no cost to the Owner.

3.03 EXCAVATION FOR UTILITIES

A. Excavation shall be made to the alignment, invert and finish grades shown on the drawings, or as modified by the Owner or the Engineer. Excavations shall be accurately graded to allow satisfactory construction of the contract work.

B. The bottoms of excavations shall be thoroughly compacted and in approved condition prior to placing gravel bedding. Gravel bedding shall be placed in layers not exceeding 6 inches in loose depth and each layer shall be compacted by at least two (2) passes of an approved plate-type vibratory compactor. The moisture content of the gravel shall be adjusted by moistening or drying so that proper compaction will be obtained. Where crushed stone bedding is used for pipe bedding, the Owner or the Engineer may waive the compaction requirement.

C. Bell holes and depressions for joints shall be dug after the trench bottom has been graded and

compacted, and after gravel bedding, if required, has been placed and compacted. The bottom quadrant of each pipe barrel shall have complete and uniform bearing for the full length of each pipe. The trench bottom shall again be thoroughly compacted just prior to final shaping for bedding and installation of pipe.

D. Excavation operations adjacent to and below existing structures and utilities shall be done manually and in a manner to prevent disturbance of, or damage to, the existing structures and utilities.

E. The Contractor shall be responsible for keeping all excavated and construction material a safe distance back from the edge of excavations to avoid overloading the sides of excavations and to prevent slides or cave-ins.

F. If an excavation is made deeper or wider than that shown on the drawings, there will be no extra payment for such unauthorized excavation, unless directed in writing by the Owner or the Engineer. Backfill of all unauthorized excavations shall be made by the Contractor with either selected materials from excavations or from borrow, as directed by the Owner or the Engineer, and at no expense to the Owner.

G. If a pipe is to be placed in fill, or the top of the pipe is within 2 feet of existing ground surface, the fill shall first be placed as specified herein to a height of not less than 2 feet over the top of the pipe and for a width of 5 feet beyond each side of the pipeline. Following placement of such fill, excavation and backfill shall proceed as specified herein.

H. Where the Contractor elects to use shoring installed as the excavation progresses, to maintain or otherwise protect the sides of the excavation from cave-ins or loss of ground, shoring shall be adequately braced to prevent cave-ins or loss of ground, and portions of the shoring or bracing shall be left in place as directed by the Engineer to maintain stability as backfilling progresses.

I. No excessive trench widths will be allowed to avoid the use of sheeting or shoring and bracing. The trench width for unbraced excavations at, and below, a level 1-foot above the top of the pipe, shall not exceed the maximum trench width indicated on the drawings for the size pipe being installed.

J. Where existing subsurface utilities, structures or other facilities adjacent to or crossing through the excavation require temporary support or protection, such temporary support or protection shall be satisfactorily provided by the Contractor at no additional expense to the owner. All necessary measures shall be taken by the Contractor to prevent lateral movement or settlement of existing facilities or of work in progress.

K. Grading shall be done as necessary to prevent surface water from flowing into excavations and, any water accumulating therein shall be removed by pumping or other approved method. The pipelines shall not, at any time, be used for trench drainage.

L. Excavations shall be adequately sheeted, shored and braced, as required, to permit proper excavation of the work and to protect all slopes and earth banks. Sheeting shall be installed as required to prevent cave-ins or settlement and to protect workmen, adjacent structures and utilities. Shoring and sheeting may be removed as the backfilling progresses, but only when banks are safe against caving. The Engineer may direct that sheeting, shoring and bracing be left in place at any time during the progress of the work, and direct that timber be used for

sheeting and bracing and authorized to be left in place and cut off at a specified elevation. In removing sheeting or bracing, care shall be taken to prevent voids. Voids, if formed, shall immediately be filled with sand. The installation of sheeting, shoring and bracing shall comply with the safety precautions as outlined in the Associated General Contractors of America, Manual of Accident Prevention in Construction, and all local, county, state and federal regulations. Dewatering shall be performed, as required, for all excavations below groundwater level.

3.04 ROCK EXCAVATION (over 1 c.y.)

A. All rock encountered with the limits of excavation shall be removed as may be required by the Owner or the Engineer to complete the work of this contract as shown on the drawings and as specified herein. No blasting will be permitted. Excavate for and remove rock by mechanical means.

B. Rock excavation shall include the excavation, removal and disposal of all boulders, 1 cubic yard or more in volume, and shall be in accordance with Section 02211, Rock Removal.

C. No separate or additional compensation shall be allowed for over breakage in rock excavation, nor for excavations in rock carried below the depths or beyond the lines indicated and/or specified, unless such additional excavation is specifically directed by the Engineer.

D. Where rock is encountered, it will be measured in cubic yards in its original position, prior to excavation, computed to the payment lines indicated or directed by the Owner or the Engineer.

E. When rock is encountered, the Contractor shall then notify the Engineer that the rock surface is ready for measurement. If the Contractor fails to give such notice, the Engineer will assume that the measurements taken at the time he first sees the material in questions will give the true quantity of excavation.

3.05 DEWATERING

A. Excavations may, to some extent, be below existing groundwater levels, causing the site to be subject to surface water and groundwater flow during the course of construction.

B. The Contractor shall control and pitch the grading to prevent water from running into the excavated areas of the structures or to prevent damage to other structures or work already accomplished.

C. The Contractor shall furnish all pumping and other dewatering equipment to keep excavated areas dry during construction. The groundwater shall be pumped adequately so that it is maintained a minimum of two (2) feet below the bottom of the excavation at all times. Filters shall be used on the dewatering devices to prevent the removal of fines from the soil. Water shall not be directed onto adjacent property.

D. Operation and Performance: Operate the dewatering system continuously, 24 hours per day, 7 days per week, until such time as construction work below existing water levels is complete, unless directed otherwise by the Engineer or Owner. Measure and record the performance of the dewatering system at the same time each day by use of suitable observation wells or piezometers installed in conjunction with the dewatering system. After placement of initial

slabs and backfill, the water level may be allowed to rise, but at no time is it to be higher than one (1) foot below the prevailing level of excavation or backfill.

3.06 BACKFILLING OF UTILITY TRENCHES

A. Unless directed otherwise by the Engineer, excavations shall not be backfilled until all work has been satisfactorily performed, and not until the work as installed conforms to all requirements specified in these sections. Each layer of backfill material shall be compacted in such a manner as to permit the proper and desired compaction of the filled excavation.

B. All excavations shall be backfilled as soon as practicable with approved excavated material. If suitable material as approved by the Engineer is not available from the excavations in the quantities required for proper backfilling of excavations, the Contractor shall provide approved bank-run gravel or earth borrow for backfills from off-site sources, as required.

C. Placement of gravel bedding shall be done in accordance with the following procedure:

1. The bottoms of excavations shall be thoroughly compacted and in approved conditions prior to placing gravel bedding. Gravel bedding shall be placed in layers not exceeding 4 inches in loose depth and each layer shall be compacted by at least two (2) passes of an approved plate-type vibratory compactor. The moisture content of the gravel bedding shall be adjusted by moistening or drying so that proper compaction will be obtained.
2. Gravel bedding shall be graded, compacted and shaped so that the full length of pipe barrel has complete and uniform bearing for the bottom quadrant of each pipe. Bell holes and depressions for joints shall be dug after the gravel bedding has been graded and compacted, and shall be the proper clearance for joining of pipes.
3. The Contractor shall exercise care in all operations to prevent disturbing joints, displacement of or damage to the pipes already installed. As the work progresses, the pipelines will be checked by the Engineer to determine whether any disturbance, displacement or damage has occurred. If inspection shows poor alignment, displaced or damaged pipe, disturbed joints or other defects, the Engineer shall require that all designated defects be remedied in a satisfactory manner by the Contractor at no additional expense to the Owner.

D. All other backfill placed in trenches below a level 12 inches above the top of pipe shall consist of selected backfill placed in layers not exceeding 4 inches in loose depths. Selected backfill shall be compatible materials as approved by the Engineer, not frozen, and free of clods or earth, stones larger than 2 inches in diameter, or unsuitable materials. The selected backfill shall be deposited uniformly on both sides of the pipe and shall be thoroughly compacted by tamping under and on each side of the pipe to provide uniform support around the pipe, free from voids.

E. The balance of backfill in trenches shall be compatible materials as approved by the Engineer, not frozen, and without any stones larger than 8 inches in their greatest dimension. All trench backfilling shall be carefully placed to avoid disturbance of new work and of existing utilities or structures. The moisture content of backfill shall be such that proper compaction will be obtained. Trench backfill shall be compacted to the minimum densities specified hereinafter. Unless otherwise approved by the Engineer in writing, the trench backfill shall be spread in layers not exceeding 12 inches in loose depth, and each layer shall be compacted by at least four (4) passes of an approved plate-type vibratory compactor. It is the responsibility of the

Contractor to assure that the minimum specified densities are obtained. Puddling or jetting of backfill with water will not be permitted.

F. During filling and backfilling operations, pipelines will be checked by the Engineer to determine whether any displacement of the pipe has occurred. If the inspection of the pipelines shows poor alignment, displaced pipe or any other defects, the defects designated by the Engineer shall be remedied in a satisfactory manner by the Contractor at no additional expense to the Owner.

G. Any backfill that fails to comply with the minimum density requirements specified hereinafter shall be re-compacted or, if necessary, removed to the limits directed by the Engineer. The trench shall then be refilled with approved materials and by approved methods. The backfill shall be compacted by approved methods to the minimum requirements specified hereinafter. The Contractor at no additional expense to the Owner shall perform all of this work.

H. After backfilling trenches the Contractor shall maintain the filled surfaces in good condition, with a smooth surface level with adjacent undisturbed surfaces. Any subsequent settling shall be immediately repaired by the Contractor in a manner satisfactory to the Owner and the Engineer, and such maintenance shall be provided by the Contractor for the remainder of this contract at no additional expense to the Owner.

I. The finished surfaces of filled excavations shall be compacted and reasonably smooth, and free from surface irregularities. Subgrade upon which either topsoil is to be placed, or pavements are to be constructed, shall be maintained in a satisfactory condition until the finish courses are placed. The storage or stockpiling of materials on finished subgrade will not be permitted.

J. Prior to placing base course material in areas to be paved, all soft or unsuitable material shall be removed and replaced with suitable material from excavation or earth borrow, as approved by the Engineer. All low sections, holes or depressions shall be brought to the required grade with material approved by the Engineer. The entire surface shall be shaped to line, grade and cross-section and thoroughly compacted.

3.07 COMPACTION

A. Fills placed under pavements such as roadways, parking lot subbase and utilities, shall be compacted to not less than 95 percent of the ASTM maximum dry density.

B. Backfill material shall be placed in lifts no greater than 6 inches and compacted to 95 percent of maximum density under slabs and 95 percent of maximum density under footings. Maximum density will be determined by AASHTO T-180 Method A or D. Density of soil in place will be determined by AASHTO T-191 or by a nuclear moisture density gauge approved by the Engineer. The method of correcting for oversize particles in soil compaction test results shall conform to AASHTO T-224-671.

C. All disturbed in-situ material shall be compacted to 95 percent of maximum density under slabs and footings. Maximum density will be determined by AASHTO - T-180 Method A or D. Density of soil in place will be determined by AASHTO T-191 or by a nuclear moisture density gauge approved by the Engineer.

D. All percentages of compaction specified herein shall be related to the maximum dry density as established by Method D, ASTM D1557-70, and verified in the field by ASTM D1556-68, D2167-66 or an approved nuclear density testing device. Prior to placing, at least one (1) laboratory test shall be made on a representative sample of each of the fill and backfill materials proposed to be furnished for the earthwork operations to determine gradation and moisture density characteristics. The Contractor shall arrange and provide the services of a geotechnical engineer, approved by the Engineer, to perform laboratory tests on samples of fill an backfill material proposed to be used by the Contractor for earthwork operations, and to perform field density tests.

E. Field density tests to determine the actual in-place densities being attained will be made at no additional expense to the Owner and in sufficient quantity to determine that the required compaction is being attained, but in no case less than the following frequency:

1. Trench bedding and backfill: One test for each compacted backfill layer in each section of trench. For trenches greater than 50 feet in length, provide one test every 50 feet for each compacted backfill layer.
2. Under foundation slabs or paved areas: One test per 5,000 square feet but no less than 3 tests per lift.

All retesting necessitated due to failure of the backfill to comply with the minimum percent of compaction shall be performed at no additional expense to the Owner.

F. Where vibratory compaction equipment is specified herein, or is directed to be used by the Engineer, all such equipment whether plate-type or roller shall be furnished with a vibrating surface at least 24-inches in width and capable of operating at a minimum of 2,000 blows per minute. Equipment not specifically designed as vibrating compaction equipment shall not be permitted for compaction of either existing in-place materials or of fills, refills and backfills. Jackhammers, rubber-tired vehicles and similar equipment not specifically designed and manufactured for the compaction of granular materials will not be approved for use.

G. Surfaces to be compacted, unless otherwise specified, shall be compacted by not less than six (6) complete passes of the approved vibratory compactors in order to obtain the required percentage of compaction. A complete pass shall consist of the entire coverage of the surface area to be compacted with one trip of the equipment. Each trip of the equipment shall overlap the previous trip by at least one (1) foot.

H. Dumping, spreading, preparing and compacting of several layers of fill material across the site may be performed simultaneously, providing there is sufficient total area to permit these operations to proceed in a systematic manner.

I. No rolling equipment shall be used to compact fill, refill or backfill material within four (4) feet of the vertical faces of any concrete walls or utility pipes. Plate vibratory tampers shall be used in these restricted areas and in other areas too confined to satisfactorily use rolling equipment.

J. It is the intent of these compaction requirements that the minimum in-place dry density of the compacted materials resulting from the specified minimum number of passes of the compaction equipment will be equal to or greater than the minimum percentages specified herein. Additional passes of the specified equipment shall be required if the minimum in-

place dry densities, as specified, are not obtained with the minimum passes indicated.

3.08 PROTECTION OF EXISTING UTILITIES AND STRUCTURES

A. Excavation and backfill operations shall be done in such a manner to prevent cave-ins of excavations or the undermining, damage or disturbing of existing utilities and structures or of new work. Backfill shall be placed and compacted so as to prevent future settlement or damage to existing utilities and structures and new work.

B. Any excavations improperly backfilled or where settlement occurs shall be reopened to the depth required then refilled with approved materials and compacted, and the surface restored to the required grade and condition, at no additional expense to the Owner.

C. Any damage due to excavation, backfilling or settlement of the backfill, or injury to persons or damage to property occurring as a result of such damage shall be the responsibility of the Contractor. All costs to repair such damage, in a manner satisfactory to the Owner and the Engineer, shall be borne by the Contractor at no additional expense to the Owner.

3.09 TEST PITS

A. Test pits shall be dug by the Contractor at the locations selected, and to the dimensions directed by the Engineer, for compaction testing or to establish locations of existing pipelines or any other buried item for which the exact location is to be determined. The excavation, protection and backfilling of test pits shall be in accordance with the provisions of this section. Test pits shall be backfilled with approved materials and compacted to the densities specified.

END OF SECTION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Removal and disposal of identified rock, ledge, and boulders previously identified and discovered during excavation for utilities and structures.

B. Mechanical trench rock removal.

1.02 RELATED WORK

A. Section 02200 – Earthwork

1.03 SHOP DRAWINGS

A. Submit shop drawings under provisions of Section 01300, Submittals.

1.04 UNIT PRICES

A. Rock Measurement: Volume of rock actually removed, measured in original position, but not to exceed the following:

1. 24 inches outside of concrete forms other than at footings.
2. 12 inches outside of concrete forms at footings.
3. 12 inches outside of minimum required dimensions of concrete cast against grade.
4. 6 inches beneath bottom of concrete slabs on grade.
5. 12 inches beneath water mains.

B. Unit prices for rock excavation include replacement with approved materials.

C. Rock and Boulders less than one (1) cubic yard in size that require removal and replacement with common borrow and/or imported material shall not be considered for payment. The cost for removal and replacement of rock and boulders less than one (1) cubic yard in size is considered incidental to the work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material exceeding 1 c.y. for bulk excavation, footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping or blasting:

1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch wide, short-tip-radius rock bucket; rated at not less than 120-hp flywheel power with bucket-curling force of not less than 25,000 lbf and stick-crowd force of not less than 18,700 lbf; measured according to SAE J-1179.

2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp flywheel power and developing a minimum of 45,000-lbf breakout force; measured according to SAE J-732.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify site conditions and note irregularities affecting work of this section.

B. Beginning work of this section means acceptance of existing conditions.

3.02 ROCK AND BOULDER REMOVAL

A. Where rock or boulders are exposed on the sides, or in the bottom, of excavations, they shall be wholly or partially removed as specified or directed. Rock and boulders shall be removed to not less than the trench width payment lines indicated, to not less than two (2) feet outside structure walls, and to not less than twelve (12) inches below the underside of pipes or six (6) inches below the underside structure foundation slabs.

B. Depressions resulting from the removal of boulders shall be refilled with approved compacted gravel bedding, earth borrow or other excavated material as directed. Unauthorized excavations in rock or excavations made beyond the indicated or directed limits, shall be refilled with approved compacted gravel bedding or earth borrow as directed by, and at no expense to, the Owner.

3.03 ROCK REMOVAL – MECHANICAL METHOD

A. Excavate for and remove rock by the mechanical method.

B. Cut away rock at excavation bottom to form level bearing.

C. Remove shaled layers to provide sound and unshattered base for footings and base slabs.

D. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.

E. Remove excavated material from site and stockpile at location determined by Owner.

F. Correct unauthorized rock removal in accordance with backfilling and compaction requirements of Section 02200.

3.05 FIELD QUALITY CONTROL

A. Provide for visual inspection of bearing surfaces and cavities formed by removed rock.

B. The Contractor is to notify the Engineer prior to construction of any structures within the rock excavation for approval.

END OF SECTION

PART 1 GENERAL

1.1 WORK INCLUDED

A. The work included for erosion control shall include but not necessarily be limited to:

1. Furnishing and installation of straw bales, silt fence, erosion netting, fiber rolls (straw wattles), compost filter socks, swales, soil berms, mulches, grasses, channels, crushed stone, riprap, grading to control runoff, and all other devices required to control erosion from the limits of the contract areas onto adjacent downgradient areas.
2. Continual maintenance of all installed devices to control erosion.
3. Removal and cleanup.

1.2 RELATED WORK

A. Section 02200 – Earthwork

1.3 APPLICABLE REGULATIONS

A. In order to prevent erosion and sedimentation from construction activities related to the performance of this project, the Contractor and his subcontractors shall comply with permits issued for the project, all applicable Federal, State and local laws and regulations concerning erosion and sediment control, as well as the specific requirements stated in this Section and elsewhere in the Specifications.

1.4 DESIGN CRITERIA

A. Conduct all construction in a manner and sequence that causes the least practical disturbance of the physical environment.

B. Stabilize disturbed earth surfaces in the shortest practical time and employ any and all such temporary erosion control devices as may be necessary until such time as adequate soil stabilization has been achieved or permanent erosion control devices are operational.

C. The erosion control devices specified herein represent the minimum required work for erosion control. The Contractor shall add to these minimum devices any and all measures to effectively prevent migration of sediment from the limits of the work area.

D. Within this section, the Rhode Island Soil Erosion and Sediment Control Handbook prepared by the U.S. Department of Agriculture Soil Conservation Service and the Rhode Island Department of Environmental Management shall be the guideline of analysis and the standard source for control measures.

1.5 SUBMITTALS

A. Implementation Plan

Prior to commencement of the work, the Contractor shall:

1. Meet with the Engineer to develop mutual understandings relative to compliance with the provisions of this Section and administration of the erosion and sediment control program.
2. Should the Contractor desire to change or modify the specified erosion controls then they shall submit in writing plans to the Engineer for implementing erosion and sediment control including, but not limited to, placement of straw bales, silt fence, containment berms, temporary channels, and settling ponds, as well as a description of all construction techniques intended to minimize erosion and sedimentation, and a program for maintenance of these facilities throughout the performance of construction activities.
3. The Contractor, should he desire to modify the specified plan, shall submit to the Owner and Engineer his detailed erosion and sedimentation plan for approval at least two (2) weeks prior to initiation of work.

PART 2 PRODUCTS

2.1 STRAW BALES

A. Bales shall be made of straw or hay with forty pounds (40 lbs) minimum weight and one hundred and twenty pounds (120 lbs) maximum weight. They should be either wire bound or string tied. Wood stakes shall be a minimum of two inches by two inches (2” x 2”) nominal size by a minimum of three feet (3’) long. As an alternate, one inch (1”) diameter steel rods or steel reinforcing bars may be used.

2.2 SILT FENCE

A. Silt fences or sedimentation barriers shall consist of wood posts with industrial support netting and sediment control filter fabric attached. It shall be placed as shown on the Contract Drawings. The cost of this work shall include the periodic maintenance of these materials and the ultimate removal upon completion of the project.

B. The filter fabric material shall be Type #3401 as manufactured by E.I. Dupont de Nemours & Co., Mirafi #100 as manufactured by Celanese Fibers Marketing Co. Inc., Bidim C-28 or C-34 manufactured by Monsanto Co. or approved equivalent. The posts shall be at least four and one-half feet (4½’) long and control fabric shall be at least three feet (3’) wide.

2.3 EROSION NETTING

A. Erosion netting of erosion control blanket shall be a machine-produced one hundred percent (100%) biodegradable mat with an agricultural straw fiber matrix with a typical functional longevity of approximately twelve (12) months. The blanket shall be of consistent thickness with the straw evenly distributed over the entire area of the mat. The

blanket shall be covered on the top and bottom sides with one hundred percent (100%) biodegradable natural woven fiber netting.

B. The straw erosion control blanket shall be S150BN as manufactured by North American Green or approved equivalent.

2.4 FIBER ROLLS (STRAW WATTLES)

A. Fiber rolls shall consist of wood excelsior, rice or wheat straw, or coconut fibers that are rolled or bound into a tight tubular roll. Fiber rolls shall be either prefabricated rolls or rolled tubes of erosion netting.

2.5 COMPOST FILTER SOCKS

A. Compost filter socks shall consist of a biodegradable mesh tube filled with sanitized, mature compost with no identifiable feedstock constituents or offensive odors. Compost used in filter socks shall meet all local, State, and Federal quality requirements.

B. The compost filter socks shall be Filtrexx Siltsoxx, Rexius Ecoberm, or approved equivalent.

PART 3 EXECUTION

3.1 GENERAL EROSION CONTROL REQUIREMENTS

A. All materials and installation shall be in accordance with the Contract Drawings.

B. The Owner and the Engineer have the authority to control the surface area of each material exposed by construction operations and to direct the Contractor to immediately provide permanent or temporary erosion control measures to prevent contamination of adjacent streams, watercourses, lakes, ponds, or other areas of water impoundment. Every effort shall be made by the Contractor to prevent erosion on the site and abutting properties.

C. All slopes shall be stabilized by mulching, seeding, or otherwise protected as the work progresses to comply with the intent of this specification. All damaged slopes shall be repaired as soon as possible. The Owner and Engineer shall limit the surface area of earth material exposed if the Contractor fails to sufficiently protect the slopes to prevent pollution.

D. The Contractor shall at all times have on hand the necessary materials and equipment to provide for early slope stabilization and corrective measures to damaged slopes.

E. The erosion control features installed by the Contractor shall be maintained by the Contractor, and he shall remove such installations upon completion of the Work or if ordered by the Owner or the Engineer.

F. The Contractor shall operate all equipment and perform all construction operations so as to minimize pollution. The Contractor shall cease any of his operations, which will

increase pollution during rainstorms.

G. The Contractor shall place additional erosion and sedimentation controls as required by laws and regulations.

3.2 STRAW BALE INSTALLATION

A. Bales shall be set lengthwise on the contour for sheet flow applications. They shall be held in place by two wooden stakes in each bale as detailed on the Contract Drawings. Bales shall be maintained or replaced until they are no longer necessary for the purpose intended or are ordered removed by the Owner or the Engineer.

B. Bales shall be set with bindings parallel to grade and entrenched to a minimum depth of four inches (4”). Stakes shall be driven a minimum of twelve inches (12”) into the ground and cut off flush with the top of the bale.

C. After the bale lines are staked, the end joints shall be chinked with loose straw to close any gaps. Excavated soil shall then be backfilled against the uphill side of the barrier to a depth of four inches (4”) above the downhill grade.

D. Following compaction of the backfill, loose straw shall be scattered over the surface directly behind the barrier.

E. Straw bale checks should be placed in diversions generally at fifty-foot (50’) intervals and in accordance with the RIDOT Standard Details. Sediment shall be removed from behind the checks when it has accumulated to one-half (½) the original height of the dam measured at the low point.

3.3 SILT FENCE INSTALLATION

A. Silt fence shall be installed utilizing posts four and one-half feet (4½’) long minimum staked at least eight feet (8’) on center. Prior to installation, a six inch by six inch (6” x 6”) anchor trench shall be installed at the base of the fence and the final height will be at minimum two feet (2’).

3.4 FIBER ROLL (STRAW WATTLE) INSTALLATION

A. For assembly of fiber rolls in the field, roll length of erosion control blanket into a tube of minimum eight inches (8”) in diameter. Bind roll at each end and every four feet (4’) along length of roll with jute-type twine. Stake fiber rolls into a two to four inch (2” - 4”) trench. Drive stakes at the end of each fiber roll and space four feet (4) maximum on center. Use wood stakes with a nominal classification of three-quarter inch by three-quarter inch (¾” x ¾”) and a minimum length of two feet (2’). If more than one (1) fiber roll is placed in a row, the rolls shall be overlapped, not abutted.

3.5 COMPOST FILTER SOCK INSTALLATION

A. Compost filter socks shall be installed and maintained in accordance with the manufacturer’s recommendations. Filter socks shall be anchored to the slope with 1” x 1” x 3’-0” (min.) wooden stakes driven through the center of the sock at regular intervals.

The ends of filter socks shall be directed upslope to prevent stormwater from bypassing the erosion control barrier.

3.6 DIVERSIONS

A. Diversions for directing surface runoff away from and/or around trenching and other construction operations shall be installed and stabilized in advance of new work. The Contractor shall select the cross-section shape (parabolic, vee-shaped or trapezoidal) such that the equipment he has on-site will be available for as needed maintenance.

B. The minimum capacity of the diversion shall be sized to accommodate a two-year (2-yr) design storm.

C. Periodic cleaning shall be done to maintain capacity.

3.7 REMOVAL AND CLEANUP

A. All temporary erosion control facilities and accumulated sediments shall be removed in a neat and workmanlike manner when all disturbed areas have been satisfactorily stabilized.

B. All debris removed, sediments and other earth materials shall not leave the project site, but shall be hauled to and stockpiled at the location designated by the Owner or the Engineer. All loading, hauling and stockpiling shall be performed by the contractor at no additional expense.

3.8 DEWATERING DISCHARGES

A. All pumped discharges and surface water flow from work areas shall be passed through a filter barrier of straw bales before being discharged into gutters, ditches, drainage swales, storm sewer systems, wetlands, natural water bodies, streams or rivers. The method of all such discharges shall be subject to the approval of the Owner or the Engineer. The sizing of sedimentation basins, if required, shall provide for a maximum velocity of one foot per second (1 ft./s).

END OF SECTION

PART 1 - GENERAL

1.1 SCOPE

A. This section specifies requirements for the testing of potable water systems. The work covered under this section includes, but is not necessarily limited to:

1. Leakage tests

NOTE: Testing will be performed prior to commencement of any demolition, blasting, surface preparation, and/or coating work, and prior to reconnecting the tank to the plant water system following tank upgrades. No physical connections (temporary or permanent) between new pipe and existing pipe will be allowed during the test without the use of an approved backflow prevention device.

B. All materials included in this section that are to come into contact with potable water shall be either NSF 61 or NSF 60 approved as applicable.

1.2 REFERENCES

A. American Water Works Association (AWWA):

1. AWWA C652: Standard for Disinfection of Water Storage Facilities

1.3 SUBMITTALS

A. Submittals shall be provided in accordance with the requirements as specified in Section 01300 – Submittal Procedures

B. Certified reports for all the required tests shall be provided from an approved qualified independent testing laboratory.

C. Shop drawing of temporary connection backflow preventer.

1.4 QUALITY CONTROL

A. Provide in accordance with requirements as specified in Section 01400 – Quality Control.

PART 2 - PRODUCTS

2.1 BACKFLOW PREVENTER

A. Backflow prevention devices required to fill the tanks with the existing water system prior to acceptance of pressure test, disinfections, and flushing, shall be of the appropriate size as required and shall be reduced pressure double check type as manufactured by Watts, Febco, Hersey, Zurn Wilkinson, or approved equivalent.

PART 3 - EXECUTION

3.1 TANK HYDROSTATIC LEAKAGE TESTING

A. The preliminary leakage test shall be performed following installation of the 8-inch gate valve on the service water main and hydrant as shown on the drawings and prior to any demolition, blasting, surface preparation, and/or coating work. The final leakage test shall be performed prior to reconnecting the tank to the plant water system. The tank shall be filled via a temporary 2-inch tap installed downstream of the new 8-inch gate valve on the service water main connected to the new hydrant with an approved backflow preventer. The contractor shall fill the tank to the maximum working level. The test shall consist of taking a measurement of the initial water height and allowing the water to sit over 24 hours. If at the end of the 24 hours the water level has dropped, then the Contractor shall identify the source of the leak and repair it, accordingly. Any leaks in the shell or bottom shall be repaired by chipping, gouging, or oxygen gouging to remove any defective welds, and rewelded. No repair work shall be done on any joints unless the water in the tank is at least two (2) feet below the joint being repaired. Damp spots will not be permitted at any location on the tank wall. Damp spots are defined as spots where moisture can be picked up on a dry hand. All such areas shall be repaired as necessary.

END OF SECTION

SECTION 02511 DISINFECTION OF WATER UTILITY STORAGE TANKS

PART 1 - GENERAL

1.1 SCOPE

A. This section specifies requirements for the testing and disinfection of potable water tanks.

NOTE: Testing will be performed prior to connecting the tank to the existing potable water system. No physical connections (temporary or permanent) between the tank and the system will be allowed during the test without the use of an approved backflow prevention device.

B. All materials included in this section that are to come into contact with potable water shall be either NSF 61 or NSF 60 approved as applicable.

1.2 REFERENCES

A. American Water Works Association (AWWA):

1. AWWA B300: Standards for Hypochlorites
2. AWWA B301: Standard for Liquid Chlorine
3. AWWA C600: Standard for Installation of Ductile Iron Water Mains and Their Appurtenances
4. AWWA C652: Standard for Disinfection of Water Storage Tanks

1.3 SUBMITTALS

A. Submittals shall be provided in accordance with the requirements as specified in Section 01300.

B. Certified reports for all the required test shall be provided from an approved qualified independent testing laboratory.

C. Shop drawing of temporary connection backflow preventer.

D. Detail of temporary connection between existing and new water pipelines.

1.4 QUALITY CONTROL

A. Provide in accordance with requirements as specified in Section 01400.

B. Sampling for laboratory analysis following disinfection shall be conducted by qualified personnel familiar with sampling procedures and protocols.

C. Reference Standards: Except as modified or supplemented herein, the testing of the pipeline system shall meet the requirements of the following standard specifications:

1. American Water Works Association (AWWA) C600, Latest Revision – Pressure and Leakage Tests; and C651 – Latest Revision, Disinfection Water Mains.

2. NSF/ANSI 60: National Sanitation Foundation Standard for Drinking Water Treatment Chemicals
3. NSF/ANSI 61: National Sanitation Foundation Standard for Drinking Water System Components

PART 2 - PRODUCTS

2.1 LIQUID CHLORINE

A. Liquid chlorine shall conform to AWWA Standard B301, current edition. Liquid chlorine shall be NSF 60 certified for potable water use.

2.2 HYPOCHLORITE

A. Hypochlorite shall conform to AWWA Standard B300, current edition. Hypochlorite shall be NSF 60 certified for potable water use.

2.3 BACKFLOW PREVENTER

A. Backflow prevention device for any connection between the existing water system and new water pipes prior to acceptance of pressure test, disinfections and flushing, shall be of the appropriate size as required and shall be double check-reduced pressure type as manufactured by Watts, Febco, Hersey, or approved equivalent.

B. Backflow prevention device shall be NSF-61 certified.

PART 3 - EXECUTION

3.1 PREPARATION

A. Cleaning and Inspection: The interior of all tank components shall be thoroughly cleaned of all foreign material and inspected for cracks, flaws, or other defects before installation, and shall be kept clean until the work is accepted.

3.2 DISINFECTION AND WATER QUALITY TESTING OF POTABLE WATER TANK

A. An approved backflow prevention device shall be installed at any connections between the existing water system and new water pipes and utilized prior to acceptance of pressure test, disinfections, and flushing.

B. The Contractor shall submit a tank disinfection procedure in accordance with AWWA C652 Chlorination Method 1, Method 2 or Method 3 to Providence Water Supply Board and the Engineer for review prior to chlorinating the tank. Please note that the Engineer will have to submit the tank disinfection procedure to HEALTH for review and approval. Disinfection shall meet with the approval of the Engineer, AWWA C652, and the requirements of HEALTH.

B. The Contractor shall provide all labor, material and facilities required to chlorinate and disinfect the tank.

C. Two (2) consecutive sets of acceptable samples taken at least 24 hours apart shall be collected by Providence Water personnel. Each sample shall be analyzed for total coliform and heterotrophic plate count (HPC). Providence Water personnel shall take single samples to be analyzed for volatile organic compounds (VOCs), pH, chlorine, fluoride, and iron. Following collection and analysis of samples, Providence Water personnel shall notify the contractor when the tank can be drained and put in service.

D. If the tank does not pass the VOC, HPC, or coliform sampling and it is required that the tank be drained and refilled, the Contractor will be billed for the water used at the water rates in place at that time.

E. After the required retention period, any water discharged from tank and mains shall be dechlorinated per AWWA C651 to meet Rhode Island Department of Environmental Management Water Quality Regulations (250-RICR-150-05-1) instream standard of 0.019 ppm. The Contractor shall be responsible for satisfactory disposal of all flushed water and chlorinated water at no additional expense to the Owner.

F. The samples shall be collected from a sample tap on the outlet piping from the storage facility or from a sample tap connected directly to the storage facility, or sampling from the top of the tank or hatch may be required. In any case, the operation shall be such to ensure that the sample collected is actually from water that has been in the storage facility. Sample equipment and methods shall follow aseptic techniques for bacteria sampling.

G. Recommended Additional Samples: During the disinfection operation and the required sampling of water from the storage facility it is recommended that samples be taken from water inflowing to the storage facility to determine if coliforms and VOCs are present in the typical potable water.

H. The water quality test results shall be submitted to the RI Department of Health Office of Drinking Water Quality on official reporting forms, for review and approval. Subject to satisfactory bacteriological and VOC testing and acceptable aesthetic quality, such water may be served to the distribution system.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

A. This section specifies requirements for furnishing and installing ductile iron pipelines complete and in place for water distribution systems.

B. All materials to come in contact with potable water shall be NSF 60 or 61 certified as appropriate.

1.02 REFERENCES

A. American Water Works Association (AWWA):

1. AWWA C104: Standard for Cement Mortar Lining
2. AWWA C110: Standard for Ductile Iron and Gray Iron Fittings for Water
3. AWWA C111: Standard for Rubber Gasket Joints
4. AWWA C150: Standard for the Thickness Design of Ductile Iron Pipe
5. AWWA C151: Standard for Ductile Iron Pipe, Centrifugally Cast
6. AWWA C153: Standard for Ductile Iron Compact Fittings
7. AWWA C600: Standard for Installation of Ductile Iron Water Mains and Their Appurtenances
8. AWWA C651: Standard for Disinfecting Water Mains
9. Providence Water – Requirements for Water Mains, Services, and Appurtenances (Latest Edition)

1.03 MARKING

A. Marking of all pipe shall conform to the requirements of AWWA C151, latest revision, and marking of all fittings shall conform to the requirements of AWWA C153 or C110, latest revision.

1.04 MANUFACTURER'S REPRESENTATIVE

A. The Contractor shall furnish at no additional expense to the Owner, the services of pipe manufacturer's representatives for instruction of the Contractor's personnel who will be installing the pipe. The instruction shall include proper handling, installation, and jointing and other construction areas, and shall be for such lengths of time required to fully familiarize the Contractor's personnel with the proper techniques.

1.05 QUALITY CONTROL

A. Manufacturers' Recommendations:

1. Using Providence Water’s Project Management software, The Contractor shall submit for approval of the manufacturer's recommendations for the storage, protection, handling and installation of the ductile iron pipe, pipe fittings and appurtenances, which shall be strictly adhered to by the Contractor.

B. Certificate of Compliance:

1. Each shipment of pipe, pipe fittings, and appurtenances, shall be accompanied by the manufacturer's notarized certificate certifying conformance with all requirements of these specifications.

PART 2 PRODUCTS

2.01 GENERAL

A. All materials to be incorporated into the work shall be new and purchased specifically for this contract.

B. All hardware shall be Corten as manufactured by Romac Industries.

2.02 DUCTILE IRON PIPE

A. Buried ductile iron pipe shall be Class 52 or 53, as indicated on the Contract Drawings, and shall conform to AWWA specifications C150 and C151, latest revision. Ductile iron pipe shall have push-on type joints. Push-on type joints shall be used with the exception that mechanical joints shall be used at all fittings and along straight pipe sections where mechanical joint restraint is required. Ductile iron pipe shall be restrained with Field Lok 350 Gaskets as manufactured by US Pipe or approved equivalent, where required by the drawings or as required by the Engineer. All mechanical type joints shall be restrained with MEGALUGS Series 1100. All pipe shall have a double bituminous seal coating on all exterior surfaces.

B. All buried ductile iron pipe shall be zinc coated in conformance with ISO 8179-1 “Ductile Iron Pipes – External Zinc-based coating - Part 1” Metallic Zinc with Finishing Layer, latest edition.

D. Interior ductile iron pipe shall be Class 53, with flanged joints, and shall conform to AWWA specifications C150 and C151, latest revision.

2.03 FITTINGS

A. Fittings shall be ductile iron, mechanical joint, class 350 cement-mortar lined and provided with an asphaltic coating 1 mil +/- thick on the exterior. Buried fittings shall be zinc coated. Fittings and plugs for use with the ductile iron pipe specified shall be ductile iron, with a working pressure rating of not less than 350 psi, class 350 conforming to AWWA C153, for buried ductile iron pipe.

B. Sleeve couplings and accessories shall be pressure rated to at least equal to that of the pipe. Couplings shall be ductile iron.

2.04 JOINTS

A. Push-on and mechanical type joints for pipe as specified above shall conform to AWWA C111, latest revision. Gasket material for all jointing requirements shall be styrene butadiene (SBR). All lubricants shall be certified NSF approved for use in potable water systems. All mechanical joint types shall be restrained by the Megalug restraining system.

2.05 CEMENT MORTAR LINING

A. The interior of all ductile iron pipe shall be covered with a double cement-mortar continuous lining not less than 1/8" thick for 12" pipe and smaller, and applied in accordance with AWWA/ANSI C104/A21.4, latest revision.

2.06 STORAGE OF MATERIALS

A. Pipe and related materials shall be stored in locations and in a manner approved by the Owner or the Engineer. The locations and manner of storage shall be as to minimize handling of the materials.

B. All pipe shall be stored with a plastic covering over each end of the pipe. The purpose of the covering is to prevent deleterious material from entering the pipe during storage. The covering shall be secured in-place with a cord or cable and each pipe opening shall be provided with its own covering.

C. The Contractor shall, at all times, be solely responsible for the safe storage of all materials.

2.07 TESTING

A. Manufacturer Testing:

1. Testing of ductile iron pipe shall be done in accordance with AWWA C151, latest revision.
2. Testing of ductile iron fittings shall be done in accordance with AWWA C153 or C110, latest revision.
3. Testing of jointing material shall be done in accordance with AWWA C111, latest revision.
4. Testing of the interior coating shall be done in accordance with AWWA C104, latest revision.
5. Certified test reports shall be submitted by the pipe manufacturer.
6. The Owner and the Engineer shall be notified at least ten (10) days in advance of the date and location of the testing in order to witness the tests.
7. The Contractor shall furnish to the Owner and the Engineer notarized test reports by an independent testing laboratory, which show compliance of all materials furnished to the requirements specified herein. The test reports shall indicate results and methods employed.

B. Field Testing

1. Field-testing of ductile iron pipe installed for water service shall be performed according to the requirements as specified in Technical Specification 02704, Pipeline Pressure, Leakage, and Disinfection.

2.08 IDENTIFICATION

A. Provide 6" blue metalized detection tape with white printing reading "CAUTION WATER LINE BURIED BELOW" for water pipes, as manufactured by Seton.

2.09 BURIED PIPE INSULATION

A. Insulation to be installed as directed by the engineer.

PART 3 EXECUTION

3.01 PIPE INSTALLATION

A. General:

1. All pipe shall be installed in accordance with AWWA C151, latest revision and manufacturer requirements.
2. All pipe and accessories shall be carefully inspected by the Contractor for defects before installation and all defective unsound or damaged materials shall be rejected.
3. The Engineer will make such additional inspections as he deems necessary and the Contractor shall furnish all necessary assistance for such inspection.
4. Proper implements, tools, and facilities satisfactory to the Owner and the Engineer shall be provided by the Contractor for the proper and satisfactory execution of the work.
5. At no time will work be allowed to proceed without the Owner's representative present to inspect the work.

B. Pipe, accessories, and appurtenances shall be new and unused, and shall be of the types and materials specified, as indicated or as directed.

C. The interior of pipe and fittings shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations.

D. Pipelines shall be constructed in dry trenches and shall not be laid when the conditions of the trench or the weather is unsuitable for such work.

E. The trench bottom and gravel bedding shall be shaped and compacted to give substantially uniform unyielding circumferential support to the lower fourth of the full length of each pipe.

F. Holes for the bells shall be excavated so that after placement the pipe and coupling receive uniform bearing pressure from the trench bottom. No blocking shall be allowed.

G. Each pipe shall be laid to the line and grade and in such a manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets of the flow line.

H. As the work progresses, the interior and exterior of the pipes and couplings shall be cleaned of all dirt and superfluous material of every description.

I. When required to keep interior of pipe clean, a suitable drag shall be kept in the pipe and pulled forward past each joint immediately after the jointing has been completed.

J. At times when work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth or other substance will enter the pipe or fitting.

K. Any pipe that has been disturbed after laying shall be taken up and re-laid at no additional expense to the owner.

L. All materials found to be defective during the progress of the work will be rejected by the Engineer and the Contractor shall promptly remove such defective material from the site of the work and replace with new material at no additional expense to the Owner.

M. The Contractor shall be responsible for the safe storage and proper handling of all materials.

N. No shims or mounds of earth shall be used to raise the pipe to grade.

O. All pipe shall be maintained accurately to the required line and grade.

P. No pipe shall be covered until the Engineer has inspected the joints.

Q. The pipeline shall not be used to convey trench drainage during construction.

R. Pipes shall be protected at all times during construction against flotation. They shall be thoroughly secured, properly supported and bedded to prevent settlement or disturbance. Compaction of bedding and backfill material shall be in strict accordance with Section 02200, Earthwork.

S. Bends, crosses, tees, caps, plugs, valves, and other appurtenances shall be strapped and clamped where indicated and/or as directed. Steel bars, rods and plates shall be of structural steel. Straps, bridle rods, clamps, anchors and such other parts shall be provided to the details as directed and as approved. After installation, all parts of the strapping and clamping devices shall be given two (2) heavy coats of an approved coal-tar base protective coating.

3.02 JOINTING

A. No pipes shall be jointed until couplings and ends of pipe have been inspected to determine that the joint surfaces are free from any defects in materials or workmanship, and free from dirt or other foreign matter.

B. Pipe, pipe fittings and accessories shall be stored, installed, joined and protected by the Contractor in strict accordance with the printed recommendations of the manufacturer of the piping material, and as approved.

C. Field assembled joints shall be checked with a suitable gauge as recommended by the manufacturer to ensure that the rubber rings are properly located.

D. Jointing by pushing the pipe home with a backhoe bucket or other heavy equipment will not be permitted. Utilizing the backhoe and a sling to suspend pipe while pushed home by bar or jack is permitted.

E. Protect the end of the pipe from damage at all times by using a timber header between the end of the pipe and the bar or jack.

F. If inspection indicates that the rings are improperly located, the Contractor shall disassemble, and properly reinstall the pipe.

G. Pipe stoppers shall be installed, sealed and blocked in such a manner as to prevent any leakage and so as to withstand an internal hydrostatic pressure of not less than 5 psi.

1. Timber blocking shall be of adequate size and arrangement to prevent the stopper from being blown off the line.
2. Timber bracing shall extend back to the undisturbed end of the trench.

H. Ductile iron pipe and fittings shall be provided with two brass wedges for 12" and smaller diameter pipe and four brass wedges for larger diameter pipe at each joint.

I. Bolts and nuts used with all mechanical joints shall be tightened to the manufactures specified torque with a torque wrench to verify that all bolts and nuts receive the same tightening. Under no conditions shall extension wrenches or pipe over handle of ordinary ratchet or wrench be used to secure greater leverage.

3.03 PIPE REMOVAL

A. Where old pipe conflicts with new pipe, old pipe shall be cut and capped on both ends and the caps shall be secured. No fitting or pipe deflections will be allowed on new pipe to go over or under old pipe. In areas where water mains are to be removed, the contractor shall disconnect each service lateral from the main at the corporation prior to removal of the main. The contractor shall be responsible for the legal disposal of the removed water main pipe.

3.04 IDENTIFICATION MARKERS

A. The line markers shall be installed two feet above the top of the buried pipeline. Where this is not possible, line markers shall be installed as close to two feet above the top of the buried pipeline as possible.

END OF SECTION

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included:

The work under this Section includes the furnishing, installation and testing of all valves, tapping sleeves, transition couplings, hydrants, and appurtenances as indicated on the Drawings or as may be required by the Owner or the Engineer.

B. All materials included in this section that are to come into contact with potable water shall be either NSF 61 or NSF 60 approved as applicable.

C. Related Work Described Elsewhere:

02200 – Earthwork
02616 – Ductile Iron Pipe and Fittings

D. Reference Providence Water – Requirements for Water Mains, Services, and Appurtenances

1.02 QUALITY ASSURANCE

1. Manufacturer's Recommendations:

Using Providence Water's Project Management software, The Contractor shall submit for approval of the manufacturer's recommendations for the storage, protection, handling and installation of the valves, hydrants and appurtenances, which shall be strictly adhered to by the Contractor.

2. Certificate of Compliance:

Each shipment of valves, tapping sleeves, transition couplings, hydrants and appurtenances shall be accompanied with the manufacturer's notarized certificate certifying conformance with all requirements of the Specifications.

1.03 MARKING

A. Marking of all tapping sleeves shall conform to the requirements of AWWA 110 latest revision, marking of all valves shall conform to the requirements of AWWA 515 latest revision, and marking of all hydrants shall conform to the requirements of AWWA 502 latest revision.

1.04 MANUFACTURER'S REPRESENTATIVE

A. The Contractor shall furnish at no additional expense to the Owner, the services of the manufacturer's representative for instruction of the Contractor personnel who will be installing the tapping sleeves, transition couplings, valves and hydrants. The instruction shall include proper handling, installation and jointing, and other construction areas and

shall be for such lengths of time required to fully familiarize the Contractor's personnel with proper techniques. This information shall be bound and indexed for each type of unit as herein specified.

PART 2 PRODUCTS

2.01 GENERAL

A. All materials to be incorporated into the work shall be new and purchased specifically for this Contract. All material shall be made in the United States of America and shall be provided with documentation indicating the location of the foundry and/or place of origin, unless otherwise approved.

B. All coatings and/or protective oils used on materials that will eventually be in contact with potable water must be ANSI/NSF approved.

C. All hardware for valves, tapping sleeves, and appurtenances shall be stainless steel for corrosion resistance.

2.02 TAPPING SLEEVES AND TAPPING VALVES

A. All tapping sleeves shall comply in all respects to AWWA Standard C-110 and the following design standards:

1. Tapping sleeve shall be installed at the locations shown on the plans and details.
2. The tapping sleeve shall be a mechanical type joint to provide pressure-tight installation and be suitable for use with the existing pressurized pipe material. Outlet flange shall be Class 125C, ANSI B16.1.
3. Mechanical joint tapping sleeves shall have totally confined end gaskets and be designed to withstand a minimum of 200 psi working pressure. Nuts and bolts shall be Type 304 stainless steel. Nuts shall be coated per manufacturer’s recommendations to prevent galling.
4. The test plug shall be ¾” NPT, type 304 stainless steel.
5. Mechanical joint tapping sleeve body and outlet shall be thick gauge ASTM A240 type 304/304L stainless steel.
6. Tapping valves shall comply with Section 2.03 - Gate Valves except one end shall be flanged and the other end shall be mechanical.
7. Tapping valves shall be provided with an oversized opening to allow the use of full size cutters.
8. Mechanical tapping sleeves shall be ROMAC Industries, Inc. Model STS420, or approved equivalent.

2.03 BURIED GATE VALVES

A. Resilient seated gate valves shall meet AWWA C-515 and be UL listed and FM approved. Valves shall be ductile iron-body, stainless steel mounted, non-rising stem, 3-inch through 16-inch in diameter as shown on plans. All valves shall OPEN RIGHT. All valves shall be mechanical joint.

B. Sizes 3-inch through 16-inch shall be suitable for 250 psig maximum working pressure and 400 psig test pressure.

C. Manganese bronze stem material shall have a minimum tensile strength of 70,000 psi, yield strength of 35,000 psi and maximum elongation of 15 percent. Valve shall have a minimum of two O-ring stem seals.

D. Operating nuts shall be 2-inch square at the base, tapering to 1-15/16 inches square at the top and shall be manufactured of cast or ductile iron and attached to the stem with a nut or pin at the factory. Nuts shall be painted red and marked with an "arrow" to indicate direction of opening.

E. All hardware shall be Corten as manufactured by Romac Industries.

F. Rubber seats shall be new and of a compound natural or synthetic – designated for water service application. Reclaimed rubber is not acceptable. Seats shall be either bonded or mechanically attached to the gate. When mechanically attached, all exposed hardware shall be 18-8 Type 304 stainless steel.

G. The interior and exterior of valves shall be fully epoxy coated 8 mils thick. Epoxy shall be certified NSF approved for use in potable water systems. Field touch-up of the bonded epoxy within the body of the valve will be allowed; however, touch-up kit must be provided by the manufacturer of the valve and must meet the same NSF approval as the original bonded epoxy.

H. Valves sized 3-inch to 12-inch shall be by Mueller or approved equivalent.

I. Valves sized 16-inch shall be by American Flow Control and shall have a gear actuator with a minimum 2:1 gear ratio.

2.04 STRAIGHT AND TRANSITION PIPE COUPLINGS

A. Straight and Transition Couplings shall be restrained, couplings to be Romac Alpha or approved equal.

2.05 FLANGED COUPLING ADAPTERS

A. Flanged coupling adapters shall be Romac Restrained Flanged Coupling Adapter or approved equivalent. All nuts, washers and bolts shall be stainless steel.

B. Mechanical restraint shall be an integral part of the follower gland utilizing multiple single tooth wedges. Each follower gland shall incorporate cam action, independent wedge engagement and meet applicable requirements of ANSI/AWWA C111/A21.11.

2.06 VALVE BOXES AND COVERS

A. A gate valve box shall consist of three pieces – over, upper section, and lower section – all of which are manufactured of cast iron. The lower section shall have an inside diameter of not less than 5 1/4 – inches and a length of at least 36-inches. It shall be designed to telescope into the upper section. Upper section length shall be 26-inches. Covers shall have the word "WATER" cast upon them.

B. An approved operating Key shall be provided.

2.07 THRUST RESTRAINTS

A. Restraining devices shall be utilized on all mains under the following conditions:

1. Pipeline direction changes (tees, bends)
2. Dead end lines (caps or plugs)
3. Transition pieces (reducers)
4. Couplings
5. All mechanical joints

B. Thrust blocks shall be designed to withstand the force imparted by the main with a minimum 1½ times the anticipated working pressure but not less than 150 p.s.i. Maximum lateral bearing capacity shall be 1,500 lb/sf. Sizing guidelines for thrust blocks are detailed on the project Drawings.

C. Thrust restraint shall also be provided via restrained joint, ductile iron pipe meeting AWWA C151/A21.512 and AWWA C111/A21.11. Restrained joint pipe lengths (restrained length) shall be sufficient to restrain thrust imparted by 1½ times the anticipated working pressure but not less than 150 psi. Pipe restrained joints shall be manufactured by EBAA Iron Sales, Inc. Series 1100 Megalug restraining system.

D. Thrust restraint utilizing tie-rods shall not be utilized unless approved by the Engineer or specifically indicated. Tie-rod diameters shall be 2 times the diameter required to restrain the main. All rods, nuts and other appurtenances shall be stainless steel.

2.09 HYDRANTS

A. All fire hydrants shall comply in all respects to AWWA C-502 and the following design standards:

1. Hydrants shall be dry-barrel, post-type. The main hydrant valve shall be of the compression type that opens against pressure in the main and be constructed of solid rubber that may be reinforced with steel. The connecting line or hydrant lateral shall be 6 inches in diameter, as per AWWA Standard M17.
2. The depths of bury shall have a typical bury of 5 feet, but at all times be installed to meet manufacturer's specifications for proper operation of the traffic breakaway feature. Hydrant extensions, which may be required, shall be manufactured by the same manufacturer of the hydrants being installed. Contractor shall field verify exact bury depths of all proposed hydrants prior to ordering. Should extensions be necessary on new hydrants, the contractor shall not be entitled to additional compensation or time.
3. Hydrant shall be furnished with a sealed reservoir located in the bonnet so that all threaded and bearing surfaces are lubricated each time the hydrant is operated.
4. The bottom nut is to be bronze or fusion-bonded epoxy coasted ductile or cast iron. An O-ring seal shall be provided in the main valve assembly to insure that water cannot leak from the hydrant shoe, or elbow, into the hydrant barrel of drain way. O-ring seals in the main valve area shall seat against bronze or fusion-bonded epoxy coated cast iron. Hydrants shall have a bronze seat ring threaded to a bronze sub-set.
6. Hydrant shall be equipped with 5-¼ inch main valve opening.
7. Hydrants shall have a 150 PSI working pressure. Each hydrant shall be able to deliver

500 gallons per minute through its two hose nozzles when opened together with a loss of not more than 2 psi through hydrant.

8. Hydrant shall have at least two (2) bronze or copper lined drain outlets with a minimum net diameter of ¼-inch. The shoe of the hydrant shall be 6 inch mechanical joint D-150, suitable for use either with centrifugally cast pipe or Class D Pit Cast Pipe. Lugs will be case on either side shoe, securely anchoring the hydrant. Hydrants shall be furnished with a breakable feature that will break cleanly upon impact. This shall consist of a 2-part breakable safety flange with a breakable stem coupling. Hydrant nozzles must be able to be rotated to any position without disassembly of ground-line flange.
9. Hydrants shall open to the RIGHT (clockwise) and shall have a direction-to open arrow with the word "OPEN" imprinted on the hydrant and utilize a breakaway design. Each hydrant shall have two 2 ½ inch nozzles, 180-degrees apart, and one 4 ½ - inch steamer port nozzle. All nozzle threads are to be National Standard Threat. Lead shall not be used to secure nozzles to the hydrant barrel. Nozzle caps shall be cast iron and shall be secured to the hydrant barrel with rustproof steel chains.
10. The above grade stem shall be factory-coated with “Caution” yellow enamel.
11. Hydrant exteriors, above the ground line, shall be painted with on coat of primer and two finish coats of “Ivy Green” paint that will produce a surface to which subsequent coasts of paint, having a linseed oil base, will readily adhere. Bonnets shall be painted, in the same manner, to match existing colors (“Safety Yellow”)
12. Hydrants shall be so arranged that the direction of outlets may be turned 90 degrees without interference with the drip mechanism or obstructing the discharge from any outlet.
13. Hydrants shall be furnished with caps, double galvanized steel hose cap chain, galvanized steel pumper hose cap chain, a galvanized steel chain holder and any other hooks and/or appurtenances required for proper use.
14. All hydrants shall be equipped with a 6" gate valve, or 8” gate valves and 8” lateral when tee to hydrant distances are greater than 10 feet, in accordance with Section 2.3 above, and be fully restrained as shown on the drawings. Restrained joints shall be by Megalug Thrust Restraint Wedge manufactured and sold by EBAA Iron Sales Inc. In the event a bell and spigot joint is located between the tee and hy6drant, the bell and spigot joint shall be restrained with a Field Lok gasket or approved equivalent (from Providence Water’s approved manufacturer’s list)
15. Hydrants shall be Mueller A423 or Kennedy K81D. No substitutions will be allowed.
16. Hydrants shall be installed with sufficient height that when installed a 15-inch hydrant wrench will not contact the ground when making a full 360-degree turn on any nozzle cap.
17. A drainage pit with a volume of 10 cubic feet shall be provided at the base of the fire hydrant barrel. The pit shall be filled with gravel or crushed stone to a depth of 6 inches above the hydrant drain opening and covered with filter fabric prior to backfilling. The gravel or crushed stone aggregate shall provide void space greater than the volume of the hydrant barrel.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:

1. All tapping sleeves, valves, hydrants, and accessories shall be carefully inspected by

the Contractor for defects before installation and all defective, unsound or damaged materials shall be rejected.

2. The Owner or the Engineer will make such additional inspections as deemed necessary and the Contractor shall furnish all necessary assistance for such inspection.
3. Proper implements, tools and facilities satisfactory to the Owner or the Engineer shall be provided by the Contractor for the proper and satisfactory execution of the work.

B. Tapping sleeves, valves, couplings and appurtenances shall be new and unused and shall be of the types and materials specified as indicated or as directed.

C. The interior of tapping sleeves, valves, and fittings shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operation.

D. Tapping sleeves, valves, and fittings shall be constructed in dry trenches and shall not be laid when the conditions of the trench or the weather are unsuitable for such work.

E. Tapping sleeves, valves, and couplings shall be laid to the line and grade in such a manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets of the flow line.

F. At times when work is not in progress, open ends of tapping sleeves, valves and fittings shall be securely closed so that no trench water, earth or other substances will enter.

G. Any tapping sleeves, valves or fittings that have been disturbed after laying shall be taken up and re-laid.

H. All materials found to be defective during the progress of the work will be rejected by the Engineer and the Contractor shall promptly remove such defective material from the site of the work and replace with new material at no additional expense to the Owner.

I. The Contractor shall be responsible for the safe storage and proper handling of all materials.

J. No shims or mounds of earth shall be used to raise the equipment to grade.

K. No tapping sleeve, valve, or appurtenance shall be covered until the joints have been inspected.

L. Installed materials shall be protected at all times during construction against flotation; they shall be thoroughly secured, properly supported and bedded to prevent settlement or disturbance. Compaction of bedding and backfill material shall be in accordance with Section 02200, EARTHWORK.

M. Tapping sleeves shall be installed where indicated or as directed by the Owner or the Engineer and shall be installed according to the manufacturer's recommended procedures.

N. Valves and joint restraints shall be installed where indicated or as directed by the Owner or the Engineer and shall be installed according to the manufacturer’s recommended procedures.

3.02 SETTING VALVES AND VALVE BOXES

A. Valves shall be set in the pipelines as directed. Blocking or supports of a permanent nature shall be placed under each valve to ensure against settlement.

B. Each valve shall be tightly closed before being placed in the line and shall remain so until the joints on each side are completely tightened.

C. Valve boxes shall be set for all valves and shall be locking type. They shall be carefully fitted together and to the valve and securely held during backfilling. They shall be centered over the valve-operating nut. The bedding material around them shall be thoroughly tamped in place and the box cover set to the finished grade.

3.3 TESTING

A. All materials shall be tested for tightness as soon after installation as possible in accordance with Section 02704, PIPELINE PRESSURE, LEAKAGE, AND DISINFECTION.

B. All materials found to be defective during testing shall be replaced with new and approved material at no additional expense to the Owner.

3.4 TEST REPORTS AND CERTIFICATES

A. In addition to other requirements specified herein, the Contractor shall furnish to the Engineer notarized test reports and methods of test by an approved independent testing laboratory to show compliance of all materials furnished under this section of the Specifications with all the requirements herein.

A. Each shipment of tapping sleeves, valves, and other appurtenances shall be accompanied by the manufacturer's notarized certificate of conformance certifying that materials to be furnished under these items meet all requirements herein.

B. All testing of materials furnished under this section of the Specifications shall be provided by the Contractor at no additional expense to the Owner.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

A. This section specifies requirements for the testing and disinfections of underground potable water pipelines. The work covered under this section includes, but is not necessarily limited to:

1. Leakage tests
2. Disinfection

NOTE: Testing will be performed prior to connecting new pipeline sections to any existing potable water system piping. No physical connections (temporary or permanent) between new pipe and existing pipe will be allowed during the test without the use of an approved backflow prevention device.

1.02 REFERENCES

A. American Water Works Association (AWWA):

1. AWWA B300: Standards for Hypochlorites
2. AWWA C600: Standard for Installation of Ductile Iron Water Mains and Their Appurtenances
3. AWWA C651: Standard for Disinfecting Water Mains
4. Providence Water: Requirements for Water Mains, Services, and Appurtenances (latest edition).

1.03 SUBMITTALS

A. Certified reports for all required tests shall be provided from an approved, qualified, independent testing laboratory.

B. Shop drawing of temporary connection backflow preventer.

C. Detail of temporary connection between existing and new water pipelines.

PART 2 PRODUCTS

2.01 HYPOCHLORITE

A. Hypochlorite shall conform to AWWA Standard B300, current edition. Hypochlorite shall be NSF 60 certified for potable water use.

2.02 BACKFLOW PREVENTER

A. Backflow prevention device for any connection between the existing water system and new water pipes prior to acceptance of pressure test, disinfections and flushing, shall be of the appropriate size as required and shall be double check type as manufactured by Watts, Febco, Hersey, or approved equivalent.

B. Backflow prevention device shall be NSF-61 certified.

2.03 GAUGES

A. Gauges used by the contractor in performance of the leakage tests shall be NIST certified and certification shall be traceable back to NIST.

PART 3 EXECUTION

3.01 PREPARATION

A. Cleaning and Inspection: The interior of all pipe, fittings, valves and appurtenances shall be thoroughly cleaned of all foreign material and inspected for cracks, flaws, or other defects before installation, and shall be kept clean until the work is accepted.

3.02 FIELD QUALITY CONTROL

A. Alignment Tests: Each section of pipe will be checked by the Owner or the Engineer in order to determine whether any displacement of the pipe has occurred. The Contractor shall provide suitable assistance to the Owner or the Engineer. The Contractor shall repair any poor alignment, displaced pipe or other defects discovered, as directed by the Engineer.

B. Hydrostatic Tests: After the pipe has been laid and the trench has been backfilled, all newly laid pipe or any valve section thereof, shall be subjected to a pressure and leakage test in accordance with AWWA C600-latest edition, Providence Water standards, and as approved by the Engineer. The Contractor shall provide all pumps, pipe, connections, gages, measuring devices, and all other apparatus necessary for the test and shall conduct the test in the presence of and to the satisfaction of the Engineer. The Owner will supply water to the Contractor for testing purposes at no expense to the Contractor.

1. Test Pressure - The required minimum test pressure shall be 1-1/2 times the working pressure measured at the point of lowest elevation of the pipeline and corrected to the elevation of the test gauge, but shall not be less than 150 psi. Test pressures shall not vary by more than plus or minus 5 psi for the duration of the test.
2. Duration of Test - two (2) hours minimum.
3. Air Removal - Prior to performance of the test the pipeline shall be completely filled with water for a period of 72 hours. Expel air by means of air relief valves, hydrants or other means as required. If permanent air vents or taps are not located at all high points, the Contractor shall install corporation stops at such points so air can be expelled. After the tests are completed, plug all temporary taps.
4. Allowable Leakage:
    a. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valve section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. Leakage shall not be measured by a drop in pressure in a test section over a period of time.
    b. No pipe installation will be accepted if the leakage is greater than that determined by the following formula in which "L" is the allowable leakage in gallons per hour; "S" is the length of pipe tested in feet; "P" is the average test pressure during the leakage test in pounds per square inch (gauge); and "D" as the nominal diameter of the pipe in inches.

$$L = \frac{SD\sqrt{P}}{133{,}200}$$

5. Repair of Leaks - If the test discloses leakage greater than the allowable leakage the Contractor shall, at his own expense, locate and repair the defective joints until leakage is within the specified allowable. The Contractor shall repair any specific leaks regardless of the test results if, in the opinion of the Engineer, they are serious enough to endanger the future serviceability of the pipeline.

3.03 DISINFECTIONS OF POTABLE WATER LINES

A. General:

1. Flushing and disinfections of potable waterlines shall be done in accordance with the procedure set forth in AWWA C651 - Disinfecting Water Mains, latest edition, and shall be witnessed by the Engineer unless otherwise approved. The Contractor shall provide all temporary blowoffs, pumps, chlorination equipment, chlorine and all other necessary apparatus required. The Owner will supply water to the Contractor for disinfections purposes at no expense to the Contractor.
2. All valves on the new main shall be operated during the disinfections procedure in order to ensure complete disinfections.
3. The form of chlorine proposed by the Contractor for disinfections shall be approved by the Engineer.
4. The Contractor shall take adequate measures to prevent backflow of flushing water and chlorinated water into the existing water distribution system.
5. Contractor shall not make physical connection to the existing water main prior to satisfactory results of chlorination. An approved backflow prevention device shall be utilized to transfer water from the existing system to the new piping network.
6. Unless precluded by unexpected events, the Contractor shall notify the Owner at least three (3) working days prior to a water main shutdown. The Owner shall determine if the operation of valves will be performed by The Owner’s work forces, the Contractor, or a Owner Subcontractor. The immediacy of water main shutdowns or valve operation is not warranted by the Owner. In the operation of valves, for the purpose of shutting down existing mains, the Owner does not guarantee or imply that shut down will be completely effective in stopping the flow of water to open ends. If so directed by the Owner, the Contractor shall operate all valves required to shut down (and subsequently reopen) existing water mains. If the Contractor is unable to shut down a valve after two (2) hours of attempting to do so, the Owner will direct the Contractor as to how to proceed.

B. Pipe Cleaning:

1. If the pipe contains dirt or heavy encrusted matter that, in the opinion of the Engineer, will not be removed during the flushing operation, the Contractor shall clean and swab the interior of the pipe with a one (1) percent hypochlorite disinfecting solution.
2. The pipeline shall be flushed to remove all remaining foreign material prior to disinfections, except when the tablet method is used. The flushing operation shall develop a minimum velocity of 3.0 ft/sec. It will be the Contractor's responsibility to properly size and locate corporations within test sections to adequately flush all piping

at least 2 times its volume at the desired velocity. A minimum of a six-inch (6") supply line will be required to adequately flush all piping for this project.

3. Main line valves shall not be utilized to fill, flush, test or chlorinate water mains unless authorized and supervised by the Engineer.

C. Chlorine Application:

1. In general, chlorine shall be applied using the continuous feed method, as specified in AWWA C651.
2. Introduce water into the line at a constant rate while adding chlorine to the water at a constant rate, such that the water will have not less than 25 mg/L free chlorine. Maintain the chlorinated water in the pipeline for a minimum of 24 hours, after which period the treated water shall have a free chlorine residual of not less than 10 mg/L throughout the entire length. Repeat the above procedure if the residual, at the end of the 24 hours, fails to meet the minimum concentration. Chlorinated water, above the normal system prevailing concentration, shall not be allowed to remain in the pipeline for a period longer than 5 days.
3. Fire hydrants may not be used for sampling points but may be utilized as a feed source if properly flushed and the Owner's required temporary piping system installed.

D. Final Flushing:

1. After the required retention period, flush all heavily chlorinated water from the main until the chlorine concentration is no higher than that prevailing in the system, or is acceptable for domestic use. The Contractor shall be responsible for satisfactory disposal of all flushing water and chlorinated water at no additional expense to the Owner.
2. Prior to discharging, a reducing agent shall be applied to the water to be wasted, to neutralize thoroughly the chlorine residual remaining in the water. (See Appendix C of AWWA C651 for neutralizing chemicals).

E. Analytical Tests:

1. After completion of the final flushing and prior to placing the pipeline in service, two (2) consecutive sets of acceptable samples taken at least 24 hours apart shall be collected by Providence Water personnel. Each sample shall be analyzed for total coliform and heterotrophic plate count (HPC). Providence Water personnel shall take single samples to be analyzed for pH, chlorine, and iron.
2. No VOC samples will be taken for water mains.
3. All samples must meet Providence Water Standards.

F. Repetition of Procedure - If the original disinfections fails to produce satisfactory samples, repeat the disinfections procedure until satisfactory results are obtained at no additional expense to the Owner. The Owner reserves the right to charge for the cost of additional water and cost to preform additional sampling, should the first round of sampling fail to produce satisfactory results.

END OF SECTION

DIVISION 3

CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. This specification describes the patching and overlay of damaged/spalled elevated tank foundations using portland cement concrete.

1.02 QUALITY ASSURANCE

A. Manufacturing qualifications: The manufacturer of the specified product shall be ISO 9001/9002 certified and have in existence a recognized ongoing quality assurance program independently audited on a regular basis.

B. Contractor qualifications: Contractor shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. Contractor shall maintain qualified personnel who have received product training by a manufacturer's representative

C. Install materials in accordance with all safety and weather conditions required by manufacturer or as modified by applicable rules and regulations of local, state and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

1.03 DELIVERY, STORAGE, AND HANDLING

A. All materials must be delivered in original, unopened containers with the manufacturer’s name, labels, product identification, and batch numbers. Damaged material must be removed from the site immediately.

B. Store all materials off the ground and protect from rain, freezing or excessive heat until ready for use.

C. Condition the specified product as recommended by the manufacturer.

1.04 JOB CONDITIONS

A. Environmental Conditions: Do not apply material if it is raining or snowing or if such conditions appear to be imminent. Minimum application temperature 45ºF (7ºC) and rising.

B. Protection: Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified material.

1.05 SUBMITTALS

A. Submit two copies of manufacturer’s literature, to include: Product Data Sheets, and appropriate Material Safety Data Sheets (MSDS).

1.06 WARRANTY

A. Provide a written warranty from the manufacturer against defects of materials for a period of one (1) year, beginning with date of substantial completion of the project.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. **Sikacrete 211 SCC Plus**, as manufactured by Sika Corporation, is considered to conform to the requirements of this specification.

2.02 MATERIALS

A. Portland cement concrete:

1. The repair concrete shall be self consolidating and polymer modified. It shall be comprised of selected portland cements, specially graded aggregates, admixtures for controlling setting time and plasticizers for workability as well as silica fume and a migrating corrosion inhibitor.
2. The materials shall be non-combustible, both before and after cure.
3. The materials shall be supplied as a factory-blended unit.
4. The portland cement concrete must be placeable from 1 in. to 8 in. in depth and appropriate for full-slab depth repair and replacement.

B. The portland cement concrete aggregate shall conform to ASTM C-33. (similar to No.8 distribution per ASTM C-33, Table II) and be clean, well-graded, having low absorption and high density.

2.03 PERFORMANCE CRITERIA

A. Typical Properties of the mixed portland cement concrete:

1. Initial spread: SCC, 27-33 in. approx.
2. Spread at 30 min: > 15 in.
3. Application time: 60 min.

B. Typical Properties of the cured portland cement concrete:

1. Compressive Strength (ASTM C-39 modified)
   a. 1 day: 2,000 psi min. (13.8 MPa)
   b. 7 day: 6,000 psi min. (41.4 MPa)
   c. 28 day: 7,000 psi min. (48.3 MPa)
2. Flexural Strength (ASTM C-78) @ 28 days: 1,000 psi (6.9 MPa)
3. Splitting Tensile Strength (ASTM C-496) @ 28 days: 1,000 psi (6.9 MPa)
4. Bond Strength (ASTM C-882 modified) @ 28 days: 2,500 psi (17.2 MPa)
5. Shrinkage (ASTM C-157): < 0.05%
6. Chloride ion permeability (ASTM C-1202): < 650 Coloumbs
7. The portland cement concrete shall not produce a vapor barrier.

Note: Above tests performed with curing conditions @ 71ºF – 75ºF and 45-55% relative humidity.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Areas to be repaired must be clean, sound, and free of contaminants. All loose and deteriorated concrete shall be removed by mechanical means. Mechanically prepare the concrete substrate to obtain an exposed aggregate surface with a minimum surface profile of +/- 1/8 in. (CSP 7-8 per ICRI Guidelines). Saturate surface with clean water. Substrate should be saturated surface dry (SSD) with no standing water during application. Area to be patched shall not be less than 1 in. in depth.

B. Where reinforcing steel with active corrosion is encountered, sandblast the steel to a white metal finish to remove all contaminants and rust. Where corrosion has occurred due to the presence of chlorides, the steel shall be high pressure washed after mechanical cleaning. Prime steel with 2 coats of Sika Armatec 110 EpoCem as directed by manufacturer. (See Spec Component SC-201-0699)

3.02 MIXING AND APPLICATION

A. Start mixing with 5.5 pints of water. An additional 0.5 pint can be added if needed. **Do not overwater**, as excess water will cause segregation. Add entire contents of one bag of Sikacrete 211 SCC Plus while continuing to mix to a uniform consistency, maximum 3 minutes. Mechanically mix with a low-speed (400-600 rpm) drill or in an appropriate-size mortar mixer or concrete mixer.

B. Placement Procedure: Pre-wet surface to SSD (Saturated Surface Dry) with no standing water. Ensure good intimate contact with the substrate is achieved. To accomplish this, material should be scrubbed into substrate filling all pores and voids. While the scrub coat is still plastic, force material against edge of repair, working toward center. If repair area is too large to fill while scrub coat is still wet use Sika Armatec 110 EpoCem in lieu of scrub coat (See Spec Component SC-200). After filling, consolidate, then screed. Allow concrete to set to desired stiffness, then finish with trowel, manual or power, for smooth surface. Broom or burlap drag for rough surface.

C. Alternatively the material may be poured or pumped into formed areas. To ensure proper filling and adhesion vibrate the material during placement or pump the repair material under pressure. Vibrate form while pouring or pumping. Pump with a variable pressure pump. Continue pumping untial a 3 to 5 psi increase in normal line pressure is evident then STOP pumping. Form should not deflect. Vent to be capped when steady flow is evident, and forms stripped when appropriate.

D. As per ACI recommendations for portland cement concrete, curing is required. Moist cure with wet burlap and polyethylene, a fine mist of water or a water-based* compatible curing compound. Moist curing should commence immediately after finishing. Protect newly applied material from rain, sun, and wind until compressive strength is 70% of the 28-day compressive strength. To prevent from freezing cover with insulating material. Setting time is dependent on temperature and humidity.

*Pretesting of curing compound is recommended.

E. Adhere to all procedures, limitations and cautions for the portland cement mortar in the manufacturers current printed technical data sheet and literature.

3.03 CLEANING

A. The uncured portland cement mortar can be cleaned from tools with water. The cured portland cement mortar can only be removed mechanically.

B. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

END OF SECTION

DIVISION 5

METALS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Structural steel repair of elevated water storage tank, including, but not limited to, the following:
   a. modification to catwalk guardrail to meet OSHA requirements;
   b. modifications to storage tank overflow pipe; and
   c. installation of a new tank access ladder with grab bars and fall protection system.

2. Drawings and general provisions of the Contract, including Division 00 and 01, apply to this Section.

1.2 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard American Welding Society (AWS) symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
5. For structural-steel connections indicated to comply with design loads, include structural analysis data signed and sealed by the qualified Professional Engineer registered in the State of Rhode Island responsible for their preparation. This shall include, at a minimum, the modifications to the guardrail.

C. Welding certificates.

D. Qualification Data: For installer, fabricator, professional engineer, and testing agency.

E. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:

1. Structural steel including chemical and physical properties.
2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
3. Direct-tension indicators.
4. Tension-control, high-strength bolt-nut-washer assemblies.

5. Shop primers.

F. Source quality-control test reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

B. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category Sbd.

C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code-Steel."

D. Comply with applicable provisions of the following specifications and documents:

1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
3. AISC's "Specification for the Design of Steel Hollow Structural Sections."
4. AISC's "Specification for Allowable Stress Design of Single-Angle Members."
5. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.5 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 erosion and deterioration.

1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
2. 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.

1.6 COORDINATION

A. Furnish 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.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. Channels, Angle Shapes: ASTM A 36/A 36M.

B. Plate and Bar: ASTM A 36/A 36M.

C. Welding Electrodes: Comply with AWS requirements.

1. E60 series electrodes shall be used for field welding to existing steel.
2. E70 series electrodes shall be used for shop fabrication of new steel components.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: Plain.
2. Direct-Tension Indicators: ASTM F 959, Type 325 compressible-washer type:
   a. Finish: Plain.

B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy hex or round head steel structural bolts with splined ends; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: Plain.

2.3 PRIMER

A. Surface Preparation, Priming, and Painting shall be according to the requirements of Section 09970 Steel Water Storage Tank Painting.

2.4 FABRICATION

A. Structural Steel: Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings-Allowable Stress Design and Plastic Design".

B. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Base-Plate 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.

2.5 SHOP PRIMING

A. All shop fabricated structural steel components shall be shop primed except for the following:

1. Surfaces to be field welded.
2. Surfaces to be high-strength bolted with slip-critical connections.

B. Surface Preparation, priming, and painting shall be according to the requirements of section 09970.

2.6 SOURCE QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify dimensions, member sizes, and plate sizes for all tank components to be repaired or replaced.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during removal and replacement of deteriorated tank components and during the erection of new components to maintain stability of all tank components and 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.

3.3 ERECTION

A. Set structural steel components accurately in locations and to elevations indicated on the approved Shop Drawing and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings-Allowable Stress Design and Plastic Design".

B. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

C. Align and adjust various members forming part of complete structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

D. Splice members only where indicated on the approved Shop Drawings.

E. Do not use thermal cutting during erection.

F. 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 according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened, Pre-tensioned, or Slip critical as specified on the approved Shop Drawings.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings-Allowable Stress Design and Plastic Design" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Welded Connections: Field welds will be visually inspected according to AWS D1.1.

1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

C. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

A. Touchup Painting: Cleaning and touchup painting are specified in Section 09970 Steel Water Storage Tank Painting.

END OF SECTION

DIVISION 7

THERMAL & MOISTURE PROTECTION

SECTION 07920 FLUID APPLIED WATERPROOFING

PART 1 GENERAL

1.01 SUMMARY

A. This specification describes the injection of cracks and joints with infiltrating water with a low viscosity hydrophobic polyurethane resin chemical grout in the underground tank piping vault as shown on the drawings.

1.02 QUALITY ASSURANCE

A. Manufacturing qualifications: The manufacturer of the specified product shall be ISO 9001:2008 certified and have in existence a recognized ongoing quality assurance program independently audited on a regular basis.

B. Contractor qualifications: Contractors shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. Contractor shall maintain qualified personnel who have received product training by the manufacturer's representative.

C. Install materials in accordance with all safety and weather conditions required by manufacturer or as modified by applicable rules and regulations of local, state and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Deliver the specified product in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers.

B. Store and condition the specified product as recommended by the manufacturer.

1.04 JOB CONDITIONS

A. Environmental Conditions: Do not apply material if it is raining or snowing or if they appear to be imminent.

B. Protection: Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified repair material.

1.05 SUBMITTALS

A. Submit two copies of manufacturer's literature, to include: Product Data Sheets, and appropriate Material Safety Data Sheets (MSDS).

1.06 WARRANTY

A. Provide a written warranty from the manufacturer against defects of materials for a period of one (1) year, beginning with date of substantial completion of the project.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Hydrophobic Polyurethane Chemical Grout:

a. SikaFix HH LV as manufactured for Sika Corporation, Lyndhurst, New Jersey, is considered to conform to the requirements of this specification.

B. Substitution: The use of other than the specified products will be considered providing the contractor requests their use in writing to the Engineer. This request shall be accompanied by (a) A certificate of compliance from an approved independent testing laboratory that the proposed substitute products meet or exceed the specified performance criteria, tested in accordance with the specified test standards; and (b) Documented proof that the proposed substitute products have a two year proven record of performance of the chemical injection grouting of a crack, confirmed by actual field tests and five successful installations that the Engineer can investigate.

2.02 MATERIALS

A. Expanding Polyurethane Chemical Grout

1. The grouting compound shall be a non-toxic, non-flammable, high flash point (270 F) hydrophobic polymer of the type which is applied in a crack or open joint by use of a packer. When the grout is mixed with water the material will expand up to 2 to 5 times its original volume and cure to a pale yellow closed cell polyurethane foam.

B. The use of injection packers is usually required for the application of the polyurethane chemical grout.

2.03 PERFORMANCE CRITERIA

A. Properties of the mixed polyurethane chemical grout.

1. Pot Life: approximately 5 hours, providing no moisture enters the system
2. Mixed Viscosity: 450 - 850 cps ASTM D- 2196 A
3. Color: pale yellow
4. Flash point 270F
5. Density 8.7 – 9.2 lbs./gal. ASTM D 3754- 95
6. Solids 100%
7. Corrosiveness - non- corrosive

B. Properties of the cured polyurethane chemical grout

1. Tensile Strength: 150 psi ASTM D-190-63
   a. Elongation: 250%
2. Absorption 10% After 6 months immersion
3. Shrinkage: Less than 4% ASTM D-1042
4. Density 8.70 – 9.17 lbs./gal ASTM D3574

Note: Above tests performed with curing conditions @ 71°F – 75°F and 45-55% relative humidity.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Expanding polyurethane chemical grout - When crack (s) is contaminated on the outside it will be necessary to clean the crack surface to exactly locate the crack. If the crack encounter high water flow, it will be necessary to seal the surface of the crack with a surface sealing material. The surface sealing can be done before or after drilling the injection holes. Then, begin drilling 5/8" diameter holes along the side of the crack at 45 angles. Drill the hole to intersect the crack midway through the substrate. Install the injection packers in holes. Prior to product application moisture must be present. If concrete being injected contains insufficient moisture to activate the grout, inject the crack with a small amount of water prior to the application of the chemical grout.

3.02 MIXING AND APPLICATION

A. Mixing the polyurethane chemical grout for the injection of cracks:

1. The material can be agitated vigorously shaking the 5 gallon pail or by mixing thoroughly for about 2 minutes max. with low speed (400-600 rpm), drill and paddle, bung mixer.

   Caution: Do not allow water to enter this mix and avoid “whipping” air into the material.

B. Placement procedure: set packers as required by the manufacturer.

1. Begin by drilling 5/8" diameter holes along the side of the crack at a 45° degree angle. Drill the hole to intersect the crack midway through the substrate. Spacing of the injection ports depends on crack width, but normal spacing varies from 6” to 36”. It is necessary to flush the drilled holes with water to remove drill dust from the holes and cracks, and insure that the crack is wet enough to react with the grout when introduced to the crack. On structures open on both sides, provide packers on opposite sides at staggered elevations. Install the injection packers in the holes.

   If the crack or joint to be injected is ½” or greater at surface, pack an open cell polyurethane foam saturated with the mixed polyurethane chemical grout into the crack/ joints. Spray the saturated foam with a small amount of water to activate the grout and create a surface seal.

   Injection pressure will vary from 200 psi to 2500 psi depending on the width of the crack, thickness of the concrete and condition of the concrete.

C. Placement Procedure: The polyurethane chemical grout for the pressure injection grouting.

1. Inject the prepared cracks with a minimum of 250 psi in order to achieve maximum filling and penetration without the inclusion of air pockets or voids in the polyurethane chemical grout. Begin the pressure injection at the lowest packer and continue until there is the

appearance of the polyurethane chemical grout at an adjacent packer, thus indicating travel. When travel is indicated, a decision to discontinue or continue the pressure injection from that packer should be made by the contractor, based on his experience, with the approval of the engineer. Continue the procedure until all pressure-inject able cracks have been filled.

2. Pump polyurethane chemical grout for 45 seconds and then pause to allow the material to flow into all of the cracks and crevices. Watch for material flow and water movement to appear on the surface. When movement stops, begin injection into the next packer. When sealing vertical cracks, begin injecting at the bottom of the crack and work vertically. If site temperatures are extremely low, heat bands or heated water baths may be used on the pails, before and during use to maintain the products temperature. Re-inject to assure that all voids are properly sealed off.

3. If penetration of any cracks is impossible, consult the engineer before discontinuing the injection procedure. If modification of the proposed procedure is required to fill the cracks, submit said modification in writing to the engineer for acceptance prior to proceeding.

4. Adhere to all limitations and cautions for the polyurethane chemical grout as stated in the manufacturers current printed literature.

Caution: Expanding chemical grout is exerting outward pressures of up to 450 psi. The review of drawings of the area to be repaired is desirable.

3.03 CLEANING

A. Clean-up: Completely flush pump and hoses with SikaFix Pump Flush. Use sharp sided tool such as putty knife or trowel to remove excess material from walls, floors, etc. Wait for material to cure before removing. May be sanded off if necessary.

B. The uncured polyurethane chemical grout can be cleaned from tools with an approved solvent. The cured polyurethane chemical grout can only be removed mechanically.

C. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

Note: Tests were performed with material and curing conditions at 71-75F and 45-55% relative humidity.

END OF SECTION

DIVISION 9

FINISHES

PART 1 GENERAL

1.01 SUMMARY

A. This specification describes the coating of storage tank concrete foundations with an anti-carbonation, protective coating following concrete rehabilitation in accordance with section 03930.

1.02 QUALITY ASSURANCE

A. Manufacturing qualifications: The manufacturer of the specified product shall be ISO 9001:2008 certified and have in existence a recognized ongoing quality assurance program independently audited on a regular basis.

B. Contractor qualifications: Contractor shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. Contractor shall maintain qualified personnel who have received product training by manufacturer's representative

C. Install materials in accordance with all safety and weather conditions required by manufacturer or as modified by applicable rules and regulations of local, state and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

1.03 DELIVERY, STORAGE, AND HANDLING

A. All materials must be delivered in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers. Damaged material must be removed from the site immediately.

B. Store all materials off the ground and protect from rain, freezing or excessive heat until ready for use.

C. Condition the specified product as recommended by the manufacturer.

1.04 JOB CONDITIONS

A. Environmental Conditions: Do not apply material if it is raining or snowing or if such conditions appear to be imminent. Minimum application temperature 45ºF (7ºC) and rising.

B. Protection: Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified material.

1.05 SUBMITTALS

A. Submit two copies of manufacturer's literature, to include: Product Data Sheets, and appropriate Material Safety Data Sheets (MSDS).

B. Submit copy of Certificate of Approved Contractor status by manufacturer.

1.06 WARRANTY

A. Provide a written warranty from the manufacturer against defects of materials for a period of one (1) year, beginning with date of substantial completion of the project.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. **Sikagard 670W**, as manufactured by Sika Corporation, 1682 Marion Williamsport Road, Marion, Ohio, 43302 is considered to conform to the requirements of this specification.

2.02 MATERIALS

A. Protective Acrylic Coating:

1. Product shall be 100% Acrylic Emulsion with the following properties:

   a. Non-vapor barrier

   b. Must resist ingress of chlorides

   c. Must resist ingress of carbon dioxide

   d. The material shall be non-combustible, both before and after cure.

2.03 PERFORMANCE CRITERIA

A. Properties of the protective acrylic coating:

1. Pot Life: indefinite
2. Tack Free Time 1 Hour @ 73°F, 50% Relative Humidity. Final Cure < 24 Hours
3. Carbon Dioxide Diffusion: μCO_2 1,100,000 Carbon Dioxide Diffusion Resistance at 5 mils (120 microns) $SdCO_2$ = 433 ft (132 m) equivalent air thickness. i.e. Approx. 13-in. of standard concrete cover.
4. Water Vapor Diffusion: μH_2O 13,140. Water Vapor Diffusion Resistance at 5 mils (120 microns) SdH_2O = 1.3 ft (0.4 m) equivalent air thickness.
5. Moisture Vapor permeability (ASTM E96) 17.9 perms
6. Solids content: By weight: 60% By Volume: 46%
7. Flame spread and smoke development (ASTM E-84-94)
   a. Flame Spread 0
   b. Smoke Development 5
   c. Class Rating A
8. Resistance to wind driven rain (TT-C-555B): No passage of water through coating.

Note: Tests above were performed with the material and curing conditions @ 71°F – 75°F and 45-55% relative humidity.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Substrate must be clean, sound, and free of surface contaminants. Remove dust, laitance, grease, oils, curing compounds, form release agents and all foreign particles by mechanical means. Substrate shall be in accordance with ICRI Guideline No. 03732 for coatings and fall within CSP1 to CSP3.

3.02 MIXING AND APPLICATION

A. Mixing: Stir materials to ensure uniformity using a low speed (400-600 rpm) drill and paddle. To minimize color variation, blend two batches of material.(boxing)

B. Coating Application: Apply by brush, roller, or spray over entire area moving in one direction. A minimum of two coats are required. Each coat should be applied at a rate not to exceed 250-sq. ft. per gallon. Total dry film thickness shall be a minimum 2.5 – 3 dry mils per coat. Allow a minimum of 1 hour prior to re-coating.

C. When applying the coating, never stop the application until the entire surface has been coated. Always stop application at an edge, corner, or joint. Never let a previously coated film dry; always coat into a wet film. Always apply the coating at a 45^{o} angle to an edge, corner, or joint.

D. If substrate has been previously coated and presents a “chalky” condition, apply 1 coat of Sikagard 552W or Sika Latex R, primer/surface conditioner by brush, roller, or spray at a rate not to exceed 300 sq. ft. per gallon.

E. Adhere to all limitations and cautions for the acrylic coating in the manufacturer's printed literature.

3.03 CLEANING

A. The uncured acrylic coating can be cleaned from tools with water. The cured acrylic coating can only be removed mechanically.

B. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

END OF SECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Divisions 00 and 01, apply to this Section.

1.2 SUMMARY

A. The Contractor shall supply all labor, materials and equipment necessary for the blast cleaning, containment, surface preparation, and the spot cleaning and painting of the interior and exterior surfaces of the rehabilitated tank structures. Work to include all required sampling and testing, and the final disinfection of the water storage facility, as specified herein.

B. All materials that are to come in contact with potable water shall be NSF 60 or 61 approved.

C. Related Sections:

1. Section 05120 – Structural Steel Framing
2. Section 11200 – Water Storage Tank Appurtenances

1.3 REFERENCE STANDARDS

A. The latest edition of the following standards and specifications shall be used with regard to materials, design, construction, inspection and testing to the extent specified herein:

1. ANSI/NSF 61 - Drinking Water System Components - Health Effects.
2. NSF/ANSI 600 - Health Effects Evaluation and Criteria for Chemicals in Drinking Water
3. Recommended Standards for Water Works (Ten States), 2012 Edition
4. ASTM D 16 - Terminology Relating to Paint, Varnish, Lacquer, and Related Products.
5. ASTM D 4263 - Indicating Moisture in Concrete by the Plastic Sheet Method.
6. ASTM F 1869 - Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
7. AWWA C 652 - Disinfection of Water-Storage Facilities.
8. AWWA D 102 - Coating Steel Water Storage Tanks.
9. International Concrete Repair Institute (ICRI) Guideline No. 03732 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.
10. OSHA 1926
11. SSPC-SP 1 - Solvent Cleaning.
12. SSPC-SP 2 - Hand Tool Cleaning.
13. SSPC-SP 3 - Power Tool Cleaning.
14. SSPC-SP 6/NACE 3 - Commercial Blast Cleaning.
15. SSPC-SP 7 – Brush-Off Blast Cleaning.

16. SSPC-SP 10/NACE 2 - Near-White Metal Blast Cleaning.
17. SSPC-SP 11 - Power Tool Cleaning to Bare Metal.
18. SSPC-SP 12 – Water Jetting Prior to Recoating
19. SSPC-SP 13/NACE 6 - Surface Preparation of Concrete.
20. SSPC-PA 1 – Painting Application Specification.
21. SSPC-PA 3 – Painting Application Guide for Safety in Paint Application.
22. SSPC Vis-1 - Pictorial Surface Preparation Standards for Painting Steel Structures.

1.4 DEFINITIONS

A. Definitions of Painting Terms:ASTM D 16, unless otherwise specified.

B. Dry Film Thickness (DFT): Thickness of a coat of paint in fully cured state measured in mils (1/1000 inch).

1.5 QUALITY ASSURANCE

A. Qualifications: Prospective Contractors shall sufficiently demonstrate experience in the rehabilitation of similar tank structures and shall have specific experience in lead-paint removal and disposal. Contractors shall use only thoroughly trained and experienced workers completely familiar with the work required for the tank rehabilitation work. All cleaning, surface preparation and painting work shall be performed by a qualified company having at least ten (10) years of experience and shall have performed steel tank cleaning and painting work for at least twenty (20) steel water storage tanks. In addition, this shall include at least 5 projects completed in the New England area in the last 5 years. The Contractor shall not sell, transfer or otherwise dispose of the Contract to any third party.

B. The Contractor shall be a qualified rigger or shall engage the services of a qualified rigger on the job at all times when rigging is being used. The foreman in charge shall have all rigging inspected by the rigger prior to use.

C. The Contractor shall abide by all local, state and federal laws for confined space entry.

D. All colors, unless specified herein, shall be selected by the Owner. The color selected will not necessarily conform to the manufacturer's color chart and any tinting required shall be done by the paint manufacturer to conform to the approved sample.

E. Only non-lead-based pigmentation shall be allowed for both interior and exterior primers and top coats.

1.6 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 – “Submittals”:

1. Product Data: Submit manufacturer's product data for each coating, including generic description, product line number, complete technical data, surface

preparation, and application instructions.

2. Product Data: Submit technical data sheets for each coating, giving descriptive data. Curing times, mixing, thinning, and application requirements.

    a. Provide material analysis, including vehicle type and percentage by weight and by volume of vehicle, resin and pigment.
    b. Provide upon request of the Engineer, specific ASTM Performance Criteria for the submitted materials.

3. Product Data: Provide verification from the coating manufacturer that the interior coatings to be in contact with potable water do not contain any of the following Per- and Polyfluoroalkyl Substances (PFAS):

    a. Properfluorooctanoic acid (PFOA);
    b. Perfluorooctane sulfonic acid (PFOS);
    c. Perfluorononanoic acid (PFNA);
    d. Hexafluoropropylene oxide dimer acid (HFPO-DA, GenX Chemicals);
    e. Perfluorohexane sulfonic acid (PFHxS); and
    f. Perfluorobutane sulfonic acid (PFBS).

4. Product Data: Submit manufacturer's Safety Data Sheets (SDS) and other safety requirements.

5. Color Samples: Submit manufacturer's color samples showing full range of standard colors.

    a. Submit three (3) samples of each coating and color selected, showing bare, prepared surface and each successive coat.
    b. Samples shall be submitted on hardboard or metal as appropriate to coating system (size not less then 5" x 11"). Label samples on back identifying manufacturer, product name, and color number.

6. Manufacturer's Quality Assurance: Submit manufacturer's certification that coatings comply with specified requirements and are suitable for intended application.

7. Applicator's Quality Assurance: Submit list of a minimum of twenty (20) completed projects of similar size and complexity to this Work. Include for each project, including projects where the specified coating system has been successfully applied.

    a. Project name and location.
    b. Name of Owner.
    c. Name of Contractor.
    d. Name of Engineer.
    e. Name of coating manufacturer.
    f. Approximate area of coatings applied.
    g. Date of completion.

8. Applicator's Quality Assurance: Provide certification that specialized equipment as may be required by manufacturer for proper application of coating materials shall be utilized.

9. Warranty:

    a. Submit manufacturer's 15-year corrosion, color, and gloss warranty for the exterior coating system.
    b. Submit manufacturer's 10-year corrosion, color, and gloss warranty for the interior coating system.

10. Containment system design details including materials of construction, methods of support, and any other equipment or appurtenances that is required for the stability and maintenance of the containment system.

11. Worker safety plan as it pertains to the OSHA and environmental regulations associated with confined space entry; air emissions associated with cleaning, blasting, or painting operations; and residual blast waste handling.

12. A plan for providing adequate cross ventilation and containment during any welding, abrasive blasting, painting and curing of the interior of the tank.

13. A certified test report shall be submitted indicating results from the dry film thickness and holiday tests.

14. A plan for chlorinating method to be used shall be submitted with the calculation for the amount of chlorine to be added to the tank.

B. Pre-Installation meetings:

1. Schedule a conference and inspection to be held on-site before field application of coating systems begins.

2. Conference shall be attended by Contractor, Engineer, Owner's representative, coating applicators and a representative from the coating material manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying:

1. Coating or material name.
2. Manufacturer.
3. Color name and number.
4. Batch or lot number.
5. Date of manufacture.
6. Mixing and thinning instructions.

B. Storage:

1. Store materials in a clean dry area and within temperature range in accordance with manufacturer's instructions.
2. Keep containers sealed until ready for use.
3. Do not use materials beyond manufacturer's shelf life limits.
4. Comply with all health and fire safety regulations.

C. Handling: Protect materials during handling and application to prevent damage or contamination.

1.8 ADDITIONAL REQUIREMENTS

A. Weather:

1. Air and Surface Temperatures: Prepare surfaces and apply and cure coatings within air and surface temperature range in strict accordance with manufacturer's instructions.

2. Surface Temperature: Minimum of 5 degrees F (3 degrees C) above dew point, or in accordance with manufacturer's instructions if more stringent.

3. Relative Humidity: Prepare surfaces and apply and cure coatings within relative humidity range in accordance with manufacturer's instructions.

4. Precipitation: Do not prepare surfaces or apply coatings in rain, snow, fog, or mist.

5. Wind: Do not spray coatings if wind velocity is above manufacturer's limit.

B. Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with AWWA D102.

C. Dust and Contaminants:

1. Schedule coating work to avoid excessive dust and airborne contaminants.

2. Protect work areas from excessive dust and airborne contaminants during coating application and curing.

3. The Contractor shall furnish all materials, equipment and labor for the design, fabrication, and erection of a Class 1A containment system for the containment and management of abrasive blast residuals in accordance with SSPC Guide 6 (Con). This temporary system shall include all suitable dust collectors, ventilators, decontamination trailers, air quality monitors, personal monitors, and any other incidental equipment necessary for the safe and effective removal of lead-based paints.

4. Work to be performed in accordance with RIDEM regulations for fugitive dust

(250-RICR-120-05-5).

D. Existing Conditions

1. Phillip J. Holton Service Water Tank
   a. Constructed in 1959
   b. Last Painted – 1990s
   c. Last Inspected – May 2022
   d. Exterior and interior paint chip analysis performed by Phoenix Environmental Laboratories in June 2022 confirmed that lead is present in the exterior and interior coatings.

E. Worker Protection

1. Contractor shall be responsible for all employee health and safety in accordance with Federal, State and local requirements.

2. Contractor will conform to the applicable OSHA requirements for the workers' protection as stipulated in 29CFR 1910.1025. Sanitary facilities shall include change rooms and shower facilities.

3. Shower facilities shall be those specifically designed for decontamination purposes and shall be equipped with a wastewater filtration system rendering wastewater non-hazardous. The Contractor shall maintain the filtration system in accordance with manufacturer's instructions and shall properly dispose of all filtered residuals and spent filter media.

4. The Contractor shall monitor the concentrations of lead with suitable air monitoring devices relative to the permissible exposure limits and the action levels associated with worker protection.

5. The Contractor shall provide OSHA approved respiratory and other protective equipment for worker protection during the cleaning and blasting operations required for this project. Protective clothing may be required if lead concentrations exceed the action or permissible levels of lead concentrations.

6. Contractor shall certify to the Owner that all employees or other subcontractor employees, as applicable, are medically qualified to perform the proposed tank cleaning and associated lead paint removal work, and that there are no pre-existing medical conditions relating to lead exposure.

7. The Contractor shall furnish and display appropriate warning signs in the designated work areas when the lead exposure levels exceed the permissible exposure limits in accordance with OSHA and State Health regulations.

PART 2 PRODUCTS

2.1 GENERAL

A. All tank painting shall be in accordance with the latest edition of AWWA D102, the Steel Structures Painting Council Specification SSPC-PA1, approved paint manufacturer specifications, and as specified herein.

B. Each paint system shall be from a single manufacturer. Materials specified are those that have been evaluated for the specific service. Products of the Tnemec Company, Inc. are listed to establish a standard of performance and quality. Equivalent materials of other manufacturer's may be submitted on written approval of the Engineer. Requests for substitution shall include manufacturer's literature for each product giving name, product number, generic type, descriptive information, solids by volume, recommended dry film thickness and certified lab test reports showing results to equal the performance criteria of the products specified herein. In addition, a list of a minimum 15 water tank projects located in the New England Region in the last 10 years shall be submitted in which each product has been used and rendered satisfactory service.

C. All paint systems shall be environmentally (VOC) compliant in accordance with all Federal and Rhode Island regulations and the latest OTC (Ozone Transport Commission) VOC regulations.

D. The interior paint system shall conform to Inside Coating System No. 5 as defined in AWWA D102 and shall be NSF approved. The Rhode Island Department of Health has a zero (0) VOC extractable requirement for potable water in contact with new lining systems. The interior finish lining shall be 100% solids by volume and contain no Xylene, Xylol and/or MEK solvents.

E. All materials in contact with potable water shall not contain the following per- and polyfluoroalkyl substances (PFAS):

1. Properfluorooctanoic acid (PFOA);
2. Perfluorooctane sulfonic acid (PFOS);
3. Perfluorononanoic acid (PFNA);
4. Hexafluoropropylene oxide dimer acid (HFPO-DA, GenX Chemicals);
5. Perfluorohexane sulfonic acid (PFHxS); and
6. Perfluorobutane sulfonic acid (PFBS).

F. The exterior paint system shall conform to Outside Coating System No. 4 or No. 6 as defined in AWWA D102.

G. "Or Equivalent": The Contractor shall furnish the required exterior and interior painting systems as specified herein. All paint coating and other related products, such as solvents and thinners, shall be supplied by the same paint manufacturer. The specified painting systems are based on products manufactured by the Tnemec Company in Kansas City, Missouri. "Or Equivalent" systems may be considered as an alternative product.

2.2 EXTERIOR COATING SYSTEM

A. The exterior coating system shall be a three-coat zinc, epoxy, polyurethane, and fluoropolymer coating system applied to all exterior surfaces of the tank, including all appurtenances such as railings, columns, structural support systems and members,

overflow pipe, steel riser pipe, vent pipes, vents, frames, hatch covers, ladders, ladder safety cage, panels, cabinets, etc.

B. Coating System (product and dry film thickness):

Surface Preparation:	SSPC-SP-6 to Commercial Blast Standard	
First Coat:	Tnemec Series 94-H_20 Hydro-Zinc	2.5-3.5 mils
Stripe Coat:	Tnemec Series 21 Epoxoline	3.0-3.5 mils
Third Coat:	Tnemec Series 1095 Endura-shield (100g/litre)	2.5-3.0 mils
Fourth Coat:	Tnemec Series V701 HydroFlon (100g/litre)	2.5-3.0 mils

C. No substitutions from the specified coating system will be allowed.

D. Stripe coat shall be applied to weld seams and leading edges.

E. The finish color of the top coat for the tank shall be selected by the Owner.

F. Furnish to the Owner two (2) gallons of exterior top coat of the same type and color used on the work.

2.3 INTERIOR COATING SYSTEM

A. The interior coatings shall be a urethane zinc rich primer followed by a one-coat (plus stripe coat) epoxy coating system applied to all interior surfaces of the tank including the floor, roof, hatches, column pipe, steel riser pipe, structural support systems, and other appurtenances.

B. Coating System (product and dry film thickness):

Surface Preparation:	SSPC-SP-10 to Near-White Standard	
First Coat:	Tnemec Series 94-H_20 Hydro-Zinc	2.5-4.0 mils
Pit Filling:	Tnemec Series 215 Surfacing Epoxy, as required	
Stripe Coat:	Tnemec Series 21 Epoxoline	3.0-4.0 mils
Finish Coat:	Apply ONE full finish coat of Tnemic Series FC22 Epoxoline, WH08-White	25-30 mils

C. No substitutions from the specified coating system will be allowed.

D. Pit filling shall be completed with Tnemec Series 215 Surfacer or approved equivalent.

E. Stripe coat shall be applied to weld seams and leading edges at 3.0-4.0 mils DFT.

F. Interior ceiling weld seam openings shall be sealed with De-Neef DeneSeal P-2235 100% solids and shall be an NSF 600 Standard Sealant.

2.4 DEHUMIDIFICATION AND HEATING

A. As required to perform the work within the paint manufacturers specifications or other

project requirements, the Contractor shall furnish and maintain on site a dehumidification and indirect hot-air heating system that is capable of maintaining a controlled atmosphere for the interior of the tank during the surface preparation, coating application procedures, and full cure of the interior coating system. The systems shall include all equipment, materials, labor, and power supply for operation. The specified surface preparation standard (SSPC SP 10) must be maintained with the use of this equipment. While this equipment is in use, and prior to coating, should the surface preparation quality fall below the specified standard, the Contractor shall re-clean the affected surfaces, at his own expense, to the specified standard prior to coating. The Contractor shall utilize dehumidification and heating equipment to maintain minimum surface temperatures and minimum dew point requirements for the interior coating system on an as needed basis throughout the application and cure-to-immersion service time frames, as established by the coating manufacturer.

B. The Contractor shall submit detailed information to include the manufacturer of the unit, dimensions, power requirements, flow rates, and moisture removal.

C. The Contractor shall submit a plan indicating the location of all proposed equipment.

PART 3 EXECUTION

3.1 GENERAL

A. After the tank has been drained, Contractor shall ensure that all sediment has been removed from the tank floor and inlet/outlet piping, as necessary and determined by the Engineer.

B. No paint shall be applied when the temperature of the surface to be painted is below the minimum temperature specified by the paint manufacturer, or less than 5 degrees above the dew point temperature. Paint shall not be applied to wet or damp surfaces or when the relative humidity exceeds 85%. Follow paint manufacturer’s recommendations for the specific paint system used.

C. The Contractor shall remove and legally dispose of all sediment, including the debris from the tank interior visible after the tank has been drained, prior to any coating.

D. Before painting, remove slag, weld metal splatter and sharp edges by chipping or grinding. All surfaces that have been welded, abraded or otherwise damaged shall be cleaned and primed in the field in accordance with the paint system requirements.

E. All areas blasted in the field shall be coated the same day before any oxidation occurs.

F. Take precautionary measures to prevent fire hazards and spontaneous combustions. Remove empty paint containers from site.

G. Place cotton waste, cloths, and hazardous material in containers, and remove from site daily.

H. Protect elements surrounding work of this section from damage or disfiguration.

I. During application of coating materials, post 'Wet Paint' signs.

J. During application of solvent based materials, post 'No Smoking' signs.

3.2 EXAMINATION

A. Site Verification of Conditions:

1. Examine areas and conditions under which application of coating systems shall be performed for conditions that will adversely affect execution, permanence, or quality of coating system application.

2. Correct conditions detrimental to timely and proper execution of Work.

3. Do not proceed until unsatisfactory conditions have been corrected.

4. Commencement of installation constitutes acceptance of conditions and responsibility for satisfactory performance.

3.3 TANK DRAINING COORDINATION

A. Owner will be responsible for draining the elevated water storage tank. The Contractor shall pump out and remove any remaining water within the bottom of the tank and remove any sediment as part of the initial cleaning of the tank's interior.

3.4 SITE MOBILIZATION AND PREPARATION

A. The Contractor may be required to temporarily remove any existing chain-link fence around the tanks to facilitate the installation of the proper containment system required for the performance of the contract work.The Contractor shall make this determination during the bidding phase at the time of the site examination in order to include the cost of the temporary removal and re-attachment of the existing chain-linking fencing, if required, upon completion of the contract work.

B. Contractor shall complete any site clearing or tree trimming necessary to perform the project scope of work.

C. The Contractor shall furnish and install other temporary fencing around the limit of work, including staging areas for equipment and stored materials around the immediate grounds, to secure the work and equipment during the course of the contract.

D. The Contractor shall adjust scaffolding as required to protect existing enclosures and antennas that are to remain.

3.5 PREPARATION

A. Interior surfaces shall be abrasive blast cleaned in accordance with SSPC SP-10, Near-White Blast Cleaning. Exterior surfaces shall be abrasive blast cleaned in accordance with SSPC-SP-6, Commercial Blast Cleaning. Entire tank exterior must be shrouded during abrasive blast cleaning. The coatings to be removed contain lead, therefore acceptable coating removal methods include wet abrasive blast cleaning, water jetting with or without abrasives, vacuum abrasive blast cleaning, and chemical stripping.Certain coating removal methods require subsequent dry abrasive blasting to achieve the specified surface preparation. Should these methods be selected, the Contractor shall ensure that no fugitive dust escapes the containment system during dry abrasive blasting. This is to be accomplished by the use of negative air and/or dust collection systems adequately sized to effectively control dust.

B. The ground surface shall be protected from exposure to water and debris from surface preparation.Paint chips and water to be collected and disposed offsite in accordance with applicable laws and regulations.

C. It is acknowledged that the water storage tank was painted with lead-based paint. As such, it is possible that over time, this paint may have contaminated the soils surrounding the tank. However, it is expected that the Contractor follow the specifications and take all reasonable measures to protect the surrounding soils from impacts due to the surface preparation and painting of the water tanks.

D. Surface preparation shall not be done simultaneously with priming. An entire area or section shall be cleaned and inspected by the Engineer before primer is applied to that area.No primer is to be applied until the entire area has been viewed and approved by the Engineer. Any defect not properly cleaned as specified will be cause for rejection of the entire area in question and no priming shall be done on this area until satisfactory corrections are made and approved by the Engineer.

E. The blast cleaning procedure shall use angular grit abrasive. The size and gradation shall be such as to produce a 2.0-3.0 mils angular anchor profile that is sharp and clean with no embedded spent abrasive material.

F. The abrasive blast cleaning shall be effective in removing corrosion deposits and scale as defined in the surface preparation SSPC SP-10 specification and as shown in the visual standards SSPC Vis-1.

G. Maintain ambient conditions prior to, during the coating application, and through full cure to immersion service for the interior painting process. The use of dehumidification and heating equipment shall be required to maintain the coating manufacturer’s minimum curing conditions criteria.

H. Surface Preparation:

1. General Requirements:

a. Prior to application of primer, surfaces shall be prepared to receive specified coating system in compliance with manufacturer's

recommendations and specifications of Steel Structures Painting Council (SSPC).

b. Clean surfaces of residual deposits of grease, scale, rust, oil, dirt, and other foreign matter, immediately prior to priming. Surfaces to be coated shall be clean, dry, smooth and free from dust and foreign matter which will adversely affect adhesion or appearance.

2. Ferrous Metal Surfaces:

a. Surfaces shall be free of residual deposits of grease, rust, scale, dirt, dust, and oil.

b. Surfaces shall be cleaned in compliance with specifications of Steel Structures Painting Council.

I. The Contractor shall repair all pitted areas of the tank surfaces that show loss of 35% or more of existing plate thickness and/or any areas of severe undercut or reduction of weldment below the surface of the shell plates, or as directed by the Engineer. Pitted areas of the tank surfaces that show loss of 50% or more of the existing plate thickness or areas on the tank that are concentrated with pits shall be repaired by an approved welding method, such as plating. All pits and plating shall be welded in such a manner as to ensure 100% fusion with the parent metal and to bring pits or plating flush with original plate surface. All pits and plating shall be free of surface porosity and ground flush to ensure continuity of the applied coatings. All welding will be at the direction of the on-site inspector and is to be in accordance with AWWA D-100 Standards, latest revision thereof.

J. Pit welded areas are to be re-cleaned and spot blasted prior to applying coating systems. Surfaces that are damaged by pit welding shall be sand blasted and spot painted to match surrounding undamaged surfaces.

3.6 ABRASIVE BLASTING RESIDUAL WASTE PROVISIONS

A. General: The Contractor is responsible for the collection, handling, storage, testing and legal disposal of the abrasive blasting materials and residual waste generated as part of the tank rehabilitation. The cost for transporting and legal disposal of materials categorized as hazardous waste shall be paid as bid items 4 and 5 (Blast/Paint Exterior Coating System, Blast/Paint Interior Coating System) as shown in the Bid Form of these Contract Specifications.

B. The Contractor shall collect all abrasive blasting residual waste daily. These residuals shall be collected using a vacuum system with suitable HEPA filters. Blast residuals shall be stored in suitable storage containers in accordance with federal and state regulations and be properly secured and protected within the enclosed project area.

3.7 APPLICATION

A. All coatings materials shall be stored, mixed, applied and cured within ambient temperature ranges identified by the painting manufacturer. Application and curing shall

also be accomplished within the relative humidity range. Natural ambient conditions for curing periods shall be anticipated by the Contractor and have Engineer's approval.

B. No coating work shall be done if the ambient temperatures (air, coating materials and substrate) are not within the allowable ranges unless the Contractor is able to control these conditions using effective equipment.

C. The coating materials shall be applied in strict accordance with the respective coating manufacturer's written recommendations.

D. Spot field prime coat materials shall be applied to the surface after blast cleaning before any rust back occurs or before the end of each day of surface preparation effort, whichever comes first.

E. The full intermediate prime coat shall be applied to the entire tank surface (interior and exterior). Unprimed areas, abraded areas and areas considered in an advanced state of deterioration by the Engineer shall be blast cleaned and the remaining shop primed areas shall be brush cleaned prior to application of the full intermediate prime coat.

F. Spray guns shall be held perpendicular to the surface being coated in such a manner that all dry overspray is kept at a minimum. All spray application of coatings shall utilize a cross spray technique to maximize coverage of all irregular surfaces.

G. All coating material for interior surfaces shall be applied by airless spray equipment of a type and size suitable for the respective material. Coating material shall be applied around rivets, welds, edges and inside angles by use of a brush.

H. All coating material for exterior surfaces shall be applied by brush, roller or airless spray equipment of a type and size suitable for the respective material. Use of airless spray equipment shall be allowed only if adequate containment is provided to minimize overspray and emissions to the surrounding areas meeting the approval of the Engineer. Application of prime coat to the base and six inches up the side walls shall be by brush, as well as to all rivets, welds, edges and inside angles to ensure proper coverage and application.

I. After surface preparation, interior weld seams, leading edges and nut and bolt assemblies shall be “stripe-coated” by brush method with one coat of primer. Application may be performed prior to or following the application of the full prime coat on prepared surfaces. “Stripe-coat” shall be the same as the full prime coat but be a contrasting color for inspection purposes.

J. Make edges of paint adjoining other materials or colors sharp and clean, without overlapping.

K. Apply coatings in accordance with manufacturer's instructions.

L. Mix and thin coatings, including multi-component materials, in accordance with manufacturer’s instructions.

M. Keep containers closed when not in use to avoid contamination.

N. Do not use mixed coatings beyond pot life limits.

O. Use application equipment, tools, pressure settings, and techniques in accordance with manufacturer's instructions.

P. Uniformly apply coatings at spreading rate required to achieve specified DFT.

Q. Apply coatings to be free of film characteristics or defects that would adversely affect performance or appearance of coating systems.

R. Stripe paint with brush critical locations on steel such as welds, corners, and edges using specified primer.

S. The exterior prime coat is the only coat that will be permitted to be sprayed. The other coats on the tank exterior must be applied by roller. Paint application methods shall be approved by the Engineer.

3.8 VENTILATION

A. During application of coatings inside the tank, adequate ventilation shall be provided, and all equipment shall be nonsparking and explosion-proof. Necessary precautions shall be taken to ensure safe working conditions are maintained during use of paints which contain toxic and flammable solvents.

B. Effectiveness of the ventilation system shall be checked by making periodic explosive meter readings, in which the concentration of volatile material shall not exceed 20 percent of the lower explosive limit.

C. Continuous forced ventilation at a rate of at least one complete air change every 4 hours shall be provided for at least 48 hours after coating application is completely cured in accordance with the paint manufacturer's recommendations. Tank manholes shall be kept open for an additional 7 days. The Contractor may use heat to obtain proper curing and to ensure that the painting is completed within the project schedule.

3.9 CONTAINMENT SYSTEMS

A. General

1. A containment system will be employed at this tank site that meets the Class 1A Standard as outlined within the SSPC-SP Guide 6 (Guide for Containing Surface Preparation Debris Generated During Paint Preparation Operations). This may be accomplished by modular containment systems that isolate work areas or by encapsulating the entire tank.

2. The Contractor shall be fully responsible for the design and support system associated with the containment system. Full decking and associated handrails are required at each work level and stairs and handrails are required as per

OSHA regulations.

3. Engineered drawings of the scaffold and containment complying with OSHA regulations and stamped by a Registered Professional Structural Engineer licensed in the State of Rhode Island.

4. The scaffold design shall be such that no excessive loads or forces are applied to the tank, which could cause damage during various weather conditions that could be experienced while the scaffold/containment system is in place. The Contractor shall spread the load of the roof containment system over a large area to eliminate any steel deflection greater than 1-inch. The scaffolding/containment design is to include the weight of containment materials and decking as well as all cell coax cables and antennae.

5. Scaffolding system shall be designed and installed in accordance with OSHA 1926.

6. The Containment structure shall be properly grounded.

7. Cost for hazardous material collection, storage and disposal will be included in the Base Bid and all lead-based waste material will be handled in accordance with all State and Federal requirements.

B. Air Quality Monitoring

1. During the surface preparation phase on the tank's exterior, air quality monitoring shall be conducted. The Contractor shall pay for the services of a State licensed testing laboratory to set up, monitor, maintain, and remove air quality monitoring stations at the tank site.

2. The air quality monitoring will be used to determine the background air quality before work commences, during the blasting and substrate preparation period and upon completion of the surface preparation.

3. If during the monitoring of air quality, the data collected indicates that a breach of containment occurred, and material escaped the containment area the Contractor will be responsible for all cleanup costs necessary to return the affected area to its original condition.

4. In addition to the initial air quality monitoring with instruments, if during the daily observations dust or debris is seen escaping the containment area by the Engineer, the work shall be halted to correct the problem.

3.10 ACCEPTANCE

A. The base for acceptance of the coating work are listed below. Deviations beyond these parameters shall, at the Engineer's discretion, be corrected by the Contractor at his own

expense and in accordance with the manufacturer's recommendations.

1. No runs or sags
2. No overspray or roughness
3. No holidays or pinholes
4. No color or gloss variations
5. Allowable film thickness +2.0 mils over specified thickness.

B. Wet and dry film thickness measurements shall be made for each 100 square feet of surface painted. Additional coats shall be applied as required to attain the minimum dry film thickness specified for the painting system.

C. The paint on all interior surfaces below the overflow shall be tested with a High Voltage holiday detector after the paint has cured for at least 5 days. The holiday testing shall be in accordance with NACE SP0188-2016. Locations where holidays are detected shall be repaired and retested.

3.11 REPAIR

A. Damaged Materials: Repair or replace damaged materials and surfaces not scheduled to be coated.

B. Damaged Coatings: Touch-up or repair damaged coatings. Touch-up of minor damage shall be acceptable where result is not visibly different from adjacent surfaces. Recoat entire surface where touch-up result is visibly different, either in sheen, texture, or color.

C. Coating Defects: Repair in accordance with manufacturer’s instructions coatings that exhibit film characteristics or defects that would adversely affect performance or appearance of coating systems.

3.12 CLEANING

A. At completion of day’s work, remove from site rubbish and accumulated materials.

B. Leave storage area clean and in same condition indicated for equivalent spaces in Project.

C. The Contractor shall at all times keep the premises free from accumulation of waste materials and rubbish caused by his employees or work. At the completion of the painting, the Contractor shall remove all tools, scaffolding, surplus materials, and rubbish from and about the tanks.

3.13 WASTE MANAGEMENT

A. Place materials defined as hazardous or toxic waste in designated containers.

B. Do not dispose of paints or solvents by pouring on the ground. Place in designated containers for proper disposal.

C. Contractor shall be responsible for all costs associated with containment, sediment and waste disposal that may result from execution of this project.

3.14 FIRST ANNIVERSARY INSPECTION

A. The Contractor shall perform a first anniversary inspection of the tank and make repairs to the paint system in accordance with AWWA D102.

B. Contractor shall inspect the interior tank by means of a human licensed underwater diver. The inspection shall be documented via photographs and video recording.

C. The Contractor shall coordinate and schedule the inspection with the Owner and provide at least 30 days advance notice.

END OF SECTION

DIVISION 11

EQUIPMENT

SECTION 11200 WATER STORAGE TANK APPURTENANCES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section pertains to the replacement of select structural components and appurtenances to the existing service water tank.

1.2 SUBMITTALS

A. Product Data: Include rated capacities, accessories, appurtenances, and furnished specialties for all tank rehabilitation items.

B. Shop Drawings: Signed and sealed by a Professional Engineer registered in the State of Rhode Island. Show fabrication and installation details for all tank rehabilitation items, including the following:

1. Plans, elevations, sections, details, and attachments to other work.
2. Structural analysis data signed and sealed by the Professional Engineer registered in the State of Rhode Island responsible for their preparation.

C. Welding certificates.

D. See Section 01300 – Submittal Requirements for other contract submittal requirements.

1.3 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code--Steel."
2. AWS D1.3, "Structural Welding Code--Sheet Steel."

B. Pipe Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

PART 2 - PRODUCTS

2.1 PAINT MATERIALS

A. See Section 09970 – Steel Water Storage Tank Painting, for painting and material requirements.

2.2 ROOF VENT

A. A properly sized aluminum vent assembly shall be furnished and installed to replace the existing roof vents. Each vent shall conform to AWWA D100 and vent shall open downward and be fitted with four mesh outer and twenty-four mesh inner non-corrodible screens. Roof vent model shall be Model SD 18-24 (18” OD x 24” tall weld-in vent stack) as manufactured by Tomcat Consultants/T.A.P Co. of Rosebud, MO, or approved equivalent.

Each vent shall be installed along with an adequately sized short weld-in vent stack with bolt flange, as manufactured by Tomcat Consultants/T.A.P. Co of Rosebud, MO.

2.3 OVERFLOW

A. Existing overflow pipe on the existing service water tank shall be modified as shown on the drawings. Overflow pipe extension shall be 8" in diameter. Overflow pipe shall be schedule 40 carbon steel pipe and have a minimum wall thickness of ¼". The new overflow pipe shall extend from the end of the existing overflow pipe down the exterior of the tank terminated approximately 20" above grade and discharge onto a concrete splash pad. The point of discharge shall have a 90° bend and be equipped with a 24-mesh Type 316 stainless steel screen and a weighted flap valve.

2.4 WEIGHTED FLAP VALVE

A. The flap valve shall have a cast iron body and cover. The valve shall have resilient to bronze seats and the hinge pin and cotter pins shall be stainless steel.
B. The valve shall be constructed with a 10° offset from vertical to ensure positive closure. The weighted flap shall have a weight attached to the lid and allow adjustment.
C. The valve lid shall have a mechanical stop to ensure the lid cannot over rotate.
D. The flange shall be drilled using ANSI 125# template.
E. All iron parts shall be coasted with a two-part epoxy with 3-4 mils dry film thickness to prevent rusting or corrosion.
F. The valve shall be machined, assembled, and tested in the USA for quality assurance.
G. The manufacturer shall show proof of ISO 9001:2008 certification.
H. The valve and accessories shall be manufactured by Troy Valve, Model A2540, or approved equivalent.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION OF NEW TANK COMPONENTS

A. See Section 09970 – Steel Water Storage Tank Painting for surface requirements.

B. Field Cleaning: After completion of tank structural appurtenances, remove burrs, dirt, and construction debris and repair damaged finishes. Remove weld splatter, sharp edges on weld seams, scabs and slivers by grinding. Remove weld flux, slag, fins, and laminations.

C. Field Surface Preparation: After field cleaning, prepare steel surfaces where shop prime coat has been damaged according to the Specifications listed above for shop cleaning, and remove dust or residue from cleaned surfaces.

D. If surface develops rust before prime coat is applied, repeat field surface preparation.

3.2 FIELD PAINTING

A. See Section 09970 – Steel Water Storage Tank Painting of these Contract Specifications.

3.3 FIELD QUALITY CONTROL

A. Testing: The Contractor, overseen by the Engineer, will engage a qualified testing agency to perform the following field quality control testing:

1. Tank Weld Test: See Specification Section 05120 – Structural Steel Framing for weld testing provisions.
2. Leakage Test: See Specification Section 02510 – Leakage Detection for leakage and other final testing associated with completed tank restoration.

B. Remove and replace malfunctioning units and retest as specified above.

3.4 CLEANING AND DISINFECTION

A. See Section 09970 – Steel Water Storage Tank Painting and Section 02511 – Disinfection of Water Utility Storage Tanks for final cleaning and disinfection requirements of the elevated storage tank upon completion of restoration and painting work.

END OF SECTION

APPENDIX A

PROVIDENCE WATER SERVICE WATER TANK INSPECTION REPORT

Interior and Exterior Inspection Report
Philip J. Horton - Elevated Tank
CorrTech Report No. 15746-FOR-01-1

Prepared For:

Providence Water Supply Board
125 Dupont Drive
Providence, RI 02907

CORRTECH
CORROSION UNDERSTOOD

25 South Street
Hopkinton, MA 01748

6/3/2022

STATEMENT OF LIMITATION

Conclusions presented in this document are based on the services described and performed and not on tasks or procedures beyond the scope of the contracted services or time and budgetary constraints imposed by contract limitations.

CorrTech, Inc. has performed this assessment in a professional manner using the degree of skill and care exercised for similar projects under similar conditions by reputable and competent consultants, and in accordance with the procedures established within CorrTech's quality assurance, quality control protocol.

CorrTech, Inc. shall not be responsible for conditions or consequences arising from relevant facts that were concealed, withheld or not fully disclosed at the time the evaluation was performed.

Report Prepared by: Max Miezejeski
Corrosion Technician

Report Reviewed by: Gary M. Roberts
Project Manager

TABLE OF CONTENTS

INTRODUCTION

On May 20, 2022, CorrTech representatives, Max Miezejeski, Scott Leighton, and Sanskriti Tripathi performed a corrosion and structural assessment of the exterior and interior of a drinking water storage tank for Providence Water Supply Board. The inspection was conducted to establish the current condition of the tank's coatings and steel substrate. The tank inspected included:

Philip J. Holton WTP 40,000-gallon Elevated Tank

For applicable standards used in this inspection, please see below.

The interior of the reservoir was inspected with the TankRover remotely operated vehicle, while full. The TankRover is the only piece of equipment like it in the United States and was developed by CorrTech. By using the TankRover the interior of the tank was inspected with no special preparation, confined space entry, no additional disinfection and no downtime.

The TankRover is equipped with a surface-cleaning tool used to remove loose rust or debris in order to view the potential metal loss under the coating. The unit has high-powered thrusters, which are used to maneuver throughout the tank and are used to wash away bottom sediment for observations. Video is recorded with audio narration on site with digital stills captured for the report.

The TankRover and all tether were prepared for the inspection by disinfecting equipment with a 200 ppm chlorine spray in accordance with AWWA C652.

The exterior portions of the tank were inspected by walking the roof and shell portions that were accessible from the ground.

The objectives of the assessment were to:

1. Perform field inspections and tests to assess the structural integrity of the tank.
2. Assess condition of any protective coatings present
3. Review the safety compliance of tank ladders and access.
4. Review sanitary protection equipment
5. Provide recommendations for rehabilitation.

APPLICABLE STANDARDS

- American Water Works Association (AWWA) Standard D100, Welded Carbon Steel Tanks for Water Storage
- AWWA Standard D101, Inspecting Steel Tanks, Standpipes, Reservoirs, and Elevated Tanks for Water Storage
- AWWA Standard D106, Sacrificial Anode Cathodic Protection Systems for the Interior submerged Surfaces of Steel Water Storage Tanks
- AWWA Standard D652, Disinfection of Water Storage Facilities
- AWWA Manual M42, Steel Water Storage Tanks
- Rhode Island Department of Public Heath Regulation R46-13-DWQ, Rules and Regulations Pertaining to Public Drinking Water

EXECUTIVE SUMMARY

The condition and recommendations for the tank are briefly summarized in this section. For detailed information regarding tank conditions and specific recommendations please refer to the designated section for the tank.

The exterior coating was in poor condition with significant delamination along the bottom of the legs and risers. More moderate delamination was observed on the shell and roof of the tank.

The interior was in better condition with only localized areas of corrosion along the weld seams of patch plates. The six (6) anodes installed in the tank were intact and potential readings indicated that they were protecting the interior submerged surfaces.

The following recommendations are included in this report:

- Install an AWWA complaint pressure/vacuum vent
- Install a gasket on the roof hatch
- Modify the overflow pipe so that it discharged 16-in. to 24-in. above grade
- Install a splash pad under the modified overflow pipe, once complete
- Modify the roof railings to meet current OSHA standards
- Install a self-closing swing gate at the top of the ladder
- Recoat the tank exterior surfaces
- Clean tank foundation pads and make repairs, as necessary
- Conduct the next tank inspection in 2027

TANK DATA FOR PHILIP J. HOLTON SERVICE TANK

Site Information	Fencing In Place:	Yes						Locks on Gates:	Yes		
Address:	61 N Rd, Hope, Road							Vault Lock in Place:	N/A		
Tank Information	Tank Name:	Philip J. Holton Service Water Tank						Tank Diameter:	24 -ft		
Tank Height:	10-ft	Tank Capacity:	40,000			Previous Cleaning Date:			Unknown		
Previous Inspect. Date:	2014					Previous Coating Application:			Unknown		
Foundation	Height:	5-in	Adequate Drainage:	Yes				Chime Plate Size:	N/A		
# of Anchors:	4	Anchor Bolt Diameter:	1-in					Chair Thickness	0.5-in		
Anchor Chair Dimensions:	3-in x 3-in										
Shell Manhole	# of Manholes	1				Dimensions:		18 x 14-in			
Ladder	Height from Ground:	10-ft						Safety Cage:	Yes		
Anti Climb Lock :	Yes					Climbing Safety System Style:		Rail			
Rung to Rung Dim:	12-in	Distance from Shell:	11-in					Width:	14-in		
Overflow	Diameter:	8-in	Air Gap	Approx. 68-ft				Overflow Protection	Screen		
Screen Condition:	Intact	Screen Type:	Coarse					Splash Pad	No		
Roof Hatch	Dimensions:	24 x 24-in				Sanitary Neck		4-in.			
# of Hatches:	1	Hatch Cover Overlap	2-in					Lock	Yes		
Roof Vent	Style:	Mushroom				Diameter:		8-in			
Cap to Roof Distance:	10-in	Screen Condition:	Damaged					Type:	Coarse		
Roof Handrail Hts	Top Rail:	37-in	Mid Rail:	19-in				Toe Kick Plate:	4-in		
Interior	Sediment Depth:	2-3-in around riser				Sediment Coverage:		10%			
Inlet/Outlet Pipe:	Combined		Sediment Ring:			Yes					
Interior Ladder	Climbing Safety System:		None			Style:		Fixed			
Columns:	No		Column Number:		N/A		Interior Column Style		N/A		

OBSERVATIONS

Photos provided in the report were created from a digital camera and interior pictures were captured in digital format from the interior video. The interior images are as clear as our printed technology will allow. The copies in the report provide a reference for our comments. Keep in mind that for underwater video snaps, the video provides the greatest detail and should be viewed as part of the report.

Narration on the video is done in the field and some of the comments may be different than the written report.

TESTING

Cathodic Protection Survey

This tank was equipped with six (6) sacrificial anodes, three (3) at the bottom of the bowl around the riser pipe, and three (3) attached to the ladder inside the riser pipe. A silver/silver chloride reference electrode was lowered into the tank from the roof hatch to collect tank-to-electrolyte potential measurements.

Position	Potential Measurements
Top	-1.1 V
Middle	-1.2 V
Bottom	-1.21 V

All tank-to-electrolyte potential measurements indicate adequate levels of cathodic protection are being provided to submerged steel portions of the tank interior at this time.

Dry Film Thickness Readings

A Positector 6000 gauge was used to take dry film coating thickness readings on the exterior shell and roof. These reading measure the thickness of the paint remaining on the substrate. For complete data, see APPENDIX II.

Location	Number of Readings	Average	Minimum	Maximum
Shell - Batch	45	8.4	5.1	12.4
Roof – Batch	45	11.4	4.2	30.3
Riser/Legs	45	9.8	5.3	19.6

(All measurements taken in mils)

INTERIOR

Roof Structure:

The roof is a self-supporting domed structure. There were no signs of significant metal loss and no visible light penetrations.

Roof Coating:

The coating was mostly intact with corrosion bush and delamination across approximately 5% of the roof plates.

Shell Structure:

There were no signs of deformations, bowing or buckling, in the shell plates. No metal loss was apparent during this inspection.

Shell Coating:

The shell was 99% intact with a few spots of minor corrosion development. There were 4-5 patch plates along the shell and all of them had minor corrosion in some part of their welds.

Floor Structure:

There were no deformations, bowing or buckling, in the floor plates. There were no signs of metal loss.

Sediment:

Sediment has accumulated at the center of the tank around the riser pipe as well as at the bottom of the riser. It is difficult to make an accurate measurement of the sediment depth, but it is estimated to be approximately 2-3-in deep at the center of the tank and roughly 6-in at the bottom of the riser.

Floor Coating:

From what was visible of the floor coating no corrosion or delamination was observed.

Piping:

The inlet and outlet pipes are combined into a single pipe at the bottom of the riser pipe. The pipe had a solid cover on top of it.

EXTERIOR

Foundation:

The concrete foundations for the legs are showing significant spalling and cracking.

Manholes:

There is one manway on the riser pipe. It has moderate corrosion blush around its outer edge and the bolts. The manway neck had significant coating delamination.

Ladder:

The ladder was in acceptable condition to climb, free from any major deformations or corrosion. It was equipped with a safety cage and a rail climb.

Overflow:

The overflow pipe has an internal weir funnel that exits through the top of the shell, goes through the balcony, and discharges immediately below, approximately 68-feet above grade. The overflow was protected with an intact screen.

Shell Coating:

The shell coating was approximately 85% intact with several areas of delamination and some minor biological growth. No significant corrosion was found on the shell.

Roof Hatch:

The hatch was initially blocked by the rotating roof ladder. The ladder was movable, but required significant effort to do so.

The hatch was intact but had no gasket.

Roof Vent:

A mushroom style vent was located at the center of the roof. A coarse screen is present inside of the cap but has been damaged.

Handrails:

Handrails enclose the balcony but there are none on the roof. The handrails do not meet OSHA standards of a top rail height of 42-in. The top rail was measured at 37-in.

Roof Coating:

20% of the roof has corrosion and delamination coverage. Corrosion is mostly focused along the weld seams and is more severe closer to the center of the roof.

RECOMMENDATIONS

The roof vent does not meet current AWWA D100 standard or the generally accepted Ten States standard for sanitary protection. Fine mesh screens are subject to clogging due to freeze up in the winter so a special vent assembly is needed. Vents should be installed which can relieve both a positive or negative pressure should the fine mesh screen become clogged. An AWWA vacuum/pressure relief vent provides for the safe use of insect screen and should be designed for easy inspection and maintenance of the screens.

A gasket should be installed on the roof hatch to provide a sanitary seal.

Overflow pipe needs to be replaced or modified to meet current standards:

Per AWWA D100, the overflow pipe should extend down to within 16-24-in above ground for maintenance and be fitted with a corrosion resistant 24-mesh screen with or without a self-closing flapper cover. Rubber type duck bill check valves can be used in lieu of the flapper cover. Discharge point must be onto a splash pad or drainage structure to prevent erosion of the tank foundation. In areas where freezing is common rubber duckbill check valves may need to be protected against freeze up.

In accordance with the requirements of AWWA D100, overflows must discharge over a drain inlet or splash pad to prevent erosion of material from around the tank. A suitable method of erosion protection should be installed at this site.

During the next tank rehabilitation project modifications to the roof hand railings should be considered to bring the railing into compliance with current OSHA and AWWA requirements. Per AWWA D100 handrails on balconies, around roof hatches and rest platforms are required to be 42-in high with a 21-in high mid-rail and 4-in toe kick. These safety features allow safe access to roof surfaces to safely inspect and maintain vent screens and collect water samples.

Self-Closing Swing Gate

In order to be in compliance with OSHA Standard 1910.23(a)(2) all railing openings or platform pass through openings should be equipped with a self-closing swing gate. Although this standard strictly addresses new construction after November 19, 2018 it is advisable to modify existing tanks with this safety device. If existing ladders are substantially modified or replaced on an existing tank, then this new standard would apply.

Exterior Coating should be replaced:

Tank exterior should be fully blasted and coated in the next 2-3-years using a properly written job specification and certified coating inspection. To ensure longest possible service life from the new coating, contractors should follow the AWWA D102 standard and use a full-time coatings inspector to ensure proper surface preparation and application.

Concrete Foundation Repair Required

Repairs should be made to the exposed portion of the foundation pads due to cracking and spalling that was noted during the inspection. Cracking or spalling of the concrete foundation allows for water intrusion, freeze thaw damage and vegetation intrusion. Long term degradation could lead to structural stability issues. Repairing the concrete foundation with proper materials and techniques will prolong the lifespan of the structure.

Per AWWA guidelines it is recommended that this tank be inspected again in 2027.

Appendix I: Photographs

1) 1-Tank overview

4) 4-Engaged turnbuckle with corrosion blush

2) 2-Site overview

5) 5-Spalling on concrete foundation pad

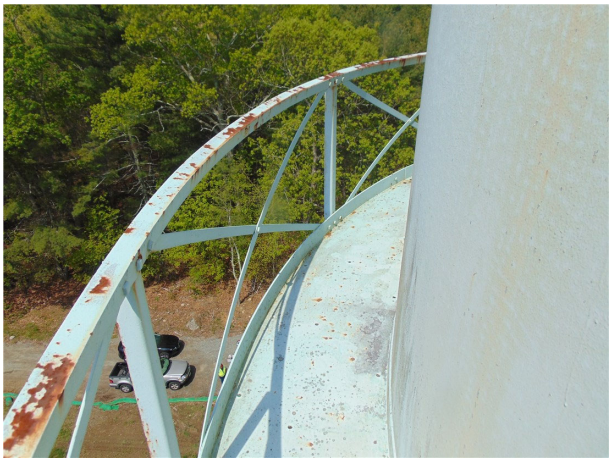
3) 3-Tank leg base

6) 6-Corrosion on anchor chair

7) 7-Bottom of bowl with corrosion

8) 8-Overflow pipe

9) 9-Ladder with safety cage



10) 10-Tank balcony with minor delamination

11) 11-Delamination on shell

12) 12-Corrosion on overflow pipe

13) 13-Biological growth on shell

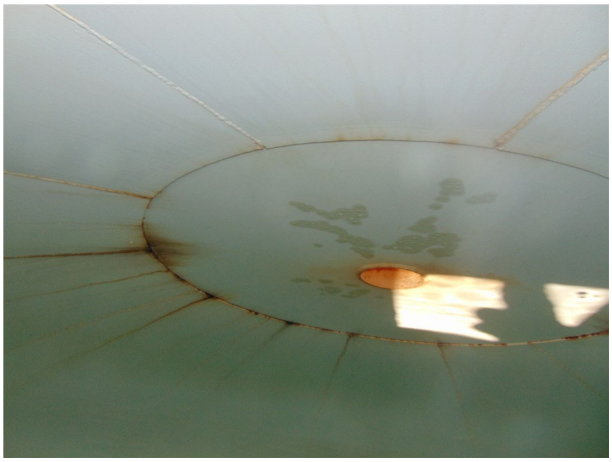
16) 16-Typical condition of roof and vent overview

14) 14-Corrosion and delamination on the roof

17) 17-Corrosion on vent and damaged screen

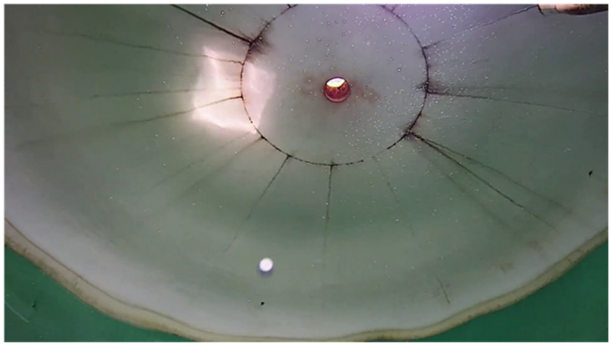
15) 15-Rotating roof ladder

18) 18-Roof hatch



19) 19-Corrosion on interior weld seams

20) 20-Overflow weir funnel

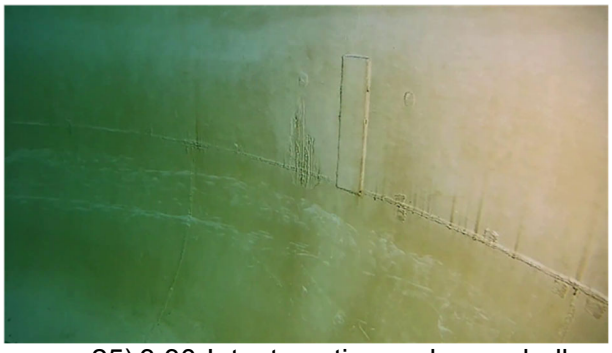


21) 0:16-Interior roof

22) 1:51-Corrosion cell on roof

23) 2:05-Interior ladder

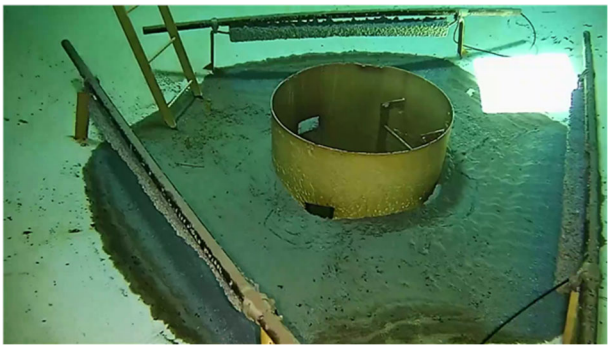
24) 3:15-Corrosion around patch plates



25) 3:30-Intact coating on lower shell

26) 4:54-Sacrifical anode

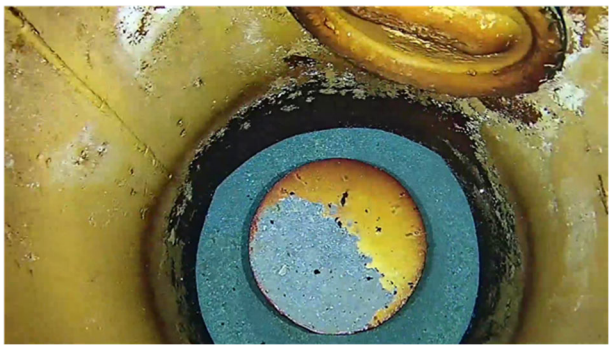
27) 5:14-Intact coating on bowl



28) 5:47-Riser pipe opening and anode overview

29) 6:32-Interior of riser pipe

30) 6:47-Delamination inside riser pipe



31) 8:18-Bottom of riser pipe with inlet/outlet

32) 8:34-Riser Manway

Appendix II
Exterior Paint Thickness Readings

B9

Created:	2022-05-20 08:51:32
PosiTector Body S/N:	871573
Probe Type:	PosiTector 6000 F
Probe S/N:	423385
CAL:	Cal 1

Exterior legs & riser

Summary

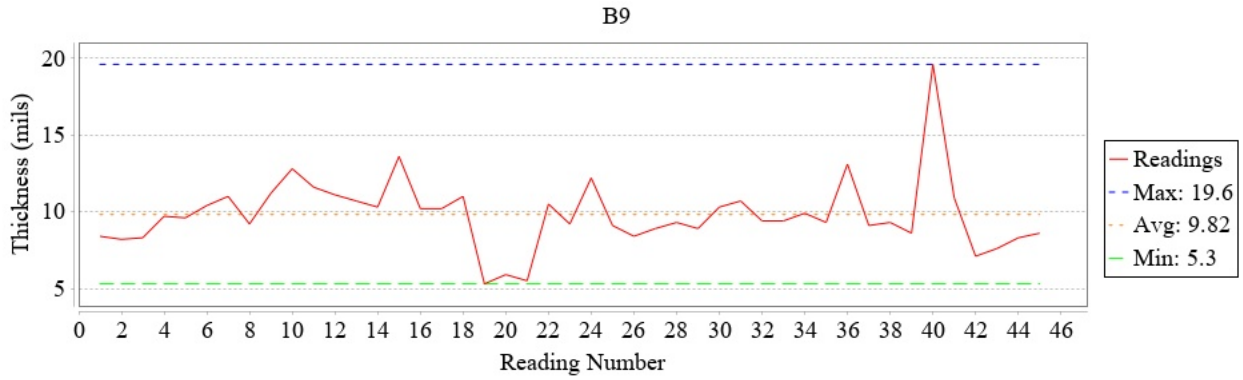
	#	x	σ	↓	↑
Thickness (mils)	45	9.82	2.31	5.3	19.6

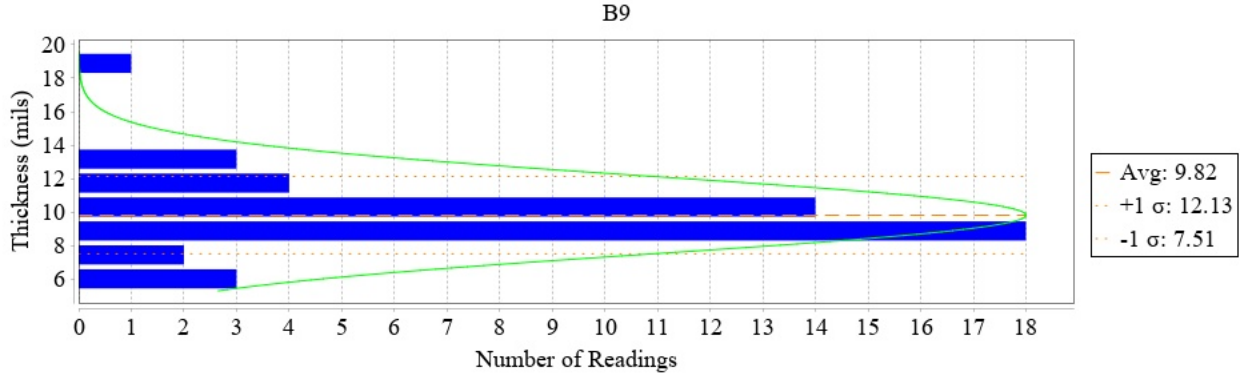
Readings

#	Thickness (mils)	Time
1	8.4	2022-05-20 08:51:43
2	8.2	08:51:48
3	8.3	08:51:49
4	9.7	08:51:53
5	9.6	08:51:54
6	10.4	08:51:55
7	11.0	08:51:59
8	9.2	08:52:00
9	11.2	08:52:01
10	12.8	08:52:10
11	11.6	08:52:11
12	11.1	08:52:12
13	10.7	08:52:28
14	10.3	08:52:29
15	13.6	08:52:30
16	10.2	08:52:31
17	10.2	08:52:32
18	11.0	08:52:33
19	5.3	08:52:44
20	5.9	08:52:45
21	5.5	08:52:46
22	10.5	08:52:56
23	9.2	08:52:57
24	12.2	08:52:59
25	9.1	08:53:10
26	8.4	08:53:11
27	8.9	08:53:13
28	9.3	08:53:23
29	8.9	08:53:24
30	10.3	08:53:25
31	10.7	08:53:33
32	9.4	08:53:35
33	9.4	08:53:35
34	9.9	08:53:37

B9 Readings

#	Thickness (mils)	Time
35	9.3	08:53:38
36	13.1	08:53:39
37	9.1	08:53:42
38	9.3	08:53:43
39	8.6	08:53:45
40	19.6	08:53:46
41	10.9	08:53:47
42	7.1	08:53:48
43	7.6	08:53:50
44	8.3	08:53:51
45	8.6	08:53:52





B11

Created:	2022-05-20 11:02:19
PosiTector Body S/N:	871573
Probe Type:	PosiTector 6000 F
Probe S/N:	423385
CAL:	Cal 1

Exterior roof

Summary

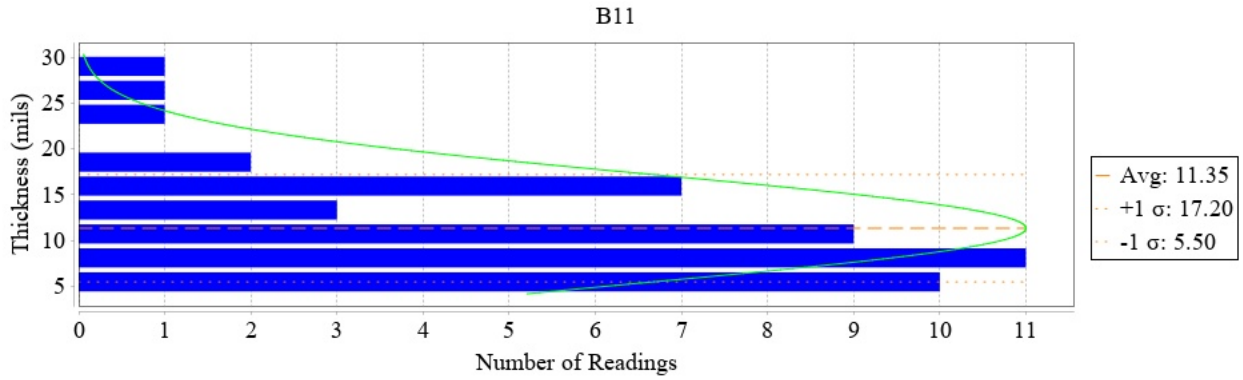
	#	x	σ	↓	↑
Thickness (mils)	45	11.35	5.85	4.2	30.3

Readings

#	Thickness (mils)	Time
1	16.9	2022-05-20 11:40:38
2	18.5	11:40:40
3	25.1	11:40:41
4	5.6	11:40:43
5	15.3	11:40:44
6	11.7	11:40:45
7	4.2	11:40:47
8	4.7	11:40:48
9	7.1	11:40:49
10	13.0	11:40:51
11	12.0	11:40:52
12	12.2	11:40:53
13	14.0	11:40:55
14	30.3	11:40:56
15	16.6	11:40:57
16	7.0	11:40:59
17	8.0	11:41:00
18	9.9	11:41:00
19	9.7	11:41:02
20	6.3	11:41:03
21	5.7	11:41:03
22	9.3	11:41:05
23	16.2	11:41:06
24	5.6	11:41:07
25	7.3	11:41:08
26	7.2	11:41:09
27	6.5	11:41:11
28	11.7	11:41:15
29	11.9	11:41:16
30	7.4	11:41:17
31	9.4	11:41:18
32	8.5	11:41:19
33	24.9	11:41:20
34	16.1	11:41:22

B11 Readings

#	Thickness (mils)	Time
35	19.5	11:41:23
36	14.9	11:41:24
37	6.7	11:41:39
38	9.8	11:41:42
39	10.1	11:41:43
40	6.8	11:41:45
41	8.7	11:41:46
42	10.1	11:41:47
43	16.8	11:41:48
44	7.0	11:41:49
45	4.5	11:41:50



B10

Created:	2022-05-20 11:01:06
PosiTector Body S/N:	871573
Probe Type:	PosiTector 6000 F
Probe S/N:	423385
CAL:	Cal 1

Exterior shell

Summary

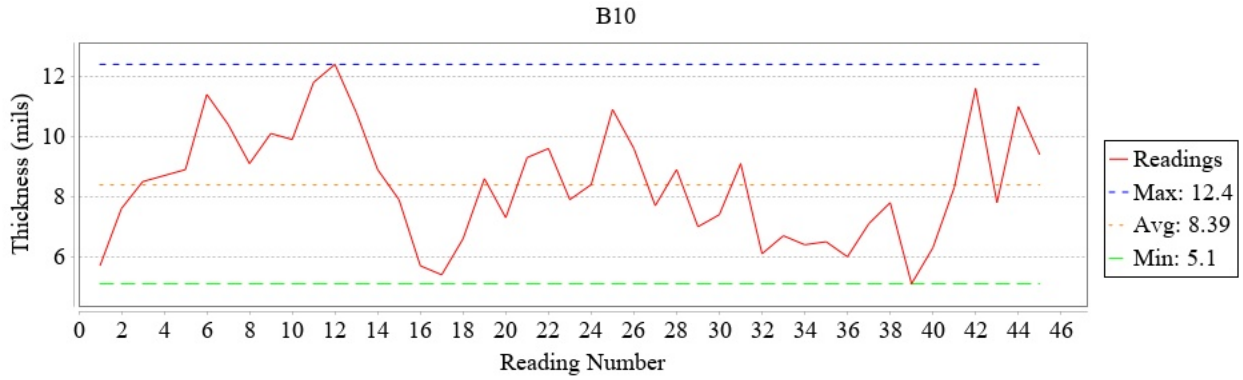
	#	x	σ	↓	↑
Thickness (mils)	45	8.39	1.87	5.1	12.4

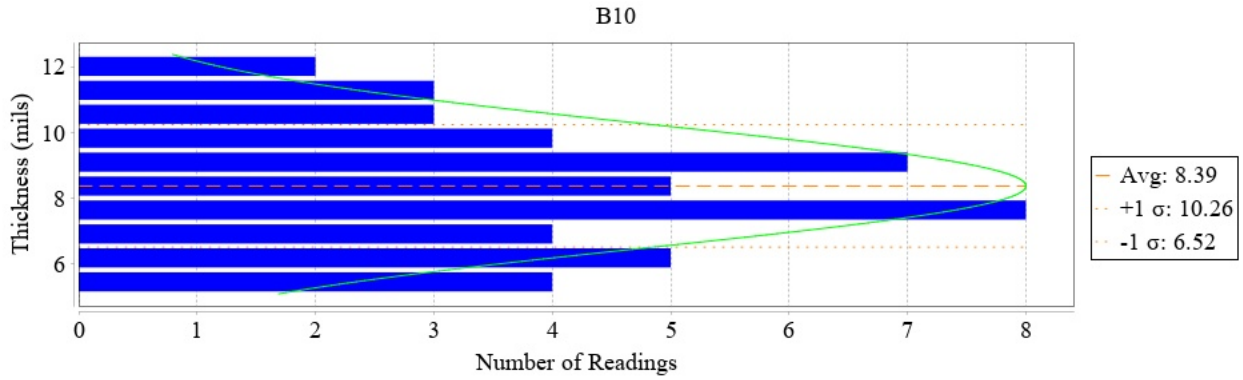
Readings

#	Thickness (mils)	Time
1	5.7	2022-05-20 11:01:09
2	7.6	11:01:10
3	8.5	11:01:11
4	8.7	11:01:13
5	8.9	11:01:14
6	11.4	11:01:15
7	10.4	11:01:17
8	9.1	11:01:17
9	10.1	11:01:18
10	9.9	11:01:20
11	11.8	11:01:20
12	12.4	11:01:21
13	10.8	11:01:23
14	8.9	11:01:24
15	7.9	11:01:25
16	5.7	11:01:28
17	5.4	11:01:28
18	6.6	11:01:29
19	8.6	11:01:34
20	7.3	11:01:35
21	9.3	11:01:36
22	9.6	11:01:37
23	7.9	11:01:38
24	8.4	11:01:39
25	10.9	11:01:46
26	9.6	11:01:47
27	7.7	11:01:48
28	8.9	11:01:49
29	7.0	11:01:50
30	7.4	11:01:51
31	9.1	11:01:54
32	6.1	11:01:55
33	6.7	11:01:56
34	6.4	11:01:57

B10 Readings

#	Thickness (mils)	Time
35	6.5	11:01:58
36	6.0	11:01:59
37	7.1	11:02:06
38	7.8	11:02:07
39	5.1	11:02:08
40	6.3	11:02:11
41	8.3	11:02:12
42	11.6	11:02:13
43	7.8	11:02:16
44	11.0	11:02:17
45	9.4	11:02:18





Appendix III
Paint Sample Laboratory Results

PHOENIX
Environmental Laboratories, Inc.

Tuesday, June 21, 2022

Attn:
Corrtech
25 South Street
Hopkinton MA 01748

Project ID: **PROVIDENCE WATER 15746**
SDG ID: **GCL53711**
Sample ID#s: **CL53711 - CL53713**

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B
NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
UT Lab Registration #CT00007
VT Lab Registration #VT11301

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Sample Id Cross Reference

June 21, 2022

SDG I.D.: GCL53711

Project ID: PROVIDENCE WATER 15746

Client Id	Lab Id	Matrix
A-EXT SHELL	CL53711	BULK
B-LEG/RISER	CL53712	BULK
C-INTERIOR	CL53713	BULK

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

June 21, 2022

FOR: Attn:
Corrtech
25 South Street
Hopkinton MA 01748

Sample Information		Custody Information		Date	Time
Matrix:	BULK	Collected by:		05/21/22	
Location Code:	CORRT-MA	Received by:	SW	06/10/22	11:14
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.□:	15746-1				

Laboratory Data

SDG ID: GCL53711
Phoenix ID: CL53711

Project ID: PROVIDENCE WATER 15746
Client ID: A-EXT SHELL

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Chromium	2.8	1.5	mg/Kg	1	06/18/22	CPP	SW6010D
Lead	14100	15	mg/Kg	10	06/18/22	CPP	SW6010D
Total Metals Digest	Completed				06/10/22	B/AG	SW3050B

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

Results are reported on an ``as received`` basis, and are not corrected for dry weight.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
June 21, 2022
Reviewed and Released by: Helen Geoghegan, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

June 21, 2022

FOR: Attn:
Corrtech
25 South Street
Hopkinton MA 01748

Sample Information		Custody Information		Date	Time
Matrix:	BULK	Collected by:		05/21/22	
Location Code:	CORRT-MA	Received by:	SW	06/10/22	11:14
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.□:	15746-1				

Laboratory Data

SDG ID: GCL53711
Phoenix ID: CL53712

Project ID: PROVIDENCE WATER 15746
Client ID: B-LEG/RISER

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Chromium	10600	110	mg/Kg	100	06/21/22	EK	SW6010D
Lead	72200	110	mg/Kg	100	06/21/22	EK	SW6010D
Total Metals Digest	Completed				06/10/22	B/AG	SW3050B

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

Results are reported on an ``as received`` basis, and are not corrected for dry weight.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
June 21, 2022
Reviewed and Released by: Helen Geoghegan, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

June 21, 2022

FOR: Attn:
Corrtech
25 South Street
Hopkinton MA 01748

Sample Information		Custody Information		Date	Time
Matrix:	BULK	Collected by:		05/21/22	
Location Code:	CORRT-MA	Received by:	SW	06/10/22	11:14
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.□:	15746-1				

Laboratory Data

SDG ID: GCL53711
Phoenix ID: CL53713

Project ID: PROVIDENCE WATER 15746
Client ID: C-INTERIOR

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Chromium	452	11	mg/Kg	10	06/15/22	EK	SW6010D
Lead	530	1.1	mg/Kg	1	06/15/22	EK	SW6010D
Total Metals Digest	Completed				06/11/22	B/AG	SW3050B

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

Results are reported on an ``as received`` basis, and are not corrected for dry weight.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
June 21, 2022
Reviewed and Released by: Helen Geoghegan, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

QA/QC Report

June 21, 2022

QA/QC Data

SDG I.D.: GCL53711

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
QA/QC Batch 628525 (mg/kg), QC Sample No: CL53429 (CL53711, CL53712)														
ICP Metals - Soil														
Chromium	BRL	0.33	14.4	14.4	0	98.7	103	4.3	92.2			75 - 125	35	
Lead	BRL	0.33	5.29	5.07	4.20	98.8	100	1.2	96.7			75 - 125	35	
Comment:														
Additional Criteria: LCS acceptance range is 80-120% MS acceptance range 75-125%.														
QA/QC Batch 628566 (mg/kg), QC Sample No: CL54454 (CL53713)														
ICP Metals - Soil														
Chromium	BRL	0.33	24.7	27.2	9.60	110	101	8.5	121			75 - 125	35	
Lead	BRL	0.33	114	165	36.6	107	99.7	7.1	112			75 - 125	35	r
Comment:														
Additional Criteria: LCS acceptance range is 80-120% MS acceptance range 75-125%.														

r = This parameter is outside laboratory RPD specified recovery limits.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller, Laboratory Director
June 21, 2022

Tuesday, June 21, 2022

Criteria: RI: Com

State: RI

Sample Criteria Exceedances Report

GCL53711 - CORRT-MA

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units
CL53711	PB-SM	Lead	RI / Direct Exposure Criteria / Inorganics (Com)	14100	15	500	500	mg/Kg
CL53712	PB-SM	Lead	RI / Direct Exposure Criteria / Inorganics (Com)	72200	110	500	500	mg/Kg
CL53713	PB-SM	Lead	RI / Direct Exposure Criteria / Inorganics (Com)	530	1.1	500	500	mg/Kg

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Comments

June 21, 2022 SDG I.D.: GCL53711

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

Cooler: Yes ☐ No ☒
Coolant: IPK ☐ ICE ☐ No ☒

CHAIN OF CUSTODY RECORD

Temp 19.3 C Pg of

PHOENIX
Environmental Laboratories, Inc.

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email Makrina Nolan: makrina@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-1102

Data Delivery/Contact Options:
☐ Fax:
☐ Phone:
☒ Email: mmiezejeski@corrtech-inc.com

Customer: 25 South Street Unit E
Address: Hopkinton, MA 01748
CorrTech Inc.

Project: Providence Water 15746
Report to:
Invoice to: CorrTech
QUOTE #

Project P.O: 15746 - 1

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature: [signature] Date: 6-3-22

Matrix Code:
DW=Drinking Water **GW**=Ground Water **SW**=Surface Water **WW**=Waste Water
RW=Raw Water **SE**=Sediment **SL**=Sludge **S**=Soil **SD**=Solid **W**=Wipe **OIL**=Oil
B=Bulk **L**=Liquid **X** = _____(Other)

Analysis Request

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	Lead	Chromium	Ray	MS/MSD*	GL Amber 8 oz. [ ] H3PO4 [ ] NAHSO4	Soil VOA Vials [ ] methanol [ ] H2O	GL Soil container ( )oz	GL Soil container ( )oz	40 ml VOA Vial [ ] As is [ ] HCL	GL Amber 1000ml [ ] As is [ ] H2SO4	PL As is [ ] 250ml [ ] 500ml [ ] 1000ml	PL H2SO4 [ ] 250ml [ ] 500ml	PL HNO3 250ml	PL NaOH 250ml	Bacteria Bottle w/thio	Bacteria Bottle as is
53711	A-Ext. Shell	~~SW~~ B	5/21		✓	✓							1							
53712	B-leg/riser	~~SW~~ B	5/21		✓	✓							1							
53713	C-Interior	~~SW~~ B	5/21		✓	✓							1							

Relinquished by:	Accepted by:	Date:	Time:
Max Miezejeski			
UPS	Kupsum	6/10/22	11:14

Comments, Special Requirements or Regulations:

Turnaround Time:
☐ 1 Day*
☐ 2 Days*
☐ 3 Days*
☒ Standard
☐ Other
* SURCHARGE APPLIES

RI
☐ (Residential)
☒ (Comm/Industrial) Direct Exposure
☐ GA Leachability
☐ GB Leachability
☐ GA-GW Objectives
☐ GB-GW Objectives

CT
☐ RCP Cert
☐ GW Protection
☐ SW Protection
☐ GA Mobility
☐ GB Mobility
☐ Residential DEC
☐ I/C DEC
☐ Other

MA
☐ MCP Certification
☐ GW-1 ☐ MWRA eSMART
☐ GW-2 ☐ S-1 10% CALC
☐ GW-3
☐ S-1 GW-1 ☐ S-1 GW-2 ☐ S-1 GW-3
☐ S-2 GW-1 ☐ S-2 GW-2 ☐ S-2 GW-3
☐ S-3 GW-1 ☐ S-3 GW-2 ☐ S-3 GW-3
☐ SW Protection

State where samples were collected: RI

Data Format
☐ Excel
☒ PDF
☐ GIS/Key
☐ EQuIS
☐ Other

Data Package
☐ Tier II Checklist
☐ Full Data Package*
☒ Phoenix Std Report
☐ Other
* SURCHARGE APPLIES

*MS/MSD are considered site samples and will be billed as such in accordance with the prices quoted.

GLOSSARY OF TERMS FOR STEEL/CONCRETE TANKS

Adhesion- State in which two surfaces are held together by interfacial forces which may consist off valence forces or interlocking action or both

Aggregate- Granular material, such as sand, gravel, crushed stone, crushed hydraulic-cement concrete, or iron blast-furnace slag used with a hydraulic cementing medium to produce either concrete or mortar.

Bugholes- Small regular or irregular cavities, usually not exceeding 15 mm in diameter, resulting from entrapment of air bubbles in the surface of formed concrete during placement and compaction.

Cathodic Protection - The use of a sacrificial metal or energized substance to polarize the structures surfaces and prevents corrosion.

Chalking - The degradation of a paint binders when exposed to ultra-violet light which creates a loose residue on the surface.

Chemical Attack- Decomposition of a coating or concrete due to the action of a chemical.

Chime- Portion of tank floor plate that extends outside the tank shell and rests on top of the foundation.

Contraction Joint- Formed, sawed, or tooled groove in a concrete structure to create a weakened plane and regulate the location of cracking resulting

Corrosion Cell - A concentrated localized site of accelerated corrosion that creates pitting.

Disbondment- The loss of adhesion between a coating and the substrate.

Dry Film Thickness - Total thickness of a paint film when completely cured.

Efflorescence- A white crystalline or powdery deposit on the surface of concrete. Efflorescence results from leaching of lime or calcium hydroxide out of a permeable concrete mass over time by water, followed by reaction with carbon dioxide and acidic pollutants.

Finish- The texture of a concrete surface after compaction and finishing operations have been performed.

Finial Vent - The central roof vent on top of a water tank.

Grout- A plastic mixture of cementitious materials and water used as a filler for cracks, or other void spaces, in concrete surfaces to be coated.

Holiday - A hole or void in a protective coating that may be invisible to the unaided eye that extends to the substrate.

Honey Comb- Voids left in concrete due to failure of the mortar to effectively fill the spaces among coarse aggregate particles.

Hydraulic, Hydrostatic Pressure- A force exerted on the concrete/coating interface due to the level of the ground water.

Isolation Joint- A separation between adjoining parts of a concrete structure

Joint Sealant- Compressible material used to exclude water and solid foreign materials from joints.

Lap Joint Seam- Overlapping seam between roof plates that is open and un-welded on the interior.

Laitance- A thin, weak brittle layer of cement and aggregate fines on a concrete surface. The amount of laitance is influenced by the degree of working or the amount of water in the concrete.

Lead Abatement - The removal of a lead bearing paint system.

Lead Encapsulation - The covering over of a lead based paint by applying a compatible topcoat.

Osmotic Blister - Raised coating area created by buildup of fluid under the coating. Fluid moves through coating in response to water/solvent concentrations between coating and tank water.

Osmotic Pressure- A force exerted on the concrete /coating interface through the capillaries in the concrete due to a moisture differential across the coating.

Overflow Weir Box- internal or external box that captures water above the operating height of the tank and directs it to an overflow pipe.

Pack Rust/Crevice Corrosion- Advanced form of steel corrosion that forms visible layers of oxidized steel swollen larger than the original steel plate thickness, usually found between steel plates or surfaces.

Pinholes- Film defect characterized by small pore-like flaws in a coating which extend entirely through the applied film and have the general appearance of pinpricks, fine holes, or voids when viewed by reflected light.

Plastic Cracking or Shrinkage- Cracking that occurs in the surface of fresh concrete soon after it is placed and while it is still plastic,

Porosity- The ratio usually expressed as a percentage, of the volume of voids in a material to the total volume of the material, including the voids.

Reflective Cracking-Cracking that develops in a coating directly over a dynamic crack in concrete.

Rigging plug- Thread steel nipple welded to a tank roof for the purposes of rigging painting cables. Usually sealed with a threaded plug when not in use.

ROV - Remotely operated vehicle, underwater inspection device "TankRover" by CorrTech

Screen Mesh- Number of openings per linear inch of screen.

Silt - Material that accumulates in the bottom of a water tank originating from treatment by products, raw water particles and distribution system debris.

Silt Stop- Solid cylinder installed on a floor inlet or outlet pipe to extend the pipe above the floor. Pipe prevents floor sediment from being stirred up or sucked out of the tank during flow.

Static Cracks- A crack in the concrete surface whose width does not change.

GLOSSARY OF TERMS FOR STEEL/CONCRETE TANKS

Stich or Skip Weld- Method of welding two pieces of steel together with intermittent short sections of weld bead. Leaves open lap joints along the unwelded sections.

Tubercle - Domed shaped buildup of corrosion products over an active corrosion site. Promotes metal loss through pitting due to differential oxygen concentrations.

Ultrasonic Measurement - The use of high frequency sound waves passed through a material to measure the time required to return. The time required to pass through the material is correlated to the speed of sound in the substrate to yield an actual thickness at a specific location.

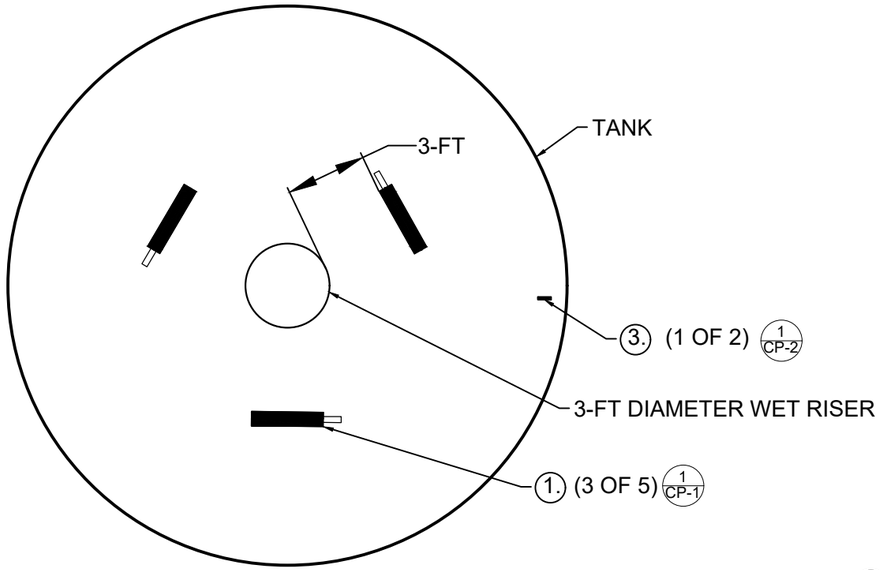
Vapor Barrier- Waterproof membrane placed under concrete floor slabs that are placed on grade.

APPENDIX B

CATHODIC PROTECTION SYSTEM

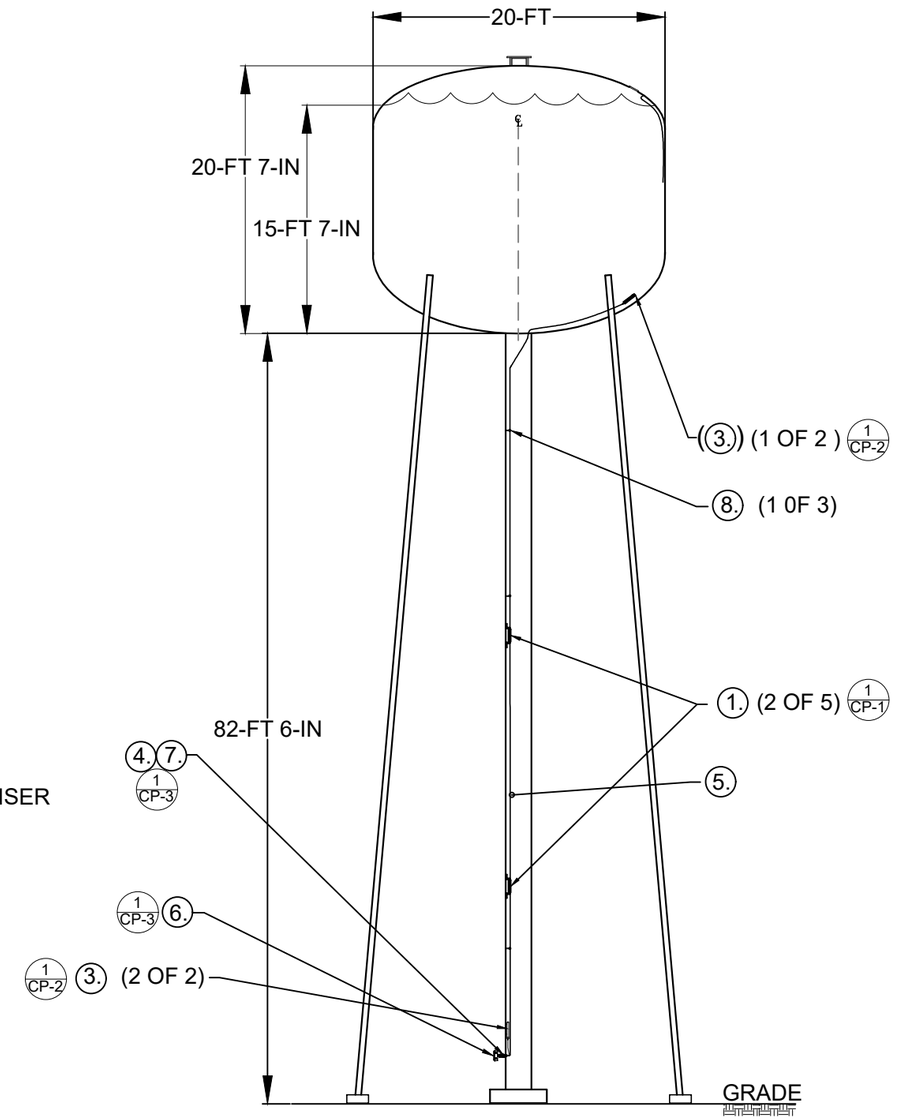
NOTES:

1. REFER TO BOM/PARTS LIST FOR ALL FNS (FIND NUMBERS.) PARENTHESIS SURROUNDING FNS REPRESENT PREVIOUS CALL OUT REFERENCE.



FLOOR ANODE LAYOUT

- 3 ANODES, TRIANGULAR LAYOUT PATTERN.



40,000-GALLON ELEVATED
WATER STORAGE TANK

CATHODIC PROTECTION SYSTEM
LAYOUT: PROFILE

NO.	DATE	DESCRIPTIONS	BY	APP'D
		REVISIONS		
00	11/17/23	INITIAL CP DESIGN	RHG	SHP

CORRTECH CORROSION UNDERSTOOD
25 SOUTH STREET
HOPKINTON, MA 01748
(508) 435-0090
www.corrtech-inc.com

DESIGNED SHP
DRAWN RHG
CHECKED JBP

ENGINEER-IN-CHARGE

DIRECTOR

CLIENT:
PROVIDENCE WATER SUPPLY BOARD
125 DUPONT DRIVE
PROVIDENCE, RI 02907

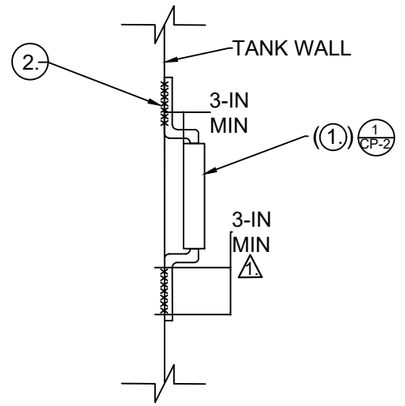
PROJECT:
PROVIDENCE WATER
40,000 GAL WATER STORAGE TANK,
JOB NO. 16753

CATHODIC PROTECTION SYSTEM
GENERAL ARRANGEMENT

DATE:	DRAWING NUMBER:	SHEET NUMBER:	REV.
11/21/23	16753-CAD-01-1	1 OF 4	00

NOTES:

1. REFER TO BOM/PARTS LIST FOR ALL FNS (FIND NUMBERS.) PARENTHESIS SURROUNDING FNS REPRESENT PREVIOUS CALL OUT REFERENCE.



ANODE WELDMENT DETAILS

- REMOVE COATING TO BARE STEEL, WELD 3–IN MINIMUM OF WIRE CORE ON BOTH ENDS, AND RE–COAT WIRE CORE. DO NOT COAT ANODES.

1
CPD–1

BOM/PARTS LIST				
FN	QTY	ITEM	NOTES	P/N
1	5	ANODE, 36LB, MAGNEZIUM		
2	AR	FILLET WELD		
3	2	REFERENCE CELL, SILVER CHLORIDE		
4	1	3/4" NPT FITTING		
5	AR	CABLE, HMWPE		
6	1	JUNCTION BOX, NEMA 4X, 8" X 6" X 4" W/ LATCH		
7	1	WALL PENETRATION GLAND (CONAX)		
8	3	3/8" X 3" CARBON STEEL EYELETS		

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REVISIONS

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NACE CERTIFIED SPECIALIST SCOTT H. PAUL 4183

ENGINEER-IN-CHARGE

DIRECTOR

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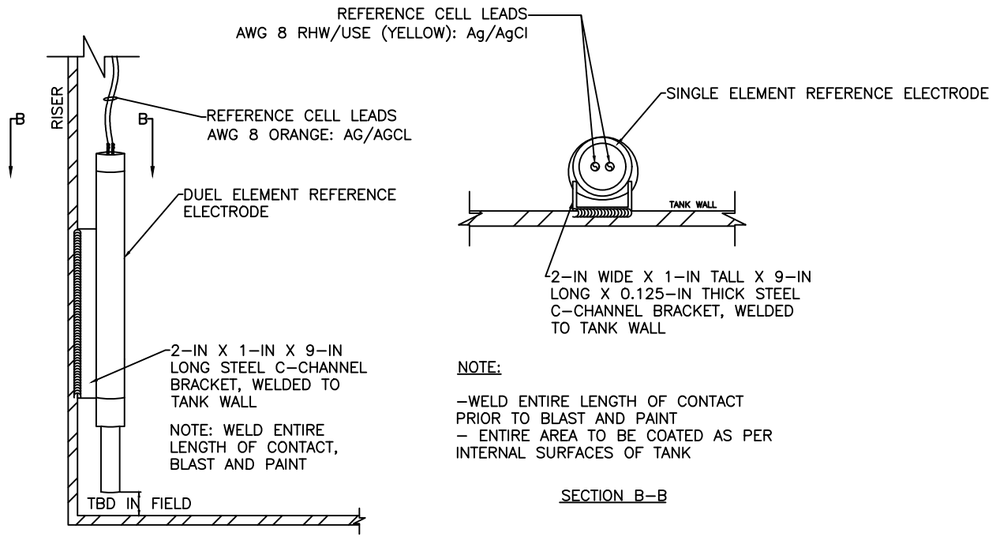


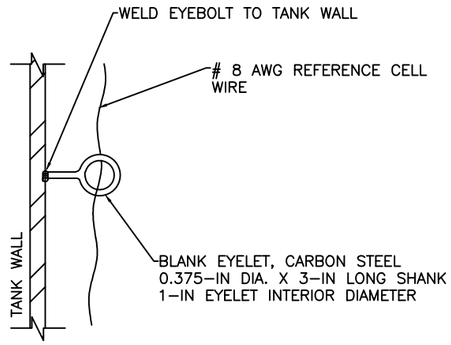
NOTE:

-WELD ENTIRE LENGTH OF CONTACT PRIOR TO BLAST AND PAINT
- ENTIRE AREA TO BE COATED AS PER INTERNAL SURFACES OF TANK

SECTION B-B

REFERENCE ELECTRODE

1
CP-2



NOTE:

-WELD ENTIRE LENGTH OF CONTACT PRIOR TO BLAST AND PAINT
- ENTIRE AREA TO BE COATED AS PER INTERNAL SURFACES OF TANK

EYELET

2
CP-2

NO.	DATE	DESCRIPTIONS	BY	APPR'D
00	11/17/23	INITIAL CP DESIGN	RHG	SHP

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11/21/23	16753-CAD-01-1	3 OF 4	00

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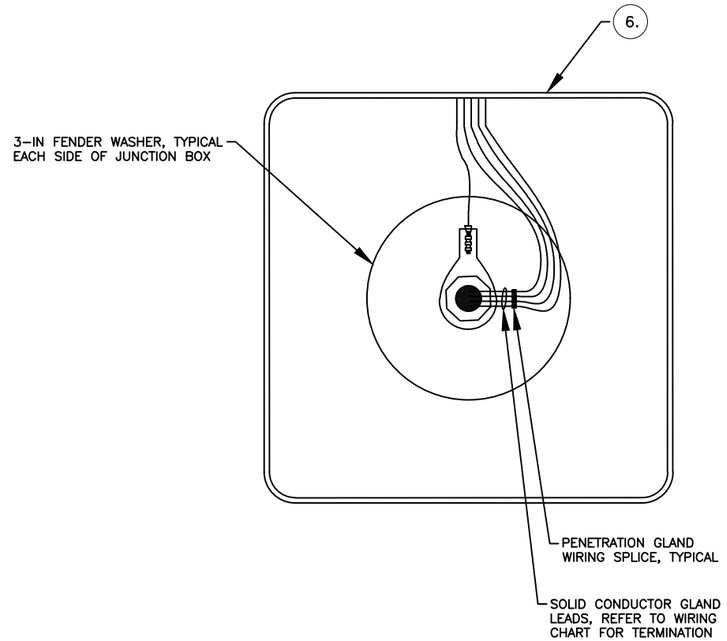
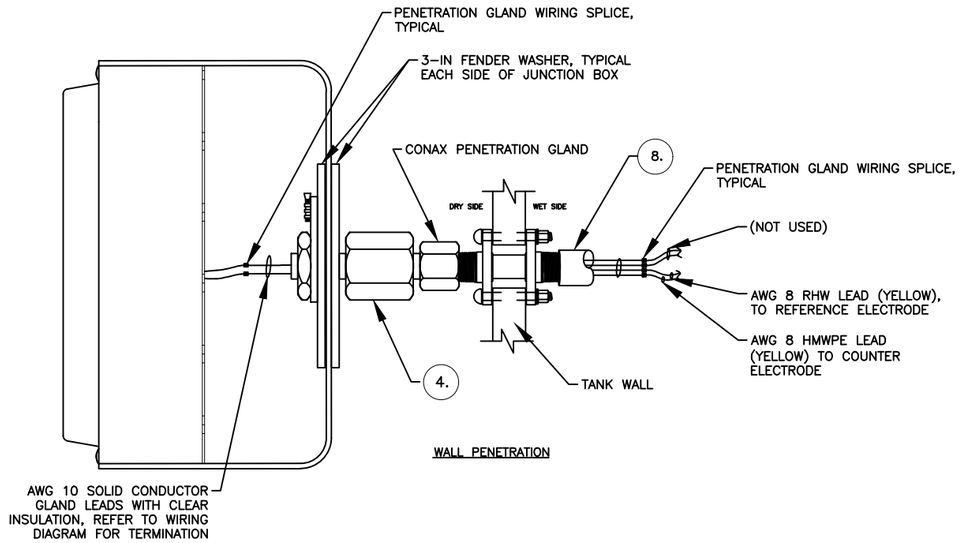


PLAN VIEW



WALL PENETRATION

PROFILE VIEW

CP TEST STATION

1
CP–3

Wire No.	Dry–Side Designation (Wire Gauge/Color)	Wet–Side Designation (Wire Gauge/Color)	Wire Termination
1	12/BLACK	8/BLACK	REFERENCE CELL 1
2	12/BLACK	8/BLACK	REFERENCE CELL 2
3			NOT USED
4			NOT USED

WIRING DIAGRAM

NO.	DATE	DESCRIPTIONS	BY	APPR'D
00	11/17/23	INITIAL CP DESIGN	RHG	SHP

REVISIONS

CORRTECH CORROSION UNDERSTOOD

25 SOUTH STREET
HOPKINTON, MA 01748
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www.corrtech-inc.com

DESIGNED SHP
DRAWN RHG
CHECKED JBP

REGISTERED PROFESSIONAL ENGINEER
STATE OF MINNESOTA
SCOTT H. PAUL
41613

ENGINEER-IN-CHARGE

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