FALL RIVER REDEVELOPMENT AUTHORITY
CITY OF FALL RIVER

One Government Center
Fall River MA 02722

CITY PIER
SITE IMPROVEMENTS

CITY OF FALL RIVER
COUNTY OF BRISTOL
MASSACHUSETTS

IFB# 21-30

BETA Group, Inc.
701 George Washington Highway
Lincoln, RI 02865
(401) 333-2382

MAY 2021

Conformed Set - 6.17.2021

CONFORMED

TABLE OF CONTENTS

Division 0 – Contract	Section	Page No.
Notice to Bidders	00200	00200-1 to 00200-6
Bid	00300	00300-1 to 00300-20
Bid Bond	00400	00400-1 to 00400-2
Contract Agreement	00500	00500-1 to 00500-24
Contract Bonds	00600	00600-1 to 00600-8
Minority Business Enterprise	00610	00610-1 to 00610-11
General Conditions	00700	00700-1 to 00700-8
Supplementary Conditions	00800	00800-1 to 00800-2
Wage Rates	00850	00850-1 to 00850-37

Division 1 - General Requirements		
Summary of Work	01010	01010-1 to 01010-2
Allowances	01020	01020-1 to 01020-2
Measurement and Payment	01025	01025-1 to 01025-20
Schedule of Values	01026	01026-1 to 01026-2
Modification Procedures	01035	01035-1 to 01035-2
Coordination	01040	01040-1 to 01040-2
Field Engineering	01050	01050-1 to 01050-2
Regulatory Requirements	01060	01060-1 to 01060-2
State of Massachusetts	01067	01067-1 to 01067-10

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Division 1 Cont'd	**Section**	**Page No.**
And Local Requirements		
Health & Safety Requirements	01069	01069-1 to 01069-4
Reference Standards	01090	01090-1 to 01090-6
Project Meetings	01200	01200-1 to 01200-2
Submittals	01300	01300-1-to 01300-4
Construction Progress Schedule	01310	01310-1 to 01310-4
Construction Photographs	01380	01380-1 to 01380-2
Quality Control	01400	01400-1 to 01400-2
Testing Laboratory Services	01410	01410-1 to 01410-4
Temporary Controls	01560	01560-1 to 01560-4
Project Signs	01380	01380-1 to 01380-2
Field Office	01590	01590-1 to 01590-2
Materials and Equipment	01600	01600-1 to 01600-2
Contract Closeout	01700	01700-1 to 01700-3
Warranties	01740	01740-1 to 01740-2
Division 2 Sitework-		
Site Preparation	02050	02050-1 to 02050-6
Management of Contaminated Materials	02062	02062-1 to 02062-
Maintenance	02105	02105-1 to 02105-2
Earth Excavation, Backfill, Fill and Grading	02200	02200-1 to 02200-10
Aggregate Material	02215	02215-1 to 02215-4
Erosion and Sedimentation Control	02270	02270-1 to 02270-4
Geotextile Materials	02272	02272-1 to 02272-
Pavement	02500	02550-1 to 02550-6
Walks and Curbing	02510	02510-1 to 02510-8

CONFORMED

Division 2 Cont'd	**Section**	**Page No.**
Signage	02540	02540-1 to 02540-2
Pavement Markings	02550	02550-1 to 02550-4
Manholes, Frames and Covers	02607	02607-1 to 02607-8
Reinforced Concrete Pipe	02614	02614-1 to 02614-6
Ductile Iron Pipe	02618	02618-1 to 2618-12
Water Service Connection	02642	02642-1 to 02642-x
PVC Pipe & Appurtenances	02622	02622-1 to 02622-8
HDPE Corrugated Drain Pipe	02626	02626-1 to 02626-6
Water Service Connections	02642	02642-1 to 02642-6
Under Drain System	02712	02712-1 to 02712-2
Catch Basins & Gutter Inlets, Frames & Grates	02720	02720-1 to 02720-6
Landscape Boulders	02805	02805-1 to 02805-2
Irrigation	02810	02810-1 to 02810-22
Site Furniture	02870	02870-1 to 02870-2
Loaming & Seeding	02930	02930-1 to 02930-4
Trees, Plants, and Ground Covers	02950	02950-1 to 02950-12
Division 3 Concrete		
Concrete Formwork	03100	03100-1 to 03100-6
Concrete Reinforcement	03200	03200-1 to 03200-6
Expansion, Construction and Control Joints	03250	03250-1 to 03250-8
Cast-in-Place Concrete	03300	03300-1 to 03300-12
Concrete Sealant	03320	03320-1 to 03320-4
Concrete Finishing	03346	03346-1 to 03346-4
Division 5 Metals		
Miscellaneous Metals	05010	05010-1 to 05010-8

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Division 6 Carpentry

Carpentry	06200	06200-1 to 06200-2

Division 9 Finishes

Metal Finishes	09000	09000-1 to 09000-8

Division 16 General Electrical

General Electrical Requirements	16560	16560-1 to 16560-10

Appendices

Appendix A Geophysical Survey For the Concrete Sheet Pile Cap

Appendix B 2017 Construction Plans

Appendix C Risk-Based Cleanup Plan (RBCP)

Additional Site Data can be found at MassDEP website thru their on-line viewer per below
Energy & Environmental Affairs Data Portal (state.ma.us)

END OF T.O.C.

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SECTION 00200

NOTICE TO BIDDERS

The Fall River Redevelopment Authority
Fall River, Massachusetts

City Pier Site Improvements
Bid # 21-30

The City of Fall River Massachusetts, acting through the Fall River Redevelopment Authority, invites sealed bids for City Pier Site Improvements IFB #21-30 in accordance with the Contract Documents prepared by BETA Group Inc., Consulting Engineers, 315 Norwood Park South, Norwood MA 02062.

A. INTRODUCTION

This Notice of Invitation to Bid sets forth the procedures and requirements to conduct work for the Fall River Redevelopment Authority (RDA) to perform the requested services. The location, general characteristics, and principal details of the Work are indicated in a set of drawings, entitled:

'City Pier Site Improvements'

Work shall commence upon selection of a Contractor and issuance of a Notice to Proceed

B. PROJECT AREA

The project area consists of an existing 125,000 square foot pier located on the west side of Davol Street in Fall River. The pier is surrounded on three sides by the Taunton River. The pier is framed by a bulkhead wall that is approximately 1,840 feet in length. The project address is 600 Davol Street, Fall River, Massachusetts 02722.

C. PROJECT BACKGROUND & PURPOSE

The City Pier site historically was utilized for lumber, coal, oil and natural gas storage and production facilities as well as maritime based industrial operations. Over time this pattern of use resulted in the presence of contaminated materials on site. Due to the presence of polychlorinated biphenyls (and other recognized contaminants) in soil, the Site is regulated under both the Massachusetts Department of Environmental Protection (MassDEP) and the U. S. Environmental Protection Agency (EPA). The Site has MassDEP Release Tracking Number 4-17012.

In 2017 a new steel and concrete bulkhead and EPA/DEP approved granular soil cap approximately 3'-0" thick was installed over the entire site encapsulating soils below. On the central and northern pier areas a geotextile fabric cap underlying the granular fill was installed prior to the placement of the fill. Stormwater, sanitary sewer and water infrastructure was installed as part of the bulkhead construction. In 2020 a re-use vision for the site was developed by the RDA. The City Pier is located within the Waterfront Urban Renewal Plan District.

The Fall River Redevelopment Authority has determined to allow the public temporary access to the City Pier until such time as the Fall River Redevelopment Authority determines a permanent development plan for the City Pier.

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In order to accommodate such temporary public use certain improvements need to be made to the City Pier. The work includes the construction of a paved access drive and drop-off loop, sidewalks, pedestrian walkways, site lighting, a pedestrian railing system, a new electric service, and related electrical improvements, water and sewer infrastructure improvements, drainage improvements and the addition of plant bed areas, open turfgrass lawn areas and other site amenities.

These improvements are being made without a formal dedication of the land to any permanent public use and are being made with a full reservation of all rights by the Fall River Redevelopment Authority to alter or remove said improvements or change the use of said property in the future. Whenever the term park or public park are used in these specifications those terms are used in a generic meaning and not intended to establish this property as a park or public park and the public use hereunder is only for temporary public access until a further determination by the Fall River Redevelopment Authority.

The planned improvements will be constructed under and shall be performed in compliance with an EPA-approved Risk-Based Cleanup Plan (RBCP) Amendment and a MassDEP Release Abatement Measure (RAM) Plan Modification. When completed the finished surfaces of the pier will comprise the EPA mandated cap.

D. SCOPE OF SERVICES

The work in this Contract includes, but is not limited to furnishing and installing:

- Concrete walkways
- Hot Mix Asphalt pavement
- Granite curb along entry drive, drop off and Davol Street
- Landscape improvements including landscaped plant bed areas and lawn areas
- Installation of an automatic underground irrigation system
- Perimeter pedestrian railing system affixed to the existing concrete bulkhead wall
- Primary electric service, park load center and related park power panels
- Conduit, light pole foundations and Site lighting
- Modifications to the existing drainage system
- Water Service connection and related waterline terminations
- Site Furnishings and other incidental items necessary to complete the work.

E. PRE-BID MEETING AND QUESTIONS

A virtual Pre-Bid Conference will be held on **Thursday, May 13th at 10:00 AM.**

Pre-registration is recommended. Contact BETA Group: Marissa LaDuke at MLaDuke@beta-inc.com. Individuals requesting interpreter services for the hearing-impaired must provide notification at least 72 hours in advance of the pre-bid meeting.

Pre-Bid Conference

https://teams.microsoft.com/l/meetup-join/19%3ameeting_MDEzNTYxYTItZDdjNi00YTkwLThlY2YtNjkwZGYzYmUxN2Fh%40thread.v2/0?context=%7b%22Tid%22%3a%22f5be52b5-537b-4d0f-84c8-cbb31562afbd%22%2c%22Oid%22%3a%221978a6df-3ae9-4775-89e7-1d948c37154e%22%7d

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Pre-Bid Conference

Or call in (audio only)
+1 929-336-6302 United States, New York City
Phone Conference ID: 668 503 523#
Find a local number | Reset PIN
Learn More | Meeting options

The site will be open for inspection on **Friday, May 14th from 10:00 AM to 12:00 PM**.

Questions or Requests for Further Information Due: Friday, May 21, 2021 @ 2:00 PM

Bidders must reference the Bid number on all correspondence. Answers to questions received, if any, will be issued as an addendum to this bid solicitation

Direct all inquiries in writing to BETA Group, Attention to Marissa LaDuke at MLaDuke@beta-inc.com. Telephone 401.333.2382.

F. BID DOCUMENTS

Bid Documents are available electronically thru BETA Group, Contact MLaDuke@beta-inc.com. Telephone 401.333.2382.

Bidders requesting a hard copy Contract Documents to be mailed to them shall include a non-refundable payment in the amount of Two Hundred ($200.00) Dollars for each set. Payment shall be by money order, treasurer's or cashier's check, payable to The Fall River Redevelopment Authority**.** The Owner is not responsible for delivery of any mailed or delivered documents or delivery of said documents within the prescribed time set for the receipt of bids.

G. RESPONSE REQUIREMENTS AND QUALIFICATIONS

One (1) original copy of the responses must be furnished to City Purchasing Office, One Government Center, Fall River, MA 02722, on or before **June 3rd 2021 at 2:00 PM**. Responses must include:

- The identity of the Bidder: individual, partnership, corporation /company applying for contract award.
- If the applicant/Bidder is a partnership or joint venture, the proposal should specify who will act as the lead contractor for purposes of assuming contractual responsibility.
- The applicant/Bidder shall identify all sub-contractors to be utilized in the execution of the Work.
- A completed Bid Form Proposal with applicant/Bidder background and acknowledgment of all addenda issued.

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- A completed statement within the Bid Form Proposal providing the Bidder's experience, qualifications and references including relevant work experience.

The Bidder must comply with all statutory requirements. Any proposal that fails to include all of the above information may be rejected as unresponsive and may will not be afforded a complete review by the evaluation team.

H. EVALUATION CRITERIA

The Fall River Redevelopment Authority (RDA) will review proposals received in response to the Invitation to Bid. The Bid shall be awarded to the lowest eligible responsible bidder. The Redevelopment Authority as the Awarding Authority may reject any and all bids.

No person or firm, including applicants' listed consultants, debarred from undertaking public work in the Commonwealth of Massachusetts shall be considered or included as a finalist on the list.

I. INTERVIEWS

After review of the Bid Proposals received, the Fall River Redevelopment Authority may, at their discretion, schedule interviews with any or all of the Bidders for the purposes of further evaluation of the proposer's qualifications and ability to provide the required services.

J. SUBMISSIONS

Submit response to:

Ms. Tammy Moutinho
Project Manager/Purchasing Agent
Purchasing Office
One Government Center
Fall River, MA 02722

Responses must be submitted in a sealed envelope clearly marked:

City Pier Site Improvements

The final date for submission of responses is 2:00 PM Thursday June 3rd Friday, May 28th.

Bids will be opened and read at this time. Due to Covid-19 restrictions/precautions the bid opening will be witnessed, video-taped and made public on the City's website:

https://link.edgepilot.com/s/90f5d869/FtIzAT5c4EmYKDymWLh_8w?u=http://www.fallriverma./org

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Bids may be mailed or hand-delivered to the Third Street entrance of Government Center between the hours of 8:00am and 4:00pm, Monday through Friday.

One (1) original copy of the responses must be submitted

All submissions must include the following:

1. Completed Bid Form Proposal
2. All requirements listed under Section G
3. A signed copy of the anti-collusion affidavit
4. A signed tax affidavit
5. Bid Security

Bid Security: Certified, treasurer's or cashier's check or bid bond in the sum of five (5) percent of the Total Bid is required.

Time for Completion for this project shall be **330 consecutive calendar** days from the date stipulated in the Notice to Proceed to commence the Work. A winter shut-down is anticipated from Mid-December 2021 to Mid-March 2022, with final landscaping and related improvements to be completed by the end of May 2022.

It is anticipated the Notice to Proceed shall be issued no later than June 25, 2021, and the Project shall be found to be Substantially Complete in 2021

All Bids for this project are subject to applicable bidding laws of Massachusetts, including General Laws Chapter 30, Section 39M as amended.

Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and minimum wage rates to be paid under this Contract as determined by the Department of Labor and Industries under provisions of the Massachusetts General Laws Chapter 149, Section 26-27, inclusive, as amended.

The minimum combined MBE/WBE participation goal of **5** % is applicable to this project.
No Bidder may withdraw his bid within Ninety (90) days after the actual date of the opening thereof.

The successful Bidder must furnish 100 percent Performance and Labor and Materials Bonds.

The Owner and Engineer, being considered the sole and only judge, reserves the right to waive any informality in, or to reject, any or all bids, should the Owner deem it to be in the owner's best interest to do so.

IFB 21-30 is being offered by the Redevelopment Authority of Fall River, Massachusetts

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SECTION 00300

BID FORM

This Proposed Bid is made to the Fall River Redevelopment Authority
herein called the Owner, acting through the City of Fall River's Purchasing Office
for
"**City Pier Site Improvements"**

The Undersigned, as a bidder herein referred to as singular and masculine, declares as follows:

(1) The only parties interested in this BID as Principals are named herein;

(2) This BID is made without collusion with any other person, firm, or corporation;

(3) No officer, agent, or employee of the Owner is directly or indirectly interested in this BID;

(4) The Bidder has carefully examined the site of the proposed Work and fully informed and satisfied himself as to the conditions there existing, the character and requirements of the proposed Work, the difficulties attendant upon its execution and the accuracy of all estimated quantities stated in this BID, and he has carefully read and examined the Drawings, the annexed proposed AGREEMENT and the Specifications and other Contract Documents therein referred to and knows and understands the terms and provisions thereof;

(5) The Bidder understands that information relative to subsurface and other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) has been furnished only for his information and convenience without any warranty or guarantee, expressed or implied, that the subsurface and/or other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) actually encountered will be the same as those shown on the Drawings or in any of the other Contract Documents and he agrees that he shall not use or be entitled to use any such information made available to him through the Contract Documents or otherwise or obtained by him in his own examination of the site, as a basis of or ground for any claim against the Owner, Owner's Representative, or the Consulting Engineer arising from or by reason of any variance which may exist between the aforesaid information made available to or acquired by him and the subsurface and/or other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) actually encountered during the construction work, and he has made due allowance therefore in this BID;

(6) The Bidder understands that the quantities of work tabulated in this BID or indicated on the Drawings or in the Specifications or other Contract Documents are only approximate and are subject to increase or decrease as deemed necessary by the Engineer; and he agrees that, if this BID is accepted he will contract with the Owner, as provided in the copy of the Contract Documents deposited in the office of the Owner's Representative, this BID Form being part of said Contract Documents, and that he will perform all the work and furnish all the materials and equipment, and provide all labor, services, plant, machinery, apparatus, appliances, tools, supplies and all other things required by the Contract Documents in the manner and within the time therein prescribed and according to the requirements of the Owner's Representative as therein set forth, and that he will take in full compensation therefore the total dollar amount tabulated from the actual measured quantities of said work and each unit or lump sum price stated in this BID as hereinafter set forth.
(Note: All entries in the entire BID must be made clearly and in ink; price bid must be written in both words and figures.)

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Item No.	Item with Unit Bid Price Written in Words (and figures)	Quantity	Unit	Amount
1.0	Mobilization _____ dollars and _____ cents ($)	1	LS	$ _____
2.0	Site Preparation & Demoliton _____ dollars and _____ cents ($)	1	LS	$ _____
3.0	Unclassified / Earth Excavation _____ dollars and _____ cents ($)	1,900	CY	$ _____
4.0	Gravel Borrow _____ dollars and _____ cents ($)	1,515	CY	$ _____
5.0	Crushed Stone _____ dollars and _____ cents ($)	150	CY	$ _____
6.0	Trimming & Fine Grading _____ dollars and _____ cents ($)	14,400	SY	$ _____
7.0	Excavation, Handling, On-Site Placement and/or Loading of PCB Impacted Soils _____ dollars and _____ cents ($)	350	CY	$ _____
8.0	Bituminous Base Course-Class 12.5 Intermediate HMA _____ dollars and _____ cents ($)	150	TON	$ _____
9.0	Bituminous Concrete Class 12.5 Surface Course HMA _____ dollars and _____ cents ($)	150	TON	$ _____
10.0	Underdrain System _____ dollars and _____ cents ($)	955	LF	$ _____
11.0	Area Drain & Piping _____ dollars and _____ cents ($)	1	LS	$ _____
12.0	Core-Drill Existing Drainage Structure _____ dollars and _____ cents ($)	12	EA	$ _____
13.0	Gutter Dain Inlet Drainage Structure _____ dollars and _____ cents ($)	2	EA	$ _____

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Item No.	Item with Unit Bid Price Written in Words (and figures)	Quantity	Unit	Amount
14.0	8" Dia. Ductile Iron Drainage Pipe _____ dollars and _____ cents ($)	55	LF	$ _____
15.0	Adjust Drainage/Utility Structure Frame and Grate/Cover _____ dollars and _____ cents ($)	25	EA	$ _____
16.0	Reconstruct Drainage/Utility Structure Frame and Grate/Cover _____ dollars and _____ cents ($)	7	EACH	$ _____
16.1	Frame and Round Cover _____ dollars and _____ cents ($)	2	EACH	$ _____
17.0	Sewer Clean Out - Extend and Reset _____ dollars and _____ cents ($)	1	EA	$ _____
18.0	Water Service Extension at Pier _____ dollars and _____ cents ($)	2	EA	$ _____
19.0	Water Line Connection & Appurtenances _____ dollars and _____ cents ($)	1	LS	$ _____
20.0	Granite Curb - Type VA1 - Straight _____ dollars and _____ cents ($)	95	LF	$ _____
21.0	Granite Curb - Type VA1 - Curved _____ dollars and _____ cents ($)	50	LF	$ _____
22.0	Granite Curb - Type VA4 - Straight _____ dollars and _____ cents ($)	170	LF	$ _____
23.0	Granite Curb - Type VA4 - Curved _____ dollars and _____ cents ($)	550	LF	$ _____
24.0	Geotextile Separation Fabric _____ dollars and _____ cents ($)	1300	SY	$ _____
25.0	Walkway Type A - 6" Broom Finish Concrete _____ dollars and _____ cents ($)	250	SY	$ _____
26.0	Walkway Type B - 4" Broom Finish Concrete _____ dollars and _____ cents ($)	3050	SY	$ _____

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Item No.	Item with Unit Bid Price Written in Words (and figures)	Quantity	Unit	Amount
27.0	ADA Tactile Warning Plate _____ dollars and _____ cents ($)	30	SF	$ _____
28.0	Remove & Reset Exist. Bollards _____ dollars and _____ cents ($)	2	EA	$ _____
29.0	Bench _____ dollars and _____ cents ($)	6	EA	$ _____
30.0	Bicycle Hitch _____ dollars and _____ cents ($)	6	EA	$ _____
31.0	Entrance Gate _____ dollars and _____ cents ($)	1	EA	$ _____
32.0	Landscape Boulder _____ dollars and _____ cents ($)	30	EA	$ _____
33.0	Pedestrian Railing System _____ dollars and _____ cents ($)	1	LS	$ _____
34.0	Modification to Existing Boardwalk System _____ dollars and _____ cents ($)	1	LS	$ _____
35.0	Imported Loam for Lawn (6" Depth) _____ dollars and _____ cents ($)	1550	CY	$ _____
36.0	Seeding _____ dollars and _____ cents ($)	8,800	SY	$ _____
37.0	Imported Loam for Planting Beds _____ dollars and _____ cents ($)	800	CY	$ _____
38.0	Landscape Plantings _____ dollars and _____ cents ($)	1	LS	$ _____
39.0	Irrigation System _____ dollars and _____ cents ($)	1	LS	$ _____
40.0	Misc. Concrete Foundations for Slabs and Utility Work _____ dollars and _____ cents ($)	20	CY	$ _____

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Item No.	Item with Unit Bid Price Written in Words (and figures)	Quantity	Unit	Amount
41.0	Concrete Transformer Slab, Oil Containment Curb & Steel Bollards _____ dollars and _____ cents ($)	1	LS	$ _____
42.0	Concrete Foundation for Main Circuit Breaker Cabinet _____ dollars and _____ cents ($)	1	EA	$ _____
43.0	Concrete Foundation for Power Panel / Conex Panel _____ dollars and _____ cents ($)	4	EA	$ _____
44.0	Concrete Foundation for Light Pole _____ dollars and _____ cents ($)	32	EA	$ _____
45.0	2" Schedule 40 PVC Electrical Conduit _____ dollars and _____ cents ($)	2250	LF	$ _____
46.0	4" Schedule 40 PVC Electrical Conduit _____ dollars and _____ cents ($)	1350	LF	$ _____
47.0	4" PVC, Type DB, Electrical Conduit, Concrete Encasement _____ dollars and _____ cents ($)	325	LF	$ _____
48.0	Electric Handhole - Type B _____ dollars and _____ cents ($)	6	EA	$ _____
49.0	Primary Electric Pullbox _____ dollars and _____ cents ($)	1	EA	$ _____
50.0	500 MCM Copper Cable _____ dollars and _____ cents ($)	3,700	LF	$ _____
50.1	#6 Copper Cable _____ dollars and _____ cents ($)	11,500	LF	$ _____
50.2	1/0 Copper Cable _____ dollars and _____ cents ($)	400	LF	$ _____
50.3	#10 Copper Cable _____ dollars and _____ cents ($)	2,300	LF	$ _____
50.4	#3 Copper Cable _____ dollars and _____ cents ($)	900	LF	$ _____

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Item No.	Item with Unit Bid Price Written in Words (and figures)	Quantity	Unit	Amount
50.5	#8 Copper Cable _____ dollars and _____ cents ($)	6	LF	$ _____
51.0	Main Circuit Breaker Cabinet _____ dollars and _____ cents ($)	1	EA	$ _____
52.0	Power Panel - 400 AMP Panel _____ dollars and _____ cents ($)	3	EA	$ _____
53.0	Conex Panel _____ dollars and _____ cents ($)	1	EA	$ _____
54.0	Light Pole & Luminaires (All Types) _____ dollars and _____ cents ($)	32	EA	$ _____
55.0	Type C Lights - Uplights _____ dollars and _____ cents ($)	2	EA	$ _____
56.0	Pier Signage _____ dollars and _____ cents ($)	27	SF	$ _____
57.0	Pier Sign Post _____ dollars and _____ cents ($)	10	EA	$ _____
58.0	Pavement Striping _____ dollars and _____ cents ($)	1	LS	$ _____
59.0	Project Demobilization and Close-Out _____ dollars and _____ cents ($)	1	LS	$ _____

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Item No.	Item with Unit Bid Price Written in Words (and figures)	Quantity	Unit	Amount

Allowances

A.1	Owner Testing of Imported Materials Six Thousand dollars and Zero cents ($ 6,000)	1	ALL	$6,000.00
A.2	Police / Traffic Protection Ten Thousand dollars and Zero cents ($ 10,000)	1	ALL	$10,000.00
A.3	Haul & Dispose of Excess PCB Impacted Soils Seven Thousand dollars and Zero cents ($ 7,000)	1	ALL	$7,000.00

TOTAL CONTRACT SUM PROPOSED $ _____
(BASE BID)

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Bid Form Part C Allowances

As part of the Base Bid (Total Bid), the Bidder agrees to carry quantities of materials below in the base bid of the contract. The Owner reserves the right to remove these items from the contract totally or in part and to adjust the contract sum to reflect the actual costs of the construction authorized by the Owner. Unit prices reflect replacement with suitable materials.

ALLOWANCE NO. 1 Owner Testing of Imported Materials

The Base Bid Price listed in the Bid Proposal shall include testing of all imported materials to be tested and certified as clean.

Owner Testing of Imported Materials

$6,000	$ Six Thousand
Lump Sum	In Words

ALLOWANCE NO. 2 Police / Traffic Protection

An allowance of Ten-Thousand Dollars ($10,000.00) shall be provided to address this item. The Contractor shall be responsible for reviewing proposed work operations with the Engineer/Owner's Representative and shall coordinate and ensure the proper police detail is present to maintain orderly traffic flow and provide the necessary traffic protection.
The Contractor shall provide documentation of the days and manhours required. The amount reimbursed will be the amount that is stated on the permit receipt(s). Unused allowances not expended for Police Detail for Traffic Protection shall be reimbursed to the Owner

Owner Testing of Imported Materials

$10,000	$ Ten Thousand
Lump Sum	In Words

ALLOWANCE NO. 3 Haul & Dispose of Excess PCB Impacted Soils

This Allowance shall include the trucking and tipping fees for the removal and legal disposal of PCB Impacted Soils from the site as determined to be excess. Material shall not be removed from the site without inspection and approval by the Owner's Representative. Payment shall be a reimbursement of the actual cost incurred per the actual weight shown on the certified scales slips from the Receiving Facility. The Contractor shall coordinate directly with the Engineer to meet all regulatory requirements per D.O.T., EPA, DEP and the Toxic Substances Control Act (TSCA) inclusive of all shipping manifests and pertinent forms related to proper transportation and legal disposal off site at no additional cost.

Haul & Dispose of Excess PCB Impacted Soils

$7,000	$ Seven Thousand
Lump Sum	In Words

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Bid Form Part D ADD ALTERNATES

Add Alternates as quoted are for price adjustments to the Base Bid prior to Contract Award. The Add Alternate indicated will adjust the Bid Proposal price by the stated amount, not replace the Base Bid, provided that the Alternate is selected by the Owner.

Alternates will be executed at the Owner's option. None of the Add Alternates, One of the Add Alternates or One-or-More of the Add Alternates may be chosen in any order. Accepted Alternates will be listed in the Owner/Contractor Agreement.

ADD ALTERNATE NO. 1 Geo-Reinforced Turfgrass

Geo-Reinforced Turfgrass : Eliminate 835 SY of Loam & Seed at Loam & Seed Area B. Install Geo-Reinforced Turfgrass system, as detailed.

Total Cost Adjustment for this Item:

ADD _____ ($ Figures) 1 LS

_____ Dollars/Cents

The undersigned agrees that for extra work, if any, performed in accordance with the terms and provisions of the annexed form of AGREEMENT, he will accept compensation as stipulated therein as full payment for such extra work.

If the Bid is accepted by the OWNER, the undersigned agrees to commence work under this Contract on a date to be specified in a written "Notice to Proceed" by the Owner and complete the entire work provided to be done under this Contract within the time stipulated in Table "A" of Section 0200. If this Bid is accepted by the Owner, the undersigned, also agrees to comply with the provisions within AIA Form of Agreement and AIA 201 General Conditions as outlined in Table A of Section 0200.

As provided in the INFORMATION FOR BIDDERS, the Bidder hereby agrees that he will not withdraw this BID, within 90 consecutive calendar days after the actual date of the opening of Bids, and that, if the Owner shall accept this BID, the bidder will duly execute and acknowledge the AGREEMENT and furnish, duly executed and acknowledged, the required CONTRACT BONDS within fourteen (14) consecutive calendar days after notification that the AGREEMENT and other Contract Documents are ready for signature.

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ADDENDA

In completing this Bid Form Proposal the bidder hereby acknowledges the receipt of, and has included in this Bid, the following Addenda:

(To be filled in by Bidder, if Addendums are issues.)

Addendum No. _____, dated _____

Addendum No. _____, dated _____

Addendum No. _____, dated _____

Addendum No. _____, dated _____

Addendum No. _____, dated _____

The Bidder is a corporation or limited liability company organized incorporated in the State of _____ - a partnership - an individual. (Bidder must add and delete as necessary to make this sentence read correctly.)

(Note: If the Bidder is a corporation, affix corporate seal and give below the names of its president treasurer, and general manager, if any; if a partnership, give full names and residential addresses of all partners; and if an individual, give residential address, if different from business address.)

The required names and addresses of all persons interested in the foregoing Bid, as Principals, are as follows:

_____

_____

_____

_____

(Add supplementary pages if necessary)

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CERTIFICATE OF AUTHORIZATION
FOR
BIDDING REPRESENTATIVE

(Note: The Bidder must complete for certification of authorized representative signing the Bid.)

At a duly authorized meeting of the Board of Directors, Members or Managers of the

_____ held on _____, (Name of Corporation or Limited Liability Company) (Date)

at which all the Directors, Members or Managers were present or waived notice, it was voted that

_____ _____
(Name of Authorized Representative) (Title)

of this company shall be, and hereby is, authorized to execute bidding documents, contracts and bonds in the name and on behalf of said company, and, if applicable to affix the corporate seal thereto, and such execution of any contract obligation in this company's name.

_____shall be valid and binding upon this company. (Title)

A true copy

ATTEST_____
(Clerk, Secretary, Member or Manager)

Place of Business_____

_____

I hereby certify that I am the Clerk of the _____
(Name of Corporation)

_____, that _____
(Name of Authorized Representative)

is the duly elected _____ of said company, and that the
(Title)

above vote has not been amended or rescinded and remains in full force and effect as of the date of this contract.

Corporate
_____Seal (if applicable)
(Clerk, Secretary, Member or Manager)

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STATEMENT OF BIDDERS' QUALIFICATIONS

The following shall accompany the Bid and is required as evidence of the Bidder's qualifications to perform the work, as bid upon, in accordance with the contract drawings and specifications. This statement must be notarized. All questions must be answered. Any additional data may be submitted on separate attached sheets.

1. Name of Bidder_____

2. Permanent Main Office Address_____

3. Official Mailing Address For This Contract_____

4. When Organized?_____

5. Where Incorporated, If a Corporation_____

6. Years Contracting under Present Name_____

7. Provide a list of contracts on hand. Identify those similar in nature to this kind of project.

Owner	Engineer	Contract	Description	Contract Amount	Completion Date

8. Identify and list any work the firm has failed to complete and state where and why.

_____

_____

_____

_____

9. Identify and list if you have ever defaulted on any contract and state where and for what reason.

_____

_____

_____

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10. List full names and residences of all principals (i.e.: Officers, Directors, Partners, Owners) interested in this bid.

Name	Residence	Title	Firm

11. Upon request from the Owner, do you agree to furnish detailed financial statements & other related information?

_____

_____

12. List bank references for verifying financial ability of your company.

Name	Address

CONFORMED

13. The undersigned hereby authorized and requests any person, firm or corporation, to furnish all information requested by the Owner and/or its designated agents relative to the recitals comprising this Statement of the Bidder's Qualifications.

Dated at _____ this _____ day of _____20_____.

_____
(Name of Bidder)

By: _____

_____
(Title)

State of _____

County of _____

_____ being duly sworn in person, deposes and says

that he is _____ of _____,
(Title) (Name of Bidder)

that he is the firm's duly authorized agent to execute these contract documents, and that the

answers to the foregoing questions and all statements therein contained are correct and true.

Subscribed and sworn to before me this _____ day of _____ 20_____.

(SEAL)

_____
(Notary Public)

_____
(My Commission Expires)

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STATEMENT OF PROPOSED SUBCONTRACTORS

The following shall accompany the Bid and is required as evidence of the Bidder's overall qualifications to perform the work as bid upon, in accordance with the contract drawings and specifications. The Bidder must state the names and appurtenant information of all major subcontractors proposed to be utilized to complete the work as bid upon. Additional data may be submitted on separate attached sheets. If subcontractors are not to be used to complete the Work and/or any portion thereof, as herein bid upon, the Bidder must acknowledge by writing "NONE" _____.

1. Description of Work_____

   Approximate percentage of Total Bid_____

   Proposed Subcontractor, Name_____

   Address_____

2. Description of Work_____

   Approximate percentage of Total Bid_____

   Proposed Subcontractor, Name _____

   Address _____

3. Description of Work _____

   Approximate percentage of Total Bid _____

   Proposed Subcontractor, Name _____

   Address _____

4. Description of Work _____

   Approximate percentage of Total Bid _____

   Proposed Subcontractor, Name _____

   Address _____

5. Description of Work _____

   Approximate percentage of Total Bid _____

   Proposed Subcontractor, Name _____

   Address _____

CONFORMED

6. Description of Work_____

Approximate percentage of Total Bid_____

Proposed Subcontractor, Name_____

Address_____

7. Description of Work_____

Approximate percentage of Total Bid_____

Proposed Subcontractor, Name _____

Address _____

8. Description of Work _____

Approximate percentage of Total Bid _____

Proposed Subcontractor, Name _____

Address _____

9. Description of Work _____

Approximate percentage of Total Bid _____

Proposed Subcontractor, Name _____

Address _____

10. Description of Work _____

Approximate percentage of Total Bid _____

Proposed Subcontractor, Name _____

Address _____

11. Description of Work _____

Approximate percentage of Total Bid _____

Proposed Subcontractor, Name _____

Address _____

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The Bidder shall complete above descriptions of work, listing work as a percentage of Total BID, and provide the subcontractors' names and addresses.

This is to certify that all names of the above-mentioned subcontractors are submitted with full knowledge and consent of the respective parties.

The Bidder warrants that none of the proposed subcontractors have any conflict of interest as respects this contract.

Date _____

Bidder

_____

(Name of Bidder)

By

_____

(Signature)

_____

(Title)

_____

(Business Address)

_____

(City and State)

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BIDDERS EXPERIENCE RECORD
[Attach continuation sheets as necessary to fully respond to each item below]

I. CONTRACTOR PERSONNEL & TEAM:
The following shall be answered fully and completely by the Bidder to assist the Town in making a determination of the most responsible, qualified and lowest eligible bidder:

1. If a Sole Proprietor or Partnership furnish the names, and addresses of all persons and parties identified as owners, partners or principals of such sole proprietorship or partnership.
   _____

_____

_____

_____

2. If a Corporation, furnish the names of all officers, directors and shareholders, or if a Limited Liability Company, furnish the names of members, managers and officers.

_____

_____

_____

_____

3a. Name and provide qualifications for the on-site Project Foreman/Superintendent to be in charge of the Project if so awarded. Identify and state years with the Bidder. This person shall be on the Project site on a daily basis and shall be responsible for the Bidder's conduct of this Project. No later substitutions will be allowed except if granted in writing by the Owner upon review of the proposed substitute's qualifications.

Name:
_____

3b. Qualifications: Provide a list of up to five similar projects with contact information for owner of the project, the above identified Project Foreman/Superintendent has supervised and an approximate dollar value for the work responsible for in regard to each project listed. Provide relevant years of experience and any related training certifications and/or licenses.

1._____

2._____

3._____

4._____

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5._____

Years of Experience _____Certifications/Licenses_____ __

II. PROJECTS: Perspective Bidders must have successfully constructed a minimum of two (2) Timber Frame structures or similar (in regard to style, size and shape, and trades involved as well as details, complexity and fit and finish) as representative projects within the last 5 years.

1. List at least two (2) related projects the Bidder has completed in the last 5 years and provide the respective construction dollar value that meets the descriptions provided above. Give the information indicated for each project:

   Project No. 1 – The project name, on-site Foreman/Superintendent, location and brief description of the project.

_____

_____

_____

_____

Name, address and telephone # of owner for whom the project was completed.

_____

_____

Contact Name, address and telephone # of the owner's project manager.

_____

_____

_____

Identify any work accomplished by subcontractor and identity subcontractor.

_____

_____

_____

Identify the approximate contract value of the project.

_____

Identify the approximate dates the project was accomplished.

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Project No.2 – The project name, on-site foreman, location and brief description of the project.

Name, address and telephone # of owner for whom the project was completed.

Contact Name, address and telephone # of the owner's project manager.

Identify any work accomplished by subcontractor and identity subcontractor.

Identify the approximate contract value of the project.

Identify the approximate dates the project was accomplished.

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Project No. 3 – The project name, on-site foreman, location and brief description of the project.

_____

_____

_____

_____

_____

_____

_____

Name, address and telephone # of owner for whom the project was completed.

_____

_____

Contact Name, address and telephone # of the owner's project manager.

_____

_____

Identify any work accomplished by subcontractor and identity subcontractor.

_____

_____

_____

_____

Identify the approximate contract value of the project.

_____

Identify the approximate dates the project was accomplished.

_____

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III. BACKGROUND:

1. How many years has the Bidder been in business as a general contractor?

_____

2. If in business prior to present under another name, list below and give dates:

_____

3. Please list all other projects of similar scope that have been accomplished by the Bidder in the last 5 years. Include the name and telephone number of the awarding authority's project manager in charge of the project.

_____

_____

_____

_____

_____

_____

_____

_____

4. Please list all other projects of similar scope that are currently under contract or that the Bidder has bid on and expects to undertake in the time-period from Spring of 2021 to the Spring of 2022. Include the name and telephone number of the awarding authority's project manager in charge of the projects listed.

_____

_____

_____

_____

_____

_____

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5. Has the Bidder or any of its sub-contractors ever failed (or been alleged in a written notice, demand for arbitration or complaint to have failed) to satisfactorily complete any work awarded to it? If so, state details briefly, including any such matters that have gone to hearing, the agency, court, or other body hearing the matter and its outcome.

_____

_____

_____

6. Has the Bidder ever been cited by the Massachusetts Department of Environmental Protection for a Notice of Violation (NOV). If yes provide the details.

_____

_____

_____

_____

7. Have any of the sub-contractors identified and carried in this Bid Form Proposal ever been cited by the Massachusetts Department of Environmental Protection and received a Notice of Violation (NOV). If yes provide the details.

_____

_____

_____

_____

8. If the Bidder has been pre-qualified by any Town, State or Governmental agency please state the name and contact information for the government or agency that made the qualification determination and the URL for the website if any, on which such prequalification is published.

_____

_____

_____

_____

9. In the past five years, has any project on which the Bidder was general contractor been the subject of a recorded mechanic's or materialman's lien or a lien enforcement litigation. If so, please provide the name of and contact information for the owner of the project in question.

_____

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_____

10. If the Bidder has been responsible for constructing a project that has been recognized by the building or architecture industry and has received acknowledgements, awards, or other types of recognition in regard to standards of excellence and quality within the building and construction industry please identify the nature of the recognition and provide any related details.

_____

_____

_____

_____

By submittal of this Proposal, the Bidder agrees with the Owner that the amount of the bid security represents the amount of damage the Owner will suffer due to the failure of the Bidder to fulfill the terms of the Bid.

The undersigned representative of the Bidder hereby certifies that (i) he or she is duly authorized to execute the Bid on behalf of the Bidder identified below and legally bind the Bidder to the terms thereof; (ii) such Bidder is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work; and (iii) all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and shall furnish documentation of successful completion of said course to the Owner upon the Owner's written request.

Full legal name of Bidder (if a corporation or limited liability company, is filed with the Massachusetts Secretary of State):
_____

By:_____
(signature and Title of authorized representative)

Business Address: _____

City and State: _____

Telephone No.: _____

Email Address: _____

Date: _____

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*The bidder is a corporation incorporated in the state of _____
As a partnership; an individual.

*NOTES:

1. Bidder must add and delete as necessary to make this sentence above read correctly.

2. If the Bidder is a corporation, affix corporate seal and give below the names of its president, treasurer, and general manager; if a partnership, give full names and residential addresses of all partners; and, if an individual, give residential address if different firm business address.

Corporation

President _____

General Manager _____

Corporate Seal

Partnership

Partner

_____
_____
_____

Partner

_____
_____
_____

Partner

_____
_____
_____

Partner

_____
_____
_____

Partner

_____
_____
_____

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CONFORMED

SECTION 00400

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we the undersigned (Insert Name of Bidder) _____ _____, as Principal, and (Insert Name of Surety) _____, as Surety, are hereby held and firmly bound and obligated unto the Fall River Redevelopment Authority as the Owner, in the sum of _____Dollars ($_____), as liquidated damages for payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

The condition of the above obligation is such that whereas the Principal has submitted to the Fall River Redevelopment Authority a certain Bid attached hereto and hereby made a part hereof, to enter into a contract in writing, hereinafter referred to as the "AGREEMENT" and/or "Contract", for "IFB #21-30 City Pier Site Improvements.

NOW THEREFORE,

(a) If said BID shall be rejected or withdrawn as provided in the INFORMATION FOR BIDDERS attached hereto or, in the alternative,

(b) If said BID shall be accepted and the Principal shall duly execute and deliver the form of AGREEMENT attached hereto and shall furnish the specified bonds for the faithful performance of the AGREEMENT and/or Contract and for the payment for labor and materials furnished for the performance of the AGREEMENT and/or Contract,

then this obligation shall be void, otherwise it shall remain in full force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder in no event shall exceed the amount of this obligation.

The Surety, for value received, hereby agrees that the obligations of said Surety and its bond shall in no way be impaired or affected by any extensions of the time with which such BID may be accepted and said Surety does hereby waive notice of any such extensions.

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IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, have duly executed this bond on the
_____ day of _____, 20 _____.

(SEAL) _____ L.S.
(Name of Principal)

BY: _____
(Signature)

_____
(Title)

_____
(Name of Surety (Seal)

BY: _____
(Signature and Title)

BY: _____
Attorney-In-Fact

Sealed and delivered in
the presence of:

_____

_____

IMPORTANT: Surety Companies executing BONDS must appear on the U.S. Treasury Department's most current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts and be authorized to transact business in the state where the PROJECT is located.

If the Bond is signed on behalf of the Surety by an Attorney-In-Fact, there should be attached, a duly certified copy of his power of attorney showing his authority to sign such Bond.

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SECTION 00500

CONTRACT AGREEMENT

Fall River Redevelopment Authority
City Pier Site Improvements
IFB # 21-30

THIS AGREEMENT, is executed this _____ day of _____ in the year Two Thousand and Twenty-one (herein referred to as the "AGREEMENT") by and between the Fall River Redevelopment Authority, a Massachusetts public body politic and corporate under M.G.L. c. 121B party of the first part, and _____ (Name of Contractor) party of the second part.

Whereas, the Fall River Redevelopment Authority is the owner of property held as general corporate property and located on the west side of Davol Street, Fall River, Massachusetts pursuant to an Order of Taking recorded at the Bristol County Fall River District Registry of Deeds in Book 1405, Page 225 (the property is known as the "City Pier"); and

Whereas, the City Pier is located within the Waterfront Urban Renewal Plan district; and

Whereas, the Fall River Redevelopment Authority wishes to allow the public to temporarily access the City Pier until such time as the Fall River Redevelopment Authority determines a permanent development plan for the City Pier; and

Whereas, in order to accommodate such temporary public use certain improvements need to be made to the City Pier; and

Whereas, these improvements are being made without a formal dedication of the land to any permanent public use and are being made with a full reservation of all rights by the Fall River Redevelopment Authority to alter or remove said improvements or change the use of said Property in the future;

Now, therefore, for good and valuable consideration the parties hereby agree as follows:

WITNESSETH, that the parties to these presents, each in consideration of the undertakings, promises, and agreements on the part of the other herein contained, have undertaken, promised, and agreed and do hereby undertake, promise, and agree, the party of the first part for itself, its successors and assigns, and the party of the second part for himself and his heirs, executors, administrators, successors and assigns, as follows:

1.01 Definitions
1.02 The Contract Documents
1.03 Obligations and Liability of Contractor
1.04 Authority of the Engineer
1.05 Supervision of Work
1.06 Insurance
1.07 Patents
1.08 Compliance with Laws
1.09 Provisions Required by Law Deemed Inserted
1.10 Permits
1.11 Not to Sublet or Assign
1.12 Delay by Owner
1.13 Time for Completion
1.14 Liquidated Damages
1.15 Night, Saturday, Sunday and Holiday Work
1.16 Employ Competent Persons
1.17 Employ Sufficient Labor and Equipment
1.18 Intoxicating Liquors and/or Drugs
1.19 Access to Work
1.20 Examination of Work
1.21 Defective Work, Etc.
1.22 Protection Against Water and Storm
1.23 Right to Materials
1.24 Changes
1.25 Extra Work

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1.26 Extension of Time on Account of Extra Work
1.27 Changes Not to Affect Bonds
1.28 Claims for Damages
1.29 Abandonment of Work or Other Default
1.30 Prices for Work
1.31 Moneys May Be Retained
1.32 Formal Acceptance
1.33 Progress Estimates
1.34 Partial Acceptance
1.35 Final Estimate and Payment
1.36 Liens
1.37 Claims
1.38 Application of Moneys Retained
1.39 No Waiver
1.40 Liability of Owner
1.41 Guarantee
1.42 Return of Drawings
1.43 Cleaning Up
1.44 Legal Address of Contractor
1.45 Headings
1.46 Modification or Termination
1.47 Direct Labor cost
1.48 Massachusetts Tax Laws
1.49 Minority Business
1.50 Termination for Convenience
1.51 Equal Employment Opportunity…
1.52 Unlawful Conduct and Participation in Boycott
1.53 Miscellaneous

1.01 DEFINITIONS

Wherever the words hereinafter defined or pronouns used in their stead occur in the Contract Documents, they shall have the following meaning indicated which shall be applicable to both the singular and plural thereof:

ADDENDA - Written or graphic instruments prior to the opening of Bids which Clarify, correct or change the Bidding Requirements or Contract Documents.

AGREEMENT - the written contract between Owner and Contractor covering the Work to be performed.

"AS DIRECTED," "AS ORDERED," "AS REQUESTED," "AS REQUIRED", "AS PERMITTED," or words of like import are used, it shall be understood that the direction, order, request, requirement, or permission of the Engineer is intended.

"APPROVED," "ACCEPTABLE," "SUITABLE," "SATISFACTORY," and words of like import shall mean approved by, acceptable to, suitable to, or satisfactory to the Engineer.

APPLICATION FOR PAYMENT - Form used by Contractor in requesting progress or final payments, format to be acceptable to the Engineer.

BID - The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

BIDDER - Any person, firm or corporation submitting a bid for the work.

CHANGE ORDER - A document recommended by the Engineer, which is signed by the Contractor and Owner authorizing the addition, deletion or revision in the Work, or adjustment in the Contract Price or Contract Time, issued on or after the effective date of the Agreement.

CONTRACTOR - The person, firm or corporation with whom the Owner has entered into the Agreement. Contract Bonds - Bid, Performance, and Labor and Materials Bonds and other instruments of security furnished by the Contractor and his surety in accordance with the Contract Documents.

CONTRACT DOCUMENTS - The Agreement, Addenda, IFB # 21-30, Contractor's Bid, Post Bid documentation submitted prior to the Notice Award, The Notice to Proceed, Bonds, General Conditions, Supplementary Conditions, The Specifications, the Drawings, all written Amendments, Change Orders, Field Orders, and Engineers written interpretations and clarifications.

CONTRACT PRICE - The total monies payable to the Contractor under the terms and conditions of the Contract Documents.

CONTRACT TIME - The number of calendar days stated in the Contract Documents for the completion of the Work.

CONSTRUCTION SUPERINTENDENT/FOREMAN That person designated by the Contractor to carry out the provisions of the Contract.

DATUM OR LEVELS - The figures given in the Contract and Specifications or upon the Drawings after the word elevation or abbreviation of it, shall mean the distance in feet above mean sea level, the base of the State in which the Work is located and the United States Geodetic Survey (U.S.G.S.).

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DRAWINGS - The part of the Contract Drawings which show the characteristics and Scope of the Work to be performed and which have been prepared or approved by the Engineer.

EARTH - Wherever used as the name of an excavated material or material to be excavated, shall mean all kinds of material other than rock as defined in this section.

ELEVATION - The figures given on the Drawings or in the other Contract Documents after the word "elevation" or abbreviation of it shall mean the distance in feet above the datum adopted by the Engineer.

ENGINEER - The person, firm or corporation duly appointed by the Owner to undertake the duties and powers herein assigned to the Engineer, acting either directly or through duly authorized representatives. The terms “Architect” and “Owner’s Representative” may be used interchangeable with Engineer. (For this Contract, BETA Group, Inc.)

FIELD ORDER - A written order issued by the Engineer which orders minor changes in the Work which do not involve a change in the Contract Price or an extension of the Contract time.

GENERAL REQUIREMENTS - Sections of Division 1 of the Specifications.

"HEREIN," "HEREINAFTER," "HEREUNDER," and words of like import shall be deemed to refer to the Contract Documents.

NOTICE OF AWARD - The written notice of the acceptance of the Bid from the Owner to the successful Bidder.

NOTICE TO PROCEED - Written communication issued by the Owner to the Contractor authorizing him to proceed with the Work and establishing the date of commencement of the Work.

OWNER - The public body or authority, corporation, association, firm or person with whom the Contractor has entered into the Agreement and for whom the Work is to be provided.

PROJECT OR CONTRACT - The undertaking to be performed in the Contract Documents.

PROJECT REPRESENTATIVE - The authorized representative of the Owner who is assigned to the project site or any part thereof.

ROCK - wherever used as the name of an excavated material to be excavated, shall mean only boulders and pieces of concrete and masonry exceeding 1 cu. yd. in volume, or igneous, sedimentary, metamorphic, and conglomerate rock which, in the opinion of the Engineer, requires, for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power-operated tool. No soft or disintegrated rock which can be removed with a hand pick or power-operated excavator or shovel, no loose, shaken, or previously blasted rock or broken stone in rock fillings, or elsewhere, and no rock exterior to the maximum limits of measurement allowed, which may fall into the excavation, will be measured or allowed as "rock."

SHOP DRAWINGS - All drawings, diagrams, schedules and other data or information prepared for and submitted by the Contractor, to illustrate portions of the Work.

SPECIFICATIONS - The portions of the Contract documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

SUBCONTRACTOR - An individual, firm or corporation, approved by the Owner and Engineer having a direct contract with the Contractor or with any other Sub-Contractor for the performance of a part of the Work on the Project.

SUBSTANTIAL COMPLETION - Date certified by the Engineer when construction is sufficiently complete, in accordance with the Contract Documents, so the Owner can occupy or utilize the Work or designated portion thereof for which it was intended, as expressed in the Contract documents.

SUPPLEMENTARY CONDITIONS - The part of the Contract Documents which amends or supplements the General Conditions.

SUPPLIER - Any person or organization who supplies materials or equipment for the Work, including that fabricated to a special design, but who does not perform labor at the site.

WRITTEN NOTICE - Any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed when posted by certified or registered mail to the said party at his last given address or delivered in person to said party or his authorized representative on the Work.

WORK - The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work includes and is the result of performing or furnishing

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labor and furnishing and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents.

1.02 THE CONTRACT DOCUMENTS

A. The Contract Documents, as defined above, are incorporated herein and are sometimes herein referred to as the "Contract".

The Contract Documents are complementary, and what is called for by anyone shall be as binding as if called for by all. In the event of any conflict or inconsistency between the provisions of the AGREEMENT and the provisions of any of the other Contract Documents, the provisions of the AGREEMENT shall prevail.

A. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the edition of the standard specification, manual, code or laws or regulations identified in the reference. In the event a particular edition is not identified, the reference shall mean the latest amended edition in effect at the time of receipt of the Bid. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall change the duties and responsibilities of the Owner, the Contractor or the Designer, or any of their consultants, agents or employees from those set forth in the Contract Documents, nor shall it be effective to assign to the Engineer, or any of the Engineer's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the work or any duty or authority to undertake responsibility contrary to the provisions of the AGREEMENT.

1.03 OBLIGATIONS AND LIABILITY OF CONTRACTOR

A. The Contractor shall do all the work and perform and furnish all the labor, services, materials, equipment, plant, machinery, apparatus, appliances, tools, supplies and all other things (except as otherwise expressly provided herein) necessary and as herein specified for the proper performance and completion of the Work in the manner and within the time hereinafter specified, in strict accordance with the Drawings, Specifications and other Contract Documents, in conformity with the directions and to the satisfaction of the Engineer, and at the prices herein agreed upon therefor.

B. All parts of the Work and all fixtures, equipment, apparatus and other items indicated on the Drawings and not mentioned in the Specifications, or vice versa, and all work and material usual and necessary to make the work complete in all its parts, including all incidental work necessary to make it complete and satisfactory and ready for use and operation, whether or not they are indicated on the Drawings or mentioned in the Specifications, shall be furnished and executed the same as if they were called for both by the Drawings and by the Specifications.

C. The Contractor shall coordinate his operations with those of any other contractors who may be employed on other work of the Owner, shall avoid interference therewith, and shall cooperate in the arrangements for storage of materials and equipment.

D. The Contractor shall conduct his work so as to interfere as little as possible with private business and public travel. Wherever and whenever necessary or required, he shall maintain fences, furnish watchmen, maintain lights, and take such other precaution as may be necessary to protect life and property.

E. The Contractor shall indemnify and save harmless the Owner and the Engineer and their officers, agents, servants and employees, from and against any and all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses, including attorneys' fees, on account of bodily injury, sickness, disease or death sustained by any person or persons or injury or damage to or destruction of any property, directly or indirectly arising out of, relating to or in connection with the Work, whether or not due or claimed to be due in whole or in part to the active, passive or concurrent negligence or fault of the Contractor, his officers, agents, servants or employees, any of his subcontractors, or any of their respective officers, agents, servants or employees and/or any other person or persons, and whether or not such claims, demands, suits or proceedings are just, unjust, groundless, false or fraudulent; and the Contractor shall and does hereby assume and agrees to pay for the defense of all such claims, demands, suits and proceedings, provided, however, that the Contractor shall not be required to indemnify the Engineer, his officers, agents, servants or employees, against any such damages occasioned solely by defects in maps, plans, drawings, designs or specifications prepared, acquired or used by the Engineer and/or solely by the negligence or fault of the Engineer; and provided further, that the Contractor shall not be required to indemnify the Owner, his officers, agents, servants or employees, against any such damages occasioned solely by acts or omissions

CONFORMED

of the Owner other than supervisory acts or omissions of the Owner in the Work.

F. The Contractor shall have complete responsibility for the Work and the protection thereof, and for preventing injuries to persons and damage to the Work and property and utilities on or about the Work, until final completion and final acceptance thereof. He shall in no way be relieved of his responsibility by and right of the Engineer to give permission or directions relating to any part of the Work, by any such permission or directions given, or by failure of the Engineer to give such permission or directions. The Contractor shall bear all costs, expenses, losses and damages on account of the quantity or character of the Work or the nature of the land (including but not limited to subsurface conditions) in or under or on which the Work is done being different from that indicated or shown in the Contract Documents or from what was estimated or expected, or on account of the weather, elements, or other causes.

G. The Contractor shall conduct his operations so as not to damage existing structures or work installed either by him or by other contractors. In case of any such damage resulting from his operations, he shall repair and make good as new the damaged portions at his own expense with the consent of the damaged party. In the event that consent is not given, the Contractor shall continue liable for the damage caused.

H. The Contractor shall be as fully responsible to the Owner for the acts and omissions of his subcontractors, their officers, agents, servants and employees as he is for his own acts and omissions and those of his own officers, agents, servants and employees.

I. Should the Contractor sustain any loss, damage or delay through any act or omission of any other contractor or any subcontractor of any such other contractor, the Contractor shall have no claim against the Owner therefor, other than for an extension of time, but shall have recourse solely to such other contractor or subcontractor.

J. If any other contractor or any subcontractor of any such other contractor shall suffer or claim to have suffered loss, damage or delay by reason of the acts or omissions of the contractor or of any of his subcontractors, the Contractor agrees to assume the defense against any such claim and to reimburse such other contractor or subcontractor for such loss or damage.

K. The Contractor agrees to and does hereby indemnify and save harmless the Owner from and against any and all claims by such other contractors or subcontractors alleging such loss, damage or delay from and against any and all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses, including attorneys' fees, arising out of, relating to or resulting from such claims.

L. The Contractor shall promptly pay all federal, state and local taxes which may be assessed against him in connection with the Work or his operations under the AGREEMENT and/or the other Contract Documents, including, but not limited to, taxes attributable to the purchase of material and equipment, to the performance of services, and the employment of persons in the prosecution of the Work.

M. Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material

1. The site is regulated by both Massachusetts Department of Environmental Protection (Mass DEP) and the US Environmental Protection Agency. The Owner shall be responsible for any existing Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material uncovered or revealed at the site. The Owner shall not be responsible for any such materials brought to the site by the Contractor, Subcontractors, Suppliers or anyone else for whom the Contractor is responsible.

1.04 AUTHORITY OF THE ENGINEER

A. The Engineer shall be the sole judge of the intent and meaning of the Drawings and Specifications and his decisions thereon and his interpretation thereof shall be final, conclusive and binding on all parties.

B. The Engineer shall be the Owner's Representative during the life of the Contract and he shall observe the Work in progress on behalf of the Owner. He shall have authority (1) to act on behalf of the Owner to the extent expressly provided in the Contract or otherwise in writing; (2) to determine the amount, quality, acceptability and fitness of all work, materials and equipment required by the Contract; and (3) to decide all questions which arise in relation to the Work, the execution thereof, and the fulfillment of the Contract.

C. The Contractor shall proceed without delay to perform the work as directed, instructed, determined or decided by the Engineer and shall comply promptly with such directions, instructions, determinations or decisions. If the Contractor has any objection thereto he may, within ten (10) days of having received any

CONFORMED

such direction, instruction, determination or decision, require that any such direction, instruction, determination or decision be put in writing and within ten (10) days after receipt of any such writing he may file a written protest with the Owner stating clearly and in detail his objections, the reasons therefor, and the nature and amount of additional compensation, if any, to which he claims he will be entitled thereby. A copy of such protest shall be filed with the Engineer at the same time it is filed with the Owner. Unless the Contractor requires that any such direction, instruction, determination or decision be put in writing within ten (10) days of having received such direction, instruction, determination or decision and unless the Contractor files such written protest with the Owner and Engineer within such ten (10) day period, he shall be deemed to have waived all grounds for protest of such direction, instruction, determination, or decision and all claims for additional compensation or damages occasioned thereby, and shall further be deemed to have accepted such direction, instruction, determination, or decision as being fair, reasonable, and finally determinative of his obligations and rights under the Contract.

1.05 SUPERVISION OF WORK

A. The Contractor shall be solely responsible for supervision of the Work, shall give the work the constant attention necessary to ensure the expeditious and orderly progress thereof, and shall cooperate with the Engineer in every possible way.

B. At all times, the Contractor shall have his agent on the Work a competent superintendent capable of reading and thoroughly understanding the Drawings and Specifications, with full authority to execute the directions of the Engineer without delay and to supply promptly such labor, services, materials, equipment, plant, apparatus, appliances, tools, supplies and other items as may be required. Such superintendent shall not be removed from the Work without the prior written consent of the Engineer. If, in the opinion of the Engineer, the superintendent or any successor proves incompetent, the Contractor shall replace him with another person approved by the Engineer; such approval, however, shall in no way relieve or diminish the Contractor's responsibility for supervision of the Work.

C. Whenever the Contractor or his agent or superintendent is not present on any part of the Work where it may be necessary to give directions or instructions with respect to such work, such directions or instructions may be given by the Engineer to and shall be received and obeyed by the designated foreman or any other person in charge of the particular work involved.

1.06 INSURANCE

A. Before starting and until final completion and acceptance of the Work and expiration of the guarantee period provided for in the AGREEMENT the Contractor shall procure and maintain insurance of the types specified in paragraphs (1) to (11), inclusive, below, and to the limits for this insurance specified in Table A at the end of this section. All insurance shall be obtained from companies satisfactory to the Owner and Engineer.

B. Insurance shall be in such forms as will protect the Contractor from all claims and liability for damages for bodily and personal injury, including accidental death, and for property damage, which may arise from operations under the Contract, whether such operations be by himself, his subcontractors, or by anyone directly or indirectly employed or engaged by him.

C. The Fall River Redevelopment Authority, (Owner) and the Engineer shall be named as an "additionally insured".

D. All insurance policies provided by the Contractor shall include a "*Waiver of Subrogation*" endorsement for the Owner, Engineer and/or other third-party entity.

E. The following types of insurance shall be provided on all policies:

1. Workmen's Compensation and Employer's Liability Insurance.

2. General Liability coverage, including Bodily Injury Insurance for operations and completed operations and Contractor's Protective Bodily Injury Insurance.

3. General Liability coverage, including Property Damage Insurance for operations and completed operations and Contractor's Protective Property Damage Insurance, each including coverage for injury to or destruction of wires or pipes and similar property and appurtenant apparatus and the collapse of or structural injury to any building or structure except those on which work under the Contract is being done. Blasting and explosion coverage shall be obtained if there is a need for blasting under the Contract, and no blasting shall be performed until such insurance has been secured.

4. Bodily Injury Insurance covering the operation of all motor vehicles owned by the Contractor.

5. Personal Injury Insurance to cover claims for personal injury and including claims brought by employees.

6. Property Damage Insurance covering the operation of all motor vehicles owned by the Contractor.

7. Insurance to cover bodily injuries and property damage resulting from the use of motor vehicles not owned by the Contractor, while such vehicles are being operated in connection with the prosecution of the Work.

8. Contractual Liability Insurance covering the liability assumed by the Contractor under the fifth paragraph of that subsection titled "Obligations and Liability of Contractor" of this AGREEMENT.

9. Owner's/Contractor's Protective Liability and Property Damage Insurance to protect the Owner and the Engineer against claims for Property damage and for bodily injuries, including accidental death, caused by the operations of the Contractor or his subcontractors on the Work. The policy shall indicate the Owner and the Engineer as the named insured. A copy of the policy shall be furnished to the Owner and a Certificate of Insurance shall be furnished to the Engineer.

10. Excess/Umbrella Liability Coverage shall be provided in accordance with the minimum limits stated in Table A.

11. Builders' Risk Insurance with an "All Risk" Installation Floater covering loss by fire and extended coverage in the completed value form in the amount of the total insurable value of all structures, materials, and equipment to be built and installed. The insurance shall be obtained from a company satisfactory to the Owner. The policy shall indicate Owner, the Contractor, all subcontractors, and the Engineer as the named insured with loss payable to the Owner as Trustee. The policy shall provide for a 30-day notice to the Owner of cancellation or restrictive amendment. A copy of the policy shall be furnished to the Owner and a Certificate of Insurance shall be furnished to the Engineer. The insurance shall be obtained before the work is started and shall be maintained until the date of completion of the work as stated in the final estimate, or until the Owner occupies or otherwise take possession of the structure, whichever occurs first.

F. All policies shall be so written that the Owner will be notified in writing of cancellation or restrictive amendment at least 30 days prior to the effective date of such cancellation or amendment.

G. Certificates from the Contractor's insurance carriers stating the coverage provided, the limits of liability, and expiration dates shall be filed in triplicate with the Owner before operations are begun.

H. Certificates from the contractor naming the Owner, The Fall River Redevelopment Authority, and the Engineer as additionally insured must be received by the Owner prior to initiating the work.

I. Renewal certificates must be furnished by the Contractor prior to the expiration date of any of the initial insurances.

J. No insurance required or furnished hereunder shall in any way relieve the Contractor of or diminish any of his responsibilities, obligations and liabilities under the Contract.

1.07 PATENTS

A. The Contractor's attention is directed to the following "Patent Indemnity Clause" illustrating the format and/or required wording therefore which shall be used by all manufacturers and/or suppliers, as deemed necessary by the Owner and Engineer, as an Indemnification and Hold Harmless Agreement.

B. This Agreement shall be accepted and approved in form by the Owner and Engineer prior to the approval and/or installation of the product.

PATENT INDEMNIFICATION

"In consideration for their purchase and use of the (Name of product and/or equipment) manufactured by (name of Manufacturer) and for other good and valuable consideration, (Name of Manufacturer) agrees to defend and hold harmless (Name of Contractor), BETA Group, Inc., and the (Name of Owner), and their employees and agents, from and against any liability, loss, cost, expense or damage including reasonable attorneys' and accountants' fees incurred by these entities in defending or prosecuting any claim for such liability, loss, cost, expense or damage resulting or arising out of a claim that the use of the above mentioned product and/or equipment delivered hereunder directly infringes any United States Patent, provided that (Name of Manufacturer) is given authority, information, and assistance for the defense of such suit, and (Name of Manufacturer) shall pay all damages and costs assessed against the above named entities for the use of such produce and/or equipment provided, however, that this indemnification shall not apply to equipment of (Name of Contractor) design, and provided further that if the use of such product

and/or equipment is enjoined in any suit, (Name of Manufacturer) shall at its own expense and its option either procure for (name of Contractor) the right to continue the normal use of such produce and/or equipment, replace said product and/or equipment, modify said equipment or refund the purchase price thereof; and provided further that (Name of Manufacturer) indemnity as to use shall not apply to infringement resulting from the use of the produce and/or equipment delivered hereunder in combination with other items where use of the product and/or equipment per se does not constitute infringement."

1.08 COMPLIANCE WITH LAWS

A. The Contractor shall keep himself fully informed of all existing and future federal, state, and local laws, ordinances, rules, and regulations affecting those engaged or employed on the Work, the materials and equipment used in the Work or the conduct of the Work, and of all orders, decrees and other requirements of bodies of tribunals having any jurisdiction or authority over the same. If any discrepancy or inconsistency is discovered in the Drawings, Specifications or other Contract Documents in relation to any such law, ordinance, rule, regulation, order, decree or other requirement, the Contractor shall forthwith report the same to the Engineer in writing. The Contractor shall at all times observe and comply with, and cause all his agents, with all such existing and future laws, ordinances, rules, regulations, orders, decrees and other requirements, and he shall protect, indemnify and save harmless the Owner, its officers, agents, servants and employees, from and against any and all claims, demands, suits, proceedings, liabilities, judgements, penalties, losses, damages, costs and expenses, including attorneys' fees, arising from or based upon any violation or claimed violation of any such law, ordinance, rule, regulation, order, decree or other requirement, whether committed by the Contractor or any of his agents, servants, employees or subcontractors.

1.09 PROVISIONS REQUIRED BY LAW DEEMED INSERTED

A. Each and every provision of law and clause required by law to be inserted in the Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though they were included herein. If through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion.

1.10 PERMITS

A. The Contractor shall, at his own expense, take out and maintain all necessary permits from the county, municipal, or other public authorities; shall give the notices required by law; and shall post all bonds and pay all fees and charges incident to the due and lawful prosecution of the Work.

1.11 NOT TO SUBLET OR ASSIGN

A. The Contractor shall constantly give his personal attention to the faithful prosecution of the Work, shall keep the same under his personal control, shall not assign the Contract or sublet the Work or any part thereof without the previous written consent of the Owner, and shall not assign any of the moneys payable under the Contract, or his claim thereto, unless by and with the like written consent of the Owner and the Surety on the Contract Bonds. Any assignment or subletting in violation hereof shall be void and unenforceable.

B. The Contractor shall not sublet or assign work to a subcontractor(s), for a total in excess of fifty (50) percent of the Contract Price, without prior written approval of the Owner and Engineer.

C. The Contractor shall be fully responsible to the Owner for the acts and omissions of his subcontractors, suppliers, and of persons either directly or indirectly employed by them as he is for the acts and omissions of persons directly employed by him.

D. The Contractor shall cause appropriate provisions, and applicable State or Federal regulations, to be inserted in all subcontractors relative to the work to bind subcontractors to the Contractor by the terms of the Contract Documents insofar as applicable to the work of subcontractors, and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Contract Documents.

E. The Contractor's attention is directed to the fact that nothing contained in this Contract shall create any contractual relation between any subcontractor and the Owner.

1.12 DELAY BY OWNER

A. The Owner may delay the beginning of the Work or any part thereof if the necessary lands or rights-of-way for such work shall not have been obtained. The Contractor shall have no claim for additional

CONFORMED

compensation or damages on account of such delay, but shall be entitled only to any extension of time as hereinafter provided.

1.13 TIME FOR COMPLETION

A. The rate of progress shall be such that the Work shall be performed and completed in accordance with the Contract before the expiration of the time limit stipulated in Table A at the end of this section, except as otherwise expressly provided herein.

B. It is agreed that the rate of progress herein required has been purposely made low enough to allow for the ordinary and foreseeable delays incident to construction work of this character. No extension of time will be given for ordinary or foreseeable delays, inclement weather, or accidents and the occurrence of such will not relieve the Contractor from the necessity of maintaining this rate of progress and completing the Work within the stipulated time limit.

C. If delays are caused by acts of God, acts of Government, unavoidable strikes, extra work, or other cause or contingencies clearly beyond the control or responsibility of the Contractor, the Contractor may be entitled to additional time to perform and complete the Work, provided that the Contractor shall, within ten (10) days from the beginning of such delay notify the Owner in writing, with a copy to the Engineer, of the cause and particulars of the delay. Upon receipt of such notification, the Owner shall review and evaluate the cause and extent of the delay. If, under the terms of the AGREEMENT, the delay is properly excusable, the Owner will, in writing, appropriately extend the time for completion of the Work. (This paragraph will be interpreted to include delays in receipt of equipment provided that the Contractor placed his order and submitted shop drawings for such equipment promptly after execution of the Contract, that he has shown due diligence in following the progress of the order, and that the time required for delivery is in accordance with conditions generally prevailing in the industry.) The Contractor agrees that he shall not have or assert any claim for nor shall he be entitled to any additional compensation or damages on account of such delays.

D. The time in which the Work is to be performed and completed is of the essence of this AGREEMENT.

1.14 LIQUIDATED DAMAGES

A. In case the Contractor fails to complete the Work satisfactorily on or before the date of completion fixed herein or as duly extended as hereinbefore provided, the Contractor agrees that the Owner shall deduct from the payments due the Contractor each month the sum set forth in Table A at the end of this section for each calendar day of delay, which sum is agreed upon not as a penalty, but as fixed and liquidated damages for each day of such delay. If the payments due the Contractor are less than the amount of such liquidated damages, said damages shall be deducted from any other moneys due or to become due the Contractor, and, in case such damages shall exceed the amount of all moneys due or to become due the Contractor, the Contractor or his Surety shall pay the balance to the Owner.

1.15 NIGHT, SATURDAY, SUNDAY AND HOLIDAY WORK

A. No work shall be done at night, on Saturday on Sunday or on a holiday except (1) usual protective work, such as pumping and the tending of lights, (2) work done in case of emergency threatening injury to persons or property, or (3) if all of the conditions set forth in the next paragraph below are met.

B. No work other than that included in (1) and (2) above shall be done at night except when (a) in the sole judgment of the Owner, the work will be of advantage to the Owner and can be performed satisfactorily at night, (b) the work will be done by a crew organized for regular and continuous night work, and (c) in the sole judgment of the Owner and Engineer, adequate noise prevention measures are incorporated into the Work by the Contractor to minimize any noise impact within the work area and (d) the Owner has given written permission for such night work. The Contractor is responsible for obtaining all permits and approvals required.

1.16 EMPLOY COMPETENT PERSONS

A. The Contractor shall employ only competent persons on the Work and shall not employ persons or means which may cause strikes, work stoppages or any disturbances by persons employed by the Contractor, any subcontractor, the Owner, the Engineer or any other contractor. Whenever the Engineer notifies the Contractor in writing that in his opinion any person on the Work is incompetent, unfaithful, disorderly, or otherwise unsatisfactory, or not employed in accordance with the provisions of the Contract, such person shall be discharged from the Work and shall not again be employed on it, except with the written consent of the Engineer.

CONFORMED

1.17 EMPLOY SUFFICIENT LABOR AND EQUIPMENT

A. If in the sole judgment of the Engineer the Contractor is not employing sufficient labor, plant, equipment or other means to complete the Work within the time specified, the Engineer may, after giving written notice, require the Contractor to employ such additional labor, plant, equipment and other means as the Engineer deems necessary to enable the Work to progress properly.

1.18 INTOXICATING LIQUORS AND/OR DRUGS

A. The Contractor shall not sell and shall neither permit nor suffer the introduction and/or use of intoxicating liquors and/or drugs upon or about the Work.

1.19 ACCESS TO WORK

A. The Owner, the Engineer, and their officers, agents, servants and employees may at any and all times and for any and all purposes, enter upon the Work and the site thereof and the premises used by the Contractor, and the Contractor shall at all times provide safe and proper facilities therefor.

1.20 EXAMINATION OF WORK

A. The Engineer shall be furnished by the Contractor with every reasonable facility for examining and inspecting the Work and for ascertaining that the Work is being performed in accordance with the requirements and intent of the Contract, even to the extent of requiring the uncovering or taking down portions of furnished work by the Contractor.

B. Should the work thus uncovered or taken down prove satisfactory, the cost of uncovering or taking down and the replacement thereof shall be considered as extra work unless the original work was done in violation of the Contract in point of time or in the absence of the Engineer or his inspector and without his written authorization, which case said cost shall be borne by the Contractor. Should the work uncovered or taken down prove unsatisfactory, said cost shall likewise borne by the Contractor.

C. Examination of inspection of the Work shall not relieve the Contractor of any of his obligations to perform and complete the Work as required by the Contract.

1.21 DEFECTIVE WORK, ETC.

A. Until acceptance and during the applicable guarantee period thereafter, the Contractor shall promptly, without charge, repair, correct or replace work, equipment, materials, apparatus or parts thereof which are defective, damaged or unsuitable or which in any way fail to comply with or be in strict accordance with the provisions and requirements of the Contract or applicable guarantee and shall pay to the Owner all resulting costs, expenses, losses or damages suffered by the Owner.

B. If any material, equipment, apparatus or other items brought upon the site for use or incorporation in the Work, or selected for the same, is rejected by the Engineer as unsuitable or not in conformity with the Specifications or any of the other Contract Documents, the Contractor shall forthwith remove such materials, equipment, apparatus and other items from the site of the Work and shall at his own cost and expense make good and replace the same and any material furnished by the Owner which shall be damaged or rendered defective by the handling or improper installation by the Contractor, his agents, servants, employees or subcontractors.

1.22 PROTECTION AGAINST WATER AND STORM

A. The Contractor shall take all precautions necessary to prevent damage to the Work by storms or by water entering the site of the Work directly or through the ground. In case of damage by storm or water, the Contractor shall at his own cost and expense make such repairs or replacements or rebuild such parts of the Work as the Engineer may require in order that the finished Work may be completed as required by the Contract.

1.23 RIGHT TO MATERIALS

A. Nothing in the Contract shall be construed as vesting in the Contractor any right of property in the materials, equipment, apparatus and other items furnished after they have been installed or incorporated in or attached or affixed to the Work or the site, but all such materials, equipment, apparatus and other items shall, upon being so installed, incorporated, attached or affixed, become the property of the Owner. Nothing in this subsection shall relieve the Contractor of his duty to protect and maintain all such materials, equipment, apparatus and other items.

CONFORMED

1.24 CHANGES

A. The Owner, through the Engineer, may make changes in the Work and in the Drawings and Specifications therefor by making alterations therein, additions thereto or omissions therefrom. All work resulting from such changes shall be performed and furnished under the pursuant to the terms and conditions of the Contract. If such changes result in an increase or decrease in the Work to be done hereunder, or increase or decrease the quantities thereof, adjustment in compensation shall be made therefor at the unit prices stipulated in the Contract for such work, except that if unit prices are not stipulated for such work, compensation for additional or increased work shall be made as provided hereinafter under the subsection titled "Extra Work"; and for eliminated or decreased work the Contractor shall allow the Owner a reasonable credit as determined by the Engineer.

B. Except in an emergency endangering life or property, no change shall be made unless in pursuance of a written order from the Engineer authorizing the change, and no claim for additional compensation shall be valid unless the change is so ordered.

C. The Contractor agrees that he shall neither have nor assert any claim for or be entitled to any additional compensation for damages or for loss of anticipated profits on work that is eliminated.

1.25 EXTRA WORK

A. The Contractor shall perform any extra work (work in connection with the Contract but not provided for herein) when and as ordered in writing by the Engineer, at the unit prices stipulated in the Contract for such work or, if none are so stipulated, whether (a) at the price agreed upon before such work is commenced and named in the written order for such work, or (b) if the Engineer so elects, for the reasonable cost of such work, as determined by the contractor and approved by the Engineer, plus a percentage of such cost, as set forth below. No extra work shall be paid for unless specifically ordered as such in writing by the Engineer.

B. The Contractor shall submit claim for any extra work within fourteen (14) calendar days of performing said extra work.

C. The cost of extra work done under (b) above shall include the reasonable cost to the Contractor of materials used and equipment installed, common and skilled labor, and foremen, and the fair rental of all machinery and equipment used on the extra work for the period of such use.

D. At the request of the Engineer, the Contractor shall furnish itemized statements for the cost of the extra work ordered as above and give the Engineer access to all records, accounts, bills and vouchers and correspondence relating thereto.

E. The Contractor may include in the cost of extra work the amounts of additional premiums, if any, (other than premiums on bonds) paid on the required insurance on account of such extra work, of Social Security or other direct assessments upon the Contractor's payroll by Federal or other properly authorized public agencies, and of other approved assessments when such assessments are not normally included in payments made by the Contractor directly to his employees, but in fact are, and are customarily recognized as, part of the cost of doing work.

F. The fair rental hourly rate for all machinery and equipment shall be based upon the most recent edition of "Rental Rate Blue Book" published by Equipment Watch or a similar publication approved by the Engineer. Hourly rental rates for machinery and equipment shall be developed by dividing the monthly Blue Book rates by 176 hours per month plus Estimated Hourly Operating Costs (FHWA rate). Rate Adjustment tables shall be utilized for equipment model year and region of operation. If said extra work requires the use of machinery or equipment not already on the site of the Work the cost of transportation, not exceeding a distance of 100 miles, of such machinery or equipment to and from the Work shall be added to the fair monthly rental; provided, however, that this shall not apply to machinery or equipment already required to be furnished under the terms of the Contract.

G. The Contractor shall not include in the cost of extra work any cost or rental of small tools, building, or any portion of the time of the Contractor, his superintendent, or his office and engineering staff.

H. To the cost of extra work done by the Contractor's own forces under (b) above (determined as stated above), the Contractor may add 15 percent to cover his overhead, use of capital, the premium on the Bonds as assessed upon the amount of this extra work, and profit.

I. In the case of extra work done under (b) by a subcontractor the subcontractor shall compute, as above, his cost for the extra work, to which he may add

15 percent as in the case of the Contractor. The Contractor shall be allowed an additional 5 percent of the subcontractor's initial cost for the extra work prior to the 15 percent adjustment, to cover the costs of the Contractor's overhead use of capital, the premium on the Bonds as assessed upon the amount of this work, and profit. Said subcontractor's cost must be reasonable and approved by the Engineer.

J. If extra work is done under (b) above, the Contractor and/or subcontractor shall keep daily records of such extra work. The daily record shall include the names of men employed, the nature of the work performed, and hours worked, materials and equipment incorporated, and machinery or equipment used, if any, in the prosecution of such extra work. This daily record, to constitute verification that the work was done, must be signed both by the Contractor's authorized representative and by the Engineer. A separate daily record shall be submitted for each Extra Work Order.

1.26 EXTENSION OF TIME ON ACCOUNT OF EXTRA WORK

A. When extra work is ordered near the completion of the Contract or at any time during the progress of the Work which unavoidably increases the time for the completion of the Work, and extension of time shall be granted as hereinbefore provided.

1.27 CHANGES NOT TO AFFECT BONDS

A. It is distinctly agreed and understood that any changes made in the Work or the Drawings or Specifications therefor (whether such changes increase or decrease the amount thereof or the time required for its performance) or any changes in the manner of time of payments made by the Owner to the Contractor, or any other modifications of the Contract, shall in no way annul, release, diminish or affect the liability of the Surety on the CONTRACT BONDS given by the Contractor, it being the intent hereof that notwithstanding such changes the liability of the Surety on said bonds continue and remain in full force and effect.

1.28 CLAIMS FOR DAMAGES

A. If the Contractor makes claim for any damages alleged to have been sustained by breach of contract or otherwise, he shall, within ten (10) days after occurrence of the alleged breach or within ten (10) days after such damages are alleged to have been sustained, whichever date is the earlier, file with the Engineer a written, itemized statement of the details of the alleged breach and the details and amount of the alleged damages. The Contractor agrees that unless such statement is made and filed as so required, his claim for damages shall be deemed waived, invalid and unenforceable, and that he shall not be entitled to any compensation for any such alleged damages. Within ten (10) days after the timely filing of such statement, the Engineer shall file with the Owner a copy of the statement, together with his recommendations for action by the Owner.

B. The Contractor shall not be entitled to claim any additional compensation for damages by reason of any direction instruction, determination or decision of the Engineer, nor shall any such claims be considered, unless the Contractor shall have complied in all respects with the Article titled "Authority of the Engineer", including, but not limited to the filing of a written protest in the manner and within the time therein provided.

1.29 ABANDONMENT OF WORK OR OTHER DEFAULT

A. If the Work shall be abandoned, or any part thereof shall be sublet without previous written consent of the Owner, or the Contract or any moneys payable hereunder shall be assigned otherwise than as herein specified, or if at any time the Engineer shall be of the opinion, and shall so certify in writing, that the conditions herein specified as to rate of progress are not being complied with, or that the Work or any part thereof is being unnecessarily or unreasonably delayed, or that the Contractor has violated or is in default under any of the provisions of the Contract, or if the Contractor becomes bankrupt or insolvent or goes or is put into liquidation or dissolution, either voluntarily or involuntarily, or petitions for an arrangement or reorganization under the Bankruptcy Act, or makes a general assignment for the benefit of creditors or otherwise acknowledges insolvency, the happening of any of which shall be and constitute a default under the Contract, the Owner may notify the Contractor in writing, with a copy of such notice mailed to the Surety, to discontinue all Work or any part thereof; thereupon the Contractor shall discontinue such Work or such part thereof as the Owner may designate; and the Owner may, upon giving such notice, by contract or otherwise as it may determine, complete the Work or such part thereof and charge the entire cost and expense of so completing the Work or such part thereof to the Contractor. In addition to the said entire cost and expense of completing the Work, the Owner shall be entitled to reimbursement from the Contractor and the Contractor agrees to pay to the Owner any losses, damages, costs and expenses, including attorney's fees, sustained or incurred by the Owner by reason of any of

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the foregoing causes. For the purposes of such completion the Owner may for itself or for any Contractors employed by the Owner take possession of and use or cause to be used any and all materials, equipment, plant, machinery, appliances, tools, supplies and such other items of every description that may be found or located at the site of the Work.

B. All costs, expenses, losses, damages, attorney's fees and any and all other charges incurred by the Owner under this subsection shall be charged against the Contractor and deducted and/or paid by the Owner out of any moneys due of payable or to become due or payable under the Contract to the Contractor; in computing the amounts chargeable to the Contractor the Owner shall not be held to a basis of the lowest prices for which the completion of the Work or any part thereof might have been accomplished, but all sums actually paid or obligated therefor to effect its prompt completion shall be charged to and against the account of the Contractor. In case the costs, expenses, losses, damages, attorney's fees and other charges together with all payments theretofore made to or for the account of the Contractor are less than the sum which would have been payable under the Contract if the Work had been properly performed and completed by the Contractor, the Contractor shall be entitled to receive the difference, and, in case such costs, expenses, losses, damages, attorneys' fees and other charges, together with all payments theretofore made to or for the account of the Contractor, shall exceed the said sum, the Contractor shall pay the amount of the excess to the Owner.

1.30 PRICES FOR WORK

A. The Owner shall pay and the Contractor shall receive the prices stipulated in the BID made a part hereof as full compensation for everything performed and furnished and for all risks and obligations undertaken by the Contractor under and as required by the Contract.

1.31 MONEYS MAY BE RETAINED

A. The Owner may at any time retain from any moneys which would otherwise be payable hereunder so much thereof as the Owner may deem necessary to complete the Work hereunder and to reimburse it for all costs, expenses, losses, damage and damages chargeable to the Contractor hereunder, in accordance with the States General Laws.

1.32 FORMAL ACCEPTANCE

A. This Agreement constitutes an entire contract for one whole and complete Work or result. Fixing of the date of completion and acceptance of the Work or a specified part thereof shall only be effective when accomplished by a writing specifically so stating and signed by the Owner.

1.33 PROGRESS ESTIMATES

A. Once a month, except as hereinafter provided, the Engineer shall make an estimate in writing of the total amount and value of the work done to the first of the month by the Contractor. The Owner shall retain a percentage of such estimated value, as set forth in Table A at the end of this section, as part security for fulfillment of the Contract by the Contractor and shall deduct from the balance all previous payments made to the Contractor, all sums chargeable against the Contractor and all sums to be retained under the provisions of the Contract.

B. Estimates of lump-sum items shall be based on a schedule dividing each such item into its appropriate component parts together with a quantity and a unit price for each part so that the sum of the products of prices and quantities will equal the Contract price for the item. This schedule must be submitted by the Contractor for and must have the approval of the Engineer before the first estimate becomes due.

C. If the Engineer determines that the progress of the Work will be benefited by the delivery to the site of certain materials and equipment, when available, in advance of actual requirement therefor and if such materials and equipment are delivered and properly stored, protected and insured as determined by the Engineer, the cost to the Contractor or subcontractor as established by invoices or other suitable vouchers satisfactory to the Engineer, less the retained percentages as above provided, may be included in the progress estimates; provided always that there be duly executed and delivered by the Contractor to the Engineer at the same time a Bill of Sale in form satisfactory to the Owner, transferring and assigning to the Owner full ownership and title to such materials or equipment.

D. The Owner shall pay monthly to the Contractor in accordance with General Laws Chapter 30, Section 39, as amended:

1. Within fifteen (15) days (twenty-four (24) days in the case of the Commonwealth) after receipt from the

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Contractor, at the place designated by the Owner if such a place is so designated, of a periodic estimate requesting payment of the amount due for the preceding month, the Owner will make periodic payment to the Contractor for the work performed during the preceding month and for the materials not incorporated in the work but delivered and suitably stored at the site (or at some location agreed upon in writing) to which the Contractor has title or to which a subcontractor has title and has authorized the Contractor to transfer title to the Owner, less (1) a retention based on its estimate of the fair value of its claims against the Contractor and less (2) a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section 39F and less (3) a retention not exceeding five percent of the approved amount of the periodic payment. After the receipt of a periodic estimate requesting final payment and within 65 days after (a) the Contractor fully completes the work or substantially completes the work so that the value of the work remaining to be done is, in the estimate of the awarding authority, less than one percent of original contract price, or (b) the Contractor substantially completes the work and the Owner takes possession for occupancy, whichever occurs first, the Owner shall pay the Contractor the entire balance due on the contract less (1) a retention based on its estimate of the fair value of its claims against the Contractor and of the cost of completing the incomplete and unsatisfactory items of work and less (2) a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section 39 F, or based on the record of payments by the Contractor to the subcontractors under this contract if such record of payment indicates that the Contractor has not paid subcontractors as provided in section 39 F. If the Owner fails to make payment as herein provided, there shall be added to each such payment daily interest at the rate of three percentage points above the rediscount rate than charged by the Federal Reserve Bank of Boston commencing on the first day after said payment is due and continuing until payment delivered or mailed to the Contractor; provided, that no interest shall be due, in any event, on the amount due on periodic estimate for final payment until 15 days (24 days in the case of the Commonwealth) after receipt of such a periodic estimate from the Contractor, at the place designated by the Owner if such a place is so designated. The Contractor agrees to pay to each subcontractor a portion of any such interest in accordance with the amount due each subcontractor.

2. Forthwith after the Contractor receives payment on account of a periodic estimate, the Contractor shall pay to each subcontractor the amount paid for the labor performed and the materials furnished by that subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the Contractor.

3. Not later than the 65th day after each subcontractor substantially completes his work in accordance with the plans and specifications, the entire balance due under the subcontract less amounts retained by the Owner as the estimated cost of completing the incomplete and unsatisfactory items of work, shall be due the subcontractor; and the Owner shall pay that amount to the Contractor. The Contractor shall forthwith pay to the subcontractor the full amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the Contractor.

4. Each payment made by the Owner to the Contractor pursuant to subparagraphs (2) and (3) of this paragraph for the labor performed and the materials furnished by a subcontractor shall be made to the Contractor for the account of that subcontractor; and the Owner shall take reasonable steps to compel the Contractor to make each such payment to each such subcontractor. If the Owner has received a demand for direct payment from a subcontractor for any amount which has already been included in a payment to the Contractor or which is to be included in a payment to the Contractor for payment to the subcontractor as provided in subparagraphs (2) and (3), the Owner shall act upon the demand as provided in this section.

5. If, within 70 days after the subcontractor has substantially completed the subcontract work, the subcontractor has not received from the Contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the Contractor, less any amount retained by the Owner as the estimated cost of completing the incomplete and unsatisfactory items of work, the subcontractor may demand direct payment of that balance from the Owner. The demand shall be by a sworn statement delivered to or sent by certified mail to the Owner, and a copy shall be delivered to or sent by certified mail to the Contractor at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of the subcontract work. Any demand made after substantial completion of the subcontract work shall be valid even if delivered or mailed prior to the 70th day after the subcontractor has substantially completed the subcontract work. Within ten days after the subcontractor has delivered or so mailed the demand to the Owner and delivered or so mailed a copy to the Contractor, the Contractor may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the Owner and a copy shall be delivered to or sent by certified mail to the subcontractor at the same time. The reply shall

contain a detailed breakdown of the balance due under the subcontract including any amount due for extra labor and materials furnished to the Contractor and of the amount due for each claim made by the Contractor against the subcontractor.

6. Within 15 days after receipt of the demand by the Owner, but in no event prior to the 17th day after substantial completion of the subcontract work, the Owner shall make direct payment to the subcontractor of the balance due under the subcontract including any amount due for extra labor and materials furnished to the Contractor, less any amount (i) retained by the Owner as the estimated cost of completing the incomplete or unsatisfactory items of work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the Contractor in the sworn reply; provided, that the Owner shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by subparagraph (5). The Owner shall make further direct payments to the subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this subparagraph.

7. The Owner shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of subparagraph (6) in an interest-bearing joint account in the names of the Contractor and the subcontractor in a bank in Massachusetts selected by the Owner or agreed upon by the Contractor and the subcontractor and shall notify the Contractor and the subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the Contractor and the subcontractor or as determined by decree of a court of competent jurisdiction.

8. All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to subparagraph (7) shall be made out of amounts payable to the Contractor at the time of receipt of a demand for direct payment from a subcontractor and out of amounts which later become payable to the Contractor and in the order of receipt of such demands from subcontractors. All direct payments shall discharge the obligation of the Owner to the Contractor to the extent of such payment.

9. The Owner shall deduct from payments to a Contractor amounts which, together with the deposits in interest-bearing accounts pursuant to subparagraph (7), are sufficient to satisfy all unpaid balances of demands for direct payment received from subcontractors. All such amounts shall be earmarked for such direct payments, and the subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the Contractor.

10. If the subcontractor does not receive payment as provided in subparagraph (2) or if the Contractor does not submit a periodic estimate for the value of the labor or materials performed or furnished by the subcontractor and the subcontractor does not receive payment for same when due less the deductions provided for in subparagraph (2), the subcontractor may demand direct payment by following the procedure in subparagraph (5) and the Contractor may file a sworn reply as provided in that same subparagraph. A demand made after the first day of the month following that for which the subcontractor seeks payment shall be valid even if delivered or mailed prior to the time payment was due on a periodic estimate from the Contractor. Thereafter the Owner shall proceed as provided in subparagraph (6), (7), (8), and (9).

11. "Subcontractor" as used in subparagraph 10,shall mean a person who files a sub-bid and receives a subcontract as a result of that filed sub-bid or who is approved by the Owner in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the Contractor.

1.34 PARTIAL ACCEPTANCE

A. The Owner may, at any time in a written order to the Contractor (1) declare that he intends to use a specified part of the Work which in his opinion is sufficiently complete, in accordance with the Contract Documents, to permit its use; (2) enclose a tentative list of items remaining to be completed or corrected, and (3) fix the date of acceptance of that specified part of the Work.

B. Within 45 days after acceptance under this subsection, the Engineer shall make an estimate in writing of the amount and value of the part of the Work so accepted. The Owner shall pay said amount to the Contractor after deducting therefrom all previous payments, all charges against the Contractor as provided for hereunder, and all amounts to be retained under the provisions of the Contract, said payment to be made at the time of the next monthly progress estimate.

C. Acceptance by the Owner under this subsection shall not relieve the Contractor of any obligations under the Contract Documents except to the extent agreed upon in writing between the Owner and the Contractor.

D. The Owner shall have the right to exclude the Contractor from any part of the Work which has been accepted, but the Owner will allow the Contractor reasonable access thereto to complete or correct items on the tentative list.

1.35 FINAL ESTIMATE AND PAYMENT

A. As soon as practicable (but not more than sixty-five (65) days after final completion of the Work), the Engineer shall make a final estimate in writing of the quantity of Work done under the Contract and the amount earned by the Contractor.

B. The Owner shall pay to the Contractor the entire amount found by the Engineer to be earned and due hereunder after deducting therefrom all previous payments, all charges against the Contractor as provided for hereunder, and all amounts to be retained under the provisions of the Contract. Except as in this subsection otherwise provided, such payment shall be made not later than fifteen (15) days after but in no event before, the expiration of the time within which claims for labor performed or materials or equipment furnished must be filed under the applicable Lien Law, or, if such time is not specified by law, the expiration of thirty (30) days after the completion of the Engineer's final estimate.

C. All quantities shown on progress estimates and all prior payments shall be subject to correction in the final estimate and payment as determined by the Engineer.

D. The acceptance by the Contractor of final payment shall be and shall operate as a release to the Owner of all claims and all liability to the Contractor under or by virtue of this Agreement; and upon satisfactory completion of the work performed under this Agreement, as a condition before final payment under this Agreement or as a termination settlement under this Agreement the Contractor shall execute and deliver to the Owner a release of all claims against the Owner arising under or by virtue of, this Agreement, except claims which are specifically exempted by the Contractor to be set forth herein. Unless otherwise provided in this Agreement, by State law or otherwise expressly agreed to be the parties to this Agreement, any payment, including final payment under, this Agreement or settlement upon termination of this Agreement shall not constitute a waiver of the Owner's claims against the Contractor or his sureties under this Agreement or applicable Performance and Labor and Materials Bonds.

1.36 LIENS

A. If at any time any notices of lien are filed and labor performed or materials or equipment manufactured, furnished, or delivered to or for the Work, the Contractor shall, at its own cost and expense, promptly discharge, remove or otherwise dispose of the same, and until such discharge, removal or disposition, the Owner shall have the right to retain from any moneys payable hereunder an amount which, in its sole judgement, it deems necessary to satisfy such liens and pay the costs and expenses, including attorneys' fees, of defending any actions brought to enforce the same, or incurred in connection therewith or by reason thereof.

1.37 CLAIMS

A. If at any time there be any evidence of any claims for which the Contractor is or may be liable or responsible hereunder, the Contractor shall promptly settle or otherwise dispose of the same, and until such claims are settled or disposed of, the Owner may retain from any moneys which would otherwise be payable hereunder so much thereof as, in its sole judgement, it may deem necessary to settle or otherwise dispose of such claims and to pay the costs and expenses, including attorney's fees, of defending any actions brought to enforce such claims, or incurred in connection therewith or by reason thereof.

1.38 APPLICATION OF MONEYS RETAINED

A. The Owner may apply any moneys retained hereunder to reimburse itself for any and all costs, expenses, losses, damage and damages, liabilities, suits, judgements and awards incurred, suffered or sustained by the Owner and chargeable to the Contractor hereunder or as determined hereunder.

1.39 NO WAIVER

A. Neither the inspection by the Owner or the Engineer, nor any order, measurement, approval, determination, decision or certificate by the Engineer, nor any order by the Owner for the payment of money, nor any payment for or use, occupancy, possession or acceptance of the whole or any part of the Work by the Owner, nor any extension of time, nor any other act or omission of the Owner or of the Engineer shall constitute or be deemed to be an acceptance of any defective or improper work, materials, or equipment nor operate as a waiver of any requirement or provision of the Contract, nor of any remedy, power or right of or herein reserved to the Owner, nor of any right to

damages for breach of contract. Any and all rights and/or remedies provided for in the Contract are intended and shall be construed to be cumulative; and, in addition to each and every other right and remedy provided for herein or by law, the Owner shall be entitled as of right to a writ of injunction against any breach or threatened breach of the Contract by the Contractor, by his subcontractors or by any other person or persons.

1.40 LIABILITY OF OWNER

A. No person, firm or corporation, other than the Contractor who signed this Contract as such, shall have any interest herein or right hereunder. No claim shall be made or be valid either against the Owner or any agent of the Owner and neither the Owner nor any agent of the Owner shall be liable for or be held to pay any money, except as herein provided. The acceptance by the Contractor of the payment as fixed in the final estimate shall operate as and shall be a full and complete release of the Owner and of every agent of the Owner of and from any and all claims, demands, damages and liabilities of, by or to the Contractor for anything done or furnished for or arising out of or relating to or by reason of the Work or for or on account of any act or neglect of the Owner or of an agent of the Owner or of any other person, arising out of, relating to or by reason of the Work, except the claim against the Owner for the unpaid balance, if any there be, of the amounts retained as herein provided.

1.41 GUARANTEE

A. The Contractor guarantees that the Work and services to be performed under the Contract, and all workmanship, materials and equipment performed, furnished, used or installed in the construction of the same, shall be free from defects and flaws, and shall be performed and furnished in strict accordance with the Drawings, Specifications, and other Contract Documents, that the strength of all parts of all manufactured equipment shall be adequate and as specified and that the performance test requirements of the Contract shall be fulfilled. This guarantee shall be for a period of one year from and after the date of completion and acceptance of the Work as stated in the final estimate. If part of the Work is accepted in accordance with that subsection of this AGREEMENT titled "Partial Acceptance", the guarantee for that part of the Work shall be for a period of one year from the date fixed for such acceptance.

B. If at any time within the said period of guarantee any part of the Work requires repairing, correction or replacement, the Owner may notify the Contractor in writing to make the required repairs, correction, or replacements. If the Contractor neglects to commence making such repairs, correction, or replacements to the satisfaction of the Owner within three (3) days from the date of receipt of such notice, or having commenced fails to prosecute such Work with diligence, the Owner may employ other persons to make the same, and all direct and indirect costs of making said repairs, correction or replacements, including compensation for additional professional services, shall be paid by the Contractor.

1.42 RETURN OF DRAWINGS

A. All Drawings furnished by the Owner or the Engineer to the Contractor may be used only in connection with the prosecution of the Work and shall be returned by the Contractor upon completion of the Work.

1.43 CLEANING UP

A. The Contractor at all times shall keep the site of the Work free from rubbish and debris caused by his operations under the Contract. When the Work has been completed, the Contractor shall remove from the site of the Work all of his plant, machinery, tools, construction equipment, temporary work, and surplus materials so as to leave the Work and the site clean and ready for use.

1.44 LEGAL ADDRESS OF CONTRACTOR

A. The Contractor's business address and his office at or near the site of the Work are both hereby designated as places to which communications shall be delivered. The depositing of any letter, notice, or other communication in a postpaid wrapper directed to the Contractor's business address in a post office box regularly maintained by the Post Office Department or the delivery at either designated address of any letter, notice, or other communication by mail or otherwise shall be deemed sufficient service thereof upon the Contractor, and the date of such service shall be the date of receipt. The first-named address may be charged at any time by an instrument in writing, executed and acknowledged by the Contractor delivered to the Engineer. Service of any notice, letter, or other communication upon the Contractor personally shall likewise be deemed sufficient service.

1.45 HEADINGS

A. The headings or titles of any section, subsection, paragraph, provision, or part of the Contract Documents shall not be deemed to limit or restrict the

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content, meaning or effect of such section, subsection, paragraph, provision or part.

1.46 MODIFICATION OR TERMINATION

A. Except as otherwise expressly provided herein, the Contract may not be modified or terminated except in writing signed by the parties hereto.

1.47 DIRECT LABOR COST

A. Direct labor cost percentage for Change Orders shall be _10____ percent. (Direct labor cost percent shall be established following award and prior to execution of the Contract).

1.48 MASSACHUSETTS TAX LAWS

A. The Contractor shall provide a statement that indicates compliance with all the requirements of Massachusetts General Law Chapter 62C.

1.49 MINORITY BUSINESS

A. The goal for minority business enterprise (MBE/WBE) participation for this contract is a minimum of 5 percent**.** WBE participation, on the basis of the total dollars paid. The Contractor shall take all affirmative steps necessary to achieve this goal, and shall provide reports documenting the portion of contract and subcontract dollars paid to minority businesses, and its efforts to achieve the goals, with each invoice submitted or at such greater intervals as specified by the Fall River Redevelopment Authority. The Contractor shall require similar reports from its subcontractors.

1.50 TERMINATION FOR CONVENIENCE

A. This Agreement may be terminated by the Owner upon not less than seven days' written notice for the Owner's convenience. In the case of termination for convenience, the Owner shall be responsible for amounts due the Contractor for work performed through the date of termination, provided that the Contractor shall submit a request for payment in accordance with the provisions hereof. The Contractor shall have no other claim for payments due with respect to such termination including any claim for lost profits with respect to the balance of the project.

1.51 EQUAL EMPLOYMENT OPPORTUNITY, ANTIDISCRIMINATION AND AFFIRMATIVE ACTION

A. The Contractor shall not discriminate against or exclude any person from participation herein on grounds of race, religion, color, sex, age, or national origin; and that it shall take affirmative actions to insure that applicants are employed, and that employees are treated during their employment, without regard to race, religion, color, sex, age, handicapped status, or national origin.

1.52 UNLAWFUL CONDUCT AND PARTICIPATION IN BOYCOTT

A. The Contractor shall not participate in or cooperate with an international boycott, as defined in Section 999 (b) (3) and (4) of the Internal Revenue Code of 1954, as amended, or engage in conduct declared to be unlawful by Section 2 of Chapter 151E of the Massachusetts General Laws.

1.53 Miscellaneous

The Contractor certifies under penalties of perjury that its Bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this paragraph the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

The Contractor certifies, pursuant to M.G.L. c. 62C, § 49A, that under the penalties of perjury that the Contractor complied, is complying, and will comply during the terms of this Agreement with all laws of the Commonwealth of Massachusetts relating to taxes, reporting of employees and contractors, and withholding and remitting of child support.

The Contractor certifies that the execution of this Agreement and the providing of labor, work and materials hereunder by the Contractor and any third party or subcontractor is and shall be in full compliance with the applicable conflict of interest laws including M.G.L. c. 268A and that there are no existing conflicts of interest which would prohibit the Contractor from providing labor, work and materials hereunder.

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The Contractor shall comply with all federal, state and local laws, regulations, bylaws and rules applicable to this Agreement and shall obtain all necessary bonds, licenses, permits and approvals applicable to this Agreement.

All of the applicable provisions of M.G.L. c. 30 and/or c. 149 are incorporated herein by reference.

The Contractor certifies that the said Contractor is not presently debarred, suspended or otherwise prohibited from doing public construction work in the Commonwealth of Massachusetts. Contractor shall immediately notify Town if at any time during the term of this Agreement it becomes debarred, suspended or otherwise prohibited from doing public construction work in the Commonwealth of Massachusetts.

This Agreement is to be construed as a Massachusetts contract, is to take effect as a sealed instrument, and sets forth the entire Agreement between the parties and is binding upon and enures to the benefit of the parties hereto and their respective successors and/or assigns and all parties hereby submit to the jurisdiction and venue of the courts of the Commonwealth of Massachusetts located in Bristol County for all purposes with respect to enforcement of this Agreement and all parties waive any objection to such jurisdiction and venue. If any court of competent jurisdiction holds any portion of this Agreement to be illegal, invalid, or unenforceable, the Town and Contractor agree that any such order shall not affect any other remaining term, clause, phrase, paragraph, section, or provision and all shall remain in full force and effect.

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IN WITNESS WHEREOF, the parties to this AGREEMENT have hereunto set their hands and seals, and have executed, or caused to be executed by their duly authorized officials, the AGREEMENT in Four (4) copies, each of which shall be deemed an original, as of the day and year first above-written.

WITNESSES

The Fall River Redevelopment Authority

(Owner - party of the first part)

(SEAL)

BY: _____
(Signature)

_____
(Title)

ATTEST:

_____
(Signature)

_____

_____
(Contractor - party of the second part)

(SEAL)

BY: _____
(Signature)

_____
(Title)

_____
(Address)

ATTEST:

_____
(Signature)

_____

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CERTIFICATE OF OWNER'S LEGAL COUNSEL

I, the undersigned, _____ the duly authorized and acting legal

representative of the _____, acting herein through its

_____, do hereby certify as follows:

I have examined the foregoing contract and surety bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with the terms, conditions, and provisions thereof.

By: _____
(Signature)

Date: _____

_____
(Name)

_____
(Title)

_____
(Address)

_____
(City, State, Postal code)

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Auditor's/Accountant's Certification

Pursuant to M.G.L. c.44, s31C, I certify that an appropriation has been made in the total amount of the contract.

_____
(Signature)

_____

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CERTIFICATE OF ACKNOWLEDGMENT OF CONTRACTOR IF A CORPORATION

For AGREEMENT

State of _____)

County _____)

on this _____ day of _____, 20 _____, before me personally

came _____ to me known, who being me duly

sworn, did depose and say as follows:

That he resides at _____

and is the _____

of _____

the corporation described in and which executed the foregoing instrument; that he knows the corporate seal of said corporation; that the seal affixed to the foregoing instrument is such corporate seal and it was so affixed by order of the Board of Directors of said corporation; and that by the like order he signed thereto his name and official designation.

_____

Notary Public (Seal)

My commission expires _____

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TABLE A

Agreement Subsection Reference	Item	Minimum limits
1.06	Workman's Compensation and Employer's Liability Insurance	As required by the law of the State of Massachusetts
1.06	General Liability including Contractor's Protective, Completed Operations and Contractual Liability	Bodily Injury/Property Damage including C.U. Coverage _____ **$1,000,000** (Each Occurrence) **$2,000,000** (Aggregate) _____ Blasting and explosion coverage shall be obtained if there is a need for blasting under the contract.
1.06	Personal Injury Insurance	**$2,000,000** (Aggregate)
1.06	Automobile Liability including coverage for owned, hired or borrowed vehicles	Bodily Injury/Property Damage _____ **$1,000,000** Combined Single Limit (Each Occurrence)
1.06	Owner's/Contractor's Protective (OCP) Liability & Property Damage	Bodily Injury/Property Damage _____ **$3,000,000** (Each Occurrence) **$3,000,000** (Aggregate)
1.06	Excess/Umbrella Liability Coverage	**$5,000,000** (Each Occurrence) **$5,000,000** (Aggregate)
1.06	Builder's Risk Insurance (If Applicable)	Total insurable value of all structures, materials, and equipment to be built and installed.
1.13	a) Time of Completion - Total Contract	Within 330 consecutive calendar days after the date specified in the Notice to Proceed
1.14	Liquidated Damages for each consecutive calendar day of delay in completion time.	$ 250.00
1.33	Percentage of Progress Estimates to be Retained	5%

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SECTION 00600

CONTRACT BONDS

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, _____
(an individual, a partnership, a corporation)

duly organized under the Laws of the Commonwealth of _____,

and having a usual place of business at _____,

_____,

as Principal, and _____ , a corporation duly organized

under the Laws of the Commonwealth of _____,

and duly authorized to do business in the Commonwealth of Massachusetts,

and having a usual place of business at _____
as Surety, are holden and stand firmly bound and obligated unto City Fall River, Massachusetts, as an obligee, in the sum of

_____
lawful money of the United States of America, to and for the true payment whereof we bind ourselves and, each of us, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal, be means of a written AGREEMENT (which together with the Contract Documents in said AGREEMENT referred to are collectively sometimes referred to as the "Contract") dated _____ , has entered into a contract with the said obligee for Contract No. _____ in the City Fall River Massachusetts, a copy of which agreement is attached hereto and by references made a part hereof.

NOW THEREFORE, THE CONDITION of this obligation is such that if the Principal shall well and truly keep and fully and faithfully perform all of the terms and conditions of said AGREEMENT and of the "Contract Documents" referred to in said AGREEMENT (which collectively are hereinafter and in said AGREEMENT sometimes referred to as the "Contract") and all modifications thereof on the Principal's part to be performed, this obligation shall be void; otherwise it shall remain in full force and effect.

Whenever the said Principal shall be, and declared by the Owner to be, in default under the said Contract, the Owner having performed the Owner's obligations thereunder Surety, for value received, shall promptly remedy the default, or, at the option of the Owner, shall promptly.

CONFORMED

(a) Complete the said AGREEMENT and/or Contract in accordance with its terms and conditions, or

(b) Obtain a bid or bids for submission to and the approval of the Owner for completing the said AGREEMENT and/or Contract and any modifications thereof in accordance with the terms and conditions thereof, and upon determination by the Owner and the Surety of the lowest responsible and acceptable bidder, arrange for a contract between such bidder and the Owner, and make available to the Owner as the work progresses (even though there should be default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less a sum that shall be equal to the difference between the Contract price as fixed and provided in said AGREEMENT and/or Contract or any modifications thereof to be pair thereunder to the Principal and the amount previously paid by the Owner to and/or for the account of and/or chargeable against the Principal, but not exceeding (including other costs and damages for which the Surety may be liable hereunder) the amount set forth in the first paragraph hereof.

The Surety, for value received, agrees further that no changes in, omissions from, or alterations, modifications or additions to the terms and provisions of said AGREEMENT and/or Contract or the Work to be performed thereunder, and that no extensions of time given or changes made in the manner or time of making payments thereunder, shall in any way effect the Surety's obligations on this bond, and the Surety hereby waives notice of any such changes, omissions, alterations, modifications, additions or extensions.

No right of action shall accrue on this Bond to or for the use of any persons other than the Owner named herein or the heirs, executors, administrators, successors and assigns of the Owner.

CONFORMED

IN WITNESS WHEREOF, we have hereunto set our hands and seals to _____

_____ counterparts of this bond, this _____ day of _____,

in the year Two Thousand and _____.

_____ (SEAL)
Principal

_____ (SEAL)
Principal

_____ (SEAL)
Principal

_____ (SEAL)
Surety

_____ (SEAL)
Surety

NOTE:

If the Principal (Contractor) is a partnership, the Bond should be signed by each of the partners.

If the Principal (Contractor) is a corporation, the Bond should be signed in its correct corporate name by its duly authorized officer or officers.

If this Bond is signed on behalf of the Surety by an attorney-in-fact, there should be attached to it a duly certified copy of his power of attorney showing his authority to sign such Bonds.

There should be executed an appropriate number of counterparts of the Bond corresponding to the number of counterparts of the AGREEMENT.

Date of Bond must not be prior to the date of the Contract.

Important

Surety Companies executing BONDS must appear on the U.S. Treasury Department's most current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts and be authorized to transact business in the state where the PROJECT is located.

The attention of the Surety Companies and Principal executing this Performance Bond is Directed to the fact that said Bond shall remain in full effect throughout the life of any guaranty or warranty periods stipulated in the Contract Documents and/or Agreement.

CONFORMED

LABOR AND MATERIALS BOND

(NOTE: This Bond is issued simultaneously with the attached Performance Bonds in favor of the Owner.)

KNOW ALL MEN BY THESE PRESENTS:

That we, _____
(an individual, a partnership, a corporation)

duly organized under the Laws of the State **(or Commonwealth)** of _____,

having a usual place of business at _____,

_____,

as Principal, and _____a corporation duly organized

under the Laws of the State **(or Commonwealth)** of _____,

and duly authorized to do business in the Commonwealth of Massachusetts,

and having a usual place of business at _____,
as Surety, are holden and stand firmly bound and obligated unto the Fall River Redevelopment Authority, Fall River **,** Massachusetts, as obligee, in the sum of

_____
lawful money of the United States of America, to and for the true payment whereof we bind ourselves and, each of us, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal, be means of a written AGREEMENT (which together with the Contract Documents in said AGREEMENT referred to are collectively sometimes referred to as the "Contract") dated _____ , has entered into a contract with the said obligee for The City Pier Pedestrian Railing System, Contract No. IFB 21-13 the Fall River Redevelopment Authority or Fall River, Massachusetts, a copy of which agreement is attached hereto and by references made a part hereof.

NOW, THEREFORE, THE CONDITION of this obligation is such, that if the Principal shall promptly make payments to all claimants as hereinafter defined, for all labor performed or furnished and for all materials and equipment furnished for or used in or in connection with the Work called for by said AGREEMENT and/or Contract and any modifications thereof, including lumber used but not incorporated in said Work, and for the rental or hire of vehicles, tools and other appliances and equipment furnished for or used in connection with said Work, this obligation shall be void; otherwise it shall remain in full force and effect, subject, however, to the following conditions:

(a) A claimant is defined as one having a direct contract with the Principal or with a subcontractor of the Principal for labor, materials and/or equipment used or reasonably required for use in the performance of the said Work, labor and materials being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental or

CONFORMED

equipment directly applicable to the said AGREEMENT and/or Contract and any modifications thereof.

(b) The above named Principal and Surety hereby jointly and severally agree with the Owner that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, or materials or equipment were furnished by such claimant, may sue on this bond for the use of such claimant, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon. The Owner shall not be liable for the payment of any costs or expenses of any such suit.

(c) No suit or action shall be commenced hereunder by any claimant.

Unless claimant, other than one having a direct contract with the Principal, shall have given written notice to any two of the following: the Principal, the Owner, or the Surety above named, within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials or equipment for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials or equipment were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal, Owner or Surety at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the said Work is located, save that such service need not be made by a public officer;

After the expiration of one (1) year following the date on which the Principal ceased work on said AGREEMENT and/or Contract and any modifications thereof, it being understood, however, that if any limitation embodied in this bond is prohibited by any law controlling the construction hereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

Other than in a state court of competent jurisdiction in and for the county or other political subdivision of the State in which the said Work, or any part thereof, is situated, or in the United States District Court for the district in which the said Work, or any part thereof, is situated, and not elsewhere.

(d) The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics liens which may be filed of record against said AGREEMENT and/Contract or said Work, whether or not claim for the amount of such lien be presented under and against this bond.

The surety, for value received, agrees further that no changes in, omissions from, or alterations, modifications or additions to the terms and provisions of said AGREEMENT and/or Contract or the Work to be performed thereunder, and that no extensions of time given or changes made in the manner or time of making payments thereunder, shall in any way affect the Surety's obligations on this Bond, and the Surety hereby waives notice of any such changes, omissions, alterations, modifications, additions or extensions.

CONFORMED

IN WITNESS WHEREOF, we have hereunto set our hands and seals to _____

counterparts of this Bond, this _____ day of _____, in

the year Two Thousand and _____.

_____ (SEAL)
Principal

_____ (SEAL)
Principal

_____ (SEAL)
Principal

_____ (SEAL)
Surety

_____ (SEAL)
Surety

NOTE:
If the Principal (Contractor) is a partnership, the Bond shall be signed by each of the partners.

If the Principal (Contractor) is a corporation, the Bond shall signed in its correct corporate name by its duly authorized officer or officers.

If this Bond is signed on behalf of the Surety by an attorney-in-fact, there should be attached to it a duly certified copy of his power of attorney showing his authority to sign such Bonds.

There should be executed an approximate number of counterparts of the Bond corresponding to the number of counterparts of the AGREEMENT.

Date of Bond must not be prior to the date of the Contract.

Important

Surety Companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located.

The attention of the Surety Companies and Principal executing this Labor and Materials Bond is directed to the fact that said Bond shall remain in full effect throughout the life of any guaranty or warranty periods stipulated in the Contract Documents and/or Agreement.

CONFORMED

CERTIFICATE OF ACKNOWLEDGMENT OF CONTRACTOR IF A CORPORATION
For CONTRACT BONDS

State of _____

County of _____

On this _____ day of _____, 20 _____, before

me personally came _____ to me known, who being by me duly

sworn, did depose and say as follows:

That he resides at _____

and is the _____

of _____

the corporation described in and which executed the foregoing instrument; that he knows the corporate seal of said corporation; that the seal affixed to the foregoing instrument is such corporate seal and it was so affixed by order of the Board of Directors of said corporation; and that by the like order he signed thereto his name and official designation.

_____
Notary Public (Seal)

My commission expires _____

CONFORMED

STATE TAX CERTIFICATE

Pursuant to M.G.L., Ch. 62C, sec. 49A, I certify under the penalties of perjury that I, to the best of my knowledge and belief, have filed all state tax returns and paid all state taxes required under law.

_____	_____
Social Security Number * Or Federal Identification Number *	Signature of Individual or Corporate Name
	by: _____ Corporate Office (if applicable)

* Submission of a Social Security Number or a Federal Identification Number is voluntary.

CONFORMED

SECTION 00640
Minority Business Enterprise

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SECTION 00700

GENERAL CONDITIONS

1.01 General Provisions
1.02 Definitions
1.03 Materials and Equipment
- A. General
- B. Handling
- C. Storage of Excavated Material
- D. Inspection
- E. Inspection Away from Site
- F. Samples
- G. Shop testing

1.04 Contractor's Shop and Working Drawings
1.05 Occupying Private Land
1.06 Interference with and Protection of Streets
1.07 Safety
1.08 Existing Facilities
- A. Dimensions of Existing Structures
- B. Proposed Pipe Location
- C. Interference with Existing Works
- D. Existing Utilities or Connections
- E. Failure to Repair
- F. Disturbance of Bounds

1.09 Work to Conform
1.10 Planning and Progress Schedules
1.11 Precautions During Adverse Weather
1.12 Temporary Heat
1.13 Electrical Energy
1.14 Certificates of Conformance
1.15 Patents
1.16 "Or Equal" Clause
1.17 Additional or Substitute Bonds
1.18 Separate Contracts
1.19 Payrolls of Contractor and Subcontractors
1.20 Payments by Contractor
1.21 "Dig Safe" Law
1.22 Fire Prevention and Protection
1.23 Dust Control
1.24 Disposal of Debris
1.25 Night, Saturday, Sunday and Holiday Work
1.26 Length of Work Day
1.27 Hurricane Protection
1.28 Reduction in Scope of Work

1.01 GENERAL PROVISIONS

A. The duties and obligations imposed by these General Conditions will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply.

B. Sections of Division 1, General Requirements govern the execution of the Work of all sections of the specifications.

C. The Specifications are written in imperative and streamlined form. This imperative language is directed to the Contractor, unless stated otherwise.

1.02 DEFINITIONS

A. Wherever the words as listed in subsection 1.01 of the AGREEMENT or pronouns used in their stead occur in the Contract Documents, they shall have the meanings as given in the AGREEMENT.

1.03 MATERIALS AND EQUIPMENT

A. General

1. Unless otherwise provided in the Contract Documents, only new materials and equipment shall be incorporated in the Work.

2. As soon as possible after execution of the AGREEMENT, submit to the Engineer the names and addresses of the manufacturers and suppliers of all materials and equipment proposed to be incorporated into the Work.

3. When shop and working drawings are required as specified below, submit, prior to the submission of such drawings, data in sufficient detail to enable the Engineer to determine whether the manufacturer and/or the supplier have the ability to furnish a product meeting the Specifications.

4. Submit data relating to the materials and equipment proposed to be incorporated into the Work in sufficient detail to enable the Engineer to identify and evaluate the particular product and to determine whether it conforms to the Contract requirements. Such data shall be submitted in a manner similar to that specified for submission of shop and working drawings.

B. Handling

1. Handle, haul, and distribute materials and all surplus materials on the different portions of the Work, required to complete the Work in accordance with the Contract Documents.

CONFORMED

2. Provide suitable storage room for materials and equipment during the progress of the Work, and be responsible for the protection, loss of, or damage to materials and equipment furnished under this Contract, until the final completion and acceptance of the Work.

3. Pay all storage and demurrage charges by transportation companies and vendors.

C. Storage of Excavated Material

1. Place excavated materials and equipment to be incorporated in the Work so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the Work.

2. Materials shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.

D. Inspection

1. All materials and equipment furnished by the Contractor to be incorporated in the Work shall be subject to the inspection of the Engineer.

2. No material shall be processed or fabricated for the Work or delivered to the work site without prior concurrence of the Engineer.

3. Facilities and labor for the storage, handling, and inspection of all materials and equipment shall be furnished by the Contractor.

4. Defective materials and equipment shall be removed immediately from the site of the Work.

E. Inspection away from Site

1. If work to be done, away from the construction site, is to be inspected on behalf of the Owner during its fabrication, manufacture, or testing, or before shipment, the Contractor shall give notice to the Engineer of the place and time where such fabrication, manufacture, testing, or shipping is to be done. Such notice shall be in writing and delivered to the Engineer in ample time, as determined solely by the Engineer, so that the necessary arrangements for the inspection can be made.

F. Samples

1. Submit samples of materials for tests, as the Engineer deems necessary to demonstrate conformance with the Specifications. Such samples, including concrete test cylinders, shall be furnished, taken, stored, packed, and shipped by the Contractor as directed by the Engineer.

2. Furnish suitable molds for making concrete test cylinders. Except as otherwise expressly specified, the Owner shall make arrangements for, and pay for, the tests.

3. Pack samples so as to reach their destination in good condition, and label to indicate the material represented, the name of the building or work and location for which the material is intended, and the name of the Contractor submitting the sample. To ensure consideration of samples, notify the Engineer by letter that the samples have been shipped and properly describe the samples in the letter. Send letter of notification separate from the samples.

4. Submit data and samples, or place his orders, sufficiently early to permit consideration, inspection and testing before the materials and equipment are needed for incorporation in the Work. The consequences for failure to do so shall be the Contractor's sole responsibility.

5. In order to demonstrate the proficiency of workmen, or to facilitate the choice among several textures, types, finishes, surfaces, etc., provide such samples of workmanship of wall, floor, finish, etc., as may be required.

6. After review of the samples, data, etc. the materials and equipment used for the Work shall in all respects conform therewith.

G. Shop Testing

1. When required, furnish to the Engineer in triplicate, sworn copies of manufacturer's shop or mill tests (or reports from independent testing laboratories) relative to materials, equipment performance ratings, and concrete data.

1.04 CONTRACTOR'S SHOP AND WORKING DRAWINGS

A. Submit shop drawings to the Engineer for review and approval.

B. All submittals will be identified as the Engineer may require and in the number of copies also as required by the Engineer.

C. The data shown on the Shop Drawings will be complete regarding quantities, dimensions, specified performance and design criteria, materials and other

data as particular to the Work that the Contractor proposes to provide.

1.05 OCCUPYING PRIVATE LAND

A. Entering or occupying with men, tools, materials, or equipment, any land outside the rights-of-way or property of the Owner (except after written consent from the proper parties) will not be permitted. A copy of the written consent shall be given to the Engineer.

1.06 INTERFERENCE WITH AND PROTECTION OF STREETS

A. Obtain permits from the governing authorities prior to obstructing any portion of a street, road, or private way. If any street, road or private way is rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as ordered by the governing authorities.

B. Maintain streets, roads, private ways, and walks not closed in a passable and safe condition,

C. Provide at least 24 hours in advance, notice to the Owner, Police, Fire and School Departments in writing, with a copy to the Engineer, if the closure of a street or road is necessary. Cooperate with all Departments in the establishment of alternate routes and provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.

1.07 SAFETY

A. Take all precautions and provide safeguards to prevent personal injury and property damage. Provide protection for all persons including but not limited to employees and employees of other contractors and subcontractors; members of the public; and employees, agents and representatives of the Owner, the Engineer, and regulatory agencies that may be on or about the Work. Provide protection for all public and private property including but not limited to structures, pipes, and utilities, above and below ground.

B. Provide and maintain all safety equipment such as fences, barriers, signs, lights, walkways, guards and fire prevention and fire-fighting equipment.

C. 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.

D. Designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This responsible person shall have the authority to take immediate action to correct unsafe or hazardous conditions and to enforce safety precautions and programs.

1.08 EXISTING FACILITIES

A. Dimensions of Existing Structures

1. Where the dimensions and locations of existing structures are of importance in the installation or connection of any part of the Work, verify such dimensions and locations in the field before the fabrication of any material or equipment which is dependent on the correctness of such information.

B. Proposed Pipe Location

1. Exterior pipelines will be located substantially as indicated on the Drawings, but the right is reserved to the Owner, acting through the Engineer, to make such modifications in location as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings, etc., are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him for laying and jointing different or additional items where required.

2. Small interior piping is indicated diagrammatically on the Drawings, and the exact location is to be determined in the field. Piping shall be arranged in a neat, compact, and workmanlike manner, with a minimum of crossing and interlacing, so as not to interfere with equipment or access way, and, in general, without diagonal runs.

C. Interference with Existing Works

1. Conduct operations so as to interfere as little as possible with existing works. Develop a program, in cooperation with the Engineer and interested officials, which shall provide for the construction and putting into service of the new works in the most orderly manner possible. This program shall be adhered to except as deviations therefrom are expressly permitted. All work of connecting with, cutting into, and reconstructing existing pipes or structures shall be planned to interfere with the operation of the existing facilities for the shortest time when the demands on the facilities best permit such interference, even though it may be necessary to work outside of normal

CONFORMED

working hours to meet these requirements. Electrical connections should be coordinated with the Owner so as to minimize disruption of normal plant operations. Before starting work which will interfere with the operation of existing facilities, perform preparatory work and see that all tools, materials and equipment are made ready and at hand.

2. Repair utilities damaged by the Contractors operations during the progress of the work, and be responsible for correcting all damages to existing utilities and structures at no additional expense to the Owner. Contact the proper utility or authority to correct or make any changes due to utility or other obstructions during the work but the entire responsibility and expense shall be with the Contractor.

3. Make such minor modifications in the work relating to existing structures as may be necessary, without additional compensation.

4. Submit no claim for additional compensation by reason of delay or inconvenience in adapting his operations to the need for continuous flow of sewage.

D. Existing Utilities or Connections

1. The location of existing underground pipes, conduits, and structures, as shown, has been collected from the best available sources. The Owner, together with its agents, does not imply nor guarantee the data and information in connection with underground pipes, conduits, structures and such other parts as to their completeness, nor their locations as indicated. The Contractor shall assume that there are existing water, sewer, gas and other utility connections to each and every building enroute, whether they appear on the drawings or not. An expense and/or delay occasioned by utilities and structures, or damage thereof, including those not shown, shall be the responsibility of the Contractor, at no additional expense to the Owner.

2. Above ground utilities may be present in the areas of the proposed Work. Take all necessary actions and/or precautions, including, but not limited to, utility company notification and necessary relocations (both temporary and permanent), to insure proper protection of those aboveground utilities and appurtenances to be affected by his operations. All costs associated with the aboveground utilities shall be paid by the Contractor at no additional expense to the Owner.

3. If and when encountered, existing utilities shall be properly supported and protected during the construction work and the Engineer shall be notified accordingly. The operation of existing utilities shall not be interrupted except with written permission of the operator and owner of such utilities. Allow ample time for all measures as may be required for the continuance of existing utility operations. Take extreme precautions to minimize disruption of utilities. Make prompt and full restitution for repairs by others for all disruptions caused by operations required to perform the Work.

4. Comply with all requirements of utility organizations involved.

E. Failure to Repair

1. Any emergency rising from the interruption of electric, telephone, gas, water, or sewer service due to the activities of the Contractor, shall be repaired by the Contractor as quickly as is possible.

2. If and when, in the opinion of the Owner, the Contractor is not initiating repair work as expeditiously as possible upon notification to do so, the Owner, may at his own option, make the necessary repairs using his own forces or those of others. The cost of such repairs shall be subtracted from the payments due to the Contractor.

F. Disturbance of Bounds

1. Replace all bounds disturbed during the construction operation, at no additional cost to the Owner. The bounds shall be relocated by a land surveyor approved by the Engineer and registered in the State that the Work is to be done.

1.09 WORK TO CONFORM

A. During its progress and on its completion, the Work shall confirm to the lines, levels, and grades indicated on the Drawings or given by the Engineer and shall be built in strict accordance with the Contract Documents and the directions given from time to time by the Engineer.

B. All work done without instructions having been given therefore by the Engineer, without proper lines or levels, or performed during the absence of the Engineer, will not be estimated or paid for except when such work is authorized by the Engineer in writing. Work so done may be ordered uncovered or taken down, removed, and replaced at the Contractor's expense.

1.10 PLANNING AND PROGRESS SCHEDULES

A. Before starting the Work and from time to time during its progress, as the Engineer may request, the

Contractor shall submit to the Engineer a written description of the methods he plans to use in doing the Work and the various steps he intends to take.

B. Within 14 calendar days after the date of formal execution of the AGREEMENT, the Contractor shall prepare and submit to the Engineer (a) a written schedule fixing the dates on which additional drawings, if any, will be needed by the Contractor and (b) a written schedule fixing the respective dates for the start and completion of various parts of the Work. Each such schedule shall be subject to review from time to time during the progress of the Work.

1.11 PRECAUTIONS DURING ADVERSE WEATHER

A. During adverse weather and against the possibility thereof, take all necessary precautions so that the Work may be properly done and satisfactory in all respects. When required by the manufacturer of the material or equipment to be installed, protection shall be provided by use of tarpaulins, wood and building-paper shelters, or other suitable means.

B. During cold weather, materials shall be preheated, if required, and the materials and adjacent structure into which they are to be incorporated shall be made and kept sufficiently warm so that a proper bond will take place and a proper curing, aging, or drying will result. Protected spaces shall be artificially heated by suitable means that will result in a moist or dry atmosphere according to the particular requirements of the work being protected. Ingredients for concrete and mortar shall be sufficiently heated so that the mixture will be warm throughout when used.

1.12 TEMPORARY HEAT

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

B. Temporary heating apparatus shall be installed and operated in such manner that finished work will not be damaged.

1.13 ELECTRICAL ENERGY

A. 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. Provide and pay for all temporary wiring, switches, connections, and meters.

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

1.14 CERTIFICATES OF CONFORMANCE

A. Furnish to the Engineer, in the manner as directed and prior to actual installation, notarized certificates of conformance for all materials to be furnished under this Contract. The notarized certificates of conformance shall state that the material to be furnished meets or exceeds all requirements specified under the Contract Documents. When so directed, the manufacturer’s notarized certificates of conformance, certifying that the materials meet the requirements specified shall accompany each shipment of material. Unless otherwise specifically specified and/or directed by the Engineer, all testing of materials required under this Contract shall be provided by the Contractor at no additional expense to the Owner.

1.15 PATENTS

A. Pay, at no additional expense to the Owner, all applicable royalties and license fees associated with the materials and construction methods to be used under this Contract. Defend all suits or claims for infringements of any patent rights, and save the Owner and Engineer harmless from loss on account thereof, except that the Owner shall be responsible for any such loss when a particular process, design, or product of a particular manufacturer (s) is specifically specified with no option to the Contractor. However, if the Contractor has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the Owner.

B. Refer to Specification Section 00500 Article 1.07, Patents, regarding the Contractor's responsibilities for any patent rights associated with the materials and construction methods to be used under this Contract.

1.16 " OR EQUAL" CLAUSE

A. Whenever a material or article required is specified or shown on the drawings by using the name of the proprietary product of a particular manufacturer or vendor, any material or article which will perform adequately, in the Engineer's sole judgment and/or opinion, the duties imposed by the general design may

CONFORMED

be considered equal and satisfactory providing the material or article so proposed is of equal substance. It shall not be purchased or installed without his written approval. In all cases new material shall be used in the project.

B. If more than one brand, name of material, device, or piece of equipment is shown or specified, each should be regarded as the equal of the other. Any other brand, make of material, device or equipment, which in the opinion of the OWNER and/or ENGINEER, is the recognized equal of that specified (considering quality, workmanship, and economy of operation), and is suitable for the purpose intended, may be accepted.

C. ENGINEER will be allowed a reasonable time within which to evaluate submittals for Substitute Items. ENGINEER will be the sole judge of acceptability. No "Or Equal" or Substitute Item will be ordered, installed or utilized without ENGINEER's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any "or equal" or substitute. ENGINEER will record time required by ENGINEER and ENGINEER's Consultants in evaluating substitutes proposed or submitted by CONTRACTOR and in making changes to the Contract Documents. Whether or not ENGINEER accepts a Substitute Item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed Substitute Item.

1.17 ADDITIONAL OR SUBSTITUTE BONDS

A. If at any time the Owner, for justifiable cause, shall be or become dissatisfied with any Surety or Sureties than upon the performance or payment bonds, the Contractor shall, within five (5) calendar days after notice from the Owner so to do, substitute an acceptable bond (or bonds) in such form and sum and signed by such other Surety or Sureties as may be acceptable to the Owner. The Contractor shall pay the premiums on such bonds with no additional expense to the Owner. No further payments shall be deemed due nor will be made until the new Surety or Sureties shall have furnished such as acceptable bond to the Owner.

1.18 SEPARATE CONTRACTS

A. The Owner reserves the right to let other contracts in connection with the construction of the contemplated work of this project or contiguous projects of the Owner. The Contractor, therefore, will afford any such other contractors reasonable opportunity for the introductions and storage of their materials and the execution of their work, will properly connect and coordinate his work with theirs, and will not commit or permit any act which will interfere with the performance of their work.

B. Coordinate operations with those of other contractors. Cooperation will be required in the arrangement for the storage of materials and in the detailed execution of the work.

C. It is essential that all parties interested in the project cooperate to the end that the entire project will be brought to a successful conclusion as rapidly as possible, but the Owner cannot guarantee that no interference or delay will be caused thereby. Interference and delay resulting from such cooperation shall not be basis of claims against the Owner.

1.19 PAYROLLS OF CONTRACTOR AND SUBCONTRACTORS

A. The Contractor and each of his Subcontractors shall prepare his payrolls on forms prescribed and in accordance with instructions to be furnished by the Owner. Within seven (7) days after the regular payment date of the payroll, the Contractor shall deliver to the Owner, with copies to the Engineer, a certified legible copy or copies of each such payroll. Each such payroll shall contain the statement required by the Federal Regulations issued pursuant to the "Anti-Kickback Statute", (48 Stat. 948; 18 U.S.C. 874; 40 U.S.C. 276C).

B. Carrying any person on his payrolls not employed by him will not be permitted. Carrying employees of a subcontractor on his payrolls will not be permitted, but such employees must be carried on the payrolls of the employing subcontractor.

C. Each Contractor or Subcontractor shall preserve his weekly payroll records for a period of three (3) years form the date of completion of the Contract. The payroll records shall set out accurately and completely the name, occupational classification, and hourly wage rate of each employee, hours worked by him during the payroll period and full weekly wages earned by

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him, and deductions made from such weekly wages and the actual weekly waged paid to him. Such payroll records shall be made available at all times for inspection by the Owner or his authorized representatives, the Engineer or by agents of the United States Department of Labor.

1.20 PAYMENTS BY CONTRACTOR

A. Pay for all traffic control, safety, transportation and utility services not later than the 20th day of the calendar month following that in which services are rendered. Reimbursable costs for services rendered, as specified in the Contract Documents, shall not be incorporated into partial payment estimates until such time that the Contractor submits to the Engineer actual paid invoices from those in which services were rendered.

1.21 " DIG SAFE" LAW

A. Before proceeding with construction operations, the Contractor shall notify the State of Massachusetts Underground Plant Damage Prevention Systems (DIG SAFE at 811), and shall make such supplemental investigations, including exploratory excavations, by hand digging, as he deems necessary to uncover and determine the exact locations of utilities and structures, and shall have no claims for damages due to encountering subsurface structures or utilities in locations other than that shown on the drawings, or which were made known to the Contractor prior to construction operations. The Contractor shall be responsible and liable for all damages to the existing utilities and structures.

B. Before commencing with the construction of any work, identify any water main, gas main, telephone duct, electric duct, and/or other utility present which is or could be in conflict with the proposed work.

C. Relocation of the affected utilities shall be done as directed by the Owner and in accordance with the requirements of the utility company.

D. The attention of the Contractor is directed to the fact that certain utility companies may not fall under the provisions of "DIG SAFE". Individual utility company notifications by the Contractor shall be necessary to ensure proper notification and protection of all existing utilities affected by this Contract.

1.22 FIRE PREVENTION AND PROTECTION

A. State and municipal rules and regulations with respect to fire prevention, fire-resistant construction and fire protection shall be strictly adhered to and all work and facilities necessary therefore shall be provided and maintained by the Contractor in an approved manner.

B. Provide fire protection equipment such as water tanks, hoses, pumps, extinguishers, and other materials, and apparatus, for the protection of the contract work, and adjacent property. Trained personnel experiences in the operation of all fire protection equipment and apparatus shall be available on the site whenever work is in progress, and at such other times as may be necessary for the safety of the public and the work.

1.23 DUST CONTROL

A. Exercise every precaution and means to prevent and control dust arising out of all construction operations from becoming a nuisance to abutting property owners or surrounding neighborhoods. Roadway pavement shall be kept clean of excess materials wherever and whenever directed by the Engineer. Repeated daily dust control treatment shall be provided to satisfactorily prevent the spread of dust until all construction operations that might cause dust have been completed. No extra payment will be made for dust control measures, compensation shall be considered to be included in the prices stipulated for the appropriate items as listed in the Bid.

1.24 DISPOSAL OF DEBRIS

A. The materials from the demolition, and those used in the construction of the Work throughout the project, shall be deposited in such a manner so as to not endanger persons or the Work, and so that free access may be had at any time to all hydrants, gates and existing equipment in the vicinity of the work. The materials shall be kept trimmed-up so as to be of as little inconvenience as possible to the public travel and plant operations. All excavated materials not approved for backfill and fill, all surplus material, and all rock and boulders resulting from the excavations, shall be removed and satisfactorily disposed of off the site by the Contractor, at no additional expense to the Owner.

B. The materials being removed from the pipelines and manholes during the cleaning process shall be deposited in such a manner as to not endanger the

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public, plant personnel or persons performing the work. Such debris deposits may be of such nature, high in biological organic contents, or chemically aggressive that they will require proper disposal in a safe, health risk free, environment. Contact the Owner and Engineer and all agencies having jurisdiction thereof, for approval of debris disposal methods and locations of disposal, prior to disposing of any or all debris removed form pipe cleaning methods. All debris shall be removed and satisfactorily disposed of off the work site, at no additional expense to the Owner.

1.25 NIGHT, SATURDAY, SUNDAY AND HOLIDAY WORK

A. No work shall be done at night or on Saturdays, or Sundays or holidays without the prior written approval of the Owner and Engineer.

1.26 LENGTH OF WORK DAY

A. The Owner retains the right to restrict the Contractor to an eight-hour workday. Such restrictions shall not be the basis for damages or claims against the Owner.

B. The Contractor's attentions is also directed to the fact that should it be deemed necessary to perform various items of work during off-peak flow or traffic hours, early morning or late night hours, then he shall notify the Engineer a minimum of 24 hours in advance as to his intentions and reasons for the change in work hours. The Contractor shall be responsible for properly contacting and informing all involved parties of such a change in work hours. The Contractor shall not be entitled to any additional compensation from the Owner for any expenses that may be incurred by change of working hours and/or scheduling.

END OF SECTION

1.27 HURRICANE & SEVERE WEATHER PROTECTION

A. Should hurricane warnings or similar notifications regarding severe weather events be issued, the Contractor shall take every practicable precaution to minimize danger to persons, to the work and to adjacent property. These precautions shall include securing and removing from the site any contaminated materials, closing all excavations and openings; removing all loose materials, tools and/or equipment from exposed locations; and removing or securing building materials, scaffolding, other temporary work, site trailers and or storage containers.

1.28 REDUCTION IN SCOPE OF WORK

A. The Owner reserves the right to decrease the scope of the work to be done under this Contract and to omit any work should the Owner deem it to be in the public interest to do so. To this end, the Owner reserves the right to reduce the quantity of any items or omit all of any as set forth in the BID, either prior to executing the contract or at any time during the progress of the work. The Owner further reserves the right, at anytime during the progress of the work, to restore all or part of any items previously omitted or reduced. Exercise by the Owner of the above rights shall not constitute any ground or basis of claim for damages or for anticipated profits on the work omitted.

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SECTION 00800

SUPPLEMENTARY CONDITIONS

1.01 General
1.02 Contaminated Soils
1.03 Bolts, Anchor Bolts, and Nuts
1.04 Protection Against Electrolysis
1.05 Special Safety Precautions
1.06 Cleaning Finished Work

1.01 GENERAL

A. These Supplementary Conditions are requirements which amend or supplement the General Conditions specified elsewhere.

B. The duties and obligations imposed by these Supplementary Conditions will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply.

C. Assertion of any claim for any additional compensation or damages on account of and/or the fulfillment of these Supplementary Conditions will not be allowed. Contract duration shall be met except by consent of the Owner. Time for completion of work will be extended to such time as the Owner determines will compensate for the time lost by such delay, such determination to set forth in writing.

1.02 CONTAMINATED SOIL

A. Due to the presence of polychlorinated biphenyls (and other contaminants) (PCBs) in soil, the Site is a regulated Site under both the Massachusetts Department of Environmental Protection (MassDEP) and the U. S. Environmental Protection Agency (EPA).
B. The Site has been issued MassDEP Release Tracking Number 4-17012.
C. The planned work will be conducted under an EPA-approved Risk-Based Cleanup Plan (RBCP) and a MassDEP Release Abatement Measure (RAM) Plan.
D. Contractor shall take all necessary health and safety precautions in completing the work including those required by EPA, MassDEP, and OSHA. The Contractor will be responsible for ensuring the health and safety of their workers and subcontractors including provided any needed personal protective equipment.
E. Contractor shall comply with all applicable federal, state and local laws, ordinances, rules and regulations and lawful orders of all authorities having jurisdiction for conducting response actions at the Site. This will include, but is not limited to, complying with all provisions of the RBCP and the RAM Plan.

1.03 BOLTS, ANCHOR BOLTS AND NUTS

A. Furnish bolts, anchor bolts, nuts, washers, plates and bolt sleeves required by equipment to be installed under this Contract in accordance herewith. Anchor bolts shall have suitable washers and, where so required, their nuts shall be hexagonal.

B. Anchor bolts, nuts, washers, plates, and bolt sleeves shall be galvanized unless otherwise indicated or specified.

C. Expansion bolts shall have malleable iron and lead composition elements of the required number of units and size.

D. Unless otherwise specified, stud, tap, and machine bolts, and nuts shall conform to the requirements of ASTM Standard Specification for Carbon Steel Externally and Internally Threaded Standard Fasteners, Designation A307. Hexagonal nuts of the same quality of metal as the bolts shall be used. All threads shall be clean cut and shall conform to ANSI Standard B1.1-1974 for Unified Inch Screw Threads (UN and UNR Thread Form).

E. Bolts, anchor bolts, nuts and washers, specified to be galvanized, shall be zinc coated, after being threaded, by the hot-dip process in conformity with the ASTM Standard Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strip, Designation A123, or the ASTM Standard Specifications for Zinc Coating (Hot Dip) on Iron and Steel Hardware, Designation A153, as is appropriate.

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F. Bolts, anchor bolts, nuts, and washers specified to be stainless steel shall be Type 316 stainless steel unless otherwise indicated or specified.

G. Anchor bolts and expansion bolts shall be set accurately. If anchor bolts are set before the concrete has been placed, they shall be carefully held in suitable templates of acceptable design. Where indicated on the Drawings, specified, or required, anchor bolts shall be provided with square plates at least 4 inches by 4 inches by 3/8 inches or shall have square heads and washers and be set in the concrete forms with suitable pipe sleeves, or both. If anchor or expansion bolts are set after the concrete has been placed, all necessary drilling and grouting or caulking shall be done by the Contractor and care shall be take not to damage the structure or finish by cracking, chipping, spalling, or otherwise during the drilling and caulking.

1.02 PROTECTION AGAINST ELECTROLYSIS

A. Where dissimilar metals are used in conjunction with each other, suitable insulation barriers, fiber shims etc. shall be provided between adjoining surfaces so as to eliminate direct contact and any resultant electrolysis. The insulation shall be bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or by other acceptable materials.

1.03 SPECIAL SAFETY PRECAUTIONS

A. The site is an exposed pier projecting into the tidal Taunton River. The Contractor is required to use care when performing the work adjacent to and over the water.

B. Contractor shall take all necessary safety precautions in completing the work including coordinating with and complying with emergency procedures and requirements of the Owner, Police Department, Fire Department, and the Massachusetts Department of Environmental Protection.

C. The 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. The Contractor shall have all necessary safety apparatus on-site and workers shall be instructed in its use.

1.04 CLEANING FINISHED WORK

A. After the work is complete the constructed elements shall be thoroughly cleaned, inclusive of the concrete sheet pile wall cap, pedestrian railing system, site furnishings, roadway and walkway surfaces, light poles, luminaires, and utility infrastructure and electrical equipment shall be carefully cleaned free of debris, mulch and dirt, concrete, mortar, epoxy, and left in first class condition, ready to use. All temporary or excess materials shall be legally disposed off-site and the Work left broom clean, to the complete satisfaction of the Engineer.

END OF SECTION

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SECTION 00850
Wage Rates

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THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

As determined by the Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

ROSALIN ACOSTA
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority: Fall River Redevelopment Authority

Contract Number: 21-30 **City/Town:** FALL RIVER

Description of Work: Site Improvements on a nearly 4 acre pier including a perimeter walkway, entry drive, lawn areas, lighting and plantings.

Job Location: 600 Davol Street, Fall River, MA 02722

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule from the Department of Labor Standards ("DLS") if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- All apprentices working on the project are required to be registered with the Massachusetts Department of Labor Standards, Division of Apprentice Standards (DLS/DAS). Apprentice must keep his/her apprentice identification card on his/her person during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DLS/DAS regardless of whether or not they are registered with any other federal, state, local, or private agency must be paid the journeyworker's rate for the trade.**
- The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule. Awarding authorities are required to request these updates no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F "rental of equipment" contracts.
- Every contractor or subcontractor which performs construction work on the project is required to submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. A sample of a payroll reporting form may be obtained at http://www.mass.gov/dols/pw.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.
- Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.

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Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2021	$35.95	$12.91	$14.82	$0.00	$63.68
	08/01/2021	$35.95	$13.41	$14.82	$0.00	$64.18
	12/01/2021	$35.95	$13.41	$16.01	$0.00	$65.37
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2021	$36.02	$12.91	$14.82	$0.00	$63.75
	08/01/2021	$36.02	$13.41	$14.82	$0.00	$64.25
	12/01/2021	$36.02	$13.41	$16.01	$0.00	$65.44
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2021	$36.14	$12.91	$14.82	$0.00	$63.87
	08/01/2021	$36.14	$13.41	$14.82	$0.00	$64.37
	12/01/2021	$36.14	$13.41	$16.01	$0.00	$65.56
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR *LABORERS - ZONE 2*	06/01/2021	$35.75	$8.60	$16.64	$0.00	$60.99
	12/01/2021	$36.66	$8.60	$16.64	$0.00	$61.90
	06/01/2022	$37.56	$8.60	$16.64	$0.00	$62.80
	12/01/2022	$38.41	$8.60	$16.64	$0.00	$63.65
	06/01/2023	$39.31	$8.60	$16.64	$0.00	$64.55
	12/01/2023	$40.21	$8.60	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.75	$8.60	$16.64	$0.00	$60.99
	12/01/2021	$36.66	$8.60	$16.64	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASBESTOS WORKER (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)*	12/01/2020	$38.10	$12.80	$9.45	$0.00	$60.35
ASPHALT RAKER *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.73	$13.75	$15.80	$0.00	$80.28
	12/01/2021	$51.88	$13.75	$15.80	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.73	$13.75	$15.80	$0.00	$80.28
	12/01/2021	$51.88	$13.75	$15.80	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95

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Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2*	06/01/2021	$35.75	$8.60	$16.64	$0.00	$60.99
	12/01/2021	$36.66	$8.60	$16.64	$0.00	$61.90
	06/01/2022	$37.56	$8.60	$16.64	$0.00	$62.80
	12/01/2022	$38.41	$8.60	$16.64	$0.00	$63.65
	06/01/2023	$39.31	$8.60	$16.64	$0.00	$64.55
	12/01/2023	$40.21	$8.60	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.75	$8.60	$16.64	$0.00	$60.99
	12/01/2021	$36.66	$8.60	$16.64	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2020	$46.10	$7.07	$17.98	$0.00	$71.15

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$29.97	$7.07	$11.69	$0.00	$48.73
2	65	$29.97	$7.07	$11.69	$0.00	$48.73
3	70	$32.27	$7.07	$12.59	$0.00	$51.93
4	75	$34.58	$7.07	$13.49	$0.00	$55.14
5	80	$36.88	$7.07	$14.38	$0.00	$58.33
6	85	$39.19	$7.07	$15.29	$0.00	$61.55
7	90	$41.49	$7.07	$16.18	$0.00	$64.74
8	95	$43.80	$7.07	$17.09	$0.00	$67.96

Notes:

Apprentice to Journeyworker Ratio:1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (NEW BEDFORD)*	02/01/2021	$55.75	$11.39	$22.09	$0.00	$89.23
	08/01/2021	$57.15	$11.39	$22.25	$0.00	$90.79
	02/01/2022	$57.74	$11.39	$22.25	$0.00	$91.38

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Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 New Bedford*

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.88	$11.39	$22.09	$0.00	$61.36
2	60	$33.45	$11.39	$22.09	$0.00	$66.93
3	70	$39.03	$11.39	$22.09	$0.00	$72.51
4	80	$44.60	$11.39	$22.09	$0.00	$78.08
5	90	$50.18	$11.39	$22.09	$0.00	$83.66

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.58	$11.39	$22.25	$0.00	$62.22
2	60	$34.29	$11.39	$22.25	$0.00	$67.93
3	70	$40.01	$11.39	$22.25	$0.00	$73.65
4	80	$45.72	$11.39	$22.25	$0.00	$79.36
5	90	$51.44	$11.39	$22.25	$0.00	$85.08

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$41.82	$8.60	$17.72	$0.00	$68.14
	12/01/2021	$42.83	$8.60	$17.72	$0.00	$69.15
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$40.67	$8.60	$17.72	$0.00	$66.99
	12/01/2021	$41.68	$8.60	$17.72	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$40.67	$8.60	$17.72	$0.00	$66.99
	12/01/2021	$41.68	$8.60	$17.72	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 2 (Eastern Massachusetts)*	03/01/2021	$43.54	$9.40	$18.95	$0.00	$71.89
	09/01/2021	$44.19	$9.40	$18.95	$0.00	$72.54
	03/01/2022	$44.79	$9.40	$18.95	$0.00	$73.14
	09/01/2022	$45.44	$9.40	$18.95	$0.00	$73.79
	03/01/2023	$46.04	$9.40	$18.95	$0.00	$74.39

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.77	$9.40	$1.73	$0.00	$32.90
2	60	$26.12	$9.40	$1.73	$0.00	$37.25
3	70	$30.48	$9.40	$13.76	$0.00	$53.64
4	75	$32.66	$9.40	$13.76	$0.00	$55.82
5	80	$34.83	$9.40	$15.49	$0.00	$59.72
6	80	$34.83	$9.40	$15.49	$0.00	$59.72
7	90	$39.19	$9.40	$17.22	$0.00	$65.81
8	90	$39.19	$9.40	$17.22	$0.00	$65.81

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.10	$9.40	$1.73	$0.00	$33.23
2	60	$26.51	$9.40	$1.73	$0.00	$37.64
3	70	$30.93	$9.40	$13.76	$0.00	$54.09
4	75	$33.14	$9.40	$13.76	$0.00	$56.30
5	80	$35.35	$9.40	$15.49	$0.00	$60.24
6	80	$35.35	$9.40	$15.49	$0.00	$60.24
7	90	$39.77	$9.40	$17.22	$0.00	$66.39
8	90	$39.77	$9.40	$17.22	$0.00	$66.39

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $30.72/ 3&4 $36.75/ 5&6 $55.37/ 7&8 $61.45

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME *CARPENTERS-ZONE 3 (Wood Frame)*	04/01/2021	$23.16	$7.21	$4.80	$0.00	$35.17
	04/01/2022	$23.66	$7.21	$4.80	$0.00	$35.67
	04/01/2023	$24.16	$7.21	$4.80	$0.00	$36.17

All Aspects of New Wood Frame Work

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER (Wood Frame) - Zone 3*

Effective Date - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$13.90	$7.21	$0.00	$0.00	$21.11
2	60	$13.90	$7.21	$0.00	$0.00	$21.11
3	65	$15.05	$7.21	$0.00	$0.00	$22.26
4	70	$16.21	$7.21	$0.00	$0.00	$23.42
5	75	$17.37	$7.21	$3.80	$0.00	$28.38
6	80	$18.53	$7.21	$3.80	$0.00	$29.54
7	85	$19.69	$7.21	$3.80	$0.00	$30.70
8	90	$20.84	$7.21	$3.80	$0.00	$31.85

Effective Date - 04/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$14.20	$7.21	$0.00	$0.00	$21.41
2	60	$14.20	$7.21	$0.00	$0.00	$21.41
3	65	$15.38	$7.21	$0.00	$0.00	$22.59
4	70	$16.56	$7.21	$0.00	$0.00	$23.77
5	75	$17.75	$7.21	$3.80	$0.00	$28.76
6	80	$18.93	$7.21	$3.80	$0.00	$29.94
7	85	$20.11	$7.21	$3.80	$0.00	$31.12
8	90	$21.29	$7.21	$3.80	$0.00	$32.30

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $17.63/ 3&4 $19.95/ 5&6 $27.22/ 7&8 $29.54

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (NEW BEDFORD)*	01/01/2020	$49.07	$12.75	$22.41	$0.62	$84.85

Apprentice - *CEMENT MASONRY/PLASTERING - Eastern Mass (New Bedford)*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.54	$12.75	$15.41	$0.00	$52.70
2	60	$29.44	$12.75	$17.41	$0.62	$60.22
3	65	$31.90	$12.75	$18.41	$0.62	$63.68
4	70	$34.35	$12.75	$19.41	$0.62	$67.13
5	75	$36.80	$12.75	$20.41	$0.62	$70.58
6	80	$39.26	$12.75	$21.41	$0.62	$74.04
7	90	$44.16	$12.75	$22.41	$0.62	$79.94

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$51.73	$13.75	$15.80	$0.00	$81.28
	12/01/2021	$52.88	$13.75	$15.80	$0.00	$82.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$33.40	$13.75	$15.80	$0.00	$62.95
	12/01/2021	$34.19	$13.75	$15.80	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2021	$52.06	$8.25	$22.75	$0.00	$83.06

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.03	$8.25	$0.00	$0.00	$34.28
2	55	$28.63	$8.25	$6.16	$0.00	$43.04
3	60	$31.24	$8.25	$6.72	$0.00	$46.21
4	65	$33.84	$8.25	$7.28	$0.00	$49.37
5	70	$36.44	$8.25	$19.39	$0.00	$64.08
6	75	$39.05	$8.25	$19.95	$0.00	$67.25
7	80	$41.65	$8.25	$20.51	$0.00	$70.41
8	90	$46.85	$8.25	$21.63	$0.00	$76.73

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN *LABORERS - ZONE 2*	06/01/2021	$40.82	$8.60	$17.57	$0.00	$66.99
	12/01/2021	$41.83	$8.60	$17.57	$0.00	$68.00
	06/01/2022	$42.83	$8.60	$17.57	$0.00	$69.00
	12/01/2022	$43.83	$8.60	$17.57	$0.00	$70.00
	06/01/2023	$44.83	$8.60	$17.57	$0.00	$71.00
	12/01/2023	$46.08	$8.60	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2*	06/01/2021	$41.82	$8.60	$17.57	$0.00	$67.99
	12/01/2021	$42.83	$8.60	$17.57	$0.00	$69.00
	06/01/2022	$43.83	$8.60	$17.57	$0.00	$70.00
	12/01/2022	$44.83	$8.60	$17.57	$0.00	$71.00
	06/01/2023	$45.83	$8.60	$17.57	$0.00	$72.00
	12/01/2023	$47.08	$8.60	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: BURNERS *LABORERS - ZONE 2*	06/01/2021	$41.57	$8.60	$17.57	$0.00	$67.74
	12/01/2021	$42.58	$8.60	$17.57	$0.00	$68.75
	06/01/2022	$43.58	$8.60	$17.57	$0.00	$69.75
	12/01/2022	$44.58	$8.60	$17.57	$0.00	$70.75
	06/01/2023	$45.58	$8.60	$17.57	$0.00	$71.75
	12/01/2023	$46.83	$8.60	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2*	06/01/2021	$41.82	$8.60	$17.57	$0.00	$67.99
	12/01/2021	$42.83	$8.60	$17.57	$0.00	$69.00
	06/01/2022	$43.83	$8.60	$17.57	$0.00	$70.00
	12/01/2022	$44.83	$8.60	$17.57	$0.00	$71.00
	06/01/2023	$45.83	$8.60	$17.57	$0.00	$72.00
	12/01/2023	$47.08	$8.60	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2*	06/01/2021	$41.57	$8.60	$17.57	$0.00	$67.74
	12/01/2021	$42.58	$8.60	$17.57	$0.00	$68.75
	06/01/2022	$43.58	$8.60	$17.57	$0.00	$69.75
	12/01/2022	$44.58	$8.60	$17.57	$0.00	$70.75
	06/01/2023	$45.58	$8.60	$17.57	$0.00	$71.75
	12/01/2023	$46.83	$8.60	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER *LABORERS - ZONE 2*	06/01/2021	$40.82	$8.60	$17.57	$0.00	$66.99
	12/01/2021	$41.83	$8.60	$17.57	$0.00	$68.00
	06/01/2022	$42.83	$8.60	$17.57	$0.00	$69.00
	12/01/2022	$43.83	$8.60	$17.57	$0.00	$70.00
	06/01/2023	$44.83	$8.60	$17.57	$0.00	$71.00
	12/01/2023	$46.08	$8.60	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$68.70	$9.40	$23.12	$0.00	$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$73.60	$9.40	$23.12	$0.00	$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN *ELECTRICIANS LOCAL 223*	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELECTRICIAN - Local 223*

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$17.46	$10.90	$0.52	$0.00	$28.88
2	45	$19.65	$10.90	$0.59	$0.00	$31.14
3	50	$21.83	$10.90	$0.65	$0.00	$33.38
4	55	$24.01	$10.90	$6.28	$0.00	$41.19
5	60	$26.20	$10.90	$6.77	$0.00	$43.87
6	65	$28.38	$10.90	$7.24	$0.00	$46.52
7	70	$30.56	$10.90	$7.73	$0.00	$49.19
8	75	$32.75	$10.90	$8.21	$0.00	$51.86

Notes:

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2021	$63.47	$15.88	$19.31	$0.00	$98.66
	01/01/2022	$65.62	$16.03	$20.21	$0.00	$101.86

Apprentice - *ELEVATOR CONSTRUCTOR - Local 4*

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$31.74	$15.88	$0.00	$0.00	$47.62
2	55	$34.91	$15.88	$19.31	$0.00	$70.10
3	65	$41.26	$15.88	$19.31	$0.00	$76.45
4	70	$44.43	$15.88	$19.31	$0.00	$79.62
5	80	$50.78	$15.88	$19.31	$0.00	$85.97

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.81	$16.03	$0.00	$0.00	$48.84
2	55	$36.09	$16.03	$20.21	$0.00	$72.33
3	65	$42.65	$16.03	$20.21	$0.00	$78.89
4	70	$45.93	$16.03	$20.21	$0.00	$82.17
5	80	$52.50	$16.03	$20.21	$0.00	$88.74

Notes:

Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2021	$44.43	$15.88	$19.31	$0.00	$79.62
	01/01/2022	$45.93	$16.03	$20.21	$0.00	$82.17

For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FENCE & GUARD RAIL ERECTOR *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2021	$45.88	$13.50	$15.70	$0.00	$75.08
	11/01/2021	$46.88	$13.50	$15.70	$0.00	$76.08
	05/01/2022	$48.03	$13.50	$15.70	$0.00	$77.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2021	$47.40	$13.50	$15.70	$0.00	$76.60
	11/01/2021	$48.41	$13.50	$15.70	$0.00	$77.61
	05/01/2022	$49.57	$13.50	$15.70	$0.00	$78.77
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2021	$22.91	$13.50	$15.70	$0.00	$52.11
	11/01/2021	$23.51	$13.50	$15.70	$0.00	$52.71
	05/01/2022	$24.18	$13.50	$15.70	$0.00	$53.38
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 223*	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING*ELECTRICIANS LOCAL 223*	09/01/2020	$36.86	$10.90	$12.45	$0.00	$60.21
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$41.31	$13.75	$15.80	$0.00	$70.86
	12/01/2021	$42.26	$13.75	$15.80	$0.00	$71.81
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$24.50	$8.60	$16.64	$0.00	$49.74
	12/01/2021	$24.50	$8.60	$16.64	$0.00	$49.74
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE I*	03/01/2021	$48.59	$9.40	$19.25	$0.00	$77.24
	09/01/2021	$49.39	$9.40	$19.25	$0.00	$78.04
	03/01/2022	$50.19	$9.40	$19.25	$0.00	$78.84

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *FLOORCOVERER - Local 2168 Zone I*

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.30	$9.40	$1.79	$0.00	$35.49
2	55	$26.72	$9.40	$1.79	$0.00	$37.91
3	60	$29.15	$9.40	$13.88	$0.00	$52.43
4	65	$31.58	$9.40	$13.88	$0.00	$54.86
5	70	$34.01	$9.40	$15.67	$0.00	$59.08
6	75	$36.44	$9.40	$15.67	$0.00	$61.51
7	80	$38.87	$9.40	$17.46	$0.00	$65.73
8	85	$41.30	$9.40	$17.46	$0.00	$68.16

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.70	$9.40	$1.79	$0.00	$35.89
2	55	$27.16	$9.40	$1.79	$0.00	$38.35
3	60	$29.63	$9.40	$13.88	$0.00	$52.91
4	65	$32.10	$9.40	$13.88	$0.00	$55.38
5	70	$34.57	$9.40	$15.67	$0.00	$59.64
6	75	$37.04	$9.40	$15.67	$0.00	$62.11
7	80	$39.51	$9.40	$17.46	$0.00	$66.37
8	85	$41.98	$9.40	$17.46	$0.00	$68.84

Notes: Steps are 750 hrs.
% After 09/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 $33.03/ 3&4 $39.64/ 5&6 $59.08/ 7&8 $65.73

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.73	$13.75	$15.80	$0.00	$80.28
	12/01/2021	$51.88	$13.75	$15.80	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$33.40	$13.75	$15.80	$0.00	$62.95
	12/01/2021	$34.19	$13.75	$15.80	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 1333*	06/01/2020	$39.18	$10.80	$10.45	$0.00	$60.43

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *GLAZIER - Local 1333*

Effective Date - 06/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.59	$10.80	$1.80	$0.00	$32.19
2	56	$22.04	$10.80	$1.80	$0.00	$34.64
3	63	$24.49	$10.80	$2.45	$0.00	$37.74
4	69	$26.94	$10.80	$2.45	$0.00	$40.19
5	75	$29.39	$10.80	$3.15	$0.00	$43.34
6	81	$31.83	$10.80	$3.15	$0.00	$45.78
7	88	$34.28	$10.80	$10.45	$0.00	$55.53
8	94	$36.73	$10.80	$10.45	$0.00	$57.98

Notes:

Apprentice to Journeyworker Ratio:1:3

HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.73	$13.75	$15.80	$0.00	$80.28
	12/01/2021	$51.88	$13.75	$15.80	$0.00	$81.43

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *OPERATING ENGINEERS - Local 4*

Effective Date - 06/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$27.90	$13.75	$0.00	$0.00	$41.65
2	60	$30.44	$13.75	$15.80	$0.00	$59.99
3	65	$32.97	$13.75	$15.80	$0.00	$62.52
4	70	$35.51	$13.75	$15.80	$0.00	$65.06
5	75	$38.05	$13.75	$15.80	$0.00	$67.60
6	80	$40.58	$13.75	$15.80	$0.00	$70.13
7	85	$43.12	$13.75	$15.80	$0.00	$72.67
8	90	$45.66	$13.75	$15.80	$0.00	$75.21

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$28.53	$13.75	$0.00	$0.00	$42.28
2	60	$31.13	$13.75	$15.80	$0.00	$60.68
3	65	$33.72	$13.75	$15.80	$0.00	$63.27
4	70	$36.32	$13.75	$15.80	$0.00	$65.87
5	75	$38.91	$13.75	$15.80	$0.00	$68.46
6	80	$41.50	$13.75	$15.80	$0.00	$71.05
7	85	$44.10	$13.75	$15.80	$0.00	$73.65
8	90	$46.69	$13.75	$15.80	$0.00	$76.24

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - B*	04/01/2021	$37.51	$13.65	$16.55	$2.03	$69.74
	10/01/2021	$38.51	$13.65	$16.55	$2.06	$70.77
	04/01/2022	$39.51	$13.65	$16.55	$2.09	$71.80
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 223*	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - B*	04/01/2021	$37.51	$13.65	$16.55	$2.03	$69.74
	10/01/2021	$38.51	$13.65	$16.55	$2.06	$70.77
	04/01/2022	$39.51	$13.65	$16.55	$2.09	$71.80
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) *PLUMBERS & PIPEFITTERS LOCAL 51*	08/31/2020	$44.69	$10.15	$19.80	$0.00	$74.64
	08/30/2021	$46.69	$10.15	$19.80	$0.00	$76.64
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PLUMBERS & PIPEFITTERS LOCAL 51*	08/31/2020	$44.69	$10.15	$19.80	$0.00	$74.64
	08/30/2021	$46.69	$10.15	$19.80	$0.00	$76.64
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HYDRAULIC DRILLS *LABORERS - ZONE 2*	06/01/2021	$35.75	$8.60	$16.64	$0.00	$60.99
	12/01/2021	$36.66	$8.60	$16.64	$0.00	$61.90
	06/01/2022	$37.56	$8.60	$16.64	$0.00	$62.80
	12/01/2022	$38.41	$8.60	$16.64	$0.00	$63.65
	06/01/2023	$39.31	$8.60	$16.64	$0.00	$64.55
	12/01/2023	$40.21	$8.60	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.75	$8.60	$16.64	$0.00	$60.99
	12/01/2021	$36.66	$8.60	$16.64	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)*	09/01/2020	$44.10	$13.80	$17.14	$0.00	$75.04
	09/01/2021	$46.50	$13.80	$17.14	$0.00	$77.44
	09/01/2022	$48.95	$13.80	$17.14	$0.00	$79.89

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Southern MA*

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.05	$13.80	$12.42	$0.00	$48.27
2	60	$26.46	$13.80	$13.36	$0.00	$53.62
3	70	$30.87	$13.80	$14.31	$0.00	$58.98
4	80	$35.28	$13.80	$15.25	$0.00	$64.33

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.25	$13.80	$12.42	$0.00	$49.47
2	60	$27.90	$13.80	$13.36	$0.00	$55.06
3	70	$32.55	$13.80	$14.31	$0.00	$60.66
4	80	$37.20	$13.80	$15.25	$0.00	$66.25

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER *IRONWORKERS LOCAL 37*	03/16/2021	$42.46	$7.70	$17.10	$0.00	$67.26

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *IRONWORKER - Local 37*

Effective Date - 03/16/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	70	$29.72	$7.70	$17.10	$0.00	$54.52
2	75	$31.85	$7.70	$17.10	$0.00	$56.65
3	80	$33.97	$7.70	$17.10	$0.00	$58.77
4	85	$36.09	$7.70	$17.10	$0.00	$60.89
5	90	$38.21	$7.70	$17.10	$0.00	$63.01
6	95	$40.34	$7.70	$17.10	$0.00	$65.14

Notes:

Apprentice to Journeyworker Ratio:1:4

JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER *LABORERS - ZONE 2*	06/01/2021	$35.00	$8.60	$16.64	$0.00	$60.24
	12/01/2021	$35.91	$8.60	$16.64	$0.00	$61.15
	06/01/2022	$36.81	$8.60	$16.64	$0.00	$62.05
	12/01/2022	$37.66	$8.60	$16.64	$0.00	$62.90
	06/01/2023	$38.56	$8.60	$16.64	$0.00	$63.80
	12/01/2023	$39.46	$8.60	$16.64	$0.00	$64.70

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LABORER - Zone 2*

Effective Date - 06/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.00	$8.60	$16.64	$0.00	$46.24
2	70	$24.50	$8.60	$16.64	$0.00	$49.74
3	80	$28.00	$8.60	$16.64	$0.00	$53.24
4	90	$31.50	$8.60	$16.64	$0.00	$56.74

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.55	$8.60	$16.64	$0.00	$46.79
2	70	$25.14	$8.60	$16.64	$0.00	$50.38
3	80	$28.73	$8.60	$16.64	$0.00	$53.97
4	90	$32.32	$8.60	$16.64	$0.00	$57.56

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.00	$8.60	$16.64	$0.00	$60.24
	12/01/2021	$35.91	$8.60	$16.64	$0.00	$61.15

Apprentice - *LABORER (Heavy & Highway) - Zone 2*

Effective Date - 06/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.00	$8.60	$16.64	$0.00	$46.24
2	70	$24.50	$8.60	$16.64	$0.00	$49.74
3	80	$28.00	$8.60	$16.64	$0.00	$53.24
4	90	$31.50	$8.60	$16.64	$0.00	$56.74

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.55	$8.60	$16.64	$0.00	$46.79
2	70	$25.14	$8.60	$16.64	$0.00	$50.38
3	80	$28.73	$8.60	$16.64	$0.00	$53.97
4	90	$32.32	$8.60	$16.64	$0.00	$57.56

Notes:

Apprentice to Journeyworker Ratio:1:5

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	06/01/2021	$35.00	$8.60	$16.64	$0.00	$60.24
	12/01/2021	$35.91	$8.60	$16.64	$0.00	$61.15
	06/01/2022	$36.81	$8.60	$16.64	$0.00	$62.05
	12/01/2022	$37.66	$8.60	$16.64	$0.00	$62.90
	06/01/2023	$38.56	$8.60	$16.64	$0.00	$63.80
	12/01/2023	$39.46	$8.60	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	06/01/2021	$35.00	$8.60	$16.64	$0.00	$60.24
	12/01/2021	$35.91	$8.60	$16.64	$0.00	$61.15
	06/01/2022	$36.81	$8.60	$16.64	$0.00	$62.05
	12/01/2022	$37.66	$8.60	$16.64	$0.00	$62.90
	06/01/2023	$38.56	$8.60	$16.64	$0.00	$63.80
	12/01/2023	$39.46	$8.60	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	06/01/2021	$35.09	$8.60	$16.70	$0.00	$60.39
	12/01/2021	$36.00	$8.60	$16.70	$0.00	$61.30
	06/01/2022	$36.90	$8.60	$16.70	$0.00	$62.20
	12/01/2022	$37.75	$8.60	$16.70	$0.00	$63.05
	06/01/2023	$38.65	$8.60	$16.70	$0.00	$63.95
	12/01/2023	$39.55	$8.60	$16.70	$0.00	$64.85
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	06/01/2021	$35.00	$8.60	$16.64	$0.00	$60.24
	12/01/2021	$35.91	$8.60	$16.64	$0.00	$61.15
	06/01/2022	$36.81	$8.60	$16.64	$0.00	$62.05
	12/01/2022	$37.66	$8.60	$16.64	$0.00	$62.90
	06/01/2023	$38.56	$8.60	$16.64	$0.00	$63.80
	12/01/2023	$39.46	$8.60	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 2*	06/01/2021	$35.00	$8.60	$16.64	$0.00	$60.24
	12/01/2021	$35.91	$8.60	$16.64	$0.00	$61.15
	06/01/2022	$36.81	$8.60	$16.64	$0.00	$62.05
	12/01/2022	$37.66	$8.60	$16.64	$0.00	$62.90
	06/01/2023	$38.56	$8.60	$16.64	$0.00	$63.80
	12/01/2023	$39.46	$8.60	$16.64	$0.00	$64.70
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LASER BEAM OPERATOR *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2021	$42.57	$11.39	$20.14	$0.00	$74.10
	08/01/2021	$43.69	$11.39	$20.30	$0.00	$75.38
	02/01/2022	$44.16	$11.39	$20.30	$0.00	$75.85

Apprentice - *MARBLE & TILE FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.29	$11.39	$20.14	$0.00	$52.82
2	60	$25.54	$11.39	$20.14	$0.00	$57.07
3	70	$29.80	$11.39	$20.14	$0.00	$61.33
4	80	$34.06	$11.39	$20.14	$0.00	$65.59
5	90	$38.31	$11.39	$20.14	$0.00	$69.84

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.85	$11.39	$20.30	$0.00	$53.54
2	60	$26.21	$11.39	$20.30	$0.00	$57.90
3	70	$30.58	$11.39	$20.30	$0.00	$62.27
4	80	$34.95	$11.39	$20.30	$0.00	$66.64
5	90	$39.32	$11.39	$20.30	$0.00	$71.01

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2021	$55.77	$11.39	$22.08	$0.00	$89.24
	08/01/2021	$57.17	$11.39	$22.24	$0.00	$90.80
	02/01/2022	$57.74	$11.39	$22.24	$0.00	$91.37

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.89	$11.39	$22.08	$0.00	$61.36
2	60	$33.46	$11.39	$22.08	$0.00	$66.93
3	70	$39.04	$11.39	$22.08	$0.00	$72.51
4	80	$44.62	$11.39	$22.08	$0.00	$78.09
5	90	$50.19	$11.39	$22.08	$0.00	$83.66

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.59	$11.39	$22.24	$0.00	$62.22
2	60	$34.30	$11.39	$22.24	$0.00	$67.93
3	70	$40.02	$11.39	$22.24	$0.00	$73.65
4	80	$45.74	$11.39	$22.24	$0.00	$79.37
5	90	$51.45	$11.39	$22.24	$0.00	$85.08

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 2) *MILLWRIGHTS LOCAL 1121 - Zone 2*	01/04/2021	$39.72	$9.40	$20.45	$0.00	$69.57
	01/03/2022	$40.97	$9.40	$20.45	$0.00	$70.82
	01/02/2023	$42.22	$9.40	$20.45	$0.00	$72.07

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MILLWRIGHT - Local 1121 Zone 2*

Effective Date - 01/04/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$21.85	$9.40	$5.58	$0.00	$36.83
2	65	$25.82	$9.40	$16.90	$0.00	$52.12
3	75	$29.79	$9.40	$17.92	$0.00	$57.11
4	85	$33.76	$9.40	$18.93	$0.00	$62.09

Effective Date - 01/03/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$22.53	$9.40	$5.58	$0.00	$37.51
2	65	$26.63	$9.40	$16.90	$0.00	$52.93
3	75	$30.73	$9.40	$17.92	$0.00	$58.05
4	85	$34.82	$9.40	$18.93	$0.00	$63.15

Notes: Step 1&2 Appr. indentured after 1/1/2020 receive no pension, but do receive annuity. (Step 1 $5.58, Step 2 $6.50)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:5

MORTAR MIXER *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$23.40	$13.75	$15.80	$0.00	$52.95
	12/01/2021	$23.98	$13.75	$15.80	$0.00	$53.53
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$28.26	$13.75	$15.80	$0.00	$57.81
	12/01/2021	$28.94	$13.75	$15.80	$0.00	$58.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2021	$52.06	$8.25	$22.75	$0.00	$83.06

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.03	$8.25	$0.00	$0.00	$34.28
2	55	$28.63	$8.25	$6.16	$0.00	$43.04
3	60	$31.24	$8.25	$6.72	$0.00	$46.21
4	65	$33.84	$8.25	$7.28	$0.00	$49.37
5	70	$36.44	$8.25	$19.39	$0.00	$64.08
6	75	$39.05	$8.25	$19.95	$0.00	$67.25
7	80	$41.65	$8.25	$20.51	$0.00	$70.41
8	90	$46.85	$8.25	$21.63	$0.00	$76.73

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	01/01/2021	$42.96	$8.25	$22.75	$0.00	$73.96

* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - New*

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.48	$8.25	$0.00	$0.00	$29.73
2	55	$23.63	$8.25	$6.16	$0.00	$38.04
3	60	$25.78	$8.25	$6.72	$0.00	$40.75
4	65	$27.92	$8.25	$7.28	$0.00	$43.45
5	70	$30.07	$8.25	$19.39	$0.00	$57.71
6	75	$32.22	$8.25	$19.95	$0.00	$60.42
7	80	$34.37	$8.25	$20.51	$0.00	$63.13
8	90	$38.66	$8.25	$21.63	$0.00	$68.54

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2021	$41.02	$8.25	$22.75	$0.00	$72.02

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint*
Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.51	$8.25	$0.00	$0.00	$28.76
2	55	$22.56	$8.25	$6.16	$0.00	$36.97
3	60	$24.61	$8.25	$6.72	$0.00	$39.58
4	65	$26.66	$8.25	$7.28	$0.00	$42.19
5	70	$28.71	$8.25	$19.39	$0.00	$56.35
6	75	$30.77	$8.25	$19.95	$0.00	$58.97
7	80	$32.82	$8.25	$20.51	$0.00	$61.58
8	90	$36.92	$8.25	$21.63	$0.00	$66.80

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) *	01/01/2021	$41.56	$8.25	$22.75	$0.00	$72.56

* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*

Apprentice - *PAINTER - Local 35 Zone 2 - BRUSH NEW*
Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.78	$8.25	$0.00	$0.00	$29.03
2	55	$22.86	$8.25	$6.16	$0.00	$37.27
3	60	$24.94	$8.25	$6.72	$0.00	$39.91
4	65	$27.01	$8.25	$7.28	$0.00	$42.54
5	70	$29.09	$8.25	$19.39	$0.00	$56.73
6	75	$31.17	$8.25	$19.95	$0.00	$59.37
7	80	$33.25	$8.25	$20.51	$0.00	$62.01
8	90	$37.40	$8.25	$21.63	$0.00	$67.28

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2021	$39.62	$8.25	$22.75	$0.00	$70.62

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - BRUSH REPAINT*

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.81	$8.25	$0.00	$0.00	$28.06
2	55	$21.79	$8.25	$6.16	$0.00	$36.20
3	60	$23.77	$8.25	$6.72	$0.00	$38.74
4	65	$25.75	$8.25	$7.28	$0.00	$41.28
5	70	$27.73	$8.25	$19.39	$0.00	$55.37
6	75	$29.72	$8.25	$19.95	$0.00	$57.92
7	80	$31.70	$8.25	$20.51	$0.00	$60.46
8	90	$35.66	$8.25	$21.63	$0.00	$65.54

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.00	$8.60	$16.64	$0.00	$60.24
	12/01/2021	$35.91	$8.60	$16.64	$0.00	$61.15
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2021	$35.78	$12.91	$14.82	$0.00	$63.51
	08/01/2021	$35.78	$13.41	$14.82	$0.00	$64.01
	12/01/2021	$35.78	$13.41	$16.01	$0.00	$65.20
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$46.11	$9.40	$23.12	$0.00	$78.63
For apprentice rates see "Apprentice- PILE DRIVER"						
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$46.11	$9.40	$23.12	$0.00	$78.63

Apprentice - *PILE DRIVER - Local 56 Zone 2*

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	$0.00	$0.00	$0.00	$0.00	$0.00

Notes: Apprentice wages shall be no less than the following Steps;
(Same as set in Zone 1)
1$57.06/2$61.96/3$66.87/4$69.32/5$71.78/6$71.78/7$76.68/8$76.68

Apprentice to Journeyworker Ratio:1:5

PIPELAYER *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPELAYER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
PLUMBER & PIPEFITTER *PLUMBERS & PIPEFITTERS LOCAL 51*	08/31/2020	$44.69	$10.15	$19.80	$0.00	$74.64
	08/30/2021	$46.69	$10.15	$19.80	$0.00	$76.64

Apprentice - *PLUMBER/PIPEFITTER - Local 51*

Effective Date - 08/31/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$17.88	$10.15	$2.50	$0.00	$30.53
2	50	$22.35	$10.15	$2.50	$0.00	$35.00
3	60	$26.81	$10.15	$8.73	$0.00	$45.69
4	70	$31.28	$10.15	$10.60	$0.00	$52.03
5	80	$35.75	$10.15	$17.45	$0.00	$63.35

Effective Date - 08/30/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.68	$10.15	$2.50	$0.00	$31.33
2	50	$23.35	$10.15	$2.50	$0.00	$36.00
3	60	$28.01	$10.15	$8.73	$0.00	$46.89
4	70	$32.68	$10.15	$10.60	$0.00	$53.43
5	80	$37.35	$10.15	$17.45	$0.00	$64.95

Notes:

Steps 2000hrs. Prior 9/1/05; 40/40/45/50/55/60/65/75/80/85

Apprentice to Journeyworker Ratio:1:3

PNEUMATIC CONTROLS (TEMP.) *PLUMBERS & PIPEFITTERS LOCAL 51*	08/31/2020	$44.69	$10.15	$19.80	$0.00	$74.64
	08/30/2021	$46.69	$10.15	$19.80	$0.00	$76.64
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
POWDERMAN & BLASTER *LABORERS - ZONE 2*	06/01/2021	$36.00	$8.60	$16.64	$0.00	$61.24
	12/01/2021	$36.91	$8.60	$16.64	$0.00	$62.15
	06/01/2022	$37.81	$8.60	$16.64	$0.00	$63.05
	12/01/2022	$38.66	$8.60	$16.64	$0.00	$63.90
	06/01/2023	$39.56	$8.60	$16.64	$0.00	$64.80
	12/01/2023	$40.46	$8.60	$16.64	$0.00	$65.70

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$36.00	$8.60	$16.64	$0.00	$61.24
	12/01/2021	$36.91	$8.60	$16.64	$0.00	$62.15
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.73	$13.75	$15.80	$0.00	$80.28
	12/01/2021	$51.88	$13.75	$15.80	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.73	$13.75	$15.80	$0.00	$80.28
	12/01/2021	$51.88	$13.75	$15.80	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$33.40	$13.75	$15.80	$0.00	$62.95
	12/01/2021	$34.19	$13.75	$15.80	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER *TEAMSTERS 170 - Dauphinais (Bellingham)*	01/01/2021	$25.00	$9.31	$3.20	$0.00	$37.51
	12/01/2021	$25.75	$9.76	$4.00	$0.00	$39.51
	01/01/2022	$25.75	$9.76	$4.00	$0.00	$39.51
	12/01/2022	$26.40	$10.26	$4.75	$0.00	$41.41
	01/01/2023	$26.40	$10.26	$4.75	$0.00	$41.41
	12/01/2023	$27.00	$10.76	$5.45	$0.00	$43.21
	01/01/2024	$27.00	$10.76	$5.45	$0.00	$43.21
	12/01/2024	$27.60	$11.26	$6.15	$0.00	$45.01
	01/01/2025	$27.60	$11.26	$6.15	$0.00	$45.01
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	02/01/2021	$46.60	$12.28	$17.15	$0.00	$76.03
	08/01/2021	$48.03	$12.28	$17.15	$0.00	$77.46
	02/01/2022	$49.46	$12.28	$17.15	$0.00	$78.89

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ROOFER - Local 33*

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.30	$12.28	$4.31	$0.00	$39.89
2	60	$27.96	$12.28	$17.15	$0.00	$57.39
3	65	$30.29	$12.28	$17.15	$0.00	$59.72
4	75	$34.95	$12.28	$17.15	$0.00	$64.38
5	85	$39.61	$12.28	$17.15	$0.00	$69.04

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.02	$12.28	$4.31	$0.00	$40.61
2	60	$28.82	$12.28	$17.15	$0.00	$58.25
3	65	$31.22	$12.28	$17.15	$0.00	$60.65
4	75	$36.02	$12.28	$17.15	$0.00	$65.45
5	85	$40.83	$12.28	$17.15	$0.00	$70.26

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
(Hot Pitch Mechanics' receive $1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	02/01/2021	$46.85	$12.28	$17.15	$0.00	$76.28
	08/01/2021	$48.28	$12.28	$17.15	$0.00	$77.71
	02/01/2022	$49.71	$12.28	$17.15	$0.00	$79.14
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - B*	04/01/2021	$37.51	$13.65	$16.55	$2.03	$69.74
	10/01/2021	$38.51	$13.65	$16.55	$2.06	$70.77
	04/01/2022	$39.51	$13.65	$16.55	$2.09	$71.80

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SHEET METAL WORKER - Local 17-B*

Effective Date - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$15.00	$13.65	$4.02	$1.00	$33.67
2	45	$16.88	$13.65	$4.52	$1.07	$36.12
3	50	$18.76	$13.65	$10.48	$1.31	$44.20
4	55	$20.63	$13.65	$10.48	$1.37	$46.13
5	60	$22.51	$13.65	$13.52	$1.49	$51.17
6	65	$24.38	$13.65	$13.78	$1.55	$53.36
7	70	$26.26	$13.65	$14.03	$1.62	$55.56
8	75	$28.13	$13.65	$14.28	$1.68	$57.74
9	80	$30.01	$13.65	$14.54	$1.75	$59.95
10	85	$31.88	$13.65	$14.79	$1.81	$62.13

Effective Date - 10/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$15.40	$13.65	$4.02	$1.00	$34.07
2	45	$17.33	$13.65	$4.52	$1.07	$36.57
3	50	$19.26	$13.65	$10.48	$1.31	$44.70
4	55	$21.18	$13.65	$10.48	$1.37	$46.68
5	60	$23.11	$13.65	$13.52	$1.51	$51.79
6	65	$25.03	$13.65	$13.78	$1.57	$54.03
7	70	$26.96	$13.65	$14.03	$1.64	$56.28
8	75	$28.88	$13.65	$14.28	$1.70	$58.51
9	80	$30.81	$13.65	$14.54	$1.77	$60.77
10	85	$32.73	$13.65	$14.79	$1.84	$63.01

Notes:

Apprentice to Journeyworker Ratio:1:3

SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2021	$36.24	$12.91	$14.82	$0.00	$63.97
	08/01/2021	$36.24	$13.41	$14.82	$0.00	$64.47
	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2021	$36.53	$12.91	$14.82	$0.00	$64.26
	08/01/2021	$36.53	$13.41	$14.82	$0.00	$64.76
	12/01/2021	$36.53	$13.41	$16.01	$0.00	$65.95
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 550 - (Section B) Zone 2*	03/01/2021	$56.21	$10.00	$21.25	$0.00	$87.46

CONFORMED

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SPRINKLER FITTER - Local 550 (Section B) Zone 2*

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$19.67	$10.00	$11.99	$0.00	$41.66
2	40	$22.48	$10.00	$12.70	$0.00	$45.18
3	45	$25.29	$10.00	$13.41	$0.00	$48.70
4	50	$28.11	$10.00	$14.13	$0.00	$52.24
5	55	$30.92	$10.00	$14.84	$0.00	$55.76
6	60	$33.73	$10.00	$15.55	$0.00	$59.28
7	65	$36.54	$10.00	$16.26	$0.00	$62.80
8	70	$39.35	$10.00	$16.98	$0.00	$66.33
9	75	$42.16	$10.00	$17.69	$0.00	$69.85
10	80	$44.97	$10.00	$18.40	$0.00	$73.37

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 223*	09/01/2020	$36.86	$10.90	$12.45	$0.00	$60.21

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 223*

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	$0.00	$0.00	$0.00	$0.00	$0.00

Notes: See Electrician Apprentice Wages

Telecom Apprentice Wages shall be the same as the Electrician Apprentice Wages

Apprentice to Journeyworker Ratio:2:3***

TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2021	$54.69	$11.39	$22.09	$0.00	$88.17
	08/01/2021	$56.09	$11.39	$22.25	$0.00	$89.73
	02/01/2022	$56.68	$11.39	$22.25	$0.00	$90.32

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Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.35	$11.39	$22.09	$0.00	$60.83
2	60	$32.81	$11.39	$22.09	$0.00	$66.29
3	70	$38.28	$11.39	$22.09	$0.00	$71.76
4	80	$43.75	$11.39	$22.09	$0.00	$77.23
5	90	$49.22	$11.39	$22.09	$0.00	$82.70

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.05	$11.39	$22.25	$0.00	$61.69
2	60	$33.65	$11.39	$22.25	$0.00	$67.29
3	70	$39.26	$11.39	$22.25	$0.00	$72.90
4	80	$44.87	$11.39	$22.25	$0.00	$78.51
5	90	$50.48	$11.39	$22.25	$0.00	$84.12

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$42.07	$8.60	$17.72	$0.00	$68.39
	12/01/2021	$43.08	$8.60	$17.72	$0.00	$69.40
For apprentice rates see "Apprentice- LABORER"						
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$40.79	$8.60	$17.72	$0.00	$67.11
	12/01/2021	$41.80	$8.60	$17.72	$0.00	$68.12
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$40.67	$8.60	$17.72	$0.00	$66.99
	12/01/2021	$41.68	$8.60	$17.72	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2021	$36.82	$12.91	$14.82	$0.00	$64.55
	08/01/2021	$36.82	$13.41	$14.82	$0.00	$65.05
	12/01/2021	$36.82	$13.41	$16.01	$0.00	$66.24
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)*	06/01/2021	$52.90	$8.60	$18.17	$0.00	$79.67
	12/01/2021	$53.91	$8.60	$18.17	$0.00	$80.68
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)*	06/01/2021	$54.90	$8.60	$18.17	$0.00	$81.67
	12/01/2021	$55.91	$8.60	$18.17	$0.00	$82.68
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)*	06/01/2021	$44.97	$8.60	$18.17	$0.00	$71.74
	12/01/2021	$45.98	$8.60	$18.17	$0.00	$72.75
For apprentice rates see "Apprentice- LABORER"						

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Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	06/01/2021	$46.97	$8.60	$18.17	$0.00	$73.74
	12/01/2021	$47.98	$8.60	$18.17	$0.00	$74.75
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2021	$36.24	$12.91	$14.82	$0.00	$63.97
	08/01/2021	$36.24	$13.41	$14.82	$0.00	$64.47
	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
WAGON DRILL OPERATOR *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.73	$13.75	$15.80	$0.00	$80.28
	12/01/2021	$51.88	$13.75	$15.80	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER *PLUMBERS & PIPEFITTERS LOCAL 51*	08/31/2020	$44.69	$10.15	$19.80	$0.00	$74.64
	08/30/2021	$46.69	$10.15	$19.80	$0.00	$76.64
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$29.67	$9.25	$1.89	$0.00	$40.81
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$42.03	$9.25	$10.27	$0.00	$61.55
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$34.62	$9.25	$10.07	$0.00	$53.94
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class A CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$42.03	$9.25	$14.35	$0.00	$65.63
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class B CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$37.09	$9.25	$10.87	$0.00	$57.21
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN -Inexperienced (<2000 Hrs.) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$22.25	$9.25	$1.82	$0.00	$33.32
For apprentice rates see "Apprentice- LINEMAN"						
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$49.45	$9.25	$17.48	$0.00	$76.18

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Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LINEMAN (Outside Electrical) - East Local 104*

Effective Date - 08/30/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$29.67	$9.25	$3.39	$0.00	$42.31
2	65	$32.14	$9.25	$3.46	$0.00	$44.85
3	70	$34.62	$9.25	$3.54	$0.00	$47.41
4	75	$37.09	$9.25	$5.11	$0.00	$51.45
5	80	$39.56	$9.25	$5.19	$0.00	$54.00
6	85	$42.03	$9.25	$5.26	$0.00	$56.54
7	90	$44.51	$9.25	$7.34	$0.00	$61.10

Notes:

Apprentice to Journeyworker Ratio:1:2

TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$30.73	$4.70	$3.17	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77

Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

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DIVISIONS 1- 16
Technical Specifications

City Pier Site Improvements
Technical Specifications Issued for Bid

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TABLE OF CONTENTS

Division 1 - General Requirements	Section	Page No.
Summary of Work	01010	01010-1 to 01010-2
Allowances	01020	01020-1 to 01020-2
Measurement and Payment	01025	01025-1 to 01025-20
Schedule of Values	01026	01026-1 to 01026-2
Modification Procedures	01035	01035-1 to 01035-2
Coordination	01040	01040-1 to 01040-2
Field Engineering	01050	01050-1 to 01050-2
Regulatory Requirements	01060	01060-1 to 01060-2
State of Massachusetts And Local Requirements	01067	01067-1 to 01067-10
Health & Safety Requirements	01069	01069-1 to 01069-4
Reference Standards	01090	01090-1 to 01090-6
Project Meetings	01200	01200-1 to 01200-2
Submittals	01300	01300-1-to 01300-4
Construction Progress Schedule	01310	01310-1 to 01310-4
Construction Photographs	01380	01380-1 to 01380-2
Quality Control	01400	01400-1 to 01400-2
Testing Laboratory Services	01410	01410-1 to 01410-4
Temporary Controls	01560	01560-1 to 01560-4
Project Signs	01380	01380-1 to 01380-2
Field Office	01590	01590-1 to 01590-2
Materials and Equipment	01600	01600-1 to 01600-2
Contract Closeout	01700	01700-1 to 01700-3

CONFORMED

Division 1 Cont'd	Section	Page No.
Warranties	01740	01740-1 to 01740-2
Division 2 Sitework		
Site Preparation	02050	02050-1 to 02050-6
Management of Contaminated Materials	02062	02062-1 to 02062-
Maintenance	02105	02105-1 to 02105-2
Earth Excavation, Backfill, Fill and Grading	02200	02200-1 to 02200-10
Aggregate Material	02215	02215-1 to 02215-4
Erosion and Sedimentation Control	02270	02270-1 to 02270-4
Geotextile Materials	02272	02272-1 to 02272-
Pavement	02500	02550-1 to 02550-6
Walks and Curbing	02510	02510-1 to 02510-8
Signage	02540	02540-1 to 02540-2
Pavement Markings	02550	02550-1 to 02550-4
Manholes, Frames and Covers	02607	02607-1 to 02607-8
Reinforced Concrete Pipe	02614	02614-1 to 02614-6
Ductile Iron Pipe	02618	02618-1 to 2618-12
Water Service Connection	02642	02642-1 to 02642-x
PVC Pipe & Appurtenances	02622	02622-1 to 02622-8
HDPE Corrugated Drain Pipe	02626	02626-1 to 02626-6
Water Service Connections	02642	02642-1 to 02642-6
Under Drain System	02712	02712-1 to 02712-2
Catch Basins & Gutter Inlets, Frames & Grates	02720	02720-1 to 02720-6
Landscape Boulders	02805	02805-1 to 02805-2
Irrigation	02810	02810-1 to 02810-22

CONFORMED

Division 2 Cont'd	Section	Page No.
Site Furniture	02870	02870-1 to 02870-2
Loaming & Seeding	02930	02930-1 to 02930-4
Trees, Plants, and Ground Covers	02950	02950-1 to 02950-12
Division 3 Concrete		
Concrete Formwork	03100	03100-1 to 03100-6
Concrete Reinforcement	03200	03200-1 to 03200-6
Expansion, Construction and Control Joints	03250	03250-1 to 03250-8
Cast-in-Place Concrete	03300	03300-1 to 03300-12
Concrete Sealant	03320	03320-1 to 03320-4
Concrete Finishing	03346	03346-1 to 03346-4
Division 5 Metals		
Miscellaneous Metals	05010	05010-1 to 05010-8
Division 6 Carpentry		
Carpentry	06200	06200-1 to 06200-2
Division 9 Finishes		
Metal Finishes	09000	09000-1 to 09000-8
Division 16 General Electrical		
General Electrical Requirements	16560	16560-1 to 16560-10

END OF T.O.C.

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SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Work covered by the Contract, listing of Owner, Project location, Engineer. Sequence requirements, the Contractor's use of the premises and Owner's occupancy requirements.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The Fall River Redevelopment Authority is the owner of property held as general corporate property and located on the west side of Davol Street, Fall River, Massachusetts pursuant to an Order of Taking recorded at the Bristol County Fall River District Registry of Deeds in Book 1405, Page 225 (the property is known as the "City Pier").

B. The City Pier is located within the Waterfront Urban Renewal Plan district.

C. The Fall River Redevelopment Authority has determined to allow the public temporary access to the City Pier until such time as the Fall River Redevelopment Authority determines a permanent development plan for the City Pier.

D. In order to accommodate such temporary public use certain improvements need to be made to the City Pier.

E. These improvements are being made without a formal dedication of the land to any permanent public use and are being made with a full reservation of all rights by the Fall River Redevelopment Authority to alter or remove said improvements or change the use of said property in the future. Whenever the term park or public park are used in these specifications those terms are used in a generic meaning and not intended to establish this property as a park or public park and the public use hereunder is only for temporary public access until a further determination by the Fall River Redevelopment Authority.

F. Work under this contract includes excavation, on-site consolidation of PCB -impacted soil and off-site disposal if needed. The project includes furnishing and installing primary electric service and related electrical improvements throughout the park, ornamental site lighting, storm drainage system modifications, water service connections and modifications, construction of HMA driveway, drop off loop, concrete sidewalks and park walkways, rough and finish grading work, installation of curbing, loaming and seeding and furnishing and installing landscape plantings as well as an automatic underground irrigation system for both planted and turfgrass areas. Other

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work includes furnishing and installing a perimeter pedestrian railing system mounted to the existing concrete bulkhead cap and related pedestrian amenities and site furnishings on the site.

G. All work performed under this contract shall be as specified and as shown on the plans. Additionally, direct reference is made to and where indicated work shall be in conformance with International, State and Local Building Codes.

H. References within the Standard Specifications to the Owner, Owner's Representative, or the Engineer shall, for the purposes of this Contract, be interpreted to mean the Fall River Redevelopment Authority or its designated representative.

1.3 OWNER

A. Fall River Redevelopment Authority
One Government Center
Fall River, Massachusetts
Telephone: 508.324.2662
Sarah Page, Executive Director

1.4 PROJECT LOCATION

A. 600 Davol Street, Fall River, Massachusetts 02722

1.5 ENGINEER

A. BETA Group, Inc.
315 Norwood Park South, 2nd Floor
Norwood, MA 02062
Telephone: 781-255-1982
Arek Galle, RLA, AICP Project Manager: agalle@BETA-inc.com
Andrew Pichette, RLA: apichette@BETA-inc.com

1.6 WORK SEQUENCE

A. The Contractor shall coordinate with the Engineer and Owner to determine the point or points in time when portions of the work on site will commence or be carried on. The Owner may issue orders pertaining to the work sequence, relative to the rate of progress.

1.7 CONTRACTOR USE OF PREMISES

A. The Contractor's use of premises shall be within the limits shown on the Drawings and as defined within these specifications. The existing chain link fence shall remain for the duration of the project. The contractor shall make use of the existing double leaf gate for access during construction.

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B. The Contractor shall assume full responsibility for protecting the adjacent water resources (Taunton River) from entry of pollution, debris, refuse and any other materials utilized in the execution of the Work. No foreign material shall enter the water.

C. The Contractor is advised the site is a EPA regulated site due to the presence of PCB impacted soils. Any excavation of soil beyond specified engineered cap limits shall be conducted with strict monitoring.

D. The Contractor shall assume full responsibility for all security of all materials and equipment on the site, including those of his subcontractors.

E. The Contractor is required to observe and plan severe weather events. Coordinate operations with the Owner's Representative. Rising tides, extreme wind or rain may require site materials and support equipment to be consolidated, or in the case of an extreme event, materials and equipment may be required to be moved off site.

F. The Contractor shall, If so directed by the Owner, move any containers, trailers, dumpsters, etc. and any stored items that interfere with operations of the Owner.

G. Obtain and pay for use of additional storage or work areas if needed to perform the Work.

1.8 OWNER OCCUPANCY REQUIREMENTS

A. All public sidewalks and roadway within the project area must remain in service at all times throughout the duration of the project with the exception of lane and shoulder closures as necessitated by delivery activities and / or as otherwise approved by the City.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

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SECTION 01020

ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Contingencies and their respective value which have been established in the BID as an estimated lump sum to facilitate comparison of bids only.

B. Related Sections

1. Section 00300 - Bid
2. Section 01025 - Measurement and Payment

1.2 ALLOWANCES

A. The following Allowances pertain to this project. Refer to the Bid Form.

1. Allowance No. 1 - Allowance for Owner Testing of Imported Materials

2. Allowance No. 2 - Allowance for Police/Traffic Protection

3. Allowance No. 3 – Allowance for Haul & Dispose of Excess PCB Impacted Soil

1.3 PAYMENT PROCEDURES

A. Under these items, the Contractor shall be reimbursed for charges for the allowances required and authorized by the Owner and Engineer, as detailed in Section 01025 - Measurement and Payment.

B. The price for allowances is established in Section 00300 - BID and shall constitute full compensation for services rendered.

C. The Contractor will be paid based on the actual invoiced amount from the authority in question as approved by the Engineer. If the total cost for such charges is greater or less than the allowance amount stated under this item of the BID, a debit or credit of the difference in cost shall be submitted to the Owner.

CONFORMED

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials shall conform to the Contract Documents, including any of those required or ordered by the Engineer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to relevant specification sections for information regarding installation and performance of the work. All work shall be per the Contract Documents. If additional guidance is required, the Contractor shall submit such requests in writing.

END OF SECTION

CONFORMED

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes
1. Measurement and payment criteria applicable to the Work performed under a unit price and / or lump sum payment method of Items listed in the BID.

B. RELATED SECTIONS
1. SECTION 00300 Bid
2. SECTION 00700 General Conditions
3. SECTION 00800 Supplementary Conditions
4. Divisions 1-16 of Technical Specifications

1.02 UNIT QUANTITIES WHEN SPECIFIED

A. Quantities and measurements if so indicated in the BID FORM are for bidding and contract purposes only. Quantities and measurements supplied or placed in the Work and verified by the Engineer shall determine payment. If the actual Work results in measurable discrepancies outside the tolerances indicated and requires more or fewer quantities than those quantities indicated, provide the required quantities at the unit price furnished in the BID FORM.

1.03 MEASUREMENTS OF QUANTITIES

A. Linear Measurement: Measured by linear dimension, along the horizontal projection of the centerline or mean chord.

1.04 LUMP SUM PRICES

A. Payment will be computed on the basis of the percentage of work completed on each Item in the contract BID FORM and as determined by the Engineer. Lump Sum prices are to include the cost of all necessary materials, labor, equipment, overhead, profit and other applicable costs. (See Par. 1.06, this Section.)

B. The Contractor's breakdown in the BID FORM and SCHEDULE OF VALUES of the lump sum bid will be used only as a guide to determine the percentage of completion.

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1.05 PRICES INCLUDE

A. The prices stated in the Proposal include full compensation not only for furnishing all the labor, equipment and material needed for, and for performing the work, but also for assuming all risks of any kind for expenses arising from performing the Work, for obtaining all permits and licenses and complying with the requirements thereof, including the cost of furnishing any security needed in connection therewith; for protection against inclement or cold weather; for all expenses incurred by or on account of the suspension; interruption or discontinuance of work; for the cost of the surety bond and adequate insurance; for all taxes, fees, union dues, etc., for which the Contractor may be or become liable, arising out of his operations incidental to the Contract; for providing equipment on the site and off site; for providing a field office and its appurtenances and for all general and incidental expenses; for tools, implements and equipment required to build and put into good working order all work contemplated by the Contract; for maintaining and guaranteeing the same as provided; and for fulfilling all obligations assumed by the Contractor under the Contract and its related documents.

B. The Owner shall pay and the Contractor shall receive the prices stipulated in the BID FORM made as part hereof as full compensation for everything performed and for all risks and obligations undertaken by the Contractor under and as required by the Contract.

1.06 PAYMENT

A. In general, payment will be made for all Contract work satisfactorily completed through the end of the previous month. The payment will include any additional work which has been completed and approved and change order work agreed upon by the Owner and Contractor which has been completed and approved (See BID FORM).

B. Each application for payment will indicate the total of a minimum percent retainage as defined in SECTION 01026 SCHEDULE OF VALUES as held by the Owner on the total of all work completed under the contract and approved for payment to-date.

C. Monthly applications for payment may also indicate reduction or increase of the total Contract price when an approved change order results in a net reduction or net increase in the cost and quantity of work to be performed under the Contract.

D. Special billings and charges against the Contract as credit or payment to the Owner, that are not for change order work, may be subtracted from monies due on any monthly application for payment but shall not serve to reduce the total Contract price.

E. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the Engineer multiplied by the unit price for work which is incorporated in or made necessary by the Work.

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1.07 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

A. The project Bid Items are listed below, and are reflective of sequence and the work to be performed as shown in the Contract Documents.

BID ITEM NO. 1.0 MOBILIZATION

A. METHOD OF MEASUREMENT

1. This item shall be paid for at the contract price bid per Lump Sum.

2. The Lump Sum price for this item shall not exceed five percent (5%) of the total amount of the bid.

3. A maximum of thirty-three (33%) of the Mobilization lump sum shall be payable in the initial payment requisition. Another thirty-three (33%) shall be payable upon Substantial Completion and the balance of the lump sum shall be payable upon completion of the project, after all temporary items and measures have been removed and suitably disposed of and installation of all products and associated commissioning has been completed to Owner's satisfaction.

B. BASIS OF PAYMENT

1. The Lump Sum price paid for item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

   a. Initiating and administering the contract, including but not limited to furnishing performance and payment bonds and all other securities and insurances required, project meetings, securing of all necessary permits, etc., for providing all other materials, supplies, tools, equipment, labor, financing, supervision, temporary structures, and any and all other administrative expenses incurred in carrying out the Work and furnishing the materials, keeping records and preparing required reports, permitting, the work, and assuming risks, which have not been included in the prices in other items of the Bid Proposal;
   b. Costs, exclusive of the cost of materials, for mobilizing all machinery, plants, tools, and other equipment necessary to carry on and complete the Work.
   c. Costs for preparing shop drawings, submittals, creating full scale mock-up panels.
   d. Costs for maintaining and updating the project schedule for submission to and approval by the Owner.
   e. Monthly operational costs related to the Work contained within this contract.

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BID ITEM 2.0 SITE PREPARATION & DEMOLITION

A. METHOD OF MEASUREMENT

1. Measurement of this item shall be by Lump Sum. The quantity of this item shall not be measured separately but by evaluation of the progression of work activities that comprise this item, as determined as a percent of the Work complete and accepted.

B. BASIS OF PAYMENT

1. The Lump Sum price paid for this item shall include full compensation for all labor, equipment, materials and incidentals needed to conduct various site preparation activities, with all work, complete in place but not limited to all field survey and layout, roadway and sidewalk saw-cutting, removal and disposal of asphalt and concrete pavements, minor excavation, furnishing and installation and maintenance of erosion controls for the duration of the project, furnishing and installing and maintain traffic and pedestrian protections as necessary for access and work operations, at the conclusion of the project removal and stockpiling fencing, and all types of signage including any and all incidentals related to preparing the site and any and all items considered incidental and not specifically included for payment under other specification sections.

BID ITEM 3.0 UNCLASSIFIED / EARTH EXCAVATION

A. METHOD OF MEASUREMENT

1. The quantity of Unclassified Excavation to be paid for under this item shall be measured per Cubic Yard, based on the total number of cubic yards of materials excavated and disposed of at an off-site location which are not incidental to the performance of other work items.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

   a. Excavation of all materials (except rock), including but not limited to existing granular soil on site, fill, silt, loam, sand, organic matter, gravel or other soils encountered with the exception of PCB Impacted Soils.
   b. Stockpiling and re-handling excavated materials for reuse on other portions of this project, placing, rough grading and shaping of soils excavated, removing

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and legally disposing of excess excavated materials at an off-site location (the Contractor shall locate and secure an acceptable disposal site for all excess materials);

c. When/if necessary to complete the work no separate payment will be made for saw-cutting;
d. Excavation for all drainage items (pipes, structures, underdrain systems) will be paid for under separate items.
e. Other work, whether direct or incidental, associated with excavation of unclassified materials not specifically included for payment under other bid items.

BID ITEM 4.0 GRAVEL BORROW

A. METHOD OF MEASUREMENT

1. The quantity of Gravel Borrow to be paid for under this Item shall be measured per Cubic Yard based on the number of cubic yards of gravel borrow installed, complete and accepted in place. Work shall include any and all incidentals and items not specifically included for payment under other sections.

B. BASIS OF PAYMENT

1. The Cubic Yard unit price for this item shall include full compensation for all labor, equipment, and materials related to furnishing, hauling, placement, and compaction of all gravel borrow material and any and all incidentals required to install complete and accepted, in place.

BID ITEM 5.0 CRUSHED STONE

A. METHOD OF MEASUREMENT

1. The quantity of Crushed Stone to be paid for under this Item shall be measured per Cubic Yard based on the number of cubic yards of crushed stone installed, complete and accepted in place. Work shall include any and all incidentals and items not specifically included for payment under other sections.

B. BASIS OF PAYMENT

1. The Cubic Yard unit price for this item shall include full compensation for all labor, equipment, and materials related to furnishing, hauling, placement, trimming and grading, and compaction of all crushed stone material and any and all incidentals required to complete the work.

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BID ITEM 6.0 TRIMMING & FINE GRADING

A. METHOD OF MEASUREMENT

1. The quantity of Trimming and Fine Grading to be paid for under this Item shall be measured per the number of Square Yards trimmed and graded, completed and accepted in place.

B. BASIS OF PAYMENT

1. The unit price shall constitute full compensation for all Trimming and Fine Grading operations on site, inclusive of fine grading of all areas to received loam, concrete walkways, and HMA pavement, as well as all areas designated to receive excess granular soil and surfacing materials as indicated on the Drawings or as otherwise directed by the Engineer.

BID ITEM 7.0 EXCAVATION, HANDLING, ON-SITE PLACEMENT AND/OR LOADING OF PCB IMPACTED SOILS

A. METHOD OF MEASUREMENT

1. Measurement shall be made by the volume in Cubic Yard of PCB impacted soil, measured in place prior to excavation, as determined by the Engineer, excavated, handled, placed, compacted, graded and shaped and/or loaded as described in the specifications, shown on the plans, complete and accepted in place. Excavation beyond the limits set by the Engineer shall be non-compensatory.

B. BASIS OF PAYMENT

1. Work under this Item shall be paid at the Contractor bid price, per Cubic Yard, which payment shall be considered compensation for all labor, tools, equipment and materials necessary to excavate, handle, place, compact, grade, shape and or load soils including any and all incidentals necessary to complete the work.

2. Any Test Pits required by the Engineer shall be considered incidental to the cost of the excavation and handling operations.

3. Placement of Geotextile Separation Fabric associated with on-site consolidation shall be measured separately.

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BID ITEM 8.0 BITUMINOUS BASE COURSE-CLASS 12.5 INTERMEDIATE COURSE HMA

A. METHOD OF MEASUREMENT

1. The quantity of Bituminous Base Course – Class 12.5 Intermediate Course to be paid under this Item shall be measure per TON of bituminous base course installed, complete and accepted, in place.

B. BASIS OF PAYMENT

1. Work under this Item shall be paid at the Contractor bid price, per TON of Bituminous Base Course furnished, hauled, placed and compacted as shown on the Drawings and as specified.

BID ITEM 9.0 BITUMINOUS SURFACE COURSE-CLASS 12.5 SURFACE COURSE HMA

A. METHOD OF MEASUREMENT

1. The quantity of Bituminous Base Course – Class 12.5 Surface Course to be paid under this Item shall be measure per TON of bituminous base course installed, complete and accepted, in place.

B. BASIS OF PAYMENT

1. Work under this Item shall be paid at the Contractor bid price, per TON of Bituminous Surface Course furnished, hauled, placed and compacted as shown on the Drawings and as specified.

BID ITEM 10.0 UNDERDRAIN SYSTEM

A. METHOD OF MEASUREMENT

1. The quantity of Underdrain System to be paid under this Item shall be measured by Linear Foot of underdrain system installed, complete and accepted, in place.

B. BASIS OF PAYMENT

1. Work under this Item shall be paid at the Contractor bid price, per Linear Foot of Underdrain System including excavation, and furnishing and installing all geotextile filter fabric, crushed stone, perforated pipe and all necessary fittings, attachments

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and connectors, all hardware, all backfilling, compacting as well as any and all incidentals related to the installation of the system as shown on the Drawings and as specified herein.

BID ITEM 11.0 AREA DRAIN & PIPING

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by the Lump Sum. The item shall not be measured separately by component but by evaluation of the progression of work activities that comprise this item, determined as a percent complete and accepted.

B. BASIS OF PAYMENT

1. The Lump Sum price paid for this item shall include full compensation for all labor, equipment, materials, including but not limited to excavation and furnishing and installing all bedding, piping, backfilling and any and all necessary fittings, hardware, Area Drain structures, frames and grates, as indicated on the drawings and as specified herein.

BID ITEM 12.0 CORE-DRILL EXISTING DRAINAGE STRUCTURE

A. METHOD OF MEASUREMENT

1. The quantity of Core-Drill Existing Drainage Structure to be paid under this Item shall be measured by Each (Location) of existing drainage structure core-drilled, complete and accepted, in place.

B. BASIS OF PAYMENT

1. The price paid for this item shall include full compensation for all labor equipment, materials necessary to compete this work, complete and accepted in place.

BID ITEM 13.0 GUTTER INLET DRAINAGE STRUCTURE

A. METHOD OF MEASUREMENT

1. The payment for work under these items will be measured per Each gutter inlet drainage structure installed, complete and accepted in place.

B. BASIS OF PAYMENT

1. Payment for work under these items shall be made at the Contract Unit Price bid per Each complete, regardless of the length of curb inlet or curb corner

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installed, which price shall include excavation, backfill, compaction, bedding, concrete, formwork, removal and replacement of gravel all labor, materials, equipment and incidental costs required to complete the work.

2. No separate payment will be made for cutting and chamfering of curb as required, excavation, gravel for foundation and backfill, installation, and concrete, but all costs in connection therewith shall be included in the Contract unit price.

BID ITEM 14.0 8" DIA DUCTILE IRON DRAINAGE PIPE.

A. METHOD OF MEASUREMENT

1. The quantities of ductile iron storm drain pipe to be paid for under these items shall be measured by the Linear Foot along the horizontal projection of the centerline of the completed drain, excluding the length of manholes and catch basins, measured to the limits of the manhole inside diameter or the catch basin inside face of wall.

B. BASIS OF PAYMENT

1. The unit prices for these items shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

   a. Furnishing and installing the pipe/gravity drains, complete-in-place, including all excavation, disposal of material, furnishing and installing gravel borrow backfill, crushed stone for pipe bedding/backfill material, compacting materials as specified, setting, grouting, and all incidental work not specifically included for payment under other items;
   b. Protection and support of existing utilities, maintaining flows of all utilities, and repairing and/or replacing damaged or impacted existing utilities not specifically included for payment under other items;
   c. Implementing safety precautions, including designing and implementing excavation support;
   d. Designing, furnishing, installing, operating, maintaining and removing temporary dewatering systems required to lower and control water levels and hydrostatic pressures during construction, as well as the appropriate disposal of pumped water;
   e. Furnishing and installing tees, cleanouts and other adapters or couplings required to install the system complete-in-place, as specified and indicated on the Drawings;
   f. Connecting new gravity drains to the existing gravity drain structures or system, including all excavation, modifications to existing structures

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(including but not limited to form work, coring, cutting, concrete work, masonry and bricks), modifying and/or removing existing pipe (all materials and sizes), and furnishing and installing adapters and couplings;

g. Any and all other work, whether direct or incidental, associated with the furnishing and installation of the stormwater drains not specifically identified herein.

BID ITEM 15.0 ADJUST DRAINAGE/UTILITY STRUCTURE FRAME/GRATE/COVER

A. METHOD OF MEASUREMENT

1. The quantity of drainage structure frames, grates and covers paid for under this Item shall be measured by Each, removed, re-configured, adjusted and rest, complete and accepted in place.

B. BASIS OF PAYMENT

1. The unit prices for these items shall include any and all work and incidentals required to adjust, shim, align and reset all the frames and covers of utility structures within the limit of work, complete, in place as indicated on the Drawings, as specified or as otherwise directed by the Owner's Representative.

BID ITEM 16.0 RECONSTRUCT DRAINGE/UTILITY STRUCT FRAME & GRATE/COVER

A. METHOD OF MEASUREMENT

1. This item shall be paid for at the contract price bid per Each installed, this item, as complete and accepted in place.

B. BASIS OF PAYMENT

1. The Lump Sum price paid for this item shall include full compensation for all work and incidentals required to furnish and install and reconstruct the structure, but shall not be limited to saw-cutting, excavation, installation of a new riser sections, brick, block, frame and grates/covers and backfilling, as indicated on the Drawings, within the limit of work, complete, in place as indicated on the Drawings, as specified or as otherwise directed by the Engineer.

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BID ITEM 16.1 FRAME AND ROUND COVER

A. METHOD OF MEASUREMENT

1. This item shall be paid for at the contract price bid per Each installed, this item, as complete and accepted in place.

B. BASIS OF PAYMENT

1. The Lump Sum price paid for this item shall include full compensation for all work and incidentals required to furnish and install the round frame and cover and reconstruct the structure, but shall not be limited to saw-cutting, excavation, installation of a new riser sections, brick, block, frame and grates/covers and backfilling, as indicated on the Drawings, within the limit of work, complete, in place as indicated on the Drawings, as specified or as otherwise directed by the Engineer.

BID ITEM 17.0 SEWER CLEANOUT EXTENED AND RESET

A. METHOD OF MEASUREMENT

1. The payment for work under these items will be measured per Each sewer clean out extended and reset, installed, complete and accepted in place.

B. BASIS OF PAYMENT

The price paid for this item shall include full compensation for all work and incidentals required to furnish and install the materials necessary to extend the schedule 40 clean out and cap, as well as to reset the existing structure and cover and work shall not be limited to, excavation, installation and all necessary fittings, assembling and installing all connections, bedding and backfilling the trench, as indicated on the Drawings, as specified or as otherwise directed by the Owner's Representative

BID ITEM 18.0 WATER SERVICE EXTENSION AT PIER

A. METHOD OF MEASUREMENT

1. The payment for work under these items will be measured per Each installed, complete and accepted in place.

B. BASIS OF PAYMENT

1.The unit price for this item shall include excavation, furnishing and installing bedding, pipe, fittings and appurtenances, insulation, meter boxes, any and all work and incidentals required to complete the water line extension as indicated, including

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any and all incidentals, complete and in place as indicated on the Drawings, as specified or as otherwise directed by the Engineer.

BID ITEM 19.0 WATER LINE CONNECTION & APURTENANCES

A. METHOD OF MEASUREMENT

1. The payment for work under these items will be measured per Lump Sum installed, complete and accepted in place.

B. BASIS OF PAYMENT

1. The unit prices for these items shall include any and all work and incidentals required to complete the water line, valves, all fittings, appurtenances, in place as indicated on the Drawings, as specified or as otherwise directed by the Engineer.

BID ITEM 20.0 GRANITE CURB TYPE VA1 – STRAIGHT

BID ITEM 21.0 GRANITE CURB TYPE VA1 – CURVED

BID ITEM 22.0 GRANITE CURB TYPE VA4 – STRAIGHT

BID ITEM 23.0 GRANITE CURB TYPE VA4 – CURVED

A. METHOD OF MEASUREMENT

1. The length of curb shall measured by the Linear Foot and shall be as measured along the front arris of the curb, except that where the curb is set on a curve having a radius of 10 feet or less, the measurement will be made along the curb at the lowest exposed level after completion of shoulder or pavement

B. BASIS OF PAYMENT

1. Curb will be paid for at the contract unit price per Linear Foot under the item for the particular type of curb, complete in place. Curved granite curb shall include all curb (except curb corners), cut to specified radius and set on curve. The price of the curbing shall include compensation for any other required excavation. Saw-cuts made in existing pavement, Gravel borrow and Cement Concrete for the foundations will be included in the unit price under the respective items and will not be paid for separately.

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BID ITEM 24.0 GEOTEXTILE SEPARATION FABRIC

A. METHOD OF MEASUREMENT

1. The payment for work under these items will be measured per Square Yard of Geotextile Separation Fabric installed, complete and accepted in place.

B. BASIS OF PAYMENT

1. The price paid for this item shall include full compensation for all work and incidentals required to furnish and install the specified geotextile fabric Work includes but shall not be limited to, layout, cutting, fitting lapping, anchoring, securing and any and all associated work as necessary to encapsulate the substrate surface as indicated on the Drawings, as specified or as otherwise directed by the Owner's Representative

BID ITEM 25.0 WALKWAY TYPE A – 6" BROOM FINISH CONCRETE

A. METHOD OF MEASUREMENT

1. The payment for work under this item will be measured per Square Yard of walkway installed, complete and accepted in place.

B. BASIS OF PAYMENT

1. The unit price for this item shall constitute full compensation for surface preparation, furnishing, placing and finishing 6" thick broom finish concrete including all related formwork, mesh reinforcing, joint material, and dowels as specified and as indicated on the Drawings.

BID ITEM 26.0 WALKWAY TYPE B – 4" BROOM FINISH CONCRETE

A. METHOD OF MEASUREMENT

1. The payment for work under these items will be measured per Square Yard of the walkway installed, complete and accepted in place.

B. BASIS OF PAYMENT

2. The unit price for this Item shall constitute full compensation for surface preparation, furnishing, placing and finishing 4" thick broom finish concrete including all related formwork, mesh reinforcing, joint material and dowels as specified and as indicated on the Drawings.

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BID ITEM 27.0 ADA TACTILE WARNING PLATE ASSEMBLY

A. METHOD OF MEASUREMENT

1. The quantity of ADA Tactile Warning Plate Assembly to be measured and paid for under this Item shall be measured by the Square Foot installed as per the locations indicated on the drawings.

B. BASIS OF PAYMENT

1. The unit price shall constitute full compensation for furnishing and installing the Item complete as specified, complete and in place inclusive of all layout, any form work, or specific reinforcing, the tactile warning plates, mixing, placing concrete, plate placement, finishing, surface protection and cleaning as detailed on the Drawings and specified herein.

BID ITEM 28.0 REMOVE AND RESET BOLLARDS

A. METHOD OF MEASUREMENT

1. The quantity of this Item shall be measured per Each bollard removed, stockpiled and reset, complete and accepted in place. Work shall include any and all incidentals and items not specifically included for payment under other sections.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals necessary to sawcut, jackhammer, or otherwise remove, handle, stockpile and then lay out re-set and install all bollards as indicated on the plans including all work considered incidental and not specifically identified herein, complete and accepted in place.

BID ITEM 29.0 BENCH

A. METHOD OF MEASUREMENT

1. The quantity of this Item shall be measured per Each bench installed, complete and accepted in place. Work shall include any and all incidentals and items not specifically included for payment under other sections.

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B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals necessary to furnish and layout, fabricate, drill, set and install all benches, including all work considered incidental and not specifically identified herein, complete and accepted in place.

BID ITEM 30.0 BICYCLE HITCH

A. METHOD OF MEASUREMENT

1. The quantity of this Item shall be measured per Each bicycle hitch installed, complete and accepted in place. Work shall include any and all incidentals and items not specifically included for payment under other sections.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals necessary to furnish and layout, fabricate, drill, set and install all bicycle hitches, including all work considered incidental and not specifically identified herein, complete and accepted in place.

BID ITEM 31.0 ENTRANCE GATE

A. METHOD OF MEASUREMENT

1. This quantity of this item shall be measured by the Lump Sum and shall not be measured separately but by evaluation of the progression of work activities that comprise this item, determined as a percent installed, complete and accepted in place.

B. BASIS OF PAYMENT

1. The Lump Sum price for this item shall include full compensation for all labor, equipment, materials and incidentals necessary to furnish shop drawings, materials, conduct field layout, and then to excavate, place crushed stone, insulation, forming footing, place reinforcing and anchor bolts, place and finish concrete foundations, fabricate, install gate assemblies and all necessary hardware, including any and all incidentals not specifically identified herein, complete and accepted in place.

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BID ITEM 32.0 LANDSCAPE BOULDER

A. METHOD OF MEASUREMENT

1. The quantity of this Item shall be measured per Each landscape boulder installed, complete and accepted in place. Work shall include any and all incidentals and items not specifically included for payment under other sections.

B. BASIS OF PAYMENT

1. The price for this item shall include full compensation for all labor, equipment, materials and incidentals necessary to install landscape boulders including layout, and then to excavate, place crushed stone boulders, including any and all incidentals not specifically identified herein, complete and accepted in place.

BID ITEM 33.0 PEDESTRIAN RAILING SYSTEM

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by the Lump Sum and shall not be measured separately but by evaluation of the progression of work activities that comprise this item, determined as a percent complete based on a Schedule of Values for this item, complete and accepted.

B. BASIS OF PAYMENT

1 The Lump Sum price paid for this item shall include full compensation for all labor, equipment, materials, including but not limited to furnish baseplates, anchors, posts, fasteners, cable, cable rail accessories, top-rail and incidentals necessary to lay out, template, cut, drill, grind, assemble, align and adjust, set, bolt, shim, weld, fabricate and finish the rail system, including all mock-ups, samples, components, as shown on the drawings and as specified, inclusive of all work considered incidental and not specifically identified herein, complete, inspected and accepted in place.

BID ITEM 34.0 MODIFICATION TO EXISTING BOARDWALK SYSTEM

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by the Lump Sum and shall not be measured separately but by evaluation of the progression of work activities that comprise this item, determined as a percent installed, complete and accepted in

B. BASIS OF PAYMENT

1. The Lump Sum price paid for this item shall include full compensation for all labor, equipment, materials and incidentals necessary to modify the boardwalk system , including cutting and removal of the indicted components, finishing any exposed cut

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surfaces, drilling, furnishing and installing all anchors, bolts clips, steel angle iron and related framing ad steel plate necessary to create an ADA compliant threshold transition between the existing board structure and the adjacent park walkway, inclusive of any and all incidentals not specifically identified herein, complete and accepted in place.

BID ITEM 35.0 IMPORTED LOAM FOR LAWN AREAS (6" DEPTH)

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by Cubic Yard of imported loam installed, complete and accepted in place, inclusive of any and all incidentals necessary to complete the work.

B. BASIS OF PAYMENT

1. The Cubic Yard price paid will be based on the accepted quantity of Imported Loam installed at the contract unit price per cubic yard. The price so-stated constitutes full and complete compensation for all materials, labor and equipment including trimming and fine grading, as well as any and all incidentals required to finish he work, complete and accepted by the Engineer

BID ITEM 36.0 SEEDING

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by Square Yard of turfgrass areas prepared and seeded, complete and accepted in place, inclusive of any and all incidentals necessary to complete the work.

B. BASIS OF PAYMENT

1. The Square Yard price paid for this item shall include full compensation for seed bed preparation and finish seeding of the turfgrass areas, as well as the specified germination and establishment of grass and initial maintenance as specified herein and as indicated on the Drawings.

BID ITEM 37.0 IMPORTED LOAM FOR PLANTING BEDS

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by Cubic Yard of loam for planting beds mixed as planting media installed, complete and accepted in place, inclusive of any and all incidentals necessary to complete the work.

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B. BASIS OF PAYMENT

1. The Cubic Yard price paid will be based on the accepted quantity of loam for planting beds mixed and installed at the contract unit price per Cubic Yard. The price so-stated shall constitute full and complete compensation for all materials, labor and equipment including furnishing, mixing, incorporating, installing, trimming and fine grading, as well as any and all incidentals required to finish the work, complete and accepted by the Engineer

BID ITEM 38.0 LANDSCAPE PLANTINGS

A. METHOD OF MEASUREMENT

1. This quantity of this item shall be measured by the Lump Sum, but the plants installed shall be measured individually and compared with a corresponding Schedule of Values.

B. BASIS OF PAYMENT

1. The price paid shall include furnishing and installing all plants, all layout, digging, installing, pruning, mulching, watering, all soil amendments, any and all incidentals related to the completion of the work. Payment shall be calculated based on the furnished Schedule of Values and plants actually placed and installed, converted to a percentage complete of the overall Bid Item.

BID ITEM 39.0 IRRIGATION SYSTEM

A. METHOD OF MEASUREMENT

1. This quantity of this item shall be measured by the Lump Sum and shall not be measured separately but by evaluation of the progression of work activities that comprise this item, determined as a percent installed, complete and accepted in place.

B. BASIS OF PAYMENT

1. The Lump Sum price for this item shall include full compensation for all labor, equipment, materials and incidentals necessary to furnish shop drawings, conduct field layout, and then to excavate, fit and install all pipe, fittings, valves, wiring including crushed stone, valve boxes, pipe, sprinklers, drip line and all assemblies and all necessary hardware, including the system controller, and any and all incidentals not specifically identified herein, inclusive of all zone and system testing, commissioning adjustments, as directed by the Engineer, for a fully functional irrigation system, and complete and accepted in place.

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BID ITEM 40.0 MISC. CONCRETE FOR FOUNDATIONS, SLABS & UTILITY WORK

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be per Cubic Yard, complete and accepted.

B. BASIS OF PAYMENT

1. The Lump Sum price for this item shall include full compensation for all labor, equipment, materials and incidentals necessary to furnish shop drawings, materials, conduct field layout, and then to excavate, place crushed stone, insulation, form footings, place reinforcing, and anchor bolts, place and finish concrete foundations, slabs, pipe encasement, etc. as directed, complete and accepted in place.

BID ITEM 41.0 CONCRETE TRANSFOMER SLAB, OIL CONTAINMENT CURB AND STEEL BOLLARDS

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured per the Lump Sum, complete and accepted.

B. BASIS OF PAYMENT

1. The price for this item shall include full compensation for all labor, equipment, materials and incidentals necessary to furnish shop drawings, conduct field layout, and then to excavate, install gravel base, compact, form shapes, for the slab and oil containment curb, place reinforcing, grounding rods and cables, all assemblies and all necessary hardware and incidentals installed and backfilled, including geotextile, and crushed stone, with steel bollards, complete and in place, conforming to National Gird Underground Commercial Distribution Standard details for this application, backfilled as directed by the Engineer, and complete and accepted in place.

BID ITEM 42. CONC. FOUNDATION FOR MAIN CIRCUIT BREAKER CABINET

A. METHOD OF MEASUREMENT

1.The quantity of this item shall per Each, complete and accepted.

B. BASIS OF PAYMENT

1. The price for this item shall include full compensation for all labor, equipment, materials and incidentals necessary to furnish shop drawings, conduct field layout, and then to excavate, install gravel base, compact, form shapes, place

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reinforcing, all assemblies and all necessary hardware and incidentals, as directed by the Engineer, and complete and accepted in place.

BID ITEM 43.0 CONC. FOUNDATION FOR POWER PANEL/CONEX PANEL

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be per Each complete and accepted.

B. BASIS OF PAYMENT

1. The price for this item shall include full compensation for all labor, equipment, materials and incidentals necessary to furnish shop drawings, conduct field layout, and then to excavate, install gravel base, compact, form shapes, place reinforcing, all assemblies and all necessary hardware and incidentals, as directed by the Engineer, and complete and accepted in place.

BID ITEM 44.0 CONCRETE FOUNDATION FOR LIGHT POLES

A**.** METHOD OF MEASUREMENT

1.The quantity of this item shall per Each foundation, complete and accepted.

B. BASIS OF PAMENT

1. The price for this item shall include full compensation for all labor, equipment, materials and incidentals necessary to furnish shop drawings, conduct field layout, and then to excavate, install crushed stone base, compact, place insulation, form shapes, place reinforcing, conduit, anchor bolts, ground rods all assemblies and all necessary hardware and incidentals, as directed by the Engineer, and complete and accepted in place.

BID ITEM 45.0 2" SCH. 40 PVC ELECTRICAL CONDUIT

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by linear foot of PVC electrical conduit installed, complete and accepted in place, inclusive of any and all incidentals necessary to complete the work.

B. BASIS OF PAYMENT

1. Work under this Item shall be paid at the Contractor bid price, per Linear Foot of conduit installed including excavation, and furnishing and installing all conduit, necessary fittings, attachments and connectors, all backfilling,

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compacting as well as any and all incidentals related to the installation of the system as shown on the Drawings and as specified.

BID ITEM 46.0 4" SCH. 40 PVC ELECTRICAL CONDUIT

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by Linear Foot of PVC electrical conduit installed, complete and accepted in place, inclusive of any and all incidentals necessary to complete the work.

B. BASIS OF PAYMENT

1. Work under this Item shall be paid at the Contractor bid price, per Linear Foot of conduit installed including excavation, and furnishing and installing all conduit, necessary fittings, attachments and connectors, all backfilling, compacting as well as any and all incidentals related to the installation of the system as shown on the Drawings and as specified.

BID ITEM 47.0 4" PVC TYPE DB ELECTRICAL CONDUIT, CONCRETE ENCASEMENT

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by Linear Foot of PVC electrical conduit installed, complete and accepted in place, inclusive of any and all incidentals necessary to complete the work.

B. BASIS OF PAYMENT

1. Work under this Item shall be paid at the Contractor bid price, per Linear Foot of conduit installed including excavation, and furnishing and installing all conduit, necessary fittings, cradles, attachments and connectors, all concrete forming, placement, backfilling, compacting as well as any and all incidentals related to the installation of the system as shown on the Drawings and as specified.

BID ITEM 48.0 ELECTRIC HANDHOLE TYPE B

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by Each, complete and accepted in place.

CONFORMED

B. BASIS OF PAYMENT

1. The price paid for this item shall include full compensation for all labor, equipment, materials, including but not limited to furnishing and installing the handholes, complete and accepted in place, inclusive of any and all incidentals necessary to complete the work as indicated on the drawings and as specified herein.

BID ITEM 49.0 PRIMARY ELECTRIC PULL BOX

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by Each, complete and accepted.

B. BASIS OF PAYMENT

2. The price paid for this item shall include full compensation for all labor, equipment, materials, including but not limited to excavation, crushed stone, placement and furnishing and installing the Pull box, complete and accepted in place, inclusive of any and all incidentals necessary to complete the work as indicated on the drawings and as specified herein.

BID ITEM 50 500 MCM COPPER CABLE

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by Linear Foot of copper cable installed, complete and accepted in place, inclusive of any and all incidentals necessary to complete the work.

B. BASIS OF PAYMENT

1. The price paid for this item shall include full compensation for all labor, equipment, materials, including but not limited to furnishing pulling, assembling and installing and wiring all copper cable complete and accepted in place, inclusive of any and all incidentals necessary to complete the work as indicated on the drawings and as specified herein.

BID ITEM 50.1 #6 COPPER CABLE

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by Linear Foot of copper cable installed, complete and accepted in place, inclusive of any and all incidentals necessary to complete the work.

CONFORMED

B. BASIS OF PAYMENT

1. 1.The price paid for this item shall include full compensation for all labor, equipment, materials, including but not limited to furnishing, pulling, assembling, and installing and wiring all copper cable complete and accepted in place, inclusive of any and all incidentals necessary to complete the work as indicated on the drawings and as specified herein.

BID ITEM 50.2 #1/0 COPPER CABLE

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by Linear Foot, complete and accepted in place.

B. BASIS OF PAYMENT

1. The price paid for this item shall include full compensation for all labor, equipment, materials, including but not limited to furnishing, pulling, assembling and installing and wiring all copper cable as indicated on the drawings and as specified herein.

BID ITEM 50.3 #10 COPPER CABLE

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by Linear Foot, complete and accepted in place.

B. BASIS OF PAYMENT

1. The price paid for this item shall include full compensation for all labor, equipment, materials, including but not limited to furnishing, pulling, installing and wiring all copper cable as indicated on the drawings and as specified herein.

BID ITEM 50.4 #3 COPPER CABLE

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by Linear Foot, complete and accepted in place.

B. BASIS OF PAYMENT

1.The price paid for this item shall include full compensation for all labor, equipment, materials, including but not limited to furnishing, pulling, assembling and wiring all copper cable as indicated on the drawings and as specified herein.

CONFORMED

BID ITEM 50.5 #8 COPPER CABLE

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by Linear Foot, complete and accepted in place.

B. BASIS OF PAYMENT

1.The price paid for this item shall include full compensation for all labor, equipment, materials, including but not limited to furnishing, pulling, assembling and wiring as well as any and all incidentals required to complete the work, all copper cable as indicated on the drawings and as specified herein.

BID ITEM 51.0 MAIN CIRCUIT BREAKER CABINET

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by Each, complete and accepted in place.

B. BASIS OF PAYMENT

1. The price paid for this item shall include full compensation for all labor, equipment, materials, including but not limited to furnishing and installing all components, grounding, connections, enclosures, panels, and wiring as well as any and all incidentals required to complete the work, as indicated on the drawings and as specified herein.

BID ITEM 52.0 POWER PANEL - 400 AMP PANEL

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by Each, complete and accepted in place.

B. BASIS OF PAYMENT

1. The price paid for this item shall include full compensation for all labor, equipment, materials, including but not limited to furnishing and installing all components, grounding, connections, enclosures panels and wiring as well as any and all incidentals required to complete the work, as indicated on the drawings and as specified herein.

CONFORMED

BID ITEM 53.0 CONEX PANEL

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by Each, complete and accepted in place.

B. BASIS OF PAYMENT

1. The price paid for this item shall include full compensation for all labor, equipment, materials, including but not limited to furnishing and installing all components, grounding, connections, enclosures, panels, and wiring as well as any and all incidentals required to complete the work, as indicated on the drawings and as specified herein.

BID ITEM 54.0 LIGHT POLES AND LUMINAIRES (ALL TYPES)

A. METHOD OF MEASUREMENT

1. The quantity of this item shall measured by Each, complete and accepted in place.

B. BASIS OF PAYMENT

1. The price paid for this item shall include full compensation for all labor, equipment, materials, including but not limited to furnishing and installing the Light Post and Luminaires fully assembled, wired and permanently affixed on concrete light pole foundations, inclusive of all wiring, connections, fittings and as indicated on the drawings and as specified herein.

BID ITEM 55.0 TYPE C LIGHTS-UP-LIGHTS

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured by Each Up-Light, installed, complete and accepted in place, inclusive of any and all incidentals necessary to complete the work.

B. BASIS OF PAYMENT

1. The price paid for this item shall include full compensation for all labor, equipment, materials, including but not limited to furnishing and installing the Up-lights, anchorage/support foundations, inclusive of all wiring, connections, fittings and as indicated on the drawings and as specified herein.

BID ITEM 56.0 PIER SIGNAGE

A. METHOD OF MEASUREMENT

CONFORMED

2. The quantity of signage shall be measured by the Square Foot, complete and accepted including any and all incidentals necessary to complete the work.

B. BASIS OF PAYMENT

1. The price paid for this item shall include full compensation for all labor, equipment, materials, including but not limited to furnishing drilling, and bolting and assembling of signage as indicated on the drawings and as specified herein.

BID ITEM 57.0 PIER SIGN POSTS

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be measured per Each, complete and accepted, in place including any and all incidentals necessary to complete the work.

B. BASIS OF PAYMENT

1. The price paid for this item shall include full compensation for all labor, equipment, materials, layout, and furnishing and installing all posts to support signage, all bases, and posts, inclusive of cutting, drilling, bolting, setting, as well as any and all incidentals as indicated on the drawings and as specified herein.

BID ITEM 58.0 PAVEMENT STRIPING

A. METHOD OF MEASUREMENT

1. The quantity of this item shall be paid for by the Lump Sum, and work shall not be measured separately but by evaluation of the progression of work activities that comprise this full item, determined as a percent complete and accepted.

B. BASIS OF PAYMENT

1. The Lump Sum price paid for this item shall include full compensation for all labor, equipment, materials, and layout, templating and painting, including any and all incidentals necessary to complete the work, based on the measured percent complete.

BID ITEM NO. 59.0 PROJECT DEMOBILIZATION AND CLOSE-OUT

A. METHOD OF MEASUREMENT

CONFORMED

1. This item shall be paid for at the contract price bid per Lump Sum.

2. The Lump Sum price for this item shall not exceed five percent (5%) of the total amount of the bid.

3. The Lump Sum shall be payable upon completion of the project, after all temporary items and measures have been removed and suitably disposed of, all blending and finishing of work on the edges of the project that meet existing conditions, all finishing and cleaning of newly installed project components is complete, all warranties, all As-Built Drawings, all related utility information along with any 'Attic Stock', specialty tools fasteners, paint touch up kit, and accessories, etc.

4. Measurement shall include the full completion of all training and commissioning, all warranties, and related operational information, assembled, and furnished to Owner in a complete product binder of all materials and products utilized and furnished

B. BASIS OF PAYMENT

1. The Lump Sum price paid for item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Costs for demobilizing all machinery, tools, fencing, temporary electrical services, storage containers, office space, etc. and other equipment used to perform the work not considered part of the final project and no longer necessary upon completion of the project.

    b. Costs for cleaning all park component and surfaces, compiling all warranties, all As-Built drawings and assembling product binder of materials utilized in furnishing the railing system as accepted by the Owner.

    c. Full performance of final cleanup and any necessary restorations of the site.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

CONFORMED

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CONFORMED

SECTION 01026

SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Requirements for breakdown of Lump-Sum Bid items.

B. Related Sections

1. Section 01300 - Submittals

1.2 BREAKDOWN OF LUMP SUM BID

A. Within seven (7) business days of the date of the Executed Contract, a list detailing the breakdown of the Lump Sums Bid by the appropriate Divisions of these Specifications or as otherwise directed by the Engineer, shall be submitted for review and concurrence by the Engineer. This list will be used by the Engineer as a guide in preparing estimates for payment. The list shall be an accurate representation of costs required to complete the Work in accordance with the Contract Documents.

B. A schedule of the value of work done based on the Progress Schedule submitted under Section 01300 - Submittals shall be submitted within seven (7) business days of the date of the executed Contract. The schedule shall show the total sum of work done for each month of the projected construction period and shall be updated monthly to reflect the actual amount requisitioned for payment.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

CONFORMED

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CONFORMED

SECTION 01035

MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Procedures for making modifications to the Contract by change orders or other means.

B. Related Sections

1. Section 00500 - Contract Agreement

1.2 **CHANGE ORDERS**

A. In general Change Orders will be issued for modification of Contract documents which will incorporate changes in the Contract requirements, including additions or deletions in the Work; for unforeseen field conditions which will necessitate changes in the Work; changes in code provisions or other requirements of federal, state or local authority requiring changes in the Work; changes in the availability of products or for incorporating new products into the work and for changes directed by the Engineer for the benefit of the Owner.

B. Authority to execute Change Orders shall be that of the Engineer and not of the Contractor. Changes Orders will, in general, originate by a “Change Order Proposal Request” or by issuance of a “Construction Change Authorization”.

C. Unless authorized by the Engineer, no work shall be performed that is involved in the change until a formal Change Order is issued.

D. To initiate a Change Order, the Engineer will forward a Change Order proposal request describing the proposed changes and if required, include additional or revised drawings and specifications soliciting a formal quotation of cost and time to complete the proposed Change Order work. Upon reaching mutual agreement on the cost and time, the Engineer will sign his approval of the Change Order and submit it to the Contractor for his full signature of acceptance.

1.3 **FIELD ORDERS**

A. The Engineer may, to avoid costly removal of, or alterations to, present on-going work, issue a Work Change Directive authorizing the Contractor to proceed, subject to later negotiation of the price of the change.

CONFORMED

1.4 **PRICE AGREEMENTS**

A. Prices agreed upon to cover the Change Orders may be either by mutual acceptance of a lump sum or by unit prices as stated in the Contract bid proposal or actual direct cost plus a percentage for overhead, profit and other expenses consistent with Contract Agreement.

B. Work done by a subcontractor entitles the General Contractor a percentage of the sum of the actual direct cost, not including the subcontractor's overhead and profit, consistent with the Contract Agreement.

C. Method for computing the cost of the change shall be based on the net additional increase. No overhead and profit shall be deducted from prices for changes deleting work.

D. The Change Order form document shall indicate the net adjustment (+/-) to the total Contract price as a result thereof including extension or reduction of time when applicable.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

CONFORMED

SECTION 01040

COORDINATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements for coordinating the various parts of Work under this Contract.

1.2 REQUIREMENTS

A. Coordinate scheduling, submittals, and Work of the various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements.

B. Coordinate work operations when possible to allow for Work to occur in multiple locations concurrently.

C. Coordinate site access and parking with the Owner. Utilize caution with all operations and secure the site from public access.

D. Coordinate completion and cleanup of Work of separate Sections in preparation for Substantial Completion.

E. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work determined not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

CONFORMED

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SECTION 01050

FIELD ENGINEERING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Survey work and other field engineering responsibilities of the Contractor.

1.2 REQUIREMENTS

A. The Contractor shall be responsible for layout of the Work and the establishing of lines and grades.

B. Establish elevations, lines, levels, reference marks, batter boards, etc., required during the progress of the Work. Verify such marks by instrument to confirm accuracy.

C. Locate and protect survey control and reference points.

D. Make, check, and be responsible for all measurements and dimensions necessary for the proper construction of the Work.

E. The Engineer will be permitted to check the lines, elevations, reference marks, batter boards, etc., set by the Contractor. The Contractor shall correct any errors found in lines, elevations, reference marks, batter boards, etc. Such a check shall not be construed as approval of the Contractor's work and shall not relieve or diminish the responsibility of the Contractor for the accurate construction and completion of the Work.

F. Control datum for survey as shown on Drawings.

1.3 QUALITY ASSURANCE

A. Qualifications

1. Employ a Civil Engineer or Land Surveyor registered within the Commonwealth of Massachusetts , acceptable to the Engineer.

B. Certifications

1. Submit certificate signed by the Contractor’s Engineer or Land Surveyor stating elevations and locations of the Work are in conformance with the Contract Documents.

PART 2 - PRODUCTS

NOT USED

CONFORMED

PART 3 - EXECUTION

NOT USED

END OF SECTION

CONFORMED

SECTION 01060

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Permits, Regulatory and Code requirements and Fees applicable to the project.

1.2 PERMITS BY CONTRACTOR

A. Permit Fees shall not be Waived.

B. The Contractor shall secure all necessary permits from the City authorities having jurisdiction, for constructing the work defined herein.

C. As a minimum the following permits are required:
   1. Street Opening Permit
   2. Building Permit
   3. Electrical Permit
   4. Plumbing Permit

1.3 PERMITS BY OWNER

A. The Owner has obtained the following permit updates/approvals.
   1. Mass DEP NOI File #SE 024-0760.
   2. Conservation Commission Order of Conditions issued 5.3.2021.
   3. MADEP Chapter 91 License (Minor Modification is pending MassDEP approval).

1.4 CODES

A. The Contractor shall conform to the requirements of and pay all fees imposed by local and State Building Authorities having jurisdiction over the Work. The Contractor is responsible to conform to all building, plumbing, electrical and related code requirements.

B. The Contractor shall conform to the latest requirements of the following codes:
   1. Federal, State and Municipal Laws
   2. Commonwealth of Massachusetts State Building Code, 780 CMR.

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1.04 FEES

A. The cost of all permits secured by the Contractor shall be borne by him and shall be considered as having been included in the price or prices stated in the Bid. Copies of all required permits shall be filed with the Engineer prior to starting Work for which a permit is required.

B. All off-site material disposal costs shall be borne by the Contractor. All disposal shall be in full compliance with the law.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 COORDINATION

A. The Contractor shall coordinate with the Engineer during all phases of excavation and site work to ensure protection of the existing geotextile fabric membrane cap, as well as to limit excavation and exposure to PCB Impacted Soils thru the development of the site. railing shop drawings, mock-up panels and related samples to include review and concurrence with local building official in regard to code applicability and compliance.

B. The Contractor shall facilitate and participate in any necessary meetings with the Owner and reviewing entities to allow for any necessary permitting approvals to advance.

C. No construction, fabrication or installation shall occur without prior approvals.

END OF SECTION

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SECTION 01067

STATE OF MASSACHUSETTS AND LOCAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. EXCERPTS FROM MASSACHUSETTS STATUTES
B. MINIMUM WAGE RATES
C. SAFETY AND HEALTH

1.02 EXCERPTS FROM MASSACHUSETTS STATUTES

A. In addition to the requirements as set forth under "Compliance with Laws" in the AGREEMENT, particular attention is directed to certain stipulations of Chapter 149 of the General Laws of Massachusetts, as amended to date as follows:

Section 25. "Every employee in public work shall lodge, board, and trade where and with whom he elects; and no person or his agents or employees under contract with the commonwealth, a county, city or town, or with a department, board, commission or officer acting therefore, for the doing of public work shall directly or indirectly require, as a condition of employment therein, that the employee shall lodge, board or trade at a particular place or with a particular person. This section shall be made a part of the contract for such employment."

Section 26. "In the employment of mechanics and apprentices, teamsters, chauffeurs and laborers in the construction of public works by the commonwealth, or by a county, town or district, or by persons contracting or sub-contracting for such works, preference shall first be given to citizens of the commonwealth who have been residents of the commonwealth for at least six months at the commencement of their employment who are veterans as defined by clause Forty-three of section seven of chapter four and who are qualified to perform the work to which the employment relates and within such preference, preference shall be given to service-disabled veterans, and secondly, to citizens of the commonwealth generally who have been residents of the commonwealth for at least six months at the commencement of their employment, and if they cannot be obtained in sufficient numbers then to citizens of the United States, and every contract for such work shall contain a provision to this effect."

Section 34. *Regarding Worker Compensation insurance* "Every contract, except for the purchase of, material or supplies, involving the employment of laborers, workmen, mechanics, foremen, or inspectors, to which the commonwealth or any county or any town, subject to section thirty, is a party, shall contain a stipulation that no laborer, workman, mechanic, foreman or inspector working within the commonwealth, in the employ of the contractor, subcontractor or other person doing

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or contracting to do the whole or a part of the work contemplated by the contract, shall be required or permitted to work more than eight hours in any one day or more than 48 hours in any one week, or more than six days in any one week, except in cases of emergency, or in case any town subject to section thirty-one is a party to such a contract, more than eight hours in any one day, except as aforesaid..."

Section 34A. *Regarding Contracts for Public Works:* "Every contract for the construction, alteration, maintenance, repair or demolition of or addition to, any public building or other public works for the commonwealth or any political subdivision thereof shall contain stipulations requiring that the contractor shall, before commencing performance of such contract, provide by insurance for the payment of compensation and the furnishing of other benefits under chapter one hundred and fifty-two to all persons to be employed under the contract, and that the contractor shall continue such insurance in full force and effect during the term of the contract. No officer or agent contracting in behalf of the commonwealth or any political subdivision thereof shall award such a contract until he has been furnished with sufficient proof of compliance with the aforesaid stipulations. Failure to provide and continue in force such insurance as aforesaid shall be deemed a material breach of contract and shall operate as an immediate termination thereof. No cancellation of such insurance, whether by the insurer or by the insured, shall be valid unless written notice thereof is given by the party proposing cancellation to the other party and to the officer or agent who awarded the contract at least fifteen days prior to the intended effective date thereof, which date shall be expressed in said notice. Notice of cancellation sent by the party proposing receipt of the addressee requested, shall be a sufficient notice…"

Section 34B. "Every contract for the construction, alteration, maintenance, repair or demolition of, or addition to, any public works for the commonwealth or any political subdivision thereof shall contain stipulations requiring that the contractor shall pay to any reserve police officer employed by him in any city or town the prevailing rate of wage paid to regular police officers employed by him in such city or town."

Attention is directed to Chapter 774 of the Acts of 1972 amending Section 39F of Chapter 30 to read as follows:
Section 39F. "(1) Every contract awarded shall contain the following subparagraphs and in each case those subparagraphs shall be binding between the general contractor and each subcontractor.

"(a) Forthwith after the general contractor receives payment on account of a periodic estimate, the general contractor shall pay to each subcontractor the amount paid for the labor performed and the materials furnished by that subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

(b) Not later than the sixty-fifth day after each subcontractor substantially completes his work in accordance with the plans and specifications, the entire balance due under the subcontract less amounts retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, shall be due the subcontractor; and the awarding authority shall pay that amount to the

general contractor. The general contractor shall forthwith pay to the subcontractor the full amount received from the awarding authority less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

(c) Each payment made by the awarding authority to the general contractor pursuant to sub-paragraphs (a) and (b) of this paragraph for the labor performed and the materials furnished by a subcontractor shall be made to the general contractor for the account of that subcontractor; and the awarding authority shall take reasonable steps to compel the general contractor to make each such payment to each such subcontractor. If the awarding authority has received a demand for direct payment from a subcontractor for any amount which has already been included in a payment to the general contractor for payment to the subcontractor as provided in subparagraphs (a) and (b), the awarding authority shall act upon the demand as provided in this section.

(d) If, within seventy days after the subcontractor has substantially completed the subcontractor work, the subcontractor has not received from the general contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, the subcontractor may demand direct payment of that balance from the awarding authority. The demand shall be by a sworn statement delivered to or sent by certified mail to the awarding authority, and a copy shall be delivered to or sent by certified mail to the general contractor at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of the subcontract work. Any demand made after substantial completion of the subcontract work shall be valid even if delivered or mailed prior to the seventieth day after the subcontract work. Within ten days after the subcontractor has delivered or so mailed the demand to the awarding authority and delivered or so mailed a copy to the general contractor, the general contractor may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the awarding authority and a copy shall be delivered to or sent by certified mail to the subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontractor including any amount due for extra labor and materials furnished to the general contractor and of the amount due for each claim made by the general contractor against the subcontractor.

(e) Within fifteen days after receipt of the demand by the awarding authority, but in no event prior to the seventieth day after substantial completion of the subcontract work, the awarding authority shall make direct payment to the subcontractor of the balance due under the subcontract including any amount due for extra and materials furnished to the general contractor, less any amount (i) retained by the awarding authority as the estimated cost of completing the incomplete or unsatisfactory items of work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the general contractor in the sworn reply; provided, that the awarding authority shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown

required by subparagraph (d). The awarding authority shall make further direct payments to the Subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this subparagraph.

(f) The awarding authority shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of subparagraph (e) in an interest-bearing joint account in the names of the general contractor and the subcontractor in a bank in Massachusetts selected by the awarding authority or agreed upon by the general contractor and the subcontractor and shall notify the general contractor and the subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the general contractor and the subcontractor or as determined by decree of a court of competent jurisdiction.

(g) All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to subparagraph (f) shall be made out of amounts payable to the general contractor at the time of receipt of a demand for direct payment for a subcontractor and out of amounts which later become payable to the general contractor and in the order of receipt of such demands from subcontractors. All direct payments shall discharge the obligation of the awarding authority to the general contractor to the extent of such payment.

(h) The awarding authority shall deduct from payments to a general contractor amounts which, together with the deposits in interest-bearing accounts pursuant to subparagraph (f), are sufficient to satisfy all unpaid balances of demands for direct payment received from subcontractors. All such amounts shall be earmarked for such direct payments, and the subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the general contractor."

Section 39L. The commonwealth and every county, city, town, district, board, commission or other public body which, as the awarding authority, requests proposals, bids or sub-bids for any work in the construction, reconstruction, alteration, remodeling, repair or demolition of any public building or other public works (1) shall not enter into a contract for the work with, and shall not approve as a subcontractor furnishing labor and materials for a part of the work, a foreign corporation which has not filed with the awarding authority a certificate of the state secretary stating that the corporation has complied with requirements of section 15.03 of subdivision A of Part 15 of chapter 156D and the date of compliance, and further has filed all annual reports required by section 16.22 of subdivision B of Part 16 of said chapter 156D, and (2) shall report to the state secretary and to the department of corporations and taxation any foreign corporation performing work under such contract or subcontract, and any person, other than a corporation, performing work under such contract or subcontract, and residing or having a principal place of business outside the commonwealth.

Attention is also directed to Chapter 774 of the Acts of 1972 further amending Chapter 30 by adding after Section 39M the following section:

Section 39M. (b) Specifications for such contracts, and specification for contracts awarded pursuant to the provisions of said sections forty-four A to forty-four L of said chapter one hundred and forty-nine, shall be written to provide for full competition for each item of material to be furnished under the contract; except, however, that said specifications may be otherwise written for sound reasons in the public interest stated in writing in the public records of the awarding authority or promptly given in writing by the awarding authority to anyone making a written request therefore, in either instance such writing to be prepared after reasonable investigation. Every such contract shall provide that an item equal to that named or described in the said specifications may be furnished; and an item shall be considered equal to the item so named or described if (1) it is at least equal in quality, durability, appearance, strength and design, (2) it will perform at least equally the function imposed by the general design for the public work being contracted for or the material being purchased, and (3) it conforms substantially, even with deviations, to the detailed requirements for the item in the said specifications. For each item of material the specifications shall provide for either a minimum of three named brands of material or a description of material which can be met by a minimum of three manufacturers or producers, and for the equal of any one of said named or described materials.

Section 39N. "Every contract subject to section forty-four A of chapter one hundred forty-nine or subject to section thirty-nine M of chapter thirty shall contain the following paragraph in its entirety and an awarding authority may adopt reasonable rules or regulations in conformity with that paragraph concerning the filing, investigation and settlement of such claims:

If, during the progress of the work, the contractor or the awarding authority discovers that the actual subsurface or latent physical conditions encountered at the site differ substantially or materially from those shown on the plans or indicated in the contract documents either the contractor or the contracting authority may request an equitable adjustment in the contract price of the contract applying to work affected by the differing site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions are discovered. Upon receipt of such a claim from a contractor, or upon its own initiative, the contracting authority shall make an investigation of such physical conditions, and, if they differ substantially or materially from those shown on the plans or indicated in the contract documents or from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the plans and contract documents are of such a nature as to cause an increase or decrease in the cost of performance of the work or a change in the construction methods required for the performance of the work which results in an increase or decrease in the cost of the work, the contracting authority shall make an equitable adjustment in the contract price and the contract shall be modified in writing accordingly."

Attention is also directed to Chapter 1164 of the Acts of 1973 further amending Chapter 30 by adding after Section 39N the following two sections:

Section 39O. "Every contract subject to the provisions of section thirty-nine M of this chapter or subject to section forty-four A of chapter one hundred forty-nine shall

contain the following provisions (a) and (b) in their entirety and, in the event of a suspension, delay, interruption or failure to act of the awarding authority increases the cost of performance to any subcontractor, that subcontractor shall have the same rights against the general contractor for payment for an increase in the cost of his performance as provisions (a) and (b) give the contractor against the awarding authority, but nothing in provisions (a) and (b) shall in any way change, modify or alter any other rights which the general contractor or subcontractor may have against each other.
"(a) The awarding authority may order the general contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as it may determine to be appropriate for the convenience of the awarding authority; provided however, that if there is a suspension, delay or interruption for fifteen days or more due to a failure of the awarding authority to act within the time specified in this contract, the awarding authority shall make an adjustment in the contract but shall not include any profit to the general contractor on such increase; and provide further, that the awarding authority shall not make any adjustment in the contract price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.

(b) The general contractor must submit the amount of a claim under provision (a) to the awarding authority in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this contract and, except for costs due to a suspension order, the awarding authority shall not approve any costs in the claim incurred more than 20 days before the general contractor notified the awarding authority in writing of the act or failure to act involved in the claim."

Section 39P. "Every contract subject to section thirty-nine M of this chapter or section forty-four A of chapter one hundred forty-nine shall contain the following provisions (a) and (b) in their entirety, and in the event a suspension, delay, interruption or failure to act of the awarding authority increases the cost of performance to any subcontractor, that a subcontractor shall have the same rights against the General Contractor for payment for an increase in the cost of his performance as provisions (a) and (b) give the general contractor against the awarding authority , but nothing in provisions (a) and (b) shall in any way change, modify or alter any other rights which the general contractor or the subcontractor may have against each other.

The awarding authority, any official, its architect or engineer to make a decision on interpretation of the specifications, approval of equipment, material or any other approval, or progress of the work, shall require that the decision be made promptly and, in any event no later than thirty days after the written submission for decision; but if such decision required extended investigation and study, the awarding authority, the official, architect or engineer shall, within thirty days after the receipt of the submission, give the party making the submission written notice of the reasons why the decision cannot be made within the thirty day period and the date by which the decision will be made."

Attention is also directed to Chapter 30, Section 39R of the General Laws of Massachusetts as amended to date as follows:

Section 39R. (a) The words defined herein shall have the meaning stated below whenever they appear in this section:

(1) "Contractor" means any person, corporation, partnership, joint venture, sole proprietorship, or other entity awarded a contract pursuant to section thirty-nine M of chapter thirty, sections forty-four A through forty-four H, inclusive, of chapter one hundred forty-nine and sections thirty B through thirty P, inclusive, of chapter seven.

(2) "Contract" means any contract awarded or executed pursuant to sections thirty B through thirty P, inclusive, of chapter seven and any contract awarded or executed pursuant to section thirty-nine M of chapter thirty, or sections forty-four A through forty-four H, inclusive, of chapter one hundred forty-nine, which is for an amount or estimated amount greater than one hundred thousand dollars.

(3) "Records" means books of original entry, accounts, checks, bank statements and all other banking documents, correspondence, memorandum invoices, computer printouts, tapes, discs, papers and other documents transcribed information of any type, whether expressed in ordinary or machine language.

(4) "Independent Certified Public Accountant" means a person duly registered in good standing and entitled to practice as a certified public accountant under the laws of the place of his/her residence or principal office and who is in fact independent. In determining whether an accountant is independent with respect to a particular person, appropriate consideration should be given to all relationships between the accountant and that person or any affiliate thereof. Determination of an accountant's independence shall not be confined to the relationships existing in connection with the filing of reports with the awarding authority.

(5) "Audit", when used in regard to financial statements, means an examination of records by an independent certified public accountant in accordance with generally accepted accounting principles and auditing standards for the purpose of expressing a <u>certified</u> opinion thereon, or, in the alternative, a qualified opinion or a delineation to express an opinion for stated reasons.

(6) "Accountant's Report", when used in regard to financial statements, means a document in which an independent certified public accountant indicates the scope of the audit which she/he has made and sets forth his/her opinion regarding the financial statements taken as a whole with a listing of noted exceptions and qualifications, or an assertion to the effect that an overall opinion cannot be expressed. When an overall opinion cannot be expressed the reason therefor shall be stated. An accountant's report shall include as a part thereof a signed statement by the responsible corporate officer attesting that management has fully disclosed all material facts to the independent certified public accountant, and that the audited financial statement is a true and complete statement of a financial condition of the contractor.

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(7) "Management", when used herein, means the chief executive officers, partners, principals or other person or persons primarily responsible for the financial and operational policies and practices of the contractor.

(8) Accounting terms, unless otherwise defined herein, shall have a meaning in accordance with generally accepted accounting principles and auditing standards.

(b) Subsection (a) (2) hereof notwithstanding, every agreement or contract awarded or executed pursuant to sections 30B through 30P, inclusive, of chapter seven, and pursuant to section 39M of chapter 30 or to section 44A through 44H, inclusive, of chapter 149, shall provide that:

(1) The contractor shall make, and keep for at least six years after final payment, books, records, and accounts which in reasonable detail accurately and fairly reflect the transactions and dispositions of the contractor, and

(2) until the expiration of six years after final payment, the awarding authority, office of inspector general, and the deputy commissioner of capital planning and operations shall have the right to examine any books, documents, papers or records of the contractor or of his/her subcontractors that directly pertain to, and involve transactions relating to, the contractor or his/her subcontractors, and

(3) if the agreement is a contract as defined herein, the contractor shall describe any change in the method of maintaining records or recording transactions which materially affect any statements filed with the awarding authority, including in his/her description the date of the change and reasons therefore, and shall accompany said description with a letter from the contractor's independent certified public accountant approving or otherwise commenting on the changes, and

(4) if the agreement is a contract as defined herein, the contractor has filed a statement of management on internal accounting controls as set forth in paragraph (c) below prior to the execution of the contract, and

(5) if the agreement is a contract as defined herein, the contractor has filed prior to the execution of the contracts and will continue to file annually, an audited financial statement for the most recent completed fiscal year as set forth in paragraph (d) below.

(c) Every contractor awarded a contract shall file with the awarding authority a statement of management as to whether the system of internal accounting controls of the contractor and its subsidiaries reasonably assures that:

(1) transactions are executed in accordance with management's general and specific authorization;

(2) transactions are recorded as necessary

i. to permit preparation of financial statements in conformity with generally accepted accounting principles, and

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ii. To maintain accountability for assets;

(3) access to assets in permitted only in accordance with management's general or specific authorization; and

(4) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action was taken with respect to any difference.

Every contractor awarded a contract shall also file with the awarding authority a statement prepared and signed by an independent certified public accountant, stating that she/he has examined the statement of management on internal accounting controls, and expressing an opinion as to

(1) whether the representations of management in response to this paragraph and paragraph (b) above are consistent with the result of management's evaluation of the system of internal accounting controls; and

(2) whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statements.

(d) Every contractor awarded a contract by the commonwealth or by any political subdivision thereof shall annually file with the awarding authority during the term of the contract a financial statement prepared by an independent certified public accountant on the basis of an audit by sub accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report. Such statements shall be made available to the awarding authority upon request.

(e) The office of inspector general, the deputy commissioner for capital planning and operations and any other awarding authority shall enforce the provisions of this section. The deputy commissioner of capital planning and operations may after providing an opportunity for the inspector general and other interested parties to comment, promulgate pursuant to the provisions of chapter thirty A such rules, regulations and guidelines as are necessary to effectuate the purposes of this section. Such rules, regulations and guidelines may be applicable to all awarding authorities. A contractor's failure to satisfy any of the requirements of this section may be grounds for debarment pursuant to section forty-four C of Chapter one hundred forty-nine.

(f) Records and statements required to be made, kept or filed under the provisions of this section shall not be public records as defined in section seven of chapter four and shall not be open to public inspection; provided, however, that such records and statements shall be made available pursuant to the provisions of clause (2) of paragraph (b).

1.03 MINIMUM WAGE RATES

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A. Minimum Wage Rates as determined by the Commissioner of Department of Labor and Industries under the provision of the Massachusetts General Laws, Chapter 149, Sections 26 to 27D, as amended, apply to this project. It is the responsibility of the contractor, before bid opening, to request if necessary, any additional information of Minimum Wage Rates for those trades-people who may be employed for the proposed work under this contract. Wage rates are included under Division 0 at the front of this Project Manual.

1.04 SAFETY AND HEALTH

A. This project is subject to the Safety and Health regulation of the U.S. Department of Labor set forth in 29 CFR Part 1926, Commonwealth of Massachusetts Regulations CMR 454, and to the Massachusetts (Department of Labor and Industries,) Division of (Industrial) Occupational Safety "Construction Industry Rules and Regulations for the Prevention of Accidents in Construction operations (Chapter 454 CMR 10.00 et. seq.)". Contractors shall be familiar with the requirements of these regulations.

B. Refer to Specification Section 01069 Health and Safety Requirements.

END OF SECTION

CONFORMED

SECTION 01069

HEALTH & SAFETY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for providing a Health and Safety Plan (HASP) and maintenance of health and safety while performing the Work.

1.02 REQUIREMENTS

A. Monitor working conditions at all times during construction and provide appropriate protective clothing, equipment and facilities for personnel, and establish workplace procedures to ensure personnel safety.

B. Create and Implement a Health and Safety Plan. The procedures for such implementation shall be submitted to the Engineer and Owner for acceptance. Procedures shall include provisions for stations allowing workers to wash and to put on and remove protective clothing.

C. Comply with all Federal, State, and local safety requirements related to the hazards anticipated to be encountered during the course of this project.

D. In addition to the above requirements, comply with the following:

1. All construction equipment on the site shall be equipped with vertical exhaust pipes or a spark proof exhaust.
2. Smoking shall not be permitted in any area where gases can accumulate, or in areas where contaminated soil is present.
3. Welding or open flames shall not be permitted in enclosed areas.
4. Toxic gas indicators, an organic vapor analyzer, a combustible gas indicator, an oxygen indicator, and fire extinguishers shall be available at all times during operations. Periodic monitoring with portable monitoring devices shall be employed as dictated by the Health and Safety Plan.
5. During operations, whenever unsafe levels of toxic gases are detected, all work will cease in that area until acceptable levels are reached.

1.03 SUBMITTALS

A. Submit site specific Health and Safety Plan (HASP) that complies with all applicable OSHA requirements to the Engineer for review and acceptance within fifteen (15) working days of the Contractor's Notice to Proceed. Certified Industrial Hygienist must certify the Contractor's plan prior to submittal to and review by the Engineer. The Contractor is not to proceed with any site work without Acceptance into the Record of the submitted Health and Safety Plan by the Engineer.

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1.04 QUALITY ASSURANCE

A. Consult with an independent, qualified Health and Safety expert having experience in similar construction conditions, to monitor site conditions and recommend all necessary Health and Safety protection. The Contractor shall follow such recommendations and shall provide such protection to his personnel, and personnel of the Owner and Engineer, as may be affected.

1.05 REGULATORY REQUIREMENTS

A. Commonwealth of Massachusetts COVID-19 GUIDELINES AND PROCEDURES FOR ALL CONSTRUCTION SITES AND WORKERS AT ALL PUBLIC WORK, current version as amended shall be adhered to.

B. It is the Contractor's responsibility to stay current with any changes or addendums issued to these guidelines. For copies of the guidelines go to:https://www.mass.gov/covid-19-guidelines-and-procedures-for-all-construction-sites-andworkers-at-all-public-work

C. These Guidelines and Procedures will remain in effect until further notice. At the start of the Work the Contractor is required to submit a letter to the Engineer certifying that the Contractor is in compliance with CDC, OSHA and the Commonwealth's COVID-19 guidelines. The certification applies to the general contractor as well as all subcontractors engaged with the Work covered under this contract. No Work will be allowed to begin until the letter is submitted and approved by the Engineer. In addition, on a daily basis, the Contractor is required to submit a copy of the MassDOT Contractor COVID-19 Guidelines Compliance Checklist to the Engineer. If the Contractor fails to submit the daily checklist no work will be allowed until one is submitted. Any items checked with a NO will require immediate corrective action by the Contractor before any Work can begin.

D. Per Subsection 5.09 – Inspection of the Work – Until further notice the Contractor is required to provide assistance to the Engineer to make a complete and detailed inspection of the work. That assistance includes furnishing equipment to perform the inspection, therefore the Contractor will be required to provide CDC compliant Personal Protective Equipment (PPE) to Department personnel field staff. The CDC compliant PPE shall consist of face masks, gloves and eye protection.

E. All costs associated with compliance with this provision are considered to be incidental to the contract cost and therefore the contractor will not be entitled to any additional compensation.

CONFIRMED

F. Establish work-place procedures, enforce the use of these procedures, and the associated equipment and facilities in accordance with the following guidelines:

1. Safety and Health Regulations Promulgated by the U.S. Department of Labor OSHA, 29 CFR 1910 - Occupational Safety and Health Standards, and 29 CFR 1920 - Safety and Health Regulations for Construction.
2. Occupational Safety and Health Standards, 29 CFR 1926 - Safety and Health Regulations for Construction.

1.06 SITE CONDITIONS

A. The site contains contaminated soils which have been sealed with an EPA approved fill and geotextile cap. A portion of the site has an AUL in place. The site has been overlaid with granular fill to protect and separate users from contacting the subsurface soils. The granular fill surface of the site is part of an engineered 'cap' over the entire site.

B. Sitework will involve excavation and exposure to PCB Impacted Soils within limited areas of the site.

C. The Contractor shall be responsible for reviewing site specific investigation reports included in the various Appendices attached to the Bid and Contract Documents.

D. Work on the pier involves operations adjacent to the Taunton River. Installation of the Pedestrian Railing System occurs on the edge of open water. Use caution at all times. The plan shall address operations over water and include life safety and water rescue provisions.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 PROTECTION

A. If, at any time, the Owner or the Engineer is apprised of a safety hazard which demands immediate attention because of its high potential for harm to the public travel, persons on or about the Work, or public or private property, the Owner or the Engineer shall have the right to order such safeguards to be erected and such precautions to be taken as necessary and the Contractor shall comply with such orders. If, under such circumstances, the Contractor does not or cannot immediately put the Work into proper and approved condition, or if the Contractor or his representative is not upon the site so that he can be notified immediately of the insufficiency of safety precautions, then the Owner may put the Work into such a condition that is, in his opinion, in all respects safe, and the Contractor shall pay all

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expenses of such labor and materials as may have been used for this purpose by him or by the Owner. The fact that the Owner or the Engineer does not observe a safety hazard or does not order the Contractor to take remedial measures shall in no way relieve the Contractor of the entire responsibility for any costs, loss or damage by any party sustained on account of the insufficiency of the safety precautions taken by him or by the Owner acting under authority of this Section.

B. If the Contractor is alerted to the fact that conditions of high hazard are present or can be present at the site during the performance of the Work, it is the responsibility of the Contractor to take appropriate safety precautions to meet whatever conditions of hazard may be present during the performance of the Work, whether reasonably foreseeable or not. The safety conditions enumerated in the Specifications are the minimum permissible and neither the Owner no the Engineer makes any representation that the safety standards provided herein will be adequate to meet all eventualities. The Contractor is therefore alerted to the fact that it shall be his responsibility to anticipate and provide such additional safety precautions, facilities, personnel and equipment as shall be necessary to protect life and property from whatsoever conditions of hazard are present or may be present.

C. The Contractor shall maintain the existing site fence in-situ. If not the Contractor shall supply and erect highly visible safety fencing a minimum of three feet in height around all construction areas that pose a threat to safety and post proper signage as required by Local, State and Federal requirements. The Contractor shall erect safety fencing as documented in the Contact Drawings or as directed by the Engineer and shall maintain such fencing and signage until such a time that the potential safety hazard has been rectified. Upon final completion of construction any temporary safety fencing installed shall be removed off-site by the Contractor. Safety fencing requirements of OSHA shall be enforced by the Contractor.

END OF SECTION

CONFORMED

SECTION 01090

REFERENCE STANDARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Reference material, abbreviations, and terms used in the Construction Documents and establishes edition dates and complete titles for standards referenced elsewhere in the Specifications.

1.2 QUALITY ASSURANCE

A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

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

C. Maintain copy at jobsite during submittals, planning, and progress of the specific work, until Substantial Completion.

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

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

1.3 SCHEDULE OF REFERENCES

AA Aluminum Association
818 Connecticut Ave. N.W.
Washington, DC 20006

AASHTO American Association of State Highway and Transportation Officials
444 North Capitol Street, N.W.
Washington, DC 20001

ACI American Concrete Institute
Box 19150
Reford Station
Detroit, MI 48219

AFBMA Anti-Friction Bearing Manufacturers Association

AGC Associated General Contractors of America
1956 E Street, N.W.

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	Washington, DC 20006
AGM	American Gear Manufacturers Association
AI	Asphalt Institute Asphalt Institute Building College Park, MD 20740
AISC	American Institute of Steel Construction 400 North Michigan Avenue Eighth Floor Chicago, IL 60611
AISI	American Iron and Steel Institute 1000 16th Street, N.W. Washington, DC 20036
AMCA	Air Movement and Control Association 30 West University Drive Arlington Heights, IL 60004
ANS	American National Standard
ANSI	American National Standards Institute 1430 Broadway New York, NY 10018
API	American Petroleum Institute
ARI	Air-Conditioning and Refrigeration Institute 1501 Wilson Boulevard Arlington, VA 22209
ASCE	American Society of Civil Engineers 345 East 47th Street New York, NY 10017
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, N.E. Atlanta, GA 30329
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017
ASPA	American Sod Producers Association 4415 West Harrison Street

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	Hillside, IL 60162
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103
AWG	American or Brown and Sharpe Wire Gage
AWPA	American Wood-Preservers' Association 7735 Old Georgetown Road Bethesda, MD 20014
AWS	American Welding Society
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
BIA	Brick Institute of America 11490 Commerce Park Drive Reston, VA 22091
CS	Commercial Standard
EJCDC	Engineers' Joint Contract Document Committee American Consulting Engineers Council 1015 15th Street, N.W. Washington, DC 20005
FM	Factory Mutual System 1151 Boston-Providence Turnpike PO Box 688 Norwood, Massachusetts 02062
Fed Spec.	Federal Specification General Services Administration Specification and Consumer Information Distribution Section (WFSIS) Washington Navy Yard, Bldg. 197 Washington, DC 20407
IBR	Institute of Boiler and Radiator Manufacturers
ICBO	International Conference of Building Officials 5360 S. Workman Mill Road Whittier, CA 90601
IPS	Iron Pipe Size

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JIC	Joint Industry Conference Standards
MIL	Military Specification Naval Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120
NASSCO	National Association of Sewer Service Companies 101 Wymore Road, Suite 521 Altamonte, FL 32714
NBS	National Bureau of Standards
NCMA	National Concrete Masonry Association PO Box 781 Herndon, VA 22070
NCPWB	National Certified Pipe Welding Bureau
NEMA	National Electrical Manufacturers' Association 2101 'L' Street, N.W. Washington, DC 20037
NFPA	National Fire Protection Association Battery March Park Quincy, MA 02269
NPT	National Pipe Thread
OS&Y	Outside screw and yoke
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077
SMACNA	Sheet Metal and Air Conditioning Contractors' National Assoc. 8224 Old Court House Road Vienna, VA 22180
Stl. WG	U.S. Steel Wire Washburn and Moen, American Steel and Wire or Roebling Gage
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062
USS Gage	United States Standard Gage
125-lb. ANS	American National Standard for Cast-Iron Pipe Flanges and Flange

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250-lb. ANS Fittings, Designation B16.1-1975, for the appropriate class

1.4 EDITION DATES

A. Reference to publications and reference material shall be understood to mean the latest edition, unless stated otherwise.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

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SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Administrative and procedural requirements for project meetings.

1.2 PRECONSTRUCTION CONFERENCE

A. The Engineer will schedule and administer a pre-construction conference.

B. The pre-construction conference will be scheduled and administered within seven (7) calendar days after the dated "Notice to Proceed". The Contractor shall be prepared to address such topics as projected construction sequences and schedules, major personnel, critical work areas, construction facilities, critical path components and shop drawing submittals.

1.3 PROGRESS MEETINGS

A. The Engineer will schedule and administer progress meetings and specially called meetings throughout the duration of the Work at minimum bi-monthly intervals.

B. The time and location of such meetings shall be designated by the Engineer and shall be convenient for all parties involved.

C. The Engineer will, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies to participants, and those affected by decisions made.

PART 2 - PRODUCTS

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PART 3 - EXECUTION

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SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements for submission of schedules and shop drawings.

1.2 PROGRESS SCHEDULE

A. Special attention is directed to the requirement that the Contractor shall initiate the project and within fourteen (14) calendar days after execution of the Contract Documents, and the Contractor shall submit to the Engineer for review a construction progress schedule conforming to requirements specified. This schedule shall show the proposed dates of commencement and completion of each of the various subdivisions of work required under this Contract and the anticipated monthly percentage of completion based on the total contract price. The Contractor shall be responsible for updating and/or revising this schedule whenever directed by the Engineer throughout the duration of the Contract.

B. Special attention is directed to the requirement that the Contractor shall start the Work, as specified under this Contract, no later than thirty (30) calendar days after the execution of the Contract Documents, unless otherwise directed by the Owner. The Contractor shall comply with all pre-construction requirements as specified. The Owner reserves the right to delay the commencement of the Work or any part thereof if the specified requirements as determined by the Engineer have not been satisfied. The Owner further reserves the right to limit or, delay construction, or certain activities thereof, in certain areas of the Contract should the Owner deem it to be in the public's best interest and/or safety to do so.

C. The Contractor shall contact the appropriate town or city authorities concerning any public or semi-public events that may occur during the construction period that may affect construction. The Contractor alone shall be responsible for arranging his construction sequence to conform to any restrictions these events may impose. No claims for extras will be allowed because of any delay, extra materials handling, extra excavation, etc. caused by the imposed restrictions. However, additional time may be granted for completion of the work to compensate for delays caused by said restrictions.

1.3 SHOP DRAWINGS

A. Submit four (4) copies of all shop and working drawings of all components of the Pedestrian Railing System.

B. A maximum of two (2) submittals of each shop drawing will be reviewed by the Engineer. If more submittals are required due to the Contractor’s neglect or failure to fulfill the requirements of the Contract plans and specifications, or to make corrections

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or modifications required by the Engineer in the review of the first two submittals, the Engineer will review the submittal and the Contractor will be responsible for the cost of the review, as determined by the Owner based on the Engineer's documentation of time and rates for additional services established in the Engineering Agreement between the Owner and the Engineer.

C. If resubmittals on shop and working drawings are required, the Engineer will retain two (2) copies and two (2) copies will be returned to the Contractor. When resubmittals are returned to the Engineer, six copies of the complete submittal shall again be required.

D. Such drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. When the dimensions are of particular importance, or when specified, the drawings shall be certified by the manufacturer or fabricator as correct for the Contract.

E. When so specified or if considered by the Engineer to be acceptable, manufacturer's specifications, catalog data, descriptive matter, illustrations, etc., may be submitted in place of shop and working drawings.

F. The Contractor shall be responsible for the prompt and timely submittal of all shop and working drawings to eliminate delay to the Work due to the absence of such drawings. All shop and working drawings must be submitted to the Engineer within fourteen (14) calendar days prior to incorporation into the Work, unless otherwise permitted by the Engineer. Prior to the submittal of any shop drawings, the Contractor shall submit a schedule of proposed shop drawing transmittals. The schedule shall identify the subject matter of each transmittal, the corresponding specification section number and the proposed date of submission. Prior to and during the progress of the Work the schedule shall be revised and resubmitted as requested by the Engineer.

G. No material or equipment shall be purchased or fabricated for the Contract until the required shop and working drawings have been submitted as hereinabove provided and reviewed for conformance to the Contract requirements. All such materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by said drawings.

H. Until the necessary review has been made, the Contractor shall not proceed with any portion of the Work (such as the construction of foundations) for which review is required.

I. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from his subcontractors and returning reviewed drawings to them. All shop and working drawings shall be prepared on standard size, 24 inch by 36 inch sheets, except those which are made by changing existing standard shop and working drawings. All drawings shall be clearly marked with the names of the Owner, Contractor, and building, equipment, or structure to which the drawing applies, and shall be suitable numbered. Submitted shop drawings shall be accompanied by a letter of transmittal, completed by the Contractor as approved by the Engineer.

J. Only drawings which have been checked and corrected by the fabricator should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to

satisfy himself that the subject matter thereof conforms to the Drawings and Specifications in all respects. All drawings which are correct shall be marked with the date, checker's name, and indication of the Contractor's approval, and then shall be submitted to the Engineer; other drawings shall be returned for correction.

K. If a shop drawing shows any deviation from the Contract requirements, the Contractor shall make specific mention of the deviations in his letter of transmittal.

L. The review of shop and working drawings by the Engineer will be general only, and nothing contained in this Section shall relieve, diminish or alter in any respect the responsibilities of the Contractor under the Contract Documents and in particular, the specific responsibility of the Contractor for details of design and dimensions necessary for proper fitting and construction of the work as required by the Contract and for achieving the result and performance as specified. The Contractor shall be responsible for errors and omissions in shop drawings.

M. Should the Contractor submit equipment that requires modifications, either existing or as detailed on the Drawings, he shall also submit details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the Owner, shall do the work necessary to make such modifications.

N. The Contractor shall furnish additional copies of shop drawings or catalog cuts when so requested.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

CONFORMED

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SECTION 01310

CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for construction scheduling and narrative progress report.

1.02 SUBMITTALS

A. Submit in accordance with SECTION 01300 - Submittals

1. Schedule
   a. Within 10 days following the receipt of the Notice to Proceed, the Contractor shall submit two (2) color copies of a computer-generated schedule (bar chart or CPM output) and a list of activities to the Engineer. Following review by the Engineer and Owner the Contractor shall meet with the Engineer and Owner to discuss the review. The Contractor shall incorporate the Engineer's comments into the schedule and submit eight color copies of the revised schedule within 14 days following receipt of the Engineer's comments.

PART 2 PRODUCTS

2.01 SOFTWARE

A. Computer based scheduling software used by the Contractor shall be the product of a recognized commercial computer software producer and shall be capable of meeting the requirements specified herein.

PART 3 EXECUTION

3.01 PREPARATION

A. General

1. The Contractor shall prepare his proposed construction schedule based on a breakdown of work tasks that he/she has developed.
2. The construction schedule and updates shall be prepared by the Contractor or the Contractor's qualified consultant.

B. Schedule

1. Each schedule shall be prefaced with the following summary data:
   a. Contract name and number

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b. Contractor's Name
c. Contract duration
d. The effective or starting date of the schedule
e. Revision date of the latest schedule.

2. The construction schedule shall be sequenced by early start date and shall include the following minimum items:
    1) Activity Name
    2) Estimated duration
    3) Activity description
    4) Early start date (calendar date)
    5) Early finish date (calendar date)
    6) Latest allowable start date (calendar date)
    7) Latest allowable finish date (calendar date)
    8) Status (whether critical)
    9) Estimated cost of the activity
    10) Float (total and free)
    11) Major milestones
3. Separate milestones shall be included for Notice-to-Proceed and Project Completion Date.
4. Activities shall include major components of the work including submittals that might impact the critical path, subcontractor work, major and critical equipment design, fabrication, testing, delivery and installation times, system/subsystem/component testing, process and facility startup, training, demobilization, project cleanup and closeout.
5. The sum of the costs assigned to the activities shall be equal to the Contract price. Activity costs shall not be assigned to submittals or submittal reviews. Comply with SECTION 01026 - Schedule of Values. Provide a table showing the anticipated monthly percentage of completion, based on the total contract price.
6. Each schedule submittal shall also include a list of activities in the order in which the activities will be performed, along with activity durations, activity predecessors, type of predecessor (finish-start, finish-finish, start-start, lead/lag), and any dependency or required date.
7. The schedule shall be based on a standard 5-day work week with allowance for holidays and adverse weather.
8. Engineer’s approval of the schedule is advisory only and shall not relieve the Contractor of responsibility for accomplishing the work prior to 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. The Owner hereby disclaims any obligation or liability by reason of approval by its agent, the Engineer, of the schedule.

C. Narrative Progress Report

1. Include as a minimum:
    a. Summary of work completed during the previous period (since submission of last narrative progress report).
    b. Explanation for variations between actual work completed in previous period and planned work as reported in last period.
    c. Summary of work planned during the next period.

CONFORMED

d. Current and anticipated delaying factors and their estimated impacts on other activities and milestones.
e. Corrective actions taken or proposed.

2. A Narrative Progress Report shall be submitted monthly to the Engineer, at least 2 working days prior to the progress meeting.
3. At the discretion of the Engineer, the Contractor may be required to submit a revised schedule showing completion to date and any changes to the previous schedule.

3.02 MONITORING SCHEDULE

A. The approved construction schedule shall be used by the Contractor throughout the duration of the project for planning, organizing, and directing the Work, and for reporting progress of the Work

B. The Contractor is solely responsible for monitoring schedule compliance. When a delay to the critical path occurs, the Contractor shall immediately notify the Engineer in writing. Within one week of the notification, the Contractor shall submit for the Engineer's approval, a description of proposed actions to return the project to schedule.

3.03 MODIFYING SCHEDULE

A. If the Contractor desires to make changes in his method of operating which affect the approved schedule, he shall notify the Engineer in writing stating what changes are proposed and the reason for the change. If the Engineer approves these changes, the Contractor shall revise and submit for approval, without additional cost to the Owner, all of the affected portions of the schedule.

B. It may be necessary for the contract schedule or completion time to be adjusted by the Owner to reflect the effects of job conditions, weather, technical difficulties, strikes, unavoidable delays on the part of the Owner or its representatives and other unforeseeable conditions which may indicate schedule adjustments or completion time extensions. Under such conditions, the Engineer will direct the Contractor to reschedule the work or contract completion time to reflect the changed conditions and the Contractor shall revise his schedule accordingly.

C. If the Contractor provides an accepted schedule with an early completion date, the Owner reserves the right to reduce the Time of Completion to match the early completion date by issuing a deductive Change Order at no change in Contract Price.

END OF SECTION

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SECTION 01380

CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for providing photographs for existing conditions and the Work proposed under this Contract.

1.02 REQUIREMENTS

A. The Contractor shall be responsible for photography. The purpose of this shall be to take pre-construction and construction photographs at locations and times designated by the Engineer.

1.03 SUBMITTALS

A. Submit to the Engineer regularly photos as directed.

1.04 SCHEDULING

A. Prior to commencement of any work or at any time during the construction, directed by the Engineer, the Contractor and photographer shall consult with the Engineer for instructions concerning views required at each specific work site. The photographs shall show the existing conditions prior to and during construction as may be required by the Engineer and shall be taken from locations or views designated by the Engineer to adequately illustrate the state of the project and/or conditions of construction.

PART 2 PRODUCTS

2.01 PHOTOGRAPHS

A. The Owner shall be allowed a minimum of two (2) photographed views and shall furnish to the Engineer one print of each view designated. All photographs shall be a factual presentation of the views designated and shall be taken using correct exposure and focusing techniques insuring high resolution and sharpness, maximum depth-of-field, and minimum distortion. Electronic submittal of photographs is permitted.

1. Name of Project.
2. Description of view.
3. Time and date
4. Climatic conditions (temperature and weather conditions).
5. Photographer's numbered identification

CONFORMED

B. The Contractor shall insure delivery of prints on a weekly basis, or as otherwise requested, to the Owner through the Engineer. These deliveries must be made prior to the payment of monthly progress estimates. The Contractor shall pay all costs associated with photography, as well as furnishing all construction photographs in electronic format, complete as specified, including all incidentals necessary at no additional expense to the Owner.

PART 3 EXECUTION

NOT USED

END OF SECTION

CONFORMED

SECTION 01400

QUALITY CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements for Contractor's quality control of products, suppliers, manufacturers, services, site conditions, and workmanship, to produce Work of specified quality.

1.2 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Where indicated provide full shop drawings designed and engineered by a professional engineer licensed in the state of Massachusetts.

B. Comply fully with manufacturers' instructions, including each step in the installation 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. Wall work shall be overseen and performed by qualified and experienced personnel.

F. Persons utilized in the construction and fabrication of the work shall be able to produce workmanship of the shown and specified quality.

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

1.3 FIELD SAMPLES

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

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

C. Where field sample is specified to be removed, clear area only after field sample has been accepted by the Engineer.

1.4 CERTIFIED WELDERS

A. Structural welds shall be made only by operators who have been qualified by tests, as prescribed in the "Standard Qualification Procedure" of the American Welders Society, to perform the type of work required.

CONFORMED

B. Pipe welds shall be made only by operators who have been qualified by the National Certified Pipe Welding Bureau and each operator's qualification record shall be submitted to the Engineer before any work is preformed.

C. Shop welding shall be in accordance with the "Code for Welding in Building Construction".

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

CONFORMED

SECTION 01410

TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Qualification, duties and responsibilities of testing laboratories.
2. Coordination and scheduling responsibilities of the Contractor.

B. Related Sections

1. Section 01600 - Materials and Equipment

1.2 PAYMENT PROCEDURES

A. Initial Testing

1. Testing will be performed as required by the Engineer.

B. Re-Testing

1. When initial tests indicate noncompliance with the Contract Documents, subsequent retesting occasioned by the noncompliance shall be performed by the same testing agency.
2. Testing beyond initial tests, when determined to be necessary, shall be paid for by the Contractor, until such a time that adequate results are obtained.

C. Contractors Convenience Testing

1. Inspecting and testing performed exclusively for the Contractor's quality control purpose and for conformance with the specifications shall be the sole responsibility of the Contractor.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. E329, Agencies Engaged in Construction Inspection and/or Testing

1.4 REQUIREMENTS

A. Work included:

1. The Owner may elect to conduct testing of products to be used or test or otherwise have an independent entity asses the integrity of anchorage systems, welding, rail assemblies fabricated, or finishes, the Contractor shall cooperate with the Owner to allow any such testing to occur.

CONFORMED

2. The Contractor shall make all work available and work with the selected testing agency and all others responsible for testing and inspecting the Work.

B. Work not included:

1. Selection of testing laboratory: The Owner will select a qualified independent testing laboratory or agency.

1.5 QUALITY ASSURANCE

A. Qualifications

1. The testing laboratory will be qualified to the Owner's approval in accordance with ASTM E329.

2. Work will be tested by Certified Weld Inspectors.

B. Regulatory requirements

1. Testing, will be in accordance with all pertinent codes and regulations and with selected standards of the American Society for Testing and Materials.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with pertinent provisions of Section 01600 - Materials and Equipment.

1.7 SCHEDULING

A. Establishing schedule

1. By advance discussion with Engineer and Owner coordinate with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings.

2. Provide all required products and assemblies to be tested within adequate within adequate time frames within the construction schedule.

3. Coordinate required testing activity with the Engineer to ensure appropriate testing laboratory availability.

B. Revising schedule

1. When changes of construction schedule are necessary during construction, coordinate all such changes with the testing laboratory as required.

C. Adherence to schedule

1. When the testing laboratory is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, any extra charges for testing attributable to the delay may be back-charged to the Contractor and shall not be borne by the Owner.

CONFORMED

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 QUALITY CONTROL

A. Tests

1. Testing may require advancement of representative samples of the Work be made available, or if not practicable, testing of completed welds, constructed fabrications and or assemblies intended for installation will be tested.
2. To the greatest extent practicable, non-destructive testing (NDT) methods will be utilized to avoid materially affecting the integrity of the item being inspected.
3. Representatives of the testing laboratory shall have access to the Work at all times and at all locations where the Work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.
4. All specimens and samples for testing, unless otherwise provided in the Contract Documents, shall be taken by the testing personnel. All sampling equipment and personnel will be provided by the testing laboratory. All deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.
5. Failed tests will result in the rejection of the Work. Additional testing, samples, products, may be required beyond the initial test and shall be provided.
6. Inadequate test results will require the Contractor's removal of the products, components or elements in question and full and complete replacement at no additional cost to the Owner. Replacement shall be as directed by the Owner's Representative /Engineer.
7. The Contractor may be required to adjust fabrication and/or finishing processes to obtain acceptable results. This shall be done at no additional expenses to the Owner.

END OF SECTION

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SECTION 01560

TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Project Understanding: The Contractor shall note the public sidewalk areas and travel lanes adjacent to the site may be temporarily closed during some construction operations at the Contractor's discretion. Protect the public by establishing and maintaining barricades, fencing and signage alerting the public to the construction site entrance.

B. Site Access: Site access requires utilizing the existing driveway off of Davol Street. A portion of the pier will be dedicated to Contractor use as indicated on the plans. Establish temporary fencing, utilize barrels and barricades if so directed by the Engineer or Owner to restrict access to the laydown and work areas.

C. Site Context: The site is adjacent to the Taunton River and waterfront pedestrian walkways. It is highly visible from all sides. Do not allow excess material, debris or trash to accumulate. Maintain a clean, organized site with a professional appearance at all times.

1.2 CLEANING DURING CONSTRUCTION

A. Unless otherwise specified under the various trade Sections of the Specifications, the General Contractor shall perform clean-up operations during construction as herein specified.

1. Control accumulation of waste materials and rubbish; periodically dispose of off-site. Bear all costs, including fees resulting from disposal. Furnish to the Owner all documentation from the receiving facility certifying proper disposal.
2. Clean areas prior to start of finish work and maintain areas free of dust and other contaminants during finishing operations.
3. Maintain project in accordance with all local, State and Federal Regulatory Requirements.
4. Store volatile wastes in covered metal containers and remove from premises.
5. Prevent accumulation of wastes that create hazardous conditions.
6. Provide adequate ventilation during use of volatile or noxious substances

CONFORMED

B. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

1. Do not burn or bury rubbish and waste materials on site.
2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
3. Do not dispose of wastes into streams or waterways.
4. Use only those materials which will not create hazards to health or property and which will not damage surfaces.
5. Use only those cleaning materials and methods recommended by manufacturer of surface material to be cleaned.
6. Execute cleaning to ensure that the buildings, the sites, and adjacent properties are maintained free from accumulations of waste materials and rubbish and wind blown debris, resulting from construction operations.
7. Provide on-site containers for collection of waste materials, debris, and rubbish.
8. Remove waste materials, debris, and rubbish from the site periodically and dispose of at legal disposal areas off the construction site.
9. Handle material in a controlled manner with as little handling as possible. Do not drop or throw materials from heights.
10. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not damage surrounding surfaces.
11. During its progress, the work and the adjacent areas affected thereby shall be kept cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that the public and property owners will be inconvenienced as little as possible.
12. Where material or debris has washed or flowed into or been placed in existing catch basins, gutters, drains, pipes, structures, work done under this contract, or elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the work, and the, structures, and work, etc. shall, upon completion of the work, be left in a clean and neat condition.

1.3 DUST, EROSION AND SEDIMENT CONTROL

A. Conform with all permit requirements.

B. Provide adequate means for the purpose of preventing dust caused by construction operations throughout the period of the construction contract.

C. This provision does not supersede any specific requirements for methods of construction or applicable aspects of the General Conditions for performance obligations of the General Contractor.

CONFORMED

NOISE CONTROL

A. Develop and maintain a noise-abatement program and enforce strict discipline over all personnel to keep noise to a minimum.

B. Execute construction work by methods and by use of equipment which will reduce excess noise.

1. Equip air compressors with Silencers, and power equipment with mufflers.

2. Avoid prolonged noise as well as loud noise. Manage movement of equipment, delivery vehicles, and site operations to minimize noise.

1.4 POLLUTION CONTROL

A. Conform with all permit requirements.

B. Special care shall be taken to prevent contamination or muddying or interfering with the Taunton River. No debris refuse or waste matter of any kind will be allowed to fall, or otherwise be discharged into the river.

1.5 SURFACE WATER CONTROL

A. Take all precautions to prevent damage to the work or equipment by high wind, high water and/or by storm events. The Engineer with the approval of the Owner may prohibit the carrying out of any work at any time when in his judgement, high water or storm conditions are unfavorable or not suitable, or at any time, regardless of the weather, when proper precautions are not being taken to safeguard previously constructed work or work in progress. No special compensation shall be made if the work is temporarily halted due to weather conditions.

B. In case of damage caused by the failure of the Contractor to take adequate precautions, the Contractor shall repair or replace equipment damaged and shall make such repairs or rebuild such parts of the damaged work, as the Engineer may require, at no additional expense to the Owner.

1.6 BARRIERS AND ENCLOSURES

A. Fences and Barricades

1. Maintaining the integrity of the perimeter chain link fence to protect the site and the work from unwanted access shall become the responsibility of the Contractor for the duration of the project.

2. Stockpiling of materials on site shall be limited. Any internal temporary site fence shall become the responsibility of the Contractor and shall be removed at the completion of the project. Fencing may be adjusted to allow for site-work operations to flow smoothly.

3. Store all PCB Impacted Soils in lined roll-off containers until site locations where consolidation berms are to be constructed are prepared Provide and maintain temporary fences, barriers, lights, , and barricades as indicated in the Contract

CONFIRMED

Documents, or as necessary to secure the Work and adjacent property, and protect persons and property.

4. The Contractor may obtain necessary approvals and permits and provide temporary expedients as necessary to accommodate tasks requiring items mentioned herein.

1.7 TEMPORARY TRAFFIC CONTROL

A. Maintain pedestrian and vehicular traffic flow in areas adjacent to the work site. Install signage as necessary for safe deliveries to the site. The Contractor shall have sole responsibility for the design installation, protection, maintenance and movement of temporary traffic control devices.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

A. Stockpiling of materials on site shall be limited. Any internal temporary site fence shall become the responsibility of the Contractor and shall be removed at the completion of the project. Fencing may be adjusted to allow for site-work operations to flow smoothly.

B. Store all PCB Impacted Soils in lined roll-off containers until site locations where consolidation berms are to be constructed are complete and ready to accept the materials. Provide and maintain temporary fences, barriers, lights, and barricades as indicated in the Contract

END OF SECTION

CONFORMED

SECTION 01580

PROJECT SIGNS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for fabricating and erecting the Project Sign.

B. Related Sections

1. Section 03300 CONCRETE

1.02 QUALITY CONTROL

A. Sign vendor shall have and be able to demonstrate no less than 5 years of experience with sign design and shall submit qualifications including 3-5 related example artwork images.

1.03 SUBMITTALS

A. Shop drawing shall be submitted for the “City Pier” Project Sign for approval by Owner before the manufacturing shall begin. The owner is allowed one set of changes and a second review for sign-off.

1. Design vendor will provide “Final Draft” text, typestyles, graphic elements, and layout for the park entrance sign.

B. Product Data: Submit graphic choices for each type of sign indicated. Tactile (from available graphics) and Interpretive Sign (from wetland graphics) for selection by the Engineer.

C. Shop Drawings: Show fabrication and installation details for signs.

1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
2. Include fabrication and installation details and attachments to other work.
3. Owner is allowed changes to the sign fabrication drawings during the submittal process. This includes a second proof of the entire drawing package at no additional charge.

PART 2 PRODUCTS

2.01 PROJECT SIGN

A. MDO Plywood, and Pressure Treated Lumber as indicated.

CONFORMED

B. “Final Draft” written content, design layouts and fabrication of park entrance sign to be completed by contractor complying with content plan provided at the end of this section, as indicated within, and ultimately as approved by the owner.

CONFORMED

PART 3 - EXECUTION

3.01 INSTALLATION

A. Fabricate, construct and install sign as indicated, using mounting methods and of types described and complying with applicable manufacturer's written instructions.

1. Install signs level, plumb, and at heights indicated, keep sign surfaces free of distortion and other defects in appearance.

END OF SECTION

SECTION 01590

FIELD OFFICE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Requirements for Contractor's organizing and directing field operations.

1.02 FIELD OFFICE

A. A job-site trailer field office is not required. There are few readily available utilities to serve a temporary office without requiring utility extensions. The Contractor is not required to keep a temporary field office at the job site for the duration of this project. The Project Manager/Foreman will be required to maintain all necessary paperwork, plans, files and records in a Contractor's vehicle that is present on the site during all work-days if a trailer is not utilized.

B. In the absence of a job trailer, the Contractor is required to provide a fully functional off-site office space from which to conduct the business and communication aspects related to the construction of this project. Said office may be the primary location of the business or may be a rented space. The office shall contain at a minimum:

1. Private land-line telephone w/ high-speed internet connections and full conference call/virtual meeting capabilities & full function scanner/copy machine.
2. An Answering service, Administrative Assistant or telephone answering machine.
3. A computer with reliable, high-speed internet service and corresponding direct email accounts to key personnel assigned to the project.
4. Electric lights & outlets, a meeting table, and a minimum of four (4) chairs.

C. A regular site presence from the Contractor is required during installation of the Work to ensure oversight of operations.

D. All relevant project management material (Plans, Specifications, Work Change Directives, RFI's and RFI responses, Project Submittal Log, As-Built information etc.) shall be available on site at all times work is underway regardless of presence of physical job trailer.

CONFORMED

1.03 CLOSE-OUT OF FIELD OFFICES

A. If the Contractor elected to establish an independent field office/ trailer, it shall be removed as well as all other temporary utilities and facilities from the site, at the date of Substantial Completion of the Work. If an office is established on-site, the Contractor shall fully restore the site occupied by the field office/trailer to the original condition. All costs shall be borne by the Contractor.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION

CONFORMED

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Requirements for delivery, storage, handling and installation of systems, materials, manufactured units, equipment, components, and accessories used in the work.

B. Related Sections

1. Section 01300 - Submittals

1.2 DELIVERY

A. Refer to Specifications' Sections for requirements pertaining to delivery and handling of materials and equipment.

B. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturers' unopened containers or packaging, dry.

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

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

1.3 STORAGE AND PROTECTION

A. Refer to Specifications' Sections for requirements pertaining to storage and protection of materials and equipment.

B. Store products in accordance with manufacturers' instruction, with seals and labels intact and legible. Store sensitive products in weather tight enclosures; maintain within temperature and humidity ranges required by manufacturers' instructions.

C. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

D. Arrange storage of products intended for installation in a manner that provides Owner access for inspection. Periodically inspect stored materials to assure that products are undamaged and are maintained under required conditions.

CONFORMED

1.4 INSTALLATION STANDARDS

A. Comply with Specifications and referenced standards as minimum requirements.

B. Components required to be supplied in quantity within a Specification Section shall be the same, and shall be interchangeable.

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

D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

E. When work is specified to comply with manufacturers' instructions, submit copies as specified in Section 01300 - Submittals, distribute copies to persons involved, and maintain one complete hard copy set of documents and products approved for use in the field for Owner inspection.

F. Perform work in accordance with details of instructions and specified requirements.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

CONFORMED

SECTION 01700

CONTRACT CLOSE-OUT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements for specific administrative procedures, record keeping, close-out submittals, and forms used at substantial and final completion of the Work.

B. Contractor shall satisfy all administrative requirements within the Contract Documents and the Requirements listed in this section prior to Contract Close-out.

1.2 FINAL CLEANING

A. On or before the completion of the work, the Contractor shall, unless otherwise directed remove all temporary barriers, fencing, structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.

B. The Contractor shall restore or replace, when and as directed, any public or private property damage by his work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end, the Contractor shall do as required, all necessary highway or driveway, walk and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.

C. Unless otherwise specified under the various Sections of the Specifications, the Contract or shall perform final cleaning operations as herein specified prior to final inspection.

D. At completion of work, remove waste materials, rubbish tools, equipment, machinery, and surplus materials, and clean all sight-exposed surfaces; leave project clean and ready for occupancy.

E. Cleaning shall include all surfaces, which the Contractor and all Subcontractors have had access whether existing or new.

F. Refer to Sections of the Specifications for cleaning of specific products or work.

G. Use only those materials which will not create hazards to health or property and which will not damage surfaces.

H. Use only those cleaning materials and methods that are recommended by the manufacturer of surfaces material to be cleaned.

I. Employ experienced workmen, or professional cleaners, for final cleaning operations.

CONFORMED

1.3 PROJECT RECORD DOCUMENTS

A. Project Record Documents also referred here as As-Built Drawings shall consist of all the Contract Drawings annotated by those performing the work based on work actually installed, compiled by the Contractor.

B. The Contractor and all Subcontractors shall be required to maintain one set of As-Built Drawings, as the work relates to their Sections of the Specifications, at the site.

C. As-Built Drawings shall be stored and maintained on site, in the General Contractor's field office apart from other documents used for construction. The As-Built Drawings shall be maintained in a clean, dry, and legible condition and shall not be used for construction purposes.

D. As-Built Drawings shall be available at all time for inspection by the Owner/Engineer. All deficiencies noted shall be promptly corrected.

E. The following information shall be indicated on the As-Built Drawings for building construction:

1. Record all changes, including change orders, in the location, size, number, and type both horizontally and vertically of all elements of the projects which deviate from those indicated on all the contract drawings.

2. The tolerance for the actual location of utilities and appurtenances within the building to be marked on the As-Built Drawings shall be plus or minus two (2) inches.

F. At the end of each month and before payment for materials installed, the Contractor, and his Subcontractors, shall review As-Built Drawings for purpose of payment. If the changes in location of all installed elements are not shown on the as-built drawings and verified in the field, then the material shall not be considered as installed and payment will be withheld.

G. At the completion of the contract, each Subcontractor shall submit to the Contractor a complete set of his respective As-Built Drawings indicating all changes. After checking the above drawings, the Contractor shall certify in writing on the title sheet of the drawings that they are complete and correct and shall submit the As-Built Drawings to the Engineer.

1.4 WARRANTIES

A. Comply with requirements of Section 01740 Warranties.

1.5 FINAL INSPECTION

A. The Contractor shall submit written certification that:

1. Project has been inspected for compliance with Contract Documents.

2. Furnish all records that railing system components and assemblies tested have been shown to be compliant, accepted and are satisfactory.

3. Project is completed, and ready for final inspection by Owner.

CONFORMED

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

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SECTION 01740

WARRANTIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. General administrative and procedural requirements for warranties required by the Contract Documents, including manufacturers standard warranties on products and special warranties.

1.2 SUBMITTALS

A. Coordinate and submit a outline listing of the relevant warranties related to the execution of this Work.

B. Submit written warranties to the Owner prior to the date fixed by the Engineer for Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than a date of Substantial Completion for the Work, or a designed portion of the Work, submit written warranties upon request of the Owner.

C. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Owner prior to acceptance of this portion of the Work.

D. Refer to individual Sections of these Specifications for specific content requirements, and particular requirements for submittal of special warranties.

1.3 WARRANTY REQUIREMENT

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, the Contractor shall replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise

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available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

F. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.4 DEFINITIONS

A. Standard Product Warranties are pre-printed written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 FURNISH DOCUMENTS

A. The Contractor shall provide hard copy warranty for the applicable installed work, all products utilized and all finishes applied.

END OF SECTION

CONFORMED

SECTION 02050

SITE PREPARATION

PART 1- GENERAL

1.01 DESCRIPTION OF WORK:

A. Site Preparation:

1.The Contactor shall furnish all labor, materials, equipment and services necessary for and incidental to the execution of all demolition and site preparation as shown on the Drawings and as required to complete the project.

2. The work under this Section shall include but is not limited to the excavation and isolated demolition and legal disposal of the identified items. All work shall be done in a neat, workman-like manner. The interfaces between areas of demoltion and areas desigated to remain may require precise cutting of materials and operations shall be conducted evenly and straight, resulting in a neat interface.

3. Work shall be conducted to allow for the excavation of areas adjacent to utility structures, bulkhead walls, re-grading and installation of new surfaces in limited areas of the existing site. Care and attention shall be given to protecting waterways, built structures and site elements and paving noted to remain.

4. Work includes:

A. Protection and control of the job-site.
B. Maintenance and protection for vehicles entering the site.
C. Protection of pedestrians adjacent to the site.
D. Limited Saw-cutting and demolition of materials
E. Removal of curb, asphalt and concrete pavement.
F. Removal & disposal of fence, asphalt and concrete pavement.
G. Removal & stockpile of various existing signage.

1.02 RELATED SECTIONS:

A. 02080 Management of Contaminated Soils
B. 02200 Earthwork
C. 02510 Walks and Curbing

1.03 SUBMITTALS:

A. Schedule of Work: The Contractor shall submit a site preparation plan outlining proposed methods and sequences for conducting the work. The plan shall detail specific measures to secure the work area and sequence activities to minimize soil disturbance.

B. Site Access and Traffic Protection: The Contractor shall submit a written plan outlining proposed schedule, methods and sequences for providing safe construction vehicle and delivery access to the site while project is active.

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C. The Contractor shall furnish Proof / Verification that the disposal of materials off site is legal, with documentation /certification for each truck load hauled off the site.

D. Submit Manufacturer's Product Data sheets for all products listed. Comply with Section 01300.

1.04 JOB CONDITIONS:

A. Protect the Condition of existing structures. It is the Contractor's responsibility to notify the Owner's Representative if defective concrete surfaces, cracks, fissures or breaks are identified in the course of site preparation activities. Conditions existing at time of inspection for bidding purposes will be maintained by the Owner insofar as practicable up to start of construction. Work or features that are damaged by the Contractor shall be restored at the Contractor's expense to the complete satisfaction of the Owner.

B. Traffic: Conduct excavation and trucking operations to minimize interference with vehicular and pedestrian activity on Davol Street. Work activities and oversize deliveries and off-loading shall not interrupt roadway thru traffic circulations.

C. Traffic Protection: Coordinate with the Owner per Section 12, Subsection 413.0 Provisions for Traffic. Provide signage, barrels, barricades and related protections. Indicate cautions and routing instructions with high visibility clear and legible signage in accordance with the MUTCD. When equipement is entering/existing the site driveway provide flagger as determined appropriate to assist with these activities. Traffic movement on Davol St. shall be restored to pre-existing condition at the end of each work day. Any signs not needed shall be removed or covered. If so directed by the Engineer provide additional traffic protection during special operations (oversize deliveries) that may impact traffic flow on Davol Street.

1.05 TESTING

A. Not Used.

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1.06 PROTECTIONS:

A. Existing site features: The Contractor shall utilize barriers and fencing and take all necessary precautions to ensure the local facilities, structures and equipment noted to remain are not damaged and remain in good shape and functional. Protect existing pavement/pathways/roadway surfaces from heavy equipment. Protect trees, lightpoles, signs and electrical cabinets, as well as any other items noted to remain in place. Any items to remain that are damaged by the Contractors operations during construction of the Work shall be repaired to their original condition or replaced with new.
B. Work or features shown to remain that are damaged by the Contractor shall be restored at the Contractor's expense to the complete satisfaction of the Owner. Remove and salvage all noted elements.
C. The Contractor shall follow the procedures outlined by the local, state and federal agencies regulating the project and in accordance with the permitting documents.

PART 2 – PRODUCTS

2.01

A. Traffic and Pedestrain protection measures: Traffic Cones, Polyethylene Drum Plastic Pipe Barricade and High Visibility, Reflective Construction Signs.

B. Signs as follows, Per MassDOT Standard Specifications.

i. END ROAD WORK
ii. FLAGGER AHEAD
iii.TRUCKS ENTERING/EXITING
iv. ROAD WORK AHEAD
V. DO NOT ENTER

C. Construction Signs shall be 36"x36" in size, orange background with black lettering.

D. Regulatory sign (Type V) shall be 30"x30" in size red background with white symbol and black lettering.

2.02 Compost Filter Tube

A. Compost Filter Tube size shall be 12" diameter and conform to the plans and details.

B. Filter Tube 'sock' shall be bio-degradable, tubular, knitted mesh containing the media.

C. The compost media shall be approximately 70% partially decomposed wood chips.

D. The compost media shall be approximately 30% weed-free compost.

E. 100% of the media shall pass 2" sieve, with 30% passing 3/8" sieve.

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2.03 Catch Basin Erosion Control

A. The erosion control shall be manufactured of ultra-violet light stable, durable woven polypropelene fabric.

B. The erosion control shall be designed to collect sediment and debris while allowing water to pass through and enter the storm drainage system. The fabric shall be rated for a mimimum flow rate of 150 gpm.

PART 3 – EXECUTION

3.01 OPERATIONAL ACTIVITIES

A. The Contractor shall schedule and conduct a site prepration walk-through meeting on site to review constraints and coordinate the full sequence of work.

B. The Contractor shall maintain public access on the sidewalks adjacent to the site.

C. The Contractor shall restrict public access to the site during construction. Protect the Work and areas of operation from public access. Mainatin the chain link fencing at the Contractor's for the duration of the project. All products furnished to the site intended for use shall be secured and protected.

D. Establish erosion controls on site. Utilize compost tubes and related measures to prevent erosion as directed by the Engineer. When working re-position frequently and replace with new when needed or as directed by the Engineer due to construction operations. Position to protect areas down-gradient from areas of excavation and disturbance. All preparation shall be conducted with care not to damage roadways, sidewalks and existing features shown to remain in place.

E. The Contractor shall establish traffic and site access protection in coordination with the Owner and as shown on the plans for both work in the roadway and sidewalk areas as well as construction vehicle ingress and egress to the site.

F. The Contractor shall remove all existing items designated for removal in their entirety, or to the line and grade shown on the drawings or specified herein.

G. During operations, the Contractor shall limit dust to the lowest practical level by wetting surfaces. No visible dust emissions.

H. Debris shall not be allowed to 'track' soils off the site onto the roadways. Davol St. roadway adjacent to the site shall be swept at the end of each workday durring which trucks are entering and exiting the site.

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3.02 DISPOSAL OF MATERIALS:

A. General: All material resulting from Demolition shall become the property of the Contractor except as specified otherwise. It shall be properly and legally disposed of at the Contractor's own expense as demliton and site preparation continues. The disposal method shall be in accordance with all federal, state and local requirements, as well as subject to the acceptance of the Owner's Representaive and Owner.

B. Conform to the requirements of the EPA Risk Based Clean Up Plan and all related updates and Amendments, as per Appendices.

C. Remove all pavement, rubble, stones, debris and refuse encountered in the site preparation process.

D. Finish the edges of the site to match uniformly to adjacent surfaces designated to reamain upon the installation of the completed site improvements.

E. The Contractor shall dispose of all materials generated thru the work operations legally, in an off-site location. The Contractor shall provide certification of material disposal compliance to the Owner's Representative.

F. At the completion of the Work, remove all traffic protections. Clean and sweep the adjacent roadway to the curbline at the entrance to the site.

3.03 MEASUREMENT AND PAYMENT:

A. The the Work to be performed under this Section and the items and materials utilized is diverse. The method of measurement and payment for the items of Work included in this Section shall be as specified under Section 01025 Measurement and Payment.

END OF SECTION

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SECTION 02062

MANAGEMENT OF CONTAMINATED MATERIALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Bidding requirements and Contract Forms are hereby made a part of this Section.

B. This project is being conducted under the requirements of the Massachusetts Contingency Plan (MCP) and U.S. Environmental Protection Agency (EPA) TSCA regulations. In 2011, the Fall River Redevelopment Authority (RDA) submitted a Risk-Based Cleanup (RBC) Plan (see Attachment A) to the EPA to address the Polychlorinated-Biphenyl (PCB) contamination in soils at the Site. The 2011 RBC Plan was subsequently approved by EPA. The RDA recently submitted an Amendment and associated Comment Response to the RBC to EPA (see Attachment A).

C. All response actions (waste excavation and on-site & off-site management) must be conducted in accordance with:

- the EPA-approved RBC Plan inclusive of all amendments and EPA Response
- the MCP Release Abatement Measure (RAM) Plan Modification;
- the Order of Conditions issued by the Fall River Conservation Commission (NOI approved at May 3, 2021 public hearing and OOC is pending – to be issued as an Addendum).

1.02 DESCRIPTION OF WORK

A. The Scope of the Work consists of all materials, equipment, labor and services required for all Excavation and Management of Soils containing less than 50 milligrams per kilogram (mg/kg or ppm) of PCBs, including all items incidental thereto, as specified herein and as shown on the Drawings. The following work shall be included:

1. Mobilization/demobilization of all personnel, equipment, materials and supplies to perform Work.
2. Submittal of all required certifications demonstrating that personnel are properly trained and qualified to perform the Work in accordance with applicable OSHA regulations and all laws governing the Work.
3. Permits and licenses are to be secured, as necessary, including notification of local emergency personnel and notification/reporting requirements, with respect to unforeseen conditions;
4. Excavation of PCB-impacted soil within the limits indicated on the Contract Drawings and as directed by the Engineer, including excavation for utility corridors.
5. Live loading or temporary storage of PCB-impacted soils on-Site, at Contractor's option. Temporary storage of PCB-impacted soils on-Site must be within lined, secured containers.

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6. Loading and transportation of PCB-impacted soils to the consolidation areas indicated on the plans.
7. Geotextile shall encapsulate all PCB impacted soils prior to any backfilling. Placement of geotextile barriers shall be as indicated on the plans and as directed by the Engineer to ensure complete encapsulation.
8. Excavation of the existing granular soil cap to create placement areas within indicated berms. Disturbance of the existing geotextile fabric is prohibited.
9. Excavating, hauling, placement and grading of PCB-impacted soil in the consolidation areas.
10. Compaction of PCB-impacted soil in accordance with the requirements outlined in this specification.
11. Off-site disposal of PCB-impacted soil that cannot be accommodated in the consolidation areas as defined below.
12. PCB soils that exceed the placement capacity of Berm A but are less than fifteen (15) cubic yards shall be disposed of off-site legally at a regulated disposal facility. If soils are encountered that exceed the capacity of Berm A as determined by the Engineer and exceed a volume of fifteen cubic yards, excavation of the existing granular soil cap and as indicated and placement of PCB impacted soils in Berm B shall occur.
13. Protect all existing utilities, roads, pavements, and other improvements from damage due to construction. Install temporary fencing and safety barriers or controls as necessary.
14. Dust control, as directed by Engineer. No visible dust emissions will be permitted.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Other specifications sections, which directly relate to the work of this section include, but are not limited to, the following:

1. Item 1 - Mobilization
2. Item 2 – Site Preparation

1.04 APPLICABLE LAWS AND REGULATIONS

A. Work under this Section shall be performed in strict compliance with all applicable Federal, State and local laws, rules, regulations related to the handling and on-site & off-site management of PCB-impacted wastes and regulated soils. Specific reference is made to the fact that PCB-impacted soil to be excavated and managed on-site and / or off-site is regulated under the Toxic Substances Control Act (TSCA) and the Massachusetts Contingency Plan (MCP).

B. Pertinent Federal and State Authorities having jurisdiction over this project include:

1. Occupational Safety and Health Administration (OSHA)

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2. U.S. Environmental Protection Agency (EPA)

3. Massachusetts Department of Environmental Protection (MADEP)

4. Fall River Conservation Commission

C. The following OSHA regulations apply:

1. Occupational Safety and Health Standards, Hazardous Waste Operations and Emergency Response - 29 CFR 1910.120.

2. Safety and Health Regulations for Construction - 29 CFR 1926.

1.05 Licensed Site Professional (LSP) Services

A. Licensed Site Professional (LSP) services for the work shall be provided by the ENGINEER, including Massachusetts Department of Environmental Protection (MassDEP) response actions. The ENGINEER will be responsible for preparing Massachusetts Contingency Plan (MCP) related filings including but not limited to Utility-related Abatement Measure (URAM) Plans, Release Abatement Measure (RAM) plans, Material Shipping Records, and Bills of Lading.

1.06 REFERENCE STANDARDS

A. Definitions and Reference Standards:

1. ASTM: Specifications of the American Society for Testing and Materials.

2. AASHTO: American Association of State Highway and Transportation Officials.

3. ACI: American Concrete Institute.

4. Building Code: Commonwealth of Massachusetts State Building Code, latest edition.

5. EPA: United States Environmental Protection Agency.

6. DEP: Massachusetts Department of Environmental Protection.

7. SSHB: Standard Specifications for Highways and Bridges, the Commonwealth of Massachusetts, Mass. Highway Department, latest edition.

1.07 BENCHMARKS AND ENGINEERING

A. The Contractor shall maintain all established bounds and benchmarks and replace, as directed, any that may be disturbed or destroyed. The Contractor shall pay all costs of the services of a Civil Engineer or Land Surveyor, if required..

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B. The Contractor shall verify dimensions and elevations on the ground and report any discrepancies immediately to the Engineer. Any discrepancies not reported prior to construction shall not be the basis for claims for extra compensation.

1.08 SUBSURFACE INFORMATION

A. The RDA assumes no responsibility for the Contractor's failure to make his own site investigation and makes no representation regarding the character of the soil or subsurface conditions which may be encountered during the performance of the Work.

1.09 FINISHED GRADES

The words "finished grades" as used herein mean the required final grade elevations. Where not otherwise indicated, areas shall be given uniform slopes between points for which finished grades are shown, or between such points and existing grade except that vertical curves or gradual transitions shall be provided at abrupt changes in slope.

1.10 SUBMITTALS

A. Submittals shall be made in compliance with the requirements of Section 01300 except as provided for herein.

B. No Work will be permitted to proceed until the required submittals have been received and approved by the ENGINEER. In the event the ENGINEER requests additional information, it shall be the CONTRACTOR's responsibility to provide such additional information in a complete and timely manner, so that construction can proceed by the date stipulated in the Notice to Proceed.

C. PCB-impacted soil will be encountered during the work. Prior to the commencement of work, the CONTRACTOR shall submit the following to the ENGINEER for approval:

1. Submittal of required certifications demonstrating that personnel are properly trained and qualified to perform the Work in accordance with applicable OSHA regulations and laws governing the Work.
2. Names and qualifications of proposed subcontractors, if any, identifying the tasks to be performed by each proposed Subcontractor.
3. A Proposed Soil Management Plan, including a description of the proposed equipment and decontamination procedures, identification of staging areas for the loading of the PCB-impacted soil, dust monitoring / control, and project schedule.
4. The CONTRACTOR's Site-Specific Health & Safety Plan pursuant to OSHA 1910.120 requirements.
5. Licensed facility identified to accept PCB-containing soil, if necessary.

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D. Approval of submittals by the ENGINEER shall not impose any liability upon the ENGINEER, nor shall any such approval relieve the CONTRACTOR of his/her responsibilities to meet the requirements and comply with applicable laws, regulations and other applicable requirements under this Contract.

E. Within 21 days after substantial completion of the Work, the Contractor shall submit to the Engineer one (1) original copy of all manifests, certified weigh slips (tons), bills-of-lading, and records of final waste disposition from the accepting disposal facility(ies), and all other pertinent documentation, including a summary of dates and quantities relating to the off-site management of wastes and regulated soil.

1.11 EXISTING ENVIRONMENTAL CONDITIONS

A. The project site is a confirmed disposal site, as defined under the Massachusetts Contingency Plan (MCP). The Department of Environmental Protection (DEP) has assigned the Site a release tracking number of 4-17012.

B. The PCB-impacted soil to be excavated from the Site is at a depth of between zero inches and 3 feet in depth. The primary contaminants of concern include polychlorinated biphenyls (PCBs).

D. The Contractor shall satisfy him/her self as to the conditions existing at the Site, the type of equipment required to perform the Work, and the quality and quantity of the materials to be removed. Additional environmental data relative to in-situ characterization of wastes and soils to be excavated under this Contract will be provided by the Engineer. Reference is made to Attachment A.

E. Failure of the Contractor to become fully acquainted with the available information will not relieve him/her of the responsibility to completely and properly perform the work in full compliance with the Contract Documents. The Engineer assumes no responsibility for any conclusion or interpretation made by the Contractor on the basis of information made available by the RDA or Engineer.

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PART 2 - PRODUCTS

2.01 GEOTEXTILE

A. Nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. Geotextile will conform to the Mirafi® 140N or equivalent.

Mechanical Properties	Test Method	Value
Grab Tensile Strength	ASTM D4632	120lbs
Grab Tensile Elongation	ASTM D4632	50%
Trapezoid Tear Strength	ASTM D4533	50 lbs
CBR Puncture Strength	ASTM D6241	310lbs
		Maximum Opening Size
Apparent Opening Size (AOS)	ASTM D4751	70 mm
		Minimum Roll Value
Permittivity	ASTM D4491	1.7 sec
Flow Rate	ASTM D4491	135 gal/min/ft2
		Minimum Test Value
UV Resistance (at 500 hours)	ASTM D4355	70% strength retained

PART 3 - EXECUTION

3.01 ACCESS TO WORK AREA

Access to the Site shall be via the main entrance off Davol Street. No access through abutting properties shall be permitted.

3.02 SUBMITTAL OF ALL REQUIRED CERTIFICATIONS

Submittal of all required certifications demonstrating that personnel are properly trained and qualified to perform the Work in accordance with applicable OSHA regulations and all laws governing the Work.

3.03 PERMITS AND LICENSES

All permits and licenses are to be secured, as necessary, including notification of local emergency personnel and notification/reporting requirements, with respect to unforeseen conditions.

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3.04 DECONTAMINATION AND PREVENTION OF CROSS-CONTAMINATION

Contractor will be responsible for the proper decontamination of any equipment leaving the Site and for preventing the spread of contamination at the Site. The Engineer has designated a proposed cap area (see Attachment A) where PCB-contaminated soil will remain. The Contractor will not transport by its equipment contaminated soil from the proposed cap area to other areas of the Site or off-site.

3.05 EXCAVATION

A. Protection of utilities, monuments and benchmarks, trees, and work area perimeter.

1. All rules and regulations governing the respective utilities shall be observed in executing all Work under this Section. All work shall be executed in such a manner as to prevent any damage to existing buildings, streets, curbs, paving, service utility lines, structures and adjoining property. Monuments and benchmarks shall be carefully mainlined and, if disturbed or destroyed, replaced as directed.

2. Contractor shall place hay bales at perimeter of work area as required by the Engineer. The location and installation of the hay bales / erosion controls will be approved by the RDA and the Fall River Conservation Commission. No disturbance of soil or vegetation shall be allowed outside of this designated work area.

3. The Contractor shall assume full responsibility for damages caused by him or his Subcontractor's equipment and personnel to the existing buildings and grounds as well as adjoining private property.

4. The Work of this Section shall be performed in such a manner as to cause no interference with access by the Subcontractors or other Contractors to all portions of the Site as is necessary for the normal conduct of their work.

5. Perform general site cleanup.

B. Excavation procedures are outlined as follows:

1. Provide adequate barriers and demarcation of excavation and exclusion zones to warn site visitors and the public of potential hazards.
2. Excavate soil to the elevations and dimensions shown on the Contract Drawings. Excavation will generally be 0-3 feet in depth and is not expected to extend greater than three (3) feet below grade. Confirmation of sufficient initial excavation shall be by the visual observations of the Engineer. Contractor shall coordinate with the Engineer regarding the Engineer’s collection of post-excavation confirmatory soil samples to verify the removal of sufficient contaminated soil, if necessary.
3. Soil shall be excavated to the horizontal limits indicated on the plans and to the depth(s) as directed by the Engineer.
4. All excavation operations shall be conducted in a manner suitable for removal of wastes and contaminated soil without cross contamination of “clean” soil.

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5. The Contractor shall obtain from the proper authorities locations of all utilities within the Scope of this Work so that there will be no damage done to such utilities. Neither the RDA nor the Engineer will be responsible for any such damage, and the Contractor shall restore any structure or utility so damaged without additional compensation. Written notifications to the appropriate utility agencies shall be made at least ten (10) days prior to the commencement of any work.
6. Any unsanitary conditions encountered, such as broken sewer mains, potentially contaminated soil or uncovered garbage shall be corrected or removed entirely, as directed by the Engineer.
7. Assist the Engineer with collection of post-excavation soil samples for laboratory analyses, as requested.

3.06 TEMPORARY STOCKPILING

A. If directed by the Engineer, excavated material shall be stockpiled out of the immediate work area and in a location acceptable by RDA, in lined roll-off containers. All containers shall be covered at the end of every working day. Covers shall be properly secured and maintained such that it remains fully intact during all weather conditions.

B. If required, the Contractor shall segregate the soils into separate stockpile areas to facilitate separate characterization by Engineer, and subsequent on-site or off-site management.

C. The Contractor shall take care to segregate apparently uncontaminated or lightly contaminated materials from wastes and other overtly contaminated materials, as directed by Engineer. It will be the responsibility of the Engineer to decide what portion of the excavated materials may be suitable for on-site reuse.

D. All stockpiled soil shall be either reused on site or transported from the site as soon as possible. In no event shall the volume of on-site stockpiled soil exceed 50 cubic yards, without the specific approval of Engineer.

3.07 ON-SITE MANAGEMENT OF EXCAVATED SOIL

A. The Contractor shall be responsible for the on-site transportation of all soil designated by the Engineer for on-site management.

A. Actual quantities which are subject to unit rates and measurements in the field shall be tabulated by the Contractor and verified by Engineer on a daily basis. The Contractor will not be reimbursed for unit rate work performed without the prior approval of quantities by Engineer.

3.09 FILLS, BACKFILLS AND COMPACTION

A. Samples and Testing:

1. All fill material and its placement shall be subject to quality control testing. A qualified laboratory may be selected by the RDA to perform tests on materials. All costs of testing will be paid for by the Contractor. Test results and laboratory recommendations shall be available to the Engineer.

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2. Provide samples of each fill material from the proposed source of supply including on-site sources. Allow sufficient time for testing and evaluation of results before material is needed. Submit samples from alternate source if required.

3. Engineer will be sole and final judge of suitability of all material.

B. Placing PCB-impacted Soil and Compacting

1. Fill material shall be placed in lifts not to exceed 12” and compacted.

2. Notify the Engineer when excavation is ready for inspection. Filling and backfilling shall not be started until conditions have been approved by the Engineer.

3.10 OFF-SITE MANAGEMENT OF PCB-IMPACTED SOIL

A. The Contractor shall be responsible for the off-site transportation and disposal of all soil designated by the Engineer for off-site management.

B. All soil requiring off-site disposal shall be properly disposed off-site at appropriately permitted landfill or disposal facility(ies) in good standing and holding current, valid permits and licenses in accordance with all federal, state, and local laws, regulations, ordinances, and procedures.

C. The Contractor shall contain all soil In DOT-approved containers and/or transport in DOT-approved vehicles. All containers or transport vehicles shall be provided with appropriately sized polyethylene bladder bags and/or polyethylene liners that can be secured by duct tape or other appropriate means, to the satisfaction of the Engineer, prior to leaving the site. In addition, all loose soil, dusts and other deleterious materials shall be rinsed from the all containers and transport vehicles at the decontamination area, after loading and prior to leaving the Site.

D. All vehicles used for transportation of soil shall be properly labeled and placarded, as required for off-site transportation for conformance with all federal, state, and local laws, regulations, ordinances, and procedures.

E. The Contractor shall be responsible for coordination of all transporter and receiving facility activities. Transporter vehicles used for the transportation of soil shall be covered, substance compatible, licensed, insured, and permitted pursuant to federal, state, and local laws, regulations, ordinances, and procedures.

F. All vehicles departing the site shall be properly logged to show the vehicle identification, driver’s name, time of departure, destination, and approximate volume and content of material carried. Location from which the wastes/soil originated will be provided by the Engineer for inclusion on the shipping documentation.

G. No materials shall leave the site until the designated receiving facility has agreed in writing to accept the type and quantity of waste/soil to be shipped.

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H. The Contractor shall complete all required manifests and other pertinent forms for proper transportation and disposal. The Engineer shall review and the FRRA will sign all manifests. Signatures from the receiving location of all materials transported off-site are required. The Contractor shall be held accountable for ensuring that all requirements of the transporter and receiving disposal facility(ies) and federal, state, and local laws, regulations, ordinances, and procedures are complied with and properly documented.

I. Documentation shall be maintained indicating that all applicable laws have been satisfied and that all soil has been successfully transported and received at the disposal facility(ies).

J. Actual quantities which are subject to unit rates and measurements in the field shall be tabulated by the Contractor and verified by Engineer on a daily basis. The Contractor will not be reimbursed for unit rate work performed without the prior approval of quantities by Engineer.

K. Bills of Lading and/or Hazardous Waste Manifests, as appropriate, will be provided and coordinated by the Engineer. The RDA will be responsible for signing all waste manifests and bills of lading. In order for Contractor's operations to proceed without interruption, complete and accurate information shall be provided by the Contractor during the Submittals process.

For the transportation of hazardous wastes from the Site, the Contractor must have a valid EPA identification number and any other permits or licenses required by federal, state, and local laws, regulations, ordinances, and procedures.

L. The Contractor shall comply with all required reporting and record keeping requirements in accordance with the provisions of this Contract and all applicable federal, state, and local laws, regulations, ordinances, and procedures.

3.11 DUST CONTROL

There shall be no visible dust emission rom the site. The Contractor shall utilize water to prevent the spread of dust. Metered connection to RDA hydrant is permitted. Chemical materials may not be used.

3.12 CLEAN UP

The Contractor shall remove all debris, construction equipment and scrap material from all areas within the limit of work prior to inspection for acceptance.

END OF SECTION

CONFORMED

SECTION 02105

MAINTENANCE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Procedures for maintaining work completed under this Contract.

1.2 MAINTENANCE PERIOD

A. The general maintenance period for all construction or materials under this Contract shall be one (1) year subsequent to the date of the acceptance of the work by the Owner, or as provided by other sections of this Specification.

B. If the Owner puts any structure or equipment to use prior to acceptance of all work under the Contract, the maintenance period for such structures or equipment shall be calculated from the time use begins.

C. Contractor agrees to replace the material which does not conform to the Contract requirements, and to repair any damage of material or work without cost to the Owner, to satisfaction of Engineer, in conformance with Contract Documents provided orders for replacement and/or repairs are received in writing by the Contractor within the one year period.

D. This Section shall in no way limit the duration of the Contractor's responsibility for the correction of any defect due to workmanship or materials provided by the Contractor which are not in compliance with the Contract Documents.

1.3 ABUSE OF WORK

A. Contractor is not obligated to perform work of replacement or repair that he may prove is required because of abuse by parties other than the Contractor, after the date the Owner puts to continuous use the work requiring replacements or repair, or after date the Owner has approved the Certificate of Completion.

1.4 EMERGENCY REPAIRS

A. If the Owner deems necessary, the Owner shall order replacement or repairs be undertaken within 24 hours.

B. If the Contractor delays or fails to make the ordered replacement or repairs within the time specified, the Owner shall have the right to make such replacements or repairs and the expense shall be deducted from moneys due the Contractor, or moneys of the Contractor retained by the Owner.

CONFORMED

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

CONFORMED

SECTION 02200

EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for; excavating in earth for trenches and structures; backfilling excavations; furnishing necessary material; compaction; constructing embankments and fills; miscellaneous earth excavations and miscellaneous grading.

B. Related Sections

1. Section 01025 - Measurement and Payment
2. Section 01410 - Testing Laboratory Services
3. Section 02062 – Management of Contaminated Soils
4. Section 02215 - Aggregate Materials
5. Section 02500 – Pavement
6. Section 02510 -Walks and Curbing
7. Section 03300 - Cast-In-Place Concrete

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM).

1. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

1.03 MEASUREMENT AND PAYMENT PROCEDURES

A. Test Pits

1. Where determination of the exact location of pipe or other underground structure is necessary for doing the work properly, the Contractor may be required to excavate test pits to determine such locations. When such test pits may be properly considered as incidental to other excavation, the Contractor shall receive no additional compensation, the work being understood to be included as part of the excavation. When the Engineer orders test pits beyond the limits of excavation he considers a part of the work, such test pits shall be paid for as specified in SECTION 01025.

1.04 QUALITY ASSURANCE

A. Field Samples

CONFORMED

1. Provide samples of materials as requested by the Engineer, to the Quality Control Engineer hired by the Owner, prior to delivery of materials on site, in order to facilitate field testing of compaction operations and material properties.

1.05 PROJECT/SITE CONDITIONS

A. Existing Conditions

1. There are pipes, drains, and other utilities in locations not indicated on drawings, no attempt has been made to show all services, and completeness or accuracy of information given is not guaranteed.

1.06 MAINTENANCE

A. Maintain all work in accordance with SECTION 01800.

PART 2 PRODUCTS

2.01 MATERIALS

A. Suitable Aggregate

1. The nature of materials will govern both acceptability for backfill and methods best suited for placement and compaction.
2. All material whether from excavations or from borrow pits, after being placed and properly compact, will make a dense stable fill and containing no vegetation, masses of roots, , stones over 3 inches in diameter, or porous matter.
3. Organic matter to be well distributed and not to exceed minor quantities.

B. Trench and Excavation Backfill

1. In general, and unless other material is indicated on drawings or specified, material used for backfilling trenches and excavations shall be suitable material which was removed in the course of making the construction excavations. If sufficient suitable material is not available from the excavations, the backfill material shall be crushed stone, gravel borrow or select borrow as directed by the Engineer, in according to respective Specification Sections.

C. Structure Backfill

1. Unless otherwise indicated or specified, all fill and backfill under structures and pavement adjacent to structures shall be compacted gravel borrow containing not more than 10 percent material passing a 200 sieve. When coarse aggregate and fine aggregate are indicated or specified for use under structures, they shall conform to the requirements for coarse and fine aggregate specified in SECTION 03300.

D. Filling and Embankment Backfill

1. Suitable selected materials available from the excavations and not required for backfill around pipes or against structures may be used for filling and building embankments, except as otherwise specified. Material needed in addition to that available from construction operations shall be obtained from suitable gravel

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banks or other suitable deposits. The Contractor shall furnish, at his own expense, all borrow material needed on the work.

E. Additional materials

1. Concrete: In accordance with SECTION 03300.
2. Crushed stone: In accordance with SECTION 02215.
3. Gravel borrow: In accordance with SECTION 02215.
4. Select borrow: In accordance with SECTION 02215.

2.02 SOURCE QUALITY CONTROL

A. All Materials Imported to the Site Shall be tested and certified as clean.

B. Submit all materials proposed for use.

C. Upon request, provide Engineer with access to location of off-site sources of materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify all existing utilities, wall footings, braces and tie-backs and related appurtenances prior to excavation.

3.02 PROTECTION

A. Excavation Limits

1. Excavation shall be limited to occur within the top 36” of the site with the exceptionof areas indicated. Disturbance to the geotextile fabric membrane shall be prohibited

B. Utilities

1. Support and protect from damage existing pipes, poles, wires, fences, curbing, property line markers, and other structures, which the Engineer decides must be preserved in place without being temporarily or permanently relocated.
2. Restore items damaged during construction without compensation, to a condition at least equal prior to construction.

C. Paved surfaces

1. Do not use or operate tractors, bulldozers, or other power-operated equipment with treads or wheels shaped as to cut or injure paved surfaces noted to remain.
2. All surfaces which have been injured by the Contractor's operations shall be restored to a condition at least equal to which existed prior to start of the Work.
3. Suitable materials and methods shall be used for such restoration.

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3.03 PREPARATION

A. Pavement Removal

1. Remove only existing pavement as necessary for the prosecution of the work.
2. Engineer may require that pavement be cut with pneumatic tools or saws without extra compensation to Contractor, where in the opinion of the Engineer it is necessary to prevent damage to the remaining road surface.
3. Dispose large of pieces of broken pavement before proceeding with excavation.

B. Granular Soil Removal

1. From areas which excavations are to be made, soil shall be carefully removed hauled, placed and graded to the limits indicated. On site. Excess Soils shall be removed and disposed of legally off site.
2. Remove loam and topsoil, loose vegetable matter, stumps, large roots, etc., from areas where embankments will be built or material will be placed for grading.
3. Shape as indicated on the drawings and prepare by forking, furrowing, or plowing to bond first layer of the new material placed.

3.04 RELOCATION AND REPLACEMENT OF EXISTING STRUCTURES

A. The structures to which the provisions of this article apply include pipes, wires, and other structures which meet all of the following:

1. Are not indicated on the drawings or otherwise provided for.
2. Encroach upon or are encountered near and substantially parallel to the edge of the excavation.
3. In the opinion of the Engineer will impede progress to such an extent that satisfactory construction cannot proceed until they have been changed in location, removed (to be later restored), or replaced.

B. In removing existing pipes or other structures, the Contractor should use care to avoid damage to materials, and the Engineer shall include for payment only those new materials which, in his judgment, are necessary to replace those unavoidably damaged.

C. Whenever the Contractor encounters certain existing structures as described above and is so ordered in writing, he shall do the whole or such portions of the work as he may be directed to change the location of, remove and later restore, or replace such structures, or to assist the Owner thereof in so doing. For all such work, the Contractor shall be paid under such items of work as may be applicable, otherwise as Extra Work.

D. When the perimeter fence interferes with the Contractor's operations, he shall remove and reset-re-establish the perimeter temporarily (unless otherwise specified) without additional compensation until a point at which the fence is no longer determined necessary.

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3.05 EXCAVATION

A. Excavate without undermining or disturbing foundations of existing structures or of work previously completed under this contract.

B. Excavate to widths that provide suitable room for:

1. Building and placing structures or laying and jointing piping.
2. Placing all sheeting, bracing, and supports.

C. Render bottom of excavations firm, dry and acceptable in all respects.

D. Do not plow, scrap or dig by machinery, earth at finished subgrade which results in disturbance of material below subgrade, unless indicated or specified, and remove with pick and shovel, last of material to be excavated, just before placing pipe, masonry or other structure.

E. Make all excavations in open, except as otherwise specified or permitted.

F. Excavation Near Existing Facilities

1. As the excavation approaches walls, pipes, conduits, or other underground structures, digging by machinery shall be discontinued and the excavation shall be done by means of hand tools. Such manual excavation when incidental to normal excavation shall be included in the work to be done under items involving normal excavation.

G. Unauthorized Excavation

1. If the bottom of any excavation is taken out beyond the limits indicated or prescribed, the resulting void shall be backfilled at the Contractor's expense with thoroughly compacted gravel borrow, if the excavation was for a pipeline, or with Class B concrete, if the excavation was for a masonry structure.

H. Unsuitable Material

1. If material unsuitable for foundation (in the opinion of the Engineer) is found at or below the grade to which excavation would normally be carried in accordance with the Drawings and/or Specifications, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted, crushed stone, gravel borrow, fine aggregate or concrete as directed.

3.06 TRENCHING

A. Trench Excavation

1. Where pipe is to be laid in specified bedding material or concrete cradle, the trench may be excavated by machinery to, or to just below, the designated subgrade, provided that the material remaining at the bottom of the trench is no more than slightly disturbed.

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2. Where pipe is to be laid directly on the trench bottom, the lower part of trenches in earth shall not be excavated to subgrade by machinery, but, just before the pipe is to be placed, the last of the material to be excavated shall be removed by means of hand tools to form a flat or shaped bottom, true to grade, so that the pipe will have a uniform and continuous bearing and support on firm and undisturbed material between joints except for limited areas where the use of pipe slings may have disturbed the bottom.

B. Depth of Trench

1. Excavate trench to depths permitting the pipe to be laid at the elevations, slopes, or depths of cover indicated on the drawings, and at uniform slopes between indicated elevations.

C. Width of Trench

1. Excavate trench as narrow as practicable and do not widen by scraping or loosening materials from the sides. Every effort shall be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed and consolidated.
2. Excavate trenches with approximately vertical sides between the elevation of the center of the pipe and an elevation 1 ft. above the top of the pipe.

D. Trench Excavation in Fill

1. If pipe is to be laid in embankments or other recently filled material, the material shall first be placed to the top of the fill or to a height of at least 1 ft. above the top of the pipe, whichever is the lesser. Particular care shall be taken to ensure maximum consolidation of material under the pipe location. The pipe trench shall then be excavated as though in undisturbed material.

E. Length of trench open at any one time will be controlled by conditions, subject to any limits that may be prescribed by Engineer.

3.07 BACKFILLING

A. General

1. Frozen material shall not be placed in the backfill nor shall backfill be placed upon frozen material. Previously frozen material shall be removed or shall be otherwise treated as required, before new backfill is placed.

B. Fill and Backfill under Structures

1. The fill and backfill materials shall be placed in layers not exceeding 6 in. in thickness. Unless otherwise indicated or specified, each layer shall be compacted to 95 percent in accordance with ASTM D1557.

C. Backfilling around Structures

1. Do not place backfill against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected, without distortion, cracking, or other damage. As soon as practicable after the structures are structurally adequate and other necessary work has been done, special leakage tests, if required, shall be made. Promptly after the completion of such tests, the backfilling shall be started and then shall proceed

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until its completion. The best of the excavated materials shall be used in backfilling within 2 ft. of the structure. Unequal soil pressures shall be avoided by depositing the material evenly around the structure.

2. The material shall be placed and compacted to 90 percent in accordance with ASTM D1557 unless otherwise indicated or specified.

D. Backfilling Pipe Trenches

1. As soon as practicable after the pipes have been laid and the joints have acquired a suitable degree of hardness, if applicable, or the structures have been built and are structurally adequate to support the loads, including construction loads to which they will be subjected, the backfilling shall be started and thereafter it shall proceed until its completion.
2. With the exception mentioned below in this paragraph, trenches shall not be backfilled at pipe joints until after that section of the pipeline has successfully passed any specified tests required. Should the Contractor wish to minimize the maintenance of lights and barricades and the obstruction of traffic, he may, at his own risk backfill the entire trench, omitting or including backfill at joints as soon as practicable after the joints have acquired a suitable degree of hardness, if applicable, and the related structures have acquired a suitable degree of strength. He shall, however, be responsible for removing and later replacing such backfill, at his own expense, should he be ordered to do so in order to locate and repair or replace leaking or defective joints or pipe.
3. No stone or rock fragment larger than 12 in. in greatest dimension shall be placed in the backfill nor shall large masses of backfill material be dropped into the trench in such a manner as to endanger the pipeline. If necessary, a timber grillage shall be used to break the fall of material dropped from a height of more than 5 ft. Pieces of bituminous pavement shall be excluded from the backfill unless their use is expressly permitted, in which case they shall be broken up as directed.
4. Zone Around Pipe
   a. Backfilled with the materials and to the limits indicated on the drawings.
   b. Material shall be compacted to 90 percent by tamping.
5. Remainder of Trench
   a. Compact by water-jetting, or tamping, in accordance with the nature of the material to 95 percent in accordance with ASTM D1557. Water-jetting may be used wherever the material does not contain so much clay or loam as to delay or prevent satisfactory drainage. However, tamping shall be used if water-jetting does not compact the material to the density required.
6. Excavated material which is acceptable to the Engineer for surfacing or pavement subbase shall be placed at the top of the backfill to such depths as may be specified elsewhere or as directed. The surface shall be brought to the required grade and stones raked out and removed.

E. Placing and Compacting Embankment Material

1. After the subgrade has been prepared as hereinbefore specified, the material shall be placed thereon and built up in successive layers until it has reached the required elevation.

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2. Layers shall not exceed 12 in. in thickness before compaction. In embankments at structures, the layers shall have a slight downward slope away from the structure; in other embankments the layers shall have a slight downward slope away from the center. In general, the finer and less pervious materials shall be placed against the structures or in the center, and the coarser and more pervious materials, upon the outer parts of embankments.
3. Each layer of material shall be compacted by the use of approved rollers or other approved means so as to secure a dense, stable, and thoroughly compacted mass. At such points as cannot be reached by mobile mechanical equipment, the materials shall be thoroughly compacted by the use of suitable power-driven tampers.
4. Previously placed or new materials shall be moistened by sprinkling, if required, to ensure proper bond and compaction. No compacting shall be done when the material is too wet, from either rain or too great an application of water, to compact it properly; at such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compaction, or such other precautions shall be taken as may be necessary to obtain proper compaction.
5. The portion of embankments constructed below proposed structures shall be compacted to 95 percent in accordance with ASTM D1557. The top 2 ft. of an embankment below a pavement base shall be compacted to 95 percent. All other embankments shall be compacted to 90 percent in accordance with ASTM D1557.

3.08 METHODS OF COMPACTION

A. Water-Jetting

1. Saturate backfill material throughout its full depth and at frequent intervals across and along the trench until all slumping ceases.
2. Furnish one or more jet pipes, each of sufficient length to reach the specified depth and of sufficient diameter (not less than 1-1/4 in.) to supply an adequate flow of water to compact the material.
3. Equip jet pipe with a quick-acting valve, supply water through a fire hose from a hydrant or a pump having adequate pressure and capacity to achieve the required results.

B. Tamping and Rolling

1. Deposit backfill material and spread in uniform, parallel layers not exceeding 8 in. thick before compaction. Before the next layer is placed, each layer shall be tamped to obtain a thoroughly compacted mass. Care shall be taken that the material close to the bank, as well as in all other portions of the trench, is thoroughly compacted. When the trench width and the depth to which backfill has been placed are sufficient to make it feasible, and it can be done effectively and without damage to the pipe, backfill may, on approval, be compacted by the use of suitable rollers, tractors, or similar power equipment instead of by tamping. For compaction by tamping (or rolling), the rate at which backfilling material is deposited in the trench shall not exceed that permitted by the facilities for its spreading, leveling, and compacting.
2. If necessary, to ensure proper compaction by tamping (or rolling), the backfill material shall first be wet by sprinkling. However, no compaction by tamping (or

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rolling) shall be done when the material is too wet either from rain or too great an application of water to be compacted properly; at such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compacting, or such other precautions shall be taken as may be necessary to obtain proper compaction.

C. Miscellaneous Requirements.

1. Whatever method of compacting backfill is used, care shall be taken that stones and lumps shall not become nested and that all voids between stones shall be completely filled with fine material. Only suitable quantities of stones and rock fragments shall be used in the backfill; the Contractor shall, as part of the work done under the items involving earth excavation and rock excavation as appropriate, furnish and place all other necessary backfill material.
2. All voids left by the removal of sheeting shall be completely backfilled with suitable materials, and thoroughly compacted.

3.09 DISPOSAL OF SURPLUS EXCAVATED MATERIALS

A. No excavated materials shall be removed from the site of the work or disposed of by the Contractor except as directed or permitted by the Engineer.

B. Surplus excavated materials suitable for backfill shall be used to backfill normal excavations in rock or to replace other materials unacceptable for use as backfill; shall be neatly deposited and graded so as to make or widen fills, flatten side slopes, or fill depressions; or shall be neatly deposited for other purposes within a haul of 1 mile from the point of excavation; all as directed or permitted and without additional compensation.

C. Surplus excavated materials not needed as specified above shall be hauled away and dumped by the Contractor, at his expense, at appropriate locations, and in accordance with arrangements made by him.

D. All excess materials deemed “suitable” by the Engineer are the property of the Owner. The Contractor shall place these materials at a temporary location specified by the Owner within the confines of the property and shall also be transported a permanent location within 5 miles of the project site. The materials shall be placed in a manner that utilizes the available space efficiently and to the satisfaction of the Owner. Reworking the dumped materials to efficiently use stockpile area is considered incidental to the contract and no separate payment will be made.

3.10 DISPOSAL OF SPECIAL WASTES

A. The Contractor's attention is directed to the requirements set forth by the State of Massachusetts, Department of Environmental Protection, (MA DEP) regarding "Special Wastes" and the proper disposal thereof. All waste materials and debris, as designated by the Owner and/or Engineer, including but not limited to any sewers, storm drains, catchbasins, and combined system pipelines and associated structures, or any portions thereof, including but not limited to sludge, grit, sediment,

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dirt, sand, rock, grease, roots and other liquid, solid or semi-solid materials contained therein, shall be considered "Special Wastes." In addition, any excavated soils contaminated in any manner, as designated by the Owner and/or Engineer, shall also fall under this category and shall be handled the same. When so encountered, all such materials and debris shall be removed to the extent so ordered by the Engineer and properly disposed of in strict compliance with the requirements of the MA DEP and other regulating authorities to an approved and certified waste disposal site. It shall remain the sole responsibility of the Contractor to apply for and obtain all required permits, bonds and/or insurance relative to such disposal. The Contractor shall also pay all costs associated with the disposal, required permits, bonds and insurance with no additional expense to the Owner. All handling of such "Special Waste" shall be done in strict compliance with the MA DEP requirements and/or any other federal, state or local agency having jurisdiction or authority over the same. Under no circumstances shall sewage, solids or other "Special Wastes" removed from the sewer lines be dumped or spilled onto the streets or into ditches, catch basins or storm drains. The Contractor must use watertight and State approved vehicles in transporting any wastes as hereinbefore designated.

B. The Contractor shall indemnify and save harmless the Owner and Engineer and all persons acting for or on behalf of the Owner and Engineer from all claims and liability of any nature or kind, and all damages, costs and expenses, including attorney's fees and penalties, arising from the improper handling, transportation or disposal of "Special Wastes" as determined by the MA DEP and/or any other federal, state or local agency having jurisdiction or authority over the same.

3.11 DUST CONTROL

A. During the progress of the Work, maintain the area of activities, by sweeping and sprinkling of streets to minimize the creation and dispersion of dust. If the Engineer decides that it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread the material, as directed.

3.12 BRIDGING TRENCHES

A. Provide suitable and safe bridges and other crossings where required for the accommodation of travel, and to provide access to private property during construction. Remove once bridges and crossings are no longer needed.

3.13 FIELD QUALITY CONTROL

A. Site Tests

CONFORMED

1. In accordance with SECTION 01410

3.14 CARE AND RESTORATION OF PROPERTY

A. Restoration of existing property or structures done as promptly as practicable and not left until the end of the construction period.

END OF SECTION

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SECTION 02215

AGGREGATE MATERIALS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for furnishing and placing materials, which include Crushed Stone, Gravel Borrow, Sand Borrow and Select Borrow.
2. Location of specified materials as detailed on the Drawings or as directed by the Engineer for excavation below normal depth, utility support, replacement of unsuitable material or elsewhere, as ordered.

B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading.
2. Section 02500 - Paving

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO).

1. T11, Amount of Material Finer than 0.075 mm Sieve in Aggregate
2. T27, Sieve Analysis of Fine and Coarse Aggregates.

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

1. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

1.03 DEFINITIONS

A. The term Screened Gravel as used in the Contract Documents shall mean Crushed Stone.

1.04 SUBMITTALS

A. Shop Drawings

1. Provide sieve analysis when gradation requirements are given in the Specification.

B. Samples

1. Furnish representative sample including location of source with Shop Drawing transmittal sheet.

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1.05 QUALITY ASSURANCE

A. Field Samples

1. The attention of the Contractor is directed to the fact that under Specification SECTION 00700, 1.03 Materials and Equipment, all materials furnished by the Contractor to be incorporated into the Work shall be subject to the inspection of the Engineer. The Engineer shall be the sole judge as to the acceptability of proposed materials and said judgement shall be final, conclusive, and binding.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection

1. In accordance with Specification SECTION 00700, 1.03 Materials and Equipment.

PART 2 PRODUCTS

2.01 MATERIALS

A. Crushed Stone

1. For bedding and pipe zone material for pipe larger than 3 inches diameter. Well graded in size from 3/8 inches to 3/4 inches or such other sizes as may be approved.
2. For bedding and pipe zone material for plastic pipe 3 inches diameter and less, maximum particle size shall be 3/8 inches.
3. Clean, hard, and durable particles or fragments, free from dirt, vegetation, or other objectionable matter, and free from an excess of soft, thin elongated, laminated or disintegrated pieces.
4. Screened Stone of similar size and grading to this specification may be used instead of Crushed Stone.

B. Gravel Borrow

1. Granular material well graded from fine to coarse with a maximum size of 3 inches, obtained from approved natural deposits and unprocessed except for the removal of unacceptable material and stones larger than the maximum size permitted.
2. Gravel shall not contain vegetation, masses of roots, or individual roots more than 18 inches long or more than 1/2 inches in diameter.
3. Gravel shall be substantially free from loam and other organic matter, clay and other fine or harmful substances.
4. Gradation requirements for gravel shall be determined by AASHTO-T11 and T27 and conform to the following:

Sieve	Percent Passing
1/2 inch	60-95
No. 4	50-85
No. 50	8-28
No. 200	0-8

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C. Select Borrow

1. Use inorganic natural soils and/or rock, having not more than 8 percent by weight passing the No. 200 sieve and having a maximum stone size no greater than 6-inches.
2. Use only material well-graded throughout entire size range, free of roots, leaves and other organic material, ice or frost and aggregations of frozen soil particles.
3. Moisture content to be within plus minus 3 percent optimum at the borrow source.
4. Material must meet compaction requirements indicated or as specified.

D.

E. Gravel Base Course

1. In accordance with SECTION 02500.

F. Sand borrow

Sand borrow shall consist of clean, inert, hard, durable grains of quartz or other hard durable rock, free from loam or clay and surface coatings. Sand borrow shall conform to the following gradation requirement.

Sieve Size	Percent Passing (By Weight)
1/2”	100
3/8”	85-100
No. 4	60-100
No. 16	35-80
No. 50	10-55
No. 100	2-10

F. Controlled Density Fill - Excavatable. Controlled Density Fill (CDF) for backfilling excavated trenches as directed by the Engineer shall be Type 2E, conforming to the relevant provisions of Subsection M4.-08.0 of the Massachusetts Standard Specifications for Highways and Bridges.

1. All transverse trenches and all parallel trenches of less than 20 feet in length, excavated beneath paved streets within the City, are to be backfilled with Controlled Density Fill (CDF). Such work shall be done in accordance with the requirements of the “Street Opening and Pipe Connections Policies for the City of Fall River”.

2. Utility pipes are to be placed in an envelope of ¾ inch crushed stone for sewer and drains and sand for water and force mains. The envelope is to extend from 6 inches beneath, and to 12 inches above the top of pipe and on each side of the pipe. Controlled Density Fill is then to be place to a depth of 4 inches below the finish pavement. The surface patch is to be in

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accordance with the “Street Opening and Pipe Connections Policies for the City of Fall River”.

3. CDF shall be backfilled from the top surface of the stone/sand (Item 4 or 1) to 4-inches below the existing pavement surface.

4. If any public or private utility has policies in variance with this ordinance, and such variance is the result of state regulations, then all work by such utility is to be in accordance with the “Standards to Be Employed by Public Utility Operators When Restoring any of the Streets, Lanes and Highways in Municipalities” as issued by the Massachusetts Department of Public Utilities.

5. The Contractor will be responsible for backfilling and compacting trenches as specified in Section 02200. Compaction testing will be as directed by the Engineer at no additional cost to the Owner.

2.02 SOURCE QUALITY CONTROL

A. Test, Inspection

1. Engineer may elect to sample material supplied at the source.
2. Assist the Engineer and/or personnel from the designated testing laboratory in obtaining samples.

PART 3 EXECUTION

3.01 INSTALLATION

A. Crushed Stone

1. Spread in layers of uniform thickness not greater than 6 inches.
2. Compact thoroughly by means of a suitable vibrator or mechanical tamper.

B. Gravel Borrow

1. Spread in layers of uniform thickness not exceeding 12 inches before compaction and moistened or allowed to dry as directed.
2. Compact thoroughly by means of suitable power-driven tampers or other power-driven equipment.
3. Compaction shall conform to 95% of minimum dry density per ASTM D1557.
4. The percolation rate for the compacted bank-run gravel shall not exceed 5 minutes per inch.

C. Select Borrow

1. Spread in layers of uniform thickness not exceeding 12 in. (loose lift) before compaction and moistened or allowed to dry.
2. Compact thoroughly by means of suitable power-driven tampers or other power-driven equipment unless otherwise directed by the Engineer.

D. CONTROLLED DENSITY FILL

CONFORMED

1. All transverse (lateral) trenches and all parallel (longitudinal) trenches of less than 20 feet in length, excavated beneath paved streets in the project area, are to be backfilled with Controlled Density Fill (CDF). Such work shall be done in accordance with the requirements of the "Street Opening and Pipe Connections Policies for the City of Fall River," except as indicated on the Construction Details and as specified in this Section.
2. Utility pipes are to be placed in an envelope of ¾-inch crushed stone for sewer and drains and an envelope of sand for water and force mains. The envelope is to extend from 6-inches beneath and to 12-inches above the top of pipe and alongside the pipe. Controlled Density Fill is then to be placed to a depth of 4-inches below the finish permanent pavement.
    - Trenches in rock will have an envelope of ¾-inch of crushed stone around the pipe as herein specified, regardless of further Controlled Density Fill placement.

3. Refer to the pipe trench details in the Contract Drawings for material placements and depths.

3.02 FIELD QUALITY CONTROL

A. Material and compaction testing

1. In accordance with SECTION 01410.

END OF SECTION

CONFORMED

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SECTION 02270

EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required and perform all installation, maintenance, removal and area cleanup related to erosion and sedimentation control work required to meet Federal, State, and local permit requirements and as shown on the Drawings and as specified herein. The work shall include, but not necessarily be limited to; installation of temporary access ways and staging areas, silt fences, catch basin sediment filters, stone filter berms, sediment removal and disposal, device maintenance, removal of temporary devices, temporary mulching and final cleanup.

1.02 RELATED WORK

A. Environmental Protection Procedures are included in Section 01170.

B. Site Preparation is included in Section 02100.

C. Permits and Regulatory requirements are included in Section 01060.

1.03 SUBMITTALS

A. Submit, in accordance with Section 01300, within 10 days after award of Contract, technical product literature for all commercial products to be used for erosion and sedimentation control.

B. If a NPDES General Permit is required, Contractor shall, prior to the start of construction:

1. Prepare and submit the EPA NPDES Notice of Intent to Discharge to the applicable EPA office in accordance with EPA regulations. Submit one copy of the permit to Engineer for informational purposes only.

2. Prepare and submit a Stormwater Pollution Prevention Plan (SWPPP) in accordance with the U.S. Environmental Protection Agency (EPA) National Pollution Discharge
Elimination System (NPDES) General Permit for this work. Submit one copy of the permit to Engineer for informational purposes only.

CONFORMED

1.04 REFERENCE STANDARDS

A. EPA document titled: "Stormwater Management for Construction Activities — Developing Pollution Prevention Plans and Best Management Practices" document number EPA 832-R-92005, dated 1992, or most recent edition. State, County Conservation Districts or local Conservation Commission standards can be substituted for the EPA standard if the State, County or Local Conservation Commission standards is equal to, or more detailed than, the EPA standard.

B. Massachusetts Department of Transportation (MassDOT)

1. The Commonwealth of Massachusetts, Massachusetts Highway Department, Standard Specifications for Highways and Bridges, dated 1988, as amended, hereinafter referred to as the MassDOT Standard Specifications.

1.05 QUALITY ASSURANCE

A. Be responsible for the timely installation and maintenance of all erosion and sedimentation control devices necessary to prevent the movement of sediment from the construction site to off-site areas or into the stream system via surface runoff or underground drainage systems. Measures in addition to those shown on the Drawings necessary to prevent the movement of sediment off site shall be installed, maintained, removed, and cleaned up at the expense of the Contractor. No additional charges to the Owner will be considered.

B. Where Contractor's efforts to control erosion and sediment have been demonstrated to be ineffective or potentially ineffective in the opinion of the Engineer, the Engineer may order that additional measures be implemented and constructed at no additional cost to the Owner.

C. Erosion and sedimentation control shall conform to the submittal requirements above and the permits appended to Section 01060.

PART 2 PRODUCTS

2.01 MATERIALS

A. Catch Basin sediment control devises shall be sediment capture devices specifically designed for this purpose such as "Silt Sack" by Geo-Synthetics, LLC or approved equal.

B. Compost Tubes /Socks shall be utilized to protect drainage structures.

C. Straw mulch shall be utilized on all newly graded areas to protect areas against washouts and erosion. Straw mulch shall be comprised of threshed straw of oats, wheat, barley, or rye that is free from noxious weeds, mold or other objectionable material. The straw mulch shall contain at least 50 percent by weight of material to be 10-in or longer. Straw shall be in an air-dry condition and suitable for placement with blower equipment.

CONFORMED

D. The use of calcium chloride or similar shall be deployed to limit airborn soil/dust emissions from the site.

PART 3 EXECUTION

3.01 INSTALLATION

A. The surface of te site shall be stable at all times.

B. Catch basin sediment control devices shall be installed according to manufacturer's recommendations and as directed by the Engineer.

C. Staging areas and stabilized construction enstrance shall be surfaced with a minimum depth of 6 inches of crushed stone (Supply additional if so required by the Engineer). Stabilized construction entrance(s) shall be installed as shown on the Plans.

3.02 MAINTENANCE AND INSPECTION

A. Inspections

1. Make a visual inspection of all erosion and sedimentation control devices once per week and promptly after every rainstorm. If such inspection reveals that additional measures are needed to prevent movement of sediment to offsite areas, promptly install additional devices as needed. Sediment controls in need of maintenance shall be repaired promptly.

B. Device Maintenance

1. Sediment Filters

a. Catch basin sediment control devices shall be cleaned of sediment in a manner as recommended by the manufacturer and as directed by the Engineer. Remove sediment from filter bag when saturated with sediment as directed by the Engineer.

3.03 REMOVAL AND FINAL CLEANUP

A. Once the site has been permanently stabilized against erosion, remove all sediment control devices and sediment. Dispose sediment and all waste materials in a proper manner.

END OF SECTION

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SECTION 02272

GEOTEXTILE MATERIALS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for installation of geotextile filter fabric in trenches and under riprap.

B. Related Sections

1. Section 02100 - Site Preparation
2. Section 02200 – Earth Excavation, Backfill, Fill and Grading
3. Section 02215 – Aggregate Materials

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. D3786, Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method
2. D4355, Test Method for Deterioration of Geotextiles From Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
3. D4491, Test Method for Water Permeability of Geotextiles by Permittivity
4. D4533, Test Method for Trapezoid Tearing Strength of Geotextiles
5. D4632, Test Method for Grab Breaking Load and Elongation of Geotextiles
6. D4751, Test Method for Determining Apparent Opening Size of a Geotextile
7. D4833, Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
8. D5261, Measuring Mass Per Unit Area of Geotextiles.
9. D6241, Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe

1.03 QUALITY ASSURANCE

A. General

1. Producer of fabric to maintain competent laboratory at point of manufacture to insure quality control in accordance with ASTM testing procedures.
2. Laboratory to maintain records of quality control results.

1.04 SUBMITTALS

A. Shop Drawings

1. Submit in accordance with SECTION 01300

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2. Include manufacturer's recommended method of joining of adjacent fabric panels.

B. Certificate of Conformance

1. Upon each shipment/delivery of product to the work site, furnish mill certificate(s) from the company manufacturing the fabric attesting that the fabric meets the chemical, physical, manufacturing and performance requirements specified. Fabric will be rejected if it is found to have defects, rips, flaws, deterioration or other damage.

1.05 DELIVERY, STORAGE AND HANDLING

A. Provide fabric in rolls wrapped with a heavy-duty protective covering to protect fabric from, mud, dirt, dust, debris and other deleterious sources until it is installed. Label each roll of fabric with number or symbol to identify production run.

B. Do not expose fabric to ultraviolet radiation (sunlight) for more than 20 days total in period of time following manufacture until fabric is installed and covered.

C. If Engineer determines material is damaged in any way or has excessive sunlight exposure, the Contractor shall immediately make all repairs and replacements as directed by the Engineer, at no additional cost to the Owner.

1.06 SCHEDULING

A. Schedule Work so that the covering of the fabric with a layer of the cover material is accomplished immediately after inspection and approval of the placed fabric by the Engineer. Failure to comply with this requirement shall require replacement of the fabric.

PART 2 PRODUCTS

2.01 GEOTEXTILE SEPARATION FABRIC

A. Separation Fabric: Geotextile fabric shall be nonwoven polypropylene designated as MIRAFI 140N as manufactured by US Fabrics, Cincinnati, Ohio; or acceptable equivalent and shall meet the following minimum requirements:

Minimum Property (Unit)	Unit	Test Method	Requirements
Weight	oz/sy	ASTM D5261	4.5
Grab Tensile Strength	lbs	ASTM D4632	120
Grab Tensile Elongation	%	ASTM D4632	50
CBR Puncture Strength	lbs	ASTM D6241	310
Trapezoid Tear Strength	lbs	ASTM D4533	50
Apparent Opening Size (AOS)	US Std. Sieve (mm)	ASTM D4751	70 (0.21)
Permittivity	sec^{-1}	ASTM D4491	1.7

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Permeability	cm/sec	ASTM D4491	0.22
Flow Rate	gal/min/sf	ASTM D4491	135
Ultraviolet Resistance (strength retained at 500 hrs)	%	ASTM D4355	70

2. To keep the number of overlay joints to a minimum, fabric shall be provided in sections not less than fifteen (15) feet in width unless otherwise approved by the Owner's Representative prior to delivery to the site.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

A. For Riprap

1. Prepared areas to receive geotextile in accordance with SECTION 02100 and SECTION 02200
2. Clear subgrade of all sharp objects, large stones, roots, debris, or any other foreign materials that may contribute to puncturing, shearing, rupturing or tearing of the geotextile.
3. Grade area as smooth as possible and compact in accordance with SECTION 02200, with a vibratory roller or other method approved by the Engineer.
4. Inspect subgrade and repair all unstable areas or soft spots with the installation of gravel and recompact prior to the placement of geotextile.

3.02 FABRIC INSTALLATION

A. For Riprap

1. Place at the locations shown on the Contract Drawings.
2. Unroll directly onto the prepared slope in a continuous manner. Join adjacent sections by overlapping the fabric a minimum of 12-inches. Join end sections by overlapping the fabric a minimum of 2-feet with field-sewn joints or as recommended by the manufacturer.
3. Place fabric on slopes creating a "shingled" effect in the direction of anticipated water flow.
4. Lay fabric smooth, maximizing surface contact with the prepared subbase, free of tension, stress, folds, wrinkles, or creases.
5. Securely anchor fabric sections at the top of the slope as recommended by the manufacturer. Use anchoring pins, nails, staples or other such means to secure fabric to the subbase surface to prevent fabric movement caused by wind uplift, and/or placement of cover material.
6. Maintain sufficient amount of cover material (minimum depth of 6-inches) to protect fabric during placement of riprap. Dozer buckets or blades, or other heavy or damaging equipment shall not be in direct contact with the fabric.
7. Minimize the height from which cover material is dumped and/or dropped directly onto the fabric material in order to avoid fabric damage or movement. Equipment used for spreading and compacting the cover material shall be of the type and size to avoid damage or movement to the underlying geotextile fabric.

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8. Spread cover material in the direction of fabric overlap and in a manner that avoids creating undue tension, stress, sagging, buckling and/or other movement of the underlying fabric.

3.03 PROTECTION

A. Protect the work before, during and after installation, and protect the installed work covered by other Sections.

3.04 REPAIR

A. Geotextile fabric damaged during installation shall be repaired by a piece of geotextile material cut, placed and adequately anchored over the damaged area, subject to a 3-foot minimum overlap requirement or as directed by the Engineer.

B. If detrimental movement of the geotextile fabric occurs during any step of the installation, as determined solely by the Owner's Representative, the Contractor shall remove the cover material and/or sections of fabric to the limits deemed necessary and reinstall the fabric.

C. Any fabric damage during its installation or during placement of cover materials shall be replaced by the Contractor at no additional cost to the Owner.

END OF SECTION

CONFORMED

SECTION 02500

PAVEMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for construction of all temporary and permanent pavement on paved areas affected or damaged by the Contractors operations, whether inside or outside the normal trench limits, as indicated on the Drawings and as herein specified.

B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading

1.02 REFERENCES

A. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification prior to preparation and installation of any pavements.

1. The Massachusetts Department of Transportation, Highway Division, Standard Specifications for Highways and Bridges, 2020 Edition, together with all errata addenda additional revisions, and supplemental specifications, all of which are hereinafter referred to as the MassDOT Standard Specifications.

1.03 PAVEMENT SCHEDULE

A. The Contractors attention is directed to the various pavements required under this contract, and their locations as detailed below.

B. All pavement thickness specified in this specification shall be of the thickness required after compaction.

1. <u>Location: Davol Street</u>
   Type: Flexible - 2"
   Requirements: 2” Superpave Surface Course – SSC 12.5
   Superpave levelling as required – SLC 12.5

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2. Location: Drive and Cul-De-Sac
   Type: Flexible – 4""
   Requirements: 2" Superpave Surface Course – SSC 12.5
   2" Superpave Intermediate Course – SIC 12.5

3. Location: *Permanent Trench Width Pavement*
   Type: Flexible - 5"
   Requirements: 2" Superpave Surface Course – SSC 12.5
   3" Superpave Intermediate Course – SIC 12.5

PART 2 PRODUCTS

2.01 MATERIALS

A. Asphalt Tack

1. Tack coat shall consist of emulsified asphalt, grade RS-1 or cutback asphalt, conforming to the requirements of the MassDOT Standard Specification Section M3.11.06.

B. Superpave Intermediate Course (SIC)

1. Superpave Intermediate Course shall conform to Subsection 460, Hot Mix Asphalt for Local Streets, of the MassDOT Standard Specifications.

C. Superpave Leveling Course (SLC)

1. Superpave Leveling Course shall conform to Subsection 460, Hot Mix Asphalt for Local Streets, of the MassDOT Standard Specifications.

D. Superpave Intermediate Course (SIC), Trench Width (Permanent Pavement)

1. Superpave Intermediate Course shall conform to Subsection 460, Hot Mix Asphalt for Local Streets, of the MassDOT Standard Specifications.

E. Superpave Surface Course (SSC), Trench Width (Permanent Pavement)

1. Superpave Surface Course shall conform to Subsection 460, Hot Mix Asphalt for Local Streets, of the MassDOT Standard Specifications.

F. Superpave Surface Course (SSC), Curb to Curb

1. Superpave Surface Course shall conform to Subsection 460, Hot Mix Asphalt for Local Streets, of the MassDOT Standard Specifications.

G. Superpave Intermediate Course (SIC) Trench Width (Temporary Pavement)

1. Temporary Pavement shall be Superpave Intermediate Course (SIC) conforming to the requirements of Subsection 460, Hot Mix Asphalt for Local Streets, and Subsection 472, Temporary Asphalt Patching, of the MassDOT Standard Specification.

CONFORMED

H. Gravel Sub-Base Course

1. The gravel sub-base course shall consist of Gravel Borrow Type b, (3-inches largest dimension) as specified in MassDOT Standard Specification Section M1.03.0
2. The gravel sub-base shall be spread and compacted in one layer, 8 inches in depth compacted measurement, to not less than 95 percent of the maximum dry density of the material, as determined by the Standard AASHTO Test Designation T99 compaction test Method C within 5% of optimum moisture content as determined by the Engineer. If the material retained on the #4 sieve is 50% or more of the total sample, this test shall not apply and the material shall be compacted to the satisfaction of the Engineer. The specific density of the Gravel Sub-base shall be maintained by determining the number of passes of a roller required to produce a constant and uniform density, after conducting a series of tests either using the sand/volume or the nuclear density-testing device.
3. Any stone with a dimension greater than 3 inches shall be removed from the sub-base before the gravel is compacted. Compaction shall continue until the surface is even and true to the proposed lines and grades within a tolerance of ½-inch above or below the required cross sectional elevations and to a maximum irregularity not exceeding ½ inch under a l0 foot line longitudinally. Any specific area a gravel sub-base which, after being rolled, does not form a satisfactory, solid, stable foundation shall be removed, replaced and recompacted by the Contractor without additional compensation.

2.02 SOURCE QUALITY CONTROL

A. The paving plant used by the Contractor for preparation of hot mix asphalt paving materials shall be acceptable to the Engineer who shall have the right to inspect the plant and the making of the material as specified in MassDOT Specification M2.01.7 except as noted above.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to placing pavement, all backfill shall have been properly compacted as specified under Section 02200 to eliminate settling of backfill. No pavement shall be placed over poorly compacted backfill. Backfill and gravel base course shall be compacted, brought to the proper elevation, and dressed so that new pavement construction shall be at the required grade. The Contractor shall maintain the surfaces of all excavated and disturbed areas until the pavement is placed. If there is a time lapse of more than 24 hours between completion of preparation of subgrade or placing of gravel base course and placing of paving, or if subgrade or gravel base course has been eroded or disturbed by traffic, the subgrade or gravel base course shall be restored before placing pavement.

CONFORMED

B. When installing permanent pavement on bituminous concrete roadway the edges of existing pavement shall be cut back 12-inches, or more as required, from the trench excavation wall or damaged area to sound undamaged material, straightened, cleaned, and painted with an accepted asphalt emulsion to ensure a satisfactory bond between it and the newly placed surface courses. Existing surface courses shall be stripped from the bituminous concrete base course for at least a 6-inch width and trimmed square and straight so that new permanent surfacing shall be placed on undisturbed bituminous concrete base course. Existing pavement shall be swept clean prior to placing any asphalt emulsion over it. Existing pavement that will be under new pavement shall be painted with asphalt emulsion to ensure a satisfactory bond.

C. Before permanent pavement is installed, the base shall be brought to the proper grade, and temporary pavement and excess gravel base shall be removed.

D. All manhole covers, catch basin grates, valve and meter boxes, curbs, walks, walls and fences shall be adequately protected and left in a clean condition. Where required, the grades of manhole covers, catch basin grates, valve boxes, and other similar items shall be adjusted to conform to the finished pavement grade.

E. The Contractor shall remove and acceptably dispose of all surplus and unsuitable material.

3.02 INSTALLATION

A. General

1. Unless indicated otherwise, all permanent hot mix asphalt pavement shall be installed in two courses or more. Hot mix asphalt intermediate courses shall be carefully spread and raked to a uniform surface and thoroughly rolled before application of the top course.
2. All top courses of permanent paving shall be applied with acceptable mechanical spreaders in widths of at least 9 feet.
3. The rolling for all asphalt and gravel base courses shall conform to the standards listed in the appropriate Subsection of the Standard Specification.
4. Pavement shall be placed so that the entire roadway or paved area shall have a true and uniform surface, and the pavement shall conform to the proper grade and cross section with a smooth transition to existing pavement.

B. Gravel Sub-Base Course

1. The sub-base course shall be placed to such depth that the furnished compacted base course is the depth as indicated on the Contract Drawings and specified herein.
2. The top of the sub-base course shall be below the furnish grade a distance required to accommodate the compacted pavement material as indicated on the Contract Drawings and specified herein.
3. The sub-base course as herein specified shall be 12-inches thick for flexible pavement.

CONFORMED

C. Temporary Pavement

1. Temporary pavement shall be placed over all trenches in paved areas where directed by the Engineer.
2. The Contractor, upon completing the backfilling and compaction of the trenches in the streets and the placing of the gravel base courses, shall be required to construct temporary pavement unless otherwise directed by the Engineer.
3. Temporary Pavement in City roads shall be placed in one course and shall consist of 2-inch compacted thickness of hot asphalt mix, on a 12-inch compacted thickness gravel base as directed by the Engineer.
4. The Contractor shall maintain temporary pavement in good repair and flush with the existing pavement at all times until the permanent pavement is placed.
5. The temporary pavement shall not be removed until 90 days after installation or until such time that the Engineer authorizes the placement of permanent pavement at an earlier time.

D. Asphalt Base (Superpave Intermediate Course – SIC 12.5):

1. Asphalt Base shall be used in city streets and site roadways as listed in Article 1.03 of this specification.
2. Asphalt Base shall be placed to the thickness as indicated in Article 1.03 of this Specification and installed in accordance with the requirements of the MassDOT Standard Specification and as detailed in the Contract Drawings.
3. Prior to placing asphalt base, all temporary pavement and sufficient gravel base course shall be removed, to proper depths as detailed in the Contract Drawings.

E. Asphalt Surface (Superpave Surface Course - SSC 12.5):

1. Asphalt Surface shall be used in city streets and site roadways as listed in Article 1.03 of this specification.
2. Asphalt Surface shall be placed to the thickness as indicated in Article 1.03 of this Specification and installed in accordance with the requirements of the MassDOT Standard Specification and as detailed in the Contract Drawings.

F. Sidewalks, Driveways, Parking Lots and Curbing

1. Sidewalks, driveways, parking lots and curbing that are removed or damaged by the Contractor's operations shall be restored to a condition at least equal to that in which they are found immediately prior to the start of operations. Materials and methods used for such restoration shall be in conformance with the requirements of the MassDOT Standard Specification.
2. Where the trench location is in a sidewalk, the entire width of the sidewalk shall be replaced with new material. Side forms shall be set so as to obtain and preserve a straight edge along both sides of the walk.
3. Where trench is in a driveway, the driveway shall be repaved across its entire width with even edges.
4. Parking lots shall be repaved in accordance with Article 3.01 of this section.
5. Gravel base course under sidewalks and driveways shall not be less than 8-inches thick.

CONFORMED

G. Surface Maintenance

During the guarantee period, the Contractor shall maintain the paved surface and shall promptly make good all defects such as cracks, depressions, and holes that may occur. At all times, the surfacing shall be kept in a safe and satisfactory condition for traffic. If defects occur in paved surfacing constructed by the Contractor, the Contractor shall remove all asphalt and sub-base course as is necessary and as determined by the Engineer to properly correct the identified defect. After removing asphalt and sub-base course, the Contractor shall correct the cause of the defect and replace the sub-base course and asphalt in accordance with these specifications at no additional cost to the Owner.

END OF SECTION

CONFORMED

SECTION 02510

WALKS AND CURBING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. The work to be done under this Section consists of furnishing all materials, labor, tools and equipment, and performing all operations necessary for the installation of all new and replacement walks, curbs and driveways as shown on the Drawings or as directed by the Engineer and as herein specified.

B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading

1.02 REFERENCES

A. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification prior to preparation and installation of any curbing or walks..

1. The Massachusetts Department of Transportation, Highway Division, Standard Specifications for Highways and Bridges, dated 2021, together with all errata addenda additional revisions, and supplemental specifications, all of which are hereinafter referred to as the MassDOT Standard Specifications.
2. AASTO-T-96: Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
3. AASHTO M153-06: Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
4. ASTM A185-07: Standard Specification for Steel Welded Wire Reinforcement, Plan, for Concrete.
5. TT-S-00230C-70: Sealing Compound, Elastomeric Type, Single Component (for Calking, Sealing, and Glazing in Buildings and other Structures).

PART 2 PRODUCTS

2.01 GRANITE CURB

A. New granite curb shall meet the requirements of Subsection 501 of the Massachusetts Standard Specifications.

B. Type VA1 -7”x18” -Straight and Curved as shown on the Plans.

CONFORMED

C. Type VA4 6”x18 Straight and Curved as shown of the Plans.

2.02 CEMENT CONCRETE SIDEWALKS

A. Cement concrete sidewalks shall be constructed with air entrained cement concrete with a minimum compressive strength of 4,000 psi at 28 days using 3/4-inch aggregate and a minimum of 610 pounds of cement per cubic yard of concrete.

B. Cement concrete shall be within the composition limits of Section M4.02.00 of the Standard Specifications.

C. Reinforcement shall be welded wire fabric per ASTM A185 (6 x 6, W10 x W10).

D. Preformed expansion joint filler shall conform to AASHTO-M153.

E. Joint sealer shall be cold applied, two-component elastomeric joint sealing compound meeting Federal Specification TT-S-00230, Type II, Class A.

2.03 HOT MIX ASPHALT SIDEWALKS

A. Hot mix asphalt sidewalks (Temporary) shall conform to the material requirements of Section 02500.

B. Thickness courses shall be a minimum of 2” or as on the Drawings.

2.04 GRAVEL BASE COURSE

A. The gravel base course shall consist of Gravel Borrow Type b, (3-inches largest dimension) as specified in MassDOT Standard Specification Section M1.03.0

B. The gravel base shall be spread and compacted in one layer for an 8 inch compacted depth, to not less than 95 percent of the maximum dry density of the material, as determined by the Standard AASHTO Test Designation T99 compaction test Method C within 5% of optimum moisture content as determined by the Engineer. If the material retained on the #4 sieve is 50% or more of the total sample, this test shall not apply and the material shall be compacted to the satisfaction of the Engineer. The specific density of the Gravel base shall be maintained by determining the number of passes of a roller required to produce a constant and uniform density, after conducting a series of tests either using the sand/volume or the nuclear density-testing device.

C. Any stone with a dimension greater than 3 inches shall be removed from the base before the gravel is compacted. Compaction shall continue until the surface is even and true to the proposed lines and grades within a tolerance of ½-inch above or below the required cross sectional elevations and to a maximum irregularity not exceeding ½ inch under a l0 foot line longitudinally. Any specific area where a gravel

CONFORMED

base which, after being rolled, does not form a satisfactory, solid, stable foundation shall be removed, replaced and recompacted by the Contractor without additional compensation.

2.05 DETECTABLE WARNING PANELS

A. The detectable warning panels shall be a prefabricated detectable warning surface tile as manufactured from Engineered Plastics Inc. 300 International Drive, Suite 100 Williamsville, NY 14221, telephone number (800) 682-2525 or the approved equal from ADA Fabricators, INC. P.O Box 179 North Billerica, MA 01862 telephone number (978) 262-9900. The tile shall conform to the dimensions shown on the plans and have a homogeneous brick red color.

2.06 SIGNAGE

A. Unless specified elsewhere, all street name and stop signs shall conform to the requirements of MassDOT Standard Section 828 and the 2009 Manual of Uniform Traffic Control Devices (MUTCD).

B. The support for the signs shall conform to the requirements of Section 840 and shall be of the breakaway type.

PART 3 EXECUTION

3.01 GENERAL

A. Sidewalks, Driveways, Parking Lots and Curbing

1. Sidewalks, driveways, parking lots and curbing that are removed or damaged by the Contractor's operations shall be restored to a condition at least equal to that in which they are found immediately prior to the start of operations. Materials and methods used for such restoration shall be in conformance with the requirements of the MassDOT Standard Specifications.
2. Where the trench location is in a sidewalk, the entire width of the sidewalk shall be replaced with new material. Side forms shall be set so as to obtain and preserve a straight edge along both sides of the walk.
3. Where trench is in a driveway, the driveway shall be repaved across its entire width with even edges.
4. Gravel base course under sidewalks and driveways shall not be less than 8-inches.

3.02 GRAVEL BASE COURSE

A. The Contractor shall establish horizontal and vertical control. The Contractor will be required to furnish all lines, grades and measurements from the control points necessary for the proper prosecution and control of the work contracted for under these specifications.

CONFORMED

3.03 CURBING

A. Granite Curbing. Granite curbing shall be removed where required and reinstalled in accordance with Subsections 501.60, 501.61, 501.62 AND 501.65 of the Massachusetts Standard Specifications.

3.04 SIDEWALKS

A. Cement Concrete Walks and Ramps. Cement concrete walks and ramps shall be constructed in accordance with Subsections 701.60 and 701.61 of the Massachusetts Standard Specifications. Concrete walks and ramps shall be 4 inches thick. Control joints shall be provided at all slope changes on ramps. When matching to existing sidewalks, control joints shall match existing joints.

   1. Preformed expansion joint filler and joint sealer shall be placed adjacent to or around all structures as directed by the Engineer.

B. Hot Mix Asphalt Sidewalks (Temporary) shall be constructed in accordance with Subsection 701.60 and 701.62 of the Massachusetts Standard Specifications.

C. Sidewalk finishes shall be as shown and specified.

3.05 DETECTABLE WARNING PANELS

A. The detectable warning panels for new construction shall be set directly in poured concrete according to the plans and the manufacturer's specifications or as directed by the Engineer. The contractor shall place two – 25-pound concrete blocks or sandbags on each tile to prevent the tile from floating after installation in wet concrete.

END OF SECTION

CONFORMED

SECTION 02540

SIGNAGE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes

1. Traffic (ADA parking) signs & sign supports (posts).
2. Removing and resetting street signs & sign supports.

1.02 RELATED SECTIONS

A. None

1.03 REFERENCES

A. Materials and construction methods shall conform, insofar as applicable, to:

1. The requirements of the Commonwealth of Massachusetts, Massachusetts Highway Department, Standard Specifications for Highway and Bridges, dated 1988, as amended (hereinafter referred to as the MassDOT Standard Specifications);
2. The latest edition of the Manual of Uniform Traffic Devices (hereinafter referred to as the MUTCD);
3. All applicable requirements of the Americans with Disabilities Act (hereinafter referred to as the ADA);
4. All errata, addenda, additional revisions, and supplemental specifications applicable to each.

PART 2 - PRODUCTS

2.01 SIGNS

A. Materials for traffic signs shall conform to the requirements of Section M8 of the MassDOT Standard Specifications.

B. For Sign Panels refer to: M8.19.1 Aluminum Sign Panels.

C. Regulatory Signs shall consist of:

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1. Regulatory Sign RS-1 Standard 12” W x 18”H ADA-compliant parking space signs. Sign face layout and content shall be in accordance with the MUTCD and the ADA.
2. Regulatory Sign RS-2 Standard 12” W x 18”H VAN-ACCESSIBLE PARKING SPACE. Sign face layout and content shall be in accordance with the MUTCD and the ADA.
3. Regulatory Sign RS-3 Standard 30” STOP. Sign face layout and content shall be per the MUTCD.
4. Regulatory Sign RS-4 Standard 12” W x18”H NO PARKING ANY TIME. Sign face layout and content shall be per the MUTCD.
5. Regulatory Sign RS-5 Standard 12” W x12”H No Parking Symbol (“P” within red circle w/diagonal)
6. Regulatory Sign RS-6 Standard 24” x 24” no Left Turn.

2.02. Pier Signs shall white w/ green lettering

1. Pier Sign PS-1-Park Hours -
2. Pier Sign PS-2-Permitted Uses
3. Pier Sign PS-3 Vehicle Restrictions-Clearance from wall
4. Pier Sign PS-4 Utility Information
5. Pier Park Sign PS-5 Instructional-Clean up after your pet
6. Final content shall be provided by Owner

2.03 SIGN SUPPORTS

A. Materials for sign supports shall conform to the requirements of Section M4 and M8 of the MassDOT Standard Specifications.

B. Signs shall be set on Type P-5 A. Square Tube Posts.

2.04 SIGN BASES

A. All signs installed within the limits of the EPA Mandated Cap areas shall be surface mounted. Signs Posts shall be paired with a compatible sign base and surface mounted as indicated on the Plans.

B. Sign posts shall be affixed to a cast iron pedestal base designed to be compatible with the sign post, with necessary tamper-proof and four (4) 4 inch anchor bolt hardware.

B. A Manufacturer that produces surface mount sign bases is:
TSP -Traffic Safety Products.
Model PBS 200 SQ-G
1.800.285.3056

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Traffic safety products.net

C. Or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of signs and sign supports shall conform to the requirements of Section 828 and 840 of the MassDOT Standard Specifications.

B. Bolt sign bases to concrete walk or base with 4” anchor bolts minimum, as shown on the Plans. Shim sign bases if necessary, to ensure sign post is set plumb. Post shall be within ¼” or vertical when measure at the top.

C. Removing and resetting of Street Signs and Traffic Signs, including the sign supports (post), shall include the dismantling, removal, transporting and resetting of signs and sign supports (post) at the location indicated on the plans.

D. Removing and resetting of traffic signs on new posts shall include the dismantling, removal, transporting and resetting of existing signs at the location indicated on the plans.

E. Signs and sign supports (posts) noted to be removed and not reset shall be carefully removed and transported to the City of Fall River DPW yard at 10 Lewiston Street or as directed by the Engineer.

F. The Contractor will be held responsible for any damage during removal and resetting of signs and sign supports (posts) and shall replace or repair the damaged item as directed by the Engineer at no additional cost to the City.

G. Locations of signs shall be in accordance with the MUTCD and the applicable requirements of the ADA.

3.02 TOLERANCES

A. Shall be in accordance with the MassDOT Standard Specifications.

END OF SECTION

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SECTION 02550

PAVEMENT MARKINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements to furnish and install,

1. Reflectorized white and yellow line markings (thermoplastic),
2. Reflectorized pavement markings (paint),

B. Requirements to remove existing pavement markings

1.02 RELATED SECTIONS

A. Section 02500 - Pavement

1.03 REFERENCES

A. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification prior to preparation and installation of any reflectorized pavement markings.

1. The Commonwealth of Massachusetts, Massachusetts Highway Department, Standard Specifications for Highways and Bridges, dated 1988, together with all errata addenda additional revisions, and supplemental specifications, all of which are hereinafter referred to as the MassDOT Standard Specifications.

1.04 SUBMITTALS

A. In accordance with Section 01300

PART 2 PRODUCTS

2.01 MATERIALS

A. For newly paved entry drive

1. Materials for reflectorized white lines (thermoplastic) shall conform to the requirements of Sub Section M7.01.03 of the MassDOT Standard Specifications.

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2. Materials for reflectorized yellow lines (thermoplastic) shall conform to the requirements of Sub Section M7.01.04 of the MassDOT Standard Specifications.
3. Material for crosswalks and stop bars to be 3M “Stamark” Brand Pliant Polymer Pavement Markings (Inlay)
   a. Series 5730: 12-inch White line
4. Material for precut symbols and legends to be 3M “Stamark” Brand Pliant Polymer Pavement Markings (Inlay)
   a. Series SMS-900

B. For existing pavement and bituminous patch work on existing streets with painted pavement markings,

1. Material and methods of installing painted reflectorized white lines shall conform to the requirements of Sub Section M7.01.05 of the MassDOT Standard Specifications.
2. Material for crosswalks and stop bars shall conform to the requirements of Sub Section M7.01.05 of the MassDOT Standard Specifications.

PART 3 EXECUTION

3.01 INSTALLATION OF TEMPORARY AND PERMANENT PAVEMENT MARKINGS

A. Installation of reflectorized markings shall be in accordance with Section 860 of the MassDOT Standard Specification.

B. Reflectorized markings shall be installed only after permanent pavement has been installed in accordance with Specification Section 02500 and approved by the Engineer.

C. All pavement marking shall be in accordance with Manual on Uniform Traffic Control Devices

D. The contractor shall notify the Engineer 48 hours in advance of installation of pavement marking.

E. The contractor shall furnish adequate protection to freshly completed markings to keep traffic off of them until thoroughly dry.

F. Pavement markings shall be installed on temporary pavement at the direction of the Owner.

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3.02 REMOVAL OF EXISTING PAVEMENT MARKINGS

A. Removal of existing pavement markings shall be in accordance with Section 850 of the MassDOT Standard Specification.

B. Pavement markings shall be removed to the fullest extent possible as shown on the plans by an approved method. Any damage to the pavement or surface caused by pavement marking removal shall be repaired by the Contractor at his expense.

END OF SECTION

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SECTION 02607

MANHOLES, COVERS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Modify existing manholes, covers, frames, pre-cast sections and apply waterproofing in conformance with the dimensions, elevations, and locations shown on the Drawings and as specified herein.

B. Related Work Specified Elsewhere (when applicable):
   1. Pipe, excavation, backfill, paving and dewatering are specified in the appropriate Sections in this Division.

1.2 QUALITY ASSURANCE

A. Precast Manhole Base, Barrel and Top Sections:
   1. Conform to ASTM C478-84 (AASHTO M199-82) except as modified herein, and on the Drawings.
   2. Average strength of 4,000 psi at 28 days.
   3. Testing:
      a. Determine concrete strength by tests on 6-inch by 12-inch vibrated test cylinders cured in the same manner as the bases, barrels and tops.
      b. Have tests conducted at the manufacturer's plant or at a testing laboratory approved by the Engineer.
      c. Have not less than 2 tests made for each 100 vertical feet of precast manhole sections.

B. Manhole Steps

   1. Acceptable Manufacturers:
      a. Aluminum Company of America.
      b. Reliance Steel Products, Inc.
      c. M. A. Industries, Inc.
      d. Or equivalent.

C. Frames and Covers:

   1. Acceptable Manufacturers:
      a. Etheridge Foundry Co.
      b. Neenah Foundry Co.
      c. E. L. LeBaron Foundry Company.
      d. Or equivalent.

D. Masonry:

   1. Brick: Shall comply with the ASTM Standard Specifications for Sewer Brick (made from clay or shale), Designation C32, for Grade SS, hard brick. (AASHTO M91-78).
   2. Cement: ASTM C-150 (AASHTO M85-79I).

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3. Hydrated Lime: ASTM C-207
4. Sand: ASTM C33 (AASHTO M6-65 (1974)).

E. Waterproofing:

1. Acceptable Manufacturers:
   a. Minwax Fibrous Brush Coat, Minwax Co., N.Y., N.Y.
   b. Tremco 121 Foundation Coating, Tremco Mfg. Co., Newark, N.J.
   c. Or approved equal.

1.3 SUBMITTALS TO THE OWNER'S REPRESENTITIVE:

A. Submit shop drawings and manufacturer's literature in conformance with Section 01300 and the Standard General Conditions of the Construction Contract.
B. Precast Manhole Sections: Submit test results and receive approval from the Owner's Representative prior to delivery to the site.

PART 2 - PRODUCTS

2.1 PRECAST MANHOLE SECTIONS

A. Dimensions, shall be as shown on the Drawings:
   1. Base & Riser Sections:
      a. Diameter: As shown on the Drawings.
      b. Length: As required.
      c. Wall Thickness: Not less than 5 inches.
      d. Joints: Bell-and-spigot or tongue-and-groove formed on machine rings to insure accurate joint surfaces.
   2. Tops:
      a. Diameter: Eccentric cone type, 24 inches I.D. at top, 48 inches I.D. at bottom unless otherwise shown on the Drawings.
      b. Length: 4 feet.
      c. Wall thickness: Not less than 5 inches at the base, tapering to not less than 8 inches at the top.
      d. Joints: Bell-and-spigot or tongue-and-groove formed on machine rings to insure accurate joint surfaces.
      e. Exterior face of cone sections shall not flare out beyond the vertical.
   3. Flat Slab Tops:
      a. Location: Where shallow installations do not permit the use of a cone-type top and where indicated on the Drawings.
      b. Slab thickness: Not less than 6 inches.
      c. Constructed to support an HS-20 wheel loading.

B. Openings:

1. Provide openings in the risers to receive pipes entering the manhole.
2. Make openings at the manufacturing plant.
3. Size: To provide a uniform annular space between the outside wall of pipe and riser.
4. Location: To permit setting of the entering pipes at the correct elevations.
5. Openings shall have a flexible watertight union between pipe and the manhole base.
   a. Cast into the manhole base and sized to the type of pipe being used.

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b. Type of flexible joint being used shall be approved by the Engineer. Install materials according to the Manufacturer's instructions.
   1. Lock Joint Flexible Manhole Sleeve made by Interpace Corporation.
   2. Kor N Seal made by National Pollution Control System, Inc.
   3. Press Wedge II made by Press-Seal Gasket Corporation.
   4. A-Lok Manhole Pipe Seal made by A-Loc Corporation.
   5. Or equivalent.

C. Joints:

1. Joint gaskets to be flexible self seating butyl rubber joint sealant installed according to manufacturer's recommendations. For cold weather applications, use adhesive with joint sealant as recommended by manufacturer.
   Acceptable Materials:
   a. Kent-Seal No. 2
   b. Ram-Nek
   c. Or equivalent.
2. Joints between precast sections shall conform to related standards and manufacturer's instructions.
3. All manholes greater than 6 ft. diameter and all manholes used as wet wells, valve pits and other dry-pit type structures shall be installed with exterior joint collars. The joint collar shall be installed according to the manufacturer's instructions. Acceptable materials:
   a. MacWrap exterior joint sealer as manufactured by Mar-MacManufacturing Company.
   b. Or equivalent.

D. Waterproofing:

1. The exterior surface of all manholes shall be given two coats of bituminous waterproofing material at a application rate of 75 to 100 square feet per gallon, per coat.
2. The coating shall be applied after the manholes have cured adequately and can be applied by brush or spray in accordance with the manufacturer's written instruction.
3. Sufficient time shall be allowed between coats to permit sufficient drying so that the application of the second coat has no effect on the first coat.

E. Frost Protective Wrapping:
1. The frost protective wrap shall be constructed of an ultraviolet resistant polyethylene material and shall be a minimum thickness of 6 mils.

2.2 FRAMES AND COVERS

A. Standard Units:

1. Made of cast iron conforming to ASTM A48-76, Class 30 minimum.
2. Have machined bearing surfaces to prevent rocking.
3. Castings shall be smooth with no sharp edges.
4. Constructed to support an HS-20 wheel loading.
5. Dimensions and Style shall conform to the Drawings, Standard castings differing in non-essential details are subject to approval by the Engineer:
   a. Covers - solid with sewer in 3-inch letters diamond pattern.
   b. Frame - 24-inch diameter clear opening, with flange bracing ribs.

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6. Minimum weight of frame and cover shall be 430 lbs.

B. Water Tight Units:

1. Same features as above for Standard Units, with 22-inch diameter minimum clear opening.
2. Sealing features:
   a. Inner lid held by a bronze tightening bolt in a locking bar.
   b. Neoprene gasket
   c. Water tight pick hole.
3. Minimum weight of frame and cover shall be 510 lbs.

2.3 MANHOLE STEPS

A. Aluminum or polyethylene coated steel safety type designed with a minimum concentrated live load of 300 pounds.
B. Thoroughly clean all surfaces to be embedded with a suitable cleaning agent to ensure that the surfaces are free from all foreign matter such as dirt, oil and grease.
C. Aluminum surfaces to be embedded shall be given a protective coating of an approved heavy-bodied bituminous material. The steps shall become thoroughly dry before being placed into the concrete.
D. All steps shall be cast into walls of the precast section so as to form a continuous ladder with a distance of 12-inches between steps.

2.4 MASONRY

A. Brick:

1. Sound, hard, uniformly burned, regular and uniform in shape and size, compact texture, and satisfactory to the Engineer.
2. Immediately remove rejected brick from the work.

B. Mortar:

1. Composition (by volume):
   a. 1 part portland cement.
   b. 1/2 part hydrated lime.
   c. 4-1/2 parts sand.
2. The proportion of cement to lime may vary from 1:1/4 for hard brick to 1:3/4 for softer brick, but in no case shall the volume of sand exceed 3 times the sum of the volume of cement and lime.

C. Cement shall be Type II portland cement.

D. Hydrated lime shall be Type S.

E. Sand:
1. Shall consist of inert natural sand.
2. Grading:

Sieve	Percent Passing
#3/8	100
4	95-100

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8	80-100
16	50-85
50	10-30
100	2-10
Fineness Modulus	2.3 - 3.1

2.5 MANHOLE AND CATCH BASIN GRADE ADJUSTMENT RING

A. Manhole and catch basin grade adjustment rings shall consist of a variety of heights(thicknesses), diameters and shapes all conforming to the following requirements:

1. Grade adjustment rings shall be manufactured from ARPRO® Expanded Polypropylene (EPP), black. 5000 series meeting ASTM D3575 and ASTM D4819-13; B6D7G4L3M24S2T17W7.
2. Rings shall be manufactured using a high compression molding process to produce a finished density of 120 g/l ((7.5 pcf).
3. “Grade” adjustment rings may contain either an upper and lower keyway (tongue and groove) for vertical alignment and/or an adhesive trench on the underside with a flat top.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Precast Manhole Sections:

1. Perform jointing in accordance with manufacturer's recommendations and as approved by the Engineer.
2. Install riser sections and tops level and plumb.
3. Make all joints watertight.
4. When necessary, cut openings carefully to prevent damage to barrel sections and tops. Solidly fill annular spaces around pipes entering the manholes with non-shrink grout or sealant approved by the Engineer. Replace damaged manhole sections and tops at no additional cost to the Owner.
5. When manhole steps are included in the Work, install barrel sections and tops so that steps are in alignment.

B. Adjust to Grade:

1. Adjust tops of manholes to grade with Expanded polypropylene.
2. Concrete rings are not acceptable for adjusting to grade.

C. Pipe Connections to Manholes: Connect pipes to manholes with joint design and materials approved by the Owner’s Representative.

D. Invert Channels:

1. Smooth and semicircular in shape conforming to the inside of the adjacent sewer section.
2. Make changes in direction of flow with smooth curves having a radius as large as permitted by the size of the manhole.

3. Stop the pipes at the inside face of the manhole where changes of direction occur.
4. Form invert channels with brick.
5. Shape invert to make smooth transition in vertical grade.

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6. Slope the floor of the manhole to the flow channel, as shown on the Drawings.

E. Masonry:

1. Laying Brick:
   a. Use only clean bricks in brickwork for manholes.
   b. Moisten the brick by suitable means until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
   c. Lay each brick in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and thoroughly bond as directed.
   d. Construct all joints in a neat workmanlike manner. Construct the brick surfaces inside the manholes so they are smooth with no mortar extending beyond the bricks and no voids in the joints. Maximum mortar joints shall be 1/2 inch.
   e. Outside faces of brick masonry shall be plastered with mortar from ¼-inch to 3/8-inch thick.
   f. Completed brickwork shall be watertight.

2. Curing:
   a. Protect brick masonry from drying too rapidly by using burlaps which are kept moist, or by other approved means.
   b. Protect brick masonry from the weather and frost as required.

F. Frames and Covers:

1. Set all frames in a full bed of mortar, true to grade and concentric with the manhole opening.
2. Completely fill all voids beneath the bottom flange to make a watertight fit.
3. Place a ring of mortar at least one inch thick around the outside of the bottom flange, extending to the outer edge of the manhole all around its circumference.
4. Clean the frame seats before setting the covers in place.

G. Plugging and Patching:

1. Fill all exterior cavities with non-shrink grout and with bituminous waterproofing once the concrete and mortar has set.
2. Touch up damaged water proofing.

H. Cleaning:

1. Thoroughly clean manholes, steps, frames and covers of all debris and foreign matter.

I. Bedding and Backfilling:

1. Bedding of manholes shall be 6 inches of 3/4" screened stone.
2. Backfill a minimum of 18 inches all around manhole with gravel borrow.

3.2 MANHOLE TESTING

A. General:

1. Perform either a vacuum test or a combination of the exfiltration and infiltration tests on all manholes.
2. All testing must be performed in the presence of the Owner’s Representative.

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3. Suitably plug all pipes entering each manhole and brace plugs to prevent blow out.

B. Exfiltration Tests After Backfilling:

1. Fill each manhole with water to the top of the manhole frame.
2. A period of up to 2 hours may be permitted, if the Contractor so wishes, to allow for absorption.
3. At the end of the absorption period, refill each manhole with water to the top of the manhole frame and begin the 4-hour test period.
4. At the end of the 4-hour test period, refill each manhole to the top of the manhole frame and measure the volume of water added. The leakage for each manhole shall not exceed 1/16 gallon per foot of diameter per vertical foot (above ground water) per 4-hour period.

C. Infiltration Tests:

1. When the groundwater is above the bottom of the manhole, infiltration testing may be performed on that portion of the manhole below water level.
2. After a 15-minute period, if no water is visibly moving down the interior surfaces of a manhole, the portion of the manhole below groundwater may be considered to be satisfactorily watertight.
3. The remaining portion above the groundwater level must be tested for exfiltration as specified above.

D. Vacuum Test:

1. The manhole shall be tested by a vacuum test after assembly of the manhole, connection piping and backfilling.
2. Plug all lifting holes completely with non-shrink grout.
3. Properly tighten all boot clamps and brace all plugs to prevent them from being sucked into the manhole.
4. Install the testing equipment according to the manufacturer's instructions.

5. A vacuum of 10 inches of Hg shall be drawn on the manhole and the loss of 1 inch of Hg vacuum timed. The manhole shall be considered to have passed the test if the time for the loss of 1 inch of Hg vacuum is two (2) minutes or longer.
6. If the manhole fails the initial test, the Contractor shall locate the leak(s) and make repairs. The manhole shall be retested until a satisfactory test result is obtained.
7. If a satisfactory vacuum test cannot be obtained, the manhole shall be water exfiltration tested and repaired as necessary.
8. These testing requirements may be reduced or eliminated only with permission from the Owner’s Representative.

E. Manhole Repairs:

1. Correct leakage by reconstruction, replacement of gaskets and/or other methods as approved by the Engineer.
2. The use of lead-wool or expanding mortar will not be permitted.

F. After the manholes have been backfilled and prior to final acceptance, any signs of leaks or weeping visible inside the manholes shall be repaired and the manhole made watertight.

END OF SECTION

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SECTION 02614

REINFORCED-CONCRETE DRAIN PIPE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for furnishing and installing the reinforced-concrete pipe as indicated on the drawings.

B. Related Sections

1. Section 02200 - Earthwork.
2. Section 02215 - Aggregate Materials.

1.02 QUALITY ASSURANCE

A. Reinforced-concrete pipe shall be made by a manufacturer of established good reputation in the industry and in a plant adapted to meet the design requirements of the pipe.

1.03 REFERENCES

A. American Association of State Highway and Transportation Officials.

1. M 170, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.

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

1. C76, Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.
2. C361, Specification for Reinforced Concrete Low-Head Pressure Pipe.
3. C443, Specification for Joints for Circular Concrete Culvert and Sewer Pipe, Using Rubber Gaskets.
4. C497, Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.

1.04 SUBMITTALS

A. In accordance with SECTION 01300 submit for review drawings showing the pipe dimensions reinforcement, joint, and other details for each type and class of pipe to be furnished for the project. All pipe furnished under the contract shall be manufactured only in accordance with the specifications and the reviewed drawings.

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PART 2 PRODUCTS

2.01 PIPE

A. Each unit of pipe shall have an interior surface, which is free from roughness, projections, indentations, offsets, or irregularities of any kind. The pipe units shall be of the classes indicated on the drawings and shall conform to ASTM C76 and AASHTO M170 with the following exceptions and additions:

1. Type II cement shall be used unless otherwise permitted by the Engineer. Admixtures shall not be used except with the prior permission of the Engineer.
2. Aggregates shall conform to the requirements set forth hereinafter.
3. Elliptical reinforcement will not be permitted. Longitudinal reinforcement shall be continuous. Reinforcement shall have a minimum cover of 3/4 in.
4. Absorption shall be as specified under "inspection, Tests and Acceptance."
5. Pipe units have a minimum laying length of 8 ft., except as otherwise indicated or permitted by the Engineer.
6. Pipe units shall be cured in accordance with ASTM C76.
7. No pipe shall be shipped until the pipe has meet strength requirements in accordance with ASTM C76.
8. There shall be no lift holes in the pipe.
9. Mortar used for repairs shall have a minimum compressive strength of 4,000 psi. at the end of 7 days and 5,000 psi. at the end of 28 days, when tested in 3-in. by 6 in. cylinders stored in the standard manner. Only those repairs permitted by the above-mentioned ASTM C76 will be allowed.
10. The date of manufacture, class of pipe unit, size of pipe unit, and trademark of the manufacturer shall be clearly and permanently marked on the inside and the outside at one end of each pipe unit.
11. Certified copies of tests on materials and the pipe units will be required.

B. Specials, if required, shall conform to the specifications for straight pipe insofar as applicable. Special design or construction necessary for specials shall be subject to acceptance by the Engineer.

2.02 JOINTS

A. Pipe joints shall be of the rubber gasket type in which the gaskets are in compression and which will permit both longitudinal and angular movement. Each unit of pipe shall be provided with proper ends made of concrete formed true to size and formed on machined rings to ensure accurate joint surface. Joints and gaskets shall be O-ring or ribbed gasket type and shall conform to the requirements of ASTM C443, and ASTM C361 and to the additional requirements specified.

2.03 INSPECTION, TESTS AND ACCEPTANCE

A. Acceptance will be on the basis of tests of materials, absorption tests, plant load-bearing tests, pressure tests, and inspection of the complete product. The required tests are enumerated hereinafter. The quality of all materials used in the pipe, the process of manufacture, and the finished pipe shall be subject to inspection by the Engineer. Inspection may be made at the place of manufacture, or on the work site after delivery, or both, and the pipe shall be subject to rejection at any time due to failure to meet any of the specification requirements, even though sample pipe units

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may have been accepted as satisfactory at the place of manufacture. All pipe which is rejected shall be immediately removed from the project site by the Contractor.

B. Tests and certified copies in triplicate of test results will be required for the materials and the finished pipe units as described herein. If less than 100 units of a given size and class of pipe are required, the Contractor may submit certified copies of tests made on identical pipe units made by the same manufacturer within the past year. If more than 100 units of a given size and class of pipe are required, the Contractor shall, at his own expense, engage the services of an acceptable independent testing laboratory to perform or witness all tests, other than mill tests on reinforcing steel and cement, and certify the results. In addition, the Owner reserves the right to have any or all pipe units inspected or tested, or both, by an independent testing laboratory at either the manufacturer's plant or elsewhere. Such additional inspection and/or tests shall be at the Owner's expense and shall be the test results of record.

C. All pipe units to be tested shall be selected at random by the Engineer. Unless otherwise permitted, all load-bearing tests on pipe units shall be made in the presence of the Engineer.

D. All tests shall be made in accordance with the latest applicable ASTM specifications.

1. Reinforcing Steel--Mill test reports, or reports on samples taken from each shipment to the pipe manufacturer, shall be submitted for reinforcing steel to be used on this project stating that the reinforcing meets the specified requirements.
2. Cement--Mill test reports shall be submitted for each shipment to the pipe manufacturer of cement to be used on this project stating that the cement meets the specified requirements. All cement accepted for this project shall be kept segregated from other cement.
3. Aggregates--Tests reports shall be submitted stating that the aggregates to be used on this project meet the requirements for concrete aggregates as specified "Fine Aggregate" and "Coarse Aggregate" under SECTION 03300. The first report shall be submitted prior to the manufacturer of any pipe for this project. Additional tests and reports shall be made monthly thereafter during the production of the pipe.
4. Absorption Tests--Three cores shall be taken from each pipe unit that is to be load tested. The cores shall be taken before the load-bearing tests are performed. All cores shall be tested for absorption by the boiling absorption test. Average absorption shall not exceed 8 percent of the dry weight and no single test shall exceed 9 percent.
5. Pipe Unit Load-Bearing Tests (ASTM C497)--A load-bearing test shall be made on one pipe unit of each size and class and the report of the test submitted before delivery to the project of that size and class of pipe unit. An additional test will be required for each 200 units of each size and class of pipe. The load-bearing test shall be performed after the cores for the absorption tests have been taken. Each load-bearing test shall be carried to the specified load to produce the 0.01 in. crack. If the 0.01 in. crack is not formed, the pipe unit may be used in the project. Cored holes shall be plugged with the mortar specified above for repairs.
6. Pressure Test (ASTM C497)--A pressure test shall be made on two pipe units of each size and class to be used. Each pipe unit shall be bulkheaded independently and then joined together in a normal manner with the joint to be

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used in the work. The pipe units shall be held in place in such manner that no external compression force is exerted on the joint during the test. The test pressure shall be an average internal hydrostatic pressure of 12 psi and shall be maintained for at least 10 minutes without visible leakage from the joint. A description of the bulk-heading and pipe holding arrangement shall be submitted to the Engineer for review prior to performing the test. All pressure tests shall be made in the presence of the Engineer.

7. Concrete Cylinders--Compression tests shall be made on standard concrete cylinders for the first or test pipe unit and then for every 100 cubic yards of concrete used in pipe manufacture, or for each additional 200 units of pipe, whichever represents the lesser amount of concrete. Four cylinder shall be made for each test and they shall be broken at 7, 14, and 28 days with one cylinder as a spare to be used in the event of an unsatisfactory break. The reports shall be submitted within three days after each of the compression tests.

PART 3 EXECUTION

3.01 HANDLING PIPE

A. Each pipe unit shall be handled into its position in the trench only in such manner and by such means as is acceptable to the Engineer.

B. The Contractor will be required to furnish suitable devices to permit satisfactory support of all parts of the pipe unit when it is lifted.

3.02 INSTALLATION

A. Each pipe unit shall be inspected before being installed. Any pipe discovered to be defective either before or after installation shall be removed and replaced with a sound pipe.

B. Except as otherwise indicated on the drawings, the pipe shall be supported by compacted crushed stone. No pipe or fitting shall be permanently supported on saddles, blocking, or stones. Crushed stone shall be as specified under SECTION 02215.

C. Suitable bell holes shall be provided, so that after placement only the barrel of the pipe receives bearing pressure from the supporting material.

D. All pipe units shall be cleared of all debris, dirt, etc., before being installed and shall be kept clean until accepted in the completed work.

E. Pipe and fittings shall be installed to the lines and grades indicated on the drawings or as required by the Engineer. Care shall be taken to ensure true alignments.

F. Before any joint is made. the unit shall be checked to assure that a close joint with the next adjoining unit has been maintained and that the inverts are matched and conform to the required grade. The pipe shall not be driven down to the required grade by striking it with a shovel handle, timber, or other unyielding object.

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G. All joint surfaces shall be cleaned. Immediately before jointing the pipe, the bell or groove shall be lubricated in accordance with the manufacturer's recommendation. Each pipe unit shall then be carefully pushed into place without damage to pipe or gasket. Suitable devices shall be used to force the pipe unit together so that they will fit with a minimum open recess inside and outside and have tightly seated joints. Care shall be taken not to use such force as to wedge apart and split the bell or groove ends. Joints shall not be pulled or cramped without the permission of the Engineer.

H. Immediately after the pipe joint is completed, the position of the gasket in the joint shall be inspected using a suitable feeler gage furnished by the Contractor, to be sure it is properly put together and is tight. Joints in which the gasket is damaged or not properly positioned shall be pulled apart and remade using a new gasket.

I. Where any two pipe units do not fit each other closely enough to enable them to be properly jointed, they shall be removed and replaced with suitable units and new gaskets.

J. Details of gasket installation and joint assembly shall follow the directions of the manufacturer of the joint materials and of the pipe, all subject to acceptance by the Engineer. The resulting joints shall be watertight and flexible.

K. After each pipe to be supported on screened gravel has been properly bedded, enough gravel shall be placed between the pipe and the sides of the trench, and thoroughly compacted, to hold the pipe in correct alignment. Bell holes provided for jointing shall be filled with screened gravel and compacted, and then screened gravel shall be placed and compacted to complete the pipe bedding, as indicated on the drawings.

L. The Contractor shall take all necessary precautions to prevent floatation of the pipe in the trench.

M. At all times when pipe installation is not in progress, the open ends of the pipe shall be closed with temporary watertight plugs or by other suitable means. If water is in the trench when work is to be resumed, the plug shall not be removed until all conditions are suitable to prevent water, earth, or other material from entering the pipe.

N. Pipelines shall not be used as conductors for trench drainage during construction.

3.03 CLEANING

A. Care shall be taken to prevent earth, water, and other materials from entering the pipeline. As soon as possible after the pipe and manholes are completed, the Contractor shall clean out pipelines and manholes, being careful to prevent soil, water, and debris from entering any existing pipe.

END OF SECTION

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SECTION 02618

DUCTILE-IRON PIPE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements to furnish, lay, joint, fittings (including special castings), and appurtenant materials and equipment indicated on the Drawings and specified in this Section.

1.02 REFERENCES

A. American Water Works Association (AWWA)/American National Standards Institute (ANSI)

1. C104/A21.4, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
2. C105/A21.5, Polyethylene Encasement for Ductile Iron Pipe Systems
3. C110/A21.10, Ductile-Iron and Gray-Iron Fittings, 3-inch. through 48-inch., for Water and Other Liquids.
4. C111/A21.11, Rubber-Gasket Joints for Ductile-Iron and Pressure Pipe and Fittings.
5. C150/A21.50, Thickness Design of Ductile-Iron Pipe.
6. C151/A21.51, Ductile-Iron Pipe, Centrifugally Cast for Water.
7. C153/A21.53, Ductile-Iron Compact Fittings, 3 inches through 64 inches for Water Service
8. C219, Bolted, Sleeve-Type Couplings for Plain-End Pipe
9. C600, Installation of Ductile-Iron Water Mains and Their Appurtenances
10. C65l, Disinfecting Water Mains

B. American Society of Testing and Materials (ASTM)

1. A536, Standard Specification for Ductile Iron Castings

1.03 SUBMITTALS

A. In accordance with SECTION 01300 submit the following:

B. Shop Drawings

1. Piping layouts in full detail.
2. Location and type of backup block or device to prevent separation.
3. Schedules of all pipe, fittings, special castings, couplings, expansion joints, restrained joints and other appurtenances.
4. Detailed disinfection plan consistent with AWWA C651.

C. Certificates

1. Sworn certificates of shop tests showing compliance with appropriate standard.

D. Manufacturer’s Literature

CONFORMED

1. Catalog cuts of joints, couplings, harnesses, expansion joints, restrained joints gaskets, fasteners and other accessories.
2. Brochures and technical data of coatings and lining's and proposed method of application.

1.04 QUALITY ASSURANCE

A. Pipe and fittings to be inspected and tested at the foundry as required according to ANSI Standards.

B. Owner reserves right to inspect and/or test by independent service at manufacturer's plant or elsewhere at his own expense.

C. Owner reserves right to perform visual and hammer test prior to installation.

PART 2 PRODUCTS

2.01 PIPE

A. Ductile-Iron Pipe

1. Designed in accordance with AWWA/ANSI C150/ A21.50.
   a. Ductile iron pipe used for water mains shall be cement lined Pressure Class 350 push-on or mechanical joint, size as indicated on the Drawings.
   b. For sewer pipeline use class as indicated on the Drawings.
2. Manufactured in accordance with AWWA/ANSI C151/A21.51.
   a. Unless otherwise indicated or specified, ductile-iron pipe shall be at least thickness Class 52

B. Pipe For Use With Couplings

1. As specified above except that the ends shall be plain (without bells or beads) cast or machined at right angles to the axis.

2.02 FITTINGS

A. General

1. Push-on or mechanical-joint fittings shall be all-bell fittings unless otherwise indicated or specified.
2. In accordance with AWWA/ANSI C110/A21.10.
   a. Fittings 24-inches in diameter and less shall be pressure Class 350.
   b. Fittings 30-inches to 48-inches in diameter shall be at least pressure Class 250.

B. Nuts and Bolts

1. Ductile Iron or Kor-10 steel T bolts and nuts or approved equal.

C. Nonstandard Fittings

1. Fittings having nonstandard dimensions and cast especially for this project shall be of acceptable design.
2. Manufactured to meet the requirements of these specifications and shall have the same diameter and thickness as standard fittings, but their laying lengths

CONFORMED

and types of ends shall be determined by their positions in the pipelines and by the particular piping to which they connect.

2.03 ADAPTERS

A. Where it is necessary to joint pipes of different type, furnish and install the necessary adapters unless solid sleeves are indicated on the drawings or permitted. Adapters shall have ends, conforming to the above specifications for the appropriate type of joint, to receive the adjoining pipe. Adapters joining two classes of pipe may be of the lighter class provided that the annular space in bell-and-spigot type joints will be sufficient for proper jointing.

2.04 JOINTS

A. Push-On and Mechanical

1. In accordance with AWWA/ANSI C111/A21.11.
2. The plain end of push-on pipe shall be factory machined to a true circle and chamfered to facilitate fitting the gasket.
3. Push-on and mechanical-joint pipe and fittings shall be provided with sufficient quantities of accessories conforming to AWWA/ANSI C111/A21.11.

B. Restrained

1. Location of restrained joints shall be based on Thrust Restraint Design for Ductile Iron Pipe (Second Edition), published by Ductile Iron Pipe Research Association.
2. Restraining glands will be required on all fittings.
3. Pipe, fittings and appurtenances for restrained joints shall be in accordance with AWWA/ANSI C110/A21.10. Only restraining glands which impart multiple wedging action against the pipe increasing its pressure as the pipe pressure increases will be allowed. Flexibility of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron conforming to ASTM A536. Twist off nuts shall be used to insure proper actuating of the restraining device.
4. Mechanical joint restraint shall have a working pressure rating of at least 250 psi.
5. Manufactured by EBAA Iron, Inc., Eastland, Texas, or equal.

C. Gaskets

1. Gaskets shall be of a composition suitable for exposure to the product which the pipe is intended.

2.05 COUPLINGS

A. Flexible Connections

1. Where flexible connections in the piping are specified or indicated on the drawings, they shall be obtained by the use of sleeve-type couplings, split couplings, or mechanical-joint pipe and/or fittings as herein specified.

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B. Sleeve Type Couplings

1. Pressure rating at least equal to that of the pipeline in which they are to be installed.
2. For sizes 2 1/2 to 16-inch diameter, up to 250 psi working pressure:
   a. Provide style 442 Long Sleeve, Cast Coupling by Smith Blair, Inc., Texarkana, Texas, or be acceptable equivalent products.
3. For sizes greater than 16-inch diameter, up to 150 psi working pressure:
   a. Provide style 411, with 10-inch long sleeve minimum, Steel Coupling by Smith Blair, Inc., Texarkana, Texas, or be acceptable equivalent products.
4. Nuts and Bolts to be galvanized-steel, unless noted otherwise.
5. Provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
6. Provide with fusion bonded epoxy finish.
7. Conform to requirements of AWWA C219.

C. Solid Sleeve Couplings

1. Solid sleeve couplings and accessories shall be of a pressure rating at least equal to that of the pipeline in which they are to be installed.
2. Couplings shall be ductile iron with gaskets of a composition suitable for exposure to the liquid within the pipe.

2.06 ACCESSORIES

A. Tapped Connections

1. Tapped connections in pipe and fittings shall be made in such manner as to provide a watertight joint and adequate strength against pullout. The maximum size of taps in pipe or fittings without bosses shall not exceed the listed size in the appropriate table of the Appendix to the above-mentioned ANS A21.51 based on 3 full threads for cast iron and 2 full threads for ductile iron.
2. Where the size of the connections exceeds that given above for the pipe in question, a boss shall be provided on the pipe barrel, the tap shall be made in the flat part of the intersection of the run and branch of a tee or cross, or the connection shall be made by means of a tapped tee, branch fitting and tapped plug or reducing flange, or tapping tee and tapping valve, all as indicated or permitted by the Engineer.
3. All drilling and tapping of cast-iron pipe shall be done normal to the longitudinal axis of the pipe; fitting shall be drilled and tapped similarly, as appropriate. Drilling and tapping shall be done only by skilled mechanics. Tools shall be adapted to the work and in good condition so as to produce good, clean-cut threads of the correct size, pitch, and taper.

2.07 POLYETHYLENE ENCASEMENT

A. In accordance with AWWA C105.

2.08 FINISHES

A. Lining

CONFORMED

1. Inside of pipe and fittings shall be coated with double thickness cement lining and bituminous seal coat conforming to AWWA/ANSI C104/A21.4.

B. Coating

1. Outside of pipe and fittings shall be coated with the standard bituminous coating conforming to AWWA/ANSI C151/A21.51

PART 3 EXECUTION

3.01 HANDLING

A. Pipe and Fittings

1. Every care shall be taken in handling and laying pipe and fittings to avoid damaging the pipe, scratching or marring machined surfaces, and abrasion of the pipe coatings.
2. Any fitting showing a crack and any pipe or fitting which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the Work.
3. In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portions, if so approved, may be cut off by and at the expense of the Contractor before the pipe is laid so that the pipe used is perfectly sound. The cut shall be made in the sound barrel at a point at least 12-inches form the visible limits of the crack.

3.02 CUTTING

A. Pipe

1. Except as otherwise approved, all cutting shall be done with a machine having rolling wheel cutters, knives, or saws adapted to the purpose. Hammer and chisel or so-called wheel span cutters shall not be used to cut pipe. All cut ends shall be examined for possible cracks caused by cutting.
2. Cut ends to be used with push-on joints shall be carefully chamfered to prevent cutting the gasket when the pipe is laid or installed.

3.03 INSTALLATION

A. Pipe and Fittings

1. No defective pipe or fittings shall be laid or placed in the piping, and any piece discovered to be defective after having been laid or placed shall be removed and replaced by a sound and satisfactory piece.
2. Each pipe and fitting shall be cleared of all debris, dirt, etc., before being laid and shall be kept clean until accepted in the complete work.
3. Pipe and fittings shall be laid accurately to the lines and grades indicated on the drawings or required. Care shall be taken to ensure a good alignment both horizontally and vertically.
4. Pipe shall have a firm bearing along its entire length. No pipe or fitting shall be permanently supported on saddles, blocking, or stones.

CONFORMED

5. The deflection of alignment at a joint shall not exceed the appropriate permissible deflection as specified in the tabulation titled PIPE DEFLECTION ALLOWANCES.

PIPE DEFLECTION ALLOWANCES

Maximum permissible deflection, in.*

Size of pipe, in.	push-on joint	Mechanical joint
4	19	31
6	19	27
8	19	20
10	19	20
12	19	20
14	11	13-1/2
16	11	13-1/2
18	11	11
20	11	11
24	11	9
30	11	9
36	11	8
42	7-1/2	7-1/2
48	7-1/2	7-1/2
54	5-1/2	--

*Maximum permissible deflection for 18-ft. lengths; maximum permissible deflections for other lengths shall be in proportion of such lengths to 18 ft.

6. When mechanical joint, push-on joint or similar pipe is laid, the bell of the pipe shall be cleaned of excess tar or other obstructions and wiped out before the cleaned and prepared spigot of the next pipe is inserted into it. The new pipe shall be shoved firmly into place until properly seated and held securely until the joint has been completed.

B. Castings

1. Castings to be encased in masonry shall be accurately set with the bolt holes, if any, carefully aligned.
2. Immediately prior to being set, castings shall be thoroughly cleaned of all rust, scale and other foreign material.

C. Temporary Plugs

1. At all times when pipe laying is not actually in progress, the open ends of pipe shall be closed by temporary watertight plugs or by other approved means. If water is in the trench when work is resumed, the plug shall not be removed until all danger of water entering the pipe has passed.

D. Appurtenances

1. Valves, fittings and appurtenances shall be set and jointed as indicated on the drawings.

CONFORMED

3.04 ASSEMBLING

A. Push-On Joints

1. Make up by inserting the gasket into the groove of the bell and applying a thin film of special nontoxic gasket lubricant uniformly over the inner surface of the gasket which will be in contact with the spigot end of the pipe.
2. The chamfered end of the plain pipe shall be inserted into the gasket and then forced past it until it seats against the bottom of the socket.

B. Bolted Joints

1. Before the pieces are assembled, rust-preventive coatings shall be removed from machined surfaces.
2. Pipe ends, sockets, sleeves, housings, and gaskets shall be thoroughly cleaned and all burrs and other defects shall be carefully smoothed.

C. Mechanical Joints

1. Surfaces against which the gasket will come in contact shall be thoroughly brushed with a wire brush prior to assembly of the joint. The gasket shall be cleaned. The gasket, bell, and spigot shall be lubricated by being washed with soapy water.
2. The gland and gasket, in that order, shall be slipped over the spigot, and the spigot shall be inserted into the bell until it is correctly seated.
3. The gasket shall then be seated evenly in the bell at all points, centering the spigot, and the gland shall be pressed firmly against the gasket.
4. After all bolts have been inserted and the nuts have been made up finger tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint to the proper tension, preferably by means of a torque wrench.
5. The correct range of torque as indicated by a torque wrench and the length wrench (if not a torque wrench) used by an average man to produce such range of torque, shall not exceed the values specified in the tabulation titled TORQUE RANGE VALUES.

TORQUE RANGE VALUES

Nominal pipe size, in.in.	Bolt diameter, ft.-lb.	Range of torque, in.	Length of wrench,
3	5/8	40-60	8
4 thru 24	3/4	60-90	10
30, 36	1	70-100	12
42, 48	1-1/4	90-120	14

If the effective sealing of the joint is not attained at the maximum torque indicated above, the joint shall be disassembled and thoroughly cleaned, then reassembled. Bolts shall not be over stressed to tighten a leaking joint.

D. Restrained Joints

1. Install in accordance with manufacturers written instructions.

CONFORMED

2. Do not exceed manufacturer's permissible pipe deflection allowance.

E. Sleeve-Type Couplings

1. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8-inches
2. Soapy water may be used as a gasket lubricant.
3. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6-inches from the end, and the middle ring shall be placed on the already laid pipe end until it is properly centered over the joint.
4. The other pipe end shall be inserted into the middle ring and brought to proper position in relation to the pipe already laid.
5. The gaskets and followers shall then be pressed evenly and firmly into the middle ring flares.
6. After the bolts have been inserted and all nuts have been made up finger tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint, preferably by use of a torque wrench of the appropriate size and torque for the bolts. The correct torque as indicated by a torque wrench shall not exceed the manufacturers recommended values
7. After assembly and inspection and before being backfield, all exterior surfaces of buried sleeve-type couplings, including the middle and follower rings, bolts, and nuts, shall be thoroughly coated with an approved heavy-bodied bituminous mastic. Care shall be taken and appropriate devices used to ensure that the undersides, as well as the more readily accessible parts, are well coated.

3.05 POLYETHYLENE ENCASEMENT

A. When required, install in accordance with AWWA C105.

3.06 SOCKET PIPE CLAMPS, TIE RODS AND BRIDLES

A. Where indicated or necessary to prevent joints or sleeve couplings from pulling apart under pressure, suitable pipe clamps, tie rods or bridles shall be provided. Bridles and tie rods shall be at least 3/4 in. diameter except where they replace flange bolts of smaller size, in which case they shall be fitted with a nut on each side of the pair of flanges. The socket clamps, tie rods or bridles shall be coated with an approved bituminous paint after assembly or if necessary, prior to assembly.

3.07 PIPING SUPPORT (THRUST BLOCK)

A. Where necessary, bends, tees, and other fittings in pipelines buried in the ground may be backed up with 3000 psi concrete placed against undisturbed earth where firm support can be obtained. If the soil does not provide firm support, then restraining devices shall be provided.

3.08 CLEANING

A. Prior to the pressure and leakage tests, thoroughly clean piping of all dirt, dust, oil, grease and other foreign material. This work shall be done with care to avoid damage to linings and coatings.

CONFORMED

3.09 TESTING

A. Except as otherwise directed, pipelines shall be given combined pressure and leakage tests in sections of approved length.

1. Provide 24 hour notice to Engineer for all testing
2. The Contractor shall make arrangements for procuring water for testing and be responsible for all associated fees.

B. Furnish and install suitable temporary testing plugs or caps; all necessary pressure pumps, pipe connections, meters, gages, relief valves, other necessary equipment; and all labor required.

C. Subject to approval and provided that the tests are made within a reasonable time considering the progress of the project as a whole, and the need to put the section into service, the Contractor may make the tests when he desires.

D. However, pipelines to be embedded in concrete shall be tested prior to placing of the concrete and exposed piping shall be tested prior to field painting.

E. Unless it has already been done, the section of pipe to be tested shall be filled with water of approved quality, and all air shall be expelled from the pipe. If hydrants or blow offs are not available at high points for releasing air the Contractor shall make the necessary excavations and do the necessary backfilling and make the necessary taps. After completion of the tests, if directed by the Engineer, remove corporations and plug said holes.

F. The section under test shall be maintained full of water for a period of 24 hours prior to the combined pressure and leakage test being applied.

G. The pressure and leakage test shall consist of first raising the water pressure (based on the elevation of the lowest point of the section under test and corrected to the gage location) to a pressure in pounds per square inch numerically equal to the pressure rating of the pipe but not to exceed 200 psi. Do not apply this pressure to items of equipment known to be incapable of withstanding such pressure.

H. If the Contractor cannot achieve the specified pressure and maintain it for a period of **two** hour with no additional pumping, the section shall be considered as having failed to pass the test. Allowable leakage over the **two** hour period shall be calculated per AWWA C-600 as summarized in the following table.

Hydrostatic Testing Allowance per 1,000 ft. of Pipe
(Loss in U.S. Gallons Following a **2** Hour Test)

	Nominal Pipe Diameter					
Avg. Pipe Press. (psi)	6 in.	8 in.	12 in.	16 in.	24 in.	36 in.
150	1.10	1.48	2.20	2.94	4.42	6.61
175	1.18	1.60	1.38	3.18	4.76	7.16
200	1.28	1.70	2.56	3.40	5.10	7.64

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I. If the section fails to pass the pressure and leakage test, the Contractor shall do everything necessary to locate, uncover, and repair or replace the defective pipe, fitting, or joint, all at his own expense and without extension of time for completion of the work. Additional tests and repairs shall be made until the section passes the specified test and is considered acceptable by the Engineer.

J. If, in the judgment of the Engineer, it is impracticable to follow the foregoing procedure exactly for any reason, modifications in the procedure may be made as required and approved by the Engineer, but in any event the Contractor shall be fully responsible for the ultimate tightness of the line within the above leakage and pressure requirement.

K. All testing to be witnessed by the Engineer.

3.10 DISINFECTING AND FLUSHING

A. The Contractor shall disinfect the lines carrying potable water.

B. Furnish all equipment and materials necessary to do the work of disinfecting, and shall perform the work in accordance with the procedure outlined in the AWWA Standard C651 except as otherwise specified herein.

C. During the disinfection period, care shall be exercised to prevent contamination of water in existing mains.

D. The dosage shall be such as to produce a chlorine concentration of not less than 10 PPM (mg/l) after a contact time of not less than 24 hours.

E. After treatment, the main shall be flushed with clean water until the residual chlorine content does not exceed 0.2 PPM (mg/l).

F. Before disposing of the water used in disinfecting and flushing water mains thoroughly neutralize it through the application of a reducing agent, as referenced in AWWA C651.

G. Dispose of the water used in disinfecting and flushing in an approved manner.

H. Connection at cut ins shall be swabbed with 50 PPM solution of chlorine at locations when above methods are not possible.

I. Bacteriological sampling and testing shall be done in accordance with AWWA C651 for each main and each branch. Sampling shall be accomplished with sterile bottles treated with sodium thiosulfate, as required by Standard Methods. No hose or fire hydrants shall be used in collection of samples. A corporation stop installed on the main, with a removable copper tube gooseneck assembly, is the recommended method.

J. Testing shall be done by a laboratory approved by the Engineer, in accordance with Standard Methods, and shall show the absence of coliform organisms. A standard plate count may be required at the option of the Engineer.

CONFORMED

3.11 CONNECTION TO EXISTING WATER MAINS

A. In general, connection to existing water mains will not be allowed prior to the new water main successfully passing pressure and bacteria tests that can be verified with written confirmation. Any exception to this requirement will be at the sole discretion of the Engineer and/or Owner.

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SECTION 02622

PVC PIPE & APPURTENANCES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for furnishing, installing and testing polyvinyl chloride (PVC) gravity pipes, fittings & appurtenances as shown on the drawings and specified herein.

B. Related Sections

1. Section 02200 - Earthwork
2. Section 02215 - Aggregate Materials

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM) Publications

1. D3034, Specification for Type PSM Poly (vinyl chloride) (PVC) Sewer Pipe and Fittings.
2. D3212, Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastometric Seals.
3. F477, Specification for Elastometric Seals (Gaskets) for Joining Plastic Pipe.
4. F679, Specification for Poly (vinyl chloride) (PVC) Large - Diameter Plastic Gravity Sewer Pipe and Fittings.

1.03 SUBMITTALS

A. Shop Drawings

1. In accordance with SECTION 01300 - SUBMITTALS.
2. Submit for review shop drawings showing pipe dimensions, joints, joint gaskets, and other details for each size of pipe to be furnished for the project.
3. All pipe furnished under the contract shall be manufactured only in accordance with the Specifications and the reviewed drawings.

B. Samples

1. Submit samples of products if requested by the Owner's Representative.

CONFORMED

1.04 QUALITY ASSURANCE

A. Certifications

1. All pipe delivered to the job site shall be accompanied by test reports certifying that the pipe and fittings conform to the herein-mentioned ASTM specifications.
2. Pipe shall be subject to thorough inspection and tests, the right being reserved for the Owner's Representative to apply such tests as he deems necessary.
3. All tests shall be made in accordance with the methods prescribed by the herein-mentioned ASTM specifications, and the acceptance or rejection shall be based on the test results.
4. Assist the Owner's Representative in inspecting the pipe upon delivery. Inspect for defects and damage and deviation beyond normal joint and pipe dimensions.
5. Pipe not conforming to the requirements of this contract will be rejected and shall be immediately removed from the site by the Contractor.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection

1. All pipe shall be stored at the site until installation in accordance with the manufactures recommendations.

PART 2 PRODUCTS

2.01 MATERIALS

A. Pipe, Fittings, and Specials

1. Diameters 4-inch through 15-inch, in conformance with ASTM D3034 (SDR35)
2. Diameters 18-inch through 27-inch in conformance with ASTM F679(Wall thickness T-1).

The pipe shall have pipe diameter to wall thickness ratio (SDR) of a maximum of 35, unless otherwise indicated and/or approved by the Owner's Representative.

B. Straight Pipe

1. Lengths of not more than 20 ft.

C. Y-branches

1. Lengths of not more than 3 ft., unless otherwise permitted by the Owner's Representative.
2. Saddle Y-branches will not be allowed.

CONFORMED

D. Specials

1. Conform to the specifications for straight pipe as applicable and to the details indicated on the drawings or bound into the back of the specifications.

E. Joints

1. Conforming to ASTM D3212.
2. Push-on bell and spigot joints using factory installed elastomeric ring gaskets per ASTM D3212-76.

F. Gaskets

1. Conforming to ASTM F477.
2. Securely fixed into place in the bells so that they cannot be dislodged during joint assembly.
3. Composition and texture which is resistant to common ingredients of sewage and industrial wastes, including oils and groundwater, and which will endure permanently under the conditions of the proposed use.

G. Lubricant

1. In accordance with manufacturers requirements.

H. Cleanout Valve Boxes & Extensions

1. Valve boxes for PVC cleanouts shall be manufactured in North America. The minimum outside diameter of the boxes shall be 5-1/2 inches, and the lengths shall be as necessary to suit the ground elevation and the depth of each cleanout, regardless of the depth of cover.
2. Each cleanout shall be provided with a valve box that has a close fitting 7-1/4 inch diameter cover and is substantially dirt-tight. The top of the cover shall be flush with the top of the box rim. The word “DRAIN” shall be cast in the top of the cover.
3. Valve boxes shall be of cast iron, and of the adjustable sliding, heavy pattern type. They shall be so designed and constructed as to prevent direct transmission of traffic loads to any portion of the PVC cleanout and pipe. The upper or sliding section of the box shall be provided with a flange on the top of the section (not on the bottom) having sufficient bearing area to prevent undue settlement. The lower section of the box shall be designed to enclose the cap nut and stuffing box of the cleanout, and to rest on the backfill. The boxes shall be adjustable through at least 6 inches vertically without reduction of lap between sections to less than 8 inches.

I. PVC “Meter Pit”

1. Rigid PVC structure 48”clear ID Structure per ASTM D-1784 w/insulating skin.
2. As manufactured by EJ Prescott or approved equal.

CONFORMED

PART 3 EXECUTION

3.01 PREPARATION

A. Inspection of Pipe

1. Inspect each pipe unit before being installed.
2. No single piece of pipe shall be laid unless it is generally straight and undamaged.
3. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16 in. per ft. of length.
4. If a piece of pipe fails to meet this required check for straightness, it shall be rejected and removed from the site.
5. Any pipe unit or fitting discovered to be defective either before or after installation shall be removed and replaced with a sound unit.

B. Handling of Pipe

1. Each pipe unit shall be handled into its position in the trench, by such means as acceptable to the Owner's Representative. Care shall be taken to avoid damaging the pipe and fittings.

3.02 INSTALLATION

A. Placement

1. Except as otherwise indicated on the drawings, support pipe with compacted Crushed Stone in accordance with Specification SECTION 02215. No pipe or fitting shall be permanently supported on saddles, blocking, or stones.
2. Provide suitable depressions in screened gravel to accept pipe bells, so that after placement, only the barrel of the pipe receives bearing pressure from the supporting material.
3. Clear pipe and fittings of debris, dirt, etc., before being installed, keep clean until accepted in the completed work.
4. Install pipe and fittings to the lines and grades indicated on the drawings or as required by the Owner's Representative. Care shall be taken to ensure true alignments and gradients.

B. Joining Pipe

1. Before any joint is made, the previously installed unit shall be checked to assure that a close joint with the adjoining unit has been maintained and that the inverts are matched and conform to the required grade.
2. The pipe shall not be driven down to the required grade by striking it with a shovel handle, timber or other unyielding object.

CONFORMED

3. All joint surfaces shall be cleaned. Immediately before jointing the pipe, the bell or groove shall be lubricated in accordance with the manufacturer's recommendation.
4. Each pipe unit shall then be carefully pushed into place without damage to pipe or gasket.
5. Suitable devices shall be used to force the pipe units together so that they will fit with a minimum open recess inside and outside and have tightly sealed joints.
6. Care shall be taken not to use such force as to wedge apart and split the bell or groove ends.
7. Joints shall not be "pulled" or "cramped" unless permitted by the Owner's Representative.
8. Where any two pipe units do not fit each other closely enough to enable them to be properly jointed, they shall be removed and replaced with suitable units.
9. Gasket installation and joint assembly shall follow the directions of the manufacturers of the joint material and of the pipe, all subject to review by the Owner's Representative. The resulting joints shall be watertight and flexible.
10. Open ends of pipe and branches shall be closed with polyvinyl chloride stoppers secured in place in an acceptable manner.

C. Rejecting Pipe

1. Pipe of a particular manufacturer may be rejected if there are more than five unsatisfactory joint assembly operations or "bell breaks" in 100 consecutive joints, even though the pipe and joint conform to the appropriate ASTM Specifications as hereinbefore specified. If the pipe is unsatisfactory, as determined above, the Contractor shall, if required, remove all pipe of that manufacturer of the same shipment from the work and shall furnish pipe from another manufacturer which will conform to all of the requirements of these specifications.

D. Bedding Pipe

1. After each pipe has been properly placed, enough gravel shall be placed between the pipe and the sides of the trench, and thoroughly compacted, to hold the pipe in correct alignment.
2. Bell holes (depressions), provided for jointing, shall be filled with screened gravel and compacted, and then screened gravel shall be placed and compacted to complete the pipe bedding, as indicated on the drawings.

E. Protecting Pipe

1. Take all necessary precautions to prevent flotation of the pipe in the trench.
2. Close the open ends of the pipe with temporary watertight plugs, at all times pipe installation is not in progress.
3. If water is in the trench when work is to be resumed, the plug shall not be removed until suitable provisions have been made to prevent water, earth, or other substances from entering the pipe.

CONFORMED

4. Pipelines shall not be used as conductors for trench drainage during construction.

F. Backfilling Pipelines

1. In accordance with SECTION 02200.

G. Cleanouts & Valve Boxes

1. PVC cleanouts shall be assembled in accordance with the standard details for same, and vertical cleanout pipes shall be set plumb.
2. Cast-iron valve boxes shall be set plumb, centered directly over the nut of the PVC cap. Earth fill shall be carefully tamped around the valve boxes to a distance of 4 feet on all sides of the boxes or to the undisturbed trench face, if less than 4 feet.

3.03 ALLOWABLE PIPE DEFLECTION

A. Pipe provided under this specification shall be installed not exceeding a maximum deflection of 7.5 percent. Deflection shall be computed by multiplying the amount of deflection (nominal diameter less minimum diameter when measured) by 100 and dividing by the nominal diameter of the pipe.

B. Upon completion of a section of sewer, including placement and compaction of backfill, the Contractor shall measure the amount of deflection by pulling a specially designed gauge assembly through the completed section. The gage assembly shall be in accordance with the recommendations of the pipe manufacturer and be acceptable to the Owner's Representative.

C. Should the installed pipe fail to meet this requirement, the Contractor shall do all work to correct the problem as the Owner's Representative may require without additional compensation.

3.04 CLEANING

A. Care shall be taken to prevent earth, water, and other materials from entering the pipeline. As soon as possible after the pipe and manholes are completed, clean out the pipeline and manholes, being careful to prevent soil, water, and debris from entering any existing sewer.

3.05 FIELD QUALITY CONTROL

A. Pipeline Flushing

1. Care shall be taken to prevent earth, water, and other materials from entering the pipe.. As soon as possible after the pipe and manholes are completed on any street, flush out the new pipeline, using a rubber ball ahead of the water, flushing water or debris will not be permitted to enter any existing sewer.

B. Inspection by Light

CONFORMED

1. The alignment of the pipe will be checked by shining a flashlight through the pipe from one manhole to the adjacent manhole. The inspector must be able to see the full circumference of the lighted pipe for its entire length when looking through the pipe from the adjacent manhole towards the manhole from which the light is being emitted.

C. Leakage Tests

1. The pipeline shall be made as nearly watertight as practicable, and leakage tests and measurements shall be made after the pipeline has been backfilled.
2. Where the groundwater level is more than 1 ft. above the top of the pipe at its upper end, the Contractor shall conduct either infiltration tests or low pressure air tests.
3. Where the groundwater level is less than 1 ft. above the top of the pipe at its upper end, conduct either exfiltration tests or low-pressure air tests.
4. At the time of the test, determine the groundwater elevation from observation wells, excavations or other means, all subject to review by the Owner's Representative.
5. For making the infiltration and exfiltration tests, furnish suitable test plugs, water pumps, and appurtenances, and all labor required to properly conduct the tests on sections of acceptable length.
6. The sewers shall be tested before any connections are made to buildings.
7. Provide all instruments, weirs, bulkheads, water and equipment required to test the sewer.
8. Should the sections under test fail to meet the requirements, the Contractor shall do all work of locating and repairing leaks and retesting as the Owner's Representative may require without additional compensation.
9. If, the in the judgment of the Owner's Representative, it is impracticable to follow the procedures specified in this Specification for any reason, acceptable modifications in the procedures shall be made as required, but in any event, the Contractor shall be responsible for the ultimate tightness of the line.

D. Low Pressure Air Test

1. For making the low-pressure air tests, use equipment specifically designed and manufactured for the purpose of testing sewer pipelines using low-pressure air. The equipment shall be provided with an air regulator valve or air safety so set that the internal air pressure in the pipeline cannot exceed 8 psig.
2. The leakage test using low pressure air shall be made on each manhole-to-manhole section of pipeline after placement of the backfill.
3. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be tested. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.
4. All air used shall pass through a single control panel.
5. Low-pressure air shall be introduced into the sealed line until the internal air pressure reaches 4 psig. greater than the maximum pressure exerted by the

CONFORMED

groundwater that may be above the invert of the pipe at the time of the test. However, the internal air pressure in the sealed line shall not be allowed to exceed 8 psig. When the maximum pressure exerted by the groundwater is greater than 4 psig., conduct only an infiltration test.

6. At least two minutes shall be allowed for the air pressure to stabilize in the section under test. After the stabilization period, the low-pressure air supply hose shall be quickly disconnected from the control panel. The time required in minutes for the pressure in the section under test to decrease from 3.5 to 2.5 psig (greater than the maximum pressure exerted by groundwater that may be above the invert of the pipe) shall not be less than that shown in the following table:

Pipe diameter in inches	Minutes	Pipe diameter in inches	Minutes
6	3.0	18	9.0
8	4.0	21	10.0
10	5.0	24	11.5
12	5.5	27	13.0
15	7.5		

E. Infiltration Test

1. For making the infiltration tests, underdrains shall be inspected thru structures and evidence of flow verified. If so requested the drain shall be plugged and other groundwater drainage shall be stopped to permit the groundwater to return to its normal level insofar as practicable and conditions observed.
2. Upon completion of the sewer connections conduct a satisfactory test to ensure uniform flow and un-impeded operation.

END OF SECTION

CONFORMED

SECTION 02626

HIGH DENSITY POLYETHYLENE (HDPE) CORRUGATED DRAIN PIPE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for furnishing and installing high density polyethylene (HDPE) corrugated, smooth lined thermoplastic pipe of all sizes including but not limited to couplings, cleanouts, adapters and fittings required to install the drainage pipe as indicated on the Drawings.

B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading.
2. Section 02215 - Aggregate Materials

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO)

1. M-252, Standard Specification for Corrugated Polyethylene Drainage Tubing.
2. M-294, Standard Specification for Corrugated Polyethylene Pipe, 305 to 1200 mm Diameter.

B. American Society for Testing and Materials (ASTM)

1. D2321, Standard practice for Underground Installation of Thermoplastic Pipe for Sewers and other Gravity-Flow Applications.
2. D3212, Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
3. D3350, Standard Specification for Polyethylene Plastic Pipe and Fitting Materials.
4. F477, Standard Specification for Elastometric Seals (Gaskets) for Joining Plastic Pipe.
5. F1417, Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air.
6. F2306, Standard Specification for 12 to 60 in. [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications.

1.03 SUBMITTALS

A. Shop Drawings

1. In accordance with Section 01300 submit the following;

CONFORMED

a. Pipe dimensions, joints, gaskets and other details for each type and class of pipe to be furnished for the project.
b. Manufactures written installation instructions.

1.04 QUALITY ASSURANCE

A. High Density Polyethylene pipe shall be made by a manufacturer of established good reputation in the industry and in a plant adapted to meet the design requirements of the pipe.

B. The piping manufacturer shall provide written certification that the pipe and appurtenances furnished under this specification were produced and tested in accordance with the applicable herein-mentioned ASTM and AASHTO specifications. The certificates shall be furnished at the time of shipment.

C. Pipe shall be subject to thorough inspection and tests, the right being reserved for the Engineer to apply such tests as he deems necessary.

D. Pipe not conforming to the requirements of this Contract will be rejected and shall be immediately removed from the site by the Contractor.

PART 2 PRODUCTS

2.01 MATERIAL

A. Virgin material for pipe and fittings shall be high density polyethylene conforming to the minimum requirements of cell classification 424420C for 4-inch through 10-inch diameters, or 435400C for 12-inch through 60-inch diameters, in accordance with the latest version of ASTM D3350.

B. The 12-inch through 60-inch virgin pipe material shall comply with the notched constant ligament-stress (NCLS) test as specified in Section 9.5 and 5.1 of AASHTO M-294 and ASTM F2306, respectively.

2.02 PIPE

A. Pipe shall be watertight, dual wall with a smooth interior and annular exterior corrugations as manufactured by ADS, type N-12 WT/IB, or approved equal.

B. Pipe 4-inch through 10-inch diameter shall meet AASHTO M-252, Type S.

C. Pipe 12-inch through 60-inch diameter shall meet AASHTO M-294, Type S or ASTM F2306.

D. Specials, if required, shall conform to the specifications for straight pipe insofar as applicable. Special design or construction necessary for specials shall be subject to acceptance by the Engineer.

CONFORMED

E. Use of pipe from alternate manufacturer(s) shall be subject to acceptance by the Engineer. Pipes not meeting all of the standards of the specified ADS pipe shall not be considered.

2.03 JOINTS

A. Pipes shall be joined using bell and spigot joint meeting AASHTO M-252, AASHTO M-294 or ASTM F2306.

B. The joint shall be water tight in accordance with ASTM D3212, with gaskets meeting the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to insure the gasket is free from debris.

C. Joint lubricant supplied by the pipe manufacturer shall be used on the gasket and bell during assembly.

D. 12-inch through 60-inch diameters shall have a reinforced bell with a bell tolerance device. The bell tolerance device shall be installed by the manufacturer.

2.04 FITTINGS

A. Conform to AASHTO M-252, AASHTO M-294 or ASTM F2306.

B. Bell and spigot connections shall utilize a spun-on or welded bell and valley or saddle gasket meeting the watertight joint performance of AASHTO M-252, AASHTO M-294 or ASTM F2306.

C. All joints shall be gasketed and watertight in accordance with ASTM D3212.

PART 3 EXECUTION

3.01 INSPECTION

A. Each pipe unit shall be inspected before being installed. Any pipe discovered to be defective, either before or after installation, shall be removed and replaced with a sound pipe.

3.02 INSTALLATION

A. In accordance with ASTM D2321, and the following;

B. Handling Pipe

1. In no case shall pipes be dropped or otherwise subjected to impact forces in the course of unloading or installation.

CONFORMED

2. The Contractor will be required to furnish suitable devices to permit satisfactory support of all parts of the pipe unit when it is lifted.
3. Each pipe unit shall be handled into its position in the trench in accordance with manufacturers instructions.

C. Placement

1. Pipe and fittings shall be installed to the lines and grades indicated on the Drawings or as required by the Engineer. Care shall be taken to ensure true alignments.
2. In no case shall the pipe be installed at less than the manufacturer's minimum recommended depth for H-25 loading.
3. All pipe units shall be cleared of all debris, dirt, etc., before being installed and shall be kept clean until accepted in the completed work.
4. The pipe shall be supported by compacted crushed stone in accordance with Section 02215 and as detailed on the Drawings. No pipe or fitting shall be permanently supported on saddles, blocking, or stones unless otherwise directed.
5. When applicable, suitable bell holes shall be provided, so that after placement only the barrel of the pipe receives bearing pressure from the supporting material.

D. Joining Pipe

1. Before any joint is made the piping shall be checked to assure that a close joint with the next adjoining unit has been maintained and that the inverts are matched and conform to the required grade. The pipe shall not be driven down to the required grade by striking it with a shovel handle, timber, or other unyielding object.
2. All joint surfaces shall be cleaned. The protective wrap removed from the gasket. Immediately before jointing the pipe, the bell and spigot shall be lubricated in accordance with the manufacturer's recommendation.
3. Each pipe unit shall then be carefully pushed into place without damage to pipe or gasket. Suitable devices shall be used to force the pipe unit together so that they will fit with a minimum open recess inside and outside and have tightly seated joints. Care shall be taken not to use such force as to wedge apart and split the bell or groove ends. The resulting joints shall be watertight and flexible.
4. Joints in which the gasket is damaged or not properly positioned shall be pulled apart and remade using a new gasket.

E. Bedding the pipe

1. After each pipe has been properly joined, enough crushed stone shall be placed between the pipe and the sides of the trench and thoroughly compacted, to hold the pipe in correct alignment. Bell holes provided for jointing shall be filled with crushed stone and compacted. Crushed stone shall then be placed and

CONFORMED

compacted to a level 6-inches above the top of the pipe, completing the pipe bedding, as indicated on the Drawings.

F. Protecting the pipe

1. The Contractor shall take all necessary precautions to prevent flotation of the pipe in the trench prior to backfilling.
2. At all times when pipe installation is not in progress, the open ends of the pipe shall be closed with temporary watertight plugs or by other suitable means. If water is in the trench when work is to be resumed, the plug shall not be removed until all conditions are suitable to prevent water, earth, or other material from entering the pipe.
3. Pipelines shall not be used as collectors or conductors for trench or other drainage during construction.

G. High Groundwater

1. In installations where high groundwater is encountered, a soil filter fabric shall be installed, as per manufacturer's recommendations, around the initial backfill material unless sufficient cover can be provided over the pipe.
2. In controlled density fill or high groundwater installations, pipe shall be restrained as per manufacturer's recommendations.

H. Backfilling pipelines

1. In accordance with Section 02200.

3.03 MANHOLE AND CATCH BASIN CONNECTIONS

A. Connections to be watertight, utilizing flexible rubber connections such as "Kor-N-Seal" or "A-Loks" installed at the manhole pipe opening. Pipe adapters or smooth exterior pipe manhole adapter pipe is to be used with all flexible manhole connectors.

B. Pipe adapters to be supplied by the pipe manufacturer.

C. Flexible rubber connections to be supplied with the manholes. Connections to be constructed and sized to suit the pipe.

3.04 FIELD CONNECTIONS

A. Utilize manufacturer supplied watertight field couplers for field connections or to repair pipe damaged during construction.

3.05 CLEANING

A. Care shall be taken to prevent earth, water, and other materials from entering the pipeline. As soon as possible after the pipe, basins and manholes are completed, the Contractor shall clean out pipelines, basins and manholes, being careful to prevent soil, water, and debris from entering any existing pipe.

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B. All material and debris removed from pipes, basins and manholes shall be removed from the site and legally disposed of, and shall not be used in any other portion of the construction.

3.06 INSPECTION

A. Pipe to be inspected to insure proper line and grade. Excessive deflection, based on manufacturer's written recommendations will not be allowed.

3.07 TESTING

A. Leakage tests are required for all pipelines.

1. Perform testing after the pipe lines are installed and backfilled.
2. Provide all labor, equipment and material required to test the pipelines.

B. Exfiltration Test

1. For making the exfiltration tests, the drains shall be subjected to an internal pressure by plugging the pipe at the lower end and then filling the pipelines and manholes with clean water to a height of 2 ft. above the top of the drain at its upper end. Provisions shall be made by suitable ties, braces, and wedges to secure the stoppers against leakage resulting from the test pressure.
2. The rate of leakage from the drains shall be determined by measuring the amount of water required to maintain the level 2 ft. above the top of the pipe for a 24 hour period.
3. Leakage from the drains under test shall not exceed 50gal./in. dia./mi./day.

C. The Contractor may elect to perform a low pressure air test in accordance with ASTM F1417 as an alternative to exfiltration testing.

D. Should the pipelines under test fail to meet the requirements, the Contractor shall do all work of locating and repairing leaks and retesting as the Engineer may require without additional compensation.

END OF SECTION

CONFORMED

SECTION 02642

WATER SERVICE CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for furnishing and installing potable water service connections.

1.02 SUBMITTALS

A. Shop Drawings

1. In accordance with Section 01300, submit manufacturer's specifications, catalog data, descriptive literature, illustrations, diagrams, etc.

1.03 REFERENCES

A. American National Standards Institute

1. NSF/ANSI 61 – Drinking Water System Components - Health effects

B. American Society for Testing and Materials (ASTM)

1. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings
2. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
3. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications.
4. ASTM D2447 - Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter.

C. American Water Works Association (ANSI/AWWA)

1. ANSI/AWWA C800, Underground Service Line Valves and Fittings.

D. Springfield Water and Sewer Commission (SWSC)

1. Springfield Water and Sewer Commission – Guidelines and Policies.
2. Springfield Water and Sewer Commission – Material Specifications.
3. Springfield Water and Sewer Commission – Rules and Regulations.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fittings and accessories shall conform to the requirements of ANSI/AWWA C800 unless noted otherwise.

1. Corporation Stops shall be CC thread by compression connection.
2. Curb Stops shall be compression connection.
3. Other connection styles as approved by the Engineer.

B. Fittings shall be manufactured by Clow Corporation, Chicago, IL; Mueller Co., Decatur, IL; Red Head Mfg. Co., Boston, MA; or an acceptable equivalent.

1. Brass goods furnished under this specification shall be new and unused.
2. Any metal past of the fitting in contact with the water must be made of Sebiloy II per ASTM B584 (UNS Alloy C89520). Brass alloys not assigned an ASTM/UNS alloy designation are not acceptable. Plated components in contact with the water not made of Sebiloy II are not approved.
3. Metal components that do not contact the water shall comply with the requirements of ASTM B62 or ASTM B584 copper alloy number C83600.
4. All seats/seals must be of an elastomeric material that has verifiable experience in water systems using chloramines for disinfection. Fluoroelastomers such as unfilled Teflon that exhibit poor tear and cut growth characteristics are not approved.
5. All service fitting shall be certified as suitable for contact with drinking water by an ANSI accredited organization in accordance with NSF/ANSI 61.
6. All fittings shall be stamped or embossed with a mark or name indicating that the product is manufactured from the low-lead alloy as specified.

C. Stops shall be ball valve style and have ends as required to suit type of pipe or tubing to be connected, and a combined cap and tee handle.

D. Curb Boxes

1. Buffalo style, 2 ½-inch, cast iron, heavy duty top section, sliding type with flare top and recess cover marked “WATER” and sliding type arched bottom section.
2. Overall length to suit specified depth of cover requirements as approved by the Engineer.

E. Service Piping

1. 4-inch and larger to be Cement Lined Ductile Iron, Class 52.
2. 2-inch or less to be Type “K” Copper in accordance with ASTM B88.

F. Service Saddle

1. Bodies shall be constructed of high strength ductile iron per ASTM A536.

2. Service saddle outlets shall have Mueller CC threads.
3. Bands shall be constructed of Grade 18-8, Type 304 stainless steel with stainless steel lugs and sidebars welded to the bands(s). Single bands shall be 3-1/4-inch minimum width and double bands shall be 2-inches minimum width each.
4. Lugs and sidebars shall be constructed of Grade 18-8, Type 304 stainless steel with stainless steel fasteners welded to lugs and sidebars. A minimum of two (2) lugs per single side bar or one (1) lug per side bar, when tapping saddles are provided with two (2) side bars, shall be provided.
5. All fasteners shall be mode of Grade 304 stainless steel.
6. All welds used in the construction of the tapping saddles shall conform to all American Welding Society (AWS) codes. All welds shall be fully passivated in compound to restore the stainless steel to its original corrosive resistant characteristics.
7. Service saddles shall be provided with gaskets constructed of virgin SBR compound for water service and must meet or exceed ASTM D2000 AA-415.
8. Ranges must be clearly labeled on the package as well as on each tapping saddle.
9. Coatings shall be fusion bonded epoxy (10-12 mils), nylon 11 (10-12 mils).
10. Tapping saddles shall be Ford FC202, Mueller DR2S, Romac 202N or, approved equal.

PART 3 EXECUTION

3.01 GENERAL

A. Water service and fire service connections shall be installed or replaced as required from the new water main corporation stop to the new curb stop and connected to the existing service. Remove and replace existing curb stop, remove service pipe from old main, tap new main, install new corporation stop, install copper water service and fire service connection between new main and new installed curb stop.

B. Service shall be maintained as continuously as possible, coordinate shut down with property owner.

C. The tapping machine shall be rigidly fastened to the pipe as near the horizontal diameter as possible. The length of travel of the tap should be so established that when the stop is inserted and tightened with a 14-inch wrench, not more than one to three threads will be exposed on the outside. When a wet tapping machine is used, the corporation cock shall be inserted with the machine while it is still in place. Stops shall be tightened only sufficiently to be watertight. Care must be exercised not to overtighten.

D. Service tubing shall be installed with care to avoid kinks or sharp bends. Do not allow tubing to contact ledge, rock or sharp stones which could cause damage.

E. Provide at least 6-inches of coarse-grained sand or gravel with a maximum particle size of ½-inch adjacent to and above the service pipe. Backfill remainder of trench with approved backfill material.

F. Services shall be flushed before activating to avoid meter clogging.

G. The Engineer must observe all service connections under normal water main pressure prior to backfilling of the service trench to check for leakage.

H. Service connections shall be free from leaks and may be pressure tested through the water main as directed by the Engineer.

I. The curb service boxes shall be set in a true vertical position and if the boxes are within the limits of the roadway or within areas where the plowing of snow will take place, the tops of the boxes shall be set about ½-inch below the top of the finished grade. In locations where these boxes are not likely to be disturbed, the tops shall be set flush with the adjoining ground.

3.02 SERVICE PIPE

A. Water services will not be installed until the water pipe has been tested and disinfected unless otherwise directed by the Engineer.

B. All work on water services shall be properly coordinated with the Commission's personnel.

C. Where new water mains are being installed and existing water services are to be transferred to the new main, the Contractor shall discontinue the existing water services by shutting down the corporation stop at the old water main, unless specifically directed otherwise. The Contractor shall take special care to minimize the interruption with existing water service.

D. The Contractor in making the transfers shall tap a new corporation stop and cut the existing water service tubing at a point acceptable to the Engineer and install new tubing to a new curb stop and box to be furnished and installed in a location adjacent to the existing curb stop and box in front of the property to be serviced.

E. The method of tap and connection of the new services shall be as specified above. New and old tubing shall be connected by an approved coupling, as necessary.

F. Where transfers are being made and the existing service is of lead or iron, the service shall be replaced to the meter in the house, unless otherwise directed. If required, the curb stop and box shall be replaced as specified above.

G. Buried curb stops and boxes shall be set plumb and centered with the box located directly over the stop. The box shall be set on a concrete block or flat stone. Earth fill shall be carefully tamped around the boxes to a distance of 4-feet on all sides of the box or to the undisturbed face of the trench, if less than 4-feet.

H. All services shall be installed with a minimum cover of 5-feet in accordance with the Standard Construction details in these Contract Documents unless otherwise directed by the Engineer. The service pipe trench shall be backfilled in accordance with SECTION 02200 – EARTHWORK.

I. Use tapping saddles when installing corporations larger than 1-1/2-inches.

J. The new water service shall be installed in accordance with SWSC Guidelines and Policies and with the Replacement Water Service Installation Detail (W-11.0).

3.03 SETTING FIRE HYDRANTS

A. Hydrants shall be set plumb, shall have steamer nozzle facing the roadway and, in general, shall be set as shown in the Drawings. The Engineer will determine the exact location.

B. Hydrant breakaway flanges shall be located a minimum of 2 inches and a maximum of 6 inches above finished grade.

C. Hydrants shall be installed per Standard Fire Hydrant Detail (W-07.0). Place stone around drain holes for all installations.

D. Hydrants furnished unsatisfactorily painted by the manufacturer shall be painted per SWSC specifications.

E. All hydrants shall be thoroughly flushed out before final acceptance of the work.

END OF SECTION

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SECTION 02712

UNDER DRAIN SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for furnishing and installing under drain system as indicated on the drawings and directed by the Engineer.

B. Related Sections

1. Section 01025 – Measurement and Payment
2. Section 02200 – Earth Excavation, Backfill, Fill and Grading.
3. Section 02215 - Aggregate Materials.
4. Section 02260 – Geotextile Materials
5. Section 02626 – HDPE Corrugated Plastic Drainage Pipe

1.02 QUALITY ASSURANCE

A. Geotextile Material – in accordance with Section 02260 Geotextile Materials, Subsection 103.

B. HDPE Corrugated Plastic Drainage Pipe - in accordance with Section 02626 HDPE Corrugated Drain Pipe, Subsection 104.

1.03 REFERENCES

A. As specified in the in the related specification sections.

1.04 SUBMITTALS

A. In accordance with SECTION 01300.

B. As specified in the related specification sections

PART 2 PRODUCTS

2.01 PIPE

A. As specified in Section 02626 HDPE Corrugated Plastic Drainage Pipe.

1. Pipe for under drain shall consist of slot-perforated corrugated polyethylene tubing, couplings and fittings. Materials, dimensions, physical properties and fabrication shall be in conformance with AASHTO M 252.

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2. Joints shall be as specified in Section 02626 HDPE Corrugated Plastic Drainage Pipe.
3. Fittings shall be as specified in Section 02626 HDPE Corrugated Plastic Drainage Pipe.

2.02 AGGREGATE

A. As specified in Section 02215 - Aggregate Materials.

1. Crushed stone shall be 3/4 - inch stone.

2.03 GEOTEXTILE MATERIAL

A. In accordance with Section 02260 – Geotextile Materials

1. Geotextile fabric used for subsurface drainage shall conform to requirements of AASHTO M 288 for the intended application.

PART 3 EXECUTION

3.01 HANDLING PIPE

A. Each pipe unit shall be handled into its position in the trench only in such manner and by such means as is acceptable to the Engineer.

B. The Contractor will be required to furnish suitable devices to permit satisfactory support of all parts of the pipe unit when it is lifted.

3.02 INSTALLATION

A. The drain trench shall be excavated to the depth designated on the plans or as directed. The excavation shall proceed in advance of the actual drain construction only to the extent the Engineer directs.

B. Each pipe unit shall be inspected before being installed. Any pipe discovered to be defective either before or after installation shall be removed and replaced with a sound pipe.

C. Before any pipe is installed, filter fabric shall be placed along the sides and bottom of the trench. The overlap between any adjoining pieces of fabric shall be at least 2 ft. Perforated subdrain pipe shall be laid with the perforations facing up.

D. The pipe shall be laid on a 6-inch bed of ¾ inch crushed stone and the space about and above shall be filled with ¾ inch. crushed stone. A minimum of 6 inches of stone shall be provided on all sides of the pipe.

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E. The Contractor shall be responsible for keeping the backfill material clean and free of objectionable material from a line 6 inches below the flow line of the pipe to the top of the trench.

F. Ends of subdrains not connected to structures shall be covered with a #23 gauge galvanized wire screen of ¼ inch mesh satisfactorily fastened to the pipe.

G. The Contractor shall take all necessary precautions to prevent floatation of the pipe in the trench.

H. At all times when pipe installation is not in progress, the open ends of the pipe shall be closed with temporary watertight plugs or by other suitable means. If water is in the trench when work is to be resumed, the plug shall not be removed until all conditions are suitable to prevent water, earth, or other material from entering the pipe.

I. Pipelines shall not be used as conductors for trench drainage during construction.

3.03 CLEANING

A. Care shall be taken to prevent earth, water, and other materials from entering the pipeline. As soon as possible after the pipe and manholes are completed, the Contractor shall clean out pipelines and manholes, being careful to prevent soil, water, and debris from entering any existing pipe.

END OF SECTION

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SECTION 02720

CATCH BASINS AND AREA DRAINS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements to install, construct, adjust, abandon, or rebuild all catch basin drainage structures as indicated on the drawing and as specified herein.

B. Related Sections

1. Section 02300 Earthwork
2. Section 02607 Manholes
3. Section 02618 Ductile Iron Pipe
4. Section 02626 Drainage Pipe
5. Section 33000- Cast-In-Place Concrete

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. A48, Specification for Gray Iron Castings.
2. C32, Specification for Sewer and Manhole Brick (Made from Clay or Shale).
3. C139, Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.
4. C150, Specification for Portland Cement.
5. C207, Specification for Hydrated Lime for Masonry Purposes.
6. C478, Specification for Precast Reinforced Concrete Manhole Sections.

1.03 DESIGN REQUIREMENTS

A. Catch basin structures shall conform in shape, size, dimensions, materials, and other respects to the details indicated on the drawings or bound in the specifications or as ordered by the Owner's Representative

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PART 2 - PRODUCTS

2.01 MATERIALS

A. Pre-Cast Concrete: Catch basin may be precast concrete. Area Drain structures may be either precast concrete such as a MDOT CB Type F structure: alternatively they may be PVC structures as manufactured by Nyloplast. Structures may be may be round or square in shape conforming to the following requirements:

1. The structure must meet H-20 loading requirements, constructed with a minimum thickness of 6” for the walls and base sump.

2. All precast concrete structures shall be 5,000 psi and shall be Type III per ASTM C150-81, conforming to ASTM C-478 and MDOT Standard Specifications.

3. The upper portion of the structure may not to exceed 6 inches in height and may be built of brickwork to permit adjustment of the frame to meet the finished surface.

4. Catch basin sumps shall be one piece precast concrete or concrete masonry units on cast-in-place or precast concrete bases.

5. The cast-iron frames and grates shall be the standard as indicated on the drawings.

B. Precast Concrete Sumps

1. Precast concrete sumps shall conform to the ASTM C478, with the following additional requirements. The wall section shall be not less than 6-inch thick.

2. Type II cement shall be used except as otherwise permitted.

3. Sumps shall be cured by subjecting them to thoroughly saturated steam at a temperature between 100 and 130 degrees F. for a period of not less than 12 hours or, when necessary, for such additional time as may be needed to enable the sections to meet the strength requirements.

4. No more than two lift holes may be cast or drilled in each sump.

5. Acceptance of the sumps will be based on material tests and inspection of the completed product.

6. All holes in sumps used for their handling shall be thoroughly plugged with rubber plugs made specifically for this purpose or with mortar. The mortar shall be one part cement to 1-1/2 parts sand, mixed slightly damp to the touch (just short of "balling"), hammered into the holes until it is dense and an excess of paste

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appears on the surface, and then finished smooth and flush with the adjoining surfaces.

D. BRICKS

1. The brick shall be sound, hard, and uniformly burned brick, regular and uniform in shape and size, of compact texture, and satisfactory to the Owner's Representative. Brick shall conform to ASTM C32 for Grade SS, hard brick, except that the mean of five tests for absorption shall not exceed 8 percent by weight.

2. Rejected brick shall be immediately removed from the work.

F. Mortar for Brickwork

1. The mortar shall be composed of Portland cement, hydrated lime, and sand, in which the volume of sand shall not exceed three times the sum of the volumes of cement and lime. The proportions of cement and lime shall be as directed and may vary from 1:1/4 for dense, hard-burned brick to 1:3/4 for softer brick. In general, mortar for Grade SS Brick shall be mixed in the proportions of 1-1/2:4-1/2.

2. Cement shall be Type II Portland cement conforming to the ASTM C150.

3. Hydrated lime shall be Type S conforming to the ASTM C207.

4. The sand shall comply with the specifications for fine aggregate, specified in Section 03300, except that all of the sand shall pass a No. 8 sieve.

G. Mortar for Concrete Masonry Units

1. Mortar shall be composed of one part Portland cement and two parts of sand by volume with sufficient water to form a workable mixture. Cement and sand shall be as specified for mortar for brickwork.

F. CATCH BASIN FRAMES AND GRATES

1. Furnish and install all cast-iron catch basin frames and grates conforming to the details indicated on the drawings and as specified.

2. Castings shall be of good quality, strong, tough, even-grained cast iron, smooth, free from scale, lumps, blisters, sand holes, and defects of every nature which would render them unfit for the service for which they are intended. Contact surfaces of grates and frame seats shall be machined to prevent cocking of grates.

3. All castings shall be thoroughly cleaned and subject to a careful hammer inspection.

4. Castings shall be at least Class 25 conforming to the ASTM A48.

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5. Unless otherwise specified or indicated on the drawings, castings in paved areas shall be capable of withstanding AASHO H-20 loading and shall meet the requirements of the municipality in which they are installed.

G. Catch Basin Flat Slab or Hood

1. Furnish and install all catch basin slabs or hoods conforming to the details indicated on the drawings and as specified.

2. Catch basin hoods shall be “The Eliminator” as manufactured by Ground Water Rescue, Inc. or the “SNOUT” manufactured by Best Management Products, Inc. or an approved equivalent.

PART 3 - EXECUTION

3.01 LAYING BRICKWORK AND GRADING RINGS

A. Only clean bricks and grading rings shall be used. Bricks shall be moistened by suitable means, as directed, until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.

B. Each brick shall be laid in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and shall be thoroughly bonded as directed.

C. Utilize rigid foam Pro-Ring risers or equal when elevation conditions permit. Install grading ring shall be laid in a full bed of mortar and shall be thoroughly bonded.

3.02 PLASTERING AND CURING BRICK MASONRY

A. Outside faces of brick masonry shall be plastered with mortar from 1/4 in. to 3/8 in. thick. If required, the masonry shall be properly moistened prior to application of the mortar. The plaster shall be carefully spread and troweled. After hardening, the plaster shall be carefully checked by tapping for bond and soundness. Unbounded or unsound plaster shall be removed and replaced.

B. Brick masonry and plaster shall be protected from too rapid drying by the use of burlaps kept moist, or by other acceptable means, and shall be protected from the weather and frost, all as required.

3.03 SETTING CASTINGS

A. Curb inlets and frames shall be set 1) with the tops conforming accurately to the grade of the pavement or finished ground surface, 2) as indicated on the drawings, or 3) as directed.

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B. Circular frames shall be set concentric with the top of the masonry and in a full bed of mortar, so that the space between the top of the manhole masonry and the bottom flange of the frame shall be completely filled and made watertight.

C. A thick ring of mortar extending to the outer edge of the masonry shall be placed all around and on the top of the bottom flange. The mortar shall be smoothly finished and have a slight slope to shed water away from the frame.

D. Grates shall be left in place in the frames on completion of other work at the manholes.

3.04 CATCH BASINS ADJUSTED TO GRADE

A. Existing catch basin tops shall be adjusted to line and grade as indicated on the drawings or as directed by the Owner's Representative.

B. All catch basins adjusted to grade shall be provided with concrete grading rings of brick as specified for new drain manholes.

3.05 REBUILDING OF EXISTING CATCH BASIN

A. Cut suitable openings in existing structures to make connections to drains as indicated on the drawings and as specified or directed. In doing so, confine the cutting to the smallest amount possible consistent with the work to be done.

B. After the drains are installed, carefully fit around, close up, and repair the structures watertight, all as acceptable to the Owner's Representative.

C. Prior to starting work, assembled all tools, materials, and construction equipment required to complete the work in the shortest possible time.

END OF SECTION

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SECTION 02805

LANDSCAPE BOULDERS

PART 1 – GENERAL

1.1 SUMMARY

A. Work under this Section includes

1. Removal from stockpiles on site and hauling and installing existing landscape boulders as indicated on the drawings and as specified here in.
2. Furnishing, hauling, and installing additional weathered landscape boulders as indicated on the Drawings and specified herein to establish the lines and finish grades indicated.

B. Related Sections

1. SECTION 02200 – Earth Excavation, Backfill and Grading
2. SECTION 02215 – Aggregate Materials

1.2 REFERENCES

A. Materials and construction methods shall conform, insofar as applicable, to the requirements of the Standard Specifications of the Maine Department of Transportation (MDOT), November 2014, together with all errata, addenda, additional revisions, and supplemental specifications.

1.3 SUBMITTALS

A. In accordance with Section 01300 – Submittals.

B. Submit photographs of additional proposed boulders for use on this project for review.

C. Facilitate a review meeting at the stockpile with the Owner's Representative for a review of the boulders proposed for use.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Boulders: Naturally occurring indigenous weathered boulders, irregular in shape and size, sound in composition, naturally weathered, light-gray to medium blue-gray or gray-green in color, irregular in shape and sized as indicated on the plans. Size range is 30" to 60" in length, 30"-48" in width and depth, of a stature suitable to facilitate grade transitions. Newly excavated, bright, white, or iron /orange colored boulders will be rejected.

B. Crushed Stone: ¾" crushed stone for bedding of boulders.

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PART 3 – EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

A. All materials for the work of this section shall be delivered, stored and handled to prevent damage. Coordinate delivery of boulders early in the project to site to prevent delays and allow for efficient placement of surrounding materials.

3.2 PROJECT CONDITIONS

A. The Contractor shall verify all finish grades prior to start of work.

B. The Contractor shall project adjacent work from damage, soiling, and staining during masonry operation.

3.3 INSTALLATION

A. Boulders shall be installed to hold steep grades, protect existing trees, contain stone plunge pools and dams, create naturalized pipe discharge headwall areas and to add definition to walkways, stairways and landscaped areas.

B. Boulders shall be placed in a manner similar to a natural appearance, somewhat irregularly aligned (+/- 3”) and positioned with a varied exposure above the finish grade. The height of the boulders shall also vary between stones, particularly when grouped together unless otherwise indicated on the plans. Overall appearance is critical, and layout shall be coordinated with the Owner’s Representative Prior to backfilling operations.

C. Position boulders to retain the slope in areas of steep grades (2:1) adjacent the building and walkway. Coordinate placement with future plant beds and landscaping.

D. Boulders shall be set on a minimum of 6” crushed stone bed, installed over the compacted subgrade. Utilize geotextiles where shown to contain soil fines. Boulders shall be embedded approximately 1/3 of their overall height below grade, depth as determined by the desired final exposed surface of each stone.

E. Boulders shall be firmly positioned and not placed on finished grade, but rather shall be embedded to ensure against overturning or shifting. Final selection and placement shall be as directed by the Owner’s Representative on site.

F. When required to be stacked to meet grades indicated, stagger joints between boulders to further ‘lock ‘ boulders together. Lay-back or ‘batter’ face plane so no boulder overhangs the face plane of the one below. Saw-cut, chisel or otherwise work edges as necessary to eliminate gaps over 3” in width where boulders meet. “Distress’ any raw cut edges to return to a natural appearance.

G. Unless otherwise directed, the Contractor shall utilize nylon straps and slings to handle and set the boulders. The weathered surface of the boulder may not be marred or otherwise damaged in any way.

END OF SECTION

CONFORMED

SECTION 02810

IRRIGATION

PART 1 GENERAL

1.1 SUMMARY

A. Provide all materials, labor, installation equipment, and technical service to complete automatic landscape and event lawn irrigation system, as well as the testing and warranty of the system as defined in this Specification and Construction Drawings.

B. Items of work specifically included are:

1. Procurement of all applicable licenses, permits, and fees.
2. Coordination of all utilities.
3. Verification of site conditions.
4. Maintenance during guarantee period.

1.2 QUALIFICATIONS.

A. Qualified irrigation system installers must have a minimum experience of five (5) years with work and products specified herein, including:

1. Two-Wire Controller and Valve Installation
2. Weather-Based Smart Controllers
3. Athletic Field and Large Turf Irrigation Systems with 1-Inch Inlet Sprinklers
4. Domestic Water Plumbing Systems

B. Submit three (3) references for similar work performed in the last five (5) calendar years, including:

1. Contact name
2. Company Name
3. Contact Phone Number
4. Project Name and Location
5. Brief Project Description

1.3 WORK DESCRIPTION

A. Irrigation System shall be a new, two-wire irrigation system with its own controller and water supply. Sprinkler head placement and throw radius shall be better than head-to-head coverage.

B. Provide new backflow preventers, irrigation master valve and flow sensor in vandal-proof enclosure for irrigation water supply. Purchase and install 2-inch water meter as specified by the City of Fall River.

C. Provide drain, blow-out port, and stop and waste valve for winterization.

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D. Provide and train Owner on remote irrigation management through Internet based platform through Wi-Fi internet service to be coordinated with site contractor.

1.4 UTILITIES

A. Water Service Point of Connection

1. Existing static water pressure within street is purported to be 100 psi.
2. Approximate point of connection from existing main within site is located on Drawings.

a. Equipment requirements within vandal-proof enclosure (see Irrigation Product Below):

1) Enclosure (Painted Hunter Green at Factory)
2) Irrigation Backflow Preventer

a) Size: 2-Inch
b) Construction: Bronze with Quarter Turn Ball Valve, Bronze Strainer,
c) Ratings: 175 psi Maximum
d) Manufacturer/Model: Watts Model 002M2-QT

3) Water Meter (as specified by City of Fall River)

a) Size: 1.5-Inch
b) Construction: Bronze
c) Features: Automatic Meter Register (ARM), Threaded Input and Output for Nipples and Unions

4) 2-Inch Brass Master Valve (see Irrigation Product Below)
5) 2-Inch Brass Flow Sensor (see Irrigation Product Below)

b. Flow and pressure requirements at Athletic Field:

1) Flow: Maximum 65 gallons per minute
2) Pressure: 80 pounds per square inch (downstream of all plumbing)

B. Electrical Power Source to New Outdoor Controller

1. New electrical circuits to be provided by Electrical Contractor (Refer to Division 26 Electrical).

a. Power Requirements for Irrigation Controller within Pedestal

1) 120-Volt, 1-Phase, 60-Hz, 20-Amp Breaker
2) Irrigation Controller has internal transformer for 24VAC valve two-wire

b. Conduits

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1) Provide minimum Schedule 80 PVC conduits through Irrigation Controller pedestal concrete pad with long elbow sweeps and under all hardscape through sleeves.

C. Internet for Outdoor Controller

1. Provide Cellular Service through Irrigation Controller manufacturer for remote, internet-based access through any web-enabled device.

D. Pipe Sleeves

1. Pipe sleeves to be provided by Earthwork Contractor beneath all hardscape, as indicated on Construction Drawings.

a. Pipe sleeve requirements

1) Two (2) parallel 4-inch Schedule 40 PVC
2) Extend 18 inches beyond edge of hardscape
3) Minimum cover: 24 inches

1.5 RELATED REQUIREMENTS

A. Coordinate with other project trades and refer to overall project Construction Document Specifications and Drawings, including, but not limited to:

1. General Requirements
2. Existing Conditions
3. Concrete
4. Plumbing
5. Electrical
6. Earthwork
7. Exterior Improvements
8. Utilities
9. Construction Drawings:

a. IR-1.0 – Irrigation Plan
b. IR-2.0 – Irrigation Details
c. IR-2.1 – Irrigation Details
d. Review all other Project Construction Documents for coordination.

1.6 APPLICABLE STANDARDS AND CODES

A. At a minimum, comply with the following standards and codes:

1. American Society for Testing and Materials (ASTM)
2. National Standard Plumbing Code (NSPC)
3. National Electric Code (NEC)
4. National Sanitary Foundation (NSF)
5. Underwriters Laboratories, Inc. (UL)
6. Occupational Safety and Health Administration (OSHA)

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B. Comply with applicable laws, standards, and regulations of the local governing authority. All local laws more stringent than those referenced above shall take precedent.

1.7 SUBMITTALS

A. Submit the following under provisions of specified Submittal Procedures:

1. Literature: Manufacturer's product data sheets, specifications and installation instructions for materials listed in this Specification (Part 2 – Products).

a. Product submittals shall be concise (no extraneous pages or sections) and clearly marked to show submitted product model, type, size, etc.
b. Substitute Product Submittal:

1) Provide specified product submittals for “an approved equal” to Owner’s Representative for approval.
2) Alternate products are acceptable when products of equal or better quality and performance are submitted and approved by the Owner’s Representative.
3) Substitute Product Submittals constitute representation that:

a) Substitute products have been thoroughly investigated and have been determined to be equal or superior in all respects to that specified.
b) Substitute products shall provide the same warranties as specified products.
c) Substitute products are compatible with interfacing items.
d) Assume responsibility of and guarantee system performance as a result of product substitution, including making all subsequent changes to meet design specifications.

c. Work shall not commence until all products specified are submitted and approved in a written notification by Owner’s Representative.
d. All product installed shall be new, without defects, and of quality and performance as specified.

2. Schedule: Submit Schedule of all products to be furnished hereunder, indicating manufacturer, size, and model.

a. Ensure that all of the types/styles of products and installation equipment specified herein can be furnished by the manufacturer submitted.
b. Provide all spare irrigation parts as noted (see Spare Irrigation Parts)
c. Prior to submitting schedule, confirm current site conditions are as provided in the Construction Drawings.

1.8 DELIVERY, STORAGE AND HANDLING

A. Do not deliver materials to the site, until all specified submittals have been submitted to, and approved by, the Owner’s Representative.

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B. Coordinate with Owner's Representative for temporary storage and staging areas.

C. Protect materials from damage from construction traffic, weather, corrosion, and other causes while stored on-site. Minimize on-site storage as possible.

D. Store and handle all products and materials in compliance with manufacturer instructions and recommendations.

1.9 GUARANTEE AND REPLACEMENT

A. Guarantee entire irrigation system, parts and labor, for one (1) year from official written date of acceptance by Owner's Representative. Provide written warranty showing date of completion and period of warranty prior to request for final payment.

B. System malfunctions occurring during the guarantee period due to defective materials, poor workmanship, or improper adjustment shall be corrected to satisfaction of Owner's Representative at no additional cost to the Owner.

1. Repair all defects within 10 days of notification from Owner or Owner's Representative.
2. Repair defects with approved products.

C. First-year spring system start-up and winterization shall be included in system guarantee.

D. Manufacturer warranties shall be provided for all products and materials where such warranties are offered in published product data. Copies of manufacturer warranties are to be included in the Operations and Maintenance Manual (See Operation and Maintenance).

PART 2 – PRODUCTS

2.1 AUTOMATIC IRRIGATION CONTROLLER

A. Controller

1. Size: 54-Station Maximum
2. Construction: Electronic with 120-Volt Input and 24-28 Volt Output; Outdoor Stainless-Steel Pedestal Enclosure.
3. Standards: UL-Listed
4. Features: Manual and Automatic Control, Water Budgeting, Cycle-Soak, Sensor Input Terminals, Internal Transformer, Flow Monitoring Capability, Lightning Protection, Remote Control via Internet, Conventional Wire with Two-Wire Capability.
5. Manufacturer/Model: Rain Bird, ESP-LXD, Baseline BaseStation 1000, Hunter ACC2 Decoder, or Approved Equal.

B. External Devices (Matching Manufacturer and Compatible with Controller)

1. Stainless Steel Pedestal Enclosure (VIT Strongbox, Model SB-16SS)
2. Wired Rain Sensor (free of Overhead Obstruction), with Enclosure Welded to Pedestal

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3. 2-Inch Brass Flow Sensor with Decoder (Inside Backflow Enclosure)

   a. Provide Isolation Valves and Unions on Each Side for Winterization
   b. Flow Range = 4 – 80 gpm

4. Decoders
5. Lightning Surge Suppression

C. Outdoor Controller Grounding

1. Size

   a. Wire: 6AWG
   b. Rod: 5/8-Inch Diameter x 8-Foot Long
   c. Plate: 4-Inch x 96-Inch x 1/16-Inch Thick

2. Construction

   a. Wire: Bare Copper
   b. Rod: Copper
   c. Plate: Copper with Loresco PowerSet Ground Enhancement Material Above and Below

3. Ratings: UL-Listed

   a. Features: Cadweld Connectors from Wire to Rod, Plate Manufacturer provided Plate Connections, PVC or ADS Drain Pipe and Grate Cover over Rod Plate with Metal Detection

2.2 WIRE

A. Two-Wire

1. Size: 14/2 AWG Minimum
2. Construction: Dual Strand Solid Copper Conductors with PVC Insulation and Poly Jacket.
3. Ratings: UL-Listed, NEC (Class II Circuit), Direct Burial UF/TWU, up to 600-Volt Potential
4. Standards: ASTM B-3, ASTM B-8
5. Markings: Manufacturer, Rating, Size, and Type
6. Manufacturer/Model: Coleman Cable #51452; Paige P7072D, P7296D, P7350D, and P7354D; Regency 14/2 and 12/2 Maxi Cable; Hunter Decoder Jacketed; Service Wire Company DEC12/2BE and DEC 14/2BE; or Approved Equal.

B. Conventional Wire (From Decoders to Electric Zone Valves)

1. Size: 14AWG Minimum
2. Construction: Single Strand Solid Copper Conductor with PVC Insulation
3. Ratings: UL-Listed, NEC (Class II Circuit), Direct Burial UF/TWU, up to 600-Volt Potential
4. Standards: ASTM B-3, ASTM B-8
5. Markings: Manufacturer, Rating, Size, and Type

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6. Manufacturer/Model: Paige Electric Model P7001D; Service Wire Company UF14, UF12; Regency Wire & Cable 14AWG, 12AWG; or Approved Equal.

C. Wire Splices

1. Type: Direct Burial Wire Splice Kit (All Components Intact)
2. Construction: Lockable Plastic Tube, Pre-Filled with Insulation Gel
3. Ratings: UL-Listed, NEC, Direct Burial and Submersion, up to 600-Volt Potential
4. Manufacturer/Model: 3M DBY-6; Rain Bird DB Series; or Approved Equal.

D. Wire Conduit

1. Size: 1-Inch Minimum
2. Construction: PVC, Solvent Weld
3. Ratings: Schedule 80
4. Fittings: Long Sweep Elbows
5. Manufacturer: Cresline; Certainteed, JM Eagle; or Approved Equal.

2.3 PIPE AND FITTINGS

A. Irrigation Mainline and Lateral

1. Size: 2.5-Inch Mainline, Lateral Sizes as Noted on Plans
2. Construction: Polyvinyl Chloride (PVC), Solvent Weld
3. Ratings: Schedule 40 PVC
4. Markings: Manufacturer, Nominal Size, Class or Schedule, Pressure, Extrusion Date, Pipe Insertion Mark.
5. Manufacturer: Cresline; Certainteed; JM Eagle; or Approved Equal.
6. Fittings

   a. For Valves Toe Nipples: Schedule 80 PVC
   b. Other Fittings: Schedule 40 PVC

7. Markings: NSF Designation, Size, Class or Schedule
8. Manufacturer: Lasco; Spears; Dura; or Approved Equal
9. Solvent

   a. Type: NSF Type I or Type II PVC
   b. Standards: ASTM D-2564
   c. Manufacturer: IPS Weld-On 711; Oatey HD Cement; Rectorseal Gold; or Approved Equal

10. Primer

    a. Type: NSF for PVC
    b. Standards: ASTM F-656
    c. Manufacturer: IPS Weld-On P-68; Oatey Clear Primer; Rectorseal Jim PR-2; or Approved Equal

2.4 ELECTRIC ZONE VALVES

CONFORMED

A. Sprinkler Zone Valve

1. Size: 1-Inch, 1.5-Inch, 2-inch
2. Construction: Plastic Globe Valve with Reinforced Nylon or Fiberglass Body
3. Ratings: 200 psi
4. Features: Manual Bleed Screw, Flow Control, Pressure Regulation, and Filter/Scrubber
5. Manufacturer/Model: Hunter ICV-FS; Rain Bird PESB; or Approved Equal

B. Master Valve (installed in Backflow Enclosure)

1. Size: 2-Inch
2. Construction: Brass Globe Valve
3. Ratings: 220 psi
4. Features: Manual Bleed Screw, Flow Control, Pressure Regulation, and Filter
5. Manufacturer/Model: Hunter IBV-FS; or Approved Equal

2.5 ISOLATION VALVES

A. Small Mainline Isolation Valve

1. Size: 2-Inch and Smaller
2. Construction: Bronze, Gate Valve
3. Ratings: 200 psi
4. Features: Steel Cross Handle, Non-Rising Stem
5. Manufacturer/Model: Nibco T-113K; Apollo 102T-K; or Approved Equal

2.6 QUICK COUPLING VALVES

A. Small Mainline Quick Coupling Valve

1. Size: 1-Inch, Normally Closed
2. Construction: Brass, Spring-Loaded Valve Seat, Key Engaged
3. Ratings: 125 psi
4. Features: 1-Inch NPT Inlet, ACME Key, Locking Vinyl Cover, Anti-Rotation Stabilization Wings

a. Swing Joint Assembly

1) Size: 1-Inch
2) Construction: PVC, with O-Ring Seals and Brass Threaded Outlet
3) Manufacturer: Hunter HSJ-1 with SnapLok; or Approved Equal

5. Manufacturer/Model: Hunter HQ-44RC-AW; or Approved Equal.

2.7 VALVE BOXES

A. General

1. Size:

CONFORMED

a. 12-Inch Standard Valve Box

1) Single 2-Inch Electric Zone Valve
2) Double 1-Inch or 1½-Inch Electric Zone Valves

b. 6-Inch Round

1) Wire Splice
2) Decoder Cable Fuse Device
3) Decoder Grounding Rod

c. 10-Inch Round

1) Single 1-Inch or 1½-Inch Electric Zone Valve
2) Isolation Valve
3) Quick Coupling Valve

2. Construction: Resin
3. Ratings: Tensile Strength 3,000-5,000 psi
4. Color: Green or Black (per Owner's Representative)
5. Features: Lockable, Bolt-Down Covers, Brick Supported
6. Manufacturer/Model: Carson, Model Specification Grade NDS Pro; Rain Bird VB; or Approved Equal

2.8 SPRAY SPRINKLERS

A. Body

1. Size: 6-Inch Pop-Up for Lawn, 12-Inch for Groundcovers and Shrubs
2. Construction: Plastic, Ratcheting Riser, Removable Nozzle, Internal Check Valve
3. Ratings: Pressure Regulated to 30 psi
4. Manufacturer/Model: Hunter PROS-6-PRS30-CV and Hunter PROS-12-PRS30-CV; or Approved Equal

B. Nozzles

1. Size: 2' – 15' Radius (see Contract Drawings)
2. Features: Full and Part-Circle Fixed-Arc and Strip Patterns, Special Micro-Stream
3. Manufacturer/Model: Hunter Pro Spray; Rain Bird MPR; Toro Precision; or Approved Equal

2.9 ROTARY SPRINKLERS

A. Body

1. Size: 6-Inch Pop-Up
2. Construction: Plastic, Ratcheting Riser, Removable Nozzle, Internal Check Valve
3. Ratings: Pressure Regulated to 40 psi
4. Manufacturer/Model: Hunter PROS-06-PRS40-CV; Rain Bird 1806-SAM-PRS-P45, or Approved Equal

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B. Nozzles

1. 12' – 30' Radius (see Contract Drawings)
2. Features: Full and Part-Circle Fixed-Arc and Strip Patterns
3. Manufacturer/Model: Hunter MP Rotator, Toro Precision Rotating, or Approved Equal

2.10 GEAR-DRIVEN ROTOR SPRINKLERS

A. General

1. Size: 6-Inch Stainless Steel Pop-Up Riser with 1-Inch NPT Bottom Inlet
2. Ratings: 37 – 81 feet Radius, 30 – 100 psi Pressure, 3 – 36 gpm Flow
3. Construction: Gear-Driven, Removable Nozzle, Internal Check Valve, Stainless Steel Retraction Spring, Rubber Cover, Stainless Steel Riser
4. Features: Adjustable, Part, and Full Circle
5. Manufacturer/Model: Hunter I-25-06-SS; Rain Bird 8006-SAM-PRS-SS, or Approved Equal
6. Spacing: As shown on Drawings, generally 80% - 100% of manufacturer rating

B. Swing Joint Assembly

1. Size: 1-Inch with 12-Inch Lay Arm
2. Construction: PVC, with O-Ring Seals and Threaded Outlet
3. Manufacturer: Hunter HSJ-1-12; Rain Bird TSJ-12; Lasco G132-100 or Approved Equal
4. Provide Combination PVC Insert Tee Fitting with FPT Outlet at Lateral for Swing Joint

2.11 EARTH MATERIALS

A. Stone (in Valve Boxes)

1. Type: ¾-Inch (minimum) Crushed Stone

B. Clean Sand

1. Gradation: (passing by weight)

a. No. 4 Sieve= 80% Minimum
b. No. 200 Sieve = 5% Maximum

C. Concrete

1. Ratings: 3,000 psi 28-day Compressive Strength
2. Standards: ASTM C-33, ASTM C-94, ASTM-C150

2.12 CURB STOP AND WASTE VALVE

A. Size: 2-inch, Flared Ends with Curb Stop Key

B. Construction: Brass

C. Ratings: 175 psi Maximum

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D. Features: Stop and Waste Feature for Winterization near Backflow Enclosure

E. Manufacturer: Mueller, Ford, or approved manufacturer

2.13 CURB BOXES AND LIDS

A. Size: 1-inch Upper Section, 2-inch Lower Section, Length to Match Finish Grade

B. Construction: Cast Iron Base and Lid per ASTM A48, Brass Plug per AWWA C800, Steel Upper Section

C. Ratings: 300 psi Maximum

D. Features: Arch Pattern, Phosphor Bronze Spring Friction Ring, Plug Style Lid

E. Manufacturer: Ford, EA2-xx-40 style or approved manufacturer

2.14 BACKFLOW PREVENTER

A. Size: 2-inch

B. Construction: Bronze with Quarter Turn Ball Valve with Strainer

C. Ratings: 175 psi Maximum

D. Manufacturer: Watts, Model 009M2-QT-S, or approved equal

2.15 WATER METER

A. Size: 1.5-inch

B. Construction: Bronze

C. Features: Automatic Meter Reading Option, Threaded Inlet and Outlet

D. Manufacturer: As specified by City of Fall River

2.16 BACKFLOW AND METER ENCLOSURE

A. Size: 60 inches long x 24 inches wide x 39 inches high. Concrete Pad shall be 72 inches long x 36 inches wide x 8 inches thick (4-inch reveal) with 1-inch Chamfer on Top Edge. Enclosure pad shall be installed on 12 inches of level crushed stone.

B. Construction: Marine-Grade Aluminum (Painted Hunter Green at Factory, to be approved by Owner)

C. Features: Lockable with Padlock

D. Ratings: Insulated

E. Manufacturer: VIT Strongbox, Model PE-60AL, or approved equal

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2.17 COPPER PIPE

A. Size: 2-inch Maximum

B. Construction: Type K Copper

C. Standards: ASTM B-88

D. Fittings: Wrought Copper, Silver Solder Joint (per ASTM B-828), Non-Corrosive Flux

2.18 ANGLED BALL METER VALVES

A. Size: 2-inch

B. Construction: Brass (85-5-5-5), Factory Installed Handles

C. Fittings: Elliptical Meter Flange (for 2-Inch Valves)

D. Manufacturer: Mueller, or Approved Equal

2.19 SPARE PARTS

A. Wrenches, Keys, and Tools for Servicing and Adjusting Sprinkler Heads (2)

B. Quick Coupler Valve Keys (1)

C. Gate Valve (1 of each size on Drawings)

D. Electric Zone Valve (1 of each size on Drawings)

E. Sprinkler Heads and Nozzles (3 of Each)

F. Assorted Valves and Fittings

PART 3 – EXECUTION

3.1 GENERAL

A. Competent superintendents and assistants shall be on-site at all times during product delivery, installation, testing, and system adjustments.

1. Field communication by Owner or Owner's Representative to superintendent shall be binding.

B. System features shall be laid out as indicated on Drawings, making minor adjustments for variations in planting arrangements or field conditions. Major changes shall be reviewed with Owner's Representative before acceptance.

1. Irrigation lines shown on Construction Drawings are diagrammatic only. Location of irrigation equipment is contingent upon and subject to integration with all other underground utilities, tree roots, and hardscape design elements.

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3.2 EXAMINATION

A. Review and verify project conditions are as indicated on Construction Drawings prior to starting work, including but not limited to:

1. Utilities provided by Others
2. Site grades and dimensions
3. Athletic Field, landscaping and features
4. Structures
5. Pipe sleeves

B. Report any irregularities of site conditions to the Owner's Representative prior to beginning work.

C. Beginning of installation connotes acceptance of existing project conditions.

3.3 PROJECT COORDINATION

A. Coordinate with Owner's Representative to expeditiously install system.

B. Provide written notifications (electronic is acceptable) to Owner's Representative prior to work commencement, weekly for progress report, for any proposed changes to system design, and upon installation completion.

C. All questions of design intent, proposed design changes, field notifications, and product substitution after installation commences shall be in writing to Owner's Representative as a Request for Information (RFI).

D. Utility Coordination:

1. Maintain 6-inch minimum clearance between irrigation lines and any utility line. Do not install sprinkler lines directly above another utility of any kind.
2. Exercise care when excavating, trenching and working near existing utilities.

3.4 SITE PROTECTION

A. Protect landscaping, paving, structures, walls, footings, etc. from damage caused during work. Damage to work of another trade shall be reported at once.

B. Replace or repair any damage with same product or material, to the satisfaction of Owner's Representative at no additional cost to the Owner per Guarantee.

C. Route pipe as necessary to prevent damage to tree roots. Where trenching must occur near trees, provide proper root pruning and sealing methods to all roots 1-inch and larger.

3.5 EXCAVATION, TRENCHING, AND BACKFILLING

A. Notify and request approval from Owner's Representative if pipe pulling is the intended installation method. Pipe pulling is an accepted installation practice only under the following conditions:

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1. Maximum pipe size 2 inches, and
2. Suitable soils (i.e. naturally rounded loamy soils without sharp rocks), and
3. Specified pipe burial depth can be maintained.

B. Pipe Trench:

1. Excavate trenches straight and true, minimizing site disturbance as possible.
2. Final trench bottom shall be undisturbed soil and shall be free of rocks and debris larger than 1 inch or with sharp edges. If trench base is unsuitable for laying pipe, over excavate 2 inches below pipe invert, and place Clean Sand or Stone.

C. Clean Backfill:

1. Material: Clean Sand (See Earth Materials)

   a. Clean backfill must be free of foreign material, debris, frozen material and rocks larger than 1-inch.

2. Carefully place clean backfill a minimum depth of 10-inches over pipe and wire, tamp in place.
3. Carefully place material around pipe and wire, tamp in place.

D. Trench Backfill:

1. Material: Re-use excavated material

   a. Clean backfill must be free of foreign material, debris, frozen material, and rocks larger than 1-inch.

2. Place and compact in maximum 6-inch lifts to dry density equal to undisturbed soil. Compaction by truck or equipment tires is prohibited.
3. Avoid backfilling in hot weather.
4. Match adjacent subsurface grades without hills or depressions. Repair settling (as required by Guarantee).
5. If final planting soils, mulch, or sod were removed or disturbed during trenching, replace to match Project Specifications and regrade as necessary.

   a. Use sod cutter where applicable, or reseed disturbed areas to acceptance of Owner.

3.6 PIPE INSTALLATION

A. PVC Pipe Installation:

1. Cut plastic pipe with handsaw or pipe cutter, removing all burrs at cut ends. All pipe cuts shall be square and true. Bevel cut end as required to conform to manufacturer instructions.
2. Make all solvent-weld joints as per manufacturer's instructions and avoid applying excess primer or solvent. Do not wipe off excess solvent from each connection.

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a. Allow welded joints minimum 5 minutes set-up/curing time before moving or handling.

1) Above 80ºF: Allow connections to set 24 hours
2) Below 80ºF: Follow manufacturer instructions
3) Below 40ºF: Prohibited

3. Maximum deflection per joint shall not exceed manufacturer limits.
4. Maintain 1-inch minimum between lines which cross at angels of 45 to 90 degrees

B. Pipe and wire shall run in same trench as mainline, at the elevation of the pipe invert (See Wire Installation).

C. Pipe Cover (unpaved surfaces):

1. PVC Mainline = 22 inches
2. PVC Lateral = 16 inches

D. Pipe Protection:

1. Prevent foreign material from entering pipe during installation.
2. Open ends of pipe shall be closed by watertight plug or seal when not in use.
3. Securely store pipe when not scheduled for installation.
4. Pipe shall not be installed when water is in trench, during rainstorms, or when temperature is below 40 ºF.

a. No additional pipe may be installed or backfilled if water enters trench during pipe installation. Remove all water from trench before resuming installation.
b. Pipe installed at temperatures below 40 ºF shall be removed and replaced at no cost to owner.

5. Trenched PVC pipe shall be snaked to accommodate for expansion and contraction due to changes in temperature.

3.7 PIPE SLEEVE INSTALLATION

A. Coordinate with Owner's Representative for provided pipe sleeves and locations installed by Earthwork Contractor.

B. New Pipe Sleeves:

1. Pipe Sleeve Cover: Minimum 24 inches
2. Install pipe sleeves where irrigation pipe runs under hardscape (see Construction Drawings).
3. Extend pipe sleeves minimum 18 inches beyond edges of hardscapes.
4. Prior to installation of pipe, pipe sleeve ends shall be field marked with vertical wood stakes extending above grade to allow field location during irrigation system installation.

C. Cutting through or jacking under new pavement shall be strictly prohibited. Failure to

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provide sleeves shall require notification to Owner's Representative for resolution.

3.8 ELECTRICAL CONDUIT INSTALLATION

1. Outdoor Electrical conduit shall be installed:

   a. Under and through all hardscape areas
   b. For all above ground wiring

2. Electrical conduit shall extend 18 inches beyond edges of hardscape.

3.9 ELECTRIC ZONE VALVE INSTALLATION

A. Install electric zone valves on level crushed stone base generally where shown on Construction Drawings. Do not pour stone around valves that are already installed.

B. Install all Schedule 80 PVC threaded nipples with Teflon tape, isolation valves, and/or union couplings in and out of electric zone valves as shown on details on Construction Drawings.

C. Set valves plumb with adjusting handle and all bolts, screws, and wiring accessible through valve box opening.

D. Install at sufficient depth to provide between 4-6 inches of cover from top of valve to finish grade.

E. Install specified valve box over all electric zone valves. Ensure lid is flush with final proposed grade (coordinate with Site Contractor).

F. Adjust zone valve operation after installation using flow control device on valve.

3.10 ISOLATION VALVE INSTALLATION

A. Install isolation valves per detail where indicated on Construction Drawings.

B. Install all isolation valves on level crushed stone base for operation ease with appropriate valve wrench. Do not pour stone around valves that are already installed.

C. Install specified valve box over all isolation valves. Ensure lid is flush with final proposed grade (coordinate with Site Contractor).

D. Check and tighten valve bonnet packing before valve box and backfill installation.

3.11 QUICK COUPLING VALVE INSTALLATION

A. Install quick coupling valves where indicated on Construction Drawings; generally, at ends of mainline branches and immediately downstream of well.

B. Mount mainline quick coupling valves on 1-inch diameter, 12-inch long brass swing joint assemblies and stabilizers.

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C. Where mainline pressure exceeds 60 psi, install pressure regulating valves to 40 psi off quick coupling valve service tee.

3.12 WIRE INSTALLATION

A. Install wiring per local codes for less than 30-Volt service.

B. Install valve two-wire in trench alongside mainline at invert elevation. Backfill carefully to avoid any damage to wire insulation on conductors.

1. In areas of unsuitable material, use clean sand in bottom of trench before placing wire (see Excavation, Trenching, and Backfilling)
2. Minimum cover: 12-inches

C. Maintain sufficient slack for expansion, contraction and servicing. Do not install wiring tightly.

1. Provide and install additional 8 to 12 inches slack for conventional wire from decoder to valve.
2. Provide 30 inches slack between decoders for two-wire.
3. Provide sufficient length of wire in valve boxes to allow valve solenoid, splice, decoder wire, and all connections to be brought above grade for servicing.
4. Coil slack for neatness in valve box.

D. Install Decoder Cable Fuse Device as shown on Contract Drawings.

E. Provide waterproof splices at all in-ground wire connections using approved splice kits. All splices shall be made in valve boxes and recorded on Record Drawings.

F. Provide complete wiring diagram showing wire routing for connections between controller and valves as specified in Record Documents.

G. Securely store wire when not scheduled for installation.

3.13 GROUND INSTALLATION

A. Controller Grounding

1. Wire 6AWG Bare Copper Wire to Grounding Rod and Plate as shown on drawings.
2. Grounding Rod

a. Coordinate with Site Contractor to ensure no obstructions below grade at grounding rod site (Call 811 / DIG-SAFE if necessary)
b. Prepare valve box for grounding rod installation 8 feet from all valve boxes and electrical equipment. Drive 8-foot grounding rod into earth with 6 inches minimum below valve box lid.
c. Make Cadweld connection between bare copper wire from lightning arrestor splice to grounding rod lug.

3.14 SPRINKLER INSTALLATION

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A. Sprinklers shall not exceed maximum spacing as indicated on Construction Drawings.

B. Install sprinklers flush with grade on PVC swing joints as specified.

C. Flush system before installing internals, flush caps, and nozzles (see Testing and Adjustments)

D. Adjust all sprinklers after installation using flow control device on valve. Do not exceed radius reduction recommendations from manufacturer.

3.15 VALVE BOX INSTALLATION

A. Furnish and install valve boxes as per valve schedule above for each valve, splice, or sensor.

B. Install valve boxes on minimum 4-inches crushed stone base. Pouring stone into valve box after installation is not acceptable.

C. Finish elevation of all boxes shall be at grade, unless otherwise noted in Drawings.

D. Provide level brick supports beneath valve boxes.

1. For square/rectangular boxes, provide four (4) supports - one at each corner.
2. For round boxes, provide three (3) supports equally spaced.

3.16 AUTOMATIC IRRIGATION CONTROLLER INSTALLATION

A. Controller

1. Controller located inside Stainless Steel Enclosure.
2. Wire valves and external sensors into controller through conduits and set proper programming.
   a. Program “Cycle-Soak” feature for all zones with sloped or poorly draining soils.
3. Use Irrigation Plans provided for Recommended Quantity and Assignment
4. Using licensed electrical, wire controller to 120-Volt, 20-Amp electrical supply provided by Electrical Contractor.
5. Provide keys to Owner after final walkthrough.

B. Rain Sensors

1. Install sensors within Sensor Guard welded to irrigation controller enclosure. Wire sensor through Sensor Guard, through enclosure, and into Controller.
2. Exposed sensor wire shall be installed within ½-inch galvanized conduit, where applicable.
3. Rain Sensor shall have direct overhead exposure to atmospheric conditions and not in contact with overhead irrigation.

C. Grounding

1. Provide outdoor grounding for irrigation controller with grounding rod and grounding plate. Refer to Ground Installation and Construction Drawings details for installation steps.

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3.17 TESTING AND ADJUSTMENTS

A. Include all testing and adjustments in submitted bid price.

B. System Flushing:

1. Open electric zone valves and flush out irrigation system under full head of water before installing sprinkler internals, flush caps, and nozzles.
2. Flush entire irrigation system after complete installation.
3. Clogged nozzles shall be remedied after completion of irrigation system.

C. Testing:

1. Test all pipe and valves for leaks at operating pressure. Repair all leaks and retest until leaks are remedied.
2. Perform coverage test with Owner's Representative present. Operate electric zone valves for five (5) minutes minimum during coverage test. Readjust sprinkler nozzles and head locations (as necessary) to attain proper coverage. Replace any equipment that does not meet specified standards.
3. After testing, clean all equipment of debris during installation.

D. Adjust sprinkler heads and valve boxes as necessary for mowing and landscaping.

E. Throughout guarantee period, adjust sprinklers and ensure coverage due to settlement and landscaping operations.

3.18 RECORD DOCUMENTS

A. Record (As-Built) Drawings

1. Maintain and update Record Drawings with red-line markings as project progresses, including locations of:

   a. Sprinklers and descriptions (nozzle, pop-up height, and type)
   b. Valve Boxes and descriptions (valve type, zone numbers, splice, etc.)
   c. All equipment installed with distinct symbols
   d. Pipe routing and tees
   e. Wire routing and splices

2. Locations of installed equipment (valve, controller, sensors) shall be referenced by two permanent locations (swing ties) or GPS.
3. Make all notes legible as work progresses, any new equipment added shall use distinct symbols denoting location.
4. Document any changes from original Construction Drawings.
5. Prints of original Construction Drawings may be obtained from the Owner's Representative at cost (0% markup).
6. Record Drawings shall be used as basis of payment for work completed. Provide copies of red-lined set to Owner's Representative along with payment request.

B. Record Documents

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1. Record Documents shall be on-site at all times. Maintain record of the following as the project progresses:

    a. Materials Approved and approval date
    b. Pressure Test results, testing personnel and testing date.
    c. Materials delivered, Accepted, and Installed by whom and date.
    d. Field Communications and Requests for Information (RFI)

C. Prior to final punchlist, provide complete electronic and hard copy files of Record Drawings and Documents to Owner's Representative as part of project completion. All information must be complete and shall be added to submitted documents prior to acceptance.

3.19 OPERATION AND MAINTENANCE

A. General

1. Bid price shall include up to four (4) hours of irrigation system overview and instruction with Owner and/or Owner's Representative.

B. Operation and Maintenance Manual

1. Provide three (3) hard cover binders titled "Operation and Maintenance for City Pier Irrigation System" prior to application for acceptance and final payment.
2. Operation and Maintenance Manual shall include, but not be limited to:

    a. Title Page and Table of Contents
    b. One-Paragraph Written Description of Irrigation System
    c. Manufacturers' Data and Cut Sheets of Equipment, including:

        1) Copies of all approved submittals
        2) Wire resistance readings to each electric valve at completion (for future troubleshooting)
        3) Recommended operating settings
        4) Recommended maintenance schedule
        5) Name, address, and telephone number of installer (for repairs, spring startup, and winterization during 1-year guarantee period)
        6) Irrigation program for periods without rain and recommended settings including, zone run time, days per week, cycle-soak, and rain sensor suspension.
        7) Web Based Application Server settings, login, and troubleshooting

    d. Winterization and Spring Startup Instructions (after 1-year guarantee period)
    e. Guarantee Data
    f. Pockets with Folded Plans of:

        1) Original Design Drawing
        2) Final Record Drawing
        3) Controller Valve and Wiring System Diagram Drawing
        4) Stop-and-Waste Valve Locations

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3.20 SITE CLEANUP

A. Remove all unused materials and equipment from project site safely and efficiently. Dispose of all unused materials legally - including construction debris and trash.

B. Adjust ground, compact, and re-plant around irrigation sprinkler heads and trenches as necessary for proper angle and elevation.

C. Fill all depressions, erosion rills, tire tracks, etc. with proper planting soil mix to ensure site drainage.

3.21 FINAL OWNER ACCEPTANCE

A. Final Owner Acceptance of Irrigation System is predicated on:

1. Complete system installation, adjustment, testing, and instructional overview.
2. Submission of Operation and Maintenance Manuals to Owner's Representative.
3. Proper Programming and Internet Connection of Automatic Irrigation Controller
4. Completed and approved all punchlist items.

B. Owner and/or Owner's Representative shall provide written notice (hard copy and/or electronic) for Final Acceptance. Date of Final Acceptance notice shall serve as start of 1-year Guarantee period as described above.

END OF SECTION 02810

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SECTION 02870

SITE FURNITURE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for installation of Benches and Tree Grates

B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading
2. Section 03300 CIP Cement concrete sidewalks

1.02 REFERENCES

A. This specification makes reference to the requirements of additional specifications as listed.

1.03 SUBMITTALS

Manufacturer's Literature

A. Provide all Manufacturers' Product Data cut sheets for all products including colors and finishes.

PART 2 PRODUCTS

2.01 MATERIALS

A. Bench shall be

1. Model 490 as manufactured by DuMor, PO Box 142, Mifflintown, PA 17059. or approved equal, to match existing benches at the site in all ways. Located and installed as shown on the drawings.

B. Bike Racks shall be

1. Dero Bollard style bike hitch or equal. Shall be as manufactured by Iron Age Designs, Burien, WA., 206-276-0925

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PART 3 EXECUTION

2.01 PREPARATION

A. Prior to excavating, confirm bench locations and measure to verify clearances.

B. Positively verify that there are no utilities present in conflict with the excavation

C. Inspect all abutting conditions and confirm final line and grade prior to starting work.

2.02 INSTALLATION

A. General

1. Review manufacturer's data regarding the bench.
2. Place Bench in position and confirm location with the Engineer.

B. Install Bench per manufacturer's recommendations at locations as shown on the drawings. Install plumb and level. Repair minor damage to finish in accordance with manufacturer's instructions and ass approved by the Engineer. Remove and replace any damaged or defective components that cannot be successfully repaired. Clean promptly after installation per manufacturer's instructions using materials that will not damage finish.

1. Drill and set tamper-proof epoxy anchor bolts to secure the bench. Size bolts as per manufacturers recommendations.

END OF SECTION

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SECTION 02930

LOAMING AND SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for loaming, fertilizing, seeding, and related work in areas disturbed in the process of performing the Work under this contract.

1.02 SUBMITTALS

A. In accordance with SECTION 01300 submit the following:

1. Submit with seed, certificates confirming seed mixture, purity, germinating value, and crop year identification.
2. Submit test samples of loam.

1.03 DELIVERY, STORAGE AND HANDLING

A. Fertilizer:

1. Delivered mixed as specified in standard size, unopened containers showing weight, analysis, and name of manufacturer.
2. Store in weather proof place.

B. Seed:

1. Delivered in original unopened containers with mixture listed.

PART 2 PRODUCTS

2.01 LOAM

A. Fertile, natural topsoil, typical of locality, without admixture of subsoil, refuse or other foreign materials, and obtained from well-drained arable site. Mixture of sand, silt and clay particles in approximately equal proportions. Free of stumps, roots, heavy or stiff clay, stones large than 1 inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other deleterious matter.

B. Not less than 5 percent nor more than 20 percent organic matter as determined by loss on ignition of oven-dried samples.

C. Loam test samples dried to constant weight at temperature of 230 degrees. F., plus or minus nine degrees.

D. Use loam, having prior vegetative growth that did not contain toxic amounts of either acid or alkaline elements.

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2.02 LIME, FERTILIZER AND SEED

A. Ground agricultural limestone containing not less than 85 percent of total carbonates.

B. Complete fertilizer, at least 50 percent of nitrogen derived from natural organic sources of ureaform and containing following percentages by weight:

Nitrogen 10% Phosphorus 10% Potash 10%

C. Turf grass seed, clean, high in germinating value and latest year's crop mixture as follows:

Name	**Minimum Proportion by Weight**	**Percent Purity**	**Percent Germination**
Kentucky bluegrass	20%	87%	85%
Merion Kentucky bluegrass	20%	87%	85%
Red Chewings fescue	45%	98%	85%
Italian rye	15%	98%	90%

PART 3 EXECUTION

3.01 GENERAL

A. Supply suitable quantities of water, hose and appurtenances.

3.02 LOAM

A. Spread loam on areas to 6-inch depth after compaction, fine grade and compact.

3.03 LIME, FERTILIZER AND SEEDING

A. Apply lime by mechanical means at rate of 3000 pounds per acre.

B. Apply fertilizer at rate of 1200 pounds per acre.

C. Remove weeds or replace loam and reestablish finish grades, if any delays in seeding lawn areas and weeds grow on surface or loam is washed out prior to sowing seed and without additional compensation. Sow seed at rate of 175 pounds per acre on calm day, by mechanical means. "Hydro-Seeding" not permitted unless otherwise permitted or required by Engineer. Sow one-half of seed in one direction, and other half at right angles to original direction. Rake seed lightly into loam, to depth of not more than 1/4 inch and compact by means of an acceptable lawn roller weighing 100 to 150 pounds per linear foot of width.

D. Coordinate Installation with Irrigation System Operations. Water lawn areas adequately at time of sowing and daily thereafter, initially with fine spray, and continue throughout maintenance and protection period.

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E. Seed during approximate time periods of April 1 to May 15 and August 15 to October 1, and only when weather and soil conditions are suitable for such work, unless otherwise permitted.

3.04 MAINTENANCE OF SEEDED AREAS

A. Maintain lawn areas and other seed areas at maximum height of 2-1/2 inches by mowing at least three times. Weed thoroughly once and maintained until time of final acceptance. Reseed and re-fertilize with original mixtures, watering or whatever is necessary to establish over entire area of lawn and other seeded areas a close stand of grasses specified, and reasonably free of weeds and undesirable coarse native grasses.

B. Begin maintenance immediately after each portion of lawn is seeded and continue for minimum of 45 days.

C. Repair or replace all seeded areas which, in judgment of Engineer, have not survived and grown in satisfactory manner, for a period of one year after acceptance.

D. Seeding replacement, same seed mixture as specified and furnished and installed as specified.

3.05 TEMPORARY COVER CROP

A. Sow a temporary cover crop of buckwheat, domestic rye grass or other acceptable seed if there is insufficient time in the planting season to complete seeding, fertilizing, and permanent seeding at the option of Contractor or order of Engineer. Cut and water cover crop as necessary until the beginning of the following planting season, at which time it shall be plowed or harrowed into soil, the areas shall be fertilized and permanent seed crop sown as specified.

END OF SECTION

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SECTION 02950

TREES, PLANTS AND GROUND COVERS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Work under this Item consists of furnishing new plant material: planting, watering, mulching, staking and guying trees, shrubs, perennials, and ground covers of the type and sizes indicated on the Plans, in accordance with these Specifications and/or as directed by the Engineer.

B. Provide all materials, equipment and labor necessary to complete the work as indicated on the drawings or as specified herein.

C. The principal work of this section includes, but may not be limited to, the following:

1. Layout and Excavation of Plant Holes
2. Planting and Backfilling
3. Watering
4. Pre-emergent Weed Control
5. Mulching
6. Fertilizing
7. Staking and Guying
8. Anti-desiccant Application
9. Tags and Labels
10. Maintenance
11. Plant Replacement Guarantee

1.02 REFERENCES

These Specifications, Section 02870 Site Furniture Tree Grates

ANSI Z-60.1 - Nursery Stock, latest edition (American Association of Nurserymen, Inc.).

SPN: “Standardized Plant Names,” latest edition, by the American Joint Committee on Horticultural Nomenclature.

AOAC: Association of Official Agricultural Chemist.”

Pruning Standards: ANSI A300 Practices for Trees, Shrubs &Other Woody Plant Maintenance: Secretariat, National Arborist Association, P. O. Box 1094 Amherst, MA.

1.03 QUALITY ASSURANCE

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A. The Contractor shall Sub-contract planting work to a firm specializing in such work unless the Contractor is fully experienced and qualified. The Landscape Contractor shall have five years continuous experience and expertise in management, handling and installation of ornamental plant material in large scale landscape construction projects. The site foreman shall have at least five years' experience, be a Massachusetts licensed Arborist and shall be on-site during all times of transplanting and plant installation.

B. The Landscape Contractor shall be responsible to coordinate with plant material suppliers in sufficient time to ensure that all of the plants as specified in the contract plant list are available in sufficient quantity for installation.

C. An arborist, licensed by the State of Massachusetts, is required for any tree pruning work.

D. At least one tree and one shrub of each variety is to be tagged with a waterproof tag bearing legible designation of botanical and common names, and all other standard products shall be delivered sealed and unbroken.

E. Do not make substitutions without written approval. If specified landscape material is not available, obtain approval for substitution from the Engineer.

F. Where formal planting arrangements and adjacent street trees of the same variety are shown, select stock with uniform height and spread, and label with numbers to assure symmetry in planting.

G. The Engineer reserves the right to inspect all plant materials for compliance with specifications, and to reject unsatisfactory or defective work at any time during progress of work.

1.04 SUBMITTALS

A. Certified analysis and source of off-site loam, used to backfill to be provided. Certification shall list any soil additives to topsoil, rates and type.

B. Certifications and/or labels of proposed plant materials or substitutions, listing common and scientific names of each.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect all products from weather or other damaging or deteriorating conditions.

B. Plants which have been damaged or have deteriorated in transit or storage are not acceptable.

C. Keep plants moist, fresh, and protected against exposure to sun, wind, and freezing temperatures whether in the receiving yard, in transit, while being handled, or at the job site awaiting planting.

D. Deliver trees, shrubs and groundcover after preparations for planting have been completed and plant immediately.

CONFORMED

E. Planting Dates: The Landscape Contractor should provide a proposed planting schedule. Schedule dates for each type of landscape work during normal seasons for such work. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.

Planting Window:	Spring – April 30 to June 30 Fall - August 15 to October 15

F. Those species known to be fall digging hazards shall be dug during the spring season only. Fall planting of these species shall be permitted only with certification, from the nursery, of the time of digging and at the discretion of the Engineer.

G. Correlate planting schedule with specified maintenance periods to provide maintenance to date of acceptance.

H. Coordination with Lawns: Plant trees, shrubs, and groundcover after final grades are established and prior to planting of lawns, unless otherwise acceptable to Owner's Representative. If planting of trees and shrubs occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

1.06 SPECIAL CONDITIONS

Should discrepancies exist between plant quantities or plant sizes as shown in the Planting Schedule and on the Planting Plan, quantities and sizes shown on the Planting Plan shall govern. Contractor shall install all plants as shown on the plan at no additional cost to the Owner.

1.07 WARRANTY

A. Provide a warranty for plant material for a minimum of one year including one continuous growing season. Commence warranty on date identified in the Certificate of Final Acceptance.

B. Warranty: Refer to SECTION – 01700, include coverage of plants from death or unhealthy conditions.

C. Replacements: Plants of same size and species as specified, planted as soon as possible in the next growing season, with a new warranty and an extended maintenance service commencing on date of replacement.

1.08 MAINTENANCE

A. Maintenance of all plant material to be performed by installer includes:
- Watering, weeding, cultivating and mulching
- Tightening, guy webbing and repairing of stakes
- Replacing of dead material
- Resetting plants to proper grades, or to upright position

CONFORMED

PART 2 - PRODUCTS

2.01 PLANTING MEDIA -AMENDED LOAM BACKFILL MIX:

A. Amended Loam Soil shall be "fine sandy loam" or "sandy loam" determined by mechanical analysis (ASTM D-422) and based on the "USDA Classification System". Loam shall have the following mechanical analysis:

Textural Class	% of Total Weight	Avg%
Sand (0.05 - 2.0 mm dia. range)	50 - 70	60
Silt (0.002-0.05 mm dia. range)	25 - 35	30
Clay (less than 0.002 mm dia. range)	5 - 15	10

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B. Loam shall contain not less than 5 1/2 percent nor more than 10 percent organic matter as determined by the loss on ignition of oven-dried samples. The loam shall have an acidity range of 5.5 pH to 7.2 pH.

C. Loam shall be free of debris and other extraneous matter. It shall be uncontaminated by salt water, foreign matter and substances harmful to plant growth. The electrical conductivity (EC2) of a 1:2 soil-water suspension shall be equal to or less than 1.0 millimhos/cm. (Test minus sieve #10 material). Soils shall not have levels of extractable aluminum greater than 200 parts per million.

D. No loam shall be delivered to the site until the review and approval of loam test results by the Engineer, but such approval shall not constitute final acceptance. The Engineer will reject any material delivered to the site which, after on-site, post-delivery testing, does not meet these specifications.

2.02 Manufactured Compost

A. Manufactured Compost shall be mature, stable, weed free, and produced by aerobic decomposition of organic matter. Compost feedstock may include, but is not limited to: agricultural, food or industrial residuals; class A biosolids as defined in the EPA CFR Title 40, Part 503; yard trimmings, or source-separated municipal solid waste. The product must not contain any visible refuse or other physical contaminants, substances toxic to plants, or over 5% sand, silt, clay or rock material by dry weight. The product shall possess no objectionable odors.

B. Manufactured Compost must meet all applicable USEPA CFR, Title 40, Part 503 Standards for Class A biosolids. The moisture level shall be such that no visible water or dust is produced when handling the material.

C. In addition, Manufactured Compost shall have the following properties:

1. pH: 5.5 – 7.5
2. Organic matter (% dry weight basis): 30 – 65
3. Soil salt (electrical conductivity): maximum 5 dS/m (mmhos/cm)
4. Moisture content %, wet weight basis: 30 – 60
5. Particle size, dry weight basis: 98% pass through 3/4 inch screen or smear
6. Stability carbon dioxide evolution rate: mg CO_2-C/ g OM/ day < 2
7. Solvita maturity test: > 6
8. Physical contaminants (inerts), %, dry weight basis: <1%
9. Chemical contaminants, mg/kg (ppm): meet or exceed US EPA Class A standard, 40CFR § 503.13, Tables 1 and 3 levels
10. Biological contaminants select pathogens fecal coliform bacteria, or salmonella, meet or exceed US EPA Class A standard, 40 CFR § 503.32(a) level requirements

CONFORMED

2.03 ANTIDESSICANT

A. Anti-desiccant shall be an emulsion which permits transpiration while retarding excessive loss of moisture from plants.

B. Deliver in manufacturer's fully identified containers and mix according to manufacturer's direction. Use "Wiltproof" or approved equal.

2.04 TREE AND SHRUB FERTILIZER:

A. Complete fertilizer in granular form, from commercial sources bearing manufacturer's analysis; 10-10-10 ratio of N-P-K.

B. Significant quantities of trace elements such as iron, boron, etc. shall be contained in the fertilizer.

C. Fifty percent (50%) of available nitrogen shall be in a slow release form as found in certain urea form products or natural organic forms or a combination of both.

D. Salt index shall not exceed 35.

2.05 STAKING AND GUYING MATERIALS:

A. Guy Web: Shall be low abrasion woven fiber webbing with break strength of 900 lbs. or better. The width of the webbing shall be no less than 5/8 inch, nor greater than ¾ inch. The length shall be sufficient enough to be attached to the tree trunk and stake.

B. Stakes: Shall be a hardwood source, free of knots, insects and fungi. Stakes shall be of uniform size and shape and shall be a minimum of 2 inches by 3 inches by 8 feet. Stakes shall be pointed with a taper of no less than 4 inches.

C. The above ground stake height shall be 8 inches above the point of attachment. The type of stakes shall be uniform throughout the job.

D. Steel Staples for use in trees located within Tree Pits. Minimum 2 per tree, as directed by the Engineer. As manufactured by Tree Staple Inc., 444 Mercer St. Stirling NJ, 07980. 1908626.9300. info@treestaple.com

2.06 PRE-EMERGENT WEED CONTROL:

A. Pre-Emergent weed control for application in mulch areas shall be granular and have the active ingredient "Trifluralin 5.0%". All application rates and product use shall be in accordance with manufactures guidelines.

2.07 MULCH:

A. Pine Bark Mulch shall be derived from evergreen tree bark aged to a minimum of six months and no more than eighteen months. The bark shall be shredded so that the resulting pieces are no more than 1/2 inch thick and no longer than 3 inches. The mulch shall be ninety-eight percent (98%) organic matter with a pH of 3.5 to 4.5. The mulch shall

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be free of stringy material and shall not contain an excess of fine particles. The mulch shall be brown in color, free of leaves, twigs, sod, weeds, shavings and other foreign materials which are injurious to health plant growth.

2.08 WATER:

A. Clean, fresh potable water free from injurious chemicals and other toxic substances harmful to plant life. No brackish water will be permitted.

B. The Engineer may reject any water delivered to the site which, after on-site, post-delivery testing, does not meet these specifications.

2.09 PLANT MATERIALS:

A. Plant materials shall conform in size, grade and quality to the "American Association of Nurserymen Standards for Nursery Stock." As approved by the United States of America standards institute, in effect at the time of bidding.

B. Plants of other kinds than those named in the Plant Schedule on the Drawings shall not be accepted without written approval of the Owner's Representative.

C. Unless otherwise approved by Owner's Representative, all plants shall be nursery-grown in accordance with good horticultural practices and shall have been grown under climatic conditions similar to those in the locality of the project for at least two years. They shall have been transplanted or root pruned at least nine months previous to moving to the site.

D. Plants shall be dug, handled and transported so as to prevent damage of any sort including but not limited to breakage of branches or limbs, scraped or bruised trunk or broken rootball. Plants shall be protected from desiccation during digging, storage and transportation by watering, covering and application of anti-desiccants as necessary to ensure their continued health and viability.

E. All plant material shall comply with the state and federal law with respect to inspection for plant disease and insect infestation.

F. Replacement plants larger in size than existing may be used if approved by the Owner's Representative provided use of larger plants does not increase Contract price.

G. If use of larger plants is approved, increase ball of earth of spread of roots in proportion to size of plant.

PART 3 - EXECUTION

3.01 Layout: Determine location of underground utilities and layout plants so as to avoid possible damage to such structures. Plant pits and bed locations as shown graphically and/or verbally on plans, shall be staked on ground by contractor and approved by the Engineer/Owner's Representative prior to excavation. Should discrepancies exist between plant quantities in Planting Schedule and Planting Plan, quantities shown on the Planting Plan shall govern. Adjustments in locations and outline shall be made as directed in field.

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Labor, equipment, and new smooth stakes are to be furnished by the Contractor for this purpose.

A. Excavation: Planting beds and pits shall conform to the approved staked locations and outlines. Holes dug for plantings shall in all cases be large enough to include the complete root system of the plant (tree, shrub, and groundcover) to be received and also sufficient amounts of approved backfill around the periphery of the root ball. All sod, weeds, roots, cobbles, and stones and other objectionable materials excavated from the plant holes, which is unsuitable for backfill shall be removed from the site immediately and legally disposed of.

B. Plant Hole Size: The minimum plant hole size, unless otherwise specified, shown on the plans or directed by the Owner's Representative shall be as follows:

1. Trees and Shrubs - The planting hole shall be twice the diameter of the root ball in width and no deeper than 2 inches less than the distance from the bottom of the root ball to the root collar (i.e. a 12 inch tall ball will require a 10 inch deep hole). Any excavation in excess of that required shall be replaced and compacted to eighty-five percent (85%) of maximum density.

2. Groundcover - The planting hole shall be twice the diameter of the root ball in width and equal to the depth from the bottom of the root ball to the level at which it was grown in the nursery. Any excavation in excess of that required shall be replaced and compacted to eighty-five percent (85%) of maximum density.

C. Any rocks or underground obstructions shall be removed to a depth necessary for planting as specified, unless alternate locations for the planting are approved by the Engineer. If removal of obstructions results in a deeper hole than specified for planting, backfill material shall be added and compacted to eighty-five percent (85%) of maximum density to the correct depth.

D. Amended Loam Backfill Mix: Add loam to suitable soil excavated from the planting hole to create mix for planting pits. Backfill mix shall be at least thirty-three percent (33%) loam. Amended Loam Soil shall be measured for payment separately, refer to Measure and Payment (Section 01025). For Add Alternates, Amended Loam Soil shall be considered inclusive.

3.03 SETTING PLANTS

A. Plants shall be handled in such a manner that the soil of the root ball will not be loosened from the roots. Carefully place plant into the prepared hole. Set plants plumb and fill in around the root ball to one-half the depth of the hole with backfill mix. Thoroughly tamp the backfill mix to eighty-five percent (85%) of maximum density.

B. Fill remaining area of planting hole with water. Once the water has completely drained loosen burlap and peel down at least the top one-third. If required wire baskets to be cut off and removed. Roots that have been wrapped around the ball within the burlap shall be made to lay in as natural a manner as possible. Cut broken or frayed roots cleanly.

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C. Fill remaining area of hole with backfill mix and thoroughly tamp to eighty-five percent (85%) of maximum density. Form a saucer around the edge of through backfill hole by constructing a berm. The finish height of the compacted berm shall be 4 inches higher than the surrounding grade. No excess soil shall be allowed to remain within the plant saucer. Fill saucer with water.

3.04 PRUNING OF NEW PLANT MATERIAL

A. After planting, prune only dead, broken or deformed branches and in such manner as to preserve natural character of plant.

B. Perform all pruning with sharp tools, with cuts flush and clean. Do not apply paint or asphalt emulsion tree wound compound on cut area.

C. Trees which have had their leaders cut, or so damaged that cutting is necessary, will not be accepted. There shall be no abrasion of bark, nor fresh cuts of limbs over ½ inch.

3.05 WATERING

A. The plants shall be watered by hand immediately following planting.

B. Soak the plants thoroughly again within a twenty-four-hour period after the initial planting.

C. Coordinate with the completion of the installation of the irrigation system.

D. Additional hand watering shall be made as directed by the Owner's Representative based on weather conditions, until final acceptance of the plant material.

3.06 FERTILIZING

A. During backfill operations, place fertilizer in upper foot of back fill around perimeters at a rate of two ounces per foot of diameter of plant pit, or as recommended by manufacturer.

3.07 MULCHING PLANTS

A. Application of mulch should only occur after planting operations have been completed and initial watering has taken place. Mulch shall be applied no later than forty-eight hours after planting.

B. Prior to the placement of mulch, the contractor shall apply a pre-emergent weed control with the entire area to be mulched. Pre-emergent weed control shall be applied by a commercial applicator, licensed by the State of Massachusetts at a rate in accordance with the manufacturer's instructions.

C. Mulch shall be applied a minimum of 3 inches in depth for all individual trees and planting beds, as indicated graphically or verbally on the drawings.

D. Where mulch abuts seeded lawn areas or other finish grade materials, edge of planting bed shall be cut smooth and cleanly. Mulch shall be placed carefully so as not to spill into

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adjacent areas. Any excess or spilled mulch shall be promptly removed from the project area. The cost of the mulch is incidental to new plantings.

3.08 GUYING AND STAKING

A. Immediately after planting, install tree stakes or staples as indicated on the drawings or as directed by Engineer.

B. Place two stakes outside of the planting pit exercising care not to damage the soil berm.

C. Guy all trees with a caliper of 2 inches or greater and all evergreen trees greater than 4 feet. Guy webbing shall be attached at a point no higher than one half the height of the tree or lower than one-third the height of the tree.

D. Guy trees to each stake near top of stake and intertwine webbing at tree trunk. The guy webbing shall lay flat against the trunk. Draw guy webbing tight enough to remove slack but shall not cause deflation or strain to the plant.

3.09 TRUNK WRAPPING

A. Remove all trunk wrap and trunk protection devices prior to staking and guying operations unless otherwise directed by the Engineer.

3.10 ANTIDESSICANT SPRAYING

A. Spray anti-desiccants as directed by the manufacturer's recommendation and as approved by the Engineer.

3.11 TAGS AND LABELS

A. Leave all tree tag and label seals unbroken and visible on plant material until final inspection. Remove all seals immediately after final inspection.

3.12 MAINTENANCE

A. Contractor is responsible for protection and maintenance of all work prior to final acceptance. No plants will be accepted unless they show a healthy growth and satisfactory condition.

B. Maintenance work for all plantings shall be as listed in Section 1.08.

3.13 PLANT REPLACEMENT GUARANTEE

A. Guarantee that, upon completion and final acceptance tree, shrub and groundcover planting conforms to requirements of contract documents and that all plants except transplant materials are healthy and will remain so for a period of one year. Such period shall commence with date of final acceptance.

B. At any time within period of guarantee, Contractor shall replace any planting which for any reason, other than vandalism, has died or is in a dying condition, or which has failed to

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flourish in such a manner or to such a degree that its usefulness or appearance has been impaired.

C. The Engineer will not maintain plantings until after guarantee period. Contractor shall not have any claim that materials have failed to flourish as a result of maintenance operations, or lack of maintenance, and shall abide by terms stated herein for guarantee and replacement of plant materials.

D. Decision of Engineer as to necessity to replace any plant materials or repair any defects on workmanship, or cause of any destruction or loss, impairment or failure to flourish, shall be conclusive and binding upon Contractor. Replacements shall be of same species and size as specified on Plant List. All plant replacements shall be inspected, sealed, furnished, planted and mulched as specified herein at Contractor's expense.

E. "Vandalism," is intended to mean any acts, whether intentional or accidental, by other persons occurring following final acceptance, which clearly result in breakage or other damage to individual plants or plant beds, and which may reasonable be considered to be beyond Contractor's reasonable control, as determined by the Engineer.

END OF SECTION

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SECTION 03100

CONCRETE FORMWORK

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for forms to be used for all concrete masonry including footings, except as otherwise permitted.

B. Related Sections

1. Section 03200 - Concrete Reinforcement.
2. Section 03300 - Cast-In-Place Concrete.

1.02 REFERENCES

A. American Concrete Institute (ACI)

1. ACI 318, Building Code Requirements for Structural Concrete.
2. ACI 347R, Guide to Formwork for Concrete.

1.03 SUBMITTALS

A. Submit in accordance with Section 01300.

B. Shop Drawings:

1. Layout of panel joints, tie hole pattern, and form liners.
2. Form Ties - Tapered Through-Bolts: Proposed method of sealing form tie hole; coordinate with details shown.

C. Samples: One each as follows:

1. Form liners.
2. Form ties.

D. Quality Control Submittals:

1. Statements of qualifications for formwork designer.
2. Manufacturer's Certificate of Proper Installation. (After installation)

1.04 QUALITY ASSURANCE

A. Qualifications: Formwork, falsework, and shoring designs prepared by an engineer licensed in the State of Rhode Island.

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PRODUCTS

1.05 FORM MATERIALS

A. Surfaces to be given burlap-rubbed finish.

1. Form surface in contact with the concrete shall be made of heavy gage metal, new plywood (used plywood which, in the opinion of the Engineer, is substantially equal to new plywood may be used), tempered wood fiberboards with smooth surface, or similar materials.
2. Metal forms or form linings shall have square edges so that the concrete will not have fins or fluting. Joints between form panels shall be well fitted so as to be tight and result in substantially flush concrete surfaces on opposite sides of the joints.
3. Forms shall not be pieced out by use of materials different from those in the adjacent form or in such manner as will detract from the uniformity of the finished surface.

B. Surfaces other than those to be given burlap-rubbed finish.

1. Forms shall be made of wood, metal, or other acceptable material. Wooden forms shall be constructed of sound lumber or plywood of suitable dimensions, free from knotholes and loose knots. Plywood shall be reasonable good, as accepted. Metal forms shall be of an acceptable type for the work involved. Edges of forms in contact with concrete shall be flush within 1/16 in.

C. Forms shall be of suitable material, design, and construction as to be rigid, tight enough to prevent the passage of mortar, and plane surfaces shall be plane within 1/16 in. in 4 ft. Particular care shall be taken to ensure that forms are true to line where deviations in the concrete would be obvious or objectionable, as where building superstructures are to be built thereon, or where the tops of walls are exposed. All such deviations which may occur shall be corrected by, and at the expense of the contractor, as directed, even to the extent of tearing down and rebuilding the concrete.

D. Forms for walls, columns, or piers shall have removable panels at the bottom forcleaning, inspection, and scrubbing-in of bonding grout. Forms for thin sections (such as walls or columns) of considerable height shall be arranged with suitable openings so that the concrete can be placed in a manner that will prevent segregation and accumulations of hardened concrete on the forms or reinforcement above the fresh concrete, unless special spouts are used to place concrete, and so that construction joints can be properly keyed and treated.

E. Forms shall be sufficiently rigid to prevent displacement or sagging betweensupports, and so constructed that the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for their adequacy.

F. Wall Forms and Underside of Slabs and Beams:

1. Materials: Plywood, hard plastic finished plywood, overlaid waterproof particle board, or steel in "new and undamaged" condition, of sufficient strength and surface smoothness to produce specified finish. Use in combination with form liners where required.

G. All Other Forms: Materials as specified for wall forms.

H. Form Sealer:

1. Material: Surface sealer will not bond with, stain, or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces, when applied to most forms of form liners. A ready-to-use water based material formulated to reduce or eliminate surface imperfections, containing no mineral oil or organic solvents. Environmentally safe, meeting local, state, and federal regulations and can be used in clean water treatment plants.
2. Manufacturer and Product: Master Builders, Inc.; Rheofinish; or Equal.

I. Rustication Grooves and Beveled Edge Corner Strips: Nonabsorbent material,compatible with form surface, fully sealed on all sides prohibiting loss of paste or water between the two surfaces. Match the rustication grooves with the existing configuration and style located at the plant.

1.06 FORM TIES

A. Form ties to be encased in concrete shall not be made of through-bolts or commonwire, but shall be of a well-established type, so made and installed as to embody the following features:

1. After removal of the protruding part of the tie, there shall be no metal nearer than 1 in. to the face of the concrete.
2. The part of the tie which is to be removed shall be at least 1/2 in. in diameter, or if smaller, it shall be provided with a wood or metal cone 1 in. long placed against the inside of the forms. cones shall be carefully removed from the concrete after the forms have been striped.
3. Ties which pass through walls subject to hydrostatic pressure shall be provided with acceptable water stops, such as washers, securely fastened to the ties.

B. Form Ties:

1. Material: Steel.
2. Spreader Inserts.
   a. Conical or spherical type.
   b. Design to maintain positive contact with forming material.
   c. Furnish units that will leave no metal closer than 1 inch to concrete surface when forms, inserts, and tie ends are removed.
3. Wire ties not permitted.
4. Flat bar ties for panel forms, furnish plastic or rubber inserts with minimum 1 inch depth and sufficient dimensions to permit patching of tie hole.

CONFORMED

5. Water Stop Ties: For water-holding structures, basements, pipe galleries, and accessible spaces below finish grade, furnish one of the following:
   a. Integral steel water stop 0.103-inch thick and 0.625 inch in diameter tightly and continuously welded to tie.
   b. Neoprene water stop 3/16-inch thick and 15/16 inch in diameter whose center hole is 1/2 diameter of tie, or a molded plastic water stop of comparable size.
   c. Water Stop: Oriented perpendicular to tie and symmetrical about center of tie.
   d. Design ties to prevent rotation or disturbance of center portion of tie during removal of ends and to prevent water leaking along tie.
6. Through-Bolts: Tapered minimum 1-inch diameter at smallest end.
7. Elastic Vinyl Plug: Design and size of plug to allow insertion with tool to enable plug to elongate and return to original length, and diameter upon removal forming a watertight seal.
   a. Manufacturer and Product: Dayton Superior Co., Miamisburg, OH; Dayton Sure Plug, or equal.

EXECUTION

1.07 SYSTEM DESIGN REQUIREMENTS

A. Design formwork in accordance with ACI 347R and ACI 318 to provide the concrete finishes specified in Section 03300, CAST-IN-PLACE CONCRETE.

B. Make joints in forms watertight.

C. Limit panel deflection to 1/360 of each component span to achieve tolerances specified.

1.08 ERECTION

A. General: Unless specified otherwise, follow the applicable recommendations of ACI347R.

B. Forms shall be so constructed and placed that the resulting concrete will be of the shape, lines, dimensions, and to the elevations indicated on the drawings or specified, and exposed concrete will be substantially free from board or grain marks, poorly matched joints, and other irregularities or defects.

C. Beveled Edges (Chamfer):

1. Form 3/4-inch bevels at concrete edges, unless otherwise shown.
2. Where beveled edges on existing adjacent structures are other than 3/4-inch, obtain ENGINEER's approval of size prior to placement of beveled edge.

D. Wall Forms:

CONFORMED

1. Do not reuse forms with damaged surfaces.
2. Locate form ties and joints in an uninterrupted pattern for smooth and uniform surface.
3. Inspect form surfaces prior to installation to assure conformance with specified tolerances.

E. Forms for Curbs, Sidewalks, and Driveways:

1. Provide standard steel or wood forms to prevent movement.
2. Set forms to true lines and grades, and securely stake in position.

F. Form Tolerances: Provide forms in accordance with ACI 347R and ACI 318 and the following tolerances for finishes specified:

1. Wall Tolerances:
   a. Straight Vertical or Horizontal Wall Surface: Flat planes within tolerance specified.
   b. Plumb within 1/4-inch to 10-feet.
   c. Depressions in Wall Surface: Maximum 5/16-inch when 10-foot straightedge is placed on high points in all directions.
   d. Thicknesses: Maximum 1/4-inch minus or 1/2-inch plus from dimensions shown.
2. Slab Tolerances:
   a. Exposed Slab Surfaces: Comprise of flat planes as required within tolerances specified.
   b. Slab Finish Tolerances and Slope Tolerances: Crowns on floor surface not too high as to prevent 10-foot straight edge from resting on end blocks, nor low spots that allow a block of twice the tolerance in thickness to pass under the supported 10-foot straightedge.
   c. Steel gauge block 5/16-inch thick.
   d. Slab drainage.
      1) Finish Slab Elevation: Slope slabs to floor drain and gutter, and shall adequately drain regardless of tolerances.
      2) Thickness: Maximum 1/4-inch minus or 1/2-inch plus from thickness shown, except where thickness tolerance will not affect slope, drainage, or slab elevation.

1.09 FORM SURFACE PREPARATION

A. Thoroughly clean form surfaces in contact with concrete or previous concrete, dirt,

B. Exposed Wood Forms in Contact with Concrete: Apply form sealer as recommended by the sealer material manufacturer.

C. Steel Forms: Apply form sealer to steel forms as soon as they are cleaned to prevent discoloration of concrete from rust.

CONFORMED

1.10 FORM COATINGS

A. All forms shall be oiled with an acceptable nonstaining oil or liquid form coating before reinforcement is placed.

B. Before form material is reused, all surfaces that are in contact with the concrete shall be thoroughly cleaned, all damaged pieces repaired, and all projecting nails withdrawn.

1.11 REMOVAL OF FORMS

A. Except as otherwise specifically authorized by the Engineer. forms shall not be removed until the concrete has aged for the following number of day-degrees*:

1. Formwork not supporting weight of concrete, (i.e., sides of beams, walls, columns, and similar parts of the Work) may be removed after cumulatively curing at not less than a total of three 50-degree F days after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing protection operations are maintained.
2. Leave forms and shoring for elevated structural slabs or beams in place, in accordance with ACI 318, Chapter 6, and until concrete has reached compressive strength equal to 80 percent of the specified 28-day compressive strength as determined by test cylinders.
3. *Day-degree: total number of days times average daily air temperature at surface of concrete. For example, 5 days at a daily average temperature of 60 deg. F. equals 300 day-degrees.

1.12 MANUFACTURER'S SERVICES

A. Provide form manufacturer's representative at site for installation assistance, and inspection.

END OF SECTION

CONFORMED

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes
1. Requirements for reinforcing steel bars, wire fabric and accessories as shown on the drawings, specified herein, and as needed for a complete and proper installation.

B. Related Sections
1. Section 03100 - Concrete Formwork.
2. Section 03300 - Cast-In-Place Concrete.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM).
1. A82, Specification for Steel Wire, Plain for Concrete Reinforcement.
2. A185, Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
3. A497, Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
4. A615, Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
5. A706, Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
6. A775, Specification for Epoxy-Coated Reinforcing Steel Bars.

B. American Concrete Institute (ACI).
1. ACI 318, Building Code Requirements for Structural Concrete.

1.03 SUBMITTALS

A. In accordance with Section 01300 submit cutting and bending drawings and schedules for all reinforcement to be furnished.

B. Shop Drawings:
1. Prepare in accordance with Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice and ACI SP-66 Detailing Manual:
   a. Bending lists.
   b. Placing drawings.
2. Welded splice, Cadweld splice, and mechanical threaded splice.

C. Quality Control Submittals:

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1. Lab test reports for reinforcing steel showing stress-strain curves and ultimate strengths.
2. Mechanical Threaded Connections:
   a. Current International Conference of Building Officials (ICBO) Research Report or equivalent code agency report listing findings to include acceptance, special inspection requirements, and restrictions.
   b. Manufacturer's instructions.
   c. Verification that device threads have been checked and meet all requirements for thread quality, in accordance with manufacturer's published methods.
3. Epoxy-Coated Reinforcing Bars: Written certification in accordance with paragraph 4.2.1 of ASTM A775.
4. Welding Qualification: Prior to welding, submit welder qualifications and radiographic nondestructive testing procedures.

1.04 QUALITY ASSURANCE

A. The steel shall be newly rolled stock substantially free from mill scale, rust, dirt, oil, grease, or other foreign matter. Bars shall be of billet steel and, unless otherwise indicated, shall be Grade 60 bars.

B. Billet steel bars shall conform to ASTM A 615.

C. All bars shall be rolled by an acceptable mill. The Contractor shall submit at his own expense certified copies of tests of the bars furnished. The tests shall be as specified in the appropriate ASTM Specification referred to above and shall be made by an acceptable laboratory.

D. Welder Qualifications: Certified in accordance with AWS D1.4-79.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Unload, store, and handle bars in accordance with CRSI publication "Placing Reinforcing Bars."

B. Coated Bars:
   1. Protect epoxy-coated bars contact areas from handling equipment.
   2. Lift bundles of coated bars at multiple pickup points to minimize bar-to-bar abrasion from sags in bundles.
   3. Do not drop or drag coated bars or bundles of coated bars.
   4. Store coated bars on protective cribbing.
   5. Color fading of coating is not cause for rejection of epoxy-coated reinforcing bars.

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PART 2 PRODUCTS

2.01 MATERIALS

A. Deformed Billet-Steel Reinforcing Bars:
   1. Includes stirrups, ties, and spirals.
   2. ASTM A615, Grade 60, including Supplemental Requirements S1 where welding is not required.
   3. ASTMA706, Grade 60, including Supplemental Requirements for reinforcing to be welded.

B. Splices and Mechanical Connections:
   1. Metal Sleeve: Furnish with cast filler metal, capable of developing, in tension or compression, 125 percent of minimum tensile strength of the bar.
   2. Mechanical Threaded Connections: Furnish metal coupling sleeve for splicing reinforcing in secondary members or in areas of low stress with internal threads engaging threaded ends of bars developing in tension or compression 125 percent of yield strength of bar.
      a. Manufacturers and Products:
         1) Erico Products, Inc., Cleveland, OH; Lenton Reinforcing Steel Couplers.
         2) Richmond Screw Anchor Co., Inc. Fort Worth, TX; Richmond DB-SAE Dowel Bar Splicers.
         3) Or equal.

C. Epoxy-Coated Reinforcing Bars: ASTM A775, deformed bars, with bond strength not less than 80 percent of uncoated bars.

D. Welded Wire Fabric:
   1. ASTM A185, or A497, and ACI 318/318R, using ASTM A82, wire of 75 ksi minimum tensile strength.
   2. Furnish flat sheets only, rolled sheets not permitted.

E. Reinforcement shall be accurately formed to the dimensions indicated on the drawings. Stirrups and tie bars shall be bent around a pin having a diameter not less than two times the minimum thickness of the bar. Bends for other bars shall be made around a pin having a diameter not less than six times the minimum thickness except for bars larger than 1 in., in which case the bends shall be made around a pin of eight bar diameters. All bars shall be bent cold.

F. Bars shall be shipped to the work with bars of the same size and shape fastened in bundles with securely wired-on metal identification tags giving size and mark.

G. Deformations on bars for concrete reinforcement shall conform to the requirements of the above-mentioned ASTM Specifications.

2.02 ACCESSORY MATERIALS

A. Tie Wire:

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1. Black, soft-annealed 16-gauge wire.
2. Nylon-, epoxy-, or plastic-coated wire.

B. Bar Supports and Spacers:
1. Precast concrete bar supports, cementitious fiber-reinforced bar supports, or all-plastic bar supports and side form spacers meeting the requirements of CRSI Manual of Standard Practice. Do not use other types of supports or spacers.
2. In Beams, Columns, Walls, and Slabs Exposed to View After Stripping: Small rectangular concrete blocks made up of same color and strength as concrete being placed around them or all-plastic bar supports and side form spacers.
3. Use supports made of dielectric material for epoxy-coated reinforcing bars supported from formwork.
4. If epoxy-coated reinforcing is used, furnish epoxy-coated reinforcing bars for spreader bars.
5. Precast concrete supports of same strength as concrete for reinforcing in concrete place don grade.

C. Welded steel wire fabric shall conform to the ASTM A 185. The gage and spacing of wires shall be as indicated on the drawings.

D. Soffit Clips: Made galvanized steel wire not lighter than No. 12 Stl. W.C. They shall be shared so that the greater portion of the wire is held about 1 in. from the flange of the steel beam, and shall be spaced not less than 9 in. on centers, the spacing being maintained by suitable longitudinal wires.

2.03 FABRICATION

A. Follow CRSI Manual of Standard Practice.

B. Bend all bars cold.

PART 3 EXECUTION

3.01 PREPARATION

A. Notify ENGINEER when reinforcing is ready for inspection and allow sufficient time for inspection prior to placing concrete.

B. Repair epoxy coating damaged due to handling, shipment, and placing. Repair with patching material in accordance with ASTM A775, and manufacturer's recommendations.

C. Clean metal reinforcement of loose mill scale, oil, earth, and other contaminants.

D. Coat wire projecting from precast concrete bar supports with dielectric material, epoxy, or plastic.

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E. Before being placed in position, reinforcement shall be thoroughly cleaned of loose mill and rust scale, dirt, and other coatings, including ice, that tend to interfere with development of proper bond. Where there is delay in depositing concrete after reinforcement is in place, bars shall be reinspected and cleaned when necessary.

F. Reinforcement which is to be exposed for a considerable length of time after having been placed shall be painted with a heavy coat of cement grout, if required.

3.02 Reinforcing Bar Installation

A. Bundle or space bars, instead of bending where construction access through reinforcing is necessary.

B. Spacing and Positioning: Conform to ACI 318/318R.

C. Location Tolerances:In accordance with CRSI publication,"PlacingReinforcing Bars".

D. Splicing:
1. Follow ACI 318/318R.
2. Use lap splices unless otherwise shown or permitted in writing by ENGINEER.
3. Welded Splices: Accomplish by full penetration groove welds and develop at least
125 percent of yield strength of bar.
4. Stagger splices in adjacent bars.
5. Metal sleeves may be used.

E. Mechanical Splices and Connections:
1. Use only in areas specifically approved in writing by the ENGINEER.
2. Install as required by manufacturer with threads tightened and in accordance with ICBO Research Report.
3. Maintain minimum edge distance and concrete cover.

F. Tying Deformed Reinforcing Bars:
1. Tie every other intersection on mats made up of Nos. 3, 4, 5, and 6 bars to hold them
firmly at required spacing.
2. Bend all noncoated tie write to prevent tie wire from being closer than 1 inch from the surface of concrete.
3. Epoxy-Coated Bars:
a. Use epoxy-coated or nonmetallic clips.
b. Repair coating damage at clipped or welded intersection.

G. Reinforcement Around Openings: Place an equivalent area of steel bars or fabric around pipe or opening and extend as shown, on each side sufficiently to develop bond with each bar. See drawing details.

H. Welding Reinforcement:
1. Only A706/A706M bars may be welded.

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2. Do not perform welding until welder qualifications are approved.
3. Provide suitable ventilation when welding epoxy-coated reinforcing bars.
4. After completion of welding on epoxy-coated reinforcing bars, repair coating damage, welds, and steel splice members with same material as used for repair of coating damage.

I. Straightening and Rebending: Field bending of reinforcing steel bars is not permitted.

J. Unless permitted by Engineer, do not cut reinforcing bars in the field. When epoxy-coated reinforcing bars are cut in the field, coat ends of bars with same material used for repair of coating damage.

K. Reinforcement shall be accurately positioned as indicated on the drawings, and secured against displacement by using annealed iron wire ties or suitable clips at intersections. Concrete blocks having a minimum bearing area of 2 in. by 2 in., and equal in quality to that specified for the slab, shall be used for supporting reinforcing bars for slabs on grade. Where the underside of slabs will be exposed to view in the finished work, stainless-steel supports shall be used

L. Furnish and place all concrete reinforcement as indicated on the drawings and as herein specified. Concrete reinforcement in sizes No. 3 (3/8 in.) and larger shall be deformed steel bars of the shapes and sizes indicated on the drawings.

3.03 WELDED WIRE FABRIC INSTALLATION

A. Extend fabric to within 2 inches of edges of slab, and lap splices at least 1-1/2 courses of fabric or minimum 8 inches.

B. Tie laps and splices securely at ends and at least every 24 inches with tie wire.

C. Place welded wire fabric on concrete blocks at correct distance as shown, above bottom of slab and rigidly support equal to that provide for reinforced bars. Do not use broken concrete, brick, or stone.

D. Follow ACI 318/318R and current Manual of Standard Practice, Welded Wire Fabric.

E. Do not use fabric that has been rolled. Install flat sheets only.

3.04 TESTS AND INSPECTION

A. Test 10 percent of all welds using radiographic, nondestructive testing procedures referenced in AWS D1.4-79.

B. Inspect each splice and verify each component is in accordance with manufacturer's instructions and ICBO Research Report.

END OF SECTION

CONFORMED

SECTION 03250

EXPANSION, CONSTRUCTION, AND CONTROL JOINTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes
   1. Requirements for making joints in concrete and masonry.

B. Related Sections
   1. Section 03200 - Concrete Reinforcing
   2. Section 03300 - Cast-In-Place Concrete
   3. Section 03600 – Epoxy Grout
   4. Section 07900 - Joint Sealants

1.02 REFERENCES

A. Army Corp. of Engineers.
   1. CRD-C-572, Specification for Polyvinyl chloride Waterstop.

B. American Society for Testing and Materials (ASTM)
   1. A36, Specification for Carbon Structural Steel.
   2. D226, Specification for Asphalt-Saturated Organic Felt used in Roofing and Waterproofing.
   3. D227, Specification for Smooth-Surfaced Asphalt Roll Roofing and Waterproofing.
   4. D994, Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
   5. D1506, Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
   6. D1751, Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

C. National Sanitation Foundation (NSF).
   1. 61-90,

1.03 SUBMITTALS

A. Shop Drawings:
   1. Plastic Type Water Stops: Details of splices to be used and method of securing water
      stop in the forms and supporting water stop so as to maintain proper orientation and
      location during concrete placement.
   2. Construction Joints: Layout and location indicating type to be used.
   3. Joint fillers for horizontal and sloped joints.
   4. Preformed control joints.

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5. Water stop.

B. Samples: Splice, joint, and fabricated cross of each size, shape, and fitting of water stop(s) proposed for use.

C. Quality Control Submittals:
1. Water stop manufacturer's written instructions for product shipment, storage, handling, installation field splices, and repair.
2. Joint filler and primer. Manufacturer's written instructions for product shipment, storage, handling, application and repair.
3. Preformed Control Joint: Manufacturer's written instructions for product shipment, storage, handling, application, and repair.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Acceptance of pourable joint filler for potable water structures by federal EPA or by a state health agency.
1. Pourable Joint Filler: Certified as meeting NSF 61-90.

1.05 DELIVERY, STORAGE AND HANDLING

A. Acceptance at Site: Verify that water stops delivered are in accordance with cross-section dimensions as shown and manufacturer's product data prior to unloading and storing on site.

PART 2 PRODUCTS

2.01 PLASTIC WATER STOP

A. Extruded from an elastomeric plastic compound of which the basic resin shall be polyvinyl chloride (PVC). Reclaimed PVC in the compound is not acceptable.

B. Specific Gravity: Approximately 1.37.

C. Shore Durometer Type A Hardness: Approximately 80.

D. Performance Requirements: Corps of Engineers' Specification CRD-C-572.

E. Type: Center bulb with a number of parallel ribs or protrusions on each side of strip center.

F. Corrugated or tapered type water stops are not acceptable.

G. Thickness: Constant from bulb edge to the outside stop edge.

H. Minimum Weight per Foot of Water Stop:
1. 0.90 pound for 3/16 inch by 4 inch.

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2. 1.62 pounds for 3/8 inch by 6 inch.
3. 2.30 pounds for 3/8 inch by 9 inch.

I. Manufacturers and Catalog Numbers:
1. Vulcan Metal Products, Inc., Construction Materials Division, Birmingham, AL; Catalog No. 3/81-15M: Type 8067 (4 inch by 3/16 inch), Type 8069 (6 inch by 3/8 inch), and Type 8070 (9 inch by 3/8 inch).
2. Vinylex Corp., Knoxville, TN; Catalog No. 03250/VIN (1987): No. RB6-38H (6 inch by 3/8 inch) and No. RB9-38H (9 inch by 3/8 inch).
3. Greenstreak Plastic Products, St. Louis, MO; Catalog No. 03250/GRD (1987): Style 732 (6 inch by 3/8 inch) and Style 735 (9 inch by 3/8 inch).
4. A.C. Horn, Inc., Beltsville, MD; Catalog No. CSP-162 (1987): Type 3 (4 inch by 3/16 inch), Type 9 (6 inch by 3/8 inch), and Type 10 (3/8 inch by 9 inch).

2.02 WIRE LOOPED PLASTIC WATER STOP

A. Furnish as an alternative to plastic water stops.

B. Same material and geometry as plastic water stops.

C. Furnish with continuous galvanized wire looping at edge for convenience in positioning and securing stop in place in the forms.

D. Manufacturers and Catalog Numbers:
1. Paul Murphy Plastics, Roseville, MI; “Wire Stop Water Stop”; geometry numbers ACR 6380, ACR 9380, as shown on Paul Murphy Plastics Co. Drawing No. CCP-120-12M dated 12-89.
2. Or equal.

2.03 BOND BREAKER

A. Tape for Expansion Joints: Adhesive-backed glazed butyl or polyethylene tape, same width as the joint, that will not adhere to the premolded joint material.

B. Use either bond breaker tape or a bond prevention material as specified in SECTION 03300, except where a tape is specifically called for.

2.04 PREMOLDED JOINT FILLER

A. Bituminous Type: ASTM D994 or D1751.

B. Sponge Rubber: Neoprene, closed-cell, expanded; ASTM D1056-85, Type 2C5, with a compression deflection, 25 percent deflection (limits), 119 to 168 kPa (17 to 24 psi) minimum.
1. Manufacturer and Product:
a. Rubatex Corp.; R451N
b. Or equal.

2.05 PREFORMED CONTROL JOINT

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A. One-Piece, Flexible, Polyvinyl Chloride Joint Former:
   1. Manufacturer and Product:
      a. Vinylex Corp., Knoxville, TN; Kold-Seal Zip-Per Strip KSF-150-50-50.
      b. Or equal.

B. One-Piece Steel Strip with Preformed Groove:
   1. Manufacturer and Product:
      a. Burke Concrete Accessories, Inc., San Mateo, CA; Keyed Kold Retained Kap.
      b. Or equal.

C. Furnish in full-length, unspliced pieces.

2.06 POURABLE JOINT FILLERS

A. Filler for Nonpotable Water Structure:
   1. Specific Gravity: Greater than 1.0 for cured, in-place filler.
   2. Sloped Joints: Furnish Gun Grade material that will remain as placed in joints and will not run down slope.
   3. Manufacturers and Products:
      a. W.R. Meadows, Inc., Elgin, IL: No. 164 Polymeric sealing compound, hot-pour, or Hi-Spec Polymeric joint sealing, hot-pour compound; or
      b. A.C. Horn, Inc., North Bergen, NJ: No-Track two-component material (Code 2323), cold-applied, self-leveling filler; or
      c. W.R. Meadows, Elgin, IL: Gardox, two-component, cold-applied compound filler.

2.07 STEEL EXPANSION JOINT DOWELS

A. Dowels: ASTM A36 round smooth steel bars.

B. Bar Coating: Two-coat system, fusion bonded, steel dowel coating, with a factory-applied lubricating coating.

2.08 ACCESSORIES

A. Joint Sealants: As specified in SECTION 07900.

B. Nonshrink Grout:
   1. As specified in SECTION 03600.
   2. Compatible with joint sealant.

C. Roofing Felt: ASTM D226, Type II, 30-pound asphalt-saturated or equal weight of ASTM D227 coal-tar saturated felt.

D. Reinforcing Steel: As specified in SECTION 03200.

E. Nails: As required for securing bituminous type premolded joint filler.

F. Masking Tape: As required to temporarily adhere to concrete at each side of joint to receive filler.

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PART 3 EXECUTION

3.01 GENERAL

A. Construct straight joints; make vertical or horizontal, except where walls intersect sloping floors.
B. Commence concrete placement after the joint preparation is complete.

C. Time Between Concrete Pours: As specified in SECTION 03300.

3.02 SURFACE PREPARATION

A. Construction Joints: Prior to placement of abutting concrete, clean contact surface:
   1. Remove laitance and spillage from reinforcing steel and dowels.
   2. Roughen surface to a minimum of 1/4-inch amplitude:
      a. Sandblast after the concrete has fully cured.
      b. Water blast after the concrete has partially cured.
      c. Green cut fresh concrete with high pressure water and hand tools.
   3. Perform cleaning so as not to damage water stop, if one is present.

B. Expansion Joint with Pourable Filler:
   1. Use motorized wire brush or other motorized device to mechanically roughen and thoroughly clean concrete surfaces on each side of joint from plastic water stop to the top of the joint.
   2. Use clean and dry high pressure air to remove dust and foreign material, and dry joint.
   3. Prime surfaces before placing joint filler.
   4. Avoid damage to water stop.

C. Expansion Joint without Pourable Filler:
   1. Coat concrete surfaces above and below plastic water stop with bond breaker.
   2. Do not damage water stop.

D. Control Joint:
   1. Coat concrete surfaces above and below plastic water stop with bond breaker.
   2. Do not damage water stop.
   3. Furnish correct type and size of reinforcing and dowels.

3.03 INSTALLATION OF WATER STOPS

A. General:
   1. Join water stops at intersections to provide continuous seal.
   2. Center water stop on joint.
   3. Secure water stop in correct position to avoid displacement during concrete placement.
   4. Repair or replace damaged water stop.
   5. Place concrete and vibrate to obtain impervious concrete in the vicinity of all joints.

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6. Joints in Footings and Slabs:
   a. Ensure that space beneath plastic water stop is completely filled with concrete.
   b. During concrete placement, make a visual inspection of the entire water stop area.
   c. Limit concrete placement to elevation of water stop in first pass, vibrate the concrete under the water stop, lift the water stop to confirm full consolidation without voids, then place remaining concrete to full height of slab.
   d. Apply procedure to full length of plastic water stops.

B. Plastic Water Stop:
   1. Install in accordance with manufacturer's written instructions.
   2. Splice in accordance with the water stop manufacturer's written instructions using a thermostatically controlled heating iron. Butt splice unless specifically detailed otherwise.
      a. Allow at least 10 minutes before the new splice is pulled or strained in any way.
      b. Finished splices shall provide a cross-section that is dense and free of porosity with tensile strength of not less than 80 percent of the unspliced materials.
   3. Wire looped plastic water stop may be substituted for plastic water stop.

3.04 EXPANSION JOINT INSTALLATION

A. General:
   1. Place bond breaker above and below water stop when premolded joint filler and pourable joint filler is not used.
   2. Premolded Joint Filler:
      a. Sufficient in width to completely fill the joint space where shown.
      b. If a water stop is in the joint, cut premolded joint filler to butt tightly against the water stop and the side forms.
   3. Precut premolded joint filler to the required depth at locations where joint filler or sealant is to be applied.
   4. Form cavities for joint filler with either precut, premolded joint filler, or smooth removable accurately shaped material. Entire joint above water stop, in slabs, shall be formed and removed so that entire space down to water stop can be filled with the pourable joint filler.
   5. Vibrate concrete thoroughly along the joint form to produce a dense, smooth surface.

B. Bituminous Type Premolded Joint Filler:
   1. Drive nails approximately 1 foot 6 inches on center through the filler, prior to installing, to provide anchorage embedment into the concrete during concrete placement.
   2. Secure premolded joint filler in forms before concrete is placed.
   3. Install in walkways, at changes in direction, at intersections, at each side of driveway entrances, and at 45-foot intervals, maximum.

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C. Pourable Joint Filler:
   1. General: Install in accordance with the manufacturer's written instructions, except as specified below:
      a. Apply primer prior to pouring joint filler.
      b. Fill entire joint above the water stop with joint filler as shown.
      c. Use masking tape on top of slabs at sides of joints; clean spillage. Remove masking tape afterwards.
   2. Rubber Asphalt Type, Hot-Applied:
      a. Heat filler material in a double-walled boiler.
      b. Place filler in the joint by means of a nozzle from a portable pouring type container to prevent spillage outside of the joint.
      c. Begin pouring joint filler at the bottom of the horizontal joint and proceed upwards in a manner that will preclude the possibility of trapping air in the joint.
   3. Rubber Asphalt Type, Cold-Applied: Place cold-applied two-component fillers in accordance with manufacturer's written instructions.
   4. Multicomponent Type for Potable Water Structures: Install in accordance with manufacturer's written instructions.

D. Steel Expansion Joint Dowels:
   1. Install coated and lubricated bars parallel to wall or slab surface and in true horizontal position perpendicular to the joint in both plan and section view, so as to permit joint to expand or contract without bending the dowels.
   2. Secure dowels tightly in forms with rigid ties.
   3. Install reinforcing steel in the concrete as shown to protect the concrete on each side of
      the dowels and to resist any forces created by joint movement.

3.05 CONTROL JOINT INSTALLATION

A. Locate reinforcing and dowels as shown.

B. Install PVC water stop.

C. Concrete surfaces shall be dense and smooth.

D. Install bond breaker to concrete surfaces above and below water stop.

3.06 PREFORMED CONTROL JOINTS

A. Use only where specifically shown; do not use in water-holding basins.

B. Locate flush, or slightly below the top of slab.

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C. Install in accordance with manufacturer's written instructions in straight, full-length unspliced pieces.

D. Steel Strip Type with Preformed Groove: Brace to withstand pressure of concrete during and after placement.

END OF SECTION

CONFORMED

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for furnishing and installing forms, reinforcing steel, concrete and expansion and/or construction joints

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. A185, Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
2. A615, Specification for deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
3. C31, Practice for Making and Curing Concrete Test Cylinders in the Field.
4. C33, Specification for Concrete Aggregates.
5. C39, Test Method for Compressive Strength of Cylindrical Concrete Specimens.
6. C42, Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
7. C94, Specification for ready Mixed Concrete.
8. C143, Test Method for Slump of Hydraulic Cement Concrete.
9. C150, Specification for Portland Cement.
10. C172, Practice for Sampling Freshly Mixed Concrete.
11. C231, Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
12. C260, Test Method for Air-Entraining Admixtures for Concrete.
13. C494, Specification for Chemical Admixtures for Concrete.
14. C920, Specification for Elastomeric Joint sealants.
15. D994, Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
16. D1056, Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
17. D1751, Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

B. American Concrete Institute (ACI):

1. ACI 301, Specification for Structural Concrete for Buildings.
2. ACI 304, Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
3. ACI 305, Recommended Practice for Hot Weather Concreting.
4. ACI 306, Recommended Practice for Cold Weather Concreting.
5. ACI 315, Building Code Requirements for Reinforced Concrete.
6. ACI 347, Guide to Formwork for Concrete.

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C. Concrete Reinforcing Steel Institute (CRSI):

1. Manual of Standard Practice.

1.03 SUBMITTALS

A. Submit Shop Drawings in accordance with SECTION 01300 for the following:

1. Reinforcing Steel
   a. Furnish in detail and completeness that all fabrication and placement at the site can be accomplished without the use of contract drawings for reference.
   b. Include number of pieces, sizes, and grade of reinforcing steel, accessories, and any other information required for fabrication and placement.
   c. Show joint layout and design
   d. Check structural and site drawings for anchor bolts, anchors, inserts, conduits, sleeves, and any other items which are required to be embedded in concrete, and make necessary provisions as required so that reinforcing steel will not interfere with the placement of such embedded items.
2. Concrete mix designs.
3. Grout manufacturer/design mix (if included in this section)
4. Manufacturer's data for ancillary materials such as joint fillers and sealants, epoxy bonding compound.

1.04 QUALITY ASSURANCE

A. Selection of testing laboratory in accordance with SECTION 01410.

B. Sample and Test Concrete as follows:

1. Test Specimens: Make, cure and have tested, a minimum of one set of four test specimens from the concrete of each day's pour and for each fifty cubic yards of concrete cast in accordance with ASTM C172, C31 and C39. One cylinder shall be broken after seven days and three cylinders after twenty-eight day.
2. Slump: A slump test shall be made for each truckload of concrete in accordance with ASTM C143. Slumps greater than design mix limit will be grounds for rejection of the concrete.
3. Air Content: An air content test shall be made from each day's pour of concrete by the pressure method in accordance with ASTM C231. Air contents above or below the limits specified will be grounds for rejection of the concrete.
4. In the event the compressive strength of the cylinders, when tested, is below the specified minimum, the Engineer may require test cores of the hardened structure to be taken by the Testing Laboratory in accordance with ASTM C42. If such test indicates that the core specimen is below the required strength, the concrete in question shall be removed and replaced without cost to the Owner. Any other work damaged as a result of this concrete removal shall be replaced with new materials to the satisfaction of the Engineer at no additional cost to the Owner. The cost of coring will be deducted from the contract amount. Where the Testing Laboratory has taken core cylinders and the concrete proves to be satisfactory, core holes shall be filled in a manner satisfactory to the Engineer at no additional cost to the Owner.

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5. The Contractor shall coordinate the date and location of tests with the Engineer before any concrete work is started.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Reinforcing steel.

1. Transport to the site, store, and cover in a manner which will ensure that no damage shall occur to it from moisture, dirt, grease, or any other cause that might impair bond to concrete or chip protective epoxy coating.
2. Store on the site at all times, a supply of approved reinforcing steel to ensure that there will be no delay of the work.
3. Identification of steel shall be maintained after bundles are broken.

PART 2 PRODUCTS

2.01 MATERIALS

A. Portland Cement.

1. In accordance with ASTM C150, Type II of U.S. manufacture.
2. Only one brand of cement shall be used on the project.

B. Aggregates.

1. Fine aggregate, in accordance with ASTM C33, clean and graded from 1/4 inch to fines.
2. Coarse aggregate, in accordance with ASTM C33, clean and graded from 1/4 inch to maximum sizes hereinafter specified.

C. Air Entraining Agent.

1. In accordance with ASTM C260.

D. Water Reducing Agent.

1. In accordance with ASTM C494 Type A.

E. Microsilica Admixture.

1. Packaged in easily dispersing form.

F. Water.

1. Clean and potable,
2. Free of impurities detrimental to concrete.

G. Reinforcing Bars.

1. New, deformed billet steel bars, in accordance with ASTM A615, Grade 60.

H. Welded Wire Fabric

1. In accordance with ASTM A185.

I. Accessories.

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1. Reinforcement accessories, consisting of spacers, chairs, ties, and similar items shall be provided as required for spacing, assembling, and supporting reinforcement in place.
2. All accessories shall be dielectric coated steel or approved plastic accessories, conforming to the applicable requirements of the CRSI Standards.

J. Tie wire.

1. 16 gauge or heavier black annealed wire.

K. Form Ties and Spreaders.

1. Standard metal form clamp assemble and plastic cone, of type acting as spreaders and leaving no metal within 1 inch of concrete face.
2. Provide form tie with water stop for all walls to be in contact with earth or liquid.
3. Inner tie rod shall be left in concrete when forms are removed.
4. No wire ties or wood spreaders will be permitted. Use ½" x 1" C.T. plastic cones for sinkages.

L. Form Coatings.

1. Non-grain raising and non-staining type that will not leave residual matter on surface of concrete or adversely affect proper bonding of subsequent application of other material applied to concrete surface.
2. "Nox-Crete Form Coating" as manufactured by Nox-Crete Company, or approved equal.
3. Coatings containing mineral oils or the non-drying ingredients will not be permitted.

M. Grout.

1. High-strength, non-shrink grout with saltwater resistance.
2. Five Star Special Grout 120 or equivalent.

2.02 CONCRETE STRENGTHS AND PROPORTIONS

A. Cast-in-place concrete shall have the minimum compressive strength at 28 days as indicated on the Drawings.

B. The exact proportions for the mix, including amounts admixture (if any), and water, shall be determined by the concrete supplier.

C. The proportions of aggregate to cement for any concrete shall be such as to produce a mixture which will work readily into the corners and angles of the forms and around reinforcement with the method of placing employed not he work, but without permitting the materials to segregate or excess free water to collect on the surface.

D. Air-Entrainment: The air content in all concrete shall be maintained at 5 to 7 percent.

2.03 PREMOLDED JOINT FILLER

A. Bituminous Type.

1. In accordance with ASTM D994 or D1751.

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B. Sponge Rubber Type.

1. Neoprene, closed-cell, expanded in accordance with ASTM D1056, Type 2C5, with a compression deflection, 25 percent deflection (limits), 17 to 24 psi (119 to 168 kPa) minimum.

2.04 POURABLE JOINT FILLERS

A. Filler for Nonpotable Water Structures

1. Specific Gravity: Greater than 1.0 for cured, in-place filler.
2. Vertical and Sloped Joints: Furnish gun grade material that will remain as placed in joints and will not run down slope.
3. Suitable for continuous immersion and exposure to liquid being contained in the structure.

2.05 JOINT SEALANTS

A. In slabs.

1. In accordance with ASTM C920 for poured 2-component polyurethane sealant.
2. Sikaflex-2c, as manufactured by Sika Corporation or approved equivalent.

B. In walls.

1. Type II, Class A, compound conforming to Interim Federal Specification TT-S-00227E (3) (COM-NBS) for Sealing Compound; Elastomeric Type, Multi-Component (for Caulking, Sealing, and Glazing in Buildings and Other Structures).
2. Sikaflex-1a, as manufactured by Sika Corporation or approved equivalent.

2.06 EPOXY BONDING COMPOUND

A. The epoxy bonding compound shall be a three-component, solvent-free, moisture-tolerant, epoxy modified, cementitious product specifically formulated as a bonding agent and anti-corrosion coating. The product shall have suitable contact time, fluidity, and application temperature for this type of application.

PART 3 EXECUTION

3.01 FORMWORK

A. Falsework for Forms

1. Build and maintain necessary false work for the forms.

B. Construction of Forms

1. General
   a. Construct in accordance with ACI 347.
   b. Construct of sound material, to the correct shape and dimensions, mortar tight, of sufficient strength, and so braced and tied together that the

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movement of men, equipment, materials, or placing and vibrating the concrete will not throw them out of line or position.

2. Embedded Items
   a. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features.
   b. Do not embed wood, other than necessary nailing blocks, in concrete.
   c. Extended complete cooperation to suppliers of embedded items in their installation.
   d. Secure information for embedded items from other trades as required.
   e. Securely anchored embedded items in correct location and alignment prior to placing concrete.
3. Openings for Items Passing Through Concrete
   a. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.
   b. Coordination work of this nature in order that there will be no unnecessary cutting and patching of concrete.
   c. Cutting and repairing of concrete as a result of failure to provide for such openings shall be paid for by the Contractor at no additional expense to the Owner.

C. Removing Forms and False work

1. Forms shall not be removed for at least 72 hours after concrete has been placed.
2. Forms shall not be removed until the concrete has attained sufficient strength to insure stability.

3.02 REINFORCING STEEL

A. General

1. Place reinforcing steel in accordance with the drawings and approved shop drawings and the applicable requirements of the CRSI, Manual of Practice.
2. Install reinforcement accurately and secure against movement, particularly under the weight of workmen and the placement of concrete.

B. Reinforcing Steel Supports

1. Support bars on approved plastic or dielectric-coated metal chairs or spacers, accurately placed and securely fastened to forms or steel reinforcement in place.
2. Supply additional bars, whether specifically shown on the drawings or not, where necessary to securely fasten reinforcement in place.
3. Support legs of accessories in forms without embedding in form surface.
4. Spacing of chairs and accessories shall conform to CRSI, Manual of Standard Practice. Accurately space hoops and stirrups and wire to the reinforcement.
5. Permit no lose wood inside forms.
6. Lifting of welded wire fabric into proper position while concrete is being poured rather than supporting fabric on chairs will not be permitted.

C. Placing and Tying

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1. Set in place, space, and rigidly and securely tie or wire with tie wire at all splices and at all crossing points and intersections in the positions shown, or as directed.

2. Rebending of bars on the job to accommodate the job to accommodate existing conditions will not be permitted without the written approval of the Engineer
3. Points ends of wire ties away from forms.

D. Spacing

1. Minimum center to center distance between parallel bars shall be in accordance with the details on the drawings, or, where not shown, the clear spacing shall be 2 times the bar diameter but in no case less than 1½ inches or less than 1½ times the maximum size aggregate.

E. Splices

1. Maximum 50% of steel spliced occurring within lap length.
2. Top bars shall be 1.3 times values given in 3.01.D.5.c.
3. Splice lengths.
   a. #6 bars and smaller: 50-bar diameter
   b. #7 bars and larger: 60-bar diameter

F. Concrete Covering

1. In accordance with ACI 315, except where shown otherwise on drawings.

3.03 CONCRETE

A. Mixing of Concrete

1. All concrete shall be ready-mixed concrete, and shall be mixed and delivered in accordance with ASTM C 94. The batch plant of the concrete producer shall be certified for compliance with the standards established by the National Ready-Mixed Concrete Association.
2. In the event concrete is mixed at a central batching plant, the delivery shall be arranged so that intervals between batches are kept to a minimum, and in any event not more than thirty (30) minutes. Trucks shall be in first class condition and kept in constant rotation during delivery.
3. Concrete shall be placed within 90 minutes after cement has been mixed with aggregate or 45 minutes after addition of water and admixtures.
4. No admixtures, except those mentioned in paragraph 2.1 shall be used. Calcium chloride will not be permitted.
5. Truck delivery slips of all concrete delivered to the job shall indicate the quantity and quality of concrete, additives, date and time of batching and delivery, and the location of placement. Delivery slips shall be forwarded to the Engineer at the end of each pour.

B. Cold Weather Concreting.

1. In accordance with ACI 306.
2. Concrete shall not be mixed or placed when the temperature is below 40 degrees F, or when conditions indicate that the temperature will fall below 40 degrees F within 72 hours unless precautions are taken to protect the concrete.

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3. Concrete temperature shall be maintained, when deposited, at not less than 60 degrees F. Reinforcement, forms, and ground which concrete will contact must be completely free of frost.
4. Concrete and formwork must be kept at a temperature of not less than 50 degrees F. for not less than 96 hours after placing.
5. Calcium chloride shall not be used.

C. Hot Weather Concreting.

1. In accordance with ACI 305.
2. The maximum temperature of the concrete, when deposited, shall be 85 degrees F. If the weather causes the placing temperature to exceed 85 degrees F., the mix shall be cooled by methods approved by the Engineer.
3. No concrete shall be deposited when the air temperature is greater than 90 degrees F.

D. Conveying and Placing Concrete.

1. In accordance with ACI 304.
2. Notification: Before placing concrete, forms shall be thoroughly inspected. All chips, dirt, etc., shall be removed, all temporary bracing and cleats taken out, all openings for pipes, etc., properly boxed, all forms properly secured in their correct position and made tight, all reinforcement, anchors, and embedded items secured in their proper places. Concrete which may be on the forms or reinforcement, and which is set and dry, shall be cleaned off, and the forms and steel washed off before proceeding. Remove all foreign matter from forms and excavations.
3. Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the Engineer. Any flow of water into an excavation shall be diverted through proper side drains into a sump, or shall be removed by other approved methods which will avoid washing away the freshly deposited concrete.
4. Soil on which concrete will be poured shall be thoroughly wetted (except in freezing weather).
5. Anchors and Embedded Items: Anchors, bolts, sleeves, inserts, wood blocking, and any other items to be embedded in concrete shall be accurately secured in position before the concrete is placed. Aluminum shall not be embedded in concrete.

E. Handling and Depositing

a. Before any concrete is placed, notify all whose work is in any way connected with or influenced by the concrete work, and give them reasonable time to complete all portions of their work that must be completed before concrete is deposited.
b. Immediately before concrete is placed, inspect all forms to ensure that they are in proper position, sufficiently rigid, thoroughly clean, properly oiled and free from foreign materials, and that all reinforcement is in proper position.
c. Concreting, once started, shall be carried on as a continuous operation until the section of approved size and shape is completed.
d. Concrete shall be conveyed as rapidly as practicable from the mixer to the place of final deposit by methods that prevent the separation or loss of

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ingredients. It shall be deposited, as nearly as practicable, in its final position to avoid rehandling or flowing.

e. Concrete shall not be dropped freely where reinforcement will cause segregation, nor shall it be dropped freely more than six (6) feet. Concrete shall be deposited to maintain a plastic surface approximately horizontal.
f. Concrete that has partially hardened shall not be deposited in the work.

F. Pumping

a. Concrete may be placed by pumping if first approved in writing by the Engineer for the location proposed.
b. Equipment for pumping shall be of such size and design as to ensure a practically continuous flow of concrete at the delivery end without separation of materials.
c. The concrete mix shall be designed to the same requirements as herein before specified, and may be richer in lubricating components in order to allow proper pumping.
d. Concrete shall not be pumped through aluminum pipes.

G. Vibrating and Compacting

a. All concrete shall be thoroughly consolidated and compacted by suitable means during the operation of placing, and shall be thoroughly worked around reinforcement, embedded items, and into the corners of the forms. All concrete against forms shall be thoroughly spaded. Internal vibrators shall be used under experienced supervision, and shall be kept out of contact with reinforcement and wood forms. Vibrators shall not be used in a manner that forces mortar between individual form members.
b. Vibrators shall be flexible electric type or approved compressed air type, adequately powered and capable of transmitting to the concrete not less than seven thousand (7,000) impulses per minute. Vibration shall be sufficiently intense to cause the concrete to flow or settle readily into place without separation of the ingredients. A sufficient number of vibrators shall be employed so that complete compaction is secured throughout the entire volume of each layer of concrete. At least one (1) vibrator shall be kept in readiness as a spare for emergency use. Vibrators shall be such that the concrete becomes uniformly plastic with their use.
c. Vibration shall be close to the forms but shall not be continued at one spot to the extent that large areas of grout are formed or the heavier aggregates are caused to settle. Care shall be taken to not disturb concrete that has its initial set.
d. Where conditions make compacting difficult, or where the reinforcement is congested, batches of mortar containing the same proportions of cement to sand as used in the concrete shall first be deposited in the forms, to a depth of at least on inch.
e. The responsibility for providing fully filled out, smooth, clean, and properly aligned surfaces free from objectionable pockets shall rest entirely with the Contractor.

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3.04 CONSTRUCTION JOINTS

A. Construction joints shall be located a maximum of 40 feet apart. If, for any reason, the contractor feels a change is necessary, he shall prepare a placing plan and submit it to the Engineer for approval.

B. Where a joint is to be made, the surface of the concrete shall be sandblasted or thoroughly picked, thoroughly cleaned, and all laitance removed. In addition to the foregoing, joints shall be thoroughly wetted, but not saturated, and slushed with a coat of grout immediately before the placing of new concrete.

C. Approved keys shall be used at all joints, unless detailed otherwise.

D. Forms shall be retightened before placing of concrete is continued. There shall be an interval of at least 48 hours between adjacent pours.

E. Bonding Concrete at Construction Joints

1. To new concrete construction joints:
   a. Thoroughly clean and saturate joint with water.
   b. Cover horizontal wall surfaces as specified in this Section, and immediately place concrete.
   c. Limit concrete lift placed immediately on top of bonding compound to 12 inches thick.
   d. Thoroughly vibrate to mix and consolidate bonding compound and concrete together.

3.05 BONDING NEW CONCRETE TO OLD CONCRETE:

1. Mechanically roughen existing concrete surfaces to a clean, rough surface using appropriate mechanical means to remove the existing concrete surface, and provide a minimum roughness profile of ¼-inch.
2. Saturate surface with water for 24 hours, cover with epoxy bonding compound and place concrete as specified for new concrete.

3.06 EXPANSION JOINTS

1. Expansion joints shall be located as shown on contract drawings.
2. The joint shall include a joint filler, a bond breaker and joint sealant and installed as indicated on contract drawings.

3.07 JOINT SEALANTS.

1. Prepare surface in accordance with manufacturers directions.
2. Apply primer as recommended by sealant manufacturer.
3. Install sealant with the proper tools and methods as directed by the sealant manufacturer.

3.08 PATCHING

1. Immediately after stripping forms, patch minor defects, form-tie holes, honeycombed areas, etc., before concrete is thoroughly dry.

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2. Repair gravel pockets by cutting out to solid surface, form key, and thoroughly wet before placing patching mortar consisting of 1 part cement to 2 parts fine sand; compact into place and neatly finish. Honeycombed areas or gravel pockets which, in the Engineer's opinion are too large and unsatisfactory for mortar patching as described above, shall be cut out to solid surface, keyed, and packed solids with matching concrete to produce firm bond and surface.
3. The Contractor shall do all the cutting as required by himself or other trades. All such work shall be of the minimum size required. No excessive cutting will be permitted, or shall any structural members or reinforcement be cut.
4. The Contractor shall do all patching after work by other trades has been installed, where required, using Portland Cement Mortar 1:2 mix.

3.09 PROTECTION AND CURING

1. Protect concrete from injurious action of the elements and defacement of any nature during construction operations.
2. Keep concrete in a thoroughly moist condition from the time it is placed until it has cured, for at least (7) days.
3. Carefully protect exposed concrete corners from damage.
4. Allow no slabs to become dry at any time until curing operations are complete. In general, slabs shall be cured with non-staining curing paper, hosing or fog spray; vertical surfaces shall be curing with Burlene or fog spray or an approved curing compound.
5. Protect fresh concrete from drying winds, rain, damage, or spoiling. Curing paper shall be lapped 4 inches minimum at joints and sealed with waterproof tape.

3.10 CONCRETE FINISHES

1. Unexposed Surfaces: All unexposed surfaces shall have any form finish, at the Contractor's option.
2. Wearing Surface Finish: Float the surface by hand using a wooden or magnesium float. Finish with a flexible bristle broom. Permit surface to harden sufficiently to retain the scoring or ridges. Broom transverse to traffic or at right angles to the slope of the slab.
3. Addition of Material: The addition of cement, sand, water, or mortar to slab surfaces while finishing concrete is strictly prohibited.

3.11 DEFECTIVE WORK

1. The following concrete work shall be considered defective and may be ordered by the Engineer to be removed and replaced at Contractor's expense:
   a. Incorrectly formed.
   b. Not plumb or level.
   c. Not specified strength.
   d. Containing rock pockets, voids, honeycomb, or cold joints.
   e. Containing wood or foreign matter.
   f. Otherwise not in accordance with the intent of the Drawings and Specifications.

END OF SECTION

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SECTION 03320

CONCRETE SEALANT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements to seal all exposed concrete shown on the drawings or specified herein.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM).

1. C309, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

1.03 SUBMITTALS

A. In accordance with Section 01300.

B. Shop Drawings:

1. Curing methods proposed.
2. Manufacturer's data for the following products as applicable:
   a. Exposed aggregate finish retardant on formed surface.
   b. Evaporation retardant.
   c. Curing compound.
   d. Clear sealer.
   e. Clear floor hardener.

C. Quality Control Submittals:

1. Curing Compound: Manufacturer's Certificate of Compliance showing moisture retention requirements.
2. Retardants for Exposed Aggregate Finish: Manufacturer's Certification of Compliance.

PART 2 PRODUCTS

2.01 MATERIALS

A. Curing Compound:

1. Solvent-based, high chlorinated rubber solids content curing compound meeting requirements of ASTM C309.
   a. Moisture Loss: 0.030 gm/square cm/72 hours maximum.
   b. Capable of meeting moisture retention with one coat.
2. Manufacturers and Products:

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a. Master Builders Co., Cleveland, OH; Masterkure CR.
b. Euclid Chemical Co., Cleveland, OH; Euco Super Floor Coat.
c. Or equal.

B. Evaporation Retardant:

1. Optional: Fluorescent color tint that disappears completely upon drying.
2. Manufacturers and Products:
   a. Master Builders Co., Cleveland, OH; CONFILM.
   b. Euclid Chemical Co., Cleveland, OH; Eucobar.
   c. Or equal.

C. Clear Sealer (One-Component Penetrating Silane Siloxane Sealer):

1. Manufacturers and Products:
   a. Master Builders, Inc.; MASTERSEAL SL.
   b. Euclid Chemical Co.; Eucoguard 200.
   c. Or equal.

D. Clear Floor Hardener:

1. Colorless, aqueous premixed solution of zinc and magnesium fluosilicate.
2. Each gallon of fluosilicate solution shall contain minimum 2 pounds of crystals.
3. Manufacturers:
   a. Master Builders Co., Cleveland, OH.
   b. Euclid Chemical Co., Cleveland, OH.
   c. Sonneborn, Minneapolis, MN.

E. Water: Clean and potable, containing less than 50 ppm of chlorides.

PART 3 EXECUTION

3.01 CURING OF CONCRETE

A. Use one of the following methods as approved by ENGINEER:

1. Walls:
   a. General: Where walls are to receive coatings, painting, cementitious material, or other similar finishes, or where solvent-based coatings are not permitted, use only water curing procedures.
   b. Method 1: Leave concrete forms in place and keep entire surfaces of forms and concrete wet for 7 days.
   c. Method 2: Apply curing compound, where allowed, immediately after removal of forms.
   d. Method 3: Continuously sprinkle with water 100 percent of exposed surfaces for 7 days starting immediately after removal of forms.
2. Slabs and Curbs:
   a. Method 1: Protect surface by water ponding for 7 days.
   b. Method 2: Cover with burlap or cotton mats and keep continuously wet for 7 days.
   c. Method 3: Cover with 1-inch layer of wet sand, earth, or sawdust, and keep continuously wet for 7 days.
   d. Method 4: Continuously sprinkle exposed surface for 7 days.

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e. Other agreed upon method that will keep moisture present and uniform at all times on surface of slabs. Do not use curing compounds.
f. Where water curing for slabs during cold weather is not possible, use an ENGINEER-approved curing compound at manufacturer's recommended coverage per gallon.
g. Where curing compound cannot be used, special methods using moisture shall be agreed upon prior to placing the concrete slabs.
h. Protect slabs during cold weather with plastic sheets or other materials inside required heated enclosure if foot traffic is permitted on slabs.

B. Use only water curing on potable water structures.

C. Use only water curing methods where solvents in the curing compounds are prohibited by state or federal air quality laws.

D. Use only water curing where additional finishes such as clear sealer, hardeners, painting, and other special coatings are required.

3.02 EVAPORATION RETARDANT APPLICATION

A. Spray onto surface of fresh flat work concrete immediately after screening to react with surface moisture.

B. Reapply as needed to ensure a continuous moist surface until final finishing is completed.

3.03 CLEAR SEALER APPLICATION

A. Apply where indicated in Finish Schedule.

B. Before application, water cure concrete walls and floors to receive sealer for a minimum of 28 days, keep clean, unpainted, free from membrane curing compounds, with Work above them completed.

C. Apply with stiff brush, short nap roller, squeegee, garden sprayer, or conventional paint spray equipment.

D. Apply at a coverage rate of 125 to 200 square feet per gallon and cure the sealer on slabs for the following minimum cure time at the ambient temperatures shown prior to allowing foot traffic:

1. 90 degrees F - 2 hours.
2. 75 degrees F - 4 hours.
3. 50 degrees F - 8 hours.
4. 35 degrees F - 16 hours.

3.04 CLEAR HARDENER APPLICATION

A. Before application, water cure floors to receive hardener for minimum 28 days, keep clean, unpainted, free to membrane curing compounds, and perfectly dry with all work above them completed.

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B. Apply hardener evenly, using three coats, allowing 24 hours between coats.

1. First coat 1/3 strength, second coat 1/2 strength, and third coat 2/3 strength, mix with water
2. Apply each coat so as to remain wet on surfaces for 15 minutes.
3. Apply approved hardeners in accordance with manufacturer's instructions.
4. After final coat is completed and dry, remove surplus hardener from surface by scrubbing and mopping with water.

3.05 MANUFACTURER'S SERVICES

A. Provide manufacturer's representative at site for installation assistance, inspection, and certification of proper installation for products specified.

B. Provide clear sealer manufacturer's representative to demonstrate proper application of product.

C. Provide floor hardener manufacturer's representative to demonstrate proper mixing and application of product.

D. Provide curing compound manufacturer's representative to demonstrate proper application of curing compound to show coverage in one coat.

END OF SECTION

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SECTION 03355

CONCRETE FINISHES

PART 1 GENERAL

1.01 SUBMITTALS

A. In accordance with section 01300

1. Shop Drawings: Manufacturer's product data sheets(s).
2. Quality Control Submittals:
   a. Agenda: Conference prior to slab placement.
   b. Manufacturer's written procedures for slab preparation, product application, protection of finished surface, and post-application cleanup.
   c. Product manufacturers representatives' names and phone numbers.
   d. Manufacturer's Certificate of Compliance for products to be furnished.
   e. Manufacturer's Certificate of Proper Installation.
3. Statement of Qualifications:
   a. Manufacturer's Product Service Record.
   b. Application personnel.
   c. Manufacturer's representative.
4. Manufacturer's installation instructions.
5. Contract Close-out Submittals: Manufacturer's written instructions for maintenance and repair of floor finishes installed.

1.02 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer's Product Service Record: Five previous projects at least 5 years old where product was used at representative coverage per square foot.
2. Floor Product Manufacturer: Manufacture components of floor material, except the epoxy, in own plant and under control of trained quality control manager.
3. Application Personnel: Four previous projects of successful installation of specified materials or manufacturer's training.

B. Preinstallation Training: Manufacturer-approved training of application personnel and quality control inspectors for these floor finishes.

C. Conference Prior to Slab Placement:

1. Conducted by CONTRACTOR.
2. Agenda:
   a. Concrete mix design.
   b. Placing techniques.
   c. Finishing techniques.
   d. Floor hardener application procedures.
   e. Equipment required for these procedures.
3. Attendees:

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a. CONTRACTOR'S superintendent.
b. Subcontractor's representative involved in slab installation and finishing.
c. ENGINEER.

D. Mockups: Install one 10-foot by 20-foot area for each type of finish floor to demonstrate that the material and methods produce a finished product acceptable to the ENGINEER.

1. Mockup will establish the standard of quality for floor finishes.
2. Use specified materials at a location designated by ENGINEER or OWNER.
3. Notify ENGINEER 5 days in advance of commencement of mockup floor slab application and training.
4. Do not purchase floor materials until mockup slab installation has been accepted by the ENGINEER or OWNER.

E. Color Samples: Minimum 2-inch by 2-inch Sample applications of floor finishes available.

PART 2 PRODUCTS

2.01 CLEAR LIQUID SEALER DUST PROOFER

A. Colorless, aqueous solution of zinc and magnesium fluosilicate.

B. Each gallon of fluosilicate solution shall contain minimum 2 pounds of crystals.

C. Manufacturers:

1. Master Builders Co., Cleveland, OH.
2. Sonneborn, Minneapolis, MN.
3. Euclid Chemical Co., Cleveland, OH.

2.02 DRY SHAKE HARDENERS

A. Mix: Surface hardener with metallic or natural aggregate, premixed and packaged at factory, delivered to site ready to apply.

B. Natural Aggregate: Mixture of specially processed graded iron aggregate, selected Portland cement, and necessary plasticizing agents formulated, processed, and packaged under stringent quality control at the manufacturer's factory.

1. Manufacturer and Product:
   a. Natural concrete gray, "Surflex" by Euclid Chemical Co., "Mastercron" by Master Builders, Cleveland, OH, or equal.

C. Metallic Aggregate: Metallic aggregate, cementitious binder, plasticizer, water-reducing admixtures, and other ingredients free from nonferrous particles, rust, and material intended to disguise rust.

1. Manufacturer and Product:
   a. Natural, concrete gray, and colored "Euco-Plate HD" by Euclid Chemical Co., "Masterplate 200" by Master Builders, Cleveland, OH, or equal.

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PART 3 EXECUTION

3.01 CLEAR LIQUID SEALER DUST PROOFER APPLICATION

A. Before application, thoroughly cure floors to receive treatment for minimum 28 days, keep clean, unpainted, free from membrane curing compounds, and perfectly dry with all Work above them completed.

B. Apply hardener evenly to surface, using three coats, allowing 24 hours between coats.

1. First coat 1/3 strength, second coat 1/2 strength, and third coat 2/3 strength, mix with water.
2. Apply each coat so as to remain wet on surfaces for 15 minutes.
3. Apply approved treatment in accordance with manufacturer's instructions.
4. After final coat is completed and dry, remove surplus hardener from surface by scrubbing and mopping with water.

3.02 INSTALLATION OF DRY SHAKE HARDENERS

A. Application:

1. Application Rate: 2 pounds per square foot or as recommended by manufacturer.
2. Penetration: Top 1/8-inch to 3/16-inch depth of floor slab.
3. Commence application immediately upon completion of floating surface area; bleed water shall not be present during and after application.
4. Distribute 2/3 of specified total quantity evenly on concrete surface to receive treatment by mechanical spreader; do not throw shake product.
5. Apply first to areas adjacent to forms, entry ways, columns, and walls where rapid moisture loss may occur.

B. Finishing:

1. Commence first mechanical float with finishing machines using float blades as soon as shake has absorbed moisture, as indicated by darkening of the surface area.
2. Float until moisture from base slab penetrates through first shake application.
3. Immediately distribute remaining 1/3 of total required shake by spreader and commence second mechanical float, as specified above.
4. Compact surface further by third mechanical float as time and setting characteristics of concrete allow.
5. Do not add water to surface area. In drying conditions, an evaporation retarder may be used to prevent plastic shrinkage cracking and rapid surface drying, subject to manufacturer's recommendations and approval of ENGINEER.
6. Hand or mechanically trowel surface while stiffening progresses, as indicated by loss of sheen with blades relatively flat.
7. Run trowel blades as soon as possible to achieve representative finish obtained on mockup panel.
8. Avoid excessive trowel blade speed which may "burn" or darken floor surface resulting in loss of wear.

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9. Remove marks and pinholes in final raised trowel operation.

C. Curing:

1. Cure treated floor surface to meet the recommendations of the dry shake hardener manufacturer. Apply curing compounds as soon as possible without marring the slab surface.
2. Commence slab protection when curing compound is dry.
   a. Cover slab with nonstaining craft building paper to protect area from droppings.
   b. Maintain floor free of traffic and loads for at least 10 days after completion.

3.03 MANUFACTURER'S SERVICES

A. Provide manufacturer's representative at site for installation assistance, inspection and certification of proper installation, and training and application personnel.

1. Technical assistance with design and adjustment of concrete mixes to receive floor finishes and toppings.
2. Technical assistance to assure and certify application and installation of system being used.
3. Consultation, direction, and certification of mockup, for full-scale application of floor finishes, and at other times as needed.
4. Attendance at the conference prior to slab placement to finalize proper methods and procedures.

END OF SECTION

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SECTION 05010

MISCELLANEOUS METALS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

A. Work includes the purchase, fabrication and installation of miscellaneous steel components, sheet steel, steel plate, steel posts, steel angle iron and related cable rail anchorage and hardware, as well as rectangular metal top-rails. All components and fabrication shall be as necessary to construct a uniform, code-compliant pedestrian railing system. System. Work shall include any and all necessary railing components including steel plates, angle and bar stock, bolts, pins, anchorage system components, injectable hybrid mortar and any and all miscellaneous hardware including tamperproof fasteners, nylon and/or rubber spacers/bushings as indicated in the plans.

B. Related Sections:
   1) See Section 09000 Metal Finishes

1.3 REFERENCES

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Welding Qualifications: AWS D1.1/D1.1M, "Structural Welding Code - Steel." And AWS D1.6, "Structural Welding Code - Stainless Steel."

C. American Welding Society Standards.

1.4 SUBMITTALS

A. Submit welder/fabricator experience and qualifications. Welder/fabricator shall provide written and photographic proof of eight (8) years of engagement in similar types of work in regard to overall site context, product form, fit and finish.

B. Welding certificates held by and professionally qualifying the welding fabricator.

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C. Manufacturers' product data for all components: Steel plate, steel posts, bar stock, angle shapes, channels and tube sections. Mill Certificates signed by manufacturers of steel products certifying that products furnished comply with specified requirements.

D. Manufacturers' product data for all cable, fasteners, hardware and related components: Bolts, washers, spacers, grommets, etc. as specified, utilized to both isolate dissimilar materials and secure railing system components in place together to constitute the complete system.

E. Manufacturers product data for railing anchorage system components, consisting of injectable hybrid mortar, threaded rod assembly.

F. Fabricate and submit for review and approval by the Engineer and Owner a full scale railing 'mock-up'. Mock-up shall be made accurately of the specified components. The finish may be shop applied, representing color selection on the appropriate components.

G. Shop Drawings: Provide plans, elevations, sections, details, and attachment details for the Base Plates based on Field Conditions. The contractor shall verify all measurements in the field prior to start of fabrication.

H. Provide for four (4) additional or extra rail posts as 'Attic Stock' to the Owner as identified and determined thru the Shop Drawing Process.

I. Structural Design Submittal for elements that are proposed to differ from those specified shall have engineering analysis and assessment signed and sealed by the qualified professional engineer responsible for their preparation unless waived by the Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect all finished surfaces from marring. Follow manufacturer's instructions. Plan the work to minimize handling. Protect and store all railing system components out of the weather and in a location and manner secure from theft.

PART 2- PRODUCTS

2.1 MATERIALS

A. METALS: GENERAL

1) Content of Steel Products: Provide products with average recycled content of steel products so post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 20 percent.

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2) Provide metal materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

3) Brackets, Flanges, and Anchors: Cold rolled steel, formed metal shapes, all of same type of material and prepared for uniform color galvanized finish excluding hardware and stainless steel mesh.

B. METALS: SPECIFIC

1) Metal railing shall conform to the requirements shown on the plans.

2) Stainless Steel ASI TYPE 316 per ASTM A 53/A 53M. Stainless Steel finish shall be No. 4 Brushed Satin appearance.

3) Steel Shapes & Rectangular Steel Tubing: ASTM A36, ASTM A 513, ASTM A500

4) Steel Posts and Channel: Steel Posts - W4x13 Post, ASTM A 788

5) Plates, Shapes, and Bars: ASTM A 276.

C. RAILING ANCHORAGE SYSTEM

1. Railing Anchorage System shall conform to the requirements shown on the plans.

2. Railing Anchorage System: Railing system base plates shall be secured to the existing concrete cap by hot dipped galvanized threaded rod, with nuts used in conjunction with injectable hybrid mortar.

3. Injectable Hybrid mortar shall be Hilti HIT-HY 200A as manufactured by Hilti or Approved Equal.

D. HARDWARE, FASTENERS, MISCELLANEOUS MATERIALS AND OTHER ITEMS

1) Molded fabric bearing pads: For use below base plates set on concrete. Pre-formed pads consisting of fabric and a rubber body. Pads shall be made of new, un-vulcanized rubber and unused fabric fibers in proportion to maintain strength and stability. The surface hardness expressed in standard rubber hardness figures shall be: 80 Shore A durometer +/- 10 durometer average. The ultimate breakdown limit of the pad under compression loading shall be no less than 7,000psi for the specified thickness without extrusion or detrimental deduction in the pad thickness. The pad shall be sized to fit beneath the base plate and shall have the bolt holes accurately located.

2) Hardware & Fasteners: 316 Stainless Steel tamper-proof bolts, washers and nuts

3) Isolators: Isolating washers, grommets, collars, spacers, etc. made of nylon and/or neoprene and/or rubber, capable of fully isolating from contact dissimilar metals.

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4) Welding Consumables: Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

5) Color Galvanizing System Repair Paint Kit: Metal finish system and color-matched primer and paint to address marring and necessary field touch up of factory finished components. The repair system shall address field applied galvanizing and include primer and paint as manufactured by the Color Galvanizing supplier.

PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor shall proceed with fabrication only when the final design and railing mock-ups have been reviewed and approved.

B. Fabrication details of the railing system shall be per plans, mock-ups and shop drawings based on system review and final approvals.

C. Structural Performance: All railing system components shall withstand the effects of the various loads and the following loads and stresses within limits and under conditions indicated by the building codes.

1. Thermal Movements: Railing system shall allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Provide slip fittings for expansion and contraction where necessary.

   a) Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

3.2 PRE- INSTALLATION

A. The Contractor shall develop a fully coordinated layout plan utilizing the railing types indicated, utilizing the G type panels as ‘flex length’ panels to facilitate uniform panel length of A and B type railing panels in all other locations.

B. The Contractor shall develop a coordinated layout for the railing base plates and identify all base plate and anchor bolt locations within a defined length or ‘run’ of railing. The Contractor shall develop accurate, rigid plywood or metal templates and lay out for review and approval by the Engineer and Owner. Affix multiple templates

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together to represent length of railing, with rail panels. Do not utilize isolated templates. Adjust templates where necessary in consultation with the Engineer and Owner to maintain a 'best-fit' visually consistent 'run' or length of rail without deviation or visual irregularities.

C. Utilize templates throughout the installation to maintain consistency.

3.3 FABRICATION

A. General: Fabricate base plates, posts and horizontal rails to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage. System is required to meet applicable building codes.

B. Assemble and weld rail system in the shop to greatest extent possible to minimize field work. and assembly. Clearly mark units for coordinated factory finishing and installation.

C. Cut, grind, drill, and punch metals cleanly and accurately. Remove burrs and ease all edges to a radius of approximately 1/32 inch unless otherwise indicated. Join by welding all joints continuously. Remove sharp or rough areas on exposed surfaces.

D. The Engineer will provide final digital cut files to the fabricator for graphic work shown on G type panels and post rail caps for Contractor's use with plasma or water jet cutting equipment.

E. Create welded work with true to line geometry, with level with accurate angles and surfaces.

F. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2) Obtain fusion without undercut or overlap.
3) Remove flux immediately.
4) At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

G. Fabricate connections that will be exposed to weather in a manner that does not trap water. Provide weep holes in the bottom of all posts, horizontal rails and where water may accumulate.

H. Cut, drill, reinforce, drill, and tap as indicated or as necessary to receive finish hardware, screws, and similar items.

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I. Non-welded Connections: Connect members with concealed mechanical fasteners and fittings, utilizing spacers, Tighten completely. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints when properly installed.

3.4 RAILING FINISHES

A. General
1) The finished railing system shall meet Architecturally Exposed Structural Steel Standard AESS-3.
2) All iron and plate steel shall be color galvanized.
3) No. 4 Satin finish on all stainless steel Mesh
4) Refer to Section 09000 – Metal Finishes.

B. Galvanized Components:
1) Remove all sharp projections, burrs, fins or other slag material that can cause injury.

3.5 INSTALLATION - GENERAL

A. The Contractor shall utilize care when working over open water. Life safety equipment shall be on hand prior to start of installation.

B. Railing system must be approved and meet current building code in regard to design and structural strength.

C. Create templates of the components for layout in the field as described under Pre-Installation section. Utilize templates for drilling for setting threaded rod and installing base plates which will secure railing posts to the existing concrete cap.

D. Utilizing a wire brush, clean top of concrete wall cap. Identify any irregularities that will affect alignment and installation of railing system. Grind to ‘even out’ and eliminate any minor imperfections, burrs or the like.

E. Clean and fill any identified void or hole with an approved cementitious mortar and finish flush.

F. Utilizing templates, finalize ‘best-fit’ alignment for length of rail run to be visually consistent uniform, and meet all embedment requirements. Drill and set base plates and posts according to approved layout. Install railing anchorage system by drilling existing concrete to receive threaded rod. Anchorage system utilizes injectable hybrid mortar. Follow approved manufacturer’s instructions.

G. Drill and set posts plumb. Shim as required. Place plates in location accurately with regards to alignment, and elevation; measured from established lines and levels and free of rack unless otherwise specified. Set all components to the angles specified.

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H. Coordinate with existing concrete to shim with fiber or SS metal plates or washers if required to maintain alignments. Shims shall not be visible when complete.

I. Periodically inspect and re-verify template locations.. Maintain all required concrete embedment and drill hole clearances when laying out and aligning rail.

J. Fit horizontal rail components and panels together to form tight, uniform joints. Bolt into place, utilizing isolation washers, grommets spacers, etc and required stainless steel tamper-proof hardware.

K. . Coordinate sequence with installation of other cable rail parts.

L. Field cut and fit mitered corners of top rail in place, as specified.

M. Temporarily fit components when necessary. Unfinished, mill steel components may be field fit, marked, removed and factory finished at a later time if conditions dictate and if so approved by the Engineer and Owner. Advance all work to the greatest degree practical to limit re-setting and re-work of components.

N. Adjust and secure cable tensioners.

O. If issues with fitment are encountered, mark or scribe on site and perform cutting, drilling, and fitting required for the fabrication in a shop setting to the greatest extent practical.

P. Drilling, grinding or welding of finished components is prohibited without prior written approval. Any adjustments shall not compromise the structural integrity of the components.

Q. Once installation is complete, field paint exposed threaded rod washers and nuts with approved touch up paint system, applied per manufacturer's instructions.

3.6 CLEANING & CLOSEOUT

A. Clean by washing thoroughly with clean water and soap and rinsing with clean water.

B. Completely clean field welds, bolted connections, and abraded areas and areas of repair

C. Utilize and apply the approved touch up paint system, applied per manufacturer's instructions.

D. Furnish any specialty fasteners and compatible tools related to the tamper-proof hardware installed to the Owner upon completion.

E. Furnish four (4) additional or extra rail panels as 'Attic Stock' to the Owner as determined in Shop Drawing Process.

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F. Protect the installed and complete railing system components from damage during construction with non-marring, temporary protective coverings.

G. Protect all installed work until Final Acceptance.

END OF SECTION

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SECTION 06200

CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. The work in this Section includes modifications to the existing boardwalk system as shown on the Drawings.

1.2 RELATED SECTIONS

A. Section 05010 – Miscellaneous Metals

1.3 REFERENCES

The following references may be found in this section:

A. AITC - American Institute of Timber Construction
B. ANSI - American National Standards Institute
C. ASTM - American Society for Testing and Materials
D. ALSC - American Lumber Standards Committee
E. AWPA - American Wood Preservers Association
F. NFPA - National Forest Products Association
G. NDS - National Design Specification for Wood Construction
H. AWPB - American Wood Preservers Bureau
I. ASTM E84 - Standard Test Method for Surface Burning Building Materials.
J. AWI - Architectural Woodwork Institute

1.4 SUBMITTALS

A. Submit in accordance with Section 01300.

B. Qualifications: Wood worker/installer responsible for the carpentry shall have eight (8) years minimum of experience. Installer shall furnish written /photographic evidence of past work experience with a minimum of three (3) references with complete contact information, derived from completed past projects of a similar nature, scale and scope.

C. Material Sample:

1) PT Lumber for Top-Rail: Supplier's Product Data Sheet, along with physical sample of wood top rail at a minimum of six feet (6'-0") in length for review and approval by Owner and Engineer.

D. Sealing Material:

1) Penofin end grain wax sealer designed for this application or approved equal.

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1.5 QUALITY ASSURANCE

A. Perform work in accordance with AWI Architectural Woodwork Quality Standards, Custom Grade.

1.6 DELIVERY, STORAGE, AND PROTECTION

A. Section 01010 – Basic Requirements: Transport, handle, store, and protect products.

B. Protect stored materials and completed work from moisture damage.

1.7 PROJECT CONDITIONS

A. Section 01010 – Basic Requirements.

B. Coordinate installation sequence to ensure layout and assembly are achieved in an orderly and expeditious manner, with minimal joints.

PART 2 - PRODUCTS

2.1 FASTENERS

A. As per approved shop drawings, size and type to suit application.
B. All fasteners to be 316 stainless steel bolts, machine bolts, washers, nuts, plates, angle brackets, etc. as necessary to secure the top rail to the angle iron components.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall examine boardwalk components before starting work.
B. Coordinate with other trades and adjacent work.

3.2 INSTALLATION

A. Cut and modify existing boardwalk railing system as indicated.
B. Trim, finish and sand all edges cleanly. Seal end grain as directed.
C. Create thru-bolt attachments for fastening steel angles Shim and adjust if necessary, to obtain tight fit to components. Any shimming shall be limited in quantity and shall not be visible. Shims shall be secured.
D. Fully tighten bolts to secure without any movement.

END OF SECTION

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SECTION 09000

METAL FINISHES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work in this Section includes a multi-step factory-applied metal coating priming and finishing operation for the non-stainless steel components of the pedestrian railing system.

1.2 RELATED SECTIONS

A. Section 05010 – Miscellaneous Metals

1.3 SUBMITTALS

A. The Metal Finisher/Manufacturer/Facility responsible for galvanizing and metal finishing shall have a minimum of ten (10) years' experience with hot dip galvanizing utilizing a dry kettle process and shall have advanced experience and expertise in the preparation, application and finishing of factory applied color-galvanized coatings and finishes on metal.

B. Submit in writing the Metal Finisher's qualifications and experience.

C. Submit the manufacturer's product data sheets for coatings specified in this Section including physical performance test data.

D. Submit a Certificate of Compliance with these specifications for metal items finished in this process. Certificate shall be signed by the entity responsible for the galvanizing and finishing, indicating compliance with requirements of these specifications

E. Substitutions: Substitutions must be submitted with performance criteria that meet or exceed the requirements of this specification.

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F. Certification from the American Galvanizers Association that Galvanizer has a certified Master Galvanizer on staff.

G. Certificate of Compliance for Shop Application: The galvanizer/applicator shall be SSPC-QP3 certified.

H. Submit Manufacturer's Product Data Sheet for Factory-Applied Metal Coatings.

I. Submit color samples for review and approval. Color shall be applied to metal.

J. Submit representative sample of the complete metal finishing system in regard to applied layers, materials and factory finished thicknesses.

1.4 QUALITY ASSURANCE

A. Galvanizer must show a proven minimum of ten year's experience in hot-dip galvanizing using the dry kettle process and the application of the coatings required in this specification. The coating application must be performed in the same facility as the galvanizing and work must be coordinated to minimize time between galvanizing, primer and paint applications.

B. Coordination between Fabricator and Galvanizer: The galvanizer shall review fabricator's shop drawings for suitability of materials for galvanizing and coatings and will notify the fabricator of any required modifications.

C. Coating Applicator: For the purpose of establishing a standard of quality, appearance and performance of the finished product, the galvanizing, primer and finishing process provided by the coating applicator shall be equal to or better than the integrated color galvanizing finishing process and product as produced by:

Duncan Galvanizing
69 Norman Street
Everett, MA. 02149
617.389.8440.wwwduncangalvanizing.com

D. The finished railing system shall meet Architecturally Exposed Structural Steel Standard AESS-3 in regard to the overall finished appearance of system.

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PART 2 - PRODUCTS

2.1 MATERIALS

A. Hot-Dip Galvanizing: For steel exposed to the elements, weather or corrosive environments and other steel indicated to be galvanized, provide coating for iron and steel fabrications applied by the hot-dip process. Galvanizing bath shall contain special high-grade zinc.

1) Product shall be Duragalv, manufactured by Duncan Galvanizing or approved equal.
2) Comply with ASTM A 123 for fabricated products and ASTM A 153 for hardware.
3) If required, plug vent holes after galvanizing and grind smooth.
4) Galvanized surface shall be prepared per SSPC SP2 or SP3 to provide a smooth surface removing all runs, drips or sags.
5) Galvanizing shall exhibit a rugosity (smoothness) of 16-25 microns or less when measured by a profilometer. This pertains to those elements that are less than 24 pounds per running foot.
6) Galvanized surfaces, that are to receive coatings, must be blasted per SSPC SP 16. The use of iron, steel shot, and aluminum oxide grit as a blast medium, and power wire brushes are not permitted.

B. Factory-Applied Primer over Galvanized Steel: Provide factory-applied polyamide epoxy prime coat over hot-dipped galvanized steel.

1) Product shall be Primergalv, manufactured by Duncan Galvanizing or approved equal.
2) Primer shall be certified OTC/VOC compliant at less than 2.8 lbs. / gal. and conform to EPA and local requirements.
3) Apply the primer at the galvanizer's facility within 12 hours after galvanizing or blasting. Application must be in a controlled environment meeting applicable conditions as required by the coating manufacturer. Primer shall have a one-year re-coat window for application of finish coat.
4) Primer shall be applied at 4-6 mils DFT and meet or exceed the following performance criteria as stipulated by the coating's manufacturer:
    a) Abrasion Resistance: ASTM D 4060 (CS17 Wheel, 1,000 grams load) 1 kg load, 200 mg loss.
    b) Adhesion: ASTM D 4541, 1050 psi.
    c) Corrosion Weathering: ASTM D 5894, 13 cycles, 4,368 hours, 10 per ASTM D 714 for blistering; 7 per ASTM D 610 for rusting.
    d) Direct Impact Resistance: ASTM D 2794, 160 in. lbs.

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e) Flexibility: ASTM D 522, 180 degrees bend, 1-inch mandrel, Passes.
f) Pencil Hardness: ASTM D 3363, 3H.
g) Moisture Condensation Resistance: ASTM D 4585, 100 degrees F, 2000 hours, Passes no cracking or delamination.
h) Dry Heat Resistance: ASTM D 2485, 250 degrees F.
i) Accelerated Weathering: QUV- ASTM D 4587 QUV A 5000 Hours, Passes.
j) Salt Fog Resistance: ASTM B 117, 5,600 hours No cracking or blister.

C. Factory-Applied Finish over Primed Steel: Provide factory-applied high performance polysiloxane coating over hot-dip galvanized steel in the specified color per approved samples.

1) Product shall be specifically design for marine environments with a color-fast finish. Product shall be Colorgalv. Marine, as manufactured by Duncan Galvanizing or approved equal.
2) Finished Color shall be selected from the metal finisher's standard colors, as identified by the Owner: Color shall approximate the colors shown, Color is 'BLUEPRINT' as manufactured by Duncan Galvanizing or approved equal.
3) Topcoat shall be certified OTC/VOC compliant and conform to applicable regulations and EPA standards.
4) Topcoat shall be applied over the primer at the galvanizer's facility within 12 hours after galvanizing or blasting. Topcoat shall be applied in a controlled environment meeting applicable conditions and recoat times as required by the coating manufacturer.
5) Topcoat shall be applied at 4-6 mils DFT.
6) Topcoat shall meet or exceed the following performance criteria:
   a) Abrasion Resistance: ASTM D4060, CS17 wheel, 1000 cycles, 1 kg load; 119 mg loss
   b) Adhesion: ASTM D4541; 3,494 psi cohesive fail
   c) Dry Heat Resistance: ASTM D2485 B; 275 deg F passes- no cracks or discoloration
   d) Flexibility: ASTM D522, 180 deg bend, 1/8" mandrel; Passes
   e) Direct Impact Resistance: ASTM D2794; 56 in. lbs.
   f) Pencil Hardness: ASTM D3363; 5H
   g) Corrosion Weathering: ASTM D5894, 10 Cycles, 3360 hours; Rating 10 per ASTM D714 for Blistering, Rating 10 per ASTM D610 for Rusting Salt Fog: ASTM B117, 5,000 hours; Rating 10 per ASTM D714 for Blistering, 7 per ASTM D610 for Rusting

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D. Warranty:

1) The Contractor shall provide the Owner a metal finisher/galvanizer's warranty that materials produced and utilized for this project will incur less than ten (10%) percent visible rust over a minimum period of 20 years.

2) Warranty provided to the Owner shall address replacement of rail system components and panels that fail to meet the above stated criteria.

PART 3 - EXECUTION

3.1 PRE-FINISHING

A. Coordination: The Contractor shall engage and facilitate coordination between the railing fabricator, railing installer and metal finisher throughout the submittal, railing mock-up and fabrication processes to ensure material compatibility, the finish properties and clearances required are accommodated to ensure proper fitment of assembled steel components, isolators, wood cap rail, fastening hardware and anchorage components.

3.2 APPLICATION OF FACTORY APPLIED METAL COATINGS

A. Galvanizing Application: Galvanize materials in accordance with specified standards and this specification. The dry kettle process shall be used to eliminate any flux inclusions on the surface of the galvanized material. The use of the wet kettle process is prohibited.

B. Prior to Galvanizing: The steel shall be immersed in a flux solution (zinc ammonium chloride). The flux tank must be 12 to 14 Baumé density and contain less than 0.4 percent iron.

1) To provide the galvanized surface required, the following procedures shall be implemented:
   a) A monitoring recorder shall be utilized and inspected regularly to observe any variances in the galvanizing bath temperature.
   b) The pickling tanks shall contain hydrochloric acid with an iron content less than 12 percent and zinc content less than 3 percent. Titrations shall be taken weekly at a minimum.
   c) All chemicals and zinc shall be tested at least once a week to determine compliance with ASTM standards. All testing shall be done using atomic

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absorption spectrometry or x-ray fluorescence (XRF) equipment at a lab in the galvanizing facility.

C. Coatings shall be applied under the following conditions:
   1) Surface of the substrate shall be dry and free from dust, dirt, oil, grease or other contaminants. Coating and cure facility shall be maintained free of airborne dust and dirt until coatings are completely cured.

D. All coatings must be applied in a controlled environment under the conditions specified by the coating's manufacturer. All coatings must be mixed and applied according to the coating manufacturer's specifications.

E. The finished railing system shall meet Architecturally Exposed Structural Steel Standard AESS-3 in regard to overall finished appearance of system.

3.3 INSTALLATION

A. The Installer shall comply with fabricator's and galvanizer's requirements for installation of materials and fabrications, including use of nylon slings or padded cables utilized for ai all operations including loading and unloading finished rail panels. equipment handling factory-coated materials.

B. Touch-Up and Repair: For damaged and field-welded metal coated surfaces, clean welds, bolted connections and abraded areas the following procedures must be used.

   1) For galvanized surfaces, apply organic zinc repair paint complying with requirements of ASTM A 780, modified to 95 percent zinc in dry film. Galvanizing repair paint shall have 95 percent zinc by weight. Basis of design is ZIRP by Duncan Galvanizing. Thickness of applied galvanizing repair paint shall be not less than coating thickness required by ASTM A 123 or A 153 as applicable.

   2) For factory-applied finish coatings, field-touch-up shall be performed by qualified applicators with experience in the application of high-performance industrial coatings. Touch-up shall be done with care such that any touch-up repair is not visible from 6 feet and a uniform protective surface is created.

C. The metal finisher shall furnish a comprehensive system touch-up field repair kit to the railing installer for use in completing and finishing the rail system.

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D. A separate touch up lit shall be furnished, complete, to the Owner for use after completion of this project.

E. The paint system and colors shall be a match to the colors applied to the railing system components at the factory. Should multiple color finishes be utilized, provide a kit for each finish.

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END OF SECTION

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SECTION 16500
GENERAL ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. The work under this Section includes the furnishing, fabrication and installation of the electrical service, all site conduit, wiring, hand holes, pull boxes, enclosures, pedestals, luminaires, lighting, and light poles as well as all related controls as indicated in the Contract Drawings and these specifications.
B. All electrical work shall be performed in accordance with the latest appliable National, State and Local Codes and the current National Electrical Code (NEC).
C. The Contractor shall provide materials, equipment, wiring etc. as necessary for installation of a complete and functional system ready for the intended operation.
D. Coordinate the work related to the Primary Electrical Service with National Grid. All work shall comply with National Grid and City of Fall River Standards.
E. The Contractor shall obtain all necessary permits and licenses, file necessary plans, and pay all fees for permits and inspections. Permit fees are the responsibility of the Contractor as part of his bid.

1.2 RELATED SECTIONS

A. Section 02200- Earth Excavation, Backfill and Grading
B. Section 03300 – Cast in Place Concrete

1.3 REFERENCES

A. ASTM Testing Standards:
1. ASTM B 117 – Standard Practice for Operating Salt Spray (Fog) Apparatus.
2. ASTM D 522 – Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
3. ASTM D 523 – Standard Test Method for Specular Gloss.

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4. ASTM D 2247 – Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
5. ASTM D 2794 – Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
6. ASTM D 3359 – Standard Test Methods for Measuring Adhesion by Tape Test.
7. ASTM D 3363 – Standard Test Method for Film Hardness by Pencil Test.
8. ASTM G 155 – Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.

B. ISO Testing Standards:

1. ISO 1520 – Paints and Varnishes – Cupping Test.
2. ISO 2815 – Paints and Varnishes – Buchholz Indentation Test.

C. Underwriters Laboratories (UL):

1. UL listed

D. IESNA LM-79 Testing Standard:

1. Type 3 and Type VS IES distribution

1.4 QUALITY ASSURANCE

A. Materials and products furnished shall be designed for the intended use, shall meet all requirements of the latest appliable National, State and Local Codes and the current National Electrical Code (NEC).
B. Materials shall be manufactured in accordance with the standards indicated in this Section and typical industry standards and codes for the products specified.
C. The materials used shall be new and of the best quality for the intended use. All equipment shall have the manufacturer's name, address, model, or type designations, serial number and all applicable ratings clearly marked in a location which can be readily observed after installation. The required information should be marked on durable nameplates that are permanently fastened to the equipment.

1.5 DELIVERY, STORAGE, PROTECTION & PROJECT CONDITIONS

A. Electrical equipment shall be adequately protected against mechanical injury or damage by water during construction. Electrical equipment shall not be stored outside exposed

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to the elements. If any equipment or apparatus is damaged, such damage shall be repaired at no additional cost, or replaced at no additional cost as directed by the Engineer. Conform to requirements of Section 01400- Quality Control and Section 01560 -Temporary Controls.

1.6 SUBMITTALS

A. Submittals for lighting equipment shall include photometric data. Shop drawings and reports shall employ terminology, classifications, and methods prescribed by the IES Lighting Handbook, as applicable, for the lighting systems specified. Manufacturer's data shall be submitted for the following:

1. Luminaires, including lamps, ballast, wattage selector.
2. Details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and connections.
3. Independent Testing Laboratory Photometric Data presented on a scaled site plan.
4. Color samples on metal plates. Color indicated, other options to be reviewed from standard RAL colors at Owners Request prior to final selection. Provide up to four (4) color samples for Owner review.
5. Light fixtures, Lamps, Poles and all related hardware.

B. Shop drawings shall be submitted for the following:

1. Luminaire type: fabrication and assembly drawings and paint finish process
2. Lighting standards: including base details, dimensions, wind loading, EPA ratings, pole deflection and other applicable information. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power and control wiring.

1.7 FIELD CONDITIONS AND EQUIPMENT LAYOUT

A. The Engineer shall provide layout information to the Contractor.

B. Mark locations of exterior luminaires for approval by Engineer Architect prior to the start of luminaire installation.

1.8 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

1. Warranty Period: [2] years from date of Substantial Completion.

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2. For luminaires seven (7) years from date of Substantial Completion

PART 2 - PRODUCTS

2.1 LUMINAIRES AND LIGHT POLES

A. LUMINIARE TYPE III

1. Luminaire shall be 60 Watt with a minimum output of 3300 lumens, CCT 3000 with IES Class III distribution with a B-U-G rating of 1-2-1.
2. The luminaire shall be round, louvered with semi-cut-off optics, furnished with adjustable 0-10V dimming presets.
3. Luminaire mounting shall be configured as Post Top, 14' h post.
4. Luminaire –Light source height: 16+/-'-0" from finished grade
5. Finish-Factory Textured finish fully coordinated and matched to light poles.
6. As manufactured by StressCrete Group, King Luminaire, K1367-P4AC-III 60 SSL-1030-120:277-3K- or approved equal.

B. LUMINAIRE TYPE VS

1. Luminaire shall be 60 Watt with a minimum output of 3300 lumens, CCT 3000 with IES Class VS distribution with a B-U-G rating of 1-2-1.
2. The luminaire shall be round, louvered with semi-cut-off optics. furnished with adjustable 0-10V dimming presets.
3. Mounting shall be configured as Post Top, 14'h post.
4. Finish-Factory Textured finish fully coordinated and matched to light poles.
5. Luminaire-Light source height: 16'+/-" from finished grade.
6. As manufactured by StressCrete Group, King Luminaire, K1367-P4AC-VS 60 SSL-1030-120:277-3K- or approved equal.

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C. UP-LIGHT TYPE C

1. Position-able 3000K LED Up lights, Gardco model #DFC7-RM-18L-350-WW-G2-UNV- BK-SP2 or approved equal.

D. LIGHT POLE

1. Poles Shall be aluminum alloy 356 /SAE 323 formulated for casting, 6063-T6 smooth tube, heat treated after fabrication. Post shall be 5” diameter with 8” diameter base. Wall thickness shall be .025” min.
2. Light Poles shall include 4”x6” factory access ‘handholes’ in base and shall have factory installed GFI receptacles at the top of each luminaire.
3. Finish-Polyester Powder coat paint, Factory Textured Finish. Color shall be TX GATE GRAY PWDC15007-2 or matching RAL color of approved equal.
4. Furnish with Manufacture hot dipped galvanized anchor bolts coordinated and sized to accommodate shallow footings as indicated.
5. Light Pole as manufactured by, Hapco, pole Stafford 18 aluminum pole 5” diameter top, 8” diameter 48” high Clamshell base Model # S8514D8-SR-SC-GFI or approved equal.

2.2 WIRE AND CABLES

A. General. Wire and cables shall be single conductor except where otherwise specified or indicated on the Plans. Conductors of sizes No. 10 AWG and larger shall be stranded. Wires of sizes smaller than 10 AWG shall be solid.

B. The conductors shall be factory identified by printing the size and type of insulation. Each conductor shall be colored in accordance with the National Electric Code. Insulation color shall be constant throughout the length of the conductor and shall not otherwise need to be taped or tagged for identification. The color of the insulation of the neutral conductor shall be white. The remaining conductors shall not be white but shall be of dissimilar colors for identification.

C. Conductors. Wire conductors shall be annealed copper conforming to the following specifications as applicable.
   1. American Society for Testing Materials
   2. ASTM B3 - specification for annealed copper wire.
      i. ASTM B8 - specification for concentric-lay-standard, copper conductor, hard, medium hard or soft.

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ii. ASTM B33 - specification for tinned soft or annealed copper wire for electrical purposes.

iii. Insulation. Insulation shall be indicated and shall conform to the following specifications as applicable.

3. American Society for Testing Materials
   ASTM D1351 - (THW and THWN) specification for polyethylene insulated wire and cable ASTM

   i. D2655 - (XHHW-2) specification for crosslink, thermosetting polyethylene insulation for wire and cable 0 to 600 volts.

D. Cable Jacket. Insulation shall be jacketed and have an outer covering as specified in the National Electric Code, Table 310-13, "Conductor Applications and Insulations." When specified by the National Electric Code, the neoprene jacket shall conform to ASTM D752.

E. All wire below finish grade shall be XHHW-2. THW or THWN may be used between the handhole and fixture if the percent of wire above ground is greater than the percent below ground.

2.3 SPLICE KITS

A. Two-Way Splice.
   1. Copper Compression Lugs and Connectors. Lugs and connectors shall be copper compressed with industry tooling. The lugs and connectors must have a current carrying capacity equal to the conductors for which they are rated and must also meet the requirement as listed in UL 486.
   2. Heat Shrinkable Tubing. This material shall be suitable for URD, submersible or direct buried installation. The tubing shall be UL approved and suitable for application on systems up to 600 volts, 90OC rating, and shall be precoated with thermoplastic adhesive sealant. When heated, the internal coating shall melt and seal the connection from moisture and dirt and adhere to the insulation material on the cable.
   3. For Semi-Permanent 3-Way Splice Kits. Splice material shall consist of compressed feeder lugs and compressed tap lug enclosed in a feeder housing and shall be "Y" type with electrical rating of 600V, 150 AMP, copper.
   4. All housings shall be made of water-resistant synthetic rubber suitable for burial in ground or exposure to sunlight. Each housing shall form a watertight seal around the cable and between the insert body and enveloping Y housing.

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2.4 CONDUITS AND FITTINGS

A. Rigid Steel Conduit and Fittings. This conduit shall conform to Federal Specification WW-C-581. The latest revision of the Underwriters' Laboratories, Inc. Publication UL-6-Standard for Rigid Metallic Conduit also forms a part of this Specification. In addition to the above requirements, the exterior surface conduit including fittings shall be zinc-coated and the interior coated with zinc, enamel, or other corrosion resisting coating. The conduit shall be metalized galvanized, hot-dip galvanized or electro-galvanized.

B. Threads and couplings shall conform to the provisions of Appendix III of ASTM A53; “Basic Threading Data for Pipe.

C. PVC Plastic Conduit. Plastic conduit and plastic fittings shall conform to the requirements of Federal Specification W-C-1094 (GSA-FSS) Conduit and Conduit Fittings, Plastic, Rigid, and the latest amendments.

D. Expansion Couplings. The fittings shall be designed to compensate for expansion in a horizontal line of conduit at expansion joints in a structure and shall be as detailed.

E. Expansion fittings shall provide for a maximum of 4 inches longitudinal conduit movement, 2 inches in either direction. Expansion fittings shall provide for transverse conduit movement as indicated where required by structural conditions. Expansion fittings shall be bonded with heavy duty, two bolt, ground fittings. Strap type clamps will not be acceptable.

F. Conduit sweeps
1. For lighting wiring: 2” RGS set 2’-6” below top of base to extend beyond concrete foundations.
2. For ground wire: ¾” RGS set 10” below top of base

2.5 HANDHOLES

A. Type “B” handhole, 24”x24”x12” Polymer Concrete with metal gasketed lid.

2.6 PULL BOX

A. Primary Electric Pull Box -compliant in all ways with National Grid UCD standard details Composite Vault Assembly Model CVA 306038 or approved equal.

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2.7 ENCLOSURES

A. Provide Hoffman Enclosures, or approved equal, size as indicated on plans. Enclosures shall be stainless steel type 316, 12 gauge.

B. Seams continuously welded and ground smooth; no holes or knockouts.

C. Backs are 10 or 12 gauge stainless steel with x-form stiffeners

D. Removable center-post for easy panel installation.

E. Panel supports.

F. Stainless steel screws and clamps on three sides of each door assure water tight seal.

G. Rolled tip around entire door openings exclude liquids and contaminants.

H. Heavy duty stainless steel continuous hinge.

I. Data pocket is high impact thermoplastic.

J. 12” floor stands are bolted onto enclosure.

K. Hasp and staple for padlocking.

L. Seamless foam-in-place gasket provides oil-tight and dust-tight seal against contaminants.

M. Collar studs provided for mounting panels.

N. External hardware manufactured of Type 316 stainless steel.

O. Bonding provision on doors; grounding studs on body.

P. Accessory mounting channel provided in enclosure top.

Q. Type 316L stainless steel lifting eyes.

R. Accessories: provide with electric heater, PANELITE Enclosure lights, panel support kit.

2.8 GROUNDING

A. Unless otherwise indicated, all grounding electrode copper conductors shall be 600 volt, type THWN-THHN. Ground Wire/Cables. Ground wire shall be sized as noted on plans, soft drawn copper and shall conform to the requirements of the latest edition of the National Electrical Code.

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B. All ground connections shall be made in accordance with the NEC and the applicable State Electric Code. Ground cable shall be carried through conduits in the form of separate conductors. Coordinate to limit or where possible to avoid penetrations in the geotextile fabric membrane.

C. Thoroughly bond and ground all metallic equipment including Conduits, enclosures and metallic supports, all in full conformance with NEC, National Grid and as per all state and local requirements.

PART 3- EXECUTION

3.1 EXAMINATION

A. Examine all proposed conduit runs and equipment locations prior to excavation. Confirm proposed finish grade elevations. The Engineer will make available light pole layout information upon request. Stake out all components for review with the Engineer prior to start of work.

B. Establish limits of geotextile separation fabric and coordinate a review of conditions with the Engineer to establish approximate limits and ascertain any potential conflicts.

C. Review and examine conditions as work progresses. Deep excavation shall not be permitted. Notify Engineer of any conditions encountered that are not as anticipated in regard to granular cap material or pre-existing grades and would adversely affect the final EPA mandated cap thickness or subsequent use of the site.

D. Repair/overlay any damaged geotextile separation fabric damaged prior to installing improvements on the surface.

E. Do not continue installation of finished work until damage/unacceptable conditions are corrected.

3.2 INSTALLATION

A. Sequence excavation and installation of electrical components to ensure efficient excavation and handling of PCB Impacted soils.

B. Coordinate trenching and routing, ensure utility connections are achieved in an orderly manner.

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3.3 ELECTRIC SERVICE TO THE SITE

A. Furnish and install all the components necessary to provide new electrical power to the site, with the exception of 1) Pad Mounted Transformer 2) Primary Service conductor cables and 3) Pulling of conductor cables and making Primary Electric Service connections. (All of above furnished and installed by National Grid) Install per all National Grid Underground Commercial Distribution Guide (UCD) most current version, conforming to all requirements for the installation of Primary Electric Service. Work related to the electric service shall in general shall include hand-digging to locate the existing conduit on the site, excavation, placement of geotextile separation fabric, and installation of crushed stone, the primary electric pull box and PVC conduit as shown to the location of the transformer slab and oil curb, the pad-mounted transformer as indicated, with concrete encasement of the conduit, backfilling and compacting.

3.4 EQUIPMENT AND LIGHT POLES

A. Excavate with caution, utilizing hand digging techniques when in proximity to the geotextile separation fabric. Furnish and install crushed stone base, and where indicated rigid foam insulation.

B. Coordinate conduit locations, sweeps and runs. Furnish and install conduits, utilize rigid steel sweeps. Set conduit plumb to extend inside enclosures and bases. Form and place concrete with reinforcing, and slabs/foundations or light pole foundations. Backfill per Section 02200.

C. Install equipment and light poles light in accordance with manufacturer’s instructions. Install lights plumb within 1/8” of true position. Anchor light securely in place. Install and make watertight connections, complete all wiring connections.

3.5 ADJUSTING

A. Finish Damage: Repair minor damages to finish in accordance with manufacturer’s instructions and as approved by Engineer/Owner.

B. Component Damage: Remove and replace damaged components that cannot be successfully repaired as determined by the Engineer/Owner.

3.6 ERECTION TOLERANCES

A. Set all light posts plumb, with a maximum variation from true position 1/8”. Install all components tightly to specified torque settings and secure with clear silicone caulking

3.7 CLEANING

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A. Clean enclosures, lights equipment etc. promptly after installation in accordance with manufacturer's instructions.

B. Do not use harsh cleaning materials or methods that could damage finish.

3.8 PROTECTION

A. Protect installed light pole, luminaires, and enclosures etc. to ensure that, except for normal weathering, products installed will be without damage or deterioration at the time of Substantial Completion.

3.9 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 02200 EARTHWORK for conduit pipe less than 6 inches in nominal diameter. Install backfill as specified.
2. After installing conduit, backfill and compact, beginning at the 'tie-in point' working toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 02200 EARTHWORK. "
3. Install manufactured rigid steel conduit elbows for stub-ups at concrete pads for enclosures, pad mounted transformer and all other equipment.
4. For stub-ups at equipment mounted on outdoor concrete slabs or foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
5. Underground Warning Tape: Provide warning tape over installed utilities. Comply with local code requirements.

3.10 INSTALLATION OF UNDERGROUND HANDHOLES AND PULL BOXES

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A. Install handholes and pull boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support handhole/pull box structures on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover of the handhole or pull box surface will be flush with finished grade. Set covers of enclosures 1 inch above finished grade in landscape areas. Confirm all elevations prior to installation, adjust where field conditions require changes to ensure positive drained away from the structure.

D. Portions of the site are covered with geotextile separation fabric. Review plans and consult with the Engineer to confirm limits. Install handholes in a manner that does not disturb the existing geotextile separation fabric.

E. Obtain handholes and pull boxes with factory openings suited for project applications. If necessary, field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

END OF SECTION

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Appendix A

Geophysical Survey of Existing Bulkhead Concrete Cap

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September 28th, 2020

Arek W. Galle
Beta Group, Inc.

Project: Geophysical Survey – Fall River City Pier, Fall River, MA

Dear Arek,

The following is a brief letter report detailing the results of the geophysical survey performed at the above referenced site. Site maps and/or pertinent ground penetrating radar (GPR) transects are contained in the report and Appendix A. It would be helpful to review Appendix A and the site maps when reading this report. TPI's standard practice is to indicate the results of the geophysical survey by marking all identified utility lines, tanks, and GPR anomalies etc. with chalk, paint or flags. It should be noted that this report is a means of transferring data and results of data interpretation, which was performed during the time allotted for the fieldwork.

Project Scope and Visual Site Inspection

TPI Environmental, Inc. (TPI) was contracted by Beta Group, Inc (client) to scan sections of a seawall for the purpose of marking the orientation of structural rebar. The site consists of an empty pier as indicated in Figure 1. Upon arrival to the site on September 14th, 2020, TPI reviewed the site with the client and performed a site walk. During the site walk the following areas of interest were noted:

- The client indicated sixteen areas to be scanned for rebar location and orientation (Figure 1). Each area is a ~5' long section of perimeter wall. TPI was primarily tasked with confirming the location of the rebar below the top surface of the wall, but when possible, the interior wall surface would also be scanned and marked.

Methodology

Geophysical surveys are typically accomplished by employing the following techniques; GPR, Fisher TW6 electromagnetic metal detection (TW6 EM), a Geonics EM61-MK2 Time – Domain Electromagnetic Detector unit (EM61), radio frequency line locating (RF), and magnetics. Known utilities are typically traced with the RF unit, GPR, and the TW6 EM unit depending on the size, matrix and conductive properties of the line. The EM61 is a high power, high sensitivity metal detector capable of detecting both ferrous and non-ferrous metal. The TW6 EM unit sounds an audible alarm in the presence of a large mass of metal such as an UST. A description and discussion of these geophysical methods as well as TPI's standard procedures for performing geophysical surveys is found in Appendix A. In general, "blind surveys" are typically performed by initially scanning the site with a TW6 EM unit and/or an EM61 unit and noting areas of relatively high EM response. Locations with high EM response are further investigated with GPR. EM units are typically not effective and practical in areas underlain with reinforced concrete and/or the presence of ubiquitous metallic objects.

Geophysical Survey Results

The geophysical survey at this site was accomplished with a GSSI Structure Scan 2.7 GHz GPR unit. GPR transects were collected across the top and interior surface of the perimeter wall within the designated scan areas. Rebar was marked on-site with grease pencil and photographed. Results of the geophysical survey are as follows:

- TPI detected and marked the rebar as indicated in the "Site Photos" section of Appendix A.
- Generally, the layout of the rebar was consistent throughout the majority of the scan areas. The areas with the most variation were Areas 9, 8, 6B, and 6A.
- Depth to rebar below the top surface of the wall ranged from 4" – 8". Representative transects are also presented in Appendix A.
- Rebar was not detected behind the interior face of the wall in Areas 6A, 6B, and 8. The does not indicate the lack of rebar, rather the rebar was likely too far from the GPR unit to be detected (concrete was too thick).

TPI completes non-intrusive geophysical surveys using equipment and techniques representing best available technology. TPI does not accept responsibility for survey limitations due to inherent technological limitations or unforeseen and varying site-specific conditions such as metal-reinforced concrete. In practical terms, TPI serves to reduce the risk of encountering subsurface utilities during excavation operations or greatly increase the chance of locating man made subsurface objects depending on the goal of the project. The results of this investigation should only be used as a tool and should not be considered a guarantee regarding the presence or absence of USTs or piping.

If you should have any questions or concerns, please do not hesitate to contact us.

Your Project Team at TPI:

Frank Fendler, M.S., P.G.
President
ffendler@tpienv.com

Mike Robbins, M.S.
Geologist/Boston Branch Manager
mrobbins@tpienv.com

Dustin Lutz
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dlutz@tpienv.com

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TPI environmental	Fall River City Pier, Fall River, MA		Figure 1
	Client: Beta	Date: 9/14/20	Geophysical Survey Results

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Appendix A

Site Photos, Representative GPR Transects, and Survey Methods

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Site Photos

Layout of the detected rebar is represented by blue lines

Photo 1. Looking south across Area 1.

Photo 2. Looking south across Area 2.

Photo 3. Looking south across Area 3.

Photo 4. Looking west across Area 4.

Photo 5. Looking north across Area 5.

Photo 6. Looking west across Area 6A.

Photo 7. Looking west across Area 6B.

Photo 8. Looking south across Area 7.

Photo 9. Looking south across Area 8.

Photo 10. Looking west across Area 9B.

Photo 11. Looking west across Area 9.

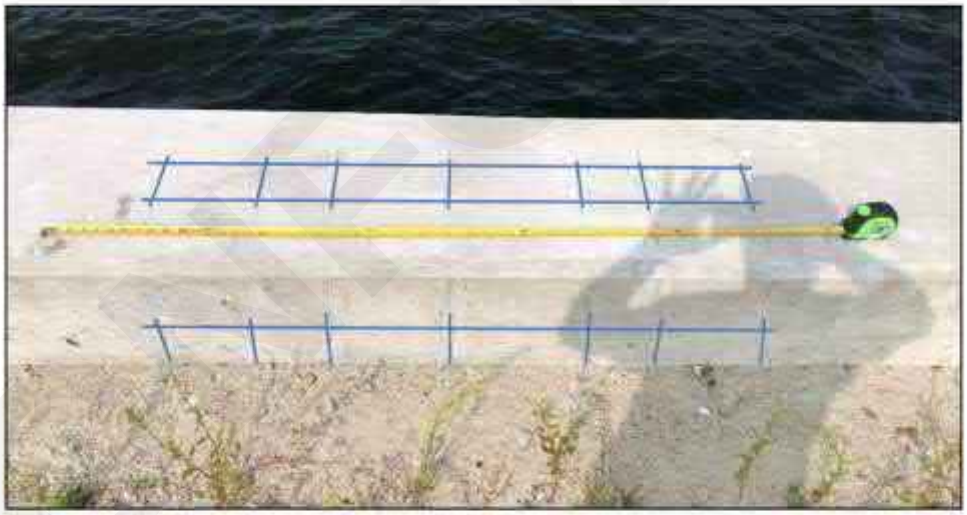

Photo 12. Looking north across Area 10.

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Photo 13. Looking north across Area 11.

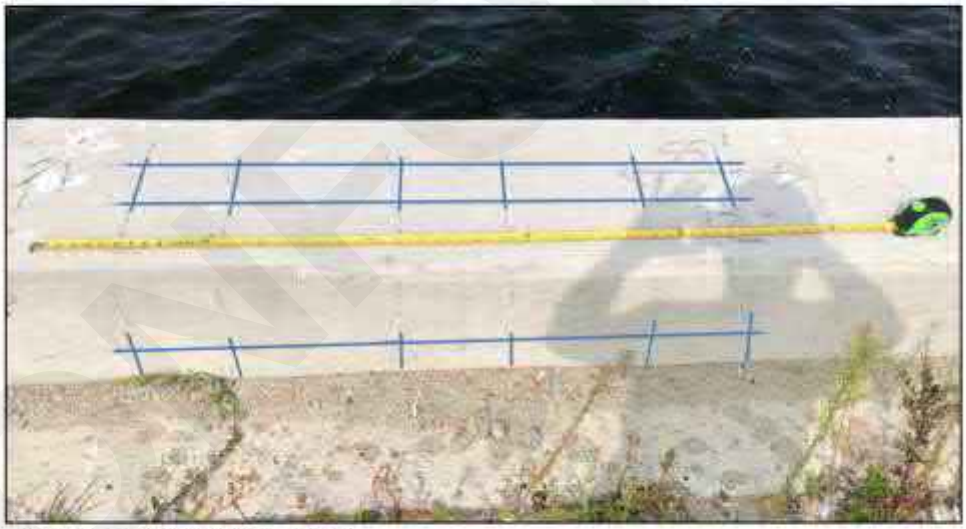

Photo 14. Looking north across Area 12.

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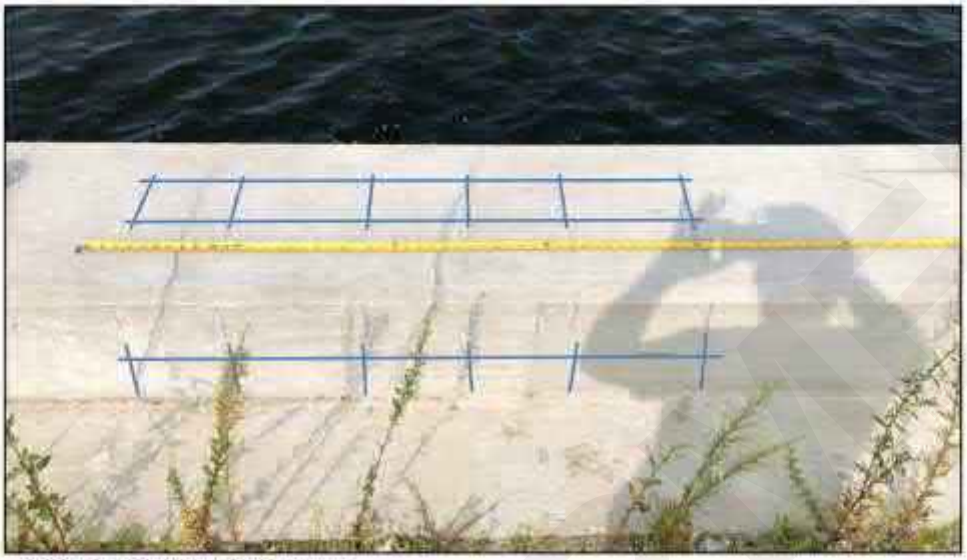

Photo 15. Looking north across Area 13.

Photo 16. Looking north across Area 14.

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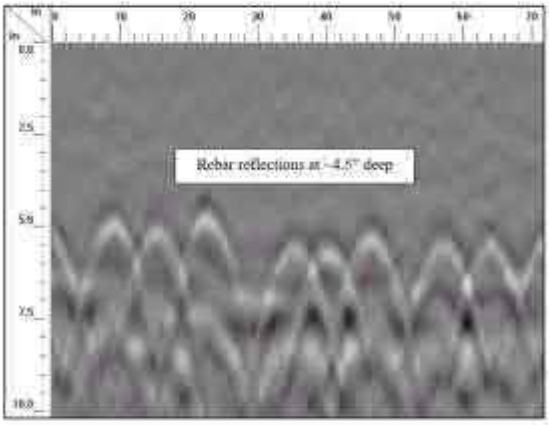
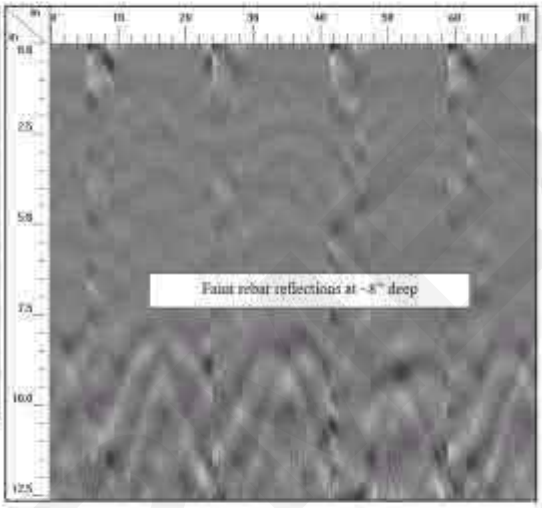
GPR Transect 1
West across Area 2



GPR Transect 2
East across Area 14



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September 28th, 2020

Arek W. Galle
Beta Group, Inc.

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Dear Arek,

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Geophysical Survey Results

The geophysical survey at this site was accomplished with a GSSI Structure Scan 2.7 GHz GPR unit. GPR transects were collected across the top and interior surface of the perimeter wall within the designated scan areas. Rebar was marked on-site with grease pencil and photographed. Results of the geophysical survey are as follows:

- TPI detected and marked the rebar as indicated in the "Site Photos" section of Appendix A.
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TPI completes non-intrusive geophysical surveys using equipment and techniques representing best available technology. TPI does not accept responsibility for survey limitations due to inherent technological limitations or unforeseen and varying site-specific conditions such as metal-reinforced concrete. In practical terms, TPI serves to reduce the risk of encountering subsurface utilities during excavation operations or greatly increase the chance of locating man made subsurface objects depending on the goal of the project. The results of this investigation should only be used as a tool and should not be considered a guarantee regarding the presence or absence of USTs or piping.

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TPI environmental	Fall River City Pier, Fall River, MA		Figure 1
	Client: Beta	Date: 9/14/20	Geophysical Survey Results

Appendix A

Site Photos, Representative GPR Transects, and Survey Methods

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Site Photos

Layout of the detected rebar is represented by blue lines

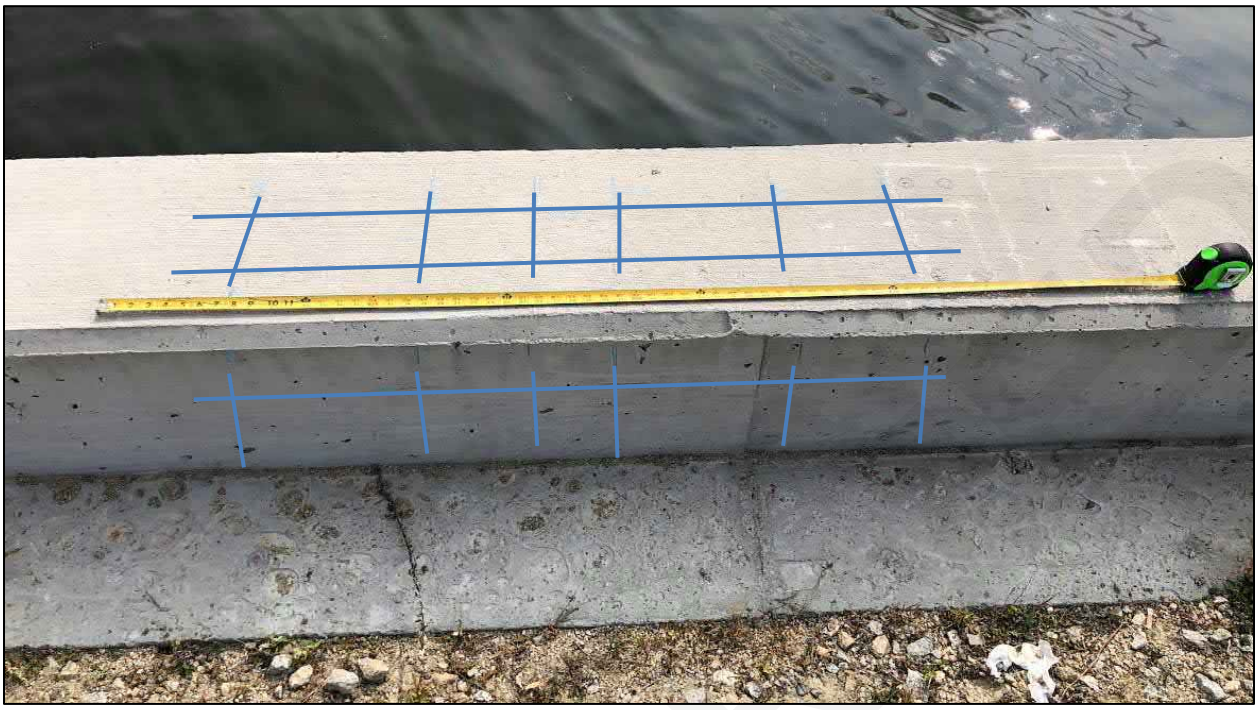


Photo 1. Looking south across Area 1.

Photo 2. Looking south across Area 2.

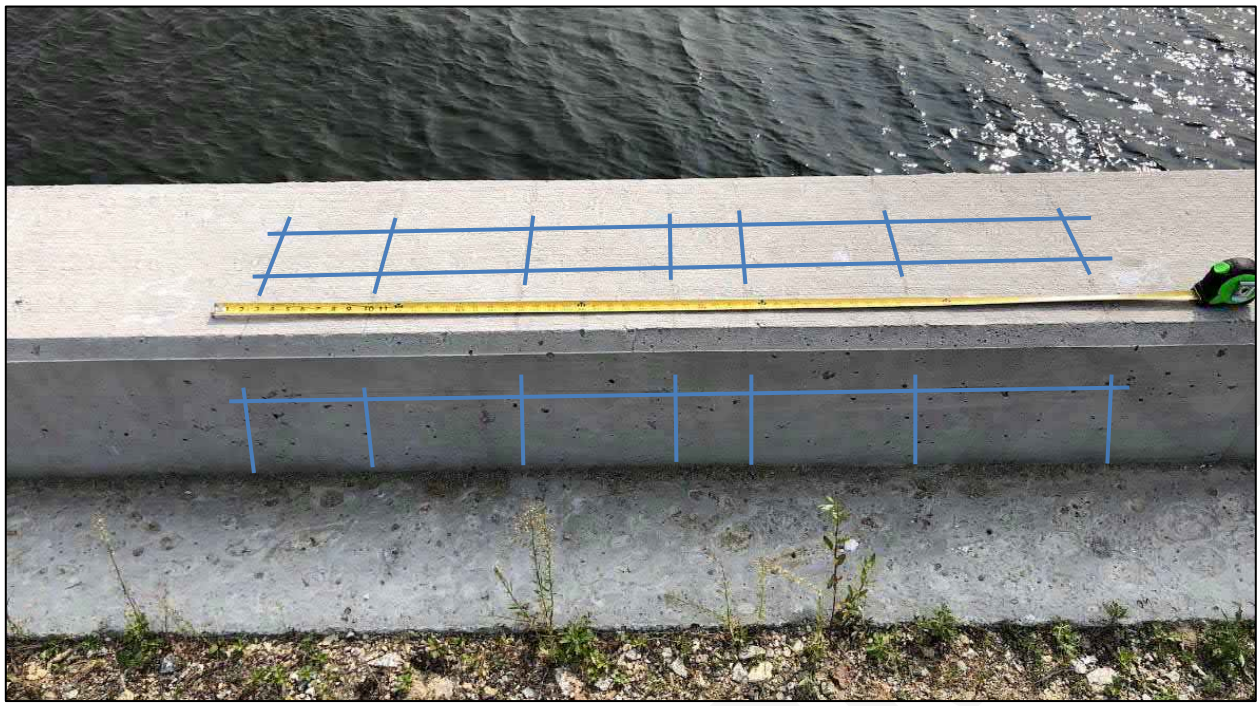


Photo 3. Looking south across Area 3.

Photo 4. Looking west across Area 4.

Photo 5. Looking north across Area 5.

Photo 6. Looking west across Area 6A.

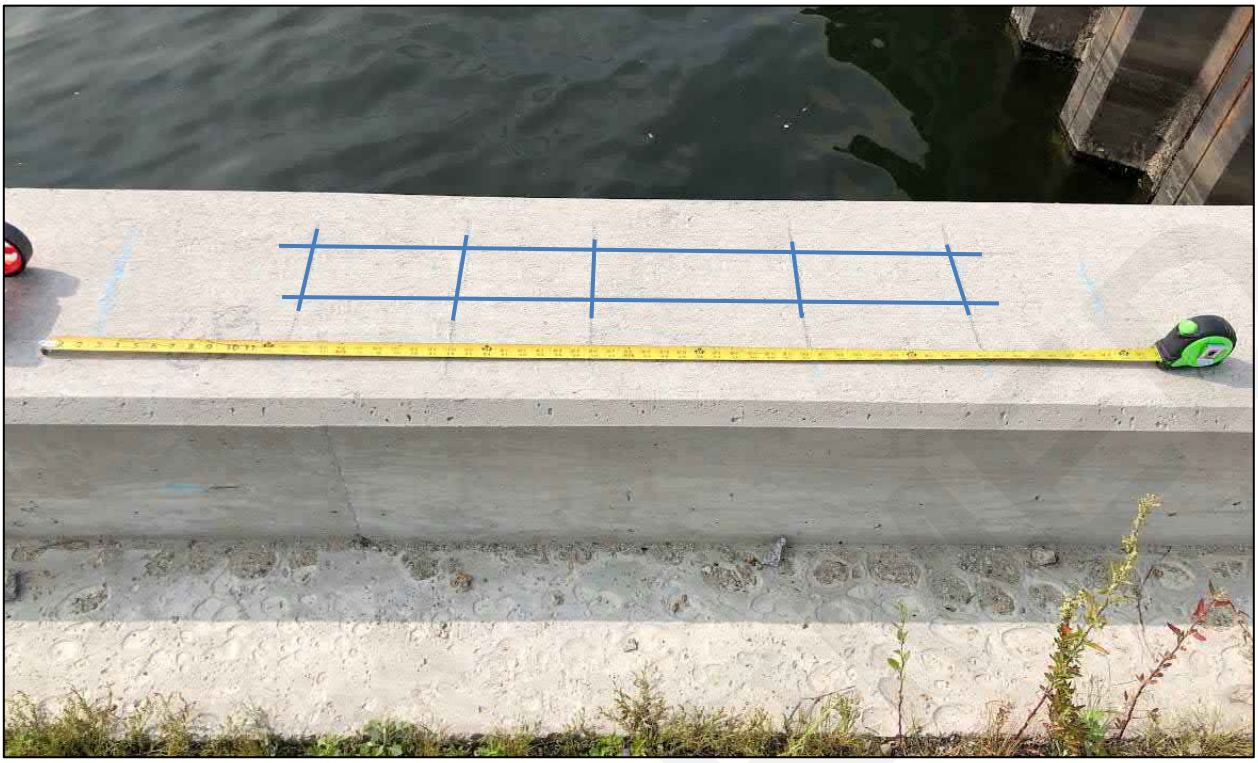


Photo 7. Looking west across Area 6B.

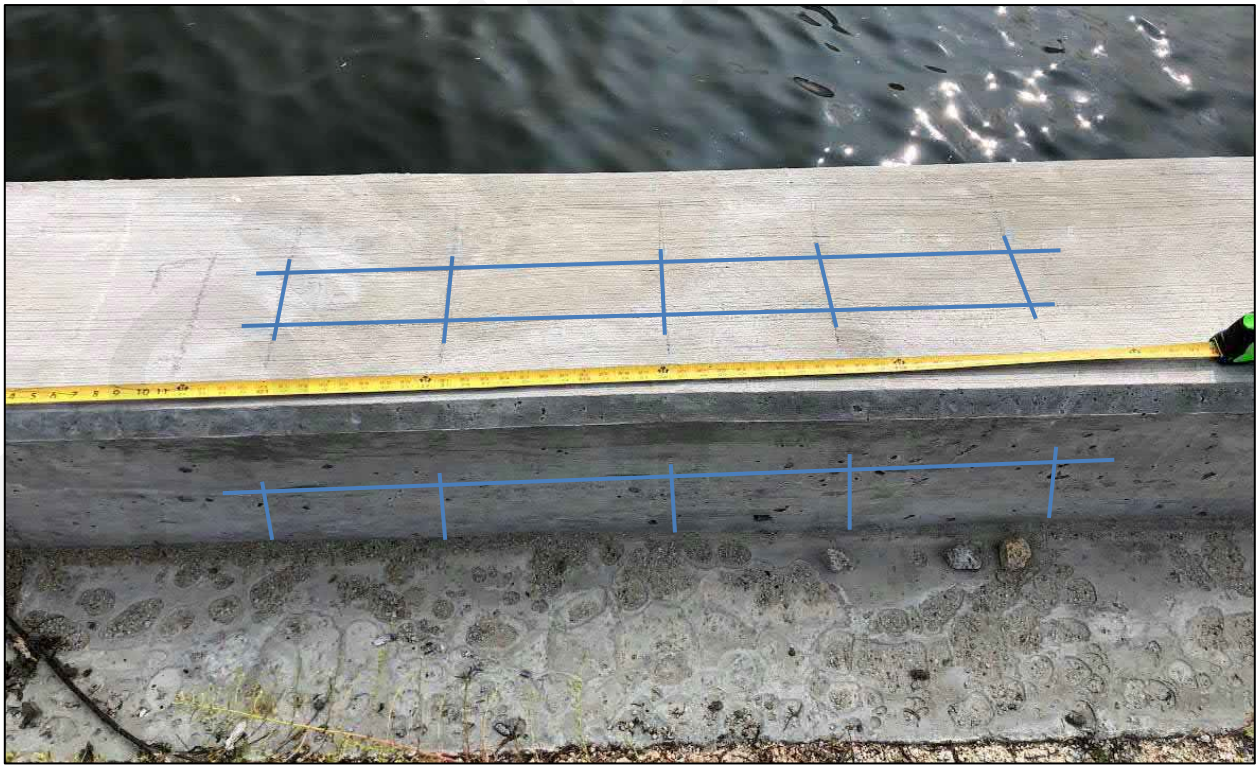


Photo 8. Looking south across Area 7.

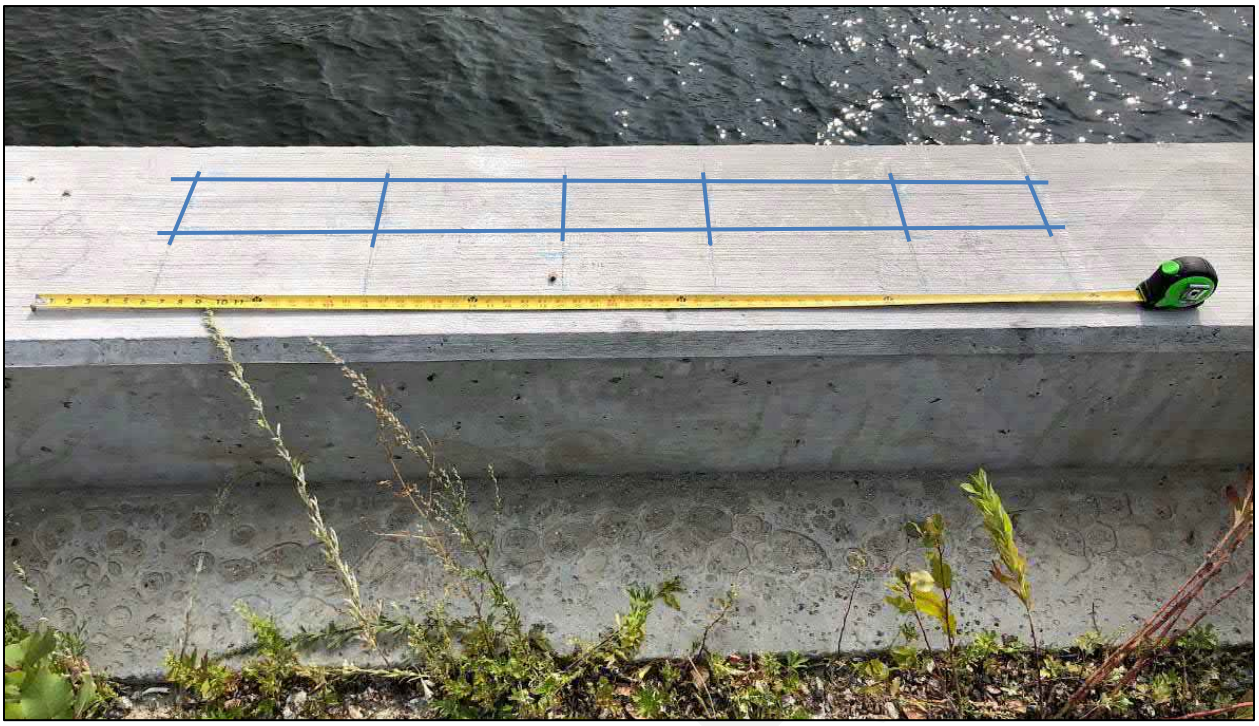


Photo 9. Looking south across Area 8.

Photo 10. Looking west across Area 9B.

Photo 11. Looking west across Area 9.

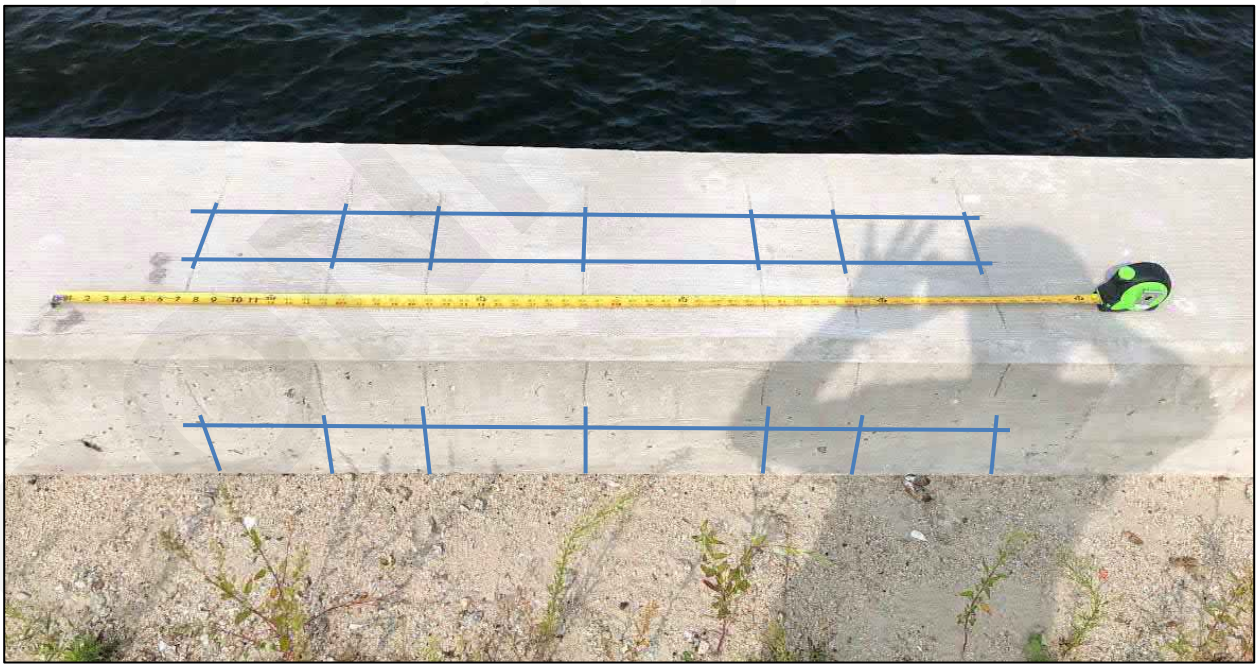


Photo 12. Looking north across Area 10.

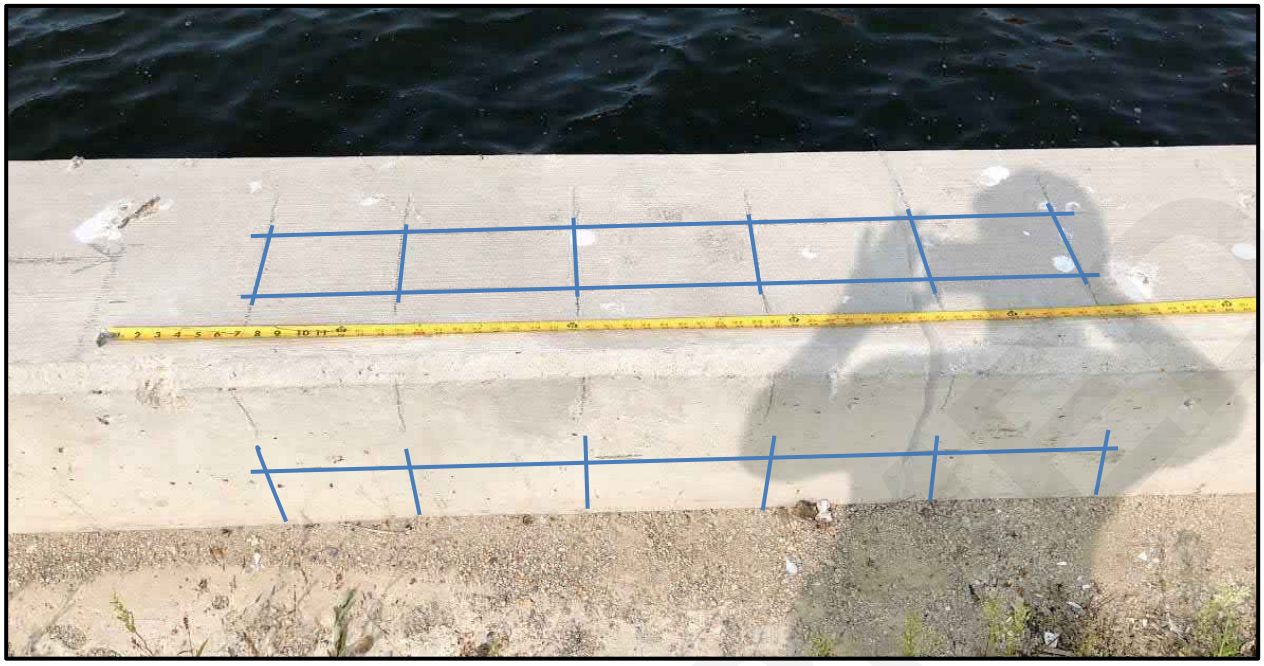


Photo 13. Looking north across Area 11.

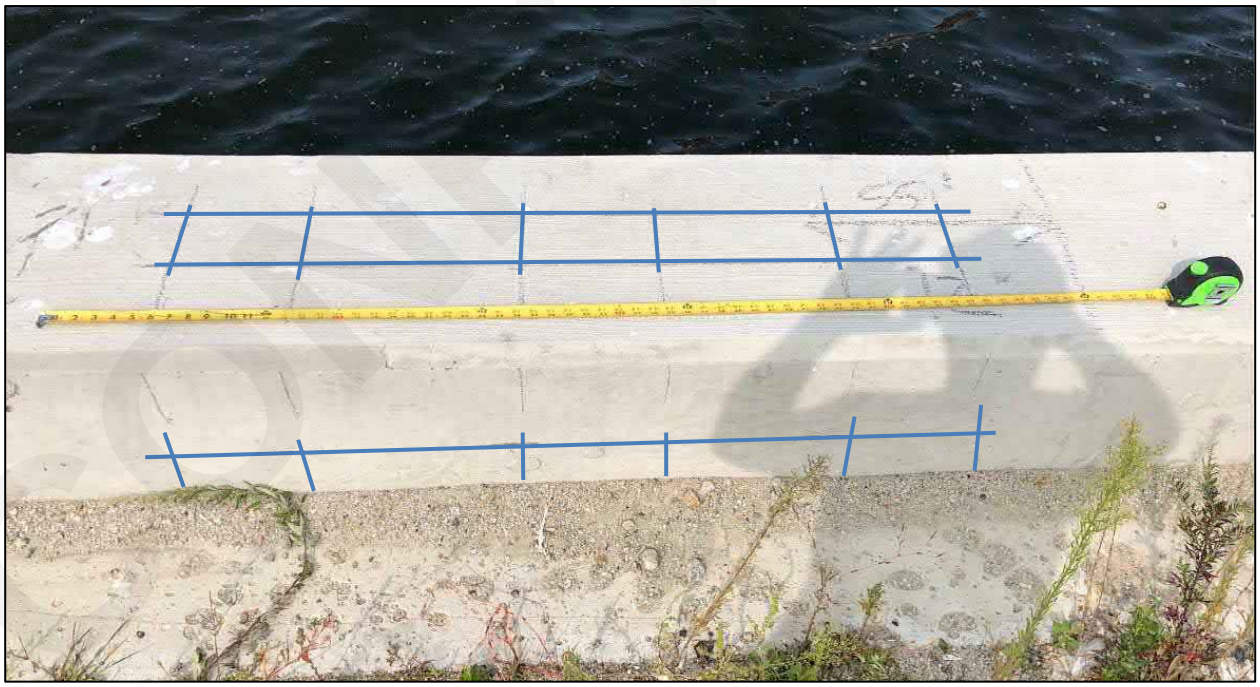


Photo 14. Looking north across Area 12.

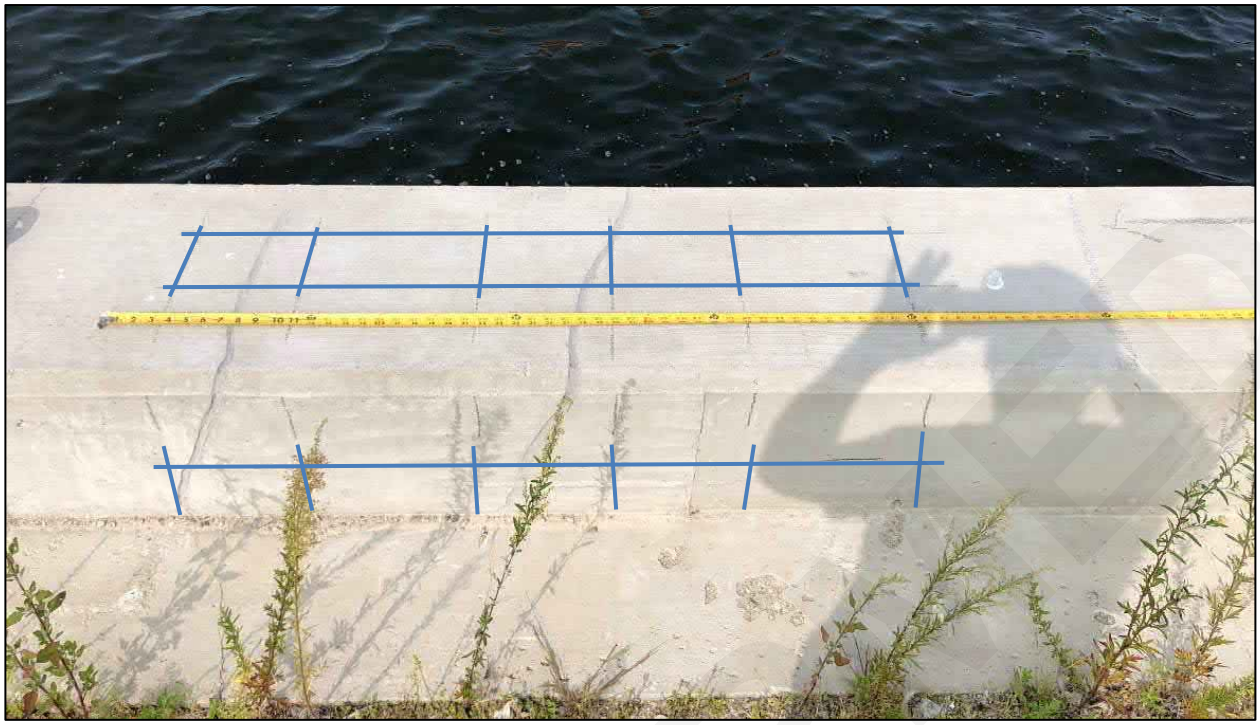


Photo 15. Looking north across Area 13.

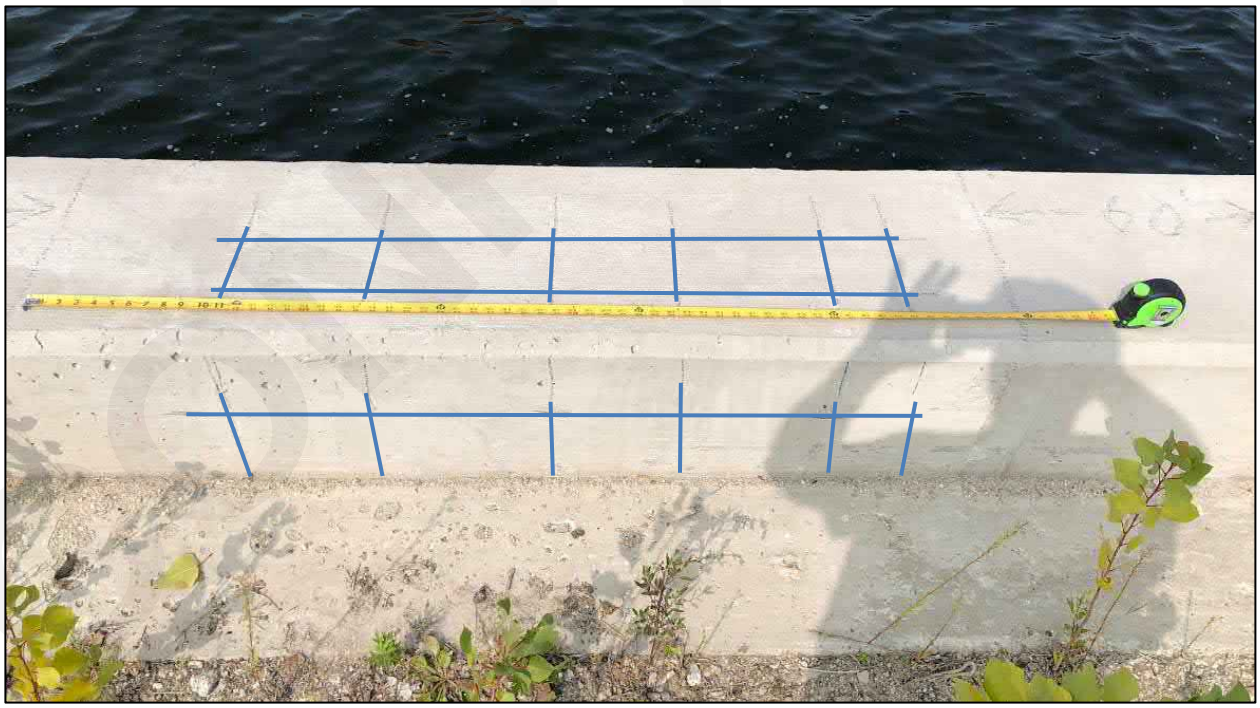
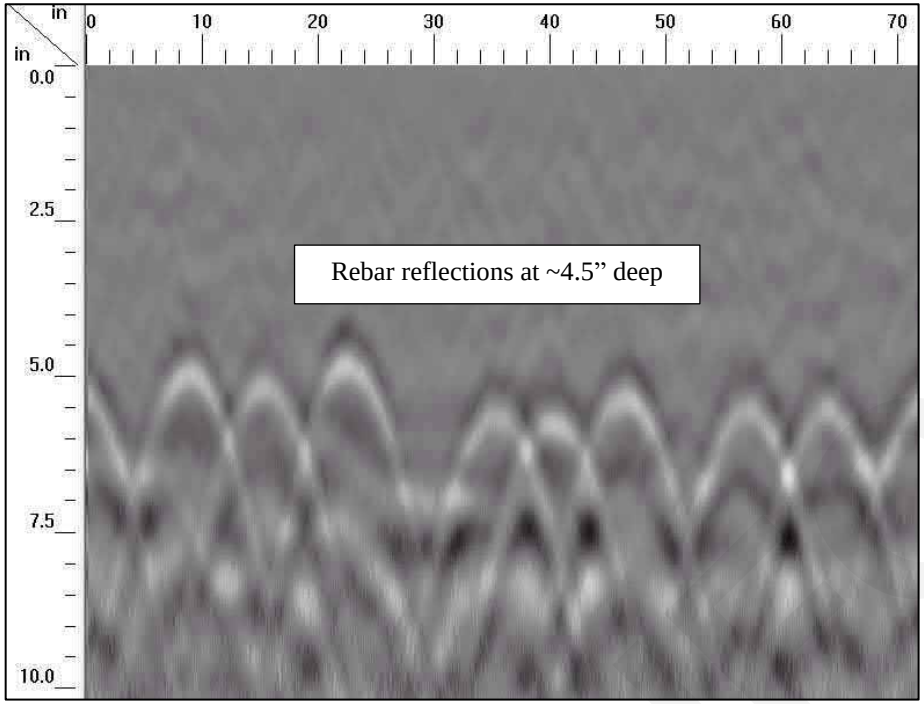
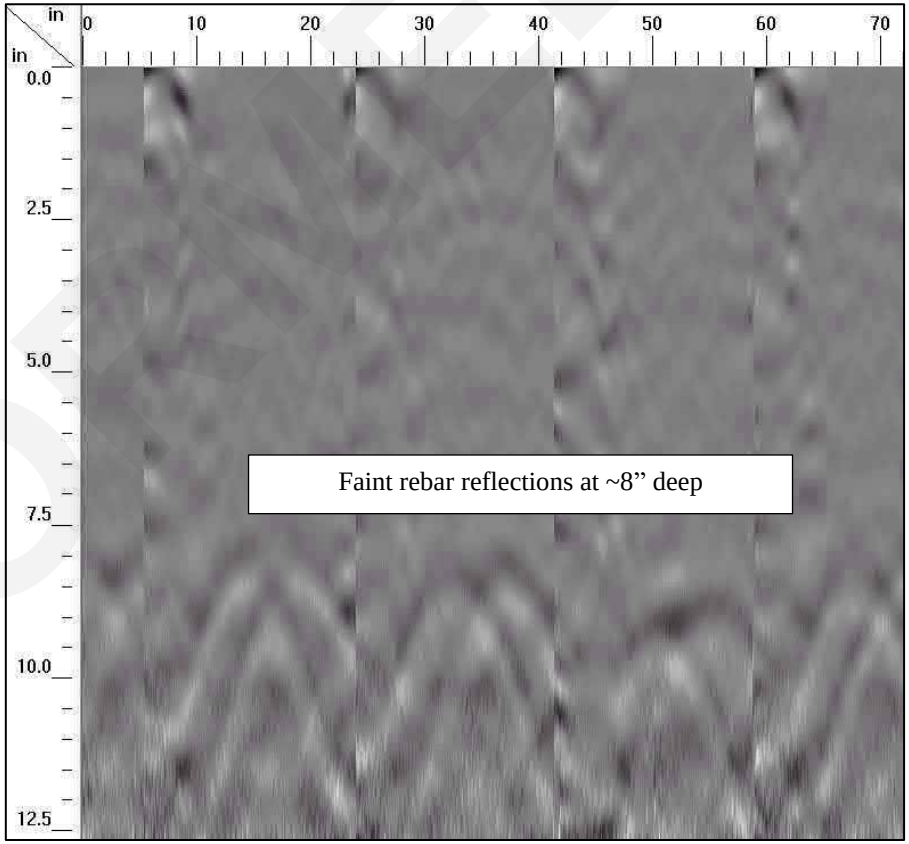


Photo 16. Looking north across Area 14.

GPR Transect 1
West across Area 2



GPR Transect 2
East across Area 14



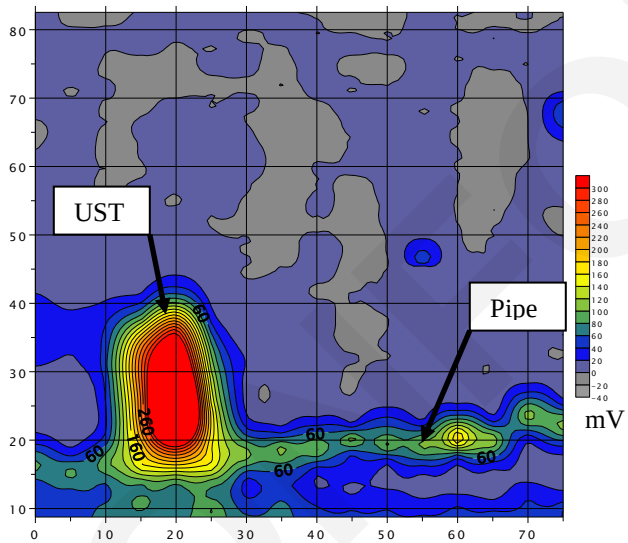
CONFIRMED

Attachment A
TPI's Geophysical Survey Equipment & Methods

Geonics EM61-MK2

The EM61 is a high resolution time-domain metal detector which is used to detect ferrous and non-ferrous metallic objects. It consists of a powerful transmitter that generates a pulsed primary magnetic field, which induces eddy currents in nearby metallic objects. The decay of these currents is measured by two receiver coils mounted on the coil assembly. The responses are recorded and displayed by an integrated computer based digital data logger with real time numeric and graphic display. Two ports on the logger allows simultaneous collection of EM and GPS data. For further processing and interpretation data can be transferred to a laptop computer in the field and a color contoured map of the EM61 reponse is prepared (see below).

EM61 Color Contoured Map



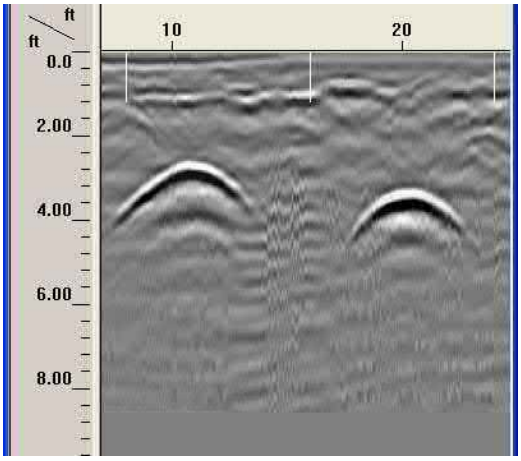
The EM61-MK2 detects a single 55 gallon drum at a depth of over 10-feet beneath the instrument, yet it is relatively insentsitive to interference from nearby surface metal such as fences, buildings, cars, etc. By making the measurement at a relatively long time after termination of the primary pulse, the response is practically independent of the electrical conductivity of the ground.

Due to its unique coil arrangements, the response curve is a single well defined positive peak greatly facilitating quick and accurate location of the target, the depth of which can usually be estimated from the width of the response and/or from relative response from each of the two receiver coils.

GPR

This method is one of the most powerful and cost effective methods of locating man made objects and stratigraphic layers in the subsurface. It is an active method that transmits electromagnetic pulses into the ground, the radar pulses are reflected from materials or layers of differing dielectric and electrical conductive properties. The GPR computer measures the elapsed time in billionths of a second (nanoseconds) from when the pulses are sent and when they are received back at the surface that can then be converted to depth. Results of the radar scan are displayed as a continuous cross-section of the subsurface on the computer screen in real time. Metallic materials such as tanks, pipes, conduits, rebar etc. have vastly different dielectric properties then soils so there reflections are striking and relatively easy to identify. Pipes and tanks constructed of PVC, concrete, and terracotta also produce distinct reflections, however, these reflections are typically not as striking as metallic materials. A typical radar image of two metallic underground storage tanks is found below.

GPR Image of Two Metallic USTs



GPR surveys are conducted with the most advanced GPR equipment currently available

724 S. 27th Street
Easton, PA 18045
ffendler@tpienv.com
www.tpienv.com
888-204-3266-Phone
888-204-3266-Fax

including a Geophysical Survey Systems (GSSI) SIR-3000 subsurface radar unit with a 400 MHz antenna. The 400 MHz antenna has a depth range of approximately 20-feet and other antennas may be employed with the system depending on specific site conditions and objectives of the survey. The GPR transect data may be saved on the internal hard drive and transferred to a PC for storage, printing, and post processing. GSSI is the world leader in the development of GPR systems and was the first company to commercialize GPR in 1970. GPR hardware and software has improved dramatically over the last several years allowing for relatively rapid and economical GPR surveys. With 3-dimensional capabilities, the latest GPR software takes data processing a step farther then the former 2-dimensional viewing method. Three-dimensional visualization helps you to see the whole picture, giving you a powerful tool to interpret complex utility layouts and identify subtle linear features that may have otherwise been missed.

GPR surveys are typically conducted by searching for GPR hyperbolas indicative of subsurface pipes or tanks signatures in the vicinity of known entities. Theses signatures are marked on the ground and areas progressively further from the known entity are scanned and marked. This process is continued until the GPR operator performed enough scans to determine and mark the subsurface pipe, tank or anomaly. During this process the GPR data is typically not saved due to the immense size of the data files. After this phase of the GPR survey is completed, representative GPR transects or grids are performed and saved for the report and post processing. Some of the factors that may negatively affect GPR results include clay soils, rebar in concrete, high moisture content, depth of the target, and the integrity, size, and material of the target.

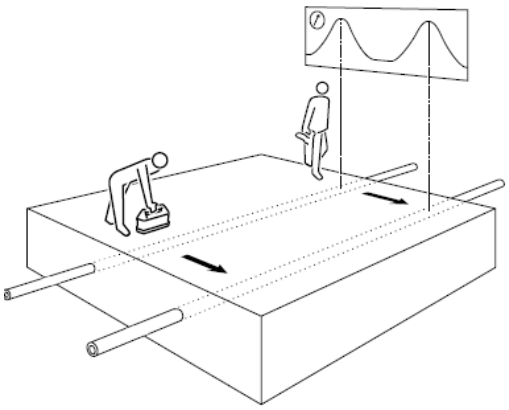
TW-6 EM Unit

TPI routinely employs a Fisher TW-6 electromagnetic metal detector when performing GPR surveys. The TW-6 creates an electromagnetic field with a transmitting coil and measures the strength of that field with a receiving coil. As the TW-6 passes over electrically conductive materials such as metal tanks or drums the field is distorted and the instrument produces an audible alarm based on the degree of the distortion. The TW-6 can detect conductive materials the size of drums or small tanks to depths of 10-feet. The instrument is actually a relatively poor metal detector which makes it ideal for locating large conductive materials such as metal drums, medium to large metal pipes, reinforced concrete pipes, and metal tanks. A more sensitive metal detector would produce "false positives" on small pieces of metal that are typically found in fill and throughout developed sites. If the survey area is underlain by reinforced concrete or cars and other large surficial metallic features are within 10-feet, the TW-6 will not be useful.

Line Locating

Line locating is performed with a Radiodetection RD400 PXL-2 line locator with a 433 HCTX-2 transmitter. The transmitter emits a specific radio or electromagnetic signal which is indirectly induced or directly conducted onto the metallic line. The transmitter is capable of producing frequencies of 512 Hz, 8 kHz, or 33 kHz and the receiver is configured for the specific transmitted frequency. The induced signal is coupled with the line by either using an induction clamp which surrounds an exposed line or placing the transmitter above a buried line and transmitting the signal to it. The receiver may also be used in a passive locate mode (power) to identify the presence of current carrying lines. Nonmetallic lines may also be located by snaking a sonde down accessible lines with push rods. A sonde is a small transmitter that emits a specific electromagnetic frequency which can be detected by the receiver at depths of 12 to 16-feet.

Inductive Sweep With Transmitter/Receiver



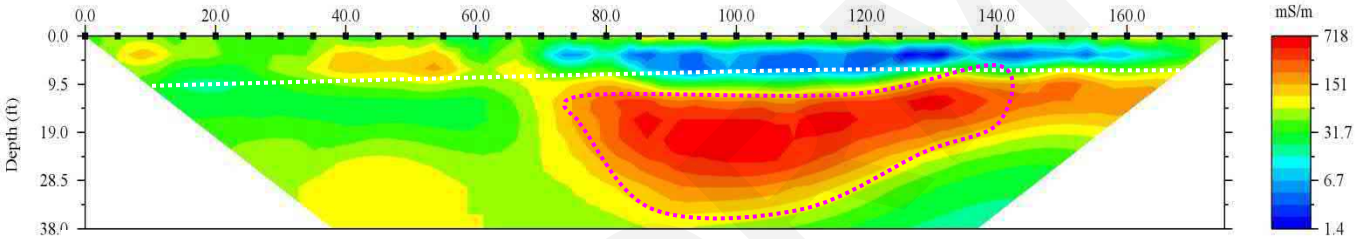
CONFORMED

Attachment A
TPI's Geophysical Survey Equipment & Methods

Resistivity

TPI conducts subsurface resistivity surveys using the AGI SuperSting R8 IP Earth Resistivity and IP Meter. The SuperSting unit measures the voltage drop of an induced electrical current across numerous electrodes as it travels through the electrically heterogenous subsurface. Multiple survey profiles are completed in this manner based upon the specific conditions of the field area in order to assemble a complete characterization of the ground resistivity properties. The resistivity data is then processed and examined for evidence of significant subsurface features including bedrock surfaces, perched groundwater tables, cavities/sinkholes, or potential contaminant plumes.

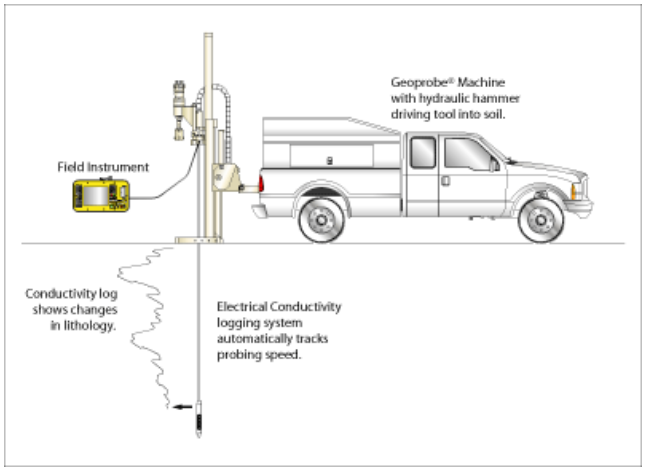
AGI SuperSting R8 IP Earth Resistivity and IP Meter assembly.



Resistivity pseudosection across a backfilled canal. Approximately 10' of high resistivity/low conductivity surficial fill (blue) over low resistivity/high conductivity canal backfill (orange-red).

Down-hole Conductivity

TPI is also able to collect down-hole soil conductivity data with an electric conductivity probe. The EC probe is driven into the subsurface by a direct push unit. A current is induced in the native soil between two contacts at opposite ends of the probe. The soil conductivity is then calculated based upon the ratio of induced current to resultant voltage across the probe. Down-hole EC profiling is particularly useful in the efficient determination of soil grain size (permeable sands vs impermeable clays), water content, and metal content.

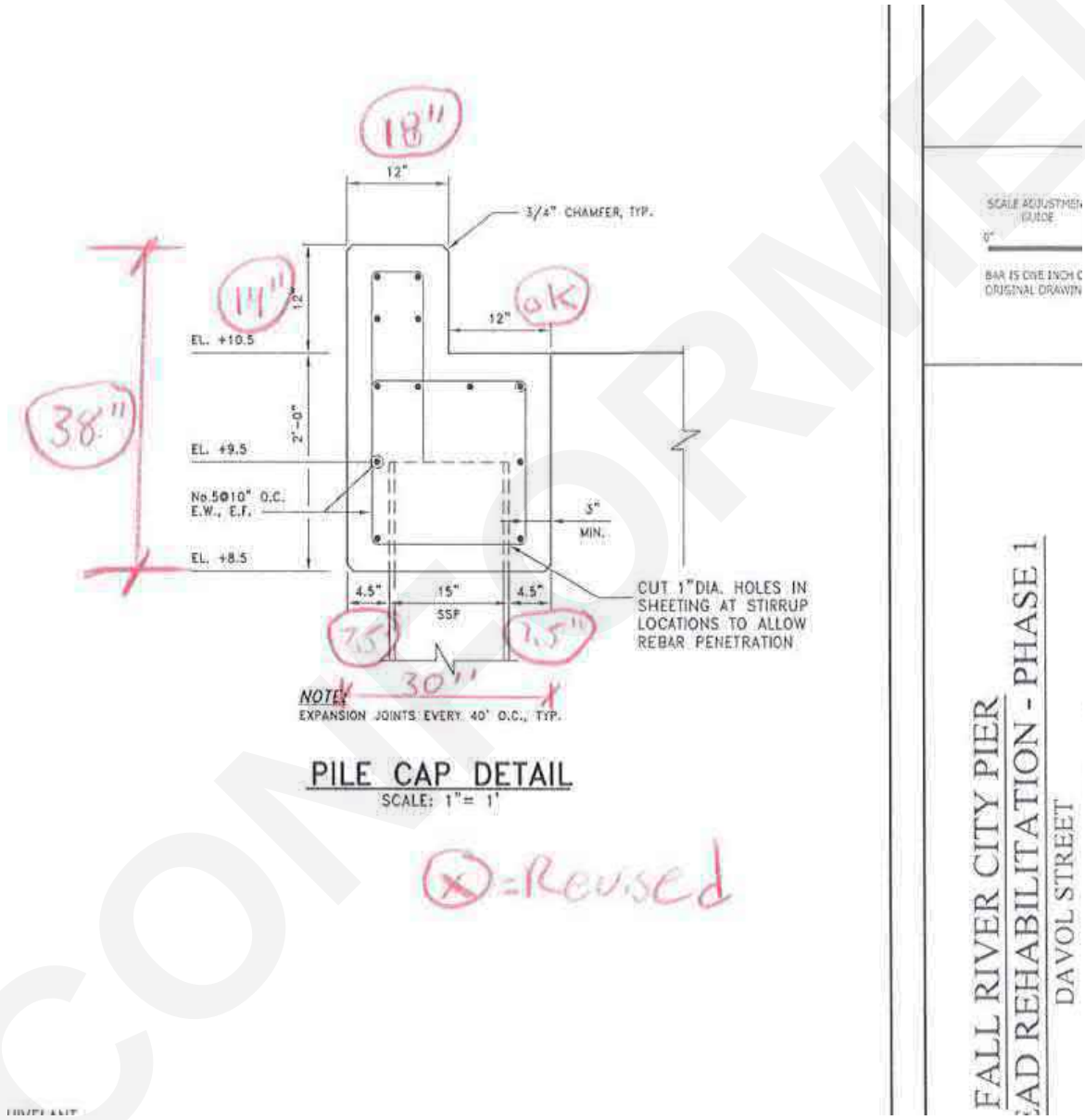


Electrical conductivity probe

724 S. 27th Street
Easton, PA 18045

ffendler@tpienv.com
www.tpienv.com

888-204-3266-Phone
888-204-3266-Fax



As-Built Plan dimensions showing existing concrete cap constructed on steel bulkhead

Appendix B

2017 Construction Plans

CONFORMED

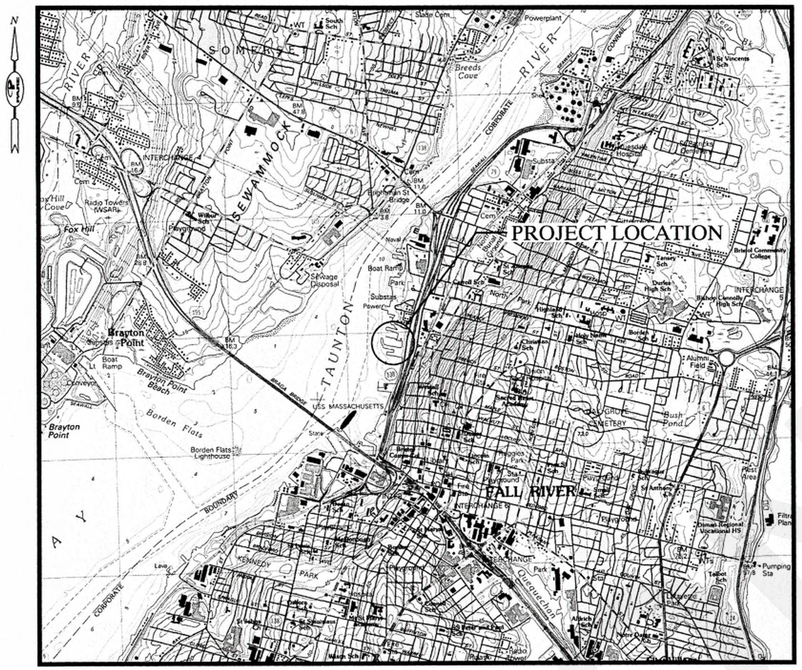
BID DOCUMENTS
NOT FOR CONSTRUCTION

Prepared for The:

CITY OF FALL RIVER REDEVELOPMENT AUTHORITY

FALL RIVER CITY PIER
BULKHEAD REHABILITATION - PHASE 1

FALL RIVER, MASSACHUSETTS
JANUARY 2017



LOCUS PLAN
SCALE: 1" = 2000'

Drawing Index

C0.0 COVER SHEET

C0.1 GENERAL NOTES AND LEGEND

C1.0 EXISTING CONDITIONS PLAN

C2.0 PROPOSED SITE PLAN

C3.0 GRADING PLAN

C4.0 STEEL SHEET PILE LAYOUT PLAN AND DETAILS

C5.0 PROPOSED SECTIONS

C6.0 DETAILS

C7.0 ADD ALTERNATES PLAN

C7.1 ADD ALTERNATES DETAILS

AERIAL PLAN
SCALE: 1" = 500'

Prepared by:

PARE CORPORATION
Foxboro, Massachusetts

PARE CORPORATION

CONFORMED

GENERAL NOTES:

1. FOR THE PURPOSE OF THIS PROJECT

   OWNER – CITY OF FALL RIVER REDEVELOPMENT AUTHORITY
   1 GOVERNMENT CENTER
   FALL RIVER, MA 02722

   ENGINEER – PARE CORPORATION
   10 LINCOLN ROAD, SUITE 210
   FOXBORO, MA 02035
   CONTACT – KARL HAMMOND, P.E.

2. HYDROGRAPHIC DATA SHOWN WAS COLLECTED ON MAY 3, 2011 BY CHILDS ENGINEERING CORPORATION AND CAN ONLY REFLECT CONDITIONS AS THEY EXISTED DURING THE TIME OF THE SURVEY.

3. SOUNDING AND ELEVATIONS ARE SHOWN IN FEET AND TENTHS BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD '29). POSITIVE VALUES REPRESENT AN ELEVATION BELOW THAT SAME PLANE.

4. UPLAND SURVEY TAKEN FROM DRAWING TITLED "TOPOGRAPHIC SURVEY, CITY PIER, DAVOL STREET, FALL RIVER, MA" DATED 8/31/2010, BY SURVEYING AND MAPPING CONSULTANTS, DRAWING NO. U12300FP.

5. BENCHMARK INFORMATION BASED ON SEWER MAN HOLE (SMH) RIM ELEVATION OF 14.56' (NGVD '29) WHICH IS LOCATED BETWEEN THE CONCRETE WALKWAY AND DAVOL STREET, EAST OF THE FALL RIVER CITY PIER.

6. COORDINATES ARE BASED ON THE MASSACHUSETTS MAINLAND STATE PLANE COORDINATE SYSTEM NAD 1983 AND ARE EXPRESSED IN FEET AND INCHES.

7. EXISTING WALL CONDITIONS AND DEFICIENCIES BASED UPON REPORT TITLED "SEAWALL INSPECTION AND EVALUATION, CITY PIER – DAVOL STREET, FALL RIVER, MA" DATED OCTOBER 2010 BY BETA GROUP, INC., AND FOLLOW-UP INSPECTION COMPLETED BY INNER TECH COMMERCIAL DIVING INC. AND PARE CORPORATION ON JUNE 6, 2013.

8. ALL CONSTRUCTION INDICATED ON THESE PLANS SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE MASSACHUSETTS STATE BUILDING CODE, AND THE SPECIFICATIONS INCLUDED IN THIS CONTRACT. THESE PLANS ARE INCOMPLETE UNLESS ACCOMPANIED BY THE SPECIFICATIONS INCLUDED IN THE CONTRACT DOCUMENTS.

9. DEPTHS AND THICKNESS OF THE SUBSURFACE STRATA INDICATED HEREIN ARE GENERALIZED FROM THE SUBSURFACE DATA COLLECTED BY PARE.

10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL DIMENSIONS. PLANS SHALL NOT BE SCALED FOR DIMENSIONS.

11. CONSTRUCTION SHALL BE MADE FROM APPROVED SHOP DRAWINGS ONLY.

12. NOTES, TYPICAL DETAILS AND SCHEDULES APPLY TO ALL WORK UNLESS OTHERWISE NOTED. FOR CONDITIONS NOT SPECIFICALLY SHOWN, PROVIDE DETAILS OF SIMILAR NATURE. VERIFY APPLICABILITY BY SUBMITTING SHOP DRAWINGS FOR REVIEW.

13. INFORMATION REGARDING THE LOCATION OF SURROUNDING STRUCTURES, UTILITIES, AND THE AS-BUILT CONFIGURATION AND CONDITION OF THE EXISTING BULKHEAD IS FURNISHED SOLELY FOR THE CONVENIENCE OF THE CONTRACTOR AND SHALL BE FIELD VERIFIED. THE CONTRACTOR SHALL CONDUCT ITS OWN INDEPENDENT EXAMINATION OF SITE CONDITIONS FOR THE PURPOSE OF BIDDING, FABRICATION, AND CONSTRUCTION ASSOCIATED WITH THE PROJECT. ANY RELIANCE UPON INFORMATION MADE AVAILABLE BY THE OWNER OR THE ENGINEER SHALL BE AT THE CONTRACTOR'S RISK.

14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSAL OF ALL PROJECT DEMOLITION AND REMOVAL OF EXCESS MATERIAL IN ACCORDANCE WITH MASSACHUSETTS, LOCAL, AND FEDERAL LAWS.

15. THE CONTRACTOR SHALL PROTECT ALL ADJACENT STRUCTURES AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OF ALL DAMAGE TO ADJACENT STRUCTURES AND UTILITIES AT NO ADDITIONAL COST TO THE OWNER.

16. THE CONTRACTOR SHALL FOLLOW ALL OSHA AND OTHER APPLICABLE FEDERAL, STATE, AND LOCAL STANDARDS FOR ALL PROJECT COMPONENTS AND ACTIVITIES. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL SITE SAFETY PROCEDURES AND PRACTICES REGARDLESS OF THE PRESENCE OF THE OWNER OR ENGINEER.

17. ALL CONSTRUCTION ACTIVITIES SHALL BE CONFINED TO THE LIMITS OF WORK AND TEMPORARY EASEMENTS DEFINED HEREIN.

18. WHERE REFERENCE IS MADE TO ANY STANDARD SPECIFICATION IT SHALL MEAN THE MOST RECENT SPECIFICATION, CODE, STANDARD, OR INTERIM SPECIFICATIONS OF THE ORGANIZATION REFERRED TO AND SHALL BE CONSIDERED A PART OF THESE CONTRACT DOCUMENTS TO THE EXTENT INDICATED. IN CASE OF CONFLICT, THE MORE RIGID REQUIREMENTS AND CODES SHALL GOVERN. THESE CODES INCLUDE, BUT ARE NOT LIMITED TO: AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM).

19. THE CONTRACTOR WILL BE REQUIRED TO SUBMIT A CONSTRUCTION SCHEDULE TO THE OWNER WITHIN 14 DAYS OF THE NOTICE OF AWARD. THE CONTRACTOR SHALL UPDATE SCHEDULE AS NEEDED THROUGHOUT THE COURSE OF WORK.

20. THE CONTRACTOR SHALL STAGE ALL EQUIPMENT IN THE DESIGNATED STAGING AREA. ALL GREASING AND REFUELING ACTIVITIES SHALL OCCUR IN THE STAGING AREA.

21. THE CONTRACTOR SHALL MAINTAIN A SECURE SITE AND PROVIDE APPROPRIATE SAFETY MEASURES TO PREVENT ACCIDENTS. THE SAFETY MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO SIGNAGE, BARRICADES, FENCES, FLASHING WARNING LIGHTS, AND POLICING IF NECESSARY.

22. UPON COMPLETION OF THE PROJECT, CONTRACTOR IS TO PROVIDE TWO AS-BUILT PLAN SETS TO THE OWNER DEPICTING ANY FIELD CHANGES OF DIMENSION OR DETAIL, LOCATION OF UNDERGROUND STRUCTURES AND/OR UTILITIES, CONSTRUCTION DEVIATIONS, CHANGES DUE TO FIELD OR CHANGE ORDER, AND DETAILS NOT ON THE ORIGINAL DRAWINGS.

23. NO WORK OR DISCHARGES, OTHER THAN THAT SHOWN, SHALL BE PERFORMED WITHIN REGULATED RESOURCE AREAS WITHOUT FIRST RECEIVING PROPER PERMITS FROM THE REGULATORY AGENCIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING, RESTORING AND REPAIRING ALL DAMAGE AS A RESULT OF UNAUTHORIZED WORK OR DISCHARGES TO THE REGULATED RESOURCE AREAS AT NO ADDITIONAL COST TO THE OWNER.

EROSION AND SEDIMENT CONTROL NOTES:

1. THE CONTRACTOR SHALL MAINTAIN ALL EROSION CONTROL DEVICES FOR THE DURATION OF THE PROJECT.

2. THE CONTRACTOR SHALL PREVENT SEDIMENT FROM ENTERING THE RIVER VIA DISCHARGES THROUGH ANY DRAINAGE/SEDIMENT CONTROL STRUCTURES.

3. THE CONTRACTOR SHALL INSTALL AND MAINTAIN TURBIDITY BARRIERS AS INDICATED IN THE CONTRACT DOCUMENTS. TURBIDITY BARRIERS SHALL BE ANCHORED SECURELY AS NECESSARY TO INSURE COLLECTION OF SEDIMENT AND ENABLE THE WORK TO BE PERFORMED.

4. STOCKPILES SHALL BE A MINIMUM OF 1-FOOT FROM THE EDGE OF ANY SLOPE TO LIMIT RUNOFF DOWN THE EMBANKMENT SLOPES.

5. THE EROSION CONTROL BARRIERS SHALL CONSIST OF STRAW BALES BACKED BY SILT FENCE.

6. EROSION CONTROL BARRIERS SHALL BE MODIFIED OR EXPANDED AS FIELD CONDITIONS WARRANT.

7. ALL EROSION CONTROL BARRIERS SHALL BE INSPECTED AT LEAST ONCE PER WEEK AND AFTER EACH STORM EVENT OF 0.5 INCH OR GREATER DURING CONSTRUCTION.

8. ANY DAMAGED AREAS SHALL BE REPAIRED WITHIN 24 HOURS OF DISCOVERY.

9. DEWATERING BASINS SHALL CONSIST OF STRAW BALE ENCLOSURES, TANKS, PERMEABLE BLADDERS, OR OTHER APPROPRIATE METHOD. DEWATERING WASTE WATERS SHALL BE PUMPED TO THE DEWATERING BASINS AND TREATED PRIOR TO DISCHARGE.

10. DISCHARGE OF TURBID WATER TO THE RIVER, OR ANY WETLAND SHALL BE PROHIBITED.

11. UPON COMPLETION OF GRADING, ALL EXPOSED SURFACES NOT OTHERWISE TO BE TREATED SHALL BE COVERED WITH A MINIMUM OF 6" OF LOAM AND SEEDED. MULCH SHALL BE APPLIED AS NECESSARY TO PROVIDE TEMPORARY STABILIZATION UNTIL PERMANENT VEGETATIVE COVER IS ESTABLISHED.

CONSTRUCTION SEQUENCE:

THE FOLLOWING SEQUENCE IS INTENDED TO BE GENERAL IN NATURE AND SHALL NOT BE CONSIDERED DIRECTION BY THE ENGINEER OR THE OWNER. ALTHOUGH IT IS LIKELY THAT SOME OF THE WORK ITEMS WILL OVERLAP, CONSTRUCTION SEQUENCES FOR THE VARIOUS PROJECT COMPONENTS ARE DESCRIBED SEPARATELY AND MAY NOT NECESSARILY PROCEED IN CONSECUTIVE ORDER. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT PLANS AND SPECIFICATIONS.

1. MOBILIZE EQUIPMENT AND PERSONNEL TO THE PROJECT SITE.

2. INSTALL EROSION AND SEDIMENT CONTROLS INCLUDING A TURBIDITY BARRIER AS INDICATED IN THE DRAWINGS AND SPECIFICATIONS.

3. REMOVE EXISTING CONCRETE, GRANITE BLOCKS AND BOTTOM DEBRIS AS REQUIRED TO FACILITATE THE WORK.

4. PREPARE AND GRADE EXISTING SITE TO RECEIVE FILTER FABRIC OVER THE "CAP AREA" AS INDICATED IN THE DRAWINGS AND SPECIFICATIONS. INSTALL FILTER FABRIC AND COVER WITH APPROXIMATELY 3 INCHES OF FILL TO HOLD FABRIC IN PLACE.

5. SUPPLY AND INSTALL NEW STEEL SHEET PILING, STEEL WALES, TIE RODS AND DEADMAN ANCHOR. PLACE GRANULAR BACKFILL BETWEEN EXISTING SEAWALL AND NEW STEEL SHEET PILE WALL.

6. CARRY OUT COMPLETED SEWER OVERFLOW IMPROVEMENTS AND LINING.

7. INSTALL CONCRETE CORNER PLUGS BETWEEN EXISTING SEAWALL AND NEW STEEL SHEET PILE WALL WHERE SHOWN.

8. INSTALL NEW REINFORCED CONCRETE PILE CAPS.

9. FILL, GRADE, AND COMPACT SITE TO THE LINES, GRADES, AND ELEVATIONS SHOWN IN THE DRAWINGS.

10. INSTALL BID ALTERNATE INFRASTRUCTURE AS APPLICABLE.

11. PERFORM SITE CLEANUP AND WALK THROUGH.

12. NOTIFY ENGINEER OF SUBSTANTIAL COMPLETION.

13. RESTORE DISTURBED AREA TO PRE-CONSTRUCTION CONDITION.

14. DEMOBILIZE FROM THE SITE.

LEGEND

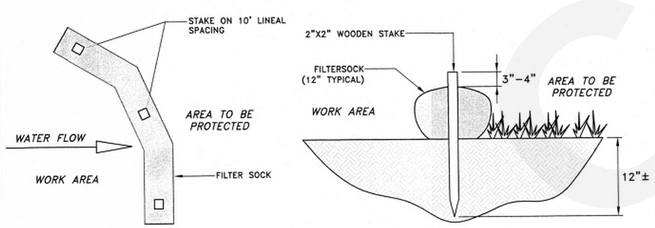
EXISTING		PROPOSED
	PAVEMENT / WALK	
	CURBING	
	RETAINING WALL	
---52---	CONTOUR 1'	52
---55---	CONTOUR 5'	55
123.45 ×	SPOT ELEVATION	XXX.XX ×
—D—	DRAINAGE	
—E—	ELECTRIC	
—S—	SEWER	
—W—	WATER	
CB	CATCH BASIN	
DMH	DRAIN MANHOLE	
SMH	SEWER MANHOLE	
	HYDRANT	
	WATER GATE	
	LIGHT POLE BASE	
	LIGHT	
	STRAW BALES	
	SILT FENCE	
	TURBIDITY BARRIER	

ABBREVIATIONS

STRAW — STRAW BALES

SILT — SILT FENCE

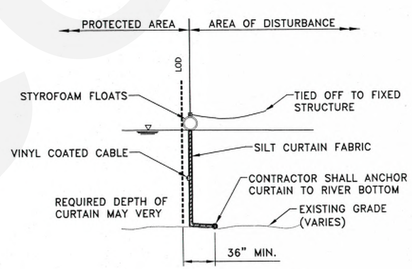
LOD — LIMIT OF DISTURBANCE



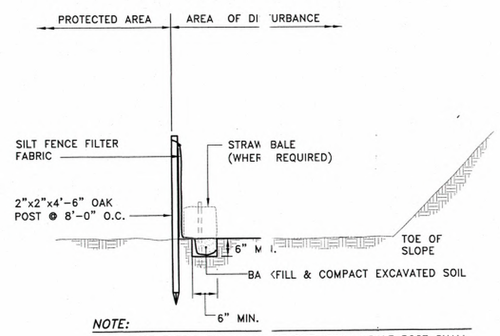
FILTERSOCK NOTES

1. COMPOST / SOIL / ROCK / SEED FILL TO MEET APPLICATION REQUIREMENTS
2. COMPOST MATERIAL TO BE REMOVED OR DISPERSED ON SITE AS DETERMINED BY ENGINEER.

FILTERSOCK DETAIL
NOT TO SCALE

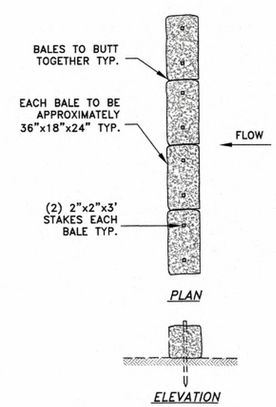


TYPICAL TURBIDITY BARRIER
NOT TO SCALE

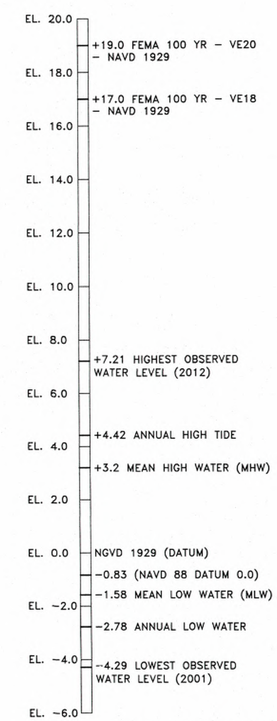


NOTE:
SILT FENCE FABRIC SHALL NOT BE SLIT. STRAW BALE POST SHALL BE DRIVEN THROUGH SILT FENCE FABRIC.

SILT FENCE DETAIL
NOT TO SCALE



STRAW BALE DETAIL
NOT TO SCALE



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BULKHEAD REHABILITATION - PHASE 1
DAVOL STREET
FALL RIVER, MASSACHUSETTS

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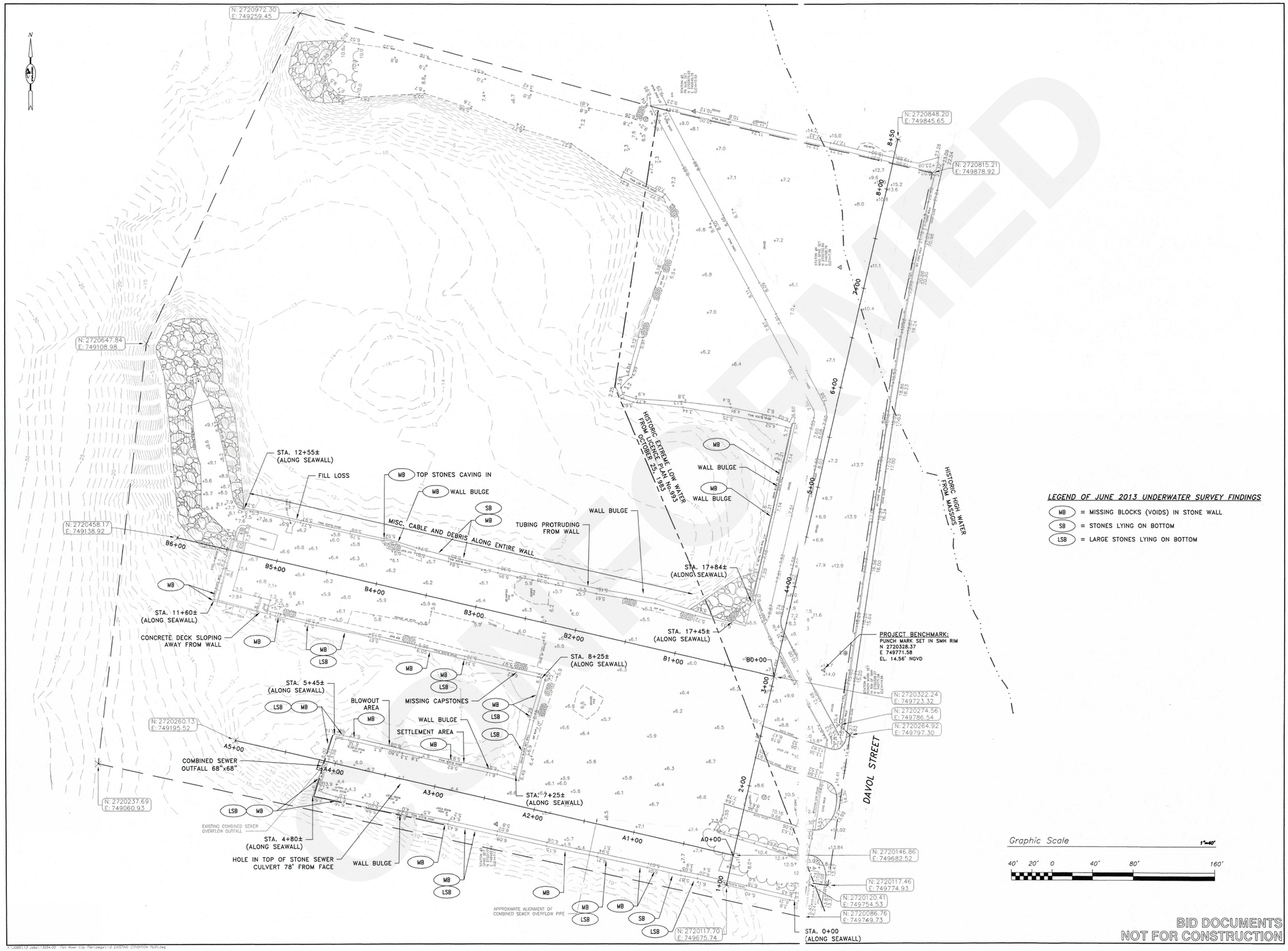
DRAWN BY:	LMC / JHG
APPROVED BY:	JMB

GENERAL NOTES AND LEGEND

SHEET NO.: C0.1



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EXISTING CONDITIONS PLAN

SHEET NO.: C1.0

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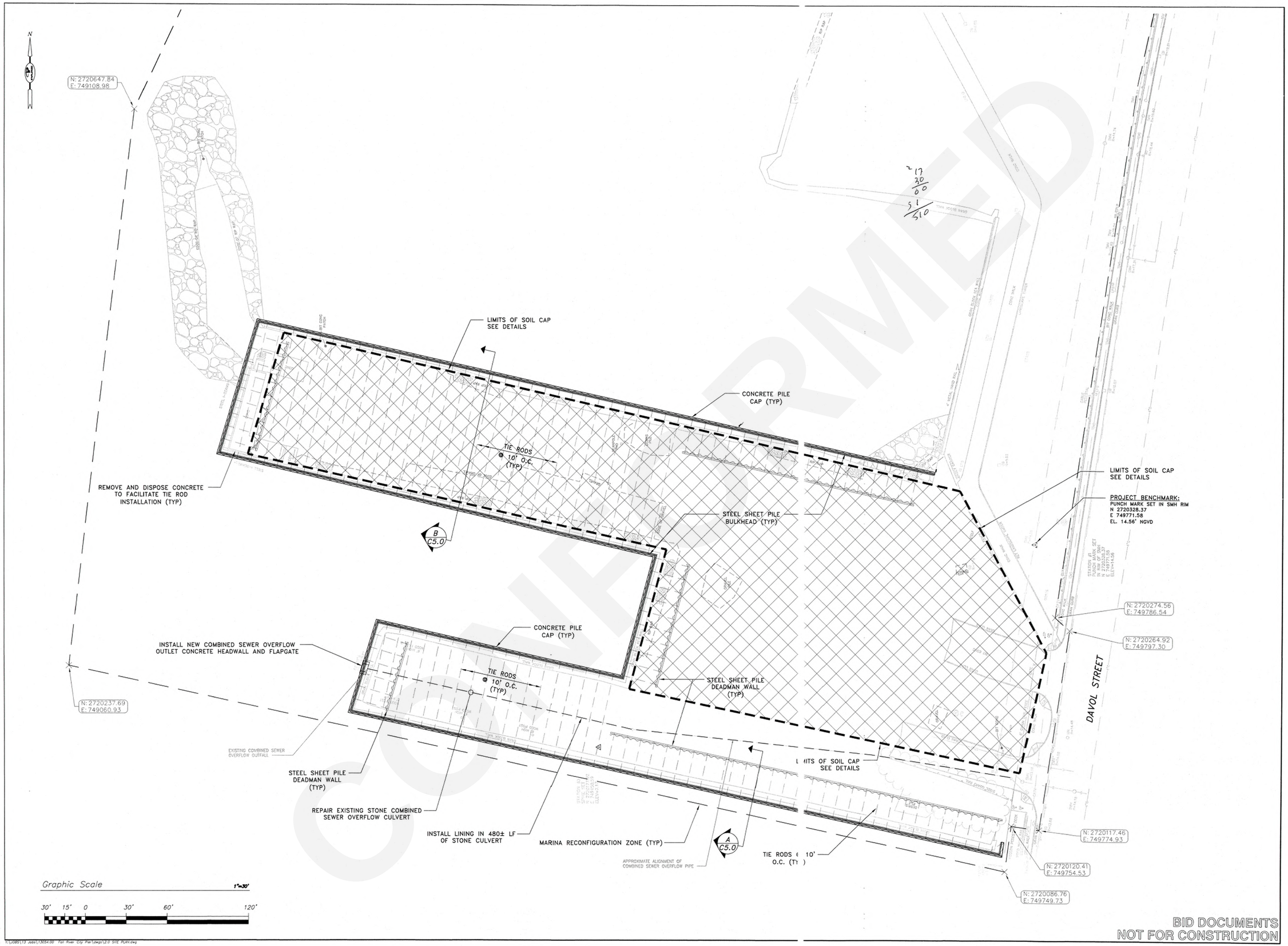

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APPROVED BY:	JMB

PROPOSED
SITE PLAN

SHEET NO.:
C2.0

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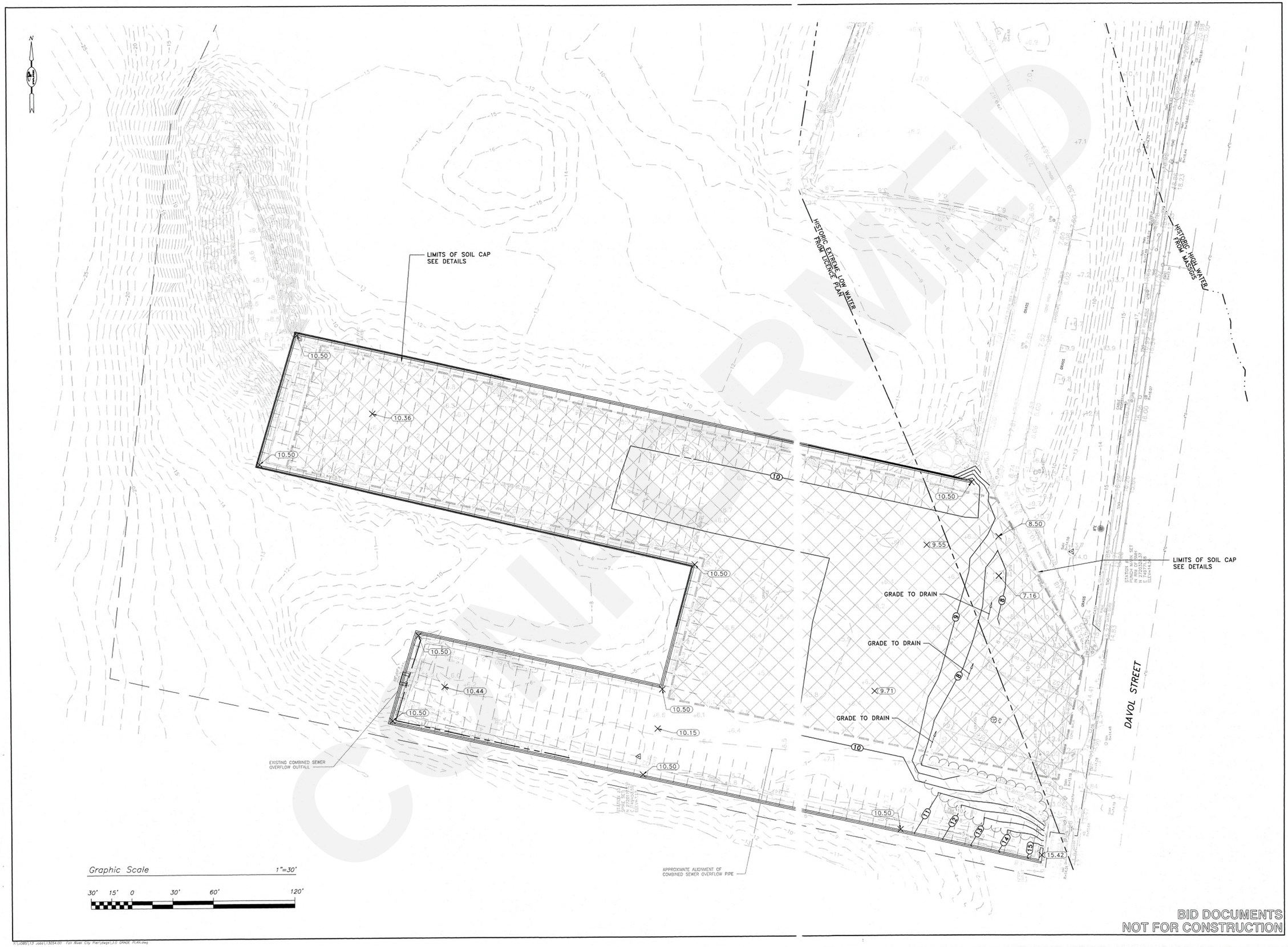

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GRADING PLAN

SHEET NO.: C3.0

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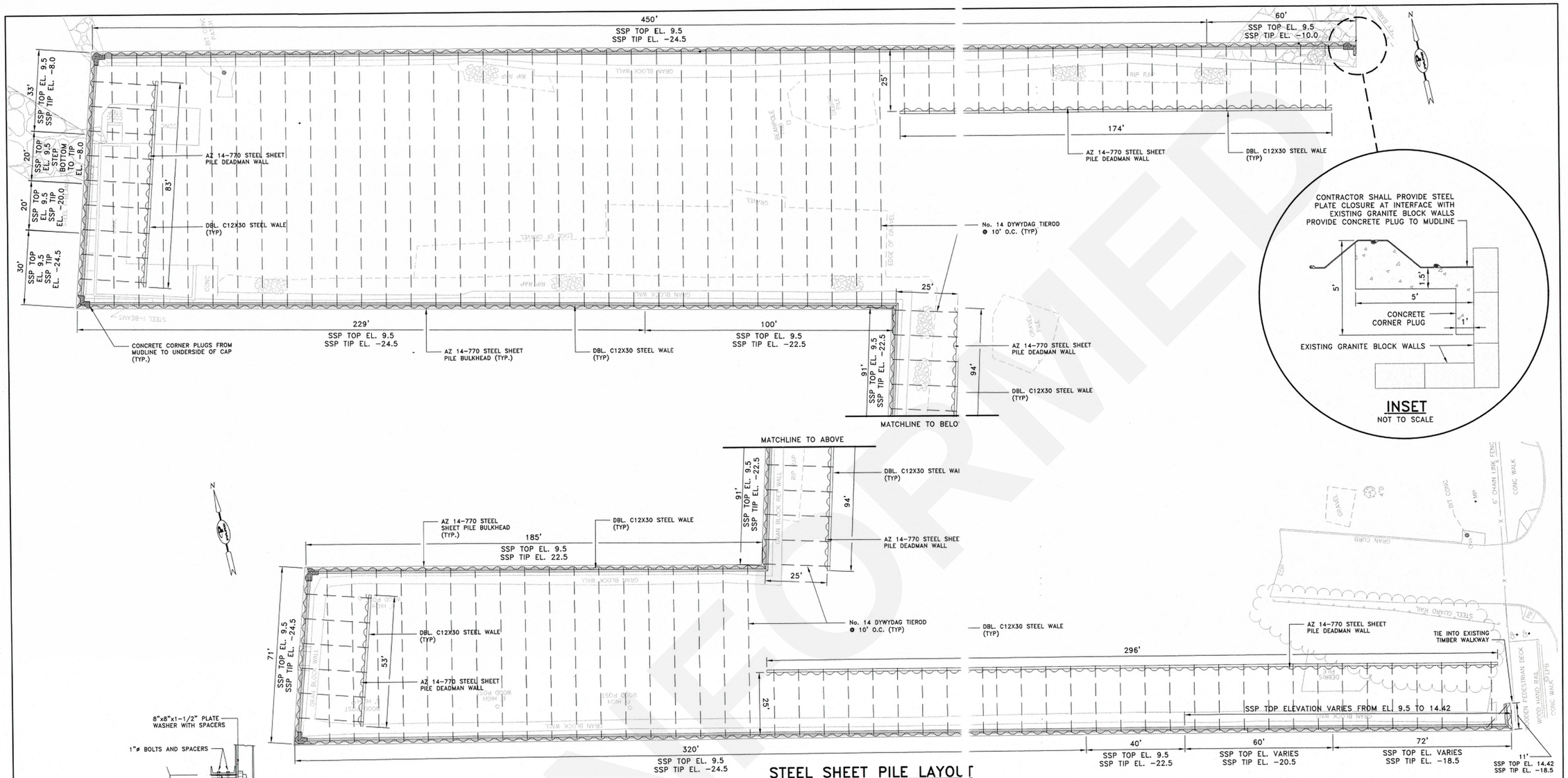
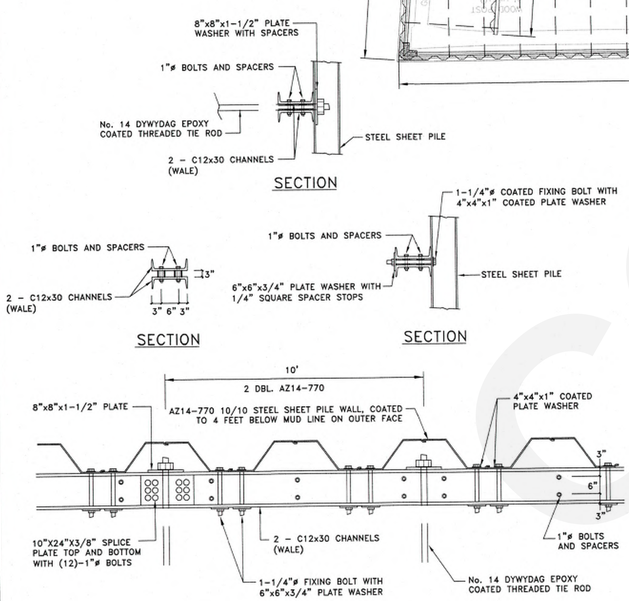


STEEL SHEET PILE LAYOUT

SCALE: 1"=20'

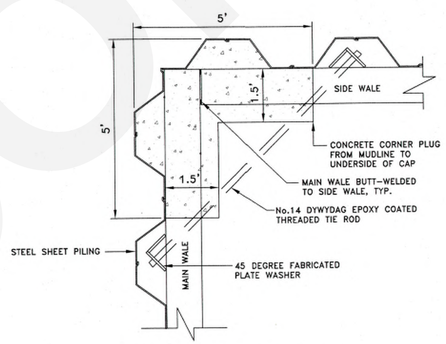
NOTE:

STEEL SHEET PILE TO BE COAL TAR EPOXY COAT) ON WATER SIDE ONLY FROM TOP TO 4 FEET BELOW UDLINE.



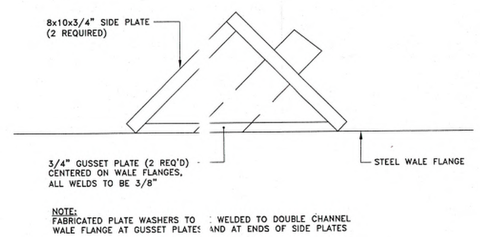
PROPOSED TIEBACK DETAILS

N.T.S.



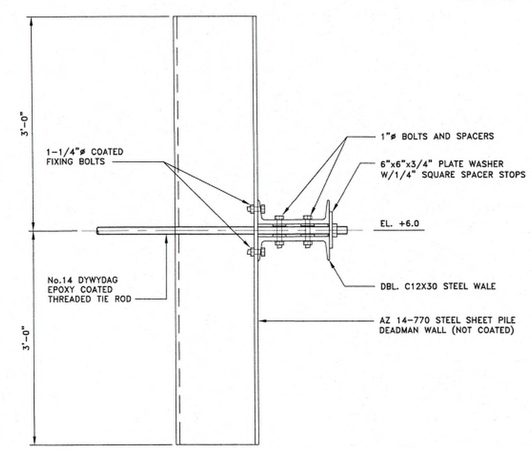
WALE CORNER DETAIL

SCALE: 1"=2'



45 DEGREE FABRICATED PLATE WASHER

SCALE: 3"=1'



STEEL SHEET PILE DEADMAN WALL

SCALE: 1"= 1'

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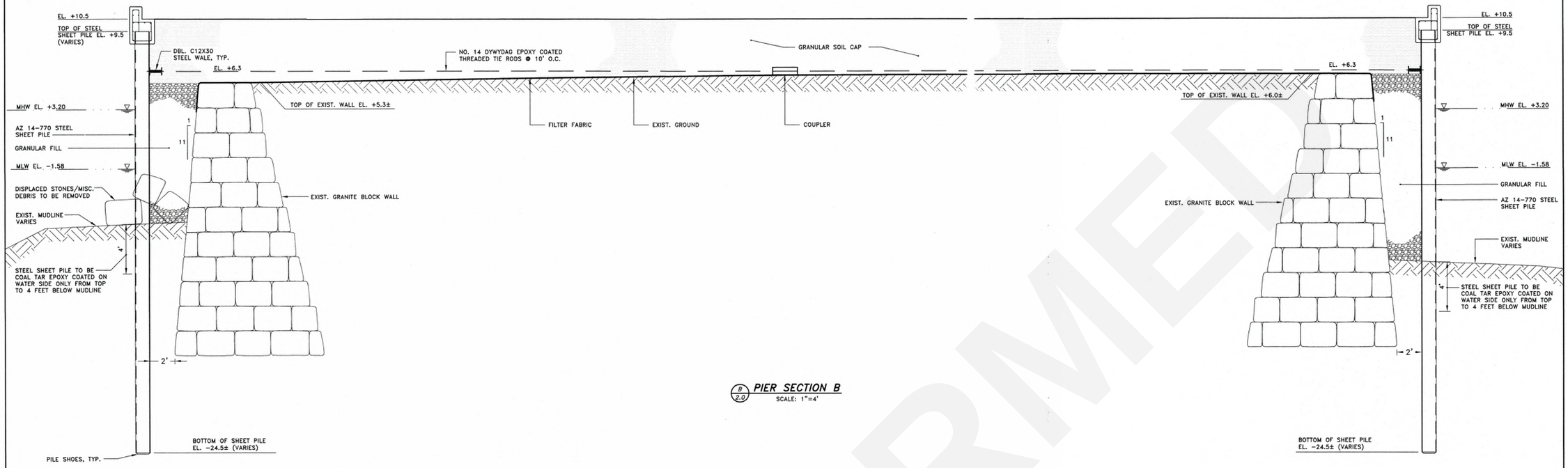
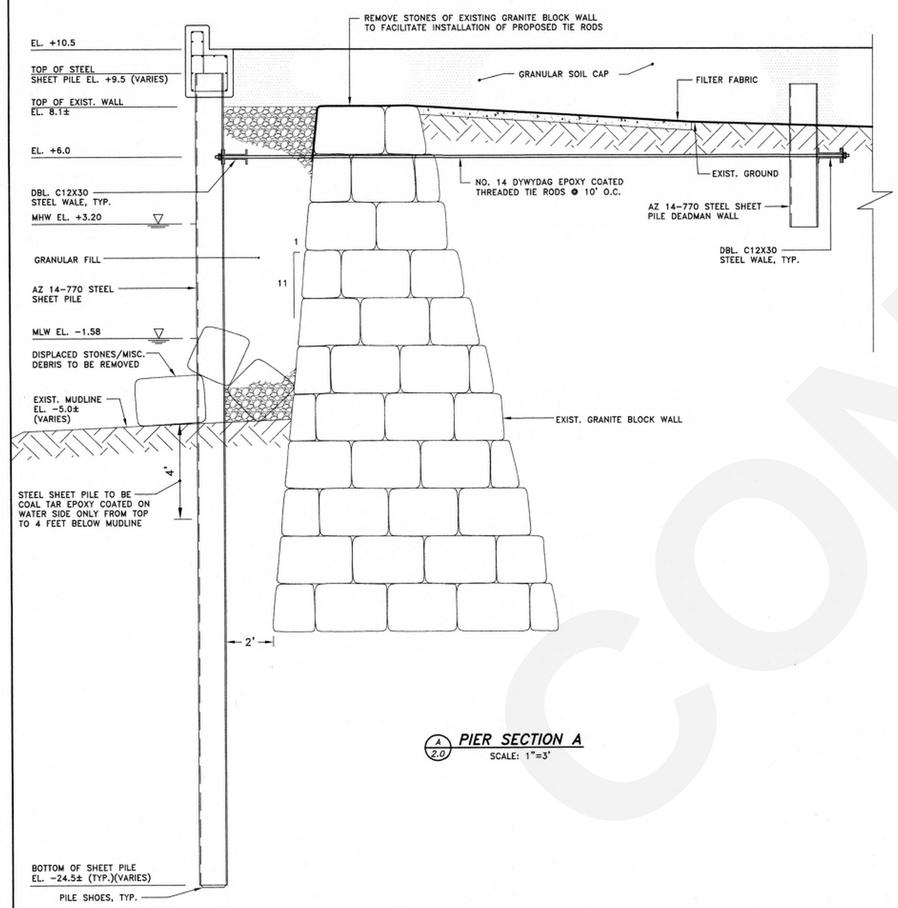
STEEL SHEET PILE LAYOUT PLAN AND DETAILS

SHEET NO.: C4.0



B 2.0 PIER SECTION B
SCALE: 1"=4'



A 2.0 PIER SECTION A
SCALE: 1"=3'

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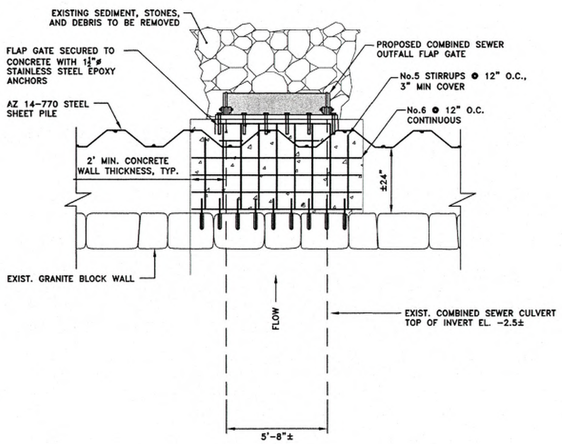
PROPOSED SECTIONS

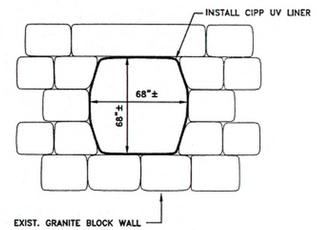
SHEET NO.:
C5.0

Y:\JOBS\13 Jobs\13054.00 Fall River City Pier\dwgs\5.0 PROPOSED SECTIONS.dwg



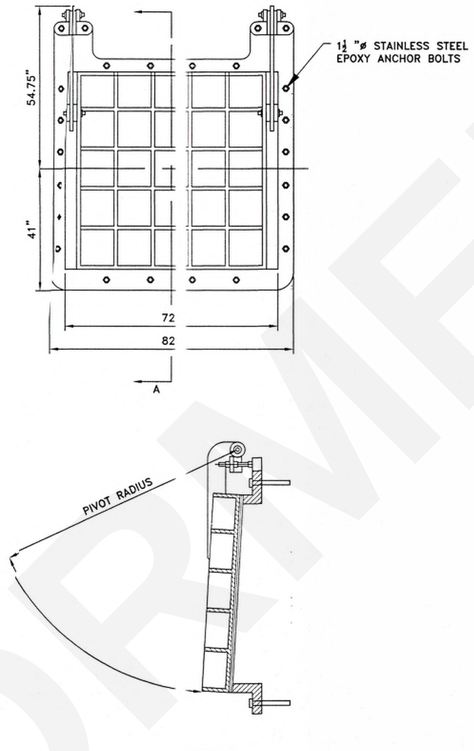
COMBINED SEWER OUTFALL SECTION AT STA. 5+15

SCALE: 1"=4'

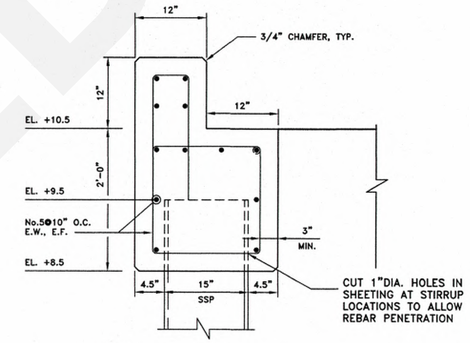


EXISTING COMBINED SEWER OUTFALL STONE CULVERT SECTION

SCALE: 1"=4'



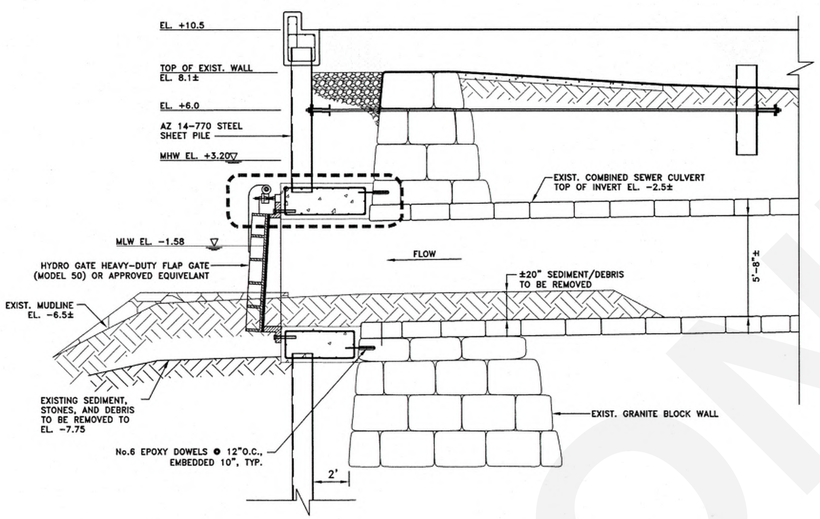
ECTION A



NOTE:
EXPANSION JOINTS EVERY 40' O.C., TYP.

PILE CAP DETAIL

SCALE: 1"= 1'



COMBINED SEWER OUTFALL SECTION AT STA. 5+15

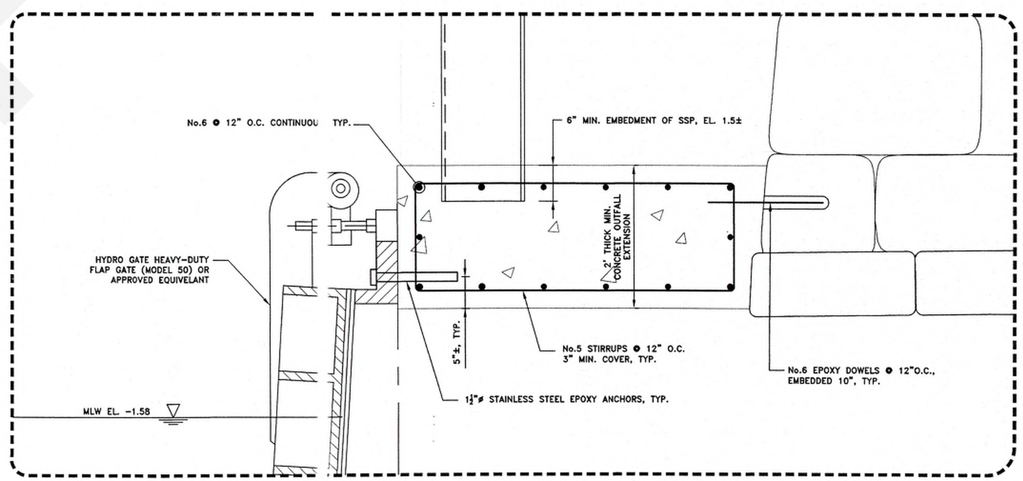
SCALE: 1"=4'

NOTE:

FLAP GATE SHALL BE HEAVY-DUTY FLAP GATE (ODEL 50) BY HYDRO GATE OR APPROVED EQUIVELANT.

FLAP G TE DETAIL

N.T.S.



FLAP GATE AND CONCRETE CULVERT EXTENSION DETAIL

SCALE: 1"=1'

NOTES:

1. CARRY OUT INSPECTION OF COMBINED SEWER OUTFALL PIPE FROM EXISTING HEADWALL TO DAVOL STREET. PROVIDE INSPECTION REPORT PRIOR TO ORDERING STEEL SHEET PILES.
2. THE PROPOSED FLAP GATE MAY HAVE AN OUTSIDE DIAMETER (O.D) THAT IS DIFFERENT THAN THE O.D OF THE EXISTING CULVERT. THE CONTRACTOR SHALL VERIFY THE O.D PRIOR TO ORDERING THE FLAP GATE.
3. OUTFALL ENTRANCE WILL BE CLEANED AND FREE OF RUBBLE, SAND AND SILT PRIOR TO INSTALLATION OF NEW PROPOSED OUTFALL EXTENSION AND FLAP GATE.
4. CONTRACTOR TO VERIFY EXISTING ELEVATIONS AND COMBINED SEWER OUTFALL OPENING DIMENSIONS PRIOR TO EXTENSION INSTALL.
5. STEEL SHEET PILE TO BE CUT TO FACILITATE INSTALLATION OF CONCRETE OUTFALL EXTENSION AND FLAP GATE.

NOTE:

"ANY MANUFACTU R'S NAMES AND/OR MODEL NUMBERS IDENTIFIED HEREIN ARE INTENDED TO ASSIST IN ESTABLISHING A GENERAL LEVEL F QUALITY, CONFIGURATION, FUNCTIONALITY, AND APPEARANCE REQUIRED. THIS IS NOT A PROPRIETARY SPE ICATION AND IT SHOULD BE NOTED THAT "OR APPROVED EQUAL" APPLIES TO ALL PRODUCTS DENOTED HEREIN. IS UNDERSTOOD THAT ALL MANUFACTURERS WILL HAVE MINOR VARIATIONS IN CONFIGURATION, APPEARANCE, ANC PRODUCT SPECIFICATION TO ENCOURAGE OPEN AND COMPETITIVE INVOLVEMENT FROM MULTIPLE MANUFACTURERS AT ARE ABLE TO SUPPLY SIMILAR PRODUCTS."

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DETAILS

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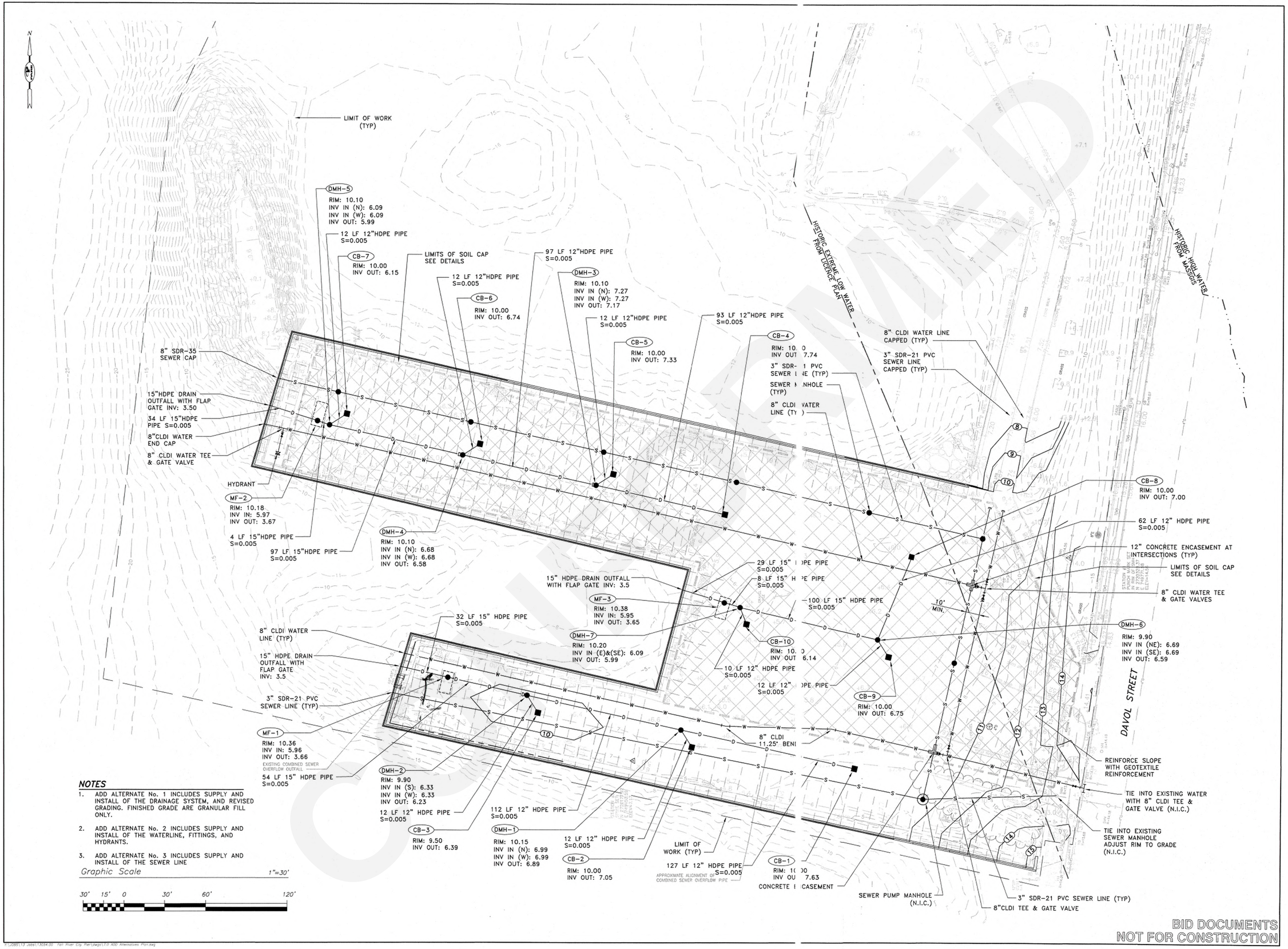

NOTES

1. ADD ALTERNATE No. 1 INCLUDES SUPPLY AND INSTALL OF THE DRAINAGE SYSTEM, AND REVISED GRADING. FINISHED GRADE ARE GRANULAR FILL ONLY.
2. ADD ALTERNATE No. 2 INCLUDES SUPPLY AND INSTALL OF THE WATERLINE, FITTINGS, AND HYDRANTS.
3. ADD ALTERNATE No. 3 INCLUDES SUPPLY AND INSTALL OF THE SEWER LINE

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APPROVED BY:	JMB

ADD ALTERNATES PLAN

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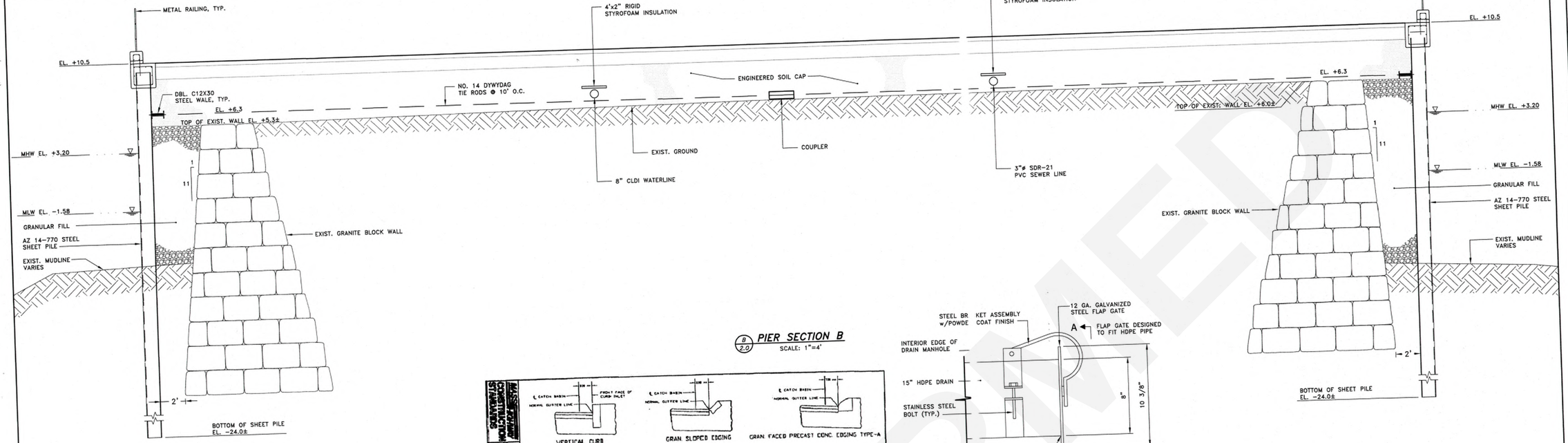
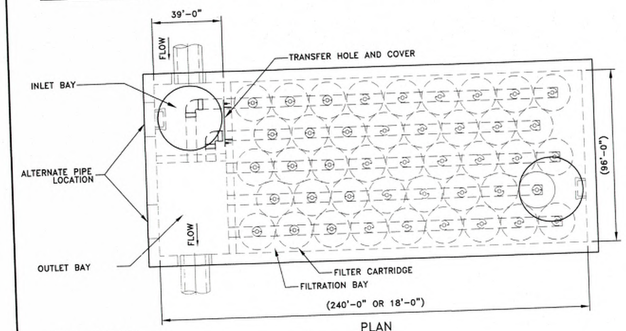
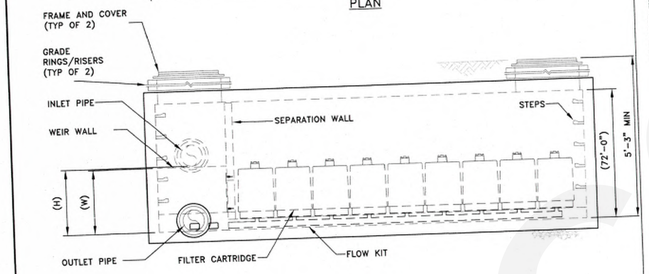


MEDIA FILTER UNIT SIZING TABLE

Structure[1]	Rim	Inv. In	Inv. Out	Pipe	# of Cartridges	Cartridge Height	Vault Size	25-yr flow	WQF (cfs)	WQV (cf)	Vehicular Imp. Area (SF)
MF-1	10.36	5.85	3.55	15" HDPE	31	18"	8'X16'	4.87	1.03	3004	36050
MF-2	10.36	5.92	3.62	15" HDPE	37	18"	8'X18'	5.58	1.22	3563	42752
MF-3	10.25	5.95	3.61	15" HDPE	28	18"	8'X16'	5.10	0.94	2736	32834
MF-4	9.20	5.14	3.34	15" HDPE	39	LOW DROP	8'X16'	5.65	0.87	2727	32718



PLAN



ELEVATION

GENERAL NOTES

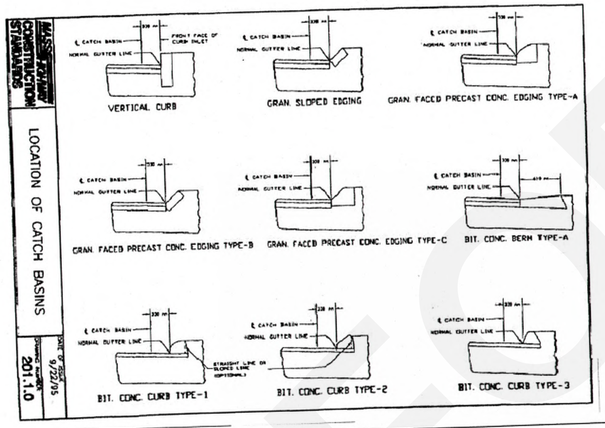
1. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
2. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET AASHTO M306 LOAD RATING, ASSUMING EARTH COVER OF 0'-5', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
3. UNITS SHALL BE STORM FILTER OR APPROVED EQUIVALENT.
4. MEDIA SHALL BE ZPG OR APPROVED EQUIVALENT FOR ALL UNITS.
5. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

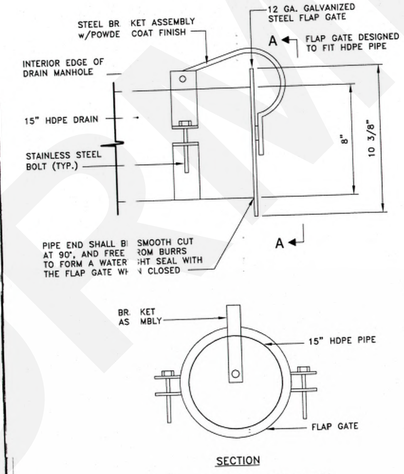
MEDIA FILTER UNIT GENERAL DETAIL

NOT TO SCALE

8/2.0 PIER SECTION B

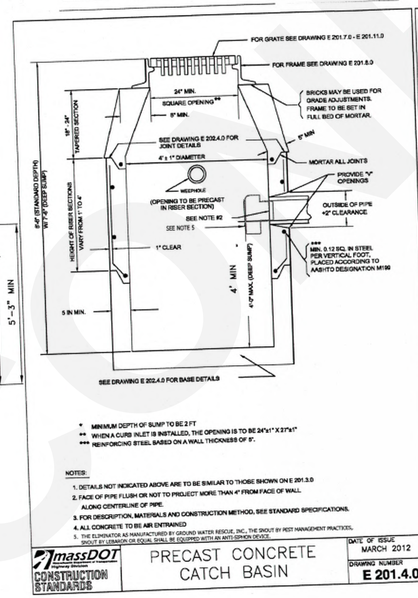
SCALE: 1"=4'

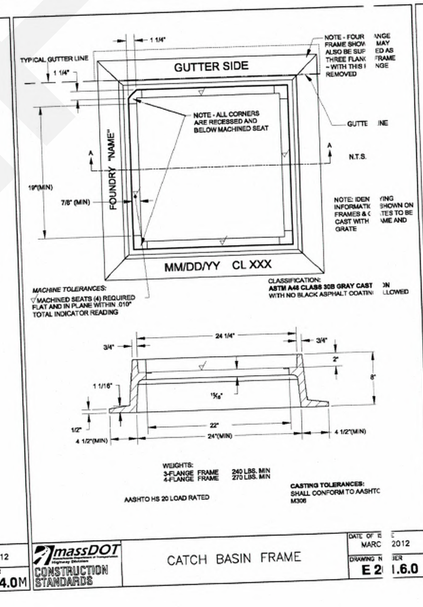


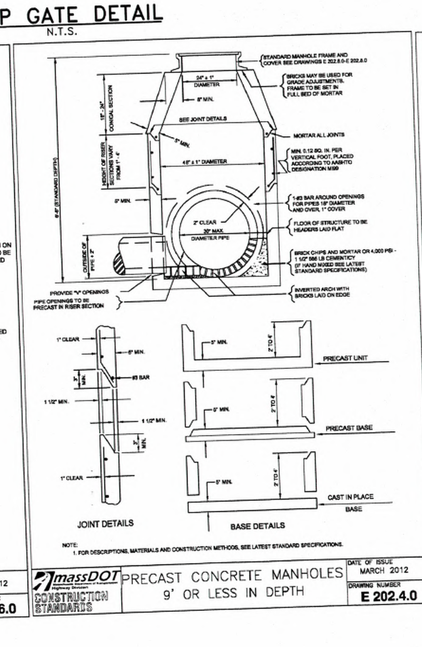


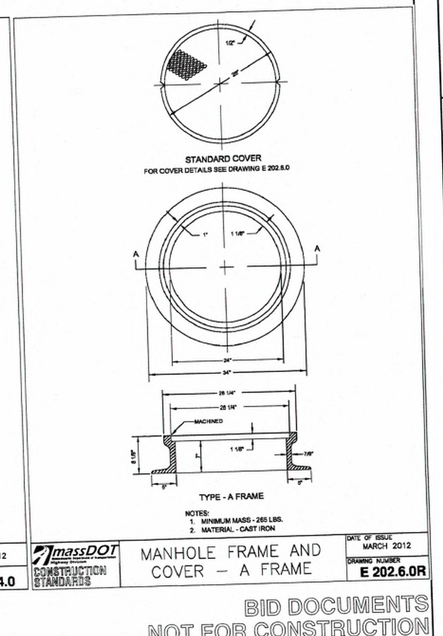
FLAP GATE DETAIL

N.T.S.









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ADD ALTERNATES DETAILS

SHEET NO.: C7.1

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Appendix C Risk Based Clean-Up Plan

Risk Based Clean Up Plan -RCBP

CONFORMED

Risk-Based Cleanup Plan Amendment

City Pier
Davol Street
Fall River, Massachusetts

October 2020

Prepared for:

Fall River Redevelopment Authority
One Government Center
Fall River, Massachusetts

701 George Washington Hwy
Lincoln, Rhode Island 02865
401.333.2382
www.BETA-Inc.com

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Risk-Based Cleanup Plan
Amendment

Disposal Site: City Pier
Davol Street
Fall River, Massachusetts
RTN Number 4-17012

Prepared for: Fall River Redevelopment Authority
One Government Center
Fall River, Massachusetts 02722

Prepared by: BETA Group, Inc.
701 George Washington Highway
Lincoln, Rhode Island 02865

Joseph R. McLoughlin II, LEP, LSP
Associate

October 2020

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Table of Contents

1.0 INTRODUCTION 1
2.0 SITE LOCATION AND DESCRIPTION 2
3.0 IDENTIFICATION OF PROJECT CONTACTS 3
4.0 SITE HISTORY 3
5.0 MASSDEP RESPONSE ACTIONS 4
6.0 PREVIOUS MODIFICATION TO RISK-BASED CLEANUP PLAN 8
7.0 MODIFICATION TO RISK-BASED CLEANUP PLAN 10
7.1 Grading and Soil Management 10
7.2 Grade Finishes 12
7.3 Amenities 14
7.4 Clean Fill Testing 16
8.0 SUMMARY AND CONCLUSIONS 17

TABLES

1. Backfill Analytical Data

FIGURES

1. Site Locus Map
2. Site Plan
3. Imported Fill Material Sample Locations

APPENDICES

A. 10% Design Submission Plan Set
B. Laboratory Analytical Data

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1.0 Introduction

On behalf of the Fall River Redevelopment Authority (FRRA), BETA Group, Inc. (BETA) has prepared this Amendment to the Risk-Based Cleanup Plan for addressing the presence of polychlorinated biphenyls (PCBs) in soil at the property known as City Pier on Davol Street in Fall River, Massachusetts (the Site).

In August 2020, the City received a $1 million grant from the Seaport Economic Council for redevelopment of the Site as a transient marina. The FRRA has also pledged $1.6 million for completing the Site improvements. With these funds, the FRRA and BETA have redesigned the finish grades and amenities at the Site. It is anticipated that the City Pier improvements will support enhanced public use of the site (open air concerts, artisan vendors, seasonal beer garden, etc.) and maritime activity in the form of recreational boating, floating interpretive and educational exhibits, as well as potential future ferry or water taxi service.

The previous plan was approved in an October 24, 2011 letter from Mr. James T. Owens III, Director, EPA's Office of Site Remediation & Restoration to Mr. Kenneth Fiola, Jr., Executive Director of the FRRA. In accordance with Section 19 of the General Conditions attached to the October 24, 2011 approval, this report represents a formal request to the United States Environmental Protection Agency (EPA) for a modification of the previously approved risk-based disposal and work plan approval in accordance with 40CFR Part 761, under the Toxic Substances Control Act (TSCA).

The results of historic analytical testing identified PCB contamination in Site soil at concentrations greater than or equal to 50 parts per million (≥50 ppm). Based on this information, PCB-impacted soil at the Site meets the definition of *PCB remediation waste* as defined under the federal PCB regulations at 40 CFR 761.3. The proposed response actions in the original plan for addressing the PCBs in Site soils included:

- Excavation and off-Site disposal of soils containing greater than 100 ppm of PCBs. This level represents the Massachusetts Department of Environmental Protection's (MassDEP's) Upper Concentration Limit for PCBs. Please note that this plan has incorporated response actions necessary to also meet the requirements of 310 CMR 40.0000 to allow for the future filing of a Permanent Solution with Conditions;
- Excavation and consolidation of soils from the southern and northern portions (outside the proposed cap area) of the Site containing greater than 1 ppm but less than 100 ppm of PCBs to within the proposed cap area;

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- Construction of a cap (soil, asphalt paving, concrete caps, etc.) over approximately 83,000 square foot of the central portion of the Site to prevent direct contact with soil containing PCBs greater than 1 ppm but less than 100 ppm; and
- Implementation of a deed restriction (Activity and Use Limitation) on the Site deed to require maintenance of the cap (once constructed) and detailing necessary response actions if future excavation activities are planned for the Site.

To date, excavation, consolidation, and off-Site disposal of soil has been completed, as has been the general construction of the soil cap (placement of the Geotextile fabric and granular material). This modification includes changes to the surficial finish of the deed restricted area (AUL area) and other areas of the Site, as well as construction of amenities at the Site related to its future use as a transient marina.

2.0 Site Location and Description

The Site, known as City Pier, is owned by the FRRA and is identified as Lot 12 on Fall River Assessor's Map 0-22. This lot consists of a total of approximately 4.22 acres. The Site is located at 41º 42′ 45″ north latitude and 71º 9′ 28″ west longitude, and is zoned for mixed business district use. The Universal Traverse Mercator (UTM) coordinates for the Site are 4,619,904 N and 320,484 E. A Site Locus Map and Site Plan are included as Figures 1 and 2, respectively.

The Site is bordered on the west by the Taunton River and on the east by Davol Street. Granite bulkhead walls, rip-rap, and crushed stone border the river. The granite bulkheads extend to the west to form two piers. The Site is relatively flat, with an approximate elevation of ten (10) feet above the National Geodetic Vertical Datum of 1929. The Site is accessible by boat on the waterside. A 6-foot high chain-link fence with locked gates restricts access from Davol Street along a portion of the Site as shown on Figure 2. The surrounding area consists of multi-family housing, commercial properties, and condominium development areas. A condominium complex (Point Gloria) is located just north of the Site, and the Braga Bridge is located just south of the Site.

There are no known schools or institutions within 500 feet of the Site. The Taunton River abuts the subject property to the west. Protected open space areas are located approximately 0.3 miles north of the Site, and 0.2 miles south of the Site. There is also a narrow strip of protected open space (a pedestrian walkway) that runs north through the Site near Davol Street. Railroad tracks are located 0.1 miles to the east of the site. The Site is also located within the 100-year flood plain). There are no other known environmental receptors, Areas of Critical Environmental Concern (ACEC), or endangered species located at the Site.

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3.0 Identification of Project Contacts

The project contact for the entity assuming responsibility for the submission of this report is:

Fall River Redevelopment Authority
One Government Center
Fall River, Massachusetts 02722
Contact: Sarah Page, Executive Director
Phone: (508) 324-2662

The Licensed Site Professional of Record is:

Joseph R. McLoughlin II, LEP, LSP
BETA Group, Inc.
701 George Washington Highway
Lincoln, Rhode Island 02865
Phone: (401) 333-2382
LSP License No. 2039

4.0 Site History

The information provided in this section is largely based on previous environmental reports prepared by others, including:

- *Phase I Initial Site Assessment (ISA) Report*, Metcalf & Eddy, Inc. (M&E), April 17, 2003
- *Phase II Comprehensive Site Assessment (CSA) Report and Phase III Remedial Action Plan (RAP)*, ESS Group, Inc (ESS) – January 19, 2006
- *Revised Phase III RAP and Phase IV Remedy Implementation Plan* (RIP), ESS – January 19, 2007

According to historical Sanborn Fire Insurance Rate Maps, the Site was occupied by Cook Borden & Co. between 1888 and 1950 for use as a lumber yard with milling operations. A historical map included in the M&E Phase I ISA report indicates that the northeastern portion of the Site contained a "fill station" during the latter part of this period. Lumber yard operations were ceased between 1950 and 1976, and all associated buildings were removed. After 1976, the Site was used for boat storage and as a marina.

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Circa 1900, the Fall River Gas Company was located east of the Site between Davol Street and the railroad tracks. A gas holder was located near the southeast corner of the Site. Also in the early 1900s, the area south of the Site was used as a coal yard. According to sources in the Fall River community, a restaurant operated in the southern portion of the Site in the early 1980's.

The FRRA acquired the property in 1982. According to available resources, the Site has been used for occasional boat storage, repairs, and river access. The Site was under lease by the FRRA to J. Cashman, Inc. until September 2005 for the storage of construction equipment, and also for use as an access point to perform bridge construction work along the Taunton River. Currently, the Site is undeveloped, with access to the southern portion of the Site restricted by a chain-link fence and locked gate.

5.0 MassDEP Response Actions

The following documents MassDEP response actions conducted and reports filed since submittal of BETA's "Release Abatement Measure Status Report and Interim Completion & Observation Report" in June 2017. The 2017 report documents Site activities from 2011 to 2017.

September 2017 RAM Status Report

On September 14, 2017, Apex Companies, LLC (Apex) field a "Release Abatement Measure Report" that documented that no significant Site activities had occurred since June 2017. Apex did state, "Apex, on behalf of FRRA and in accordance with Condition 19 of PCB Risk-Based Cleanup and Disposal Approval Conditions, submitted a Modification to Risk-Based Cleanup Plan to United States Environmental Protection Agency on August 1, 2017. The modification covered the installation of SSP [steel sheet piles] into the proposed Cap Area to support the bulkhead (deadman walls) in three locations."

This report did not specifically discuss modification to the RAM and the BWSC-106 transmittal form did not check the box for submittal of a Modified RAM Plan. However, in a September 2019 filing to MassDEP, PARE Corporation stated, "A second RAM status report was filed in September of 2017 which essentially announced the proposed modification of the initial RAM Plan to include the installation of steel sheet piles within three areas of the engineered cap."

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October 2017 Utility-related Abatement Measure

On October 9, 2017, Apex filed a Utility-related Abatement Measure (URAM) associated with the replacement of a combined sewer pipeline and outfall located in the southern portion of the Site. At some point, PARE Corporation took over the oversight of the URAM. According to PARE Corporation, the URAM consisted of "the existing stone CSO culvert located on the south pier was removed and replaced with a new 6-foot diameter HDPE pipe culvert and new flap gate. This work was located outside of the limits of the designated cap area. All excavated soils were replaced within the limits of the south pier. Following the backfilling of the existing soils, the soil was covered with geotextile and covered with an additional 4 plus feet of imported soil material to meet design grade elevation."

July 2019 Notice of Non-compliance

On July 12, 2019, MassDEP issued a "Notice of Noncompliance" (NON) that documented violations of MassDEP regulations. The NON requested submittal of Tier Classification Extension by August 30, 2019; a RAM Status or RAM Completion report by September 30, 2019; and a Periodic Evaluation of the Temporary Solution Statement by December 30, 2019.

August 2019 Tier Classification Extension

As requested in MassDEP's July 2019 NON, PARE Corporation submitted a "Tier II Classification Extension" on August 28, 2019. This submittal briefly summarized completed work and work remaining to be done at the Site.

September 2019 RAM Status Report

As requested in MassDEP's July 2019 NON, PARE Corporation submitted an "LSP Opinion and Release Abatement Measure Status Report" on September 27, 2019. In this report, PARE Corporation stated:

> "This RAM Status Report documents the release abatement measures activities that have happened since the last RAM Status Report was filed in September of 2017. Since that time, activities have largely been related to repairing the seawall bulkhead and the completion of the engineered cap with the exception of the final grading and paving components of the cap design. Additionally, the existing stone CSO culvert located on the south pier was removed and replaced with a new 6-foot diameter HDPE pipe culvert and new flap gate. This work was located outside of the limits of the designated cap area. All excavated soils were replaced within the limits of the south pier. Following the backfilling of the existing soils, the soil was covered with geotextile and covered with an additional 4 plus feet of imported soil material to meet design grade elevation."

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Regarding work completed between 2017 and 2019, PARE Corporation documented the following:

> "No remediation waste has been generated since Phase 1 work was completed in 2013, nor is any expected. Remedial activities during this period were limited to bulkhead repairs and placement of engineered cap materials. Soils displaced and managed as part of the Combined Sewer Outfall Replacement were managed under the Utility Related Abatement Measures Plan submitted October 2017 for an area within the south pier outside of the PCB soil management cap. A URAM Completion Report is being prepared under a separate submittal.
>
> The cap material and site fill consisted of imported densely graded granular fill, having a unit weight of 140 pounds per cubic foot, which raised the grade of the entire site by 3 to 4.5 feet. A geotextile fabric was placed over the northern portion of the site, laid over the existing soil prior to the placement of the imported dense grade material as a visual barrier to the underlying PCB impacted soils.
>
> Site utilities including water, sewer and stormwater were installed in April and May of 2019. The utility pipes and drainage structures were installed in accordance with the approved Risk-based cleanup plan. A limited amount of PCB-impacted soils was disturbed during installation of drainage features and re-used beneath the cap in accordance with the approved plan. No remediation waste was generated. The utility piping was installed within the clean capping material (i.e. above the geotextile fabric). The small amount of soil disturbed for the installation of the drainage structures was spread around the area of the structure, covered with filter fabric, and covered with at least three feet of imported fill.
>
> Materials that were used for construction of the engineered barrier consists of Mirafi geotextile (filter fabric) and imported dense graded gravel produced by Tiverton Materials. Tiverton RI. Materials were tested and approved for geotechnical properties prior to on-Site delivery. The thickness of the dense-grade materials varies from 2 to 5 feet with the majority of the cover being characterized by PARE Corporation as "greater than 4 feet as measured during placement."

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December 2019 Periodic Review of the Temporary Solution

As requested in MassDEP's July 2019 NON, PARE Corporation submitted an "LSP Opinion and Periodic Review of the Temporary Solution Statement" report on December 23, 2019. In this report, PARE Corporation summarized actions that have taken place since the Class C Response Action Outcome was filed in 2010 and that the temporary solution was still valid. In the report, PARE Corporation stated:

> "The temporary solution measures initially proposed have been largely replaced or made unnecessary as a result of recent remedial actions including selective soil removal, consolidation and placement of PCB impacted soils beneath an engineered barrier. All soils containing PCBs in excess of the MCP Upper Concentration Limit of 100 mg/kg have been removed and disposed as TSCA-regulated waste. PCB impacted soils containing > 1 mg/Kg have been either removed from the site or consolidated beneath the engineered cap. No other contaminants remain on-Site in excess of an MCP Upper Concentration Limit. The barrier as currently in place, presents a sufficient barrier to PCB impacted soils such that there is no longer a viable exposure pathway and as such there is no significant risk to site users provided the cap remains intact and functioning as designed. The cap consists of a densely graded and compacted fill materials. These actions are intended to result in a permanent solution with conditions and will be completed upon final surfacing and filing of an Activity and Use Limitation onto the property deed. In the meantime, site access will remain limited and the condition of the cover/engineered barrier will be monitored and maintained."

March 2020 RAM Status Report

On March 18, 2020, PARE Corporation submitted a "LSP Opinion and Release Abatement Measure Status Report" to MassDEP to document response actions conducted from September 2019 to March 2020. No significant work occurred during this time period, with PARE Corporation stating,

> "Recently, the Fall River Redevelopment Authority has had a change in Board members and a new City Administration. These board member changes occurred through January and March of 2020, during which time, no new activities were conducted with regards to the City Pier. The new board consists of Joseph Marshall, John Erickson, Joan Medeiros, and Luis Gonsalves. The new board members recently met with the LSP of Record with regards to the site conditions. The FRRA is currently pursuing financing to complete the surface barrier and anticipates funding and final surface barrier material selection within a year. If there are any changes in the approved barrier, the FRRA recognizes that a modification to the existing Risk-based Cleanup RAM Plan will need to be prepared and submitted to EPA and DEP for approval."

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6.0 Previous Modification to Risk-Based Cleanup Plan

On August 1, 2017, Apex submitted a "Modification to Risk-Based Cleanup Plan" to Ms. Kimberly Tisa of EPA. Apex's modification summarized the original plan and requested the following:

> "The objective of this modification is to facilitate rehabilitation of the bulkhead at the Site in accordance with Fall River City Pier, Bulkhead Rehabilitation – Phase 1. Phase 1 of the bulkhead rehabilitation involves the installation of a new steel sheet pile (SSP) bulkhead system around at the site and the placement of a 2- to 5-foot thick granular soil cap. A copy of the draft plan set is provided as an attachment to this modification.
>
> The modification specifically covers the installation of steel sheet pile (SSP) into the proposed PCB Cap Area to support the bulkhead (deadman walls) in three locations. The locations and construction details of the SSP deadman walls are shown on Sheets No. C2.0, C4.0, and C5.0. The SSP will be driven to a depth of approximately 3 feet below the current grade penetrating into PCB Contaminated Soils. No other disturbance of the soils in the proposed PCB Cap area is planned. The tie rods and wales used to secure the bulkhead to the deadman wall will be placed on the current grade, thus no excavation will be required. No PCB Contaminated Soils will be generated as a result of the installation of the SSP deadman walls.
>
> The acute downward force imposed on the thin SSP (3/8-inch thickness) during installation will slice through soils thus minimal disturbance to the PCB Contaminated Soils is anticipated. The project engineer will inspect the integrity of the PCB Contaminated Soils during installation of the SSP deadman walls. The project engineer will direct the contractor to backfill and compact around the SSP deadman walls if any voids or subsidence are observed."

In a September 21, 2017 e-mail, Ms. Tisa approved the modification and a subsequent request to stabilize a failing area of the seawall. Ms. Tisa stated:

> "Thank you for the additional information provided on the north bulkhead granite block wall. As I understand the issue, it appears that the sediments in the vicinity of the north bulkhead wall are causing the wall to become unstable. PCB-contaminated soil at up to 100 ppm is located beneath a temporary clean cap on the landward side of this bulkhead wall. The proposal is to excavate the soil directly behind the wall to relieve the stress/instability of the wall until the steel sheet pile wall can be completed, which is estimated to take approximately 1 month.

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EPA is in agreement that stabilization of the wall is critical to keep PCB-contaminated soil from being released into the River. As such, we discussed 2 options:

1. Excavation of the necessary soil behind the granite block wall to reduce the pressure with off-site disposal of the soil as a greater than or equal to 50 ppm PCB waste in accordance with the October 24, 2011 PCB Risk-Based Approval under 40 CFR § 761.61(c); or,

2. Excavation of the necessary soil behind the granite block wall to reduce the pressure with temporary stockpiling (storage) of the excavated-PCB contaminated soil until the steel sheet pile wall can be completed, and the excavated soil can be placed back into the excavation area. In this scenario, the stockpiling and marking requirements at 40 CFR § 761.65(c)(9) and §§ 761.40 and 761.45, respectively, would apply.

Please discuss and let EPA know your preference. If Option 2 is selected, EPA will need a plan showing the temporary stockpiling location(s) with details on how the stockpiling covers will be secured.

With respect to the proposed August 1, 2017 modification to the Risk-Based Plan dated July 15, 2011, given that no PCB-contaminated soil would be displaced as part of the steel wall deadman wall installation and that the supporting tie rods and steel wales will be placed above the PCB-contaminated soil, no formal EPA approval of this work is required. Please ensure that this is documented into the final report for the Phase II work, which includes installation of the final site cap."

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7.0 Modification to Risk-Based Cleanup Plan

The following sections provide detailed descriptions of the proposed modifications to the RBCP. These actions consist of changes to the grade finishes and construction of amenities at the Site to facilitate public use and a transient marina. Upon completion, and as included in the RBCP, an AUL will be implemented at the Site and recorded at the Bristol County Registry of Deeds.

7.1 Grading and Soil Management

The original design and RBCP called for paving the entire capped area after adding the necessary thickness of fill. During the summer of 2020, the current FRRA Board of Directors adopted a Master Plan for the Site which includes enhanced public use of the site, eliminating parking to create paved walkways, grassed areas, landscaped areas, boardwalks, with some limited pavement and concrete areas. As such, the current grades will need to be modified to accommodate the desired finish features. The following describes changes to the grades and the management of removed soil.

Grading

In order to direct stormwater to the drainage structures installed from 2017 through 2019, re-grading of the current Site surface is required. In some instances, up to 12 inches of material will need to be removed to achieve the needed pitch to direct 'overland flow' of stormwater to drainage structures. At all locations, the granular soil cap will be built back up with loam/vegetation or hardscape (pavement, pavers, boardwalks, or concrete) to meet the previously approved cap thicknesses (3 feet soil cover in vegetated areas or 2 feet hardscape cover). Sheet L8.0 of the attached City Pier Master Plan 10% Design Submission presents a grading plan that shows the existing and finish grades.

Soil Sampling

During construction of the soil cap, approximately 13,000 cubic yards of imported dense-graded clean granular fill for the cap material was furnished and installed on the Site by Biszko as authorized by PARE Corporation. The approved RBCP (Section 9.3.7) included the following provisions for sampling of imported materials:

> "Clean fill will be tested prior to being brought to the Site. Testing frequency will be a minimum of one sample per 500 cubic yards of material and analytical requirements will, at a minimum, consist of PCBs, SVOCs, metals, VOCs, and petroleum constituents. However, the actual analytical testing frequency and requirements may be modified depending on the source of the material."

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This sampling was not completed prior to the 13,000 cubic yards of imported dense-graded gravel being brought to the Site in 2017. To meet the intent of the RBCP, BETA collected thirteen samples from the imported dense-graded granular fill and submitted them to ESS Labs for analysis of PCBs, SVOCs, metals, VOCs, and petroleum constituents. Since the material originated at a virgin gravel pit, BETA reduced the sampling frequency to one sample per 1,000 cubic yards. Figure 3, attached, depicts the sampling locations for the imported fill.

Table 1, attached, summarizes the results of the laboratory data. As can be seen in Table 1, ESSLabs did not detect any VOCs or SVOCs above the laboratory method detection limits. ESS Labs identified concentrations of TPH, several metals, and PCBs at concentrations below the MassDEP RCS-1 reportable concentrations.

Soil Disposal

The surface grading and excavation discussed above and the installation of walkways, curbing, and shallow foundations and footings (all above the Geotextile fabric) will result in excess materials being generated. This material will consist of the imported clean granular fill previously brought to the Site by Biszko from 2017 to 2019. BETA will seek to re-use this material on-Site thru regrading of the surface; however, if this cannot be accomplished, the material will be disposed of off-Site at an appropriate acceptance facility (based on the recently generated laboratory data discussed above).

PCB Soil

At this time, it is not anticipated that excavation will occur beneath the Geotextile fabric. However, in the unlikely event such excavation arises, this work will be completed in accordance with the provision of the previously approved RBCP. Specifically:

- Work beneath the Geotextile fabric will be conducted by OSHA trained personnel under an appropriate Health and Safety Plan;
- In locations where the Geotextile fabric is either damaged or opened to allow for excavation, a new piece of Geotextile fabric will be placed over the opened area prior to backfilling. The new fabric will extend at least 2 feet in each direction onto the existing competent fabric;
- To the extent possible, soil will be returned to the location under the Geotextile fabric from where it originated;
- Soil that cannot be returned to beneath the Geotextile fabric will be disposed in a TSCA-permitted disposal facility or a Resource Conservation and Recovery Act (RCRA) hazardous waste landfill; and
- Soil from beneath the Geotextile fabric will not be stockpiled on-Site. It will be placed in lined, hazardous waste roll-offs prior to off-Site disposal.

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7.2 Grade Finishes

The following summarizes the finishes that will be applied to the deed restricted area and the southern pier. Sheet L6.1 of the attached 10% Design Submission shows the finishes for each area of the Site. For consistency in the appearance and use of the entire pier, these finishes will be applied both in and outside of the deed restricted area.

It should be noted that within the Deed Restricted Area, a geotextile was placed over the pre-existing site soils to provide a demarcation between and eliminate mixing of the imported clean and on-Site PCB-containing soils. A minimum of 22-inches of previously placed imported granular soil 'cap material' over the separation geotextile is in place.

Grassed Areas

At proposed grassed areas, approximately 6 to 8-inches of the in-situ granular material will be removed and replaced with loam. Grass (or Sod) will then be seeded in the loam material. The "Loam and Seed" detail on Sheet L9.4 of the attached 10% Design Submission shows typical proposed cross sections in the grassed areas.

Planting Areas

In order to add aesthetic topography at the Site, and potentially accommodate displaced excess granular material, several planting areas will be graded or bermed up above the current grade. These areas will be built up approximately 2 feet above the current grade. Mulch and loam will be added in these planters to support the vegetation in each. The "Granite Seat Block at Planting Bed" detail on Sheet L9.4 of the attached 10% Design Submission shows the proposed profile in the planting areas with a granite block bench as a support to the bermed area.

Pavement and Concrete

Proposed areas of asphalt pavement on the Site will consist of:

- 8-12 inches of crushed stone will be placed over the granular material; and
- A minimum of 5-inches of pavement (3-inch binder course and 2-inch finish course) will be placed over the crushed stone.

The "Bituminous Asphalt Paving" detail on Sheet L9.0 of the attached 10% Design Submission shows the proposed paving profile.

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Concrete areas at the Site will consist of:

- 8-inches of crushed stone will be placed over the granular material; and
- A minimum of 6-inches of concrete will be placed over the crushed stone.

The "Cement Concrete" and "Exposed Aggregate Concrete" details on Sheet L9.0 of the attached 10% Design Submission shows the proposed concrete profile. This sheet also depicts details of where various finishes will meet, expansion joint construction profiles, and curbing profiles.

Pavers

Proposed Areas of Concrete pavement on the Site will consist of:

- 6-8-inches of crushed stone will be placed over the granular material;
- 4-5 inches of concrete base;
- 1-inch of setting bed sand; and
- 2-3 inch concrete pavers will be placed on the bedding sand.

The "Concrete Pavers" detail on Sheet L9.0 of the attached 10% Design Submission shows the proposed pavers profile. This sheet also depicts details of where various finishes will meet, expansion joint construction profiles, and curbing profiles.

Boardwalks

Areas of on-grade wooden decking or boardwalks are proposed to be installed at the ends of the piers and in accent areas. These will consist of 2-inch boardwalk decking set on 3x8-inch nominal pressure treated sleepers set across concrete grade beams. The concrete grade beams will be set 10-foot on center. The grade beams will be approximately 8-inches thick and set on an 8-inch bed of crushed stone. The space between the grade beams below the decking will consist of crushed stone.

The "Wood Decking System @ Existing Wall" detail on Sheet L9.3 of the attached 10% Design Submission shows the proposed boardwalk profile.

Utilities

Clean utility corridors were created and drainage and water utilities were installed previously by Biszko. The implementation of the master plan and construction of the surface enhancements as described under this amendment will include trenching and placement of electrical conduits, electric handholes, electric service pedestals, irrigation main-line, laterals, sprinkler heads, waterline piping, irrigation valve boxes, as well as shallow area drains, trench drains, shallow area drains and shallow drainage piping. The work will be concentrated within the existing 36-inch granular soil cap. The "Electric Conduit" and "Irrigation Trench" details on Sheet L9.1 of the attached 10% Design Submission show proposed the utility trench profiles.

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7.3 Amenities

The following summarizes the amenities that will be installed in the deed restricted area (future AUL area) and the southern pier. For consistency, these amenities will be installed similarly in and outside of the deed restricted area.

Transient Marina

It is anticipated that the City Pier will support maritime activity in the form of recreational boating, floating interpretive and educational exhibits as well as potentially ferry or water taxi service. Provisions for providing pedestrian access to floating watercraft will be made in a future phase. It is anticipated gangway ramps will be attached to the existing concrete sheet pile cap, and will extend downward to floating docks on the water. The floating docks will be secured to driven piles. The marina floating dock system will be serviced with electricity and potable water (see below). As noted in Section 7.2 above, utilities will be extended to the edges of the piers to facilitate these future connections. Future construction of the marina will not involve excavation or penetration of the cap.

Lighting

Light standards will have a shallow footing that will be installed within the 36-inch granular material cap (above the Geotextile fabric). The footing will be precast concrete protected from frost action with an underlaid layer of rigid foam insulation set over a crushed stone base. The insulation will extend approximately 30” on all sides around the concrete footing. This will require a 10-foot by 10-foot or 12-foot by 12-foot excavation at each light location. This will result in the removal of approximately 3 cubic yards of the imported granular material at each location. The “Light Pole Footing” detail on Sheet L9.5 of the attached 10% Design Submission shows the proposed lighting foundation profile.

At each light pole, there will be a fiberglass hand hole for making the necessary electric connections. The conduits will be installed within the 36-inch soil cap. At some locations, there will also be small electric service pedestals and ground mounted transformers to support the electrical needs of the Site.

Pedestrian Railings

Railings will be installed around the entire perimeter of the pier. The railings and supports will be bolted to the concrete cap structure on top of the recently installed seawalls. No penetrations into the cap or beneath it will be required for the installation of the railings.

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Benches

Outdoor seating will be made up of various types of materials, likely granite, wood and metal. Seating will be in various locations across the site, and will either be bolted to concrete slabs or set into the grade at a shallow depth. The "Granite Seat Block at Planting Bed" detail on Sheet L9.4 of the attached 10% Design Submission shows the proposed "on-grade" benches. The "Bench" detail on Sheet L9.4 of the attached 10% Design Submission shows the proposed "on-concrete" benches.

Shade Structures

Shade Structures are proposed to be installed at the ends of the piers and in accent locations and will consist of steel posts with baseplates bolted to shallow concrete foundations. An all-weather UV stable fabric will be stretched between the posts to provide shade. The entire assembly will be set on a shallow concrete foundation set on a layer of rigid foam insulation over approximately 12 inches of crushed stone base. The base will be under-drained to the nearest drainage structure to prevent the build-up of water and potential frost heaving of the foundation. The "Shade Structure" detail on Sheet L9.2 of the attached 10% Design Submission shows the proposed profile of the shade structure footings.

Signage

Signage support posts will have baseplates bolted to concrete slabs, granite blocks or will have shallow concrete foundation to allow them to be positioned within the 36" clean granular material cap.

Bollards

Bollards may include both protective and illuminated styles. Both will utilize a shallow concrete footing or will be surface mounted to concrete. under both conditions to allow them to be positioned within the 36" granular soil cap.

Temporary Amenities

Temporary amenities at the Site may consist of portable Connex boxes configured to provide special event support, ADA compliant restrooms, and/or food and beverage concessions. These will be positioned to support events and will have temporary connections to the utilities that are already in place. Specialized handholes and service pedestals will be provided to facilitate access for connecting utilities.

Other temporary amenities may include public artwork, sculptures, or exhibits; trash receptacles; sanitizing stations, ash urns; scenic viewing stations; temporary exhibits, and interpretive graphic panels.
Mounting will be by utilizing baseplates and anchor bolts and affixing the element to the concrete seawall cap, shallow concrete footings, thickened concrete slabs,

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granite blocks or walkways. No penetrations into the granular material cap are anticipated for these temporary amenities.

Permanent Structures

The 2011 RBC Plan including construction of a marina building. The plans for the Site no longer include any permanent structures.

7.4 Imported Material Testing

As included in the original RBCP, clean fill including common borrow, loam, gravel, paver sand, and crushed stone will be tested prior to being brought to the Site. Testing frequency will be a minimum of one sample per 500 cubic yards of material and analytical requirements will, at a minimum, consist of PCBs, SVOCs, metals, VOCs, and petroleum constituents. However, the actual analytical testing frequency and requirements may be modified depending on the source of the material.

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8.0 Summary and Conclusions

Historic and recent investigations at the Site have delineated the nature and extent of PCB-impacted soils at the Site. BETA has designed this Risk-Based Cleanup Plan Amendment to facilitate surface finishes and Site amenities and allow for the filing of a Permanent Solution with Conditions under the Massachusetts Contingency Plan. The majority of the response actions included in the original RBCP have been completed. This RBCP Amendment is requesting modifications to the original RBCP consisting of changes to the finish features and installation of amenities at the Site. Submittal of this amendment constitutes a formal request to modify the previously approved risk-based cleanup under TSCA.

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Tables

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Table 1
Imported Fill Material Analytical Results
City Pier
Fall River, Massachusetts

Sample Designation	**C-1**	**C-2**	**C-3**	**C-4**	**C-5**	**C-6**	**C-7**	**C-8**	**C-9**	**C-10**	**C-11**	**C-12**	**C-13**	**MassDEP**
Sample Date	**09/24/2020**	**09/24/2020**	**09/24/2020**	**09/24/2020**	**09/24/2020**	**09/24/2020**	**09/24/2020**	**09/24/2020**	**09/24/2020**	**09/24/2020**	**09/24/2020**	**09/24/2020**	**09/24/2020**	**RCS-1**
Volatile Organic Compounds (VOCs), milligrams per kilogram (mg/kg)														
Total VOCs	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Semi-Volatile Organic Compounds (SVOCs), mg/kg														
Total SVOCs	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Total Petroleum Hydrocarbons, mg/kg														
Total Petroleum Hydrocarbons	10.5 U	9.7 U	10.7 U	9.8 U	10.8 U	10.5 U	**19.2**	9.8 U	10.4 U	9.9 U	10.7 U	10.2 U	10.1 U	1,000
Total Metals, mg/kg														
Arsenic	4.92 U	4.11 U	6.18 U	4.37 U	4.24 U	4.32 U	**3.58**	**2.4**	**2.7**	**2.09**	4.24 U	4.57 U	4.86 U	20
Barium	**8.49**	**8.42**	**9.18**	**7.77**	**34.2**	**8.96**	**14.9**	**6.13**	**6.17**	**5.71**	**10.8**	**5.61**	**5.48**	1,000
Cadmium	0.98 U	0.82 U	1.24 U	0.87 U	0.85 U	0.86 U	0.47 U	0.47 U	0.46 U	0.39 U	0.85 U	0.91 U	0.97 U	70
Chromium	1.97 U	1.64 U	2.47 U	**2.13**	1.7 U	1.73 U	**2.03**	**1.33**	0.91 U	**0.8**	1.7 U	1.83 U	1.94 U	100
Lead	9.84 U	8.22 U	12.4 U	8.74 U	**10.2**	8.64 U	**17.2**	**5.15**	**6.3**	3.95 U	8.49 U	9.13 U	9.71 U	200
Mercury	0.033 U	0.029 U	0.028 U	0.026 U	0.033 U	0.026 U	0.073	0.026 U	0.028 U	0.025 U	0.028 U	0.028 U	0.031 U	20
Selenium	9.84 U	8.22 U	12.4 U	8.74 U	8.48 U	8.64 U	4.68 U	4.69 U	4.56 U	3.95 U	8.49 U	9.13 U	9.71 U	400
Silver	0.98 U	0.82 U	1.24 U	0.87 U	0.85 U	0.86 U	0.47 U	0.47 U	0.46 U	0.79 U	0.85 U	0.91 U	0.97 U	100
Polychlorinated Bipheyls (PCBs), mg/kg														
Aroclor 1248	0.05 U	0.05 U	0.05 U	0.05 U	**0.2**	0.05 U	**0.4**	**0.2**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	1
Total PCBs	ND	ND	ND	ND	**0.2**	ND	**0.4**	**0.2**	ND	ND	ND	ND	ND	1

Notes
BOLD - compound detected
U - Not detected above listed detection limit.

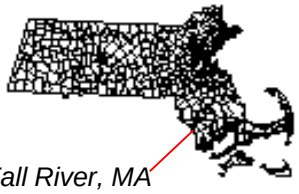
CONFORMED

Figures

CONFORMED

Figure 1

600 Davol Street
Fall River, MA



N
W E
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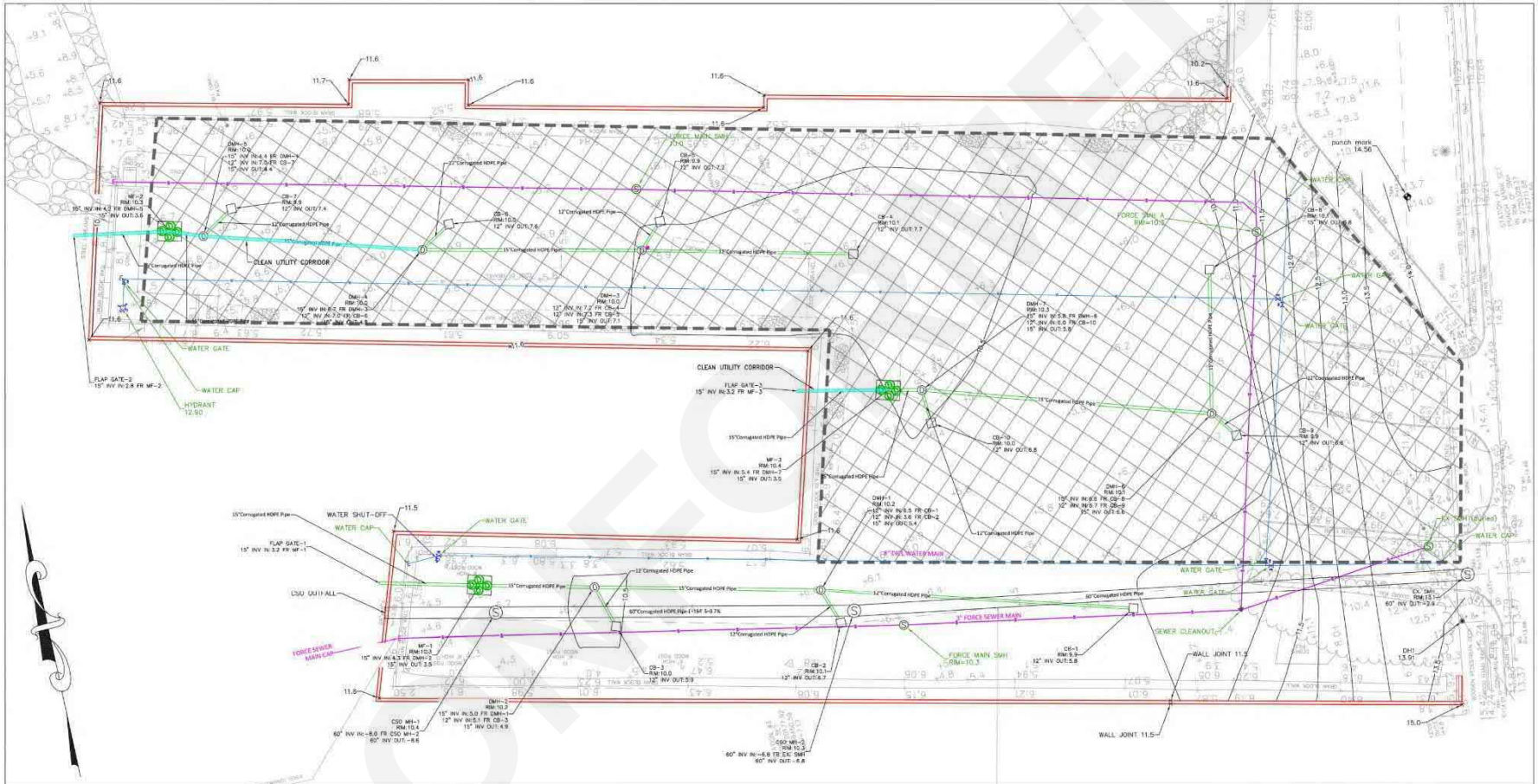
BETA Group, Inc.
Engineers • Scientists • Planners

FALL RIVER CITY PIER Fall River Redevelopment Authority



Legend

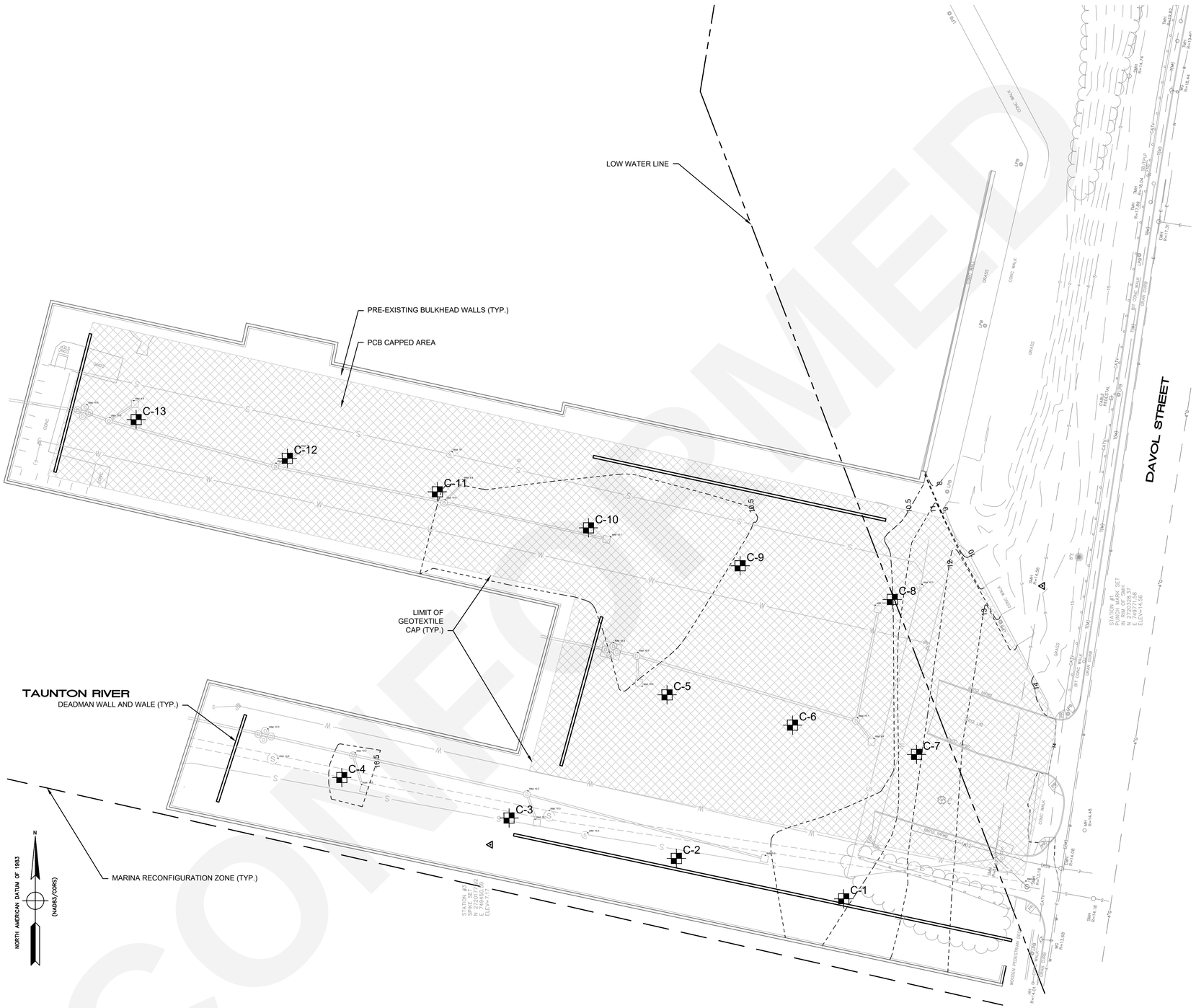
x 10.5 Final As-Built spot survey points, grade in feet above mean sea level (NGVD 1929), as surveyed by Gorodetsky Engineering 6/2019.

+ 5.6 Pre-Cap placement grade in feet above mean sea level (NGVD 1929). Spot survey points as surveyed by Surveying and Mapping Consultants 8/31/2010.

Zones identified with the hatched area denote limits of PCB Capped area. Soils outside this area have PCBs < 1ppm. Utilities are located within clean overburden.

FALL RIVER CITY PIER
BULKHEAD REHABILITATION - PHASE II
DAVOL STREET
FALL RIVER, MASSACHUSETTS

AS-BUILT SITE PLAN AND PCB LIMITS



COMPLETED

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER

Fall River, MA

TITLE

IMPORTED FILL MATERIAL SAMPLE LOCATIONS

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	
ISSUE DATE: OCTOBER 2020	
BETA JOB NO.: 7171	

SCALE

HOR. SCALE IN FEET: 1"=30'

30 0 30 60

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

FIGURE 3

10/26/2020 9:16 AM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER. MA\DRAWING FILES\CONCEPT-ALT\LA EXISTING CONDITIONS.DWG (----)

Appendix A

10% Design Submission Plan Set

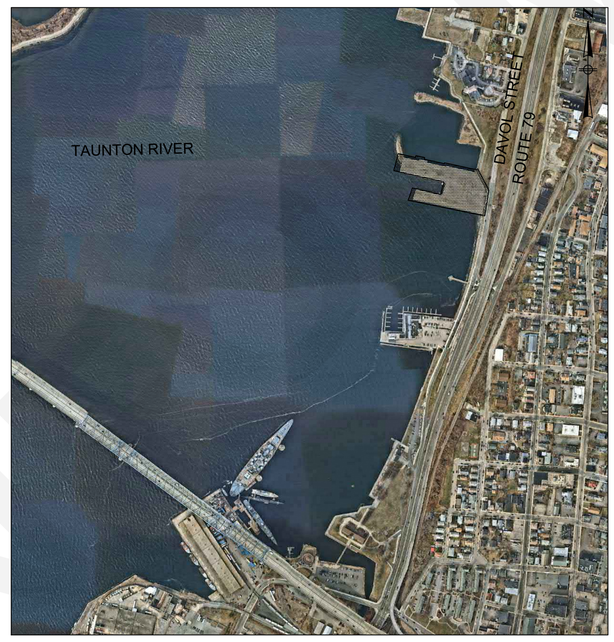
CONFORMED

CITY OF FALL RIVER, MA
CITY PIER

10% DESIGN SUBMISSION
November 4, 2020

OWNER:
FALL RIVER REDEVELOPMENT AUTHORITY
CITY OF FALL RIVER
ONE GOVERNMENT CENTER, ROOM 610
FALL RIVER, MA. 02722
508.324.2662

PROJECT ADDRESS
FALL RIVER CITY PIER
600 DAVOL STREET
FALL RIVER, MASSACHUSETTS



PROJECT LOCATION

LOCATION MAP
1" = 500' - 0"

PREPARED BY:

BETA
IMPROVING COMMUNITIES TOGETHER

ISSUE DATE: November 4, 2020

PLAN INDEX

SHEET NO.	DESCRIPTION
COVER	L1.0
GENERAL NOTES	L2.0
LEGEND & ABBREVIATIONS	L3.0
PRE-EXISTING CONDITIONS	L4.0
EXISTING CONDITIONS	L5.0
LAYOUT	L6.0
MATERIALS PLAN	L6.1
ENLARGEMENT- 1	L7.0
ENLARGEMENT- 2	L7.1
GRADING PLAN	L8.0
DETAILS - 1	L9.0
DETAILS - 2	L9.1
DETAILS - 3	L9.2
DETAILS - 4	L9.3
DETAILS - 5	L9.4
DETAILS - 6	L9.5
SECTIONS - 1	L10.0
SECTIONS - 2	L10.1
SECTIONS - 3	L10.2
SECTIONS - 4	L10.3
SECTIONS - 5	L10.4
SECTIONS - 6	L10.5
SECTIONS - 7	L10.6
UTILITIES	L11.0
IRRIGATION	L11.1
PLANTING	L12.0

PRELIMINARY
NOT FOR
CONSTRUCTION

REGISTERED PROFESSIONAL _____ DATE _____

CONFIRMED

GENERAL NOTES:

1. ANY DAMAGE TO EXISTING PAVEMENT, BRIDGES, CONDUIT, SIDEWALK, FENCES, ETC., CAUSED BY THE CONTRACTOR SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO OWNER.
2. THE CONTRACTOR SHALL PLACE ALL EQUIPMENT AND MATERIAL AS FAR AWAY AS POSSIBLE FROM STREETS AND SIDEWALKS SO AS NOT TO CAUSE A SAFETY HAZARD.
3. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE EXISTING CONDITIONS ARE NOT OBLITERATED BEFORE CONTROL POINTS ARE LOCATED AND CONSTRUCTION LAYOUT IS ESTABLISHED. THE CONSTRUCTION LAYOUT SHALL BE PROVIDED IN SUFFICIENT DETAIL, THEREBY ENABLING HIM TO CONSTRUCT THE PROJECT IN CONFORMITY WITH THE PLANS AND SPECIFICATIONS. SURVEY WILL BE PROVIDED BY THE CONTRACTOR. THE OWNER'S REPRESENTATIVE WILL NOT AUTHORIZE CONSTRUCTION ACTIVITIES TO BEGIN UNTIL HE IS SATISFIED THAT ALL GROUND CONTROL HAS BEEN ESTABLISHED, TIED DOWN, AND DULY RECORDED IN STANDARD FIELD BOOKS.
4. THE FREQUENCY AND APPLICATION RATES FOR THE DUST CONTROL ITEMS WILL BE AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
5. ALL SIDEWALK AND DRIVEWAYS DESIGNATED FOR SHALL BE CUT AND MATCHED AT LOCATIONS SHOWN ON THE PLANS OR AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
6. ASPHALT EMULSION TACK COAT SHALL BE PLACED PRIOR TO PAVEMENT PLACEMENT ON THE CONCRETE BASE OR COLD PLANED PAVEMENT, AND ON ANY NEW COURSE WHICH HAS BEEN OPEN TO TRAFFIC, OR ANY NEW COURSE WHICH HAS BEEN EXPOSED FOR MORE THAN 3 DAYS, AND/OR AS DIRECTED BY THE OWNER'S REPRESENTATIVE. IT SHALL ALSO BE APPLIED TO VERTICAL PAVEMENT FACES BETWEEN ADJOINING PAVEMENT SECTIONS. ALL APPLICATIONS ON BOTH HORIZONTAL AND VERTICAL SURFACES.
7. THE LIMITS OF SURFACE DISTURBANCE MUST BE STRICTLY ADHERED TO IN ALL AREAS. IN ADDITION TO THOSE AREAS SPECIFICALLY DESIGNATED ON THE PLANS, THE CONTRACTOR WILL BE RESPONSIBLE FOR PROVIDING AND PLACING, AT HIS OWN EXPENSE, PLANTABLE SOIL AND SEED IN AREAS WHICH ARE OUTSIDE OF THE PROJECT'S AREAS OF DISTURBANCE AND WHICH ARE IMPACTED BY CONSTRUCTION OPERATIONS INCLUDING THOSE AREAS WHERE VEHICLES, EQUIPMENT AND MATERIALS ARE STORED WITH THE PERMISSION OF THE OWNER'S REPRESENTATIVE.
8. CLEANING AND SWEEPING OF PAVEMENT WILL INCLUDE REMOVAL OF ALL PAVEMENT DEBRIS PRIOR TO THE PLACEMENT OF EACH BITUMINOUS PAVEMENT LIFT. ALL CLEANING AND SWEEPING SHALL BE DONE TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE.
9. PRIOR TO INSTALLATION, ALL SIGNS, MOUNTINGS AND LOCATIONS SHALL BE APPROVED OR MODIFIED BY THE OWNER'S REPRESENTATIVE.
10. PAVEMENT OPERATIONS FOR CURBED SECTIONS: IN AREAS WHERE CURBING IS SET TO FINISH LINE AND GRADE, THE CONTRACTOR WILL BE ALLOWED TO MANUALLY ADJUST THE BITUMINOUS SURFACE TO ESTABLISH POSITIVE PITCH.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL ROADWAYS FREE OF DEBRIS RESULTING FROM THEIR CONSTRUCTION OPERATIONS. ALL DEBRIS SHALL BE REMOVED TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE AT NO ADDITIONAL COST TO THE OWNER.
12. NO FUEL STORAGE, VEHICLE REFUELING, OR EQUIPMENT STORAGE SHALL TAKE PLACE NOR WITHIN 100' OF ANY WATER BODY. THIS REQUIREMENT SHALL NOT SUPERSEDE ANY FEDERAL, STATE OR LOCAL LAW, ORDINANCE, RULE OR REGULATION THAT APPLIES TO THE SAME, UNLESS THIS REQUIREMENT IS MORE STRINGENT THAN SAID LAW, ORDINANCE, RULE OR REGULATION.
13. THE CONTRACTOR SHALL BE RESPONSIBLE TO ENSURE THAT AT THE END OF FINAL PAVING OPERATIONS, STORM WATER FLOW TO EXISTING DRAINAGE STRUCTURES HAS BEEN REESTABLISHED AND THAT NO ISOLATED DEPRESSIONS REMAIN.
14. ALL EMBANKMENTS SHALL BE PLACED IN HORIZONTAL LAYERS NOT EXCEEDING 12" (AFTER COMPACTION) AND SHALL BE COMPACTED AS SPECIFIED BEFORE THE NEXT LAYER IS PLACED.
15. THE CONTRACTOR SHALL READ, BECOME FAMILIAR WITH, AND ADHERE TO ALL OF THE PROVISIONS, CONDITIONS, AND STIPULATIONS STATED IN THE ENVIRONMENTAL APPROVALS ISSUED FOR THE PROJECT FROM THE ALL COSTS ASSOCIATED WITH THESE CONDITIONS SHALL BE CONSIDERED INCIDENTAL TO THE CONSTRUCTION AND INCLUDED WITH THE COST FOR THE ASSOCIATED BID.
16. THE CONTRACTOR SHALL READ, BECOME FAMILIAR WITH, AND ADHERE TO ALL OF THE CONSTRUCTION RELATED PROVISIONS, CONDITIONS, AND STIPULATIONS OF ANY REMEDIAL PLANS DEVELOPED FOR THE PROJECT. COPIES OF THESE DOCUMENTS ARE INCLUDED IN THE CS PAGES OF THE CONTRACT DOCUMENTS. ALL COSTS ASSOCIATED WITH COMPLIANCE WITH THESE DOCUMENTS SHALL BE CONSIDERED INCIDENTAL TO THE CONSTRUCTION AND INCLUDED WITH THE COST FOR THE ASSOCIATED BID.

DRAINAGE AND EROSION CONTROL NOTES:

1. PROJECTS WITH AT LEAST ONE(1) ACRE OF SOIL DISTURBANCE ARE REQUIRED TO DEVELOP AND ENFORCE A SITE SPECIFIC STORM WATER POLLUTION PREVENTION PLAN (SWPPP) IN ORDER TO REMAIN IN COMPLIANCE WITH THE MASSACHUSETTS DEP FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL READ, BECOME FAMILIAR WITH, AND ADHERE TO ALL OF THE PROVISIONS, CONDITIONS, AND STIPULATIONS OF THE GENERAL PERMIT AND THE SITE SPECIFIC SWPPP FOR THIS PROJECT. ALL COSTS ASSOCIATED WITH ADHERENCE TO THE SWPPP SHALL BE CONSIDERED INCIDENTAL TO THE CONSTRUCTION AND INCLUDED WITH THE COST FOR THE ASSOCIATED BID.
2. ALL DISTURBED SOILS EXPOSED PRIOR TO OCTOBER 15 OF ANY CALENDAR YEAR SHALL BE SEEDED OR PROTECTED BY THAT DATE. ANY SUCH AREAS THAT DO NOT HAVE ADEQUATE VEGETATIVE STABILIZATION, AS DETERMINED BY THE OWNER'S REPRESENTATIVE, BY NOVEMBER 15 OF ANY CALENDAR YEAR, MUST BE STABILIZED THROUGH THE USE OF EROSION CONTROL MATTING OR HAY MULCH, IN ACCORDANCE WITH MASSACHUSETTS DEP SPECIFICATIONS. IF WORK CONTINUES WITHIN ANY OF THESE AREAS DURING THE PERIOD FROM OCTOBER 15 THROUGH APRIL 15, CARE MUST BE TAKEN TO ENSURE THAT ONLY THE AREA REQUIRED FOR THAT DAY'S WORK IS EXPOSED, AND ALL ERODIBLE SOIL MUST BE RESTABILIZED WITHIN 5 WORKING DAYS. ANY WORK TO CORRECT PROBLEMS RESULTING FROM FAILURE TO COMPLY WITH THIS PROVISION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THERE WILL BE NO SEPARATE PAYMENT FOR THIS PROVISION, IT SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION OPERATIONS. STABILIZATION OF ONE FORM OR ANOTHER AS DESCRIBED ABOVE SHALL BE ACHIEVED WITHIN 2 WEEKS OF FINAL GRADING.
3. STOCKPILES OF MATERIAL SHALL NOT BE LOCATED WITHIN REGULATED WETLANDS OR BUFFER ZONE AREAS. THEY SHALL HAVE SIDE SLOPES NO GREATER THAN 30% AND STOCKPILES OF ERODABLE MATERIAL SHALL ALSO BE SEEDED AND RINGED EROSION CONTROL.
4. IF THE PLANS INCLUDE SPECIFIC AREAS FOR PLACEMENT OF CONSTRUCTION EQUIPMENT AND MATERIALS STORAGE AND STOCKPILING, AND IF THE CONTRACTOR ELECTS TO UTILIZE ANY OTHER AREAS FOR THESE PURPOSES, THIS SHALL BE APPROVED BY THE OWNER'S REPRESENTATIVE ONLY AFTER OBTAINING ANY NECESSARY PERMITS AND/OR PERMIT MODIFICATIONS FROM THE APPROPRIATE REGULATORY AUTHORITY(IES). ANY PERMITTING REQUIREMENTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE ACCOMPLISHED AT NO COST TO THE OWNER.
5. JUTE MESH SHALL BE USED TO STABILIZE PLANTABLE SOIL AND/OR LOAM IN ALL DITCHES, ON ALL SLOPES ADJACENT TO WETLANDS AND WETLAND PERIMETERS, AND ON ALL SLOPES WITHIN WATER QUALITY BASINS. JUTE MESH IN DITCHES SHALL EXTEND TO AN ELEVATION 2 FEET ABOVE THE BOTTOM OF THE DITCH.
6. UNVEGETATED AREAS SHALL NOT BE UNATTENDED OR EXPOSED FOR PERIODS IN EXCESS OF 2 WEEKS OR THROUGH THE INACTIVE WINTER SEASON.
7. PRIOR TO DRAINAGE AND UTILITY CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION (HORIZONTAL AND VERTICAL) OF ALL EXISTING PIPES AND/OR STRUCTURES WHICH ARE TO BE CONNECTED. ANY VARIATION FOUND FROM THE PLANS MUST BE BROUGHT TO THE ENGINEER'S ATTENTION PRIOR TO DRAINAGE AND UTILITY CONSTRUCTION. WORK CAN COMMENCE ONLY UPON THE OWNER'S REPRESENTATIVE AUTHORIZATION.
8. DURING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING DRAINAGE AND RUNOFF FLOW DURING STORMS AND PERIODS OF RAINFALL THROUGHOUT THE WORK AREA.
9. CATCH BASIN RIM GRADES NOTED ON PLANS ARE DEPRESSED 0.1' LOWER THAN THE GUTTER GRADE. RIM ELEVATIONS SHOWN ARE FINAL GRADES. THE CONTRACTOR SHALL PLACE FRAMES AND GRATES 0.1' BELOW THE GRADE CONSTRUCTED IN THIS CONTRACT OR AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
10. SILT SACK INLET PROTECTION SHALL BE INSTALLED AT ALL CATCH BASINS AND INLETS WHENEVER SUBBASE IS EXPOSED, AND SHALL REMAIN IN PLACE UNTIL THE ABUTTING GROUND SURFACES ARE STABILIZED.
11. ALL INLET PROTECTION USED AT CATCH BASINS, THEY SHALL BE REMOVED AT THE END OF THE PROJECT OR AS DIRECTED BY THE OWNER'S REPRESENTATIVE IN ORDER TO PREVENT CLOGGING OF THE INLET.

DRAINAGE AND EROSION CONTROL NOTES (CONTINUED):

14. THE TOE OF ANY FILL SLOPE IS TO REMAIN AT LEAST 1' INSIDE OF ALL EROSION CONTROLS. UNDER NO CIRCUMSTANCES SHALL THE CONTRACTOR COVER ANY PORTION OF THE EROSION CONTROL MEASURES WITH MATERIAL. ANY MATERIAL THAT IS PLACED ON ANY EROSION CONTROLS BY THE CONTRACTOR, OR ANY AGENT OF THE CONTRACTOR, SHALL BE IMMEDIATELY REMOVED BY THE CONTRACTOR, AND ANY NECESSARY REPAIRS TO THE EROSION CONTROLS ACCOMPLISHED.
15. PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES, EROSION AND SEDIMENTATION CONTROLS SHALL BE INSTALLED AT THOSE AREAS INDICATED ON THE PLANS. CLEARING MAY OCCUR PRIOR TO INSTALLATION OF SUCH CONTROLS, HOWEVER NO GRUBBING, GRADING, FILLING, OR OTHER SOIL DISTURBANCE SHALL OCCUR PRIOR TO INSTALLATION. THE LIMITS OF CLEARING AND SURFACE DISTURBANCE MUST BE STRICTLY ADHERED TO IN ALL AREAS.
16. ALL EROSION CONTROL MEASURES OR TEMPORARY PROTECTION SHALL REMAIN IN PLACE UNTIL AN ACCEPTABLE STAND OF GRASS IS ESTABLISHED. IF NEEDED, TEMPORARY SEEDING SHALL BE USED TO MINIMIZE EROSION.
17. THE CONTRACTOR MUST REPAIR AND/OR RESEED ANY AREAS THAT DO NOT DEVELOP WITHIN THE PERIOD OF ONE YEAR AND HE SHALL DO SO AT NO ADDITIONAL EXPENSE TO THE OWNER.
18. THE NORMAL ACCEPTABLE SEASONAL SEEDING DATES ARE CONTAINED IN THE SPECIFICATIONS.
19. UNDER SEVERE WEATHER EVENTS ADDITIONAL EROSION CONTROLS MAYBE REQUIRED AND SHALL BE INSTALLED AS DIRECTED BY THE OWNER'S REPRESENTATIVE.

UTILITY NOTES:

1. EXISTING UTILITIES HAVE BEEN SHOWN ON THE PLANS USING THE BEST AVAILABLE INFORMATION AND ARE APPROXIMATE. BUILDING SERVICE CONNECTIONS (ELECTRIC, GAS, TELEPHONE, WATER AND SANITARY) ARE NOT SHOWN. CONTRACTOR IS TO ASSUME SERVICES ARE PRESENT AND ACTIVE IN ALL ADJACENT BUILDINGS.
2. THE CONTRACTOR SHALL VERIFY THE LOCATIONS OF ALL EXISTING DRAINAGE AND UTILITIES BOTH UNDERGROUND AND OVERHEAD BEFORE EXCAVATION BEGINS. THE CONTRACTOR SHOULD UNDERSTAND THAT NOT ALL UTILITIES SUBSCRIBE TO THE DIG SAFE PROGRAM. IT IS THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY ALL UTILITY COMPANIES AND ENSURE THAT ALL UTILITIES HAVE BEEN MARKED PRIOR TO COMMENCING THEIR WORK. ANY DAMAGE TO EXISTING UTILITIES MARKED IN THE FIELD, OR AS A RESULT OF FAILING TO CONTACT THE APPROPRIATE UTILITY COMPANY, SHALL BE REPAIRED OR REPLACED AT NO ADDITIONAL COST TO THE OWNER.
3. ALL EXISTING UTILITIES TO BE ABANDONED SHALL BE CAPPED.
4. IF INTERRUPTED ALL EXISTING WATER SERVICES SHALL BE RECONNECTED TO THE NEW WATER MAINS.
5. UTILITY SERVICE CONNECTIONS SHALL BE MAINTAINED TO ALL EXISTING FACILITIES TO REMAIN.
6. ALL NEW WATER LINES SHALL BE DISINFECTED TO THE SATISFACTION OF THE WATER AUTHORITY IN ACCORDANCE WITH THE SPECIFICATIONS.
7. ALL UTILITY RELATED WORK SHALL BE BY OTHERS.

SITE IMPROVEMENT NOTES

1. ALL SURFACES SHALL BE CONSTRUCTED WITH POSITIVE DRAINAGE.
2. INSTALL UNDER DRAINS FOR SITE IMPROVEMENTS AS SHOWN.
3. TIE UNDER DRAINS IN TO NEAREST EXISTING CATCH BASINS.
4. PROVIDE SUPPLEMENTAL TRENCH OR AREA DRAINS AS NEEDED.
5. EXCAVATE, STOCKPILE, AND REUSE EXISTING GRANULAR SOIL CAP.
6. CREATE EARTHWORK BERMS AS DIRECTED BY THE OWNER'S REPRESENTATIVE TO MAKE THE RE-USE OF GRANULAR CAP SOIL ON SITE.

CONFORMED

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER

Fall River, MA

TITLE

GENERAL NOTES

PRELIMINARY

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	Initials
ISSUE DATE:	00/00/15
BETA JOB NO.:	0000-000

SCALE

HOR. SCALE IN FEET: 1"=30'

30 0 30 60

NONE

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

Not for Construction

SHEET NO.

L2.0

11/4/2020 8:55 AM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\7171 - GENERAL NOTES.DWG (BETA STB BW.STB)

LEGEND

GENERAL SYMBOLS

EXISTING	PROPOSED	
		CURB OR BERM (TYPE AS NOTED)
		EDGE OF PAVEMENT
CB	CB	CATCH BASIN (OR GUTTER INLET, LEACHING BASIN, DROP INLET, CATCH BASIN CURB INLET)
EHH	EHH	ELECTRIC HANDHOLE (NUMBER AS NOTED)
E	EMH	ELECTRIC MANHOLE
T	TMH	TELEPHONE MANHOLE
W	WMH	WATER MANHOLE
S	SMH	SEWER MANHOLE
D	DMH	DRAINAGE MANHOLE
GG	GG	GAS GATE
WG	WG	WATER GATE
CS	CS	CURB STOP
HYD.	HYD	HYDRANT
FA	FAB	FIRE ALARM BOX
PM	PM	PARKING METER
LP		STREET LIGHT POLE
UP	UP	UTILITY POLE
UPL	UPL	UTILITY POLE w/ LIGHT
		SIGN
GUY	GUY	GUY POLE
12" RCP D	10'-12" RCP	DRAIN PIPE (SIZE AS NOTED)
8" VCP S	10'-8" PVC	SEWER MAIN (SIZE AS NOTED)
	10'-8" PVC	ELECTRIC DUCT
4" HP G	10'-4" HP	GAS MAIN (SIZE AS NOTED)
8" CI W	10'-8" DI	WATER MAIN (SIZE AS NOTED)
T	10'-8" PVC	TELEPHONE DUCT (SIZE AS NOTED)
	OHW	OVERHEAD WIRE
MB	MB	MAIL BOX
		WOOD GUARD RAIL STEEL BEAM GUARD, WOOD OR STEEL POSTS (TYPE AS NOTED)
		STEEL GUARD RAIL, STEEL POSTS (TYPE NOTED)
		STONE WALL
		RETAINING WALL (TYPE NOTED)
BND	BND	HIGHWAY/PROPERTY BOUND (TYPE AS NOTED)
SHLO (Date of Layout)		STATE HIGHWAY LAYOUT LINE (SHLO)
		CITY, TOWN OR COUNTY LAYOUT LINE (R.O.W.)
Boundary Name		CITY, TOWN, COUNTY OR STATE BOUNDARY LINE
℄		PROPERTY LINE
		EASEMENT LINE (TYPE NOTED)
	2+00	CONSTRUCTION BASELINE
N00°00'00"E 000.00'		SURVEY LINE
		RAILROAD OR STREET RAILWAY TRACKS WITH SIDELINES
		WHEELCHAIR RAMP
24" PINE		TREE (SIZE AND TYPE AS NOTED)
		HEDGE/SHRUBS
WF-1		FENCE (SIZE AND TYPE AS NOTED)
		EDGE OF WETLAND W/ FLAGGED NUMBER
		EDGE OF RIVER/STREAM LINE
		100-FT. WETLAND BUFFER LIMIT
		100-FT. RIVER FRONT LIMIT
		200-FT. RIVER FRONT LIMIT
		WOODED AREA / LIMIT OF CLEARING
× 00.0	x 00.00	SPOT GRADE
		SAW CUT LINE
	TP-1	TEST PIT
	B-1	BORING LOCATION
		EROSION CONTROL BARRIER/COMPOST FILTER TUBES

ABBREVIATIONS

GENERAL

ABAN.	ABANDON
ADJ.	ADJUST
ALT.	ALTERATION
APPROX.	APPROXIMATE
℄	BASELINE
B.B.	BITUMINOUS BERM
B.C.	BITUMINOUS CURB
BD OR BND	BOUND
BLDG.	BUILDING
B.O.	BY OTHERS
BOS	BOTTOM OF SLOPE
BOW	BOTTOM OF WALL
BSW	BACK OF SIDEWALK
C.C.	CONCRETE CURB
CEM.	CEMENT
CLF	CHAIN LINK FENCE
CONC.	CONCRETE
CONST.	CONSTRUCTION
CONT.	CONTINUOUS
DWY	DRIVEWAY
E.P., EOP	EDGE OF PAVEMENT
EL.	ELEVATION
ESMT.	EASEMENT
EXIST.	EXISTING
FDN.	FOUNDATION
GRAN.	GRANITE
GC	GRANITE CURB
HOR.	HORIZONTAL
IP	IRON PIPE
JCT	JUNCTION
LOW	LIMIT OF WORK
LP	LOW POINT
MB	MAIL BOX
MHB	MASSACHUSETTS HIGHWAY BOUND
O.C.	ON CENTER
PCC	POINT OF COMPOUND CURVATURE
PC	POINT OF CURVATURE
PRC	POINT OF REVERSE CURVATURE
PI	POINT OF INTERSECTION
PT	POINT OF TANGENCY
PVC	POINT OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
PERM.	PERMANENT
PGL	PROFILE GRADE LINE
PROP.	PROPOSED
PVC	POINT OF VERTICAL CURVATURE
PVMT.	PAVEMENT
R	RADIUS OF CURVATURE
R&D	REMOVE AND DISCARD
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
REM.	REMOVE
REMOD.	REMODEL
RET.	RETAIN
RR	RAILROAD
RT.	RIGHT
SB	SOUTH BOUND OR STONE BOUND
SDWK.	SIDEWALK
SHT.	SHEET
SHLD.	SHOULDER
STA.	STATION
TEMP.	TEMPORARY
TOS	TOP OF SLOPE
TOW	TOP OF WALL
TYP.	TYPICAL
VAR.	VARIABLE
VERT.	VERTICAL
VGC	VERTICAL GRANITE CURB
WCR	WHEELCHAIR RAMP

TRAFFIC SIGNAL SYSTEMS

R	STEADY CIRCULAR RED
Y	STEADY CIRCULAR AMBER
G	STEADY CIRCULAR GREEN
FR	FLASHING CIRCULAR RED
FY	FLASHING CIRCULAR AMBER
←FY	FLASHING YELLOW LEFT ARROW
R→	STEADY RED RIGHT ARROW
Y→	STEADY AMBER RIGHT ARROW
G→	STEADY GREEN RIGHT ARROW
←R	STEADY RED LEFT ARROW
←Y	STEADY AMBER LEFT ARROW
←G	STEADY GREEN LEFT ARROW
W	STEADY WALK (PERSON WALKING) - LUNAR WHITE
DW	STEADY DON'T WALK (HAND) - PORTLAND ORANGE
FDW	FLASHING DON'T WALK (FLASHING HAND) - PORTLAND ORANGE

UTILITIES

ACCMP	ASPHALT COATED CORRUGATED METAL PIPE
CAP	CORRUGATED ALUMINUM PIPE
CB	CATCH BASIN
CBCI	CATCH BASIN WITH CURB INLET
CI	CURB INLET
CIP	CAST IRON PIPE
CIT	CHANGE IN TYPE
CMP	CORRUGATED METAL PIPE
C	CONDUIT
CPP	CORRUGATED PLASTIC PIPE
CSP	CORRUGATED STEEL PIPE
DI	DROP INLET
DIP	DUCTILE IRON PIPE
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FM	FORCE MAIN
GI	GUTTER INLET
GIP	GALVANIZED IRON PIPE
GG	GAS GATE
HDW	HEADWALL
HYD.	HYDRANT
INV.	INVERT ELEVATION
LP	LIGHT POLE
MH	MANHOLE
PVC	POLY-VINYL-CHLORIDE PIPE
PWW	PAVED WATER WAY
RCP	REINFORCED CONCRETE PIPE (CLASS III UNLESS NOTED)
SD	SUBDRAIN
SMH	SEWER MANHOLE
TS	TRAFFIC SIGNAL
TSV&B	TAPPING SLEEVE, VALVE AND BOX
UP	UTILITY POLE
UPL	UTILITY POLE w/ LIGHT
UPT	UTILITY POLE w/ TRANSFORMER
VCP	VITRIFIED CLAY PIPE
WIP	WROUGHT IRON PIPE
WG	WATER GATE
WM	WATER METER/WATER MAIN

PAVEMENT MARKINGS AND SIGNING SYMBOLS

PROPOSED

CW	CROSSWALK, 2 - 12" WHITE LINES (8" WIDTH)
SL	STOP LINE - 12" WHITE LINE 4' BEHIND CW (TYP.)
SWEL	SOLID WHITE EDGE LINE - 4"
SWCHL	SOLID WHITE CHANNELIZING LINES - 12" (SPACING NOTED)
SWGL	SOLID WHITE GORE LINE 12" @ 33°, (SPACING NOTED)
SWLL	SOLID WHITE LANE LINE - 4"
SWPL	SOLID WHITE PARKING LINE - 4"
BWLL	BROKEN WHITE LANE LINE - 4"
DWLEx	DOTTED WHITE LANE EXTENSION LINE - 4" (2' LINE & 6' GAP)
DYLEx	DOTTED YELLOW LANE EXTENSION LINE - 4" (2' LINE & 6' GAP)
BYCL	BROKEN YELLOW CENTERLINE - 4"
DYCL	DOUBLE YELLOW CENTERLINE - 2 - 4" LINES
SYEL	SOLID YELLOW EDGE LINE - 4"
SYGL	SOLID YELLOW GORE LINE 12" @ 33°, (SPACING NOTED)
SYLL	SOLID YELLOW LANE LINE - 4"
SYCTEL	SOLID YELLOW CYCLE TRACK EDGE LINE - 4"
DYCTCL	DOTTED YELLOW CYCLE TRACK CENTERLINE - 4" (3' LINE & 9' GAP)
SCHOOL	SCHOOL ZONE - WHITE
	HANDICAP SYMBOL - WHITE
	PAVEMENT ARROW - WHITE
ONLY	LEGEND "ONLY" - WHITE

TRAFFIC SIGNAL SYMBOLS

EXISTING	PROPOSED	
		CONTROL CABINET GROUND MOUNTED WITH FOUNDATION
		CONTROL CABINET POLE MOUNTED
	Ø2	CONTROLLER PHASE
	MA-1	MAST ARM, SHAFT & BASE (ARM LENGTH AS NOTED)
		VEHICULAR SIGNAL HEAD (ALPHA-NUMERIC DESIGNATION AS NOTED)
		VEHICULAR SIGNAL HEAD, OPTICALLY PROGRAMMED
		VEHICULAR SIGNAL HEAD (REMOVED & RESET)
		FLASHING BEACON
		PEDESTRIAN SIGNAL HEAD
		PEDESTRIAN SIGNAL HEAD, OPTICALLY PROGRAMMED
HH		PULL BOX 12"x12" OR HANDHOLE
		LOOP DETECTOR
		PEDESTRIAN PUSH BUTTON, SIGN (DIRECTIONAL ARROW AS SHOWN) AND SADDLE
		PRE-EMPTION DETECTOR
		PRE-EMPTION CONFIRMATION STROBE
		SIGNAL CONDUIT (SINGLE RUN)
		SIGNAL CONDUIT (DOUBLE RUN)
		SIGNAL POST & BASE
M	M	MAGNETIC DETECTOR
		SCHOOL ZONE SPEED LIMIT SIGN
		MICROWAVE OR ULTRASONIC DETECTOR
		VIDEO DETECTION CAMERA
		VIDEO DETECTION ZONE

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FALL RIVER CITY PIER

Fall River, MA

TITLE

LEGEND & ABBREVIATIONS

PRELIMINARY

NO.	REVISIONS	DATE

DRAWN BY: AKP/ALG

DESIGNED BY: AG

CHECKED BY: Initials

ISSUE DATE: 00/00/15

BETA JOB NO.: 0000-000

SCALE

HOR. SCALE IN FEET: 1"=30"

30 0 30 60

NONE

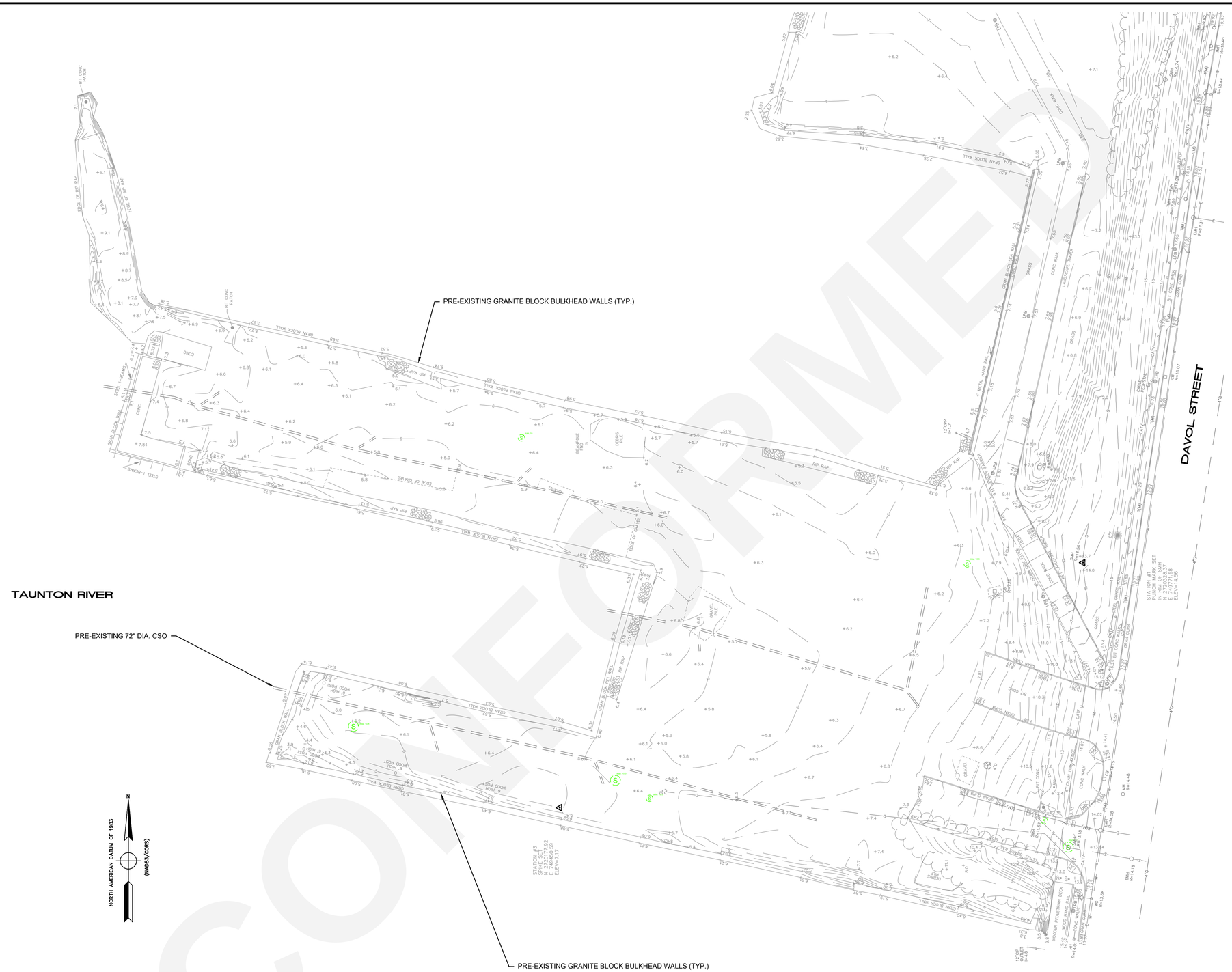
UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

Not for Construction

SHEET NO.

L3.0

11/4/2020 8:56 AM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\7171 - GENERAL NOTES.DWG (BETA STB BW.STB)



NOTES:
1. SURVEY BY SURVEYING AND MAPPING CONSULTANTS ON AUGUST 31, 2010
2. VERTICAL DATUM NGVD 1929
3. MAP 0-22 LOT 12

CONFORMED

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FALL RIVER CITY PIER

Fall River, MA

TITLE

PRE-EXISTING CONDITIONS

PRELIMINARY

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	Initials
ISSUE DATE:	00/00/15
BETA JOB NO.:	0000-000

SCALE

HOR. SCALE IN FEET: 1"=30"

30 0 30 60

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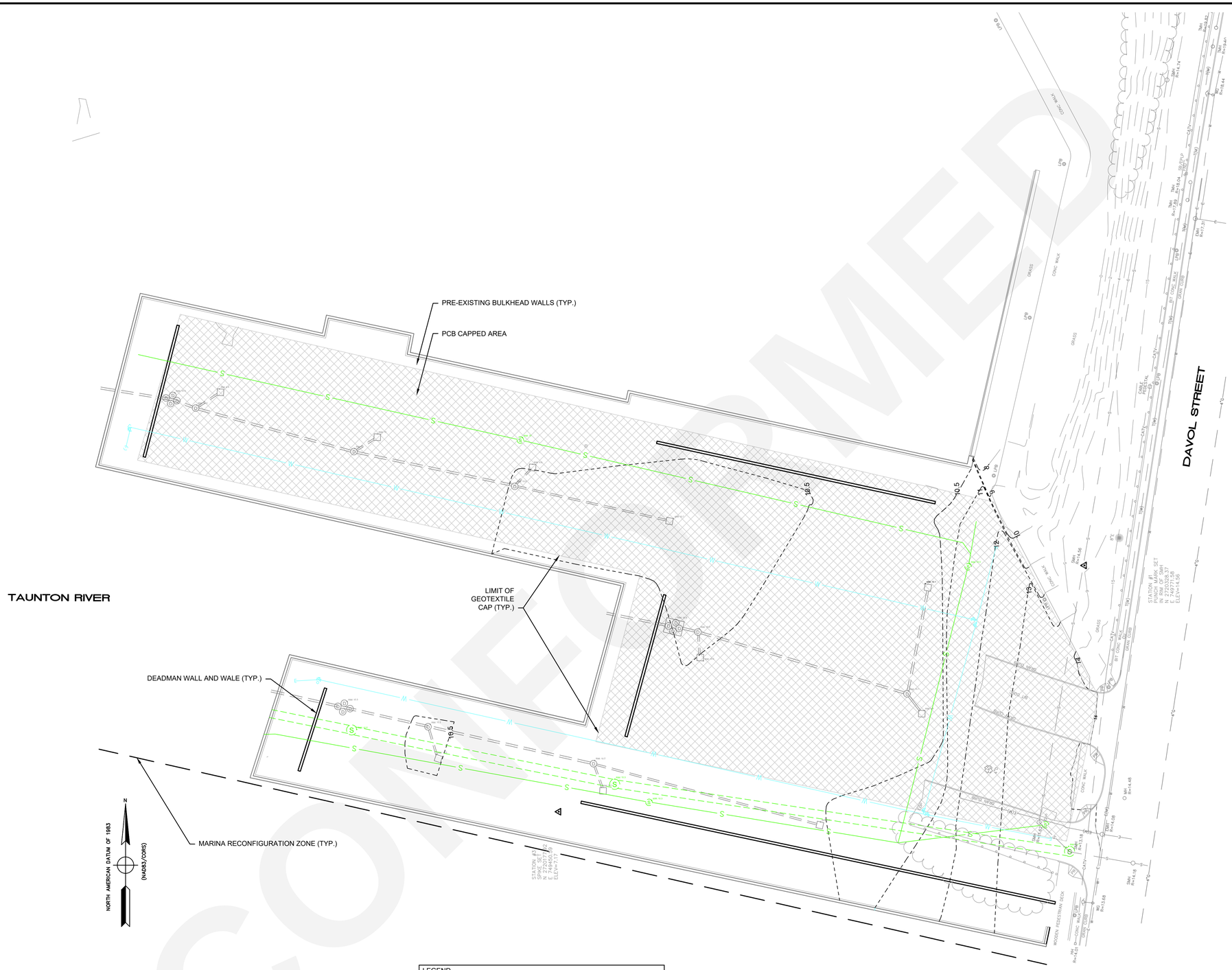
Not for Construction

SHEET NO.

L4.0

11/4/2020 8:56 AM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\L4 EXISTING CONDITIONS.DWG (BETA STB BW.STB)



LEGEND	
S	EXISTING SEWER
W	EXISTING WATER
	EXISTING DRAINAGE
	EXISTING PCB CAPPED AREA

NOTES

1. DRAWING INFORMATION COMPILED FROM PARE CORP. "AS-BUILT SITE PLAN AND PCB LIMITS".
2. PCB CAPPED AREA CONSISTS OF CLEAN GRANULAR FILL OVER GEOTEXTILE FABRIC.

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EXISTING CONDITIONS

PRELIMINARY

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DESIGNED BY:	AG
CHECKED BY:	Initials
ISSUE DATE:	00/00/15
BETA JOB NO.:	0000-000

SCALE

HOR. SCALE IN FEET: 1"=30"

30 0 30 60

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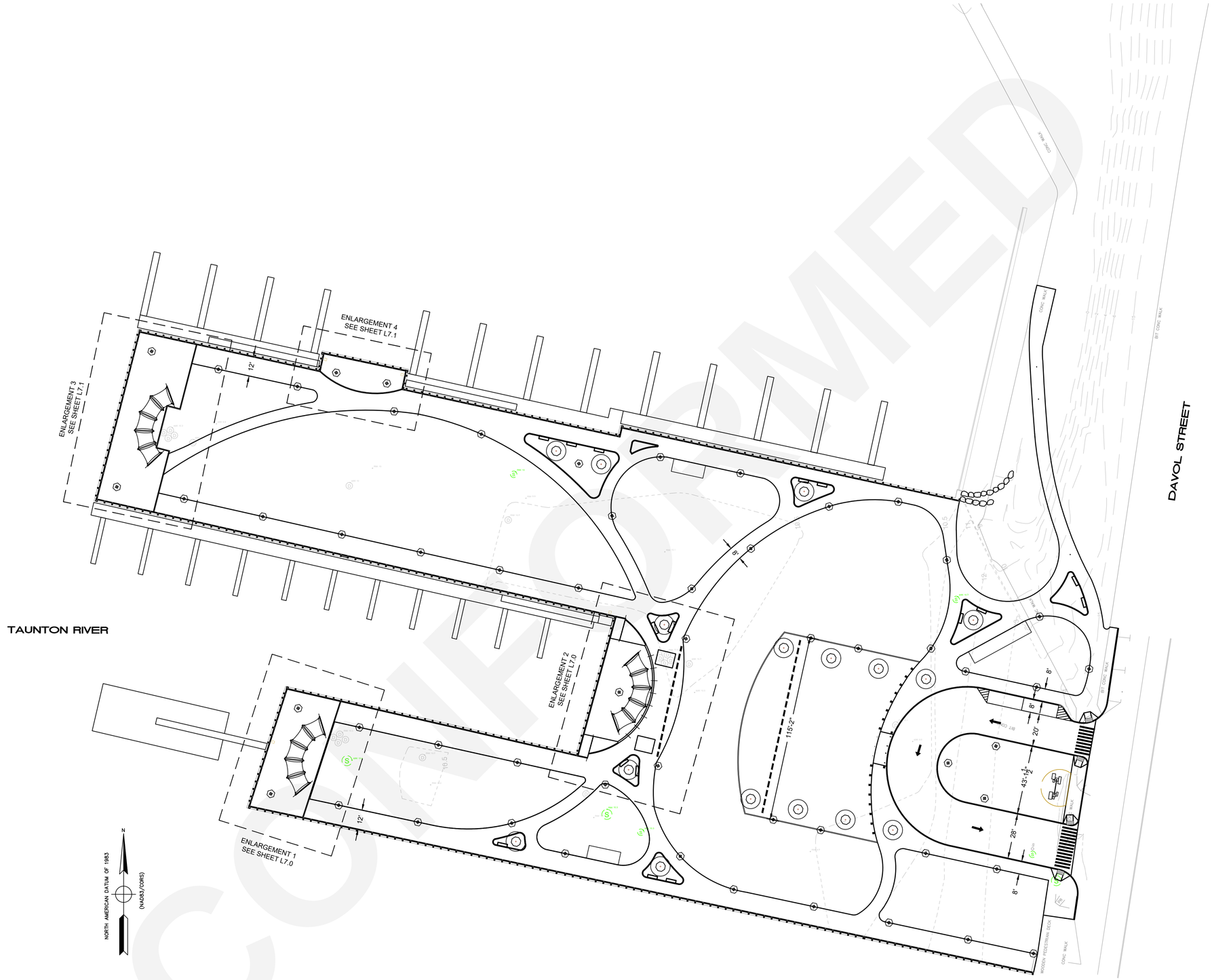
Not for Construction

SHEET NO.

L5.0

11/4/2020 8:59 AM G:\PLANNING\LANDSCAPE\7000\57171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\L4 EXISTING CONDITIONS.DWG (BETA STB BW.STB)



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LAYOUT

PRELIMINARY

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	Initials
ISSUE DATE:	00/00/15
BETA JOB NO.:	0000-000

SCALE

HOR. SCALE IN FEET: 1"=30"

30 0 30 60

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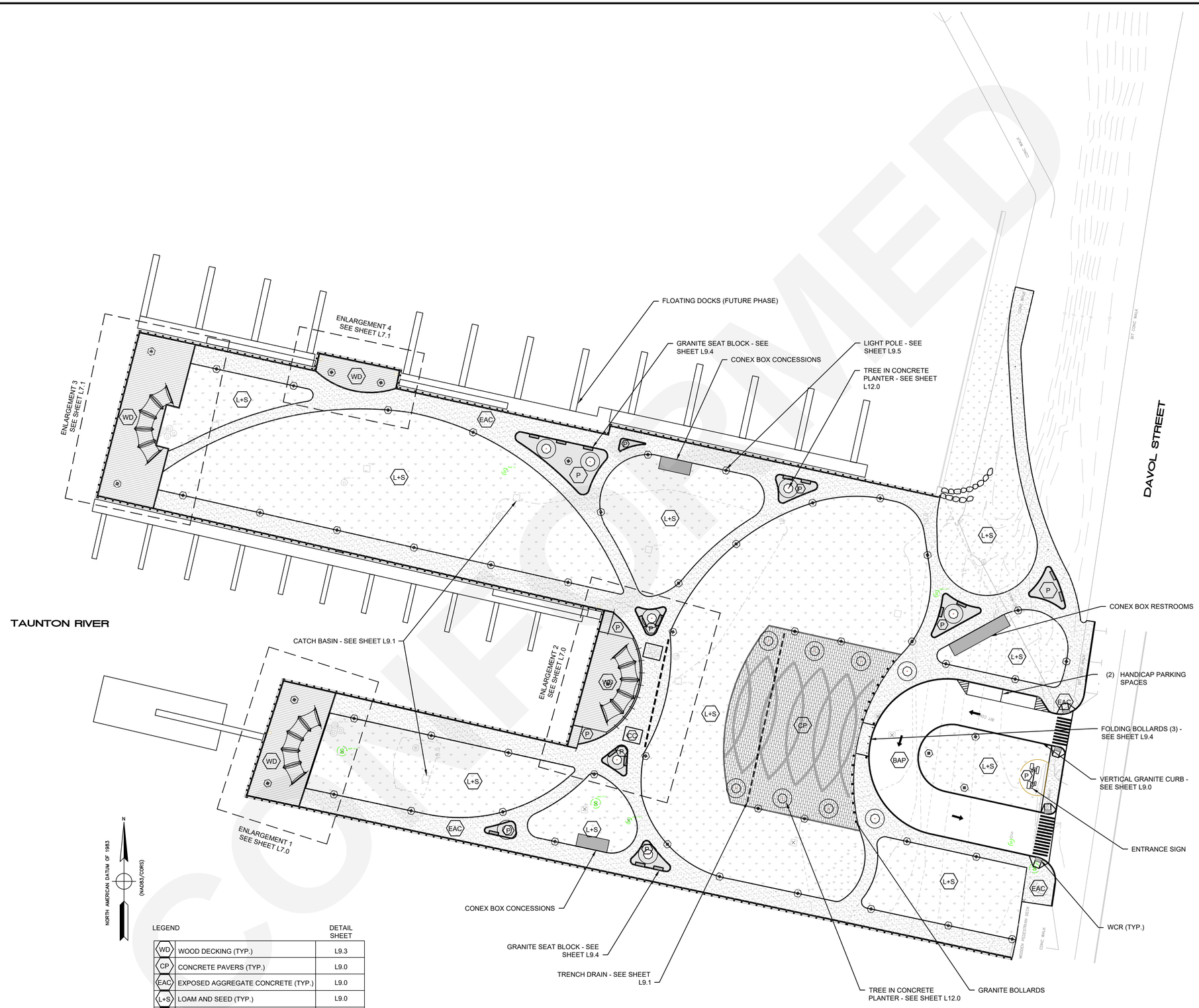
Not for Construction

SHEET NO.

L6.0

11/4/2020 9:04 AM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\7171 - LAYOUT.DWG (BETA STB BW.STB)



LEGEND		DETAIL SHEET
WD	WOOD DECKING (TYP.)	L9.3
CP	CONCRETE PAVERS (TYP.)	L9.0
EAC	EXPOSED AGGREGATE CONCRETE (TYP.)	L9.0
L+S	LOAM AND SEED (TYP.)	L9.0
BAP	BITUMINOUS ASPHALT PAVING (TYP.)	L9.0
P	PLANTING BED	L12.0
CC	CEMENT CONCRETE	L9.0

TOTAL LIGHT POLES - 57

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MATERIALS PLAN

PRELIMINARY

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	Initials
ISSUE DATE:	00/00/15
BETA JOB NO.:	0000-000

SCALE

HOR. SCALE IN FEET: 1"=30'

30 0 30 60

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

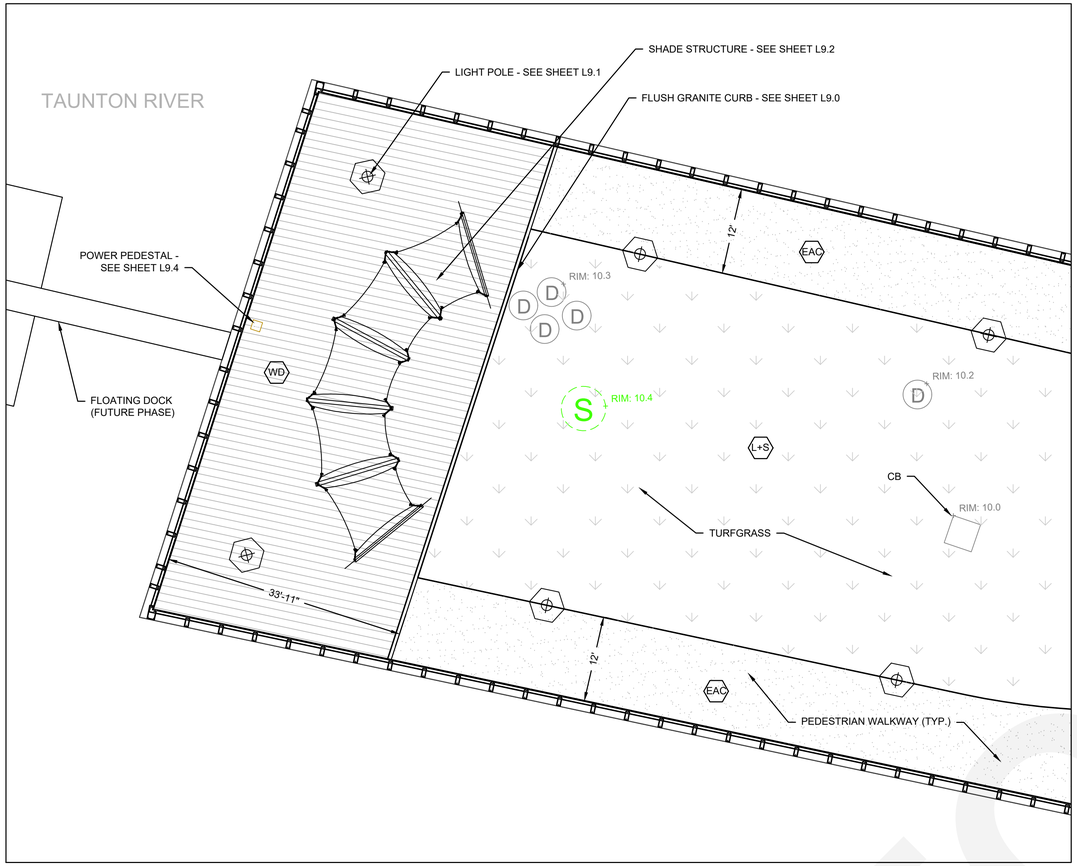
Not for Construction

SHEET NO.

L6.1

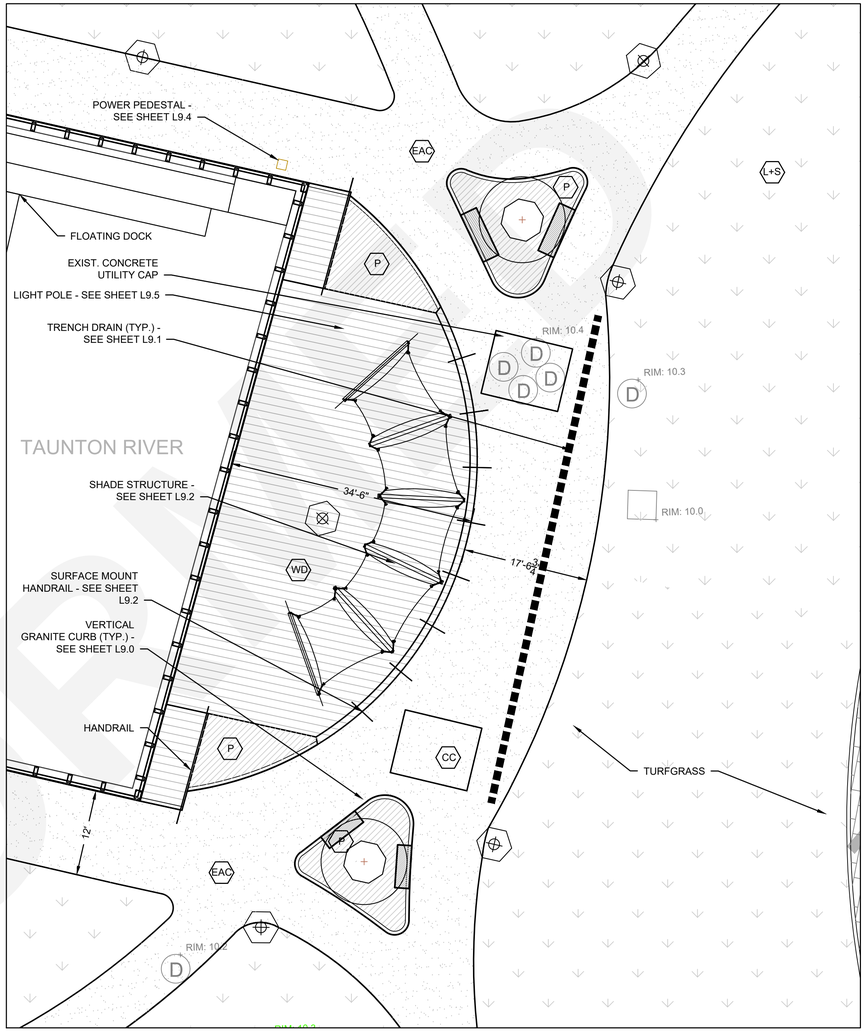
CONFORMED

11/4/2020 9:12 AM G:\PLANNING\LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\7171 - MATERIALS PLAN.DWG (BETA STB BW.STB)



ENLARGEMENT 1

SCALE: 1" = 10' - 0"



ENLARGEMENT 2

SCALE: 1" = 10' - 0"

LEGEND

		DETAIL SHEET
WD	WOODEN DECKING (TYP.)	L9.3
CP	CONCRETE PAVERS (TYP.)	L9.0
EAC	EXPOSED AGGREGATE CONCRETE (TYP.)	L9.0
L+S	LOAM AND SEED (TYP.)	L9.0
BAP	BITUMINOUS ASPHALT PAVING (TYP.)	L9.0
P	PLANTING BED	L12.0
CC	CEMENT CONCRETE	L9.0

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ENLARGEMENT- 1

PRELIMINARY

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ISSUE DATE:	00/00/15
BETA JOB NO.:	0000-000

SCALE

HOR. SCALE IN FEET: 1"=30'

30 0 30 60

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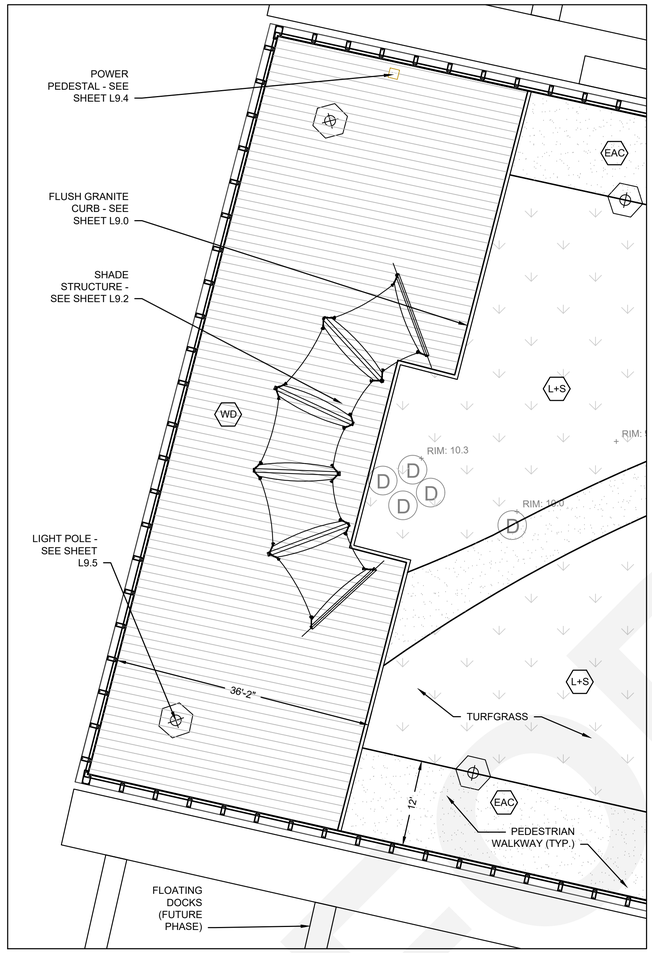
Not for Construction

SHEET NO.

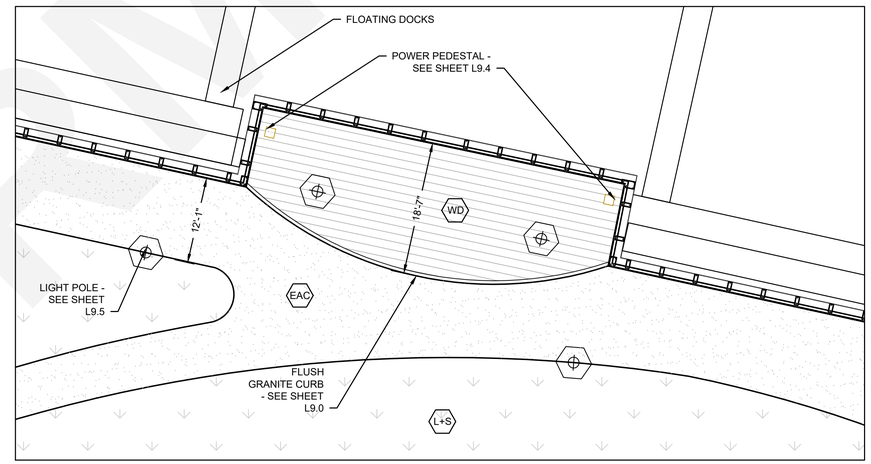
L7.0

11/4/2020 9:41 AM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\7171 -ENLARGEMENTS.DWG (BETA.STB BW.STB)



ENLARGEMENT 3

SCALE: 1" = 10' - 0"



ENLARGEMENT 4

SCALE: 1" = 10' - 0"

LEGEND

		DETAIL SHEET
WD	WOODEN DECKING (TYP.)	L9.3
CP	CONCRETE PAVERS (TYP.)	L9.0
EAC	EXPOSED AGGREGATE CONCRETE (TYP.)	L9.0
L+S	LOAM AND SEED (TYP.)	L9.0
BAP	BITUMINOUS ASPHALT PAVING (TYP.)	L9.0
P	PLANTING BED	L12.0
P	CEMENT CONCRETE	L9.0

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ENLARGEMENT- 2

PRELIMINARY

NO.	REVISIONS	DATE

DRAWN BY: AKP/ALG

DESIGNED BY: AG

CHECKED BY: Initials

ISSUE DATE: 00/00/15

BETA JOB NO.: 0000-000

SCALE

HOR. SCALE IN FEET: 1"=30"

30 0 30 60

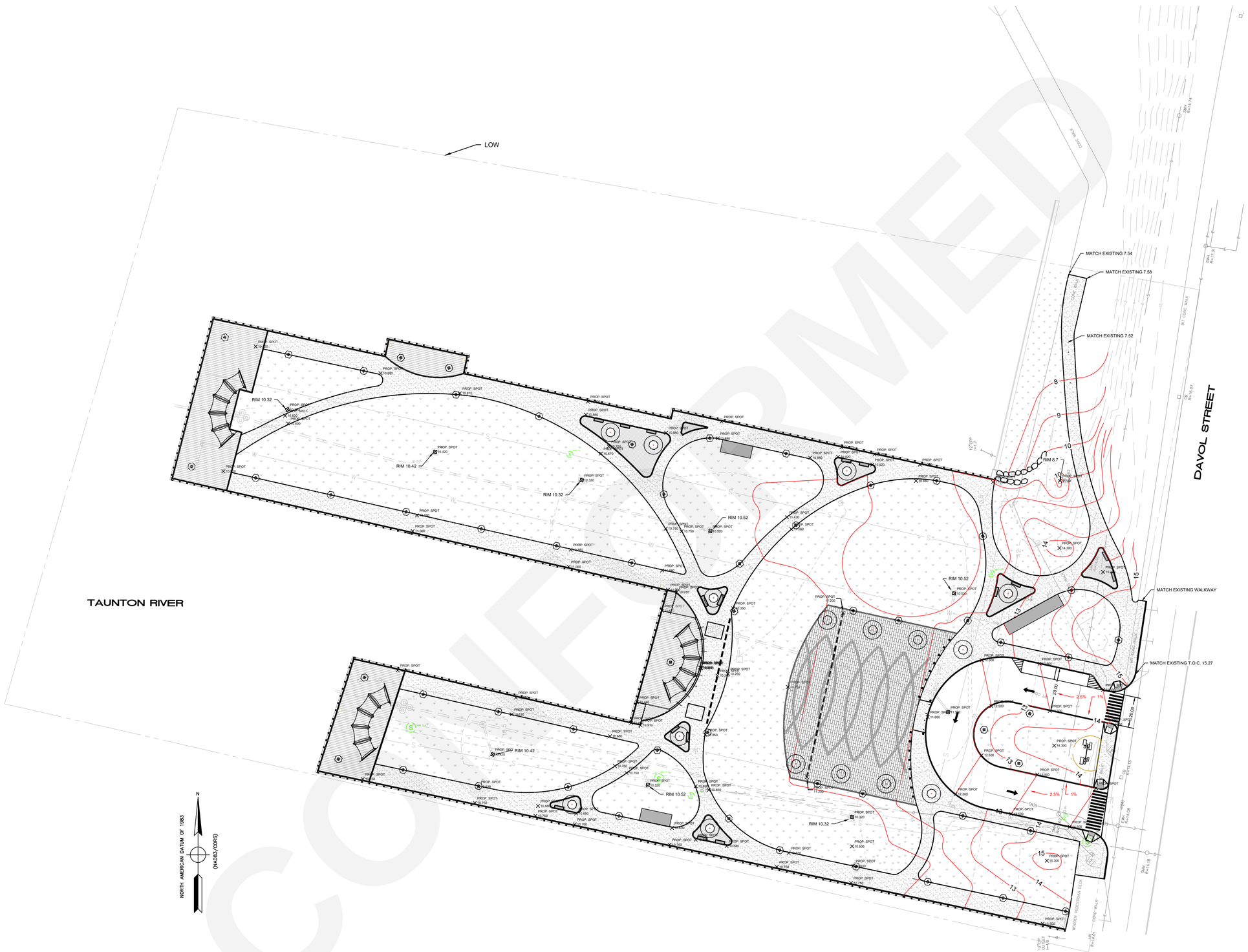
UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

Not for Construction

SHEET NO.

L7.1

11/4/2020 9:42 AM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\7171 -ENLARGEMENTS.DWG (BETA STB BW.STB)



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Fall River, MA

TITLE

GRADING PLAN

PRELIMINARY

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	Initials
ISSUE DATE:	00/00/15
BETA JOB NO.:	0000-000

SCALE

HOR. SCALE IN FEET: 1"=30'

30 0 30 60

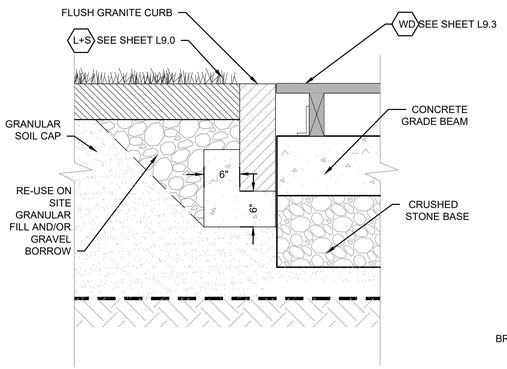
UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

Not for Construction

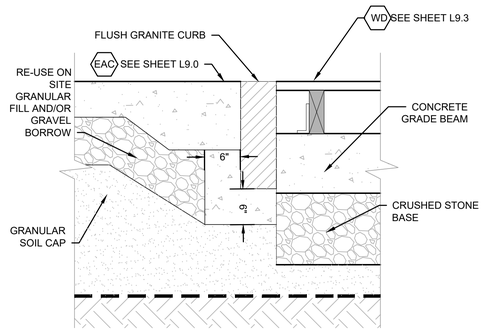
SHEET NO.

L8.0

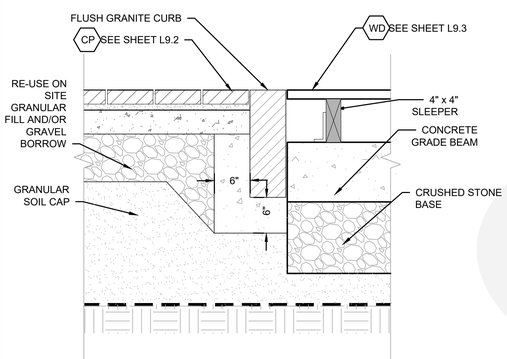
11/4/2020 10:08 AM G:\PLANNING\LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER\MAD\DRAWING FILES\PLAN SET\7171 - GRADING.DWG (BETA STB BW.STB)



FLUSH GRANITE CURB @ WOOD DECKING AND LOAM AND SEED



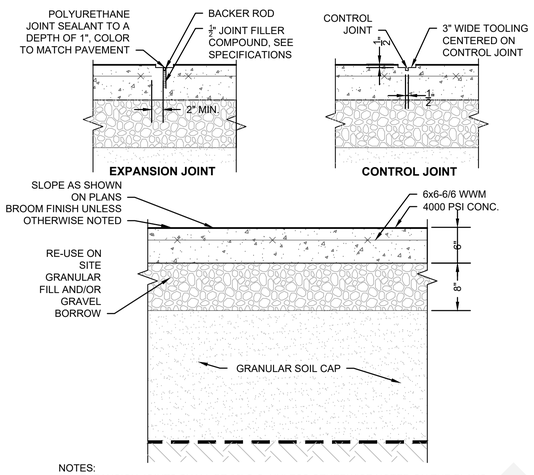
FLUSH GRANITE CURB @ WOOD DECKING AND EXPOSED AGGREGATE



FLUSH GRANITE CURB @ WOOD DECKING AND CONCRETE PAVERS

FLUSH GRANITE CURB

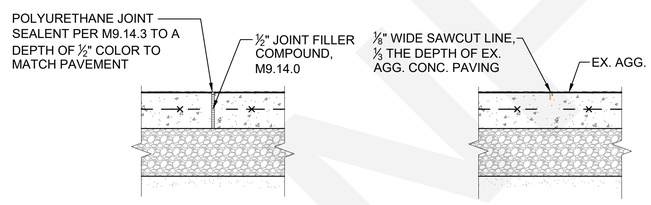
SCALE: 1" = 1'-0"



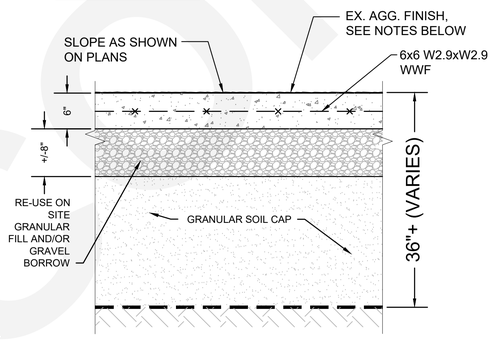
NOTES:
1. EXPANSION JOINTS SHALL BE 20' O.C. UNLESS OTHERWISE NOTED ON THE PLANS.
2. CONTROL JOINTS SHALL BE 5' O.C. UNLESS OTHERWISE NOTED ON THE PLANS.

CC CEMENT CONCRETE

SCALE: 1" = 1'-0"



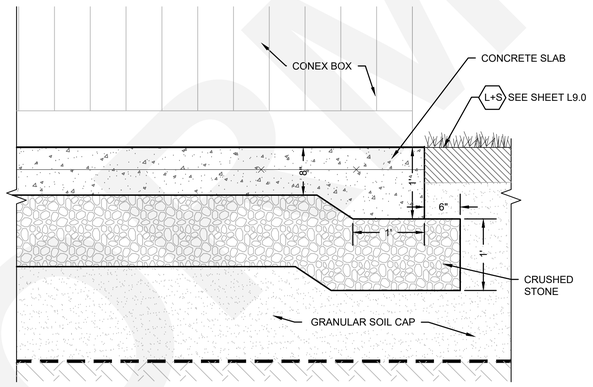
EXPANSION JOINT



NOTES:
1. SEE SPECIFICATIONS FOR AGGREGATE SIZE, COLOR, SHAPE AND SAMPLE REQUIREMENTS.
2. EXPANSION JOINTS SHALL BE 20' O.C. UNLESS OTHERWISE NOTED ON THE PLANS.
3. THOROUGHLY WASH AND CLEAN ALL SURFACES AND REMOVE ALL DEBRIS AFTER SAWCUTTING.
4. SAWCUT CONTROL JOINTS SHALL BE 5' O.C. UNLESS OTHERWISE NOTED ON THE PLANS.

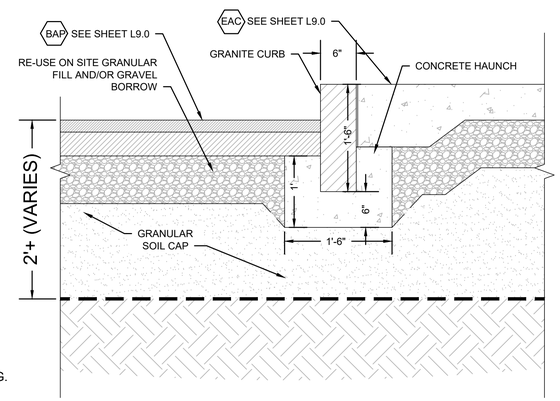
EAC EXPOSED AGGREGATE CONCRETE

SCALE: 1" = 1'-0"



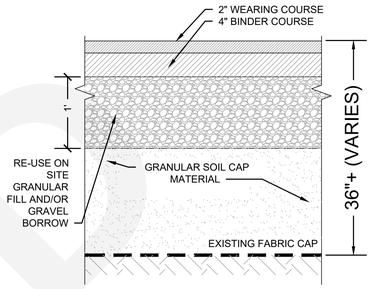
THICKENED CONCRETE SLAB FOR CONEX BOX

SCALE: 1" = 1'-0"



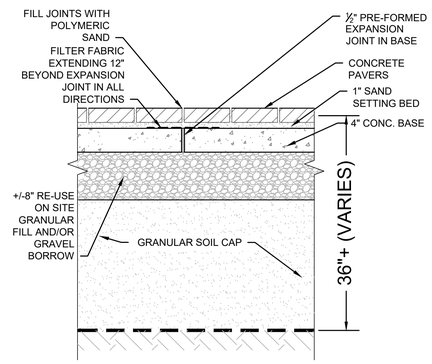
VERTICAL GRANITE CURB (TYP.)

SCALE: 1" = 1'-0"



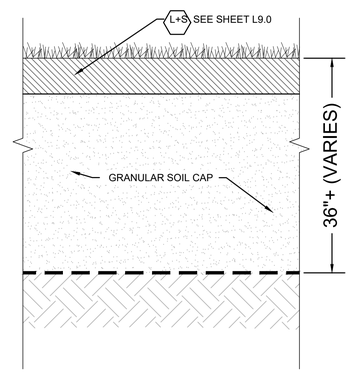
BAP BITUMINOUS ASPHALT PAVING

SCALE: 1" = 1'-0"



CP CONCRETE PAVERS

SCALE: 1" = 1'-0"



L+S LOAM AND SEED

SCALE: 1" = 1'-0"

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Fall River, MA

TITLE

DETAILS - 1

PRELIMINARY

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	Initials
ISSUE DATE:	00/00/15
BETA JOB NO.:	0000-000

SCALE

AS SHOWN

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

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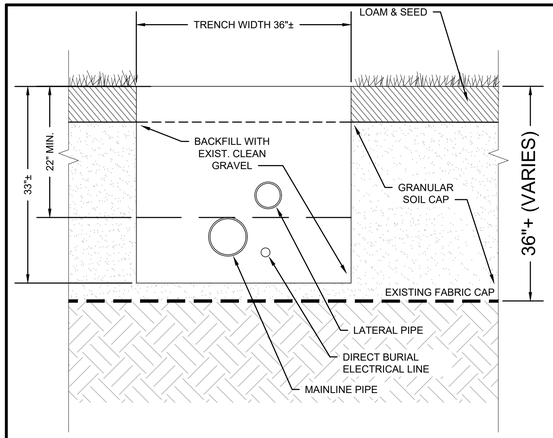
SHEET NO.

L9.0

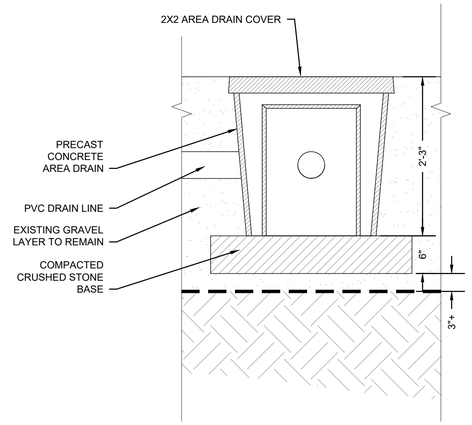
CONFORMED

11/4/2020 10:17 AM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\7171 - DETAILS.DWG (BETA STB BW.STB)



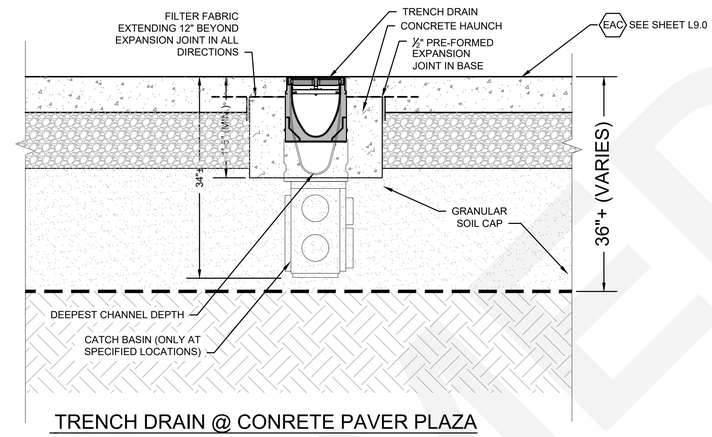
IRRIGATION TRENCH

SCALE: 1" = 1'-0"



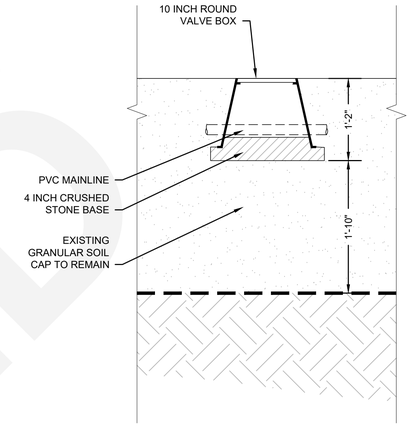
AREA DRAIN

SCALE: 1" = 1'-0"



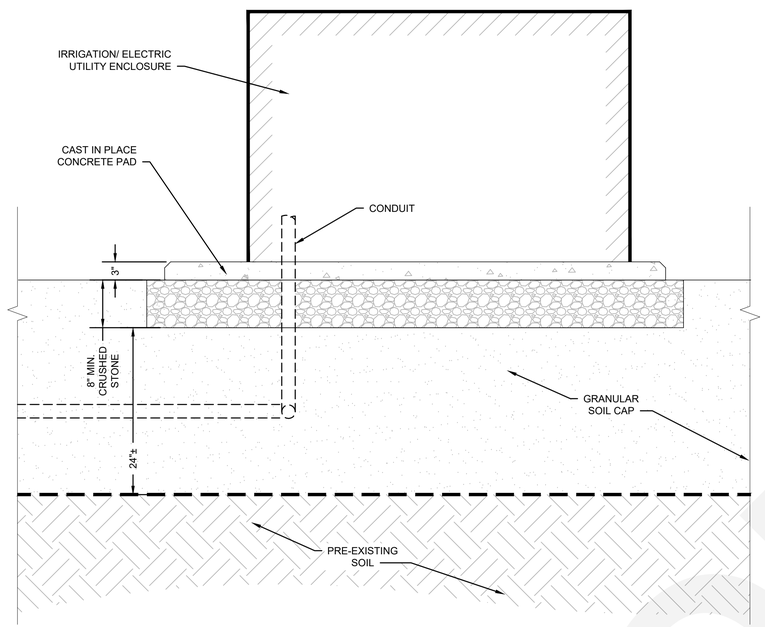
TRENCH DRAIN @ CONRETE PAVER PLAZA

SCALE: 1" = 1'-0"



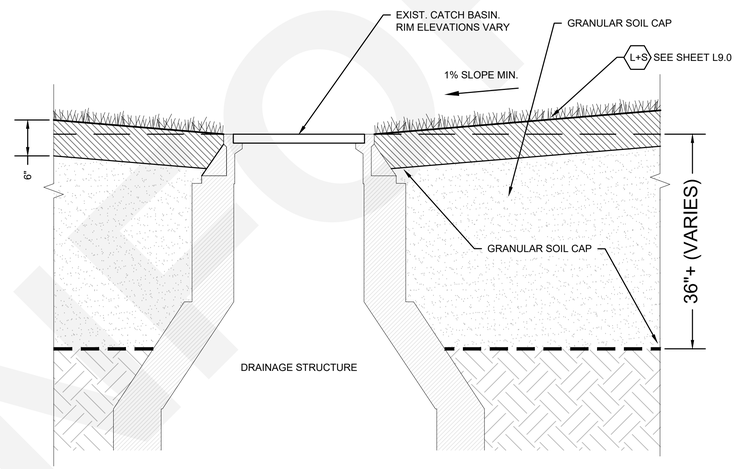
IRRIGATION/ UTILITY VALVE BOX

SCALE: 1" = 1'-0"



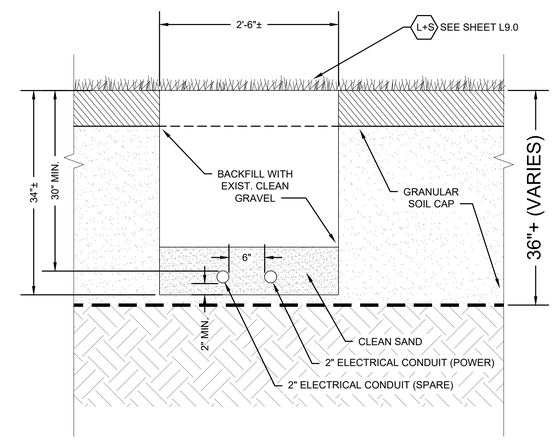
UTILITY ENCLOSURE (GENERAL-CONFORM TO UTIITY CO. REQUIREMENTS)

SCALE: 1" = 1'-0"



LOAM & SEED AT EXIST. CATCH BASIN

SCALE: 1" = 1'-0"



ELECTRICAL CONDUIT TRENCH

SCALE: 1" = 1'-0"

COMPLETED

PREPARED BY

BETA
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REGISTERED PROFESSIONAL

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER

Fall River, MA

TITLE

DETAILS - 2

PRELIMINARY

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	Initials
ISSUE DATE:	00/00/15
BETA JOB NO.:	0000-000

SCALE

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SHEET NO.

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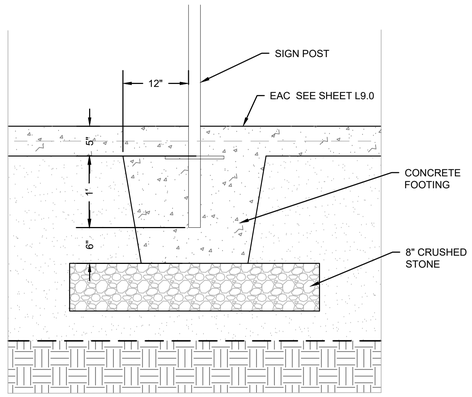
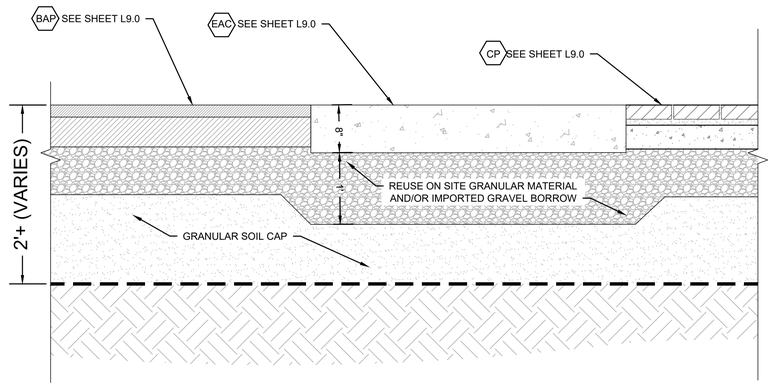
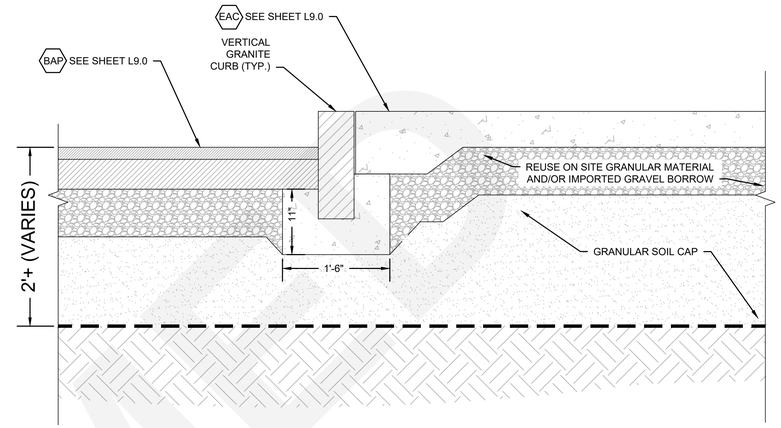
11/4/2020 11:01 AM G:\PLANNING LANDSCAPE7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\7171 - DETAILS.DWG (BETA STB BW.STB)



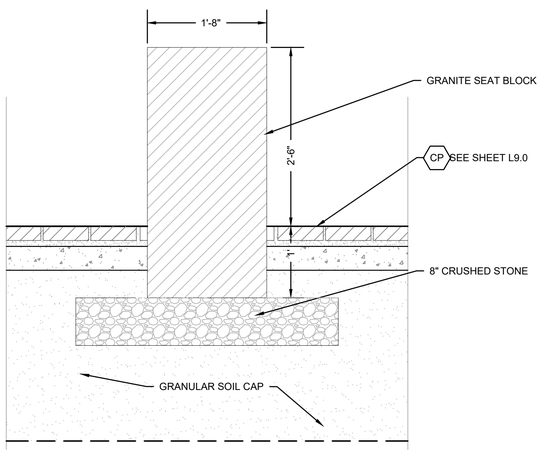
HANDICAP SIGN
SCALE: 1" = 1'-0"



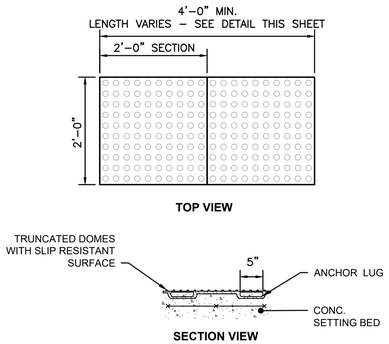
THICKENED CONCRETE SLAB AT PLAZA
SCALE: 1" = 1'-0"



CONCRETE SIDEWALK AT ENTRY DRIVE
SCALE: 1" = 1'-0"

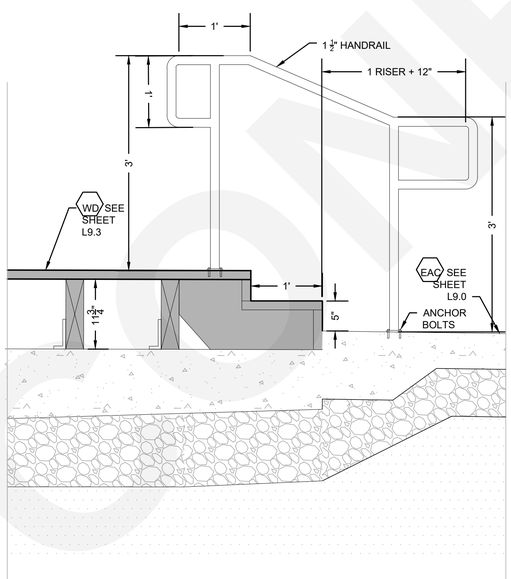


GRANITE BOLLARDS IN PAVER PLAZA
SCALE: 1" = 1'-0"

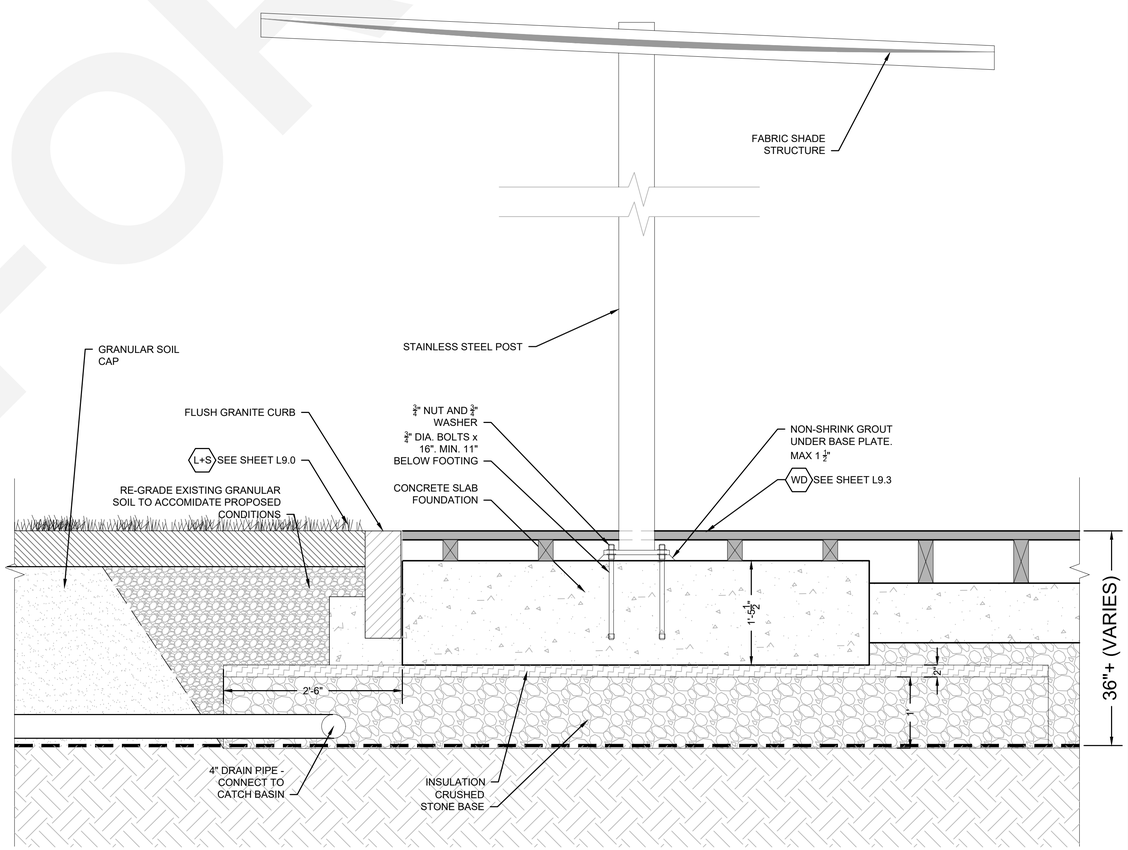


NOTES:
1. LOCATE AT ALL WHEELCHAIR RAMPS AS SHOWN ON THE PLANS.
2. ADA COMPLIANT TACTILE WARNING PLATE.

DETECTABLE WARNING PLATE
SCALE: 3/4" = 1'-0"



SURFACE MOUNT HANDRAIL
SCALE: 1" = 1'-0"



SHADE STRUCTURE
SCALE: 1" = 1'-0"

CONFORMED

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REGISTERED PROFESSIONAL

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER

Fall River, MA

TITLE

DETAILS - 3

PRELIMINARY

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	Initials
ISSUE DATE:	00/00/15
BETA JOB NO.:	0000-000

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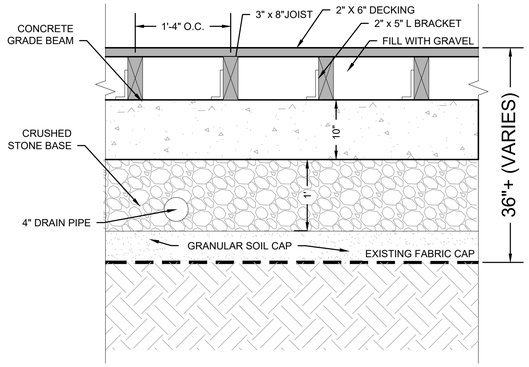
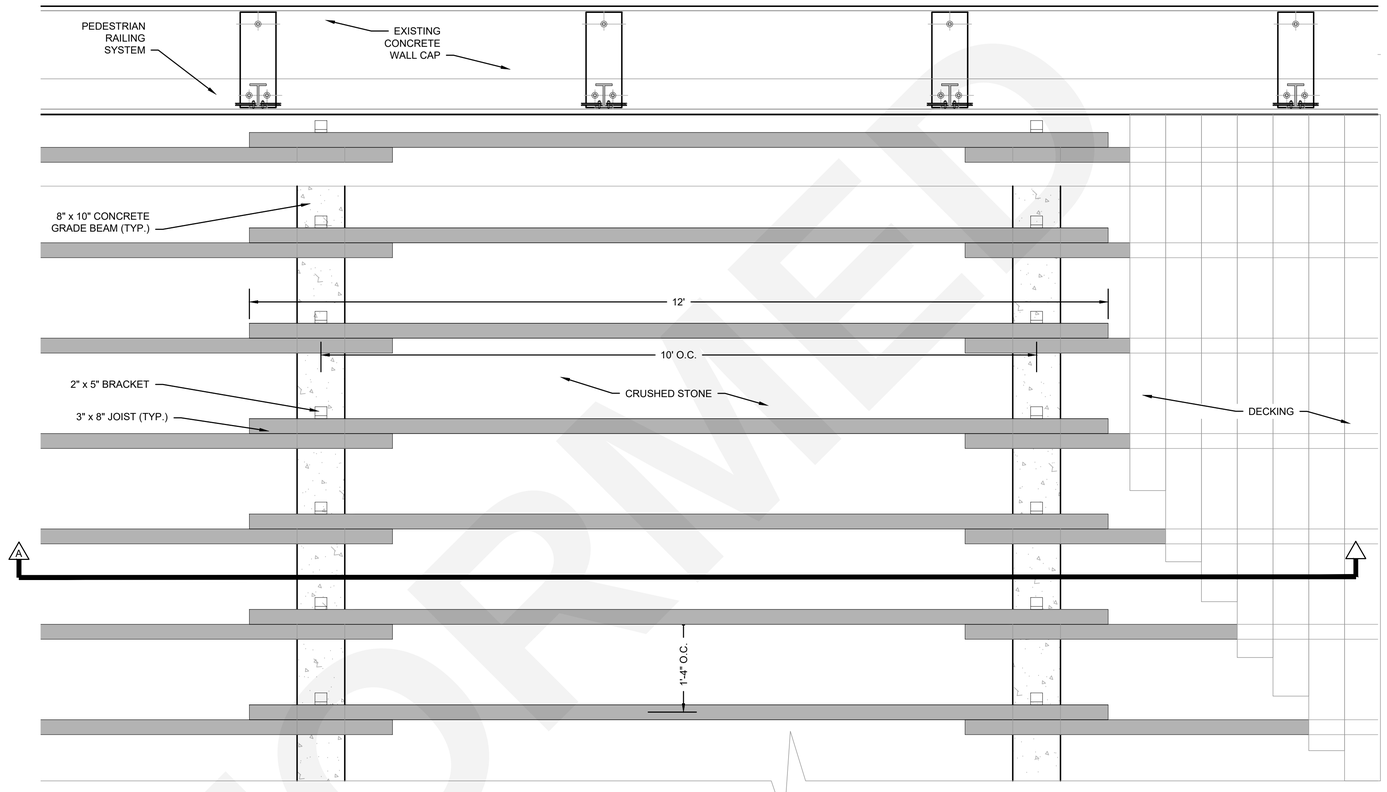
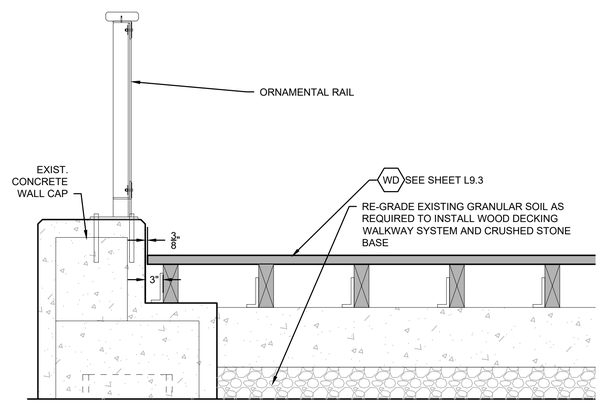
11/4/2020 11:01 AM G:\PLANNING-LANDSCAPE\7000\S7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\7171 - DETAILS.DWG (BETA STB BW.STB)



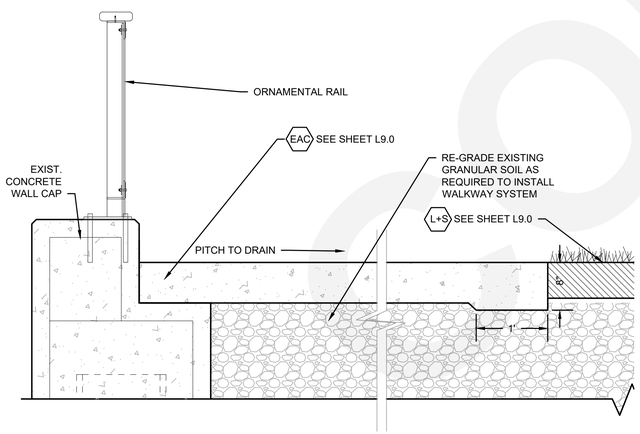
WD WOOD DECKING
SCALE: 1" = 1'-0"



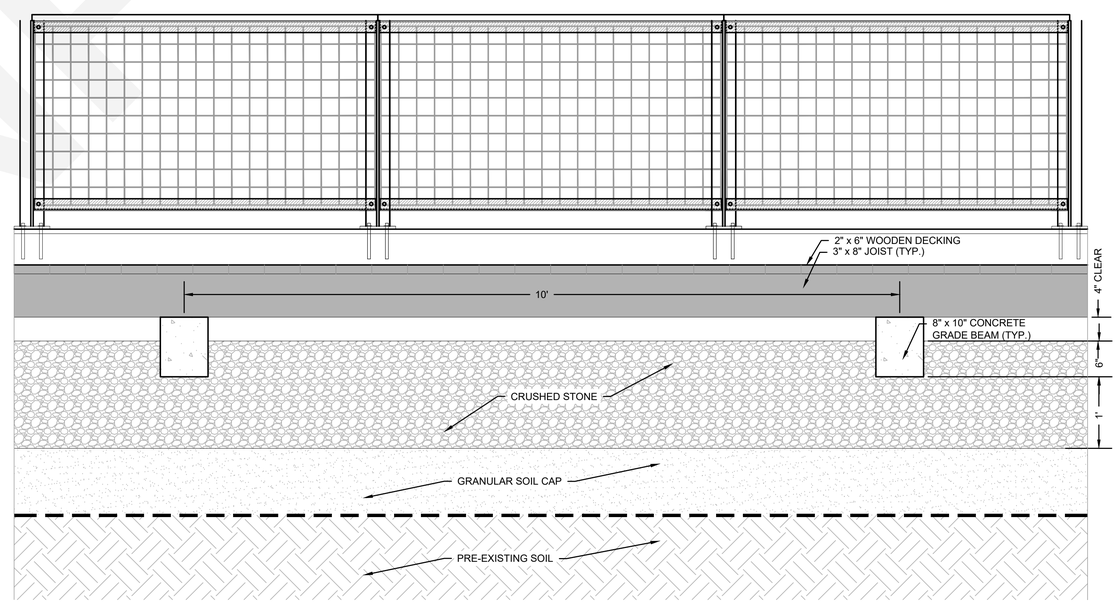
WOOD DECKING SYSTEM FRAMING LAYOUT PLAN (TYP.)



WOOD DECKING @ EXISTING WALL
SCALE: 1" = 1'-0"



EXPOSED AGGREGATE CONCRETE @ EXISTING WALL
SCALE: 1" = 1'-0"



WOODEN DECKING SYSTEM - ELEVATION
SCALE: 1" = 1'-0"

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SUBCONSULTANT

PROJECT
FALL RIVER CITY PIER
Fall River, MA

TITLE
DETAILS - 4

PRELIMINARY

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
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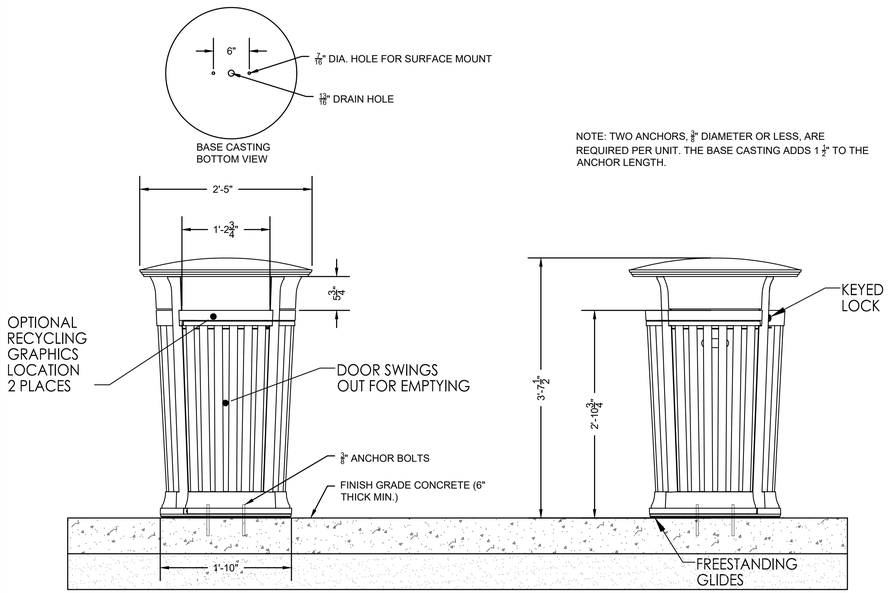
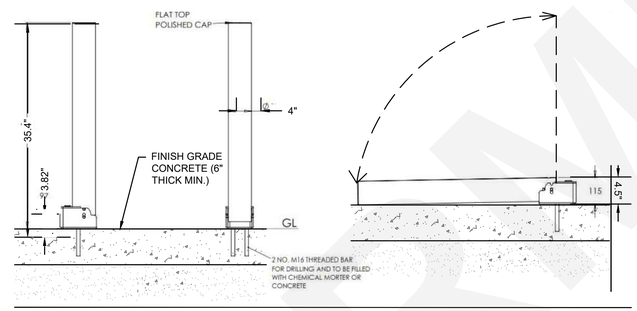
11/4/2020 11:04 AM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\7171 - DETAILS.DWG (BETA STB BW.STB)



NOTE: TWO ANCHORS, 3/8" DIAMETER OR LESS, ARE REQUIRED PER UNIT. THE BASE CASTING ADDS 1 1/2" TO THE ANCHOR LENGTH.

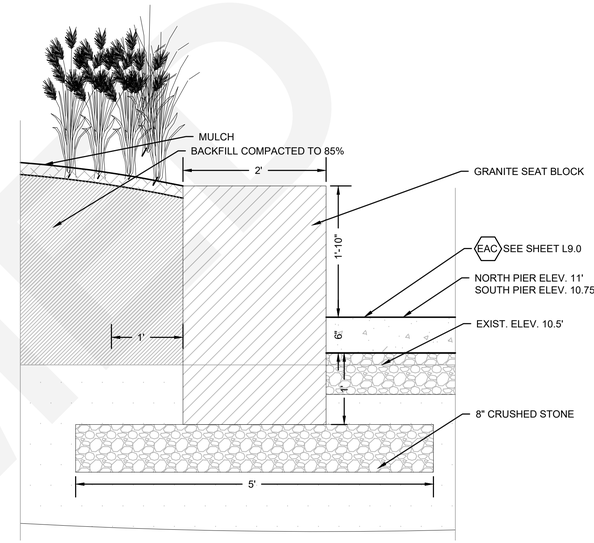
TRASH AND RECYCLING RECEPTACLE

SCALE: 1" = 1'-0"



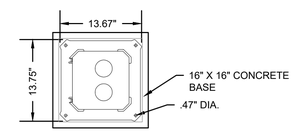
FOLD DOWN BOLLARD

SCALE: 1" = 1'-0"



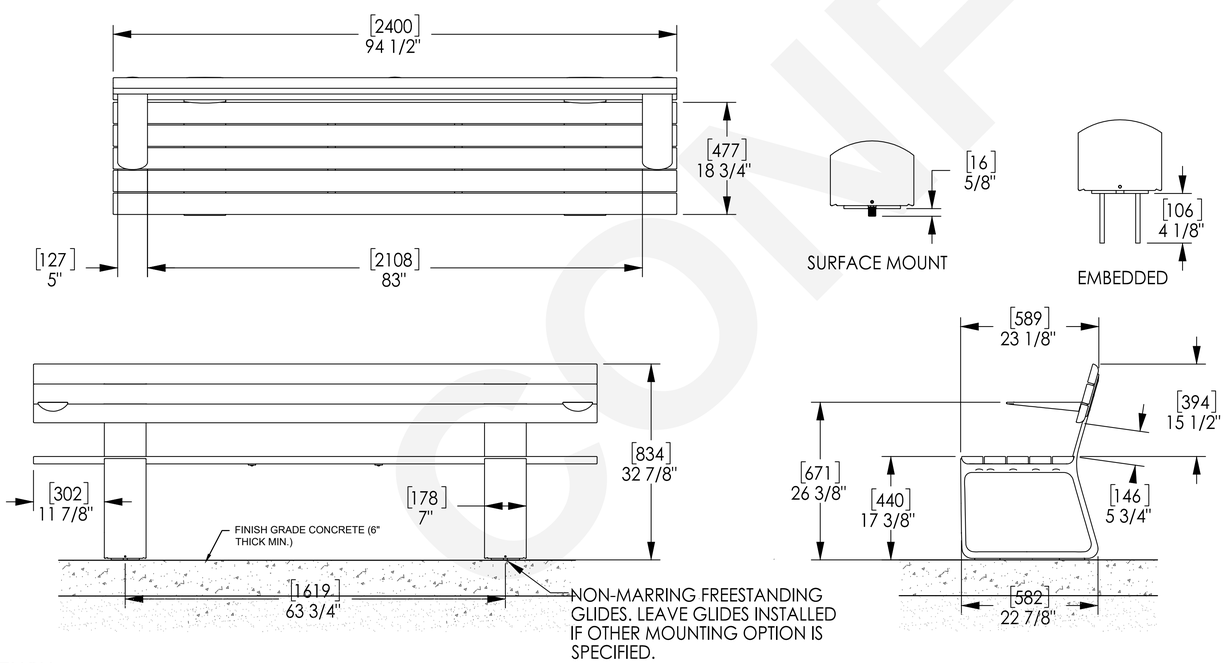
GRANITE SEAT BLOCK AT PLANTING BED

SCALE: 1" = 1'-0"



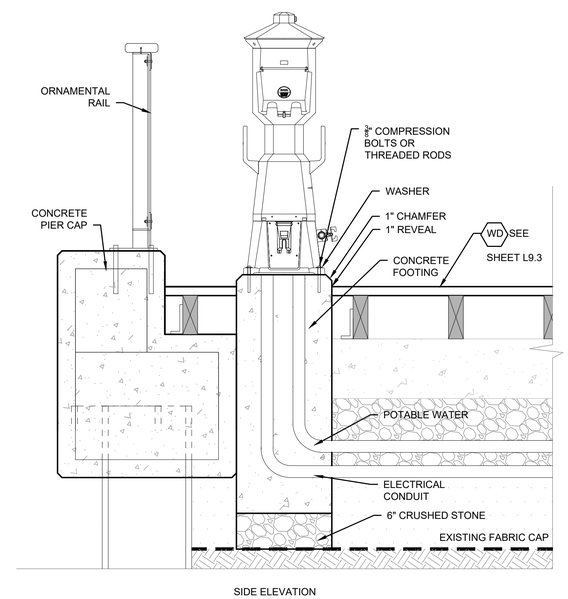
PLAN

SURFACE MOUNT OPTION INCLUDES (4) 5/8-11 THREADED ANCHORS. CONCRETE DROP-IN ANCHORS NOT INCLUDED. EMBEDDED OPTION INCLUDES (4) 3/8-16 THREADED RODS.



BENCH

SCALE: 1" = 1'-0"



SIDE ELEVATION

POWER PEDESTAL

SCALE: 1" = 1'-0"

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SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER

Fall River, MA

TITLE

DETAILS - 5

PRELIMINARY

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	Initials
ISSUE DATE:	00/00/15
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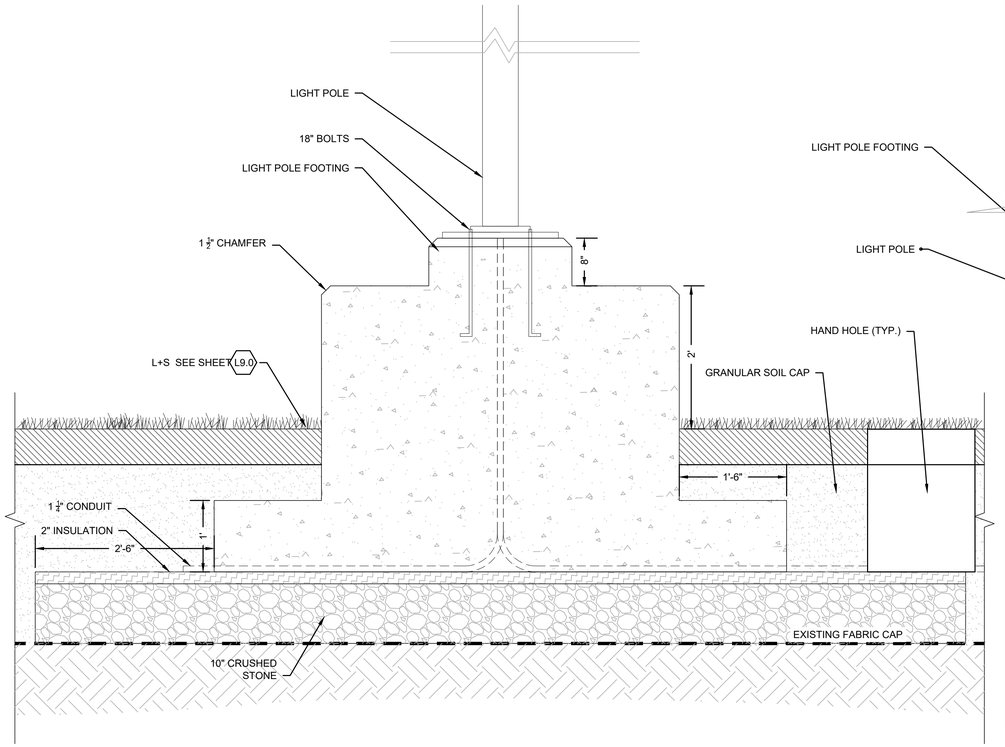
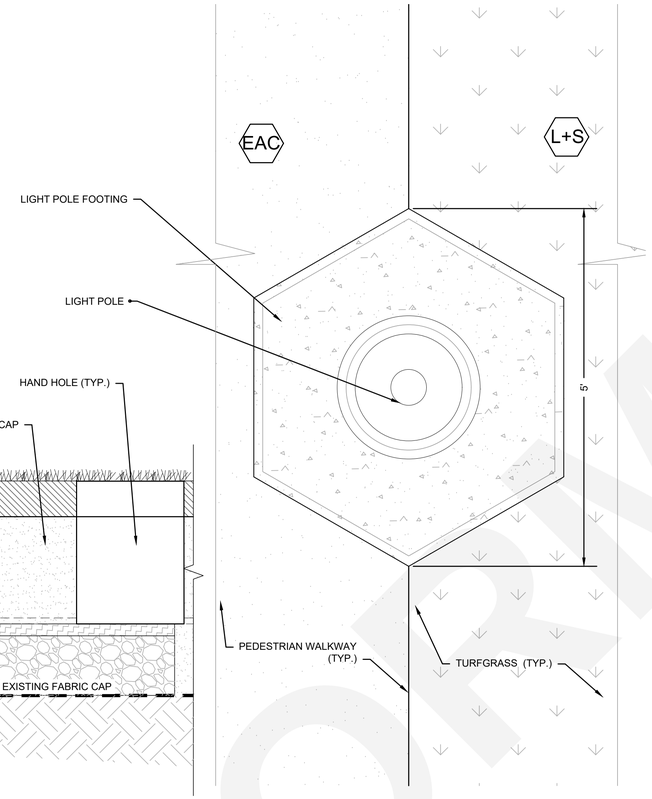
11/4/2020 11:12 AM G:\PLANNING LANDSCAPE\700\S\7171 - FRRA CITY PIER - FALL RIVER MA\DRAWING FILES\PLAN SET\7171 - DETAILS.DWG (BETA STB BW.STB)

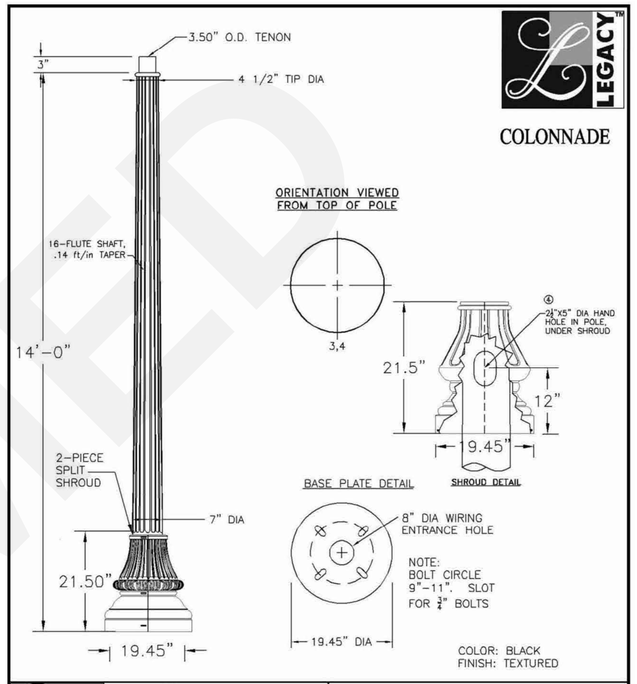


LIGHT POLE FOOTING

SCALE: 1" = 1'-0"



PLAN



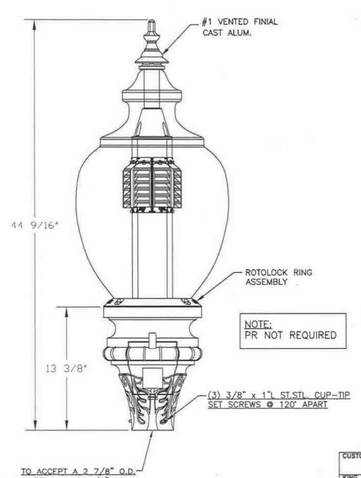
CMT by valmont
CMT
145 Wood Street
Estill, SC 29918
800-416-4276
www.cmtpoles.com

AMERESCO

QUANTITY: 1	JOB NUMBER: C0808156	CAT. NO.: LC(WW)A14-T-3-T350-F-ABG	
P.O.#: 106958A00	REF#: D25M/2/J215793	SPECS:	WIND VEL.: 100@1.3
REV. / DATE / BY	REMARKS	TOT. LENGTH: 14'-0"	LUM. WEIGHT: 50 lbs.
		EMBED. DEPTH: NA	LUM. EPA: 6.2 sq.ft.
		TIP DIA: 4.50 "	STATIC DEFL.:
		WEIGHT: 75 lbs.	TOTAL DEFL.:
		DRAWN BY: PLF	DATE: 09/17/2015

ORNAMENTAL LIGHT POLE (TYP.) CITY STANDARD

SCALE: NTS



REV.	ALTERATION	DATE	BY
A	TENON INFO. CHANGED	03/29/16	T.B
B	CAPITAL WAS K23	04/01/16	T.B
C	TWISTLOCK RECEPTACLE REMOVED	07/07/16	T.B

SPECIFICATIONS

CATALOGUE NO:	K118R-B2PR-III-75(SSL) -1042-120277V-K14-GFI
QUANTITY:	43
GLOBE MOUNTING:	ROTOLOCK
OPTICAL SYSTEM:	BAFFLED POLY. RIPPLED
IES LTG. CLASS.:	TYPE III
INPUT WATTS:	75W (1042 SERIES) SOLID STATE LIGHTING
INPUT VOLTAGE:	120277V
POLE ADAPTOR:	K14
CCT/DIODE:	4000K/HE5
PAINT:	TEXTURED BLACK
OPTIONS:	C/W 15A/120V WEATHERPROOF RECEPTACLE

OPTIONS:
QUICK DISCONNECT ☒

CUSTOMER APPROVAL & DATE:

King Luminaire • StreetCrete • Est. 1953
STRESSCRETE GROUP

Manufacturing Locations:
Burlington, Ontario 1-800-268-7809
Northport, Alabama 1-800-435-6563
Michigan, Kansas 1-800-837-1024
Jefferson, Ohio 1-800-268-7809

CUSTOMER ORDER No: 106887-ADD	PROJECT/CUSTOMER: FALL RIVER CONVERSION - ADD, AMERESCO			
KING U.S. ORDER No: A15375	DRAWN BY: TASHI B.	AT: SCI	CHECKED BY:	DATE: 03/18/16 / REVISION: C
KMFG. ORDER No: -	DRAWING TYPE: APPROVAL/MFG. DWG.			DRAWING NUMBER: 206A8644-1

LUMINAIRE (TYP.) CITY STANDARD

SCALE: NTS

PREPARED BY

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REGISTERED PROFESSIONAL

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER

Fall River, MA

TITLE

DETAILS - 6

PRELIMINARY

NO.	REVISIONS	DATE

DRAWN BY: AKP/ALG

DESIGNED BY: AG

CHECKED BY: Initials

ISSUE DATE: 00/00/15

BETA JOB NO.: 0000-000

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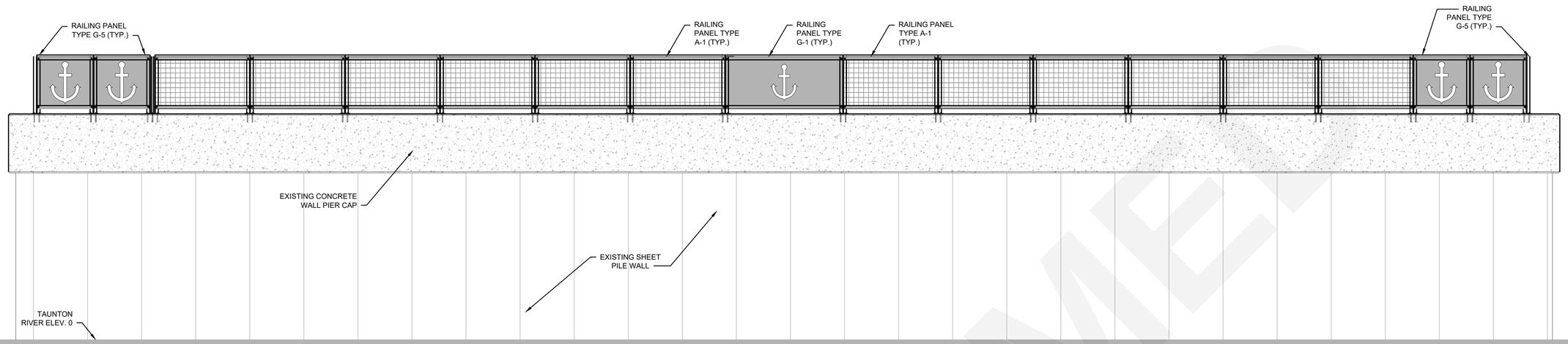
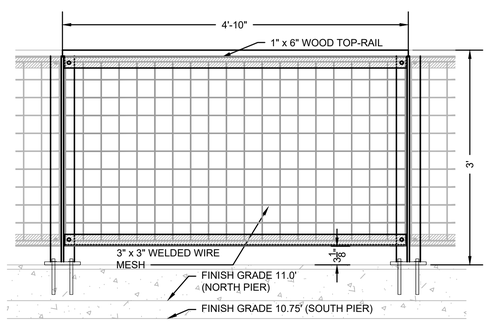


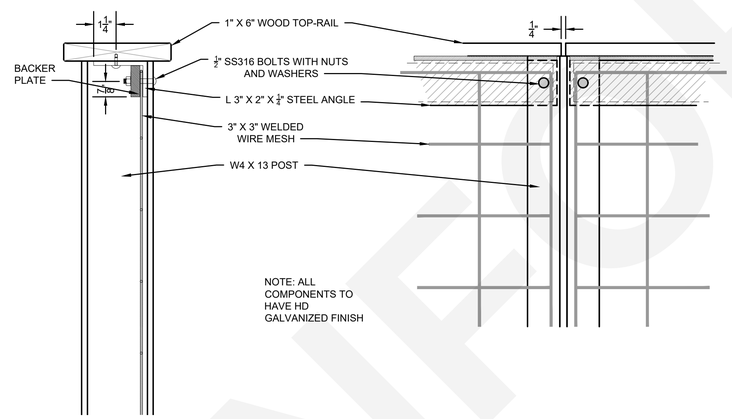
PROPOSED ORNAMENTAL RAILING ELEVATION SOUTH PIER WEST WALL - A

SCALE: $\frac{3}{8}$" = 1' - 0"



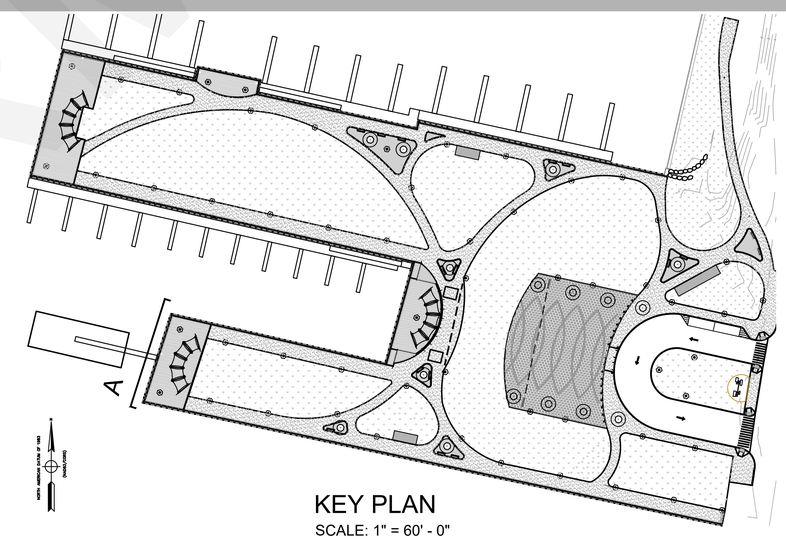
ORNAMENTAL RAILING - PANEL TYPE A1

SCALE: 1" = 1' - 0"



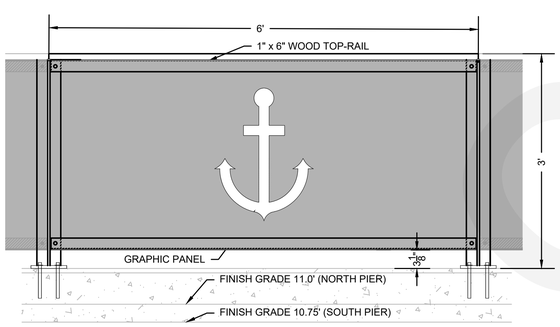
RAILING PANEL TPYES A AND G

SCALE: 1" = 1' - 0"



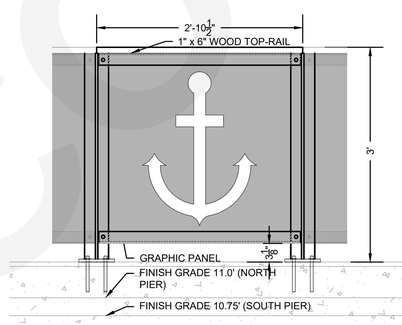
KEY PLAN

SCALE: 1" = 60' - 0"



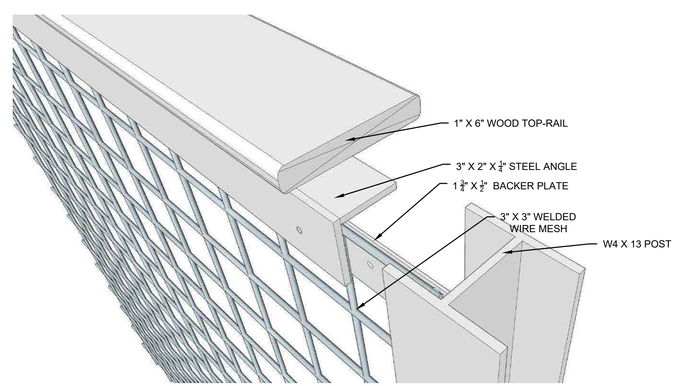
ORNAMENTAL RAILING - PANEL TYPE G-1

SCALE: 1" = 1' - 0"



ORNAMENTAL RAILING - PANEL TYPE G-5

SCALE: 1" = 1' - 0"



RAILING PANEL TPYES A AND G

SCALE: 1" = 1' - 0"

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PROJECT

FALL RIVER CITY PIER

Fall River, MA

TITLE

SECTIONS - 1

PRELIMINARY

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
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BETA JOB NO.:	0000-000

SCALE

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SHEET NO.

L10.0

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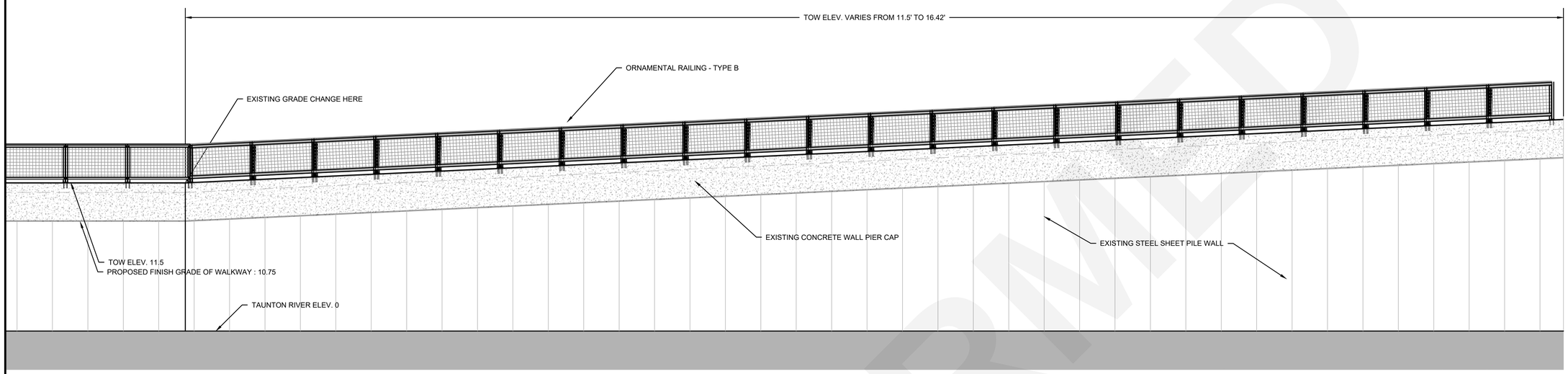
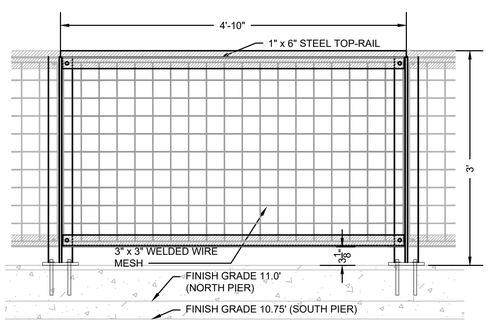
11/4/2020 11:29 AM G:\PLANNING\LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER_MA\DRAWING FILES\PLAN SET\LA SECTIONS.DWG (BETA STB BW.STB)



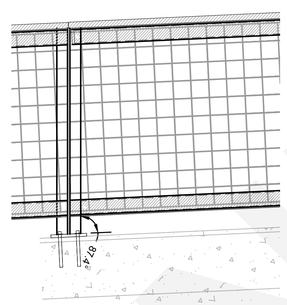
PROPOSED ORNAMENTAL RAILING ELEVATION SOUTH PIER SOUTH WALL (PARTIAL) - B

SCALE: 1 $\frac{1}{2}$" = 1' - 0"



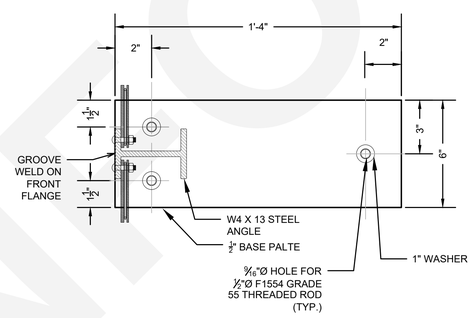
ORNAMENTAL RAILING - PANEL TYPE B

SCALE: 1" = 1' - 0"



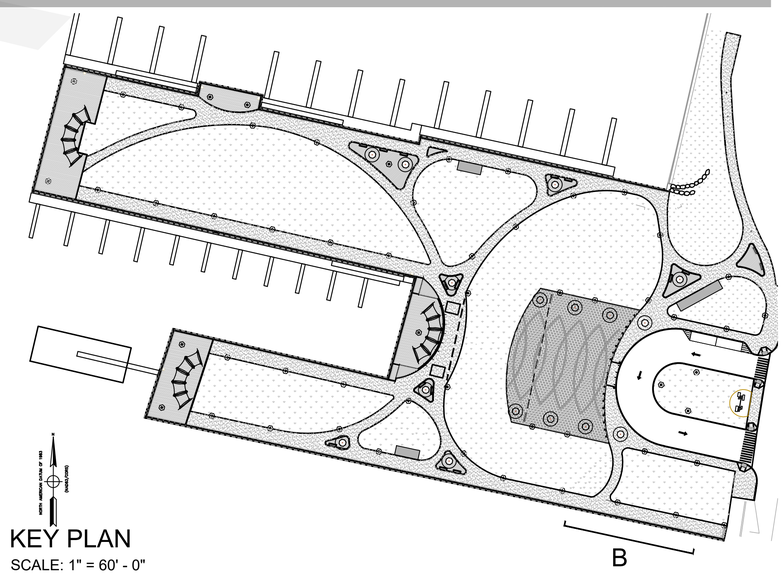
PANEL TYPE B2 - ANGLED BASE PLATE

SCALE: 1" = 1' - 0"



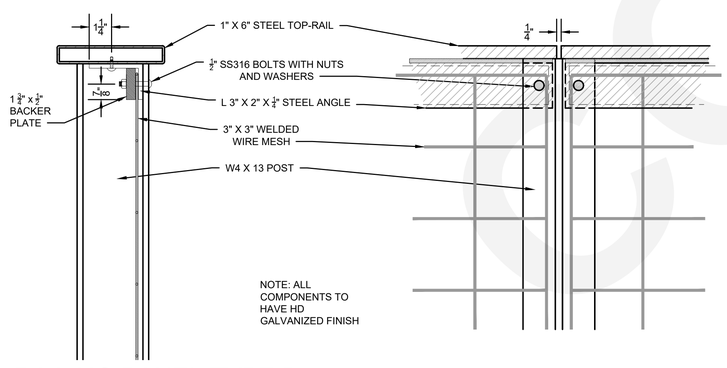
POST BASE PLATE

SCALE: 3" = 1' - 0"



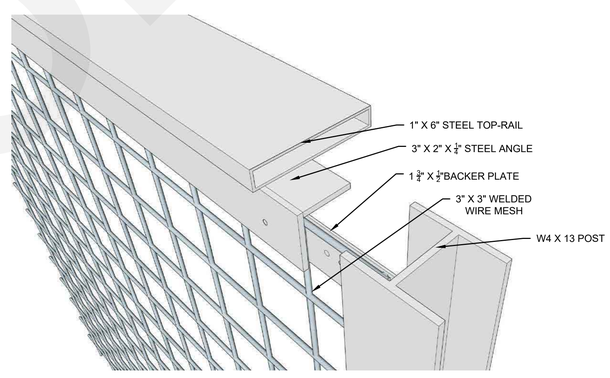
KEY PLAN

SCALE: 1" = 60' - 0"



RAILING PANEL TYPE B

SCALE: 3" = 1' - 0"



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FALL RIVER CITY PIER

Fall River, MA

TITLE

SECTIONS - 2

PRELIMINARY

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SCALE

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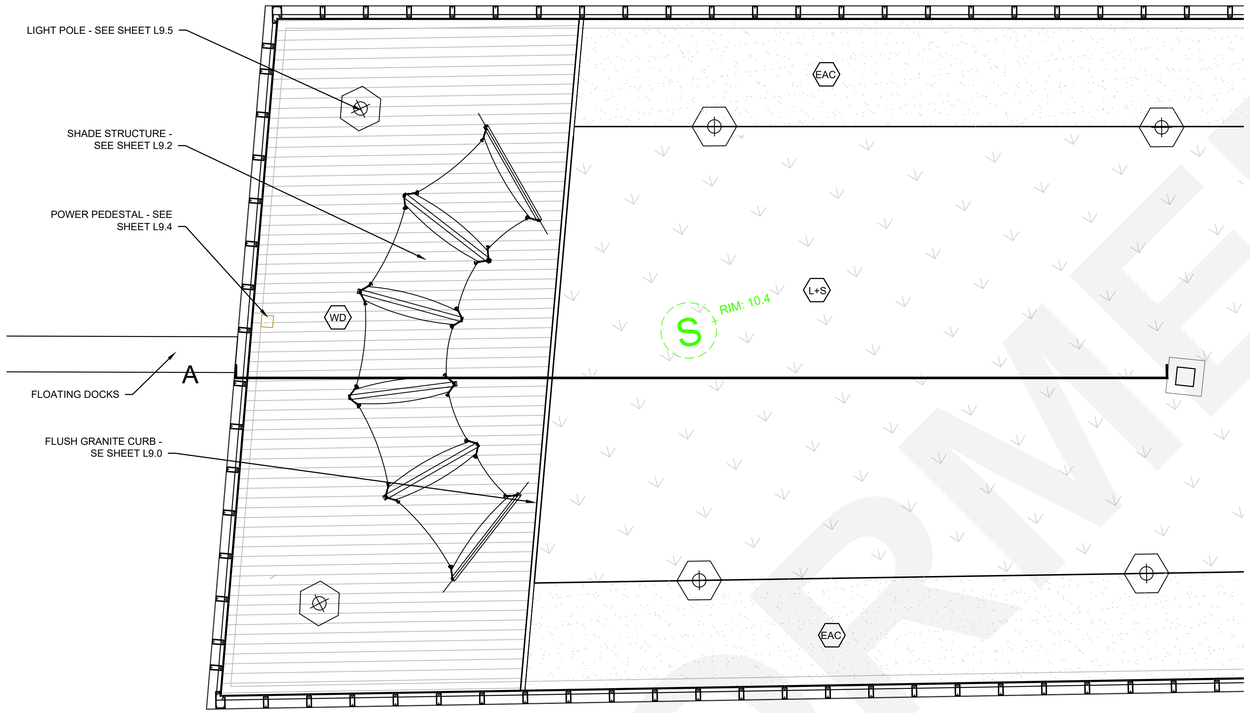
L10.1

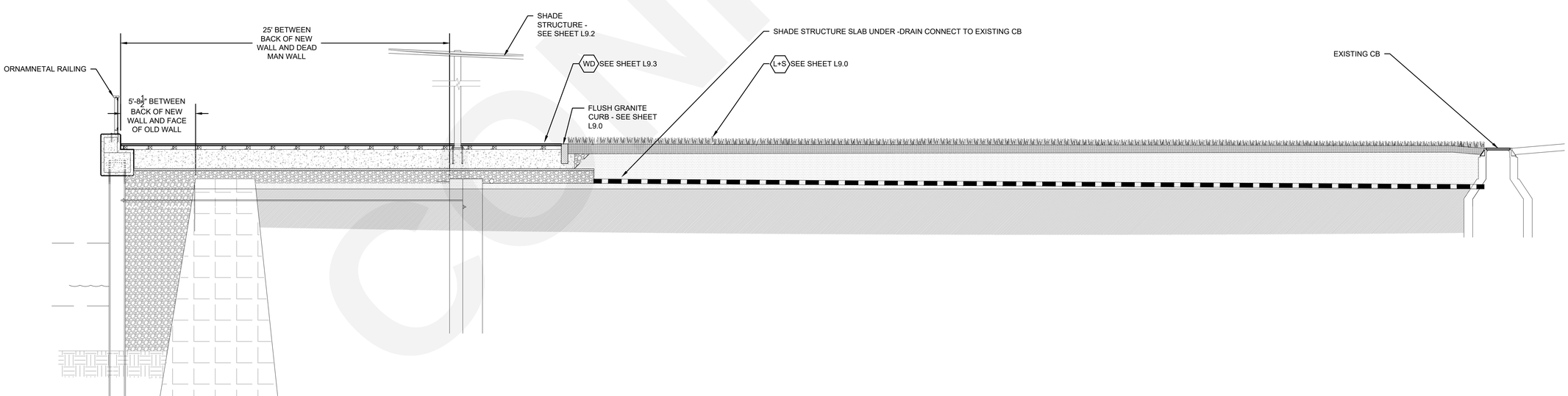
11/4/2020 11:31 AM G:\PLANNING\LANDSCAPE\7000\S7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\LA SECTIONS.DWG (BETA STB BW.STB)



LEGEND		DETAIL SHEET
WD	WOODEN DECKING (TYP.)	L9.3
CP	CONCRETE PAVERS (TYP.)	L9.0
EAC	EXPOSED AGGREGATE CONCRETE (TYP.)	L9.0
L+S	LOAM AND SEED (TYP.)	L9.0
BAP	BITUMINOUS ASPHALT PAVING (TYP.)	L9.0
P	PLANTING BED	L12.0
CC	CEMENT CONCRETE	L9.0

KEY PLAN - SOUTH PIER

SCALE: $\frac{1}{8}$" = 1' - 0"



PROPOSED ORNAMENTAL SOUTH PIER SECTION / ELEVATION - A

SCALE: $\frac{1}{4}$" = 1' - 0"

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PROJECT

FALL RIVER CITY PIER

Fall River, MA

TITLE

SECTIONS - 3

PRELIMINARY

NO.	REVISIONS	DATE

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ISSUE DATE:	00/00/15
BETA JOB NO.:	0000-000

SCALE

AS SHOWN

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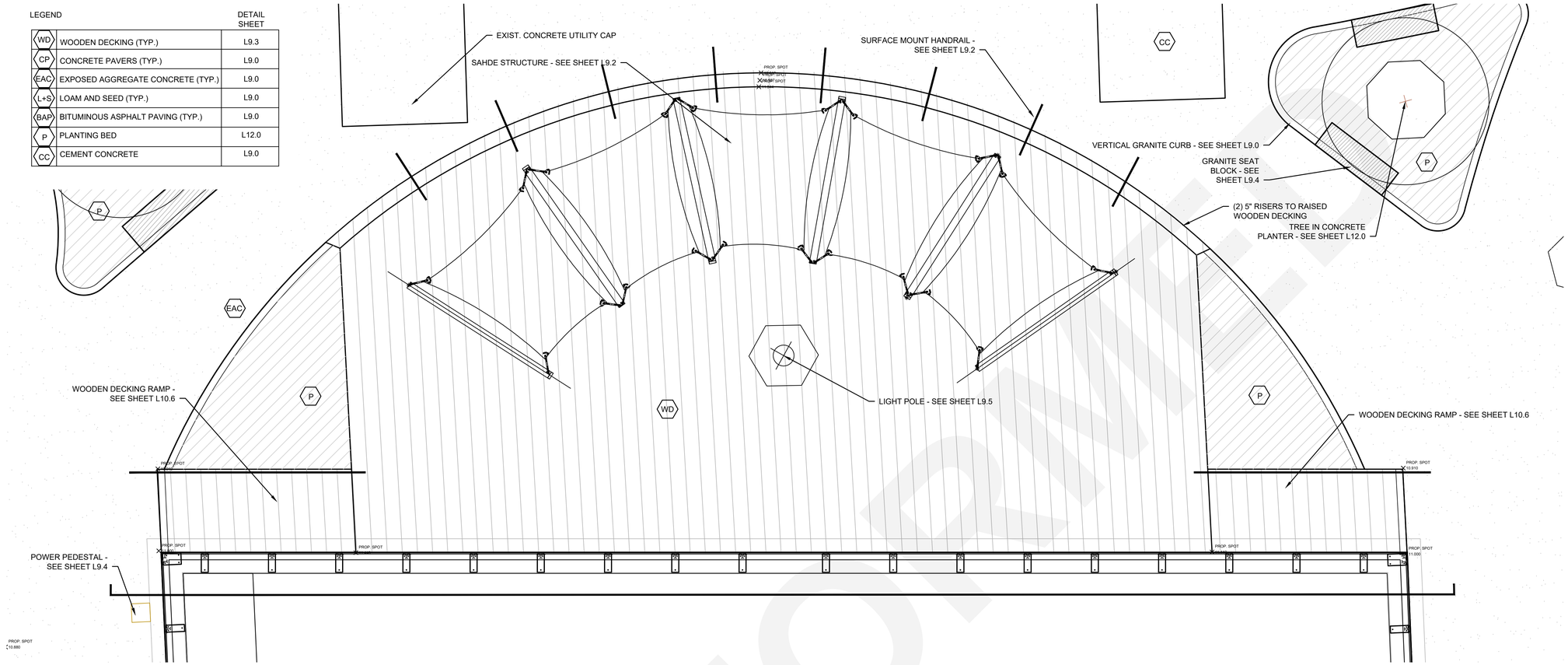
SHEET NO.

L10.2

11/4/2020 11:32 AM G:\PLANNING LANDSCAPE\7000\S7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\LA SECTIONS.DWG (BETA STB BW.STB)

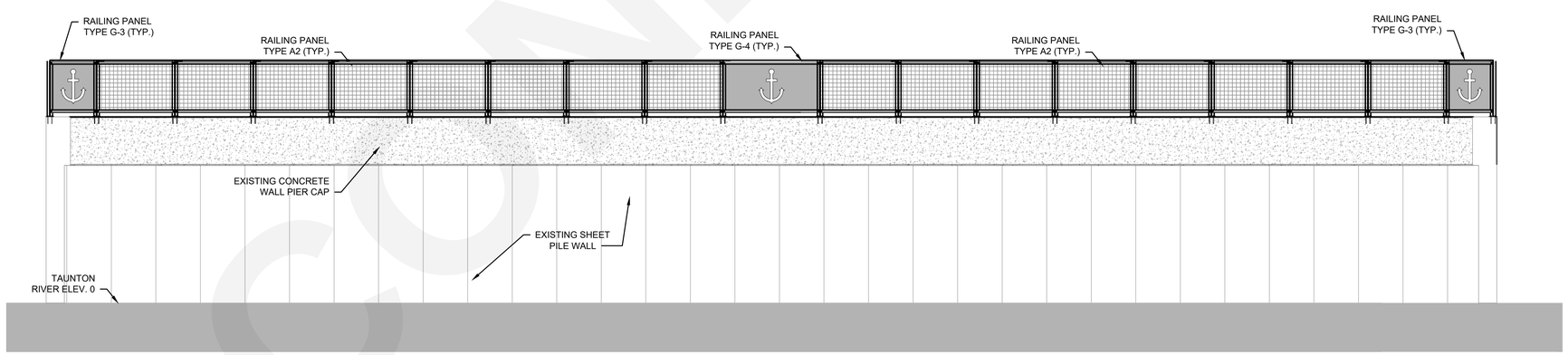
LEGEND		DETAIL SHEET
WD	WOODEN DECKING (TYP.)	L9.3
CP	CONCRETE PAVERS (TYP.)	L9.0
EAC	EXPOSED AGGREGATE CONCRETE (TYP.)	L9.0
L+S	LOAM AND SEED (TYP.)	L9.0
BAP	BITUMINOUS ASPHALT PAVING (TYP.)	L9.0
P	PLANTING BED	L12.0
CC	CEMENT CONCRETE	L9.0



KEY PLAN - ORNAMENTAL RAILING BETWEEN PIERS

SCALE: $\frac{1}{8}$" = 1' - 0"

BETWEEN PIERS



PROPOSED ORNAMENTAL RAILING BETWEEN PIERS ELEVATION

SCALE: $\frac{1}{4}$" = 1' - 0"

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FALL RIVER CITY PIER

Fall River, MA

TITLE

SECTIONS - 4

PRELIMINARY

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SCALE

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Not for Construction

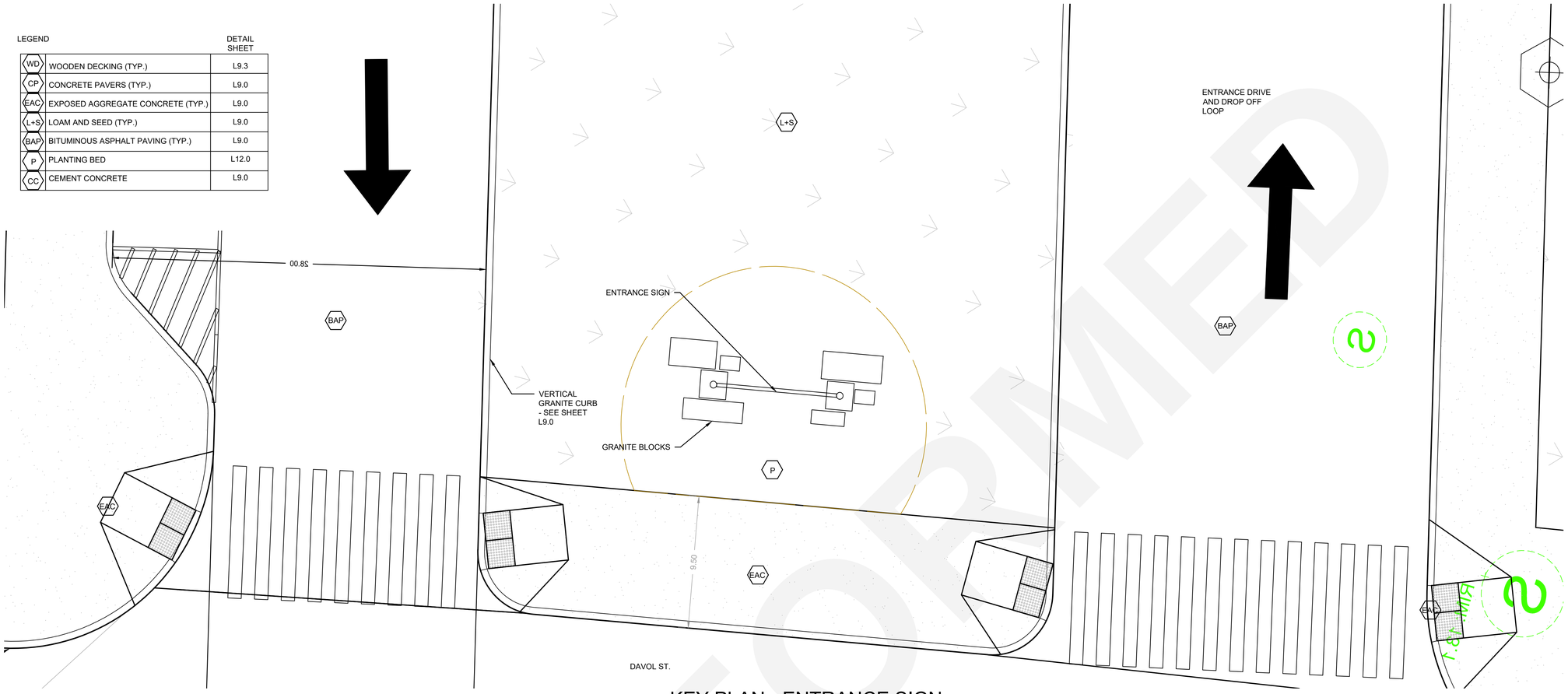
SHEET NO.

L10.3

11/4/2020 11:36 AM G:\PLANNING LANDSCAPE\7000\S7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\LA SECTIONS.DWG (BETA STB BW.STB)

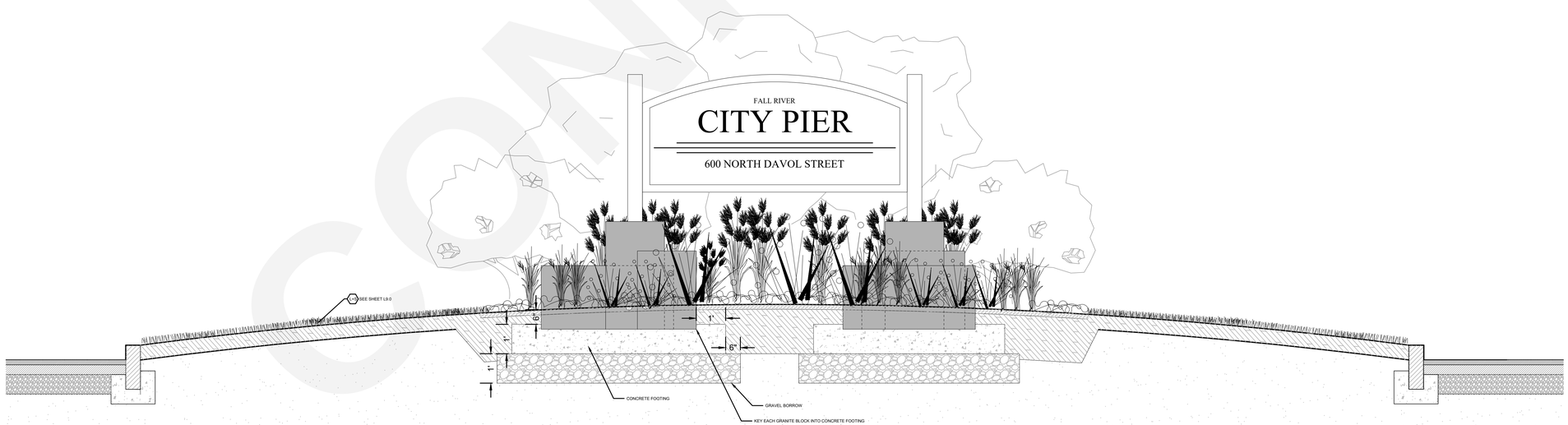
LEGEND

		DETAIL SHEET
WD	WOODEN DECKING (TYP.)	L9.3
CP	CONCRETE PAVERS (TYP.)	L9.0
EAC	EXPOSED AGGREGATE CONCRETE (TYP.)	L9.0
L+S	LOAM AND SEED (TYP.)	L9.0
BAP	BITUMINOUS ASPHALT PAVING (TYP.)	L9.0
P	PLANTING BED	L12.0
CC	CEMENT CONCRETE	L9.0



KEY PLAN - ENTRANCE SIGN

SCALE: $\frac{1}{4}$" = 1' - 0"



ENTRANCE SIGN ELEVATION

SCALE: $\frac{1}{2}$" = 1' - 0"

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FALL RIVER CITY PIER

Fall River, MA

TITLE

SECTIONS - 5

PRELIMINARY

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	Initials
ISSUE DATE:	00/00/15
BETA JOB NO.:	0000-000

SCALE

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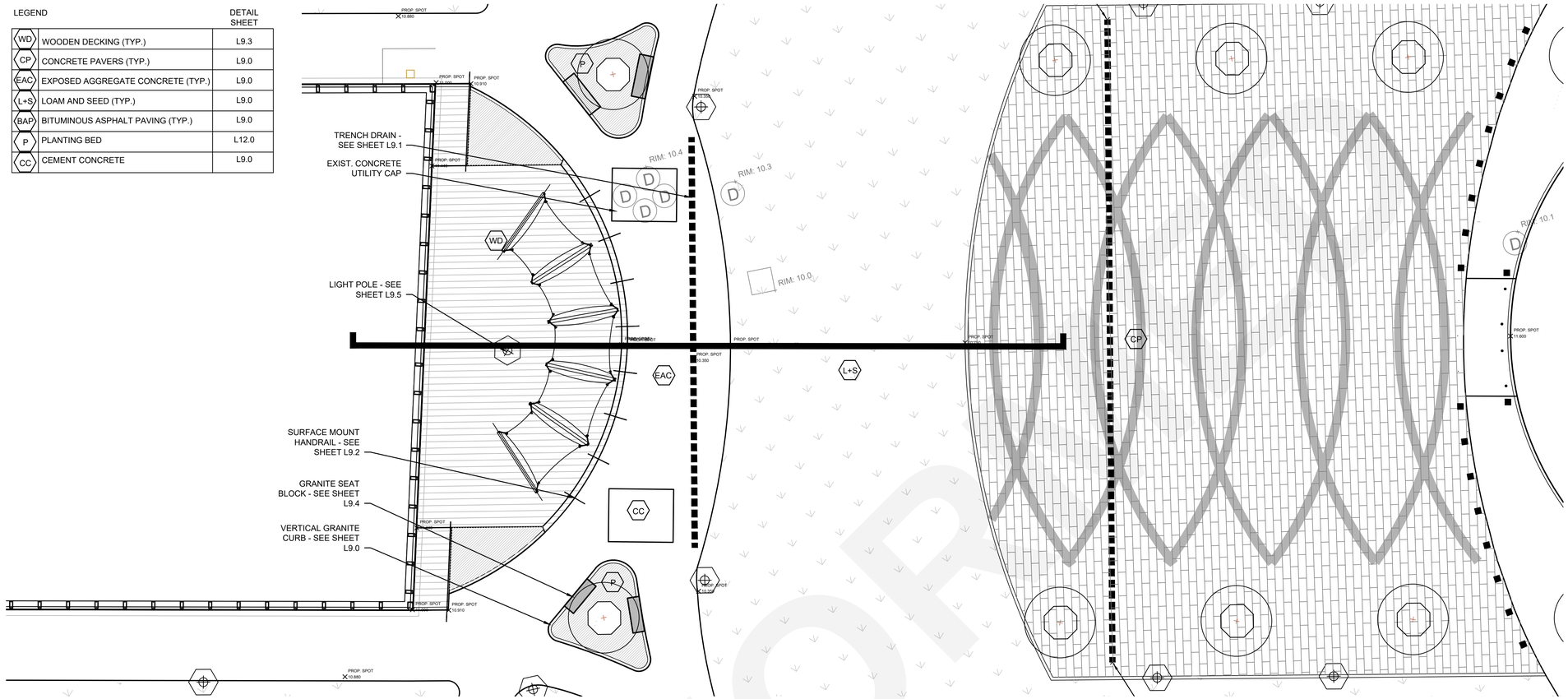
SHEET NO.

L10.4

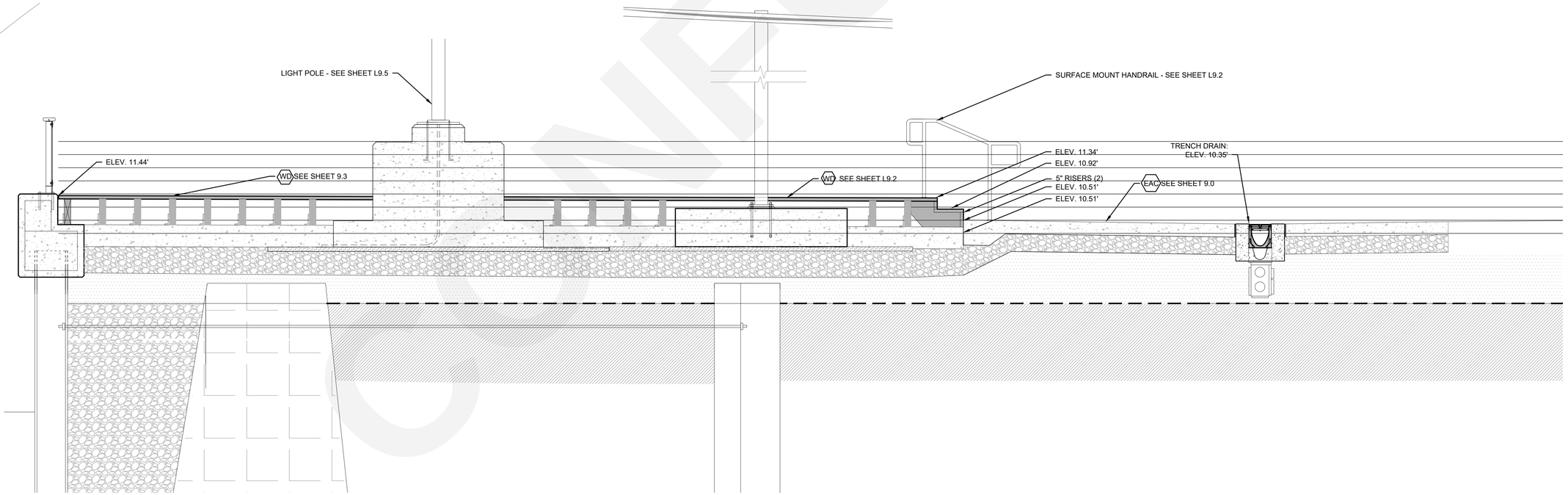
11/4/2020 11:39 AM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\LA SECTIONS.DWG (BETA STB BW.STB)

LEGEND		DETAIL SHEET
WD	WOODEN DECKING (TYP.)	L9.3
CP	CONCRETE PAVERS (TYP.)	L9.0
EAC	EXPOSED AGGREGATE CONCRETE (TYP.)	L9.0
L+S	LOAM AND SEED (TYP.)	L9.0
BAP	BITUMINOUS ASPHALT PAVING (TYP.)	L9.0
P	PLANTING BED	L12.0
CC	CEMENT CONCRETE	L9.0



KEY PLAN

SCALE: 1" = 10' - 0"



CENTER BOARWALK SECTION

SCALE: $\frac{1}{2}$" = 1' - 0"

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FALL RIVER CITY PIER

Fall River, MA

TITLE

SECTIONS - 6

PRELIMINARY

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	Initials
ISSUE DATE:	00/00/15
BETA JOB NO.:	0000-000

SCALE

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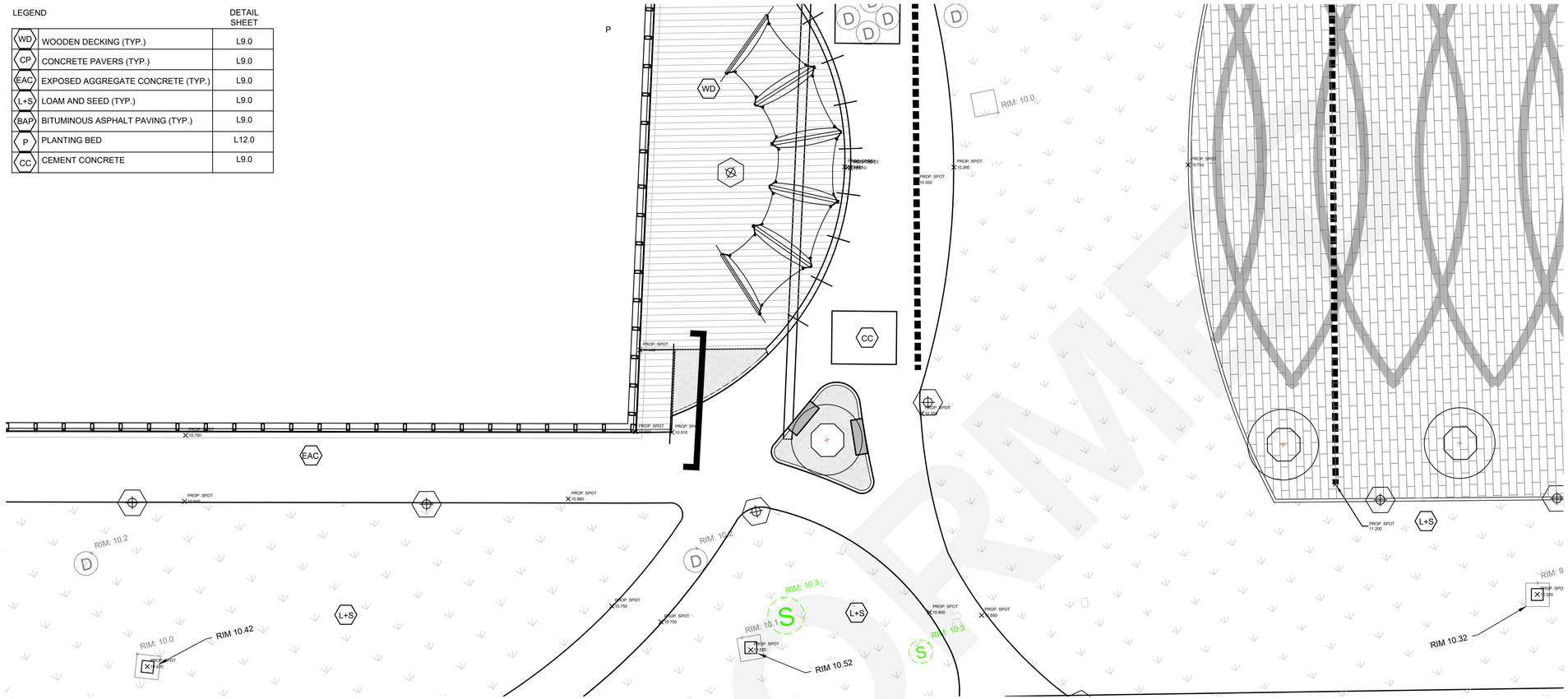
SHEET NO.

L10.5

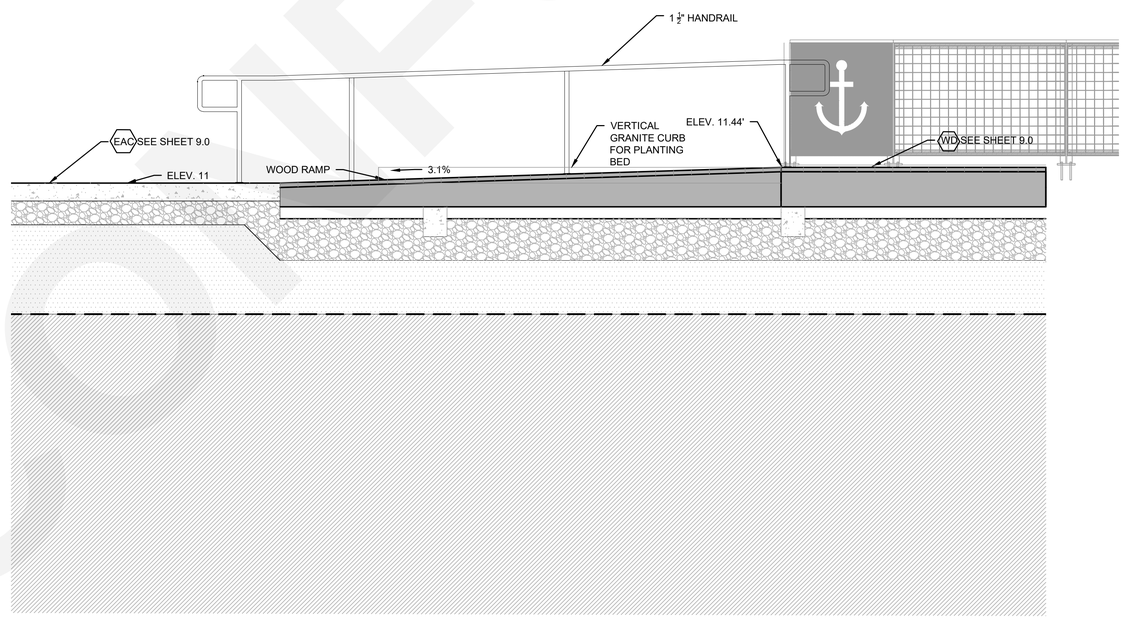
11/4/2020 11:41 AM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\LA SECTIONS.DWG (BETA STB BW.STB)

LEGEND		DETAIL SHEET
WD	WOODEN DECKING (TYP.)	L9.0
CP	CONCRETE PAVERS (TYP.)	L9.0
EAC	EXPOSED AGGREGATE CONCRETE (TYP.)	L9.0
L+S	LOAM AND SEED (TYP.)	L9.0
BAP	BITUMINOUS ASPHALT PAVING (TYP.)	L9.0
P	PLANTING BED	L12.0
CC	CEMENT CONCRETE	L9.0



KEY PLAN

SCALE: 1" = 10' - 0"



CENTER RAMP TRANSITION SECTION

SCALE: 1/2" = 1' - 0"

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FALL RIVER CITY PIER

Fall River, MA

TITLE

SECTIONS - 7

PRELIMINARY

NO.	REVISIONS	DATE

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CHECKED BY:	Initials
ISSUE DATE:	00/00/15
BETA JOB NO.:	0000-000

SCALE

AS SHOWN

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Not for Construction

SHEET NO.

L10.6

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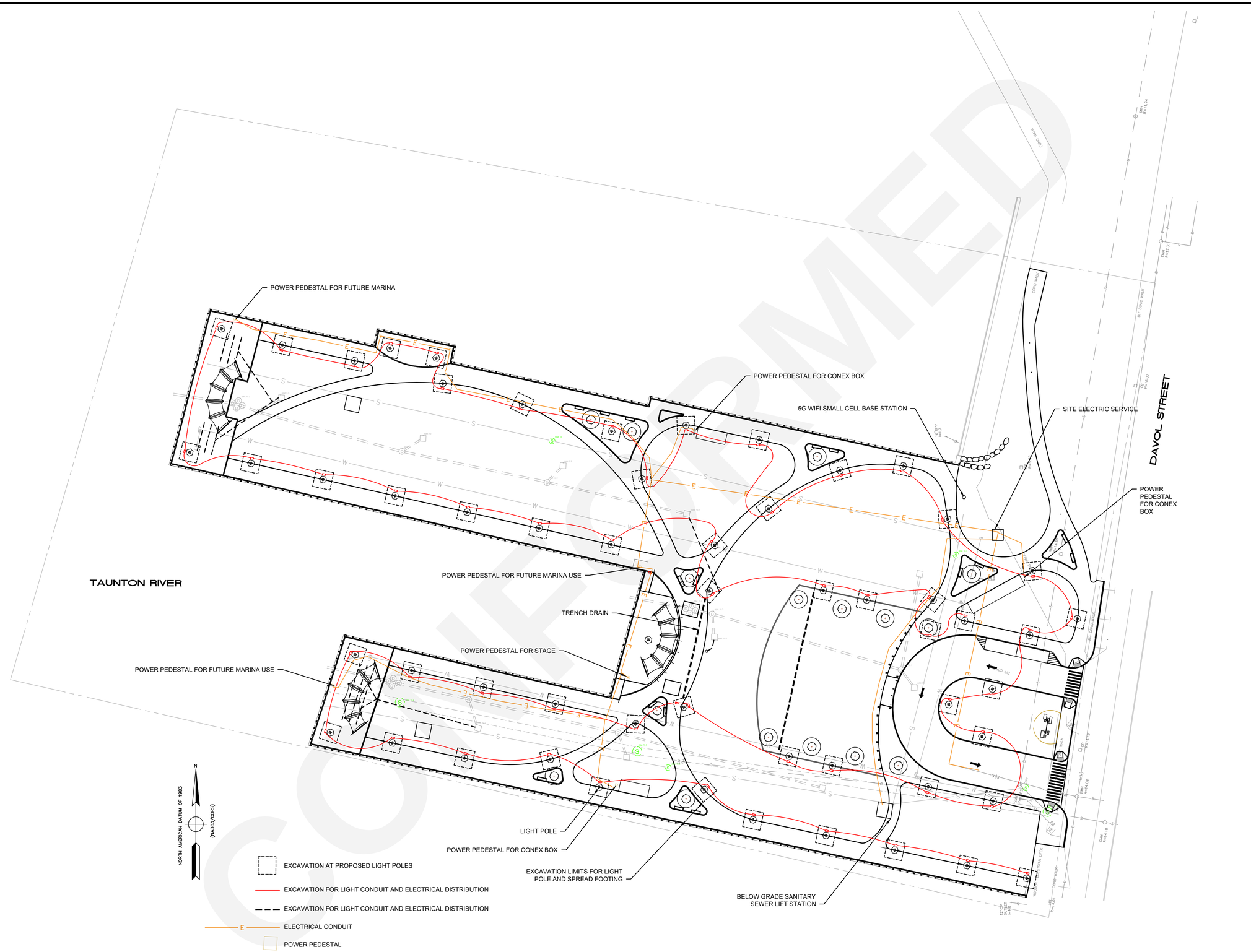
11/4/2020 11:42 AM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\LA SECTIONS.DWG (BETA STB BW.STB)



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FALL RIVER CITY PIER

Fall River, MA

TITLE

UTILITIES PLAN

PRELIMINARY

NO.	REVISIONS	DATE

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BETA JOB NO.:	0000-000

SCALE

HOR. SCALE IN FEET: 1"=30'

30 0 30 60

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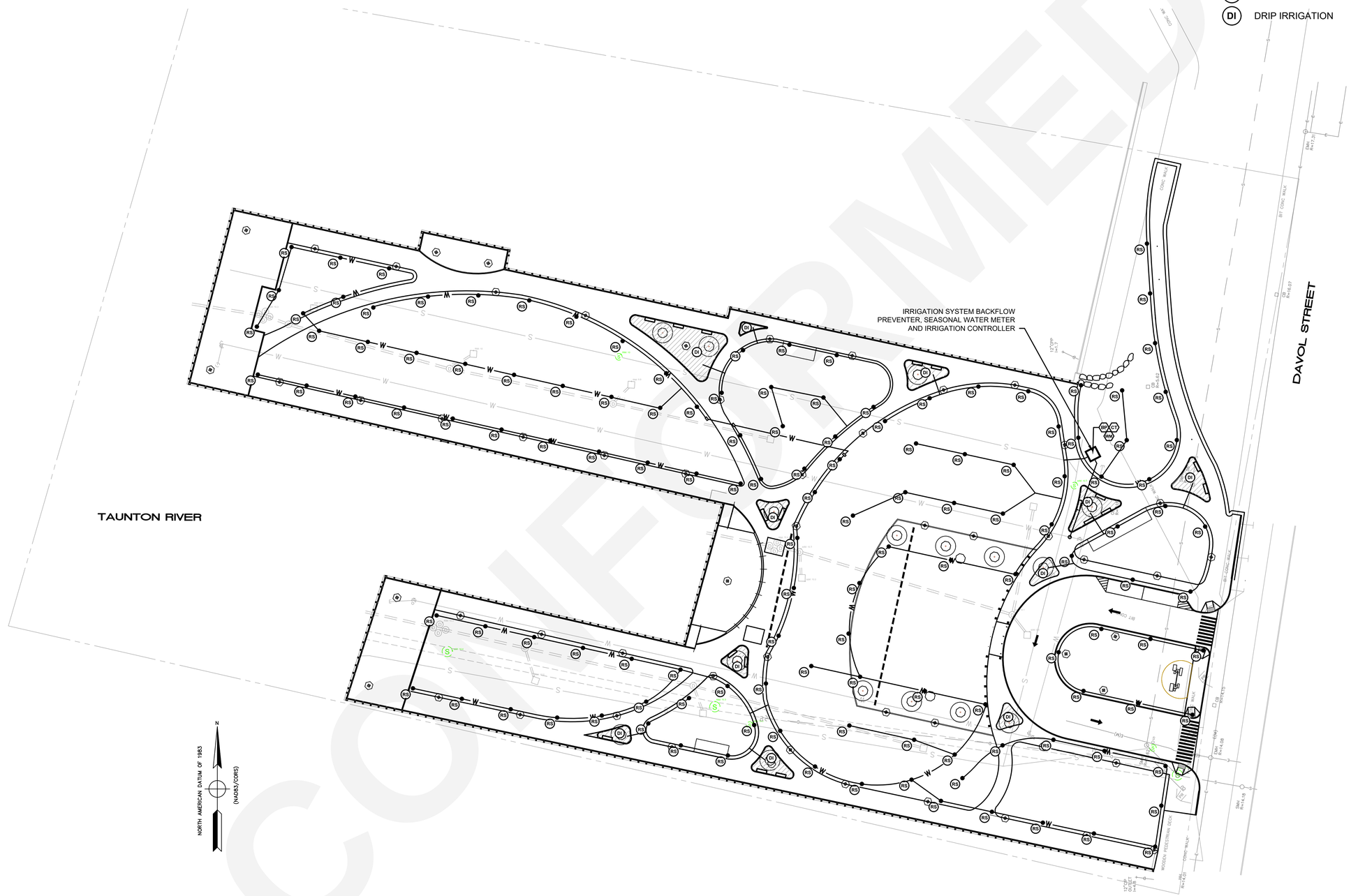
SHEET NO.

L11.0

11/4/2020 11:58 AM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\7171 - UTILITIES.DWG (BETA STB BW.STB)

LEGEND

- BP — BACK FLOW PREVENTER
- CT — IRRIGATION CONTROLLER
- WM — WATER METER
- RS — ROTOR SPRAY HEAD
- DI — DRIP IRRIGATION



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Fall River, MA

TITLE

IRRIGATION PLAN

PRELIMINARY

NO.	REVISIONS	DATE

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ISSUE DATE:	00/00/15
BETA JOB NO.:	0000-000

SCALE

HOR. SCALE IN FEET: 1"=30'

30 0 30 60

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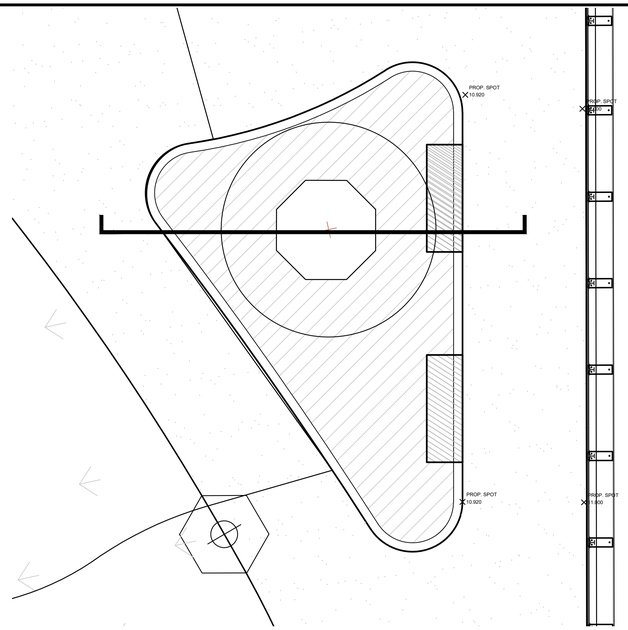
SHEET NO.

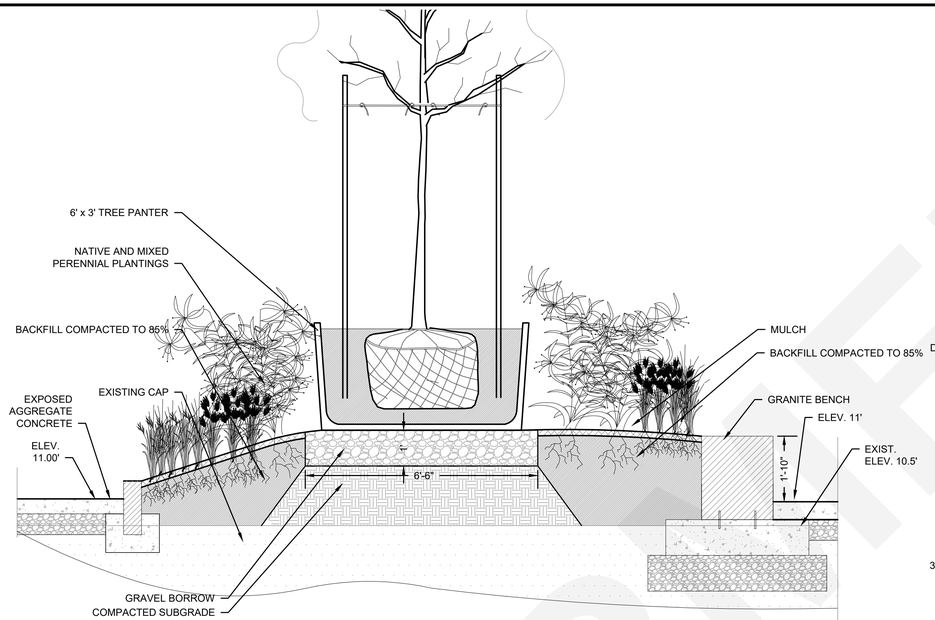
L11.1

11/4/2020 12:24 PM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\7171 - IRRIGATION.DWG (BETA STB BW.STB)



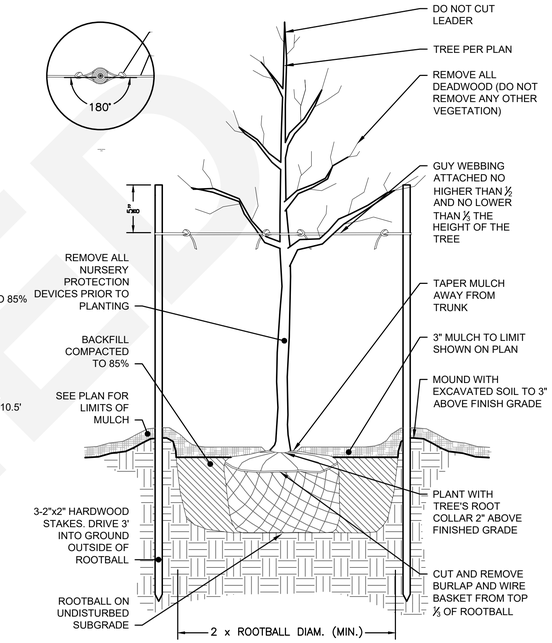
KEY PLAN - PLANTING BED

SCALE: $\frac{1}{4}$" = 1' - 0"



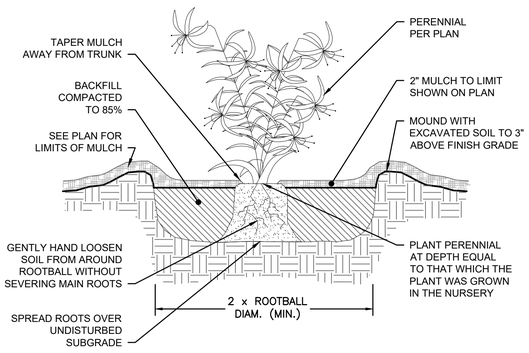
PLANTING BED SECTION

SCALE: $\frac{1}{2}$" = 1' - 0"



NOTE:
AFTER THE GUARANTEE PERIOD THE CONTRACTOR WILL BE RESPONSIBLE FOR THE REMOVAL OF STAKES AND GUY WEBBING.

DECIDUOUS TREE STAKING & PLANTING
NOT TO SCALE



PERENNIALS & GRASSES PLANTING
NOT TO SCALE

POTENTIAL PLANT PALETTE OPTIONS

MYRICA PENSYLVANICA
BAYBERRY
5-8' H X 5-8' W

PRUNUS MARITIMA
BEACH PLUM
5' H X 5' W

PENNISETUM ALOPECUROIDES
FOUNTAIN GRASS
3' H X 3' W

SCHIZACHYRIUM SCOPARIUM
LITTLE BLUESTEM
2-3' H X 1-2' W

RUDBECKIA HIRTA
BLACK EYED SUSAN
2-3' H X 1-2' W

PANICUM VARIGATUM
SWITCHGRASS
3-4' H X 2-3' W

ASTER NOVI-BELGII
NEW YORK ASTER
3' H X 3' W

ASCLEPIAS INCARNATA
PINK MILKWEED
3' H X 3' W

SISYRINCHIUM BELLUM
BLUE EYED GRASS
2' H X 1.5' W

HYDRANGEA PANICULATA
6' H X 8' W

PRECEDENT IMAGERY: NATIVE PLANTINGS WITH PERENNIALS

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PROJECT

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Fall River, MA

TITLE

PLANTING

PRELIMINARY

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
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ISSUE DATE:	00/00/15
BETA JOB NO.:	0000-000

SCALE

HOR. SCALE IN FEET: 1"=30'
30 0 30 60

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SHEET NO.

L12.0

11/4/2020 12:02 PM G:\PLANNING LANDSCAPE\7000\S7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\7171 - PLANTING.DWG (BETA STB BW.STB)

Appendix B
Laboratory Analytical Data

CONFORMED

CERTIFICATE OF ANALYSIS

Joe McLoughlin
Beta Engineering
701 George Washington Hwy 2nd FL
Lincoln, RI 02865

RE: FRRA - Fall River (7171)
ESS Laboratory Work Order Number: 20I0726

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

SAMPLE RECEIPT

The following samples were received on September 25, 2020 for the analyses specified on the enclosed Chain of Custody Record.

To achieve CAM compliance for MCP data, ESS Laboratory has reviewed all QA/QC Requirements and Performance Standards listed in each method. Holding times and preservation have also been reviewed. All CAM requirements have been performed and achieved unless noted in the project narrative.

Each method has been set-up in the laboratory to reach required MCP standards. The methods for aqueous VOA and Soil Methanol VOA have known limitations for certain analytes. The regulatory standards may not be achieved due to these limitations. In addition, for all methods, matrix interferences, dilutions, and %Solids may elevate method reporting limits above regulatory standards. ESS Laboratory can provide, upon request, a Limit Checker (regulatory standard comparison spreadsheet) electronic deliverable which will highlight these exceedances.

Question I: All samples for EPH and Metals were analyzed for a subset of the required MCP list per the client's request.

Low Level VOA vials were frozen by ESS Laboratory on September 25, 2020 at 11:55.

Lab Number	Sample Name	Matrix	Analysis
20I0726-01	C-1	Soil	6010C, 7471B, 8082A, 8100M, 8260B Low, 8270D
20I0726-02	C-2	Soil	6010C, 7471B, 8082A, 8100M, 8260B Low, 8270D
20I0726-03	C-3	Soil	6010C, 7471B, 8082A, 8100M, 8260B Low, 8270D
20I0726-04	C-4	Soil	6010C, 7471B, 8082A, 8100M, 8260B Low, 8270D
20I0726-05	C-5	Soil	6010C, 7471B, 8082A, 8100M, 8260B Low, 8270D
20I0726-06	C-6	Soil	6010C, 7471B, 8082A, 8100M, 8260B Low, 8270D
20I0726-07	C-7	Soil	6010C, 7471B, 8082A, 8100M, 8260B Low, 8270D
20I0726-08	C-8	Soil	6010C, 7471B, 8082A, 8100M, 8260B Low, 8270D
20I0726-09	C-9	Soil	6010C, 7471B, 8082A, 8100M, 8260B Low, 8270D
20I0726-10	C-10	Soil	6010C, 7471B, 8082A, 8100M, 8260B Low, 8270D
20I0726-11	C-11	Soil	6010C, 7471B, 8082A, 8100M, 8260B Low, 8270D
20I0726-12	C-12	Soil	6010C, 7471B, 8082A, 8100M, 8260B Low, 8270D
20I0726-13	C-13	Soil	6010C, 7471B, 8082A, 8100M, 8260B Low, 8270D

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

PROJECT NARRATIVE

5035/8260B Volatile Organic Compounds / Low Level

D0I0416-CCV1 **Continuing Calibration %Diff/Drift is below control limit (CD-).**
n-Propylbenzene (45% @ 20%)

DI02845-BS1 **Blank Spike recovery is below lower control limit (B-).**
Dichlorodifluoromethane (65% @ 70-130%), n-Propylbenzene (54% @ 70-130%)

DI02845-BSD1 **Blank Spike recovery is below lower control limit (B-).**
Dichlorodifluoromethane (66% @ 70-130%), n-Propylbenzene (55% @ 70-130%)

8270D Semi-Volatile Organic Compounds

D0I0342-CCV1 **Calibration required quadratic regression (Q).**
2,4-Dinitrophenol (72% @ 80-120%), Pentachlorophenol (108% @ 80-120%)

D0I0342-CCV1 **Continuing Calibration %Diff/Drift is below control limit (CD-).**
2,4-Dinitrophenol (28% @ 20%), N-Nitrosodimethylamine (25% @ 20%)

D0I0374-CCV1 **Calibration required quadratic regression (Q).**
2,4-Dinitrophenol (100% @ 80-120%), Pentachlorophenol (100% @ 80-120%)

D0I0374-CCV1 **Continuing Calibration %Diff/Drift is above control limit (CD+).**
Benzo(g,h,i)perylene (22% @ 20%)

D0I0440-CCV1 **Calibration required quadratic regression (Q).**
2,4-Dinitrophenol (109% @ 80-120%), Pentachlorophenol (128% @ 80-120%)

D0I0440-CCV1 **Continuing Calibration %Diff/Drift is above control limit (CD+).**
Pentachlorophenol (28% @ 20%)

D0I0440-CCV1 **Continuing Calibration %Diff/Drift is below control limit (CD-).**
Aniline (25% @ 20%)

DI02427-BS1 **Blank Spike recovery is below lower control limit (B-).**
Aniline (34% @ 40-140%)

DI02427-BSD1 **Blank Spike recovery is below lower control limit (B-).**
Aniline (36% @ 40-140%)

DI02511-BS1 **Blank Spike recovery is below lower control limit (B-).**
Aniline (37% @ 40-140%)

DI02511-BSD1 **Blank Spike recovery is below lower control limit (B-).**
Aniline (37% @ 40-140%)

Total Metals

20I0726-01 **Elevated Method Reporting Limits due to sample matrix (EL).**
20I0726-02 **Elevated Method Reporting Limits due to sample matrix (EL).**
20I0726-03 **Elevated Method Reporting Limits due to sample matrix (EL).**
Silver
20I0726-04 **Elevated Method Reporting Limits due to sample matrix (EL).**
20I0726-05 **Elevated Method Reporting Limits due to sample matrix (EL).**
20I0726-06 **Elevated Method Reporting Limits due to sample matrix (EL).**
20I0726-11 **Elevated Method Reporting Limits due to sample matrix (EL).**
20I0726-12 **Elevated Method Reporting Limits due to sample matrix (EL).**

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River ESS Laboratory Work Order: 20I0726
20I0726-13 **Elevated Method Reporting Limits due to sample matrix (EL).**

No other observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

MassDEP Analytical Protocol Certification Form

MADEP RTN: _____

This form provides certification for the following data set: **20I0726-01 through 20I0726-13**

Matrices: ( ) Ground Water/Surface Water (X) Soil/Sediment ( ) Drinking Water ( ) Air ( ) Other:_____

CAM Protocol (check all that apply below):

(X) 8260 VOC CAM II A	(X) 7470/7471 Hg CAM III B	( ) MassDEP VPH (GC/PID/FID) CAM IV A	(X) 8082 PCB CAM V A	( ) 9014 Total Cyanide/PAC CAM VI A	( ) 6860 Perchlorate CAM VIII B
(X) 8270 SVOC CAM II B	( ) 7010 Metals CAM III C	( ) MassDEP VPH (GC/MS) CAM IV C	( ) 8081 Pesticides CAM V B	( ) 7196 Hex Cr CAM VI B	( ) MassDEP APH CAM IX A
(X) 6010 Metals CAM III A	( ) 6020 Metals CAM III D	(X) MassDEP EPH CAM IV B	( ) 8151 Herbicides CAM V C	( ) Explosives CAM VIII A	( ) TO-15 VOC CAM IX B

Affirmative responses to questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	Yes (X) No ( )
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	Yes (X) No ( )
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	Yes (X) No ( )
D	Does the laboratory report comply with all the reporting requirements specified in the CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	Yes (X) No ( )
E	VPH, EPH, APH and TO-15 only: a. Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	Yes (X) No ( )
	b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	Yes ( ) No ( )
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	Yes (X) No ( )

Responses to Questions G, H and I below are required for '"Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocols(s)?	Yes ( ) No (X)*
	Data User Note: ***Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.***	
H	Were **all** QC performance standards specified in the CAM protocol(s) achieved?	Yes ( ) No (X)*
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	Yes ( ) No (X)*

****All negative responses must be addressed in an attached laboratory narrative.***

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: _____ Date: October 05, 2020

Printed Name: Laurel Stoddard Position: Laboratory Director

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-1
Date Sampled: 09/24/20 09:00
Percent Solids: 98

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-01
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Arsenic	ND (4.92)		6010C		2	KJK	10/01/20 17:08	2.08	100	DI02530
Barium	**8.49** (4.92)		6010C		2	KJK	10/01/20 17:08	2.08	100	DI02530
Cadmium	ND (0.98)		6010C		2	KJK	10/01/20 17:08	2.08	100	DI02530
Chromium	ND (1.97)		6010C		2	KJK	10/01/20 17:08	2.08	100	DI02530
Lead	ND (9.84)		6010C		2	KJK	10/01/20 17:08	2.08	100	DI02530
Mercury	ND (0.033)		7471B		1	MKS	09/28/20 12:07	0.61	40	DI02519
Selenium	ND (9.84)		6010C		2	KJK	10/01/20 17:08	2.08	100	DI02530
Silver	ND (0.98)		6010C		2	KJK	10/01/20 17:08	2.08	100	DI02530

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-1
Date Sampled: 09/24/20 09:00
Percent Solids: 98
Initial Volume: 8.1
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,1,1-Trichloroethane	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,1,2,2-Tetrachloroethane	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,1,2-Trichloroethane	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,1-Dichloroethane	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,1-Dichloroethene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,1-Dichloropropene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,2,3-Trichlorobenzene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,2,3-Trichloropropane	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,2,4-Trichlorobenzene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,2,4-Trimethylbenzene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,2-Dibromo-3-Chloropropane	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,2-Dibromoethane	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,2-Dichlorobenzene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,2-Dichloroethane	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,2-Dichloropropane	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,3,5-Trimethylbenzene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,3-Dichlorobenzene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,3-Dichloropropane	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,4-Dichlorobenzene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
1,4-Dioxane	ND (0.0505)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
2,2-Dichloropropane	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
2-Butanone	ND (0.0316)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
2-Chlorotoluene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
2-Hexanone	ND (0.0316)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
4-Chlorotoluene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
4-Isopropyltoluene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
4-Methyl-2-Pentanone	ND (0.0316)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Acetone	ND (0.0316)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Benzene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Bromobenzene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Bromochloromethane	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-1
Date Sampled: 09/24/20 09:00
Percent Solids: 98
Initial Volume: 8.1
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Bromoform	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Bromomethane	ND (0.0063)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Carbon Disulfide	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Carbon Tetrachloride	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Chlorobenzene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Chloroethane	ND (0.0063)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Chloroform	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Chloromethane	ND (0.0063)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
cis-1,2-Dichloroethene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
cis-1,3-Dichloropropene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Dibromochloromethane	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Dibromomethane	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Dichlorodifluoromethane	ND (0.0063)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Diethyl Ether	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Di-isopropyl ether	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Ethyl tertiary-butyl ether	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Ethylbenzene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Hexachlorobutadiene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Isopropylbenzene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Methyl tert-Butyl Ether	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Methylene Chloride	ND (0.0158)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Naphthalene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
n-Butylbenzene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
n-Propylbenzene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
sec-Butylbenzene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Styrene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
tert-Butylbenzene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Tertiary-amyl methyl ether	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Tetrachloroethene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Tetrahydrofuran	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Toluene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-1
Date Sampled: 09/24/20 09:00
Percent Solids: 98
Initial Volume: 8.1
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
trans-1,2-Dichloroethene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
trans-1,3-Dichloropropene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Trichloroethene	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Trichlorofluoromethane	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Vinyl Chloride	ND (0.0063)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Xylene O	ND (0.0032)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Xylene P,M	ND (0.0063)		8260B Low		1	09/28/20 14:27	D0I0416	DI02845
Xylenes (Total)	ND (0.00632)		8260B Low		1	09/28/20 14:27		[CALC]

	%Recovery	*Qualifier*	*Limits*
Surrogate: 1,2-Dichloroethane-d4	*101 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*100 %*		*70-130*
Surrogate: Dibromofluoromethane	*99 %*		*70-130*
Surrogate: Toluene-d8	*90 %*		*70-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-1
Date Sampled: 09/24/20 09:00
Percent Solids: 98
Initial Volume: 20.9
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MJV
Prepared: 9/25/20 13:25

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.05)		8082A		1	09/28/20 17:55		DI02420
Aroclor 1221	ND (0.05)		8082A		1	09/28/20 17:55		DI02420
Aroclor 1232	ND (0.05)		8082A		1	09/28/20 17:55		DI02420
Aroclor 1242	ND (0.05)		8082A		1	09/28/20 17:55		DI02420
Aroclor 1248	ND (0.05)		8082A		1	09/28/20 17:55		DI02420
Aroclor 1254	ND (0.05)		8082A		1	09/28/20 17:55		DI02420
Aroclor 1260	ND (0.05)		8082A		1	09/28/20 17:55		DI02420
Aroclor 1262	ND (0.05)		8082A		1	09/28/20 17:55		DI02420
Aroclor 1268	ND (0.05)		8082A		1	09/28/20 17:55		DI02420

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*75 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*68 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*63 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*63 %*		*30-150*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-1
Date Sampled: 09/24/20 09:00
Percent Solids: 98
Initial Volume: 19.5
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: NXL
Prepared: 9/25/20 13:30

8100M Total Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Total Petroleum Hydrocarbons	ND (10.5)		8100M		1	09/29/20 11:56	D0I0410	DI02512

	%Recovery	Qualifier	Limits
Surrogate: O-Terphenyl	*81 %*		*40-140*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-1
Date Sampled: 09/24/20 09:00
Percent Solids: 98
Initial Volume: 14.7
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,2,4-Trichlorobenzene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
1,2-Dichlorobenzene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
1,3-Dichlorobenzene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
1,4-Dichlorobenzene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
2,4,5-Trichlorophenol	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
2,4,6-Trichlorophenol	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
2,4-Dichlorophenol	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
2,4-Dimethylphenol	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
2,4-Dinitrophenol	ND (1.74)		8270D		1	09/25/20 22:16	D0I0374	DI02427
2,4-Dinitrotoluene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
2,6-Dinitrotoluene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
2-Chloronaphthalene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
2-Chlorophenol	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
2-Methylnaphthalene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
2-Methylphenol	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
2-Nitrophenol	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
3,3´-Dichlorobenzidine	ND (0.696)		8270D		1	09/25/20 22:16	D0I0374	DI02427
3+4-Methylphenol	ND (0.696)		8270D		1	09/25/20 22:16	D0I0374	DI02427
4-Bromophenyl-phenylether	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
4-Chloroaniline	ND (0.696)		8270D		1	09/25/20 22:16	D0I0374	DI02427
4-Nitrophenol	ND (1.74)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Acenaphthene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Acenaphthylene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Acetophenone	ND (0.696)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Aniline	ND (1.74)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Anthracene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Azobenzene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Benzo(a)anthracene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Benzo(a)pyrene	ND (0.174)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Benzo(b)fluoranthene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Benzo(g,h,i)perylene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Benzo(k)fluoranthene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-1
Date Sampled: 09/24/20 09:00
Percent Solids: 98
Initial Volume: 14.7
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
bis(2-Chloroethoxy)methane	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
bis(2-Chloroethyl)ether	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
bis(2-chloroisopropyl)Ether	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
bis(2-Ethylhexyl)phthalate	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Butylbenzylphthalate	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Chrysene	ND (0.174)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Dibenzo(a,h)Anthracene	ND (0.174)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Dibenzofuran	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Diethylphthalate	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Dimethylphthalate	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Di-n-butylphthalate	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Di-n-octylphthalate	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Fluoranthene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Fluorene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Hexachlorobenzene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Hexachlorobutadiene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Hexachloroethane	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Indeno(1,2,3-cd)Pyrene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Isophorone	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Naphthalene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Nitrobenzene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
N-Nitrosodimethylamine	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Pentachlorophenol	ND (1.74)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Phenanthrene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Phenol	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427
Pyrene	ND (0.348)		8270D		1	09/25/20 22:16	D0I0374	DI02427

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichlorobenzene-d4	*55 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*59 %*		*30-130*
Surrogate: 2-Chlorophenol-d4	*57 %*		*30-130*
Surrogate: 2-Fluorobiphenyl	*64 %*		*30-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-1
Date Sampled: 09/24/20 09:00
Percent Solids: 98
Initial Volume: 14.7
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Surrogate: 2-Fluorophenol		*55 %*		*30-130*				
Surrogate: Nitrobenzene-d5		*52 %*		*30-130*				
Surrogate: Phenol-d6		*55 %*		*30-130*				
Surrogate: p-Terphenyl-d14		*79 %*		*30-130*				

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-2
Date Sampled: 09/24/20 09:30
Percent Solids: 99

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-02
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Arsenic	ND (4.11)		6010C		2	KJK	10/01/20 17:46	2.46	100	DI02530
Barium	**8.42** (4.11)		6010C		2	KJK	10/01/20 17:46	2.46	100	DI02530
Cadmium	ND (0.82)		6010C		2	KJK	10/01/20 17:46	2.46	100	DI02530
Chromium	ND (1.64)		6010C		2	KJK	10/01/20 17:46	2.46	100	DI02530
Lead	ND (8.22)		6010C		2	KJK	10/01/20 17:46	2.46	100	DI02530
Mercury	ND (0.029)		7471B		1	MKS	09/28/20 12:17	0.69	40	DI02519
Selenium	ND (8.22)		6010C		2	KJK	10/01/20 17:46	2.46	100	DI02530
Silver	ND (0.82)		6010C		2	KJK	10/01/20 17:46	2.46	100	DI02530

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-2
Date Sampled: 09/24/20 09:30
Percent Solids: 99
Initial Volume: 7.1
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-02
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,1,1-Trichloroethane	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,1,2,2-Tetrachloroethane	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,1,2-Trichloroethane	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,1-Dichloroethane	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,1-Dichloroethene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,1-Dichloropropene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,2,3-Trichlorobenzene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,2,3-Trichloropropane	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,2,4-Trichlorobenzene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,2,4-Trimethylbenzene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,2-Dibromo-3-Chloropropane	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,2-Dibromoethane	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,2-Dichlorobenzene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,2-Dichloroethane	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,2-Dichloropropane	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,3,5-Trimethylbenzene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,3-Dichlorobenzene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,3-Dichloropropane	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,4-Dichlorobenzene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
1,4-Dioxane	ND (0.0570)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
2,2-Dichloropropane	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
2-Butanone	ND (0.0356)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
2-Chlorotoluene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
2-Hexanone	ND (0.0356)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
4-Chlorotoluene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
4-Isopropyltoluene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
4-Methyl-2-Pentanone	ND (0.0356)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Acetone	ND (0.0356)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Benzene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Bromobenzene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Bromochloromethane	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-2
Date Sampled: 09/24/20 09:30
Percent Solids: 99
Initial Volume: 7.1
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-02
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Bromoform	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Bromomethane	ND (0.0071)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Carbon Disulfide	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Carbon Tetrachloride	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Chlorobenzene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Chloroethane	ND (0.0071)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Chloroform	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Chloromethane	ND (0.0071)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
cis-1,2-Dichloroethene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
cis-1,3-Dichloropropene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Dibromochloromethane	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Dibromomethane	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Dichlorodifluoromethane	ND (0.0071)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Diethyl Ether	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Di-isopropyl ether	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Ethyl tertiary-butyl ether	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Ethylbenzene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Hexachlorobutadiene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Isopropylbenzene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Methyl tert-Butyl Ether	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Methylene Chloride	ND (0.0178)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Naphthalene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
n-Butylbenzene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
n-Propylbenzene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
sec-Butylbenzene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Styrene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
tert-Butylbenzene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Tertiary-amyl methyl ether	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Tetrachloroethene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Tetrahydrofuran	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Toluene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-2
Date Sampled: 09/24/20 09:30
Percent Solids: 99
Initial Volume: 7.1
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-02
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
trans-1,2-Dichloroethene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
trans-1,3-Dichloropropene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Trichloroethene	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Trichlorofluoromethane	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Vinyl Chloride	ND (0.0071)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Xylene O	ND (0.0036)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Xylene P,M	ND (0.0071)		8260B Low		1	09/28/20 14:53	D0I0416	DI02845
Xylenes (Total)	ND (0.00712)		8260B Low		1	09/28/20 14:53		[CALC]

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*102 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*100 %*		*70-130*
Surrogate: Dibromofluoromethane	*100 %*		*70-130*
Surrogate: Toluene-d8	*90 %*		*70-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-2
Date Sampled: 09/24/20 09:30
Percent Solids: 99
Initial Volume: 19.1
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-02
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MJV
Prepared: 9/25/20 13:25

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.05)		8082A		1	09/28/20 18:15		DI02420
Aroclor 1221	ND (0.05)		8082A		1	09/28/20 18:15		DI02420
Aroclor 1232	ND (0.05)		8082A		1	09/28/20 18:15		DI02420
Aroclor 1242	ND (0.05)		8082A		1	09/28/20 18:15		DI02420
Aroclor 1248	ND (0.05)		8082A		1	09/28/20 18:15		DI02420
Aroclor 1254	ND (0.05)		8082A		1	09/28/20 18:15		DI02420
Aroclor 1260	ND (0.05)		8082A		1	09/28/20 18:15		DI02420
Aroclor 1262	ND (0.05)		8082A		1	09/28/20 18:15		DI02420
Aroclor 1268	ND (0.05)		8082A		1	09/28/20 18:15		DI02420

	%Recovery	*Qualifier*	*Limits*
Surrogate: Decachlorobiphenyl	*81 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*72 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*79 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*82 %*		*30-150*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-2
Date Sampled: 09/24/20 09:30
Percent Solids: 99
Initial Volume: 20.9
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-02
Sample Matrix: Soil
Units: mg/kg dry
Analyst: NXL
Prepared: 9/25/20 13:30

8100M Total Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Total Petroleum Hydrocarbons	ND (9.7)		8100M		1	09/29/20 12:28	D0I0410	DI02512

	%Recovery	Qualifier	Limits
Surrogate: O-Terphenyl	*79 %*		*40-140*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-2
Date Sampled: 09/24/20 09:30
Percent Solids: 99
Initial Volume: 14.4
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-02
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,2,4-Trichlorobenzene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
1,2-Dichlorobenzene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
1,3-Dichlorobenzene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
1,4-Dichlorobenzene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
2,4,5-Trichlorophenol	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
2,4,6-Trichlorophenol	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
2,4-Dichlorophenol	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
2,4-Dimethylphenol	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
2,4-Dinitrophenol	ND (1.76)		8270D		1	09/25/20 22:45	D0I0374	DI02427
2,4-Dinitrotoluene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
2,6-Dinitrotoluene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
2-Chloronaphthalene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
2-Chlorophenol	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
2-Methylnaphthalene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
2-Methylphenol	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
2-Nitrophenol	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
3,3´-Dichlorobenzidine	ND (0.703)		8270D		1	09/25/20 22:45	D0I0374	DI02427
3+4-Methylphenol	ND (0.703)		8270D		1	09/25/20 22:45	D0I0374	DI02427
4-Bromophenyl-phenylether	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
4-Chloroaniline	ND (0.703)		8270D		1	09/25/20 22:45	D0I0374	DI02427
4-Nitrophenol	ND (1.76)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Acenaphthene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Acenaphthylene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Acetophenone	ND (0.703)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Aniline	ND (1.76)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Anthracene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Azobenzene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Benzo(a)anthracene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Benzo(a)pyrene	ND (0.176)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Benzo(b)fluoranthene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Benzo(g,h,i)perylene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Benzo(k)fluoranthene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-2
Date Sampled: 09/24/20 09:30
Percent Solids: 99
Initial Volume: 14.4
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-02
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
bis(2-Chloroethoxy)methane	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
bis(2-Chloroethyl)ether	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
bis(2-chloroisopropyl)Ether	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
bis(2-Ethylhexyl)phthalate	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Butylbenzylphthalate	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Chrysene	ND (0.176)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Dibenzo(a,h)Anthracene	ND (0.176)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Dibenzofuran	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Diethylphthalate	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Dimethylphthalate	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Di-n-butylphthalate	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Di-n-octylphthalate	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Fluoranthene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Fluorene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Hexachlorobenzene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Hexachlorobutadiene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Hexachloroethane	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Indeno(1,2,3-cd)Pyrene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Isophorone	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Naphthalene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Nitrobenzene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
N-Nitrosodimethylamine	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Pentachlorophenol	ND (1.76)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Phenanthrene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Phenol	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427
Pyrene	ND (0.351)		8270D		1	09/25/20 22:45	D0I0374	DI02427

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichlorobenzene-d4	*58 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*57 %*		*30-130*
Surrogate: 2-Chlorophenol-d4	*59 %*		*30-130*
Surrogate: 2-Fluorobiphenyl	*66 %*		*30-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-2
Date Sampled: 09/24/20 09:30
Percent Solids: 99
Initial Volume: 14.4
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-02
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Surrogate: 2-Fluorophenol		*57 %*		*30-130*				
Surrogate: Nitrobenzene-d5		*55 %*		*30-130*				
Surrogate: Phenol-d6		*57 %*		*30-130*				
Surrogate: p-Terphenyl-d14		*77 %*		*30-130*				

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-3
Date Sampled: 09/24/20 10:00
Percent Solids: 97

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-03
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Arsenic	ND (6.18)		6010C		3	KJK	10/02/20 18:14	2.49	100	DI02530
Barium	**9.18** (6.18)		6010C		3	KJK	10/02/20 18:14	2.49	100	DI02530
Cadmium	ND (1.24)		6010C		3	KJK	10/02/20 18:14	2.49	100	DI02530
Chromium	ND (2.47)		6010C		3	KJK	10/02/20 18:14	2.49	100	DI02530
Lead	ND (12.4)		6010C		3	KJK	10/02/20 18:14	2.49	100	DI02530
Mercury	ND (0.028)		7471B		1	MKS	09/28/20 12:32	0.72	40	DI02519
Selenium	ND (12.4)		6010C		3	KJK	10/02/20 18:14	2.49	100	DI02530
Silver	**EL** ND (1.24)		6010C		3	KJK	10/02/20 18:14	2.49	100	DI02530

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-3
Date Sampled: 09/24/20 10:00
Percent Solids: 97
Initial Volume: 6.4
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-03
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,1,1-Trichloroethane	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,1,2,2-Tetrachloroethane	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,1,2-Trichloroethane	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,1-Dichloroethane	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,1-Dichloroethene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,1-Dichloropropene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,2,3-Trichlorobenzene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,2,3-Trichloropropane	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,2,4-Trichlorobenzene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,2,4-Trimethylbenzene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,2-Dibromo-3-Chloropropane	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,2-Dibromoethane	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,2-Dichlorobenzene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,2-Dichloroethane	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,2-Dichloropropane	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,3,5-Trimethylbenzene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,3-Dichlorobenzene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,3-Dichloropropane	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,4-Dichlorobenzene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
1,4-Dioxane	ND (0.0641)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
2,2-Dichloropropane	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
2-Butanone	ND (0.0401)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
2-Chlorotoluene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
2-Hexanone	ND (0.0401)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
4-Chlorotoluene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
4-Isopropyltoluene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
4-Methyl-2-Pentanone	ND (0.0401)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Acetone	ND (0.0401)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Benzene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Bromobenzene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Bromochloromethane	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-3
Date Sampled: 09/24/20 10:00
Percent Solids: 97
Initial Volume: 6.4
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-03
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Bromoform	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Bromomethane	ND (0.0080)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Carbon Disulfide	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Carbon Tetrachloride	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Chlorobenzene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Chloroethane	ND (0.0080)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Chloroform	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Chloromethane	ND (0.0080)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
cis-1,2-Dichloroethene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
cis-1,3-Dichloropropene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Dibromochloromethane	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Dibromomethane	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Dichlorodifluoromethane	ND (0.0080)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Diethyl Ether	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Di-isopropyl ether	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Ethyl tertiary-butyl ether	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Ethylbenzene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Hexachlorobutadiene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Isopropylbenzene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Methyl tert-Butyl Ether	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Methylene Chloride	ND (0.0200)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Naphthalene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
n-Butylbenzene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
n-Propylbenzene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
sec-Butylbenzene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Styrene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
tert-Butylbenzene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Tertiary-amyl methyl ether	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Tetrachloroethene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Tetrahydrofuran	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Toluene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-3
Date Sampled: 09/24/20 10:00
Percent Solids: 97
Initial Volume: 6.4
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-03
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
trans-1,2-Dichloroethene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
trans-1,3-Dichloropropene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Trichloroethene	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Trichlorofluoromethane	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Vinyl Chloride	ND (0.0080)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Xylene O	ND (0.0040)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Xylene P,M	ND (0.0080)		8260B Low		1	09/28/20 15:18	D0I0416	DI02845
Xylenes (Total)	ND (0.00801)		8260B Low		1	09/28/20 15:18		[CALC]

	%Recovery	*Qualifier*	*Limits*
Surrogate: 1,2-Dichloroethane-d4	*102 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*100 %*		*70-130*
Surrogate: Dibromofluoromethane	*101 %*		*70-130*
Surrogate: Toluene-d8	*90 %*		*70-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-3
Date Sampled: 09/24/20 10:00
Percent Solids: 97
Initial Volume: 19
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-03
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MJV
Prepared: 9/25/20 13:25

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.05)		8082A		1	09/28/20 18:34		DI02420
Aroclor 1221	ND (0.05)		8082A		1	09/28/20 18:34		DI02420
Aroclor 1232	ND (0.05)		8082A		1	09/28/20 18:34		DI02420
Aroclor 1242	ND (0.05)		8082A		1	09/28/20 18:34		DI02420
Aroclor 1248	ND (0.05)		8082A		1	09/28/20 18:34		DI02420
Aroclor 1254	ND (0.05)		8082A		1	09/28/20 18:34		DI02420
Aroclor 1260	ND (0.05)		8082A		1	09/28/20 18:34		DI02420
Aroclor 1262	ND (0.05)		8082A		1	09/28/20 18:34		DI02420
Aroclor 1268	ND (0.05)		8082A		1	09/28/20 18:34		DI02420

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*76 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*71 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*78 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*80 %*		*30-150*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-3
Date Sampled: 09/24/20 10:00
Percent Solids: 97
Initial Volume: 19.2
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-03
Sample Matrix: Soil
Units: mg/kg dry
Analyst: NXL
Prepared: 9/25/20 13:30

8100M Total Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Total Petroleum Hydrocarbons	ND (10.7)		8100M		1	09/29/20 13:01	D0I0410	DI02512

	%Recovery	Qualifier	Limits
Surrogate: O-Terphenyl	*84 %*		*40-140*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-3
Date Sampled: 09/24/20 10:00
Percent Solids: 97
Initial Volume: 14.2
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-03
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,2,4-Trichlorobenzene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
1,2-Dichlorobenzene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
1,3-Dichlorobenzene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
1,4-Dichlorobenzene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
2,4,5-Trichlorophenol	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
2,4,6-Trichlorophenol	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
2,4-Dichlorophenol	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
2,4-Dimethylphenol	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
2,4-Dinitrophenol	ND (1.81)		8270D		1	09/25/20 23:14	D0I0374	DI02427
2,4-Dinitrotoluene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
2,6-Dinitrotoluene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
2-Chloronaphthalene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
2-Chlorophenol	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
2-Methylnaphthalene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
2-Methylphenol	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
2-Nitrophenol	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
3,3´-Dichlorobenzidine	ND (0.723)		8270D		1	09/25/20 23:14	D0I0374	DI02427
3+4-Methylphenol	ND (0.723)		8270D		1	09/25/20 23:14	D0I0374	DI02427
4-Bromophenyl-phenylether	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
4-Chloroaniline	ND (0.723)		8270D		1	09/25/20 23:14	D0I0374	DI02427
4-Nitrophenol	ND (1.81)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Acenaphthene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Acenaphthylene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Acetophenone	ND (0.723)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Aniline	ND (1.81)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Anthracene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Azobenzene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Benzo(a)anthracene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Benzo(a)pyrene	ND (0.181)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Benzo(b)fluoranthene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Benzo(g,h,i)perylene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Benzo(k)fluoranthene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-3
Date Sampled: 09/24/20 10:00
Percent Solids: 97
Initial Volume: 14.2
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-03
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
bis(2-Chloroethoxy)methane	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
bis(2-Chloroethyl)ether	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
bis(2-chloroisopropyl)Ether	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
bis(2-Ethylhexyl)phthalate	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Butylbenzylphthalate	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Chrysene	ND (0.181)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Dibenzo(a,h)Anthracene	ND (0.181)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Dibenzofuran	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Diethylphthalate	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Dimethylphthalate	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Di-n-butylphthalate	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Di-n-octylphthalate	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Fluoranthene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Fluorene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Hexachlorobenzene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Hexachlorobutadiene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Hexachloroethane	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Indeno(1,2,3-cd)Pyrene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Isophorone	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Naphthalene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Nitrobenzene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
N-Nitrosodimethylamine	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Pentachlorophenol	ND (1.81)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Phenanthrene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Phenol	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427
Pyrene	ND (0.361)		8270D		1	09/25/20 23:14	D0I0374	DI02427

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichlorobenzene-d4	*56 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*55 %*		*30-130*
Surrogate: 2-Chlorophenol-d4	*57 %*		*30-130*
Surrogate: 2-Fluorobiphenyl	*62 %*		*30-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-3
Date Sampled: 09/24/20 10:00
Percent Solids: 97
Initial Volume: 14.2
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-03
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Surrogate: 2-Fluorophenol		*55 %*		*30-130*				
Surrogate: Nitrobenzene-d5		*53 %*		*30-130*				
Surrogate: Phenol-d6		*54 %*		*30-130*				
Surrogate: p-Terphenyl-d14		*80 %*		*30-130*				

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-4
Date Sampled: 09/24/20 10:30
Percent Solids: 98

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-04
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Arsenic	ND (4.37)		6010C		2	KJK	10/01/20 18:14	2.34	100	DI02530
Barium	**7.77** (4.37)		6010C		2	KJK	10/01/20 18:14	2.34	100	DI02530
Cadmium	ND (0.87)		6010C		2	KJK	10/01/20 18:14	2.34	100	DI02530
Chromium	**2.13** (1.75)		6010C		2	KJK	10/01/20 18:14	2.34	100	DI02530
Lead	ND (8.74)		6010C		2	KJK	10/01/20 18:14	2.34	100	DI02530
Mercury	ND (0.026)		7471B		1	MKS	09/28/20 12:34	0.79	40	DI02519
Selenium	ND (8.74)		6010C		2	KJK	10/01/20 18:14	2.34	100	DI02530
Silver	ND (0.87)		6010C		2	KJK	10/01/20 18:14	2.34	100	DI02530

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-4
Date Sampled: 09/24/20 10:30
Percent Solids: 98
Initial Volume: 6.9
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-04
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,1,1-Trichloroethane	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,1,2,2-Tetrachloroethane	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,1,2-Trichloroethane	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,1-Dichloroethane	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,1-Dichloroethene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,1-Dichloropropene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,2,3-Trichlorobenzene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,2,3-Trichloropropane	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,2,4-Trichlorobenzene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,2,4-Trimethylbenzene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,2-Dibromo-3-Chloropropane	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,2-Dibromoethane	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,2-Dichlorobenzene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,2-Dichloroethane	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,2-Dichloropropane	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,3,5-Trimethylbenzene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,3-Dichlorobenzene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,3-Dichloropropane	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,4-Dichlorobenzene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
1,4-Dioxane	ND (0.0593)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
2,2-Dichloropropane	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
2-Butanone	ND (0.0371)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
2-Chlorotoluene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
2-Hexanone	ND (0.0371)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
4-Chlorotoluene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
4-Isopropyltoluene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
4-Methyl-2-Pentanone	ND (0.0371)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Acetone	ND (0.0371)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Benzene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Bromobenzene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Bromochloromethane	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-4
Date Sampled: 09/24/20 10:30
Percent Solids: 98
Initial Volume: 6.9
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-04
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Bromoform	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Bromomethane	ND (0.0074)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Carbon Disulfide	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Carbon Tetrachloride	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Chlorobenzene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Chloroethane	ND (0.0074)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Chloroform	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Chloromethane	ND (0.0074)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
cis-1,2-Dichloroethene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
cis-1,3-Dichloropropene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Dibromochloromethane	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Dibromomethane	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Dichlorodifluoromethane	ND (0.0074)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Diethyl Ether	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Di-isopropyl ether	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Ethyl tertiary-butyl ether	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Ethylbenzene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Hexachlorobutadiene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Isopropylbenzene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Methyl tert-Butyl Ether	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Methylene Chloride	ND (0.0185)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Naphthalene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
n-Butylbenzene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
n-Propylbenzene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
sec-Butylbenzene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Styrene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
tert-Butylbenzene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Tertiary-amyl methyl ether	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Tetrachloroethene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Tetrahydrofuran	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Toluene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-4
Date Sampled: 09/24/20 10:30
Percent Solids: 98
Initial Volume: 6.9
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-04
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
trans-1,2-Dichloroethene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
trans-1,3-Dichloropropene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Trichloroethene	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Trichlorofluoromethane	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Vinyl Chloride	ND (0.0074)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Xylene O	ND (0.0037)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Xylene P,M	ND (0.0074)		8260B Low		1	09/28/20 15:44	D0I0416	DI02845
Xylenes (Total)	ND (0.00741)		8260B Low		1	09/28/20 15:44		[CALC]

	%Recovery	*Qualifier*	*Limits*
Surrogate: 1,2-Dichloroethane-d4	*103 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*101 %*		*70-130*
Surrogate: Dibromofluoromethane	*102 %*		*70-130*
Surrogate: Toluene-d8	*90 %*		*70-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-4
Date Sampled: 09/24/20 10:30
Percent Solids: 98
Initial Volume: 19.8
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-04
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MJV
Prepared: 9/25/20 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.05)		8082A		1	09/28/20 14:44		DI02513
Aroclor 1221	ND (0.05)		8082A		1	09/28/20 14:44		DI02513
Aroclor 1232	ND (0.05)		8082A		1	09/28/20 14:44		DI02513
Aroclor 1242	ND (0.05)		8082A		1	09/28/20 14:44		DI02513
Aroclor 1248	ND (0.05)		8082A		1	09/28/20 14:44		DI02513
Aroclor 1254	ND (0.05)		8082A		1	09/28/20 14:44		DI02513
Aroclor 1260	ND (0.05)		8082A		1	09/28/20 14:44		DI02513
Aroclor 1262	ND (0.05)		8082A		1	09/28/20 14:44		DI02513
Aroclor 1268	ND (0.05)		8082A		1	09/28/20 14:44		DI02513

	%Recovery	*Qualifier*	*Limits*
Surrogate: Decachlorobiphenyl	*71 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*71 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*49 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*53 %*		*30-150*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-4
Date Sampled: 09/24/20 10:30
Percent Solids: 98
Initial Volume: 20.9
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-04
Sample Matrix: Soil
Units: mg/kg dry
Analyst: NXL
Prepared: 9/25/20 13:30

8100M Total Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Total Petroleum Hydrocarbons	ND (9.8)		8100M		1	09/29/20 13:34	D0I0410	DI02512

	%Recovery	Qualifier	Limits
Surrogate: O-Terphenyl	*92 %*		*40-140*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-4
Date Sampled: 09/24/20 10:30
Percent Solids: 98
Initial Volume: 15.2
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-04
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,2,4-Trichlorobenzene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
1,2-Dichlorobenzene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
1,3-Dichlorobenzene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
1,4-Dichlorobenzene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
2,4,5-Trichlorophenol	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
2,4,6-Trichlorophenol	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
2,4-Dichlorophenol	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
2,4-Dimethylphenol	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
2,4-Dinitrophenol	ND (1.69)		8270D		1	09/25/20 23:43	D0I0374	DI02427
2,4-Dinitrotoluene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
2,6-Dinitrotoluene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
2-Chloronaphthalene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
2-Chlorophenol	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
2-Methylnaphthalene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
2-Methylphenol	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
2-Nitrophenol	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
3,3´-Dichlorobenzidine	ND (0.673)		8270D		1	09/25/20 23:43	D0I0374	DI02427
3+4-Methylphenol	ND (0.673)		8270D		1	09/25/20 23:43	D0I0374	DI02427
4-Bromophenyl-phenylether	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
4-Chloroaniline	ND (0.673)		8270D		1	09/25/20 23:43	D0I0374	DI02427
4-Nitrophenol	ND (1.69)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Acenaphthene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Acenaphthylene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Acetophenone	ND (0.673)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Aniline	ND (1.69)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Anthracene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Azobenzene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Benzo(a)anthracene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Benzo(a)pyrene	ND (0.169)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Benzo(b)fluoranthene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Benzo(g,h,i)perylene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Benzo(k)fluoranthene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-4
Date Sampled: 09/24/20 10:30
Percent Solids: 98
Initial Volume: 15.2
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-04
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
bis(2-Chloroethoxy)methane	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
bis(2-Chloroethyl)ether	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
bis(2-chloroisopropyl)Ether	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
bis(2-Ethylhexyl)phthalate	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Butylbenzylphthalate	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Chrysene	ND (0.169)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Dibenzo(a,h)Anthracene	ND (0.169)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Dibenzofuran	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Diethylphthalate	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Dimethylphthalate	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Di-n-butylphthalate	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Di-n-octylphthalate	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Fluoranthene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Fluorene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Hexachlorobenzene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Hexachlorobutadiene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Hexachloroethane	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Indeno(1,2,3-cd)Pyrene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Isophorone	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Naphthalene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Nitrobenzene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
N-Nitrosodimethylamine	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Pentachlorophenol	ND (1.69)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Phenanthrene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Phenol	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427
Pyrene	ND (0.336)		8270D		1	09/25/20 23:43	D0I0374	DI02427

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichlorobenzene-d4	*50 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*54 %*		*30-130*
Surrogate: 2-Chlorophenol-d4	*50 %*		*30-130*
Surrogate: 2-Fluorobiphenyl	*56 %*		*30-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-4
Date Sampled: 09/24/20 10:30
Percent Solids: 98
Initial Volume: 15.2
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-04
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Surrogate: 2-Fluorophenol		*47 %*		*30-130*				
Surrogate: Nitrobenzene-d5		*47 %*		*30-130*				
Surrogate: Phenol-d6		*48 %*		*30-130*				
Surrogate: p-Terphenyl-d14		*75 %*		*30-130*				

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-5
Date Sampled: 09/24/20 11:00
Percent Solids: 98

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-05
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Arsenic	ND (4.24)		6010C		2	KJK	10/01/20 18:18	2.41	100	DI02530
Barium	**34.2** (4.24)		6010C		2	KJK	10/01/20 18:18	2.41	100	DI02530
Cadmium	ND (0.85)		6010C		2	KJK	10/01/20 18:18	2.41	100	DI02530
Chromium	ND (1.70)		6010C		2	KJK	10/01/20 18:18	2.41	100	DI02530
Lead	**10.2** (8.48)		6010C		2	KJK	10/01/20 18:18	2.41	100	DI02530
Mercury	ND (0.033)		7471B		1	MKS	09/28/20 12:36	0.62	40	DI02519
Selenium	ND (8.48)		6010C		2	KJK	10/01/20 18:18	2.41	100	DI02530
Silver	ND (0.85)		6010C		2	KJK	10/01/20 18:18	2.41	100	DI02530

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-5
Date Sampled: 09/24/20 11:00
Percent Solids: 98
Initial Volume: 7
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-05
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,1,1-Trichloroethane	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,1,2,2-Tetrachloroethane	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,1,2-Trichloroethane	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,1-Dichloroethane	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,1-Dichloroethene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,1-Dichloropropene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,2,3-Trichlorobenzene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,2,3-Trichloropropane	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,2,4-Trichlorobenzene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,2,4-Trimethylbenzene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,2-Dibromo-3-Chloropropane	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,2-Dibromoethane	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,2-Dichlorobenzene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,2-Dichloroethane	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,2-Dichloropropane	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,3,5-Trimethylbenzene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,3-Dichlorobenzene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,3-Dichloropropane	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,4-Dichlorobenzene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
1,4-Dioxane	ND (0.0584)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
2,2-Dichloropropane	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
2-Butanone	ND (0.0365)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
2-Chlorotoluene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
2-Hexanone	ND (0.0365)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
4-Chlorotoluene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
4-Isopropyltoluene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
4-Methyl-2-Pentanone	ND (0.0365)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Acetone	ND (0.0365)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Benzene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Bromobenzene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Bromochloromethane	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-5
Date Sampled: 09/24/20 11:00
Percent Solids: 98
Initial Volume: 7
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-05
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Bromoform	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Bromomethane	ND (0.0073)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Carbon Disulfide	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Carbon Tetrachloride	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Chlorobenzene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Chloroethane	ND (0.0073)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Chloroform	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Chloromethane	ND (0.0073)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
cis-1,2-Dichloroethene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
cis-1,3-Dichloropropene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Dibromochloromethane	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Dibromomethane	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Dichlorodifluoromethane	ND (0.0073)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Diethyl Ether	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Di-isopropyl ether	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Ethyl tertiary-butyl ether	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Ethylbenzene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Hexachlorobutadiene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Isopropylbenzene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Methyl tert-Butyl Ether	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Methylene Chloride	ND (0.0182)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Naphthalene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
n-Butylbenzene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
n-Propylbenzene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
sec-Butylbenzene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Styrene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
tert-Butylbenzene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Tertiary-amyl methyl ether	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Tetrachloroethene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Tetrahydrofuran	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Toluene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-5
Date Sampled: 09/24/20 11:00
Percent Solids: 98
Initial Volume: 7
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-05
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
trans-1,2-Dichloroethene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
trans-1,3-Dichloropropene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Trichloroethene	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Trichlorofluoromethane	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Vinyl Chloride	ND (0.0073)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Xylene O	ND (0.0036)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Xylene P,M	ND (0.0073)		8260B Low		1	09/28/20 16:09	D0I0416	DI02845
Xylenes (Total)	ND (0.00730)		8260B Low		1	09/28/20 16:09		[CALC]

	%Recovery	*Qualifier*	*Limits*
Surrogate: 1,2-Dichloroethane-d4	*102 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*100 %*		*70-130*
Surrogate: Dibromofluoromethane	*101 %*		*70-130*
Surrogate: Toluene-d8	*91 %*		*70-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-5
Date Sampled: 09/24/20 11:00
Percent Solids: 98
Initial Volume: 20.6
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-05
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MJV
Prepared: 9/25/20 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.05)		8082A		1	09/28/20 15:03		DI02513
Aroclor 1221	ND (0.05)		8082A		1	09/28/20 15:03		DI02513
Aroclor 1232	ND (0.05)		8082A		1	09/28/20 15:03		DI02513
Aroclor 1242	ND (0.05)		8082A		1	09/28/20 15:03		DI02513
Aroclor 1248	**0.2** (0.05)		8082A		1	09/28/20 15:03		DI02513
Aroclor 1254	ND (0.05)		8082A		1	09/28/20 15:03		DI02513
Aroclor 1260	ND (0.05)		8082A		1	09/28/20 15:03		DI02513
Aroclor 1262	ND (0.05)		8082A		1	09/28/20 15:03		DI02513
Aroclor 1268	ND (0.05)		8082A		1	09/28/20 15:03		DI02513

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*88 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*86 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*64 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*68 %*		*30-150*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-5
Date Sampled: 09/24/20 11:00
Percent Solids: 98
Initial Volume: 19
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-05
Sample Matrix: Soil
Units: mg/kg dry
Analyst: NXL
Prepared: 9/25/20 13:30

8100M Total Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Total Petroleum Hydrocarbons	ND (10.8)		8100M		1	09/29/20 14:06	D0I0410	DI02512

	%Recovery	Qualifier	Limits
Surrogate: O-Terphenyl	*89 %*		*40-140*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-5
Date Sampled: 09/24/20 11:00
Percent Solids: 98
Initial Volume: 14.5
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-05
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,2,4-Trichlorobenzene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
1,2-Dichlorobenzene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
1,3-Dichlorobenzene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
1,4-Dichlorobenzene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
2,4,5-Trichlorophenol	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
2,4,6-Trichlorophenol	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
2,4-Dichlorophenol	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
2,4-Dimethylphenol	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
2,4-Dinitrophenol	ND (1.76)		8270D		1	09/26/20 0:11	D0I0374	DI02511
2,4-Dinitrotoluene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
2,6-Dinitrotoluene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
2-Chloronaphthalene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
2-Chlorophenol	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
2-Methylnaphthalene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
2-Methylphenol	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
2-Nitrophenol	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
3,3´-Dichlorobenzidine	ND (0.705)		8270D		1	09/26/20 0:11	D0I0374	DI02511
3+4-Methylphenol	ND (0.705)		8270D		1	09/26/20 0:11	D0I0374	DI02511
4-Bromophenyl-phenylether	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
4-Chloroaniline	ND (0.705)		8270D		1	09/26/20 0:11	D0I0374	DI02511
4-Nitrophenol	ND (1.76)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Acenaphthene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Acenaphthylene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Acetophenone	ND (0.705)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Aniline	ND (1.76)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Anthracene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Azobenzene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Benzo(a)anthracene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Benzo(a)pyrene	ND (0.176)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Benzo(b)fluoranthene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Benzo(g,h,i)perylene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Benzo(k)fluoranthene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-5
Date Sampled: 09/24/20 11:00
Percent Solids: 98
Initial Volume: 14.5
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-05
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
bis(2-Chloroethoxy)methane	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
bis(2-Chloroethyl)ether	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
bis(2-chloroisopropyl)Ether	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
bis(2-Ethylhexyl)phthalate	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Butylbenzylphthalate	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Chrysene	ND (0.176)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Dibenzo(a,h)Anthracene	ND (0.176)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Dibenzofuran	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Diethylphthalate	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Dimethylphthalate	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Di-n-butylphthalate	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Di-n-octylphthalate	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Fluoranthene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Fluorene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Hexachlorobenzene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Hexachlorobutadiene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Hexachloroethane	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Indeno(1,2,3-cd)Pyrene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Isophorone	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Naphthalene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Nitrobenzene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
N-Nitrosodimethylamine	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Pentachlorophenol	ND (1.76)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Phenanthrene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Phenol	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511
Pyrene	ND (0.352)		8270D		1	09/26/20 0:11	D0I0374	DI02511

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichlorobenzene-d4	*54 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*61 %*		*30-130*
Surrogate: 2-Chlorophenol-d4	*57 %*		*30-130*
Surrogate: 2-Fluorobiphenyl	*64 %*		*30-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-5
Date Sampled: 09/24/20 11:00
Percent Solids: 98
Initial Volume: 14.5
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-05
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Surrogate: 2-Fluorophenol		*54 %*		*30-130*				
Surrogate: Nitrobenzene-d5		*53 %*		*30-130*				
Surrogate: Phenol-d6		*55 %*		*30-130*				
Surrogate: p-Terphenyl-d14		*77 %*		*30-130*				

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-6
Date Sampled: 09/24/20 11:30
Percent Solids: 98

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-06
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Arsenic	ND (4.32)		6010C		2	KJK	10/01/20 18:51	2.37	100	DI02530
Barium	**8.96** (4.32)		6010C		2	KJK	10/01/20 18:51	2.37	100	DI02530
Cadmium	ND (0.86)		6010C		2	KJK	10/01/20 18:51	2.37	100	DI02530
Chromium	ND (1.73)		6010C		2	KJK	10/01/20 18:51	2.37	100	DI02530
Lead	ND (8.64)		6010C		2	KJK	10/01/20 18:51	2.37	100	DI02530
Mercury	ND (0.026)		7471B		1	MKS	09/28/20 12:38	0.79	40	DI02519
Selenium	ND (8.64)		6010C		2	KJK	10/01/20 18:51	2.37	100	DI02530
Silver	ND (0.86)		6010C		2	KJK	10/01/20 18:51	2.37	100	DI02530

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-6
Date Sampled: 09/24/20 11:30
Percent Solids: 98
Initial Volume: 7.4
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-06
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,1,1-Trichloroethane	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,1,2,2-Tetrachloroethane	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,1,2-Trichloroethane	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,1-Dichloroethane	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,1-Dichloroethene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,1-Dichloropropene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,2,3-Trichlorobenzene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,2,3-Trichloropropane	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,2,4-Trichlorobenzene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,2,4-Trimethylbenzene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,2-Dibromo-3-Chloropropane	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,2-Dibromoethane	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,2-Dichlorobenzene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,2-Dichloroethane	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,2-Dichloropropane	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,3,5-Trimethylbenzene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,3-Dichlorobenzene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,3-Dichloropropane	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,4-Dichlorobenzene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
1,4-Dioxane	ND (0.0553)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
2,2-Dichloropropane	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
2-Butanone	ND (0.0346)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
2-Chlorotoluene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
2-Hexanone	ND (0.0346)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
4-Chlorotoluene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
4-Isopropyltoluene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
4-Methyl-2-Pentanone	ND (0.0346)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Acetone	ND (0.0346)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Benzene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Bromobenzene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Bromochloromethane	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-6
Date Sampled: 09/24/20 11:30
Percent Solids: 98
Initial Volume: 7.4
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-06
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Bromoform	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Bromomethane	ND (0.0069)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Carbon Disulfide	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Carbon Tetrachloride	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Chlorobenzene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Chloroethane	ND (0.0069)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Chloroform	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Chloromethane	ND (0.0069)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
cis-1,2-Dichloroethene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
cis-1,3-Dichloropropene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Dibromochloromethane	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Dibromomethane	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Dichlorodifluoromethane	ND (0.0069)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Diethyl Ether	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Di-isopropyl ether	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Ethyl tertiary-butyl ether	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Ethylbenzene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Hexachlorobutadiene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Isopropylbenzene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Methyl tert-Butyl Ether	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Methylene Chloride	ND (0.0173)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Naphthalene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
n-Butylbenzene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
n-Propylbenzene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
sec-Butylbenzene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Styrene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
tert-Butylbenzene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Tertiary-amyl methyl ether	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Tetrachloroethene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Tetrahydrofuran	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Toluene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-6
Date Sampled: 09/24/20 11:30
Percent Solids: 98
Initial Volume: 7.4
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-06
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
trans-1,2-Dichloroethene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
trans-1,3-Dichloropropene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Trichloroethene	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Trichlorofluoromethane	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Vinyl Chloride	ND (0.0069)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Xylene O	ND (0.0035)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Xylene P,M	ND (0.0069)		8260B Low		1	09/28/20 16:35	D0I0416	DI02845
Xylenes (Total)	ND (0.00692)		8260B Low		1	09/28/20 16:35		[CALC]

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*105 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*100 %*		*70-130*
Surrogate: Dibromofluoromethane	*103 %*		*70-130*
Surrogate: Toluene-d8	*90 %*		*70-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-6
Date Sampled: 09/24/20 11:30
Percent Solids: 98
Initial Volume: 19.7
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-06
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MJV
Prepared: 9/29/20 19:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.05)		8082A		1	09/30/20 18:03		DI02903
Aroclor 1221	ND (0.05)		8082A		1	09/30/20 18:03		DI02903
Aroclor 1232	ND (0.05)		8082A		1	09/30/20 18:03		DI02903
Aroclor 1242	ND (0.05)		8082A		1	09/30/20 18:03		DI02903
Aroclor 1248	ND (0.05)		8082A		1	09/30/20 18:03		DI02903
Aroclor 1254	ND (0.05)		8082A		1	09/30/20 18:03		DI02903
Aroclor 1260	ND (0.05)		8082A		1	09/30/20 18:03		DI02903
Aroclor 1262	ND (0.05)		8082A		1	09/30/20 18:03		DI02903
Aroclor 1268	ND (0.05)		8082A		1	09/30/20 18:03		DI02903

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*77 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*72 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*83 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*84 %*		*30-150*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-6
Date Sampled: 09/24/20 11:30
Percent Solids: 98
Initial Volume: 19.5
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-06
Sample Matrix: Soil
Units: mg/kg dry
Analyst: NXL
Prepared: 9/25/20 13:30

8100M Total Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Total Petroleum Hydrocarbons	ND (10.5)		8100M		1	09/29/20 14:39	D0I0410	DI02512

	%Recovery	Qualifier	Limits
Surrogate: O-Terphenyl	*85 %*		*40-140*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-6
Date Sampled: 09/24/20 11:30
Percent Solids: 98
Initial Volume: 14.7
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-06
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,2,4-Trichlorobenzene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
1,2-Dichlorobenzene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
1,3-Dichlorobenzene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
1,4-Dichlorobenzene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
2,4,5-Trichlorophenol	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
2,4,6-Trichlorophenol	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
2,4-Dichlorophenol	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
2,4-Dimethylphenol	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
2,4-Dinitrophenol	ND (1.74)		8270D		1	09/26/20 0:40	D0I0374	DI02511
2,4-Dinitrotoluene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
2,6-Dinitrotoluene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
2-Chloronaphthalene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
2-Chlorophenol	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
2-Methylnaphthalene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
2-Methylphenol	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
2-Nitrophenol	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
3,3´-Dichlorobenzidine	ND (0.697)		8270D		1	09/26/20 0:40	D0I0374	DI02511
3+4-Methylphenol	ND (0.697)		8270D		1	09/26/20 0:40	D0I0374	DI02511
4-Bromophenyl-phenylether	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
4-Chloroaniline	ND (0.697)		8270D		1	09/26/20 0:40	D0I0374	DI02511
4-Nitrophenol	ND (1.74)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Acenaphthene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Acenaphthylene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Acetophenone	ND (0.697)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Aniline	ND (1.74)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Anthracene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Azobenzene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Benzo(a)anthracene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Benzo(a)pyrene	ND (0.174)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Benzo(b)fluoranthene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Benzo(g,h,i)perylene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Benzo(k)fluoranthene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-6
Date Sampled: 09/24/20 11:30
Percent Solids: 98
Initial Volume: 14.7
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-06
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
bis(2-Chloroethoxy)methane	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
bis(2-Chloroethyl)ether	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
bis(2-chloroisopropyl)Ether	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
bis(2-Ethylhexyl)phthalate	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Butylbenzylphthalate	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Chrysene	ND (0.174)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Dibenzo(a,h)Anthracene	ND (0.174)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Dibenzofuran	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Diethylphthalate	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Dimethylphthalate	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Di-n-butylphthalate	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Di-n-octylphthalate	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Fluoranthene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Fluorene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Hexachlorobenzene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Hexachlorobutadiene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Hexachloroethane	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Indeno(1,2,3-cd)Pyrene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Isophorone	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Naphthalene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Nitrobenzene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
N-Nitrosodimethylamine	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Pentachlorophenol	ND (1.74)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Phenanthrene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Phenol	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511
Pyrene	ND (0.348)		8270D		1	09/26/20 0:40	D0I0374	DI02511

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichlorobenzene-d4	*45 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*56 %*		*30-130*
Surrogate: 2-Chlorophenol-d4	*47 %*		*30-130*
Surrogate: 2-Fluorobiphenyl	*53 %*		*30-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-6
Date Sampled: 09/24/20 11:30
Percent Solids: 98
Initial Volume: 14.7
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-06
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Surrogate: 2-Fluorophenol		*45 %*		*30-130*				
Surrogate: Nitrobenzene-d5		*43 %*		*30-130*				
Surrogate: Phenol-d6		*45 %*		*30-130*				
Surrogate: p-Terphenyl-d14		*75 %*		*30-130*				

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-7
Date Sampled: 09/24/20 11:45
Percent Solids: 99

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-07
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Arsenic	**3.58** (2.34)		6010C		1	KJK	10/01/20 7:14	2.16	100	DI02530
Barium	**14.9** (2.34)		6010C		1	KJK	10/01/20 7:14	2.16	100	DI02530
Cadmium	ND (0.47)		6010C		1	KJK	10/01/20 7:14	2.16	100	DI02530
Chromium	**2.03** (0.94)		6010C		1	KJK	10/01/20 7:14	2.16	100	DI02530
Lead	**17.2** (4.68)		6010C		1	KJK	10/01/20 7:14	2.16	100	DI02530
Mercury	**0.073** (0.028)		7471B		1	MKS	09/28/20 12:40	0.72	40	DI02519
Selenium	ND (4.68)		6010C		1	KJK	10/01/20 7:14	2.16	100	DI02530
Silver	ND (0.47)		6010C		1	KJK	10/01/20 7:14	2.16	100	DI02530

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-7
Date Sampled: 09/24/20 11:45
Percent Solids: 99
Initial Volume: 7.8
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-07
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,1,1-Trichloroethane	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,1,2,2-Tetrachloroethane	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,1,2-Trichloroethane	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,1-Dichloroethane	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,1-Dichloroethene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,1-Dichloropropene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,2,3-Trichlorobenzene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,2,3-Trichloropropane	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,2,4-Trichlorobenzene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,2,4-Trimethylbenzene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,2-Dibromo-3-Chloropropane	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,2-Dibromoethane	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,2-Dichlorobenzene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,2-Dichloroethane	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,2-Dichloropropane	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,3,5-Trimethylbenzene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,3-Dichlorobenzene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,3-Dichloropropane	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,4-Dichlorobenzene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
1,4-Dioxane	ND (0.0519)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
2,2-Dichloropropane	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
2-Butanone	ND (0.0324)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
2-Chlorotoluene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
2-Hexanone	ND (0.0324)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
4-Chlorotoluene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
4-Isopropyltoluene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
4-Methyl-2-Pentanone	ND (0.0324)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Acetone	ND (0.0324)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Benzene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Bromobenzene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Bromochloromethane	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-7
Date Sampled: 09/24/20 11:45
Percent Solids: 99
Initial Volume: 7.8
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-07
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Bromoform	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Bromomethane	ND (0.0065)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Carbon Disulfide	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Carbon Tetrachloride	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Chlorobenzene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Chloroethane	ND (0.0065)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Chloroform	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Chloromethane	ND (0.0065)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
cis-1,2-Dichloroethene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
cis-1,3-Dichloropropene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Dibromochloromethane	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Dibromomethane	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Dichlorodifluoromethane	ND (0.0065)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Diethyl Ether	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Di-isopropyl ether	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Ethyl tertiary-butyl ether	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Ethylbenzene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Hexachlorobutadiene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Isopropylbenzene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Methyl tert-Butyl Ether	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Methylene Chloride	ND (0.0162)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Naphthalene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
n-Butylbenzene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
n-Propylbenzene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
sec-Butylbenzene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Styrene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
tert-Butylbenzene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Tertiary-amyl methyl ether	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Tetrachloroethene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Tetrahydrofuran	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Toluene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-7
Date Sampled: 09/24/20 11:45
Percent Solids: 99
Initial Volume: 7.8
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-07
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
trans-1,2-Dichloroethene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
trans-1,3-Dichloropropene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Trichloroethene	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Trichlorofluoromethane	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Vinyl Chloride	ND (0.0065)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Xylene O	ND (0.0032)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Xylene P,M	ND (0.0065)		8260B Low		1	09/28/20 17:00	D0I0416	DI02845
Xylenes (Total)	ND (0.00649)		8260B Low		1	09/28/20 17:00		[CALC]

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*103 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*94 %*		*70-130*
Surrogate: Dibromofluoromethane	*103 %*		*70-130*
Surrogate: Toluene-d8	*94 %*		*70-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-7
Date Sampled: 09/24/20 11:45
Percent Solids: 99
Initial Volume: 19.9
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-07
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MJV
Prepared: 9/25/20 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.05)		8082A		1	09/28/20 15:43		DI02513
Aroclor 1221	ND (0.05)		8082A		1	09/28/20 15:43		DI02513
Aroclor 1232	ND (0.05)		8082A		1	09/28/20 15:43		DI02513
Aroclor 1242	ND (0.05)		8082A		1	09/28/20 15:43		DI02513
Aroclor 1248 [2C]	**0.4** (0.05)		8082A		1	09/28/20 15:43		DI02513
Aroclor 1254	ND (0.05)		8082A		1	09/28/20 15:43		DI02513
Aroclor 1260	ND (0.05)		8082A		1	09/28/20 15:43		DI02513
Aroclor 1262	ND (0.05)		8082A		1	09/28/20 15:43		DI02513
Aroclor 1268	ND (0.05)		8082A		1	09/28/20 15:43		DI02513

	%Recovery	*Qualifier*	*Limits*
Surrogate: Decachlorobiphenyl	*82 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*83 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*72 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*85 %*		*30-150*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-7
Date Sampled: 09/24/20 11:45
Percent Solids: 99
Initial Volume: 20.3
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-07
Sample Matrix: Soil
Units: mg/kg dry
Analyst: NXL
Prepared: 9/25/20 13:30

8100M Total Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Total Petroleum Hydrocarbons	**19.2** (10.0)		8100M		1	09/29/20 15:12	D0I0410	DI02512

	%Recovery	Qualifier	Limits
Surrogate: O-Terphenyl	*77 %*		*40-140*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-7
Date Sampled: 09/24/20 11:45
Percent Solids: 99
Initial Volume: 15.4
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-07
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,2,4-Trichlorobenzene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
1,2-Dichlorobenzene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
1,3-Dichlorobenzene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
1,4-Dichlorobenzene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
2,4,5-Trichlorophenol	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
2,4,6-Trichlorophenol	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
2,4-Dichlorophenol	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
2,4-Dimethylphenol	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
2,4-Dinitrophenol	ND (1.65)		8270D		1	09/26/20 1:09	D0I0374	DI02511
2,4-Dinitrotoluene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
2,6-Dinitrotoluene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
2-Chloronaphthalene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
2-Chlorophenol	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
2-Methylnaphthalene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
2-Methylphenol	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
2-Nitrophenol	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
3,3´-Dichlorobenzidine	ND (0.657)		8270D		1	09/26/20 1:09	D0I0374	DI02511
3+4-Methylphenol	ND (0.657)		8270D		1	09/26/20 1:09	D0I0374	DI02511
4-Bromophenyl-phenylether	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
4-Chloroaniline	ND (0.657)		8270D		1	09/26/20 1:09	D0I0374	DI02511
4-Nitrophenol	ND (1.65)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Acenaphthene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Acenaphthylene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Acetophenone	ND (0.657)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Aniline	ND (1.65)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Anthracene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Azobenzene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Benzo(a)anthracene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Benzo(a)pyrene	ND (0.165)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Benzo(b)fluoranthene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Benzo(g,h,i)perylene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Benzo(k)fluoranthene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-7
Date Sampled: 09/24/20 11:45
Percent Solids: 99
Initial Volume: 15.4
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-07
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
bis(2-Chloroethoxy)methane	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
bis(2-Chloroethyl)ether	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
bis(2-chloroisopropyl)Ether	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
bis(2-Ethylhexyl)phthalate	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Butylbenzylphthalate	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Chrysene	ND (0.165)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Dibenzo(a,h)Anthracene	ND (0.165)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Dibenzofuran	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Diethylphthalate	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Dimethylphthalate	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Di-n-butylphthalate	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Di-n-octylphthalate	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Fluoranthene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Fluorene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Hexachlorobenzene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Hexachlorobutadiene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Hexachloroethane	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Indeno(1,2,3-cd)Pyrene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Isophorone	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Naphthalene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Nitrobenzene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
N-Nitrosodimethylamine	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Pentachlorophenol	ND (1.65)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Phenanthrene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Phenol	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511
Pyrene	ND (0.328)		8270D		1	09/26/20 1:09	D0I0374	DI02511

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichlorobenzene-d4	*51 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*52 %*		*30-130*
Surrogate: 2-Chlorophenol-d4	*53 %*		*30-130*
Surrogate: 2-Fluorobiphenyl	*59 %*		*30-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-7
Date Sampled: 09/24/20 11:45
Percent Solids: 99
Initial Volume: 15.4
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-07
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Surrogate: 2-Fluorophenol		*50 %*		*30-130*				
Surrogate: Nitrobenzene-d5		*49 %*		*30-130*				
Surrogate: Phenol-d6		*51 %*		*30-130*				
Surrogate: p-Terphenyl-d14		*71 %*		*30-130*				

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-8
Date Sampled: 09/24/20 12:00
Percent Solids: 99

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-08
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Arsenic	**2.40** (2.34)		6010C		1	KJK	10/01/20 7:19	2.15	100	DI02530
Barium	**6.13** (2.34)		6010C		1	KJK	10/01/20 7:19	2.15	100	DI02530
Cadmium	ND (0.47)		6010C		1	KJK	10/01/20 7:19	2.15	100	DI02530
Chromium	**1.33** (0.94)		6010C		1	KJK	10/01/20 7:19	2.15	100	DI02530
Lead	**5.15** (4.69)		6010C		1	KJK	10/01/20 7:19	2.15	100	DI02530
Mercury	ND (0.026)		7471B		1	MKS	09/28/20 12:42	0.78	40	DI02519
Selenium	ND (4.69)		6010C		1	KJK	10/01/20 7:19	2.15	100	DI02530
Silver	ND (0.47)		6010C		1	KJK	10/01/20 7:19	2.15	100	DI02530

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-8
Date Sampled: 09/24/20 12:00
Percent Solids: 99
Initial Volume: 6.6
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-08
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,1,1-Trichloroethane	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,1,2,2-Tetrachloroethane	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,1,2-Trichloroethane	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,1-Dichloroethane	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,1-Dichloroethene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,1-Dichloropropene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,2,3-Trichlorobenzene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,2,3-Trichloropropane	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,2,4-Trichlorobenzene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,2,4-Trimethylbenzene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,2-Dibromo-3-Chloropropane	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,2-Dibromoethane	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,2-Dichlorobenzene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,2-Dichloroethane	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,2-Dichloropropane	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,3,5-Trimethylbenzene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,3-Dichlorobenzene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,3-Dichloropropane	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,4-Dichlorobenzene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
1,4-Dioxane	ND (0.0611)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
2,2-Dichloropropane	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
2-Butanone	ND (0.0382)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
2-Chlorotoluene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
2-Hexanone	ND (0.0382)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
4-Chlorotoluene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
4-Isopropyltoluene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
4-Methyl-2-Pentanone	ND (0.0382)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Acetone	ND (0.0382)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Benzene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Bromobenzene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Bromochloromethane	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-8
Date Sampled: 09/24/20 12:00
Percent Solids: 99
Initial Volume: 6.6
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-08
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Bromoform	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Bromomethane	ND (0.0076)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Carbon Disulfide	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Carbon Tetrachloride	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Chlorobenzene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Chloroethane	ND (0.0076)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Chloroform	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Chloromethane	ND (0.0076)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
cis-1,2-Dichloroethene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
cis-1,3-Dichloropropene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Dibromochloromethane	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Dibromomethane	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Dichlorodifluoromethane	ND (0.0076)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Diethyl Ether	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Di-isopropyl ether	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Ethyl tertiary-butyl ether	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Ethylbenzene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Hexachlorobutadiene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Isopropylbenzene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Methyl tert-Butyl Ether	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Methylene Chloride	ND (0.0191)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Naphthalene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
n-Butylbenzene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
n-Propylbenzene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
sec-Butylbenzene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Styrene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
tert-Butylbenzene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Tertiary-amyl methyl ether	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Tetrachloroethene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Tetrahydrofuran	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Toluene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-8
Date Sampled: 09/24/20 12:00
Percent Solids: 99
Initial Volume: 6.6
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-08
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
trans-1,2-Dichloroethene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
trans-1,3-Dichloropropene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Trichloroethene	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Trichlorofluoromethane	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Vinyl Chloride	ND (0.0076)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Xylene O	ND (0.0038)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Xylene P,M	ND (0.0076)		8260B Low		1	09/28/20 17:26	D0I0416	DI02845
Xylenes (Total)	ND (0.00764)		8260B Low		1	09/28/20 17:26		[CALC]

	%Recovery	*Qualifier*	*Limits*
Surrogate: 1,2-Dichloroethane-d4	*104 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*100 %*		*70-130*
Surrogate: Dibromofluoromethane	*103 %*		*70-130*
Surrogate: Toluene-d8	*91 %*		*70-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-8
Date Sampled: 09/24/20 12:00
Percent Solids: 99
Initial Volume: 19.5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-08
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MJV
Prepared: 9/25/20 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.05)		8082A		1	09/28/20 16:03		DI02513
Aroclor 1221	ND (0.05)		8082A		1	09/28/20 16:03		DI02513
Aroclor 1232	ND (0.05)		8082A		1	09/28/20 16:03		DI02513
Aroclor 1242	ND (0.05)		8082A		1	09/28/20 16:03		DI02513
Aroclor 1248 [2C]	**0.2** (0.05)		8082A		1	09/28/20 16:03		DI02513
Aroclor 1254	ND (0.05)		8082A		1	09/28/20 16:03		DI02513
Aroclor 1260	ND (0.05)		8082A		1	09/28/20 16:03		DI02513
Aroclor 1262	ND (0.05)		8082A		1	09/28/20 16:03		DI02513
Aroclor 1268	ND (0.05)		8082A		1	09/28/20 16:03		DI02513

	%Recovery	*Qualifier*	*Limits*
Surrogate: Decachlorobiphenyl	*86 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*85 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*71 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*81 %*		*30-150*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-8
Date Sampled: 09/24/20 12:00
Percent Solids: 99
Initial Volume: 20.5
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-08
Sample Matrix: Soil
Units: mg/kg dry
Analyst: NXL
Prepared: 9/25/20 13:30

8100M Total Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Total Petroleum Hydrocarbons	ND (9.8)		8100M		1	09/29/20 15:45	D0I0410	DI02512

	%Recovery	Qualifier	Limits
Surrogate: O-Terphenyl	*75 %*		*40-140*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-8
Date Sampled: 09/24/20 12:00
Percent Solids: 99
Initial Volume: 15.9
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-08
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,2,4-Trichlorobenzene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
1,2-Dichlorobenzene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
1,3-Dichlorobenzene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
1,4-Dichlorobenzene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
2,4,5-Trichlorophenol	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
2,4,6-Trichlorophenol	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
2,4-Dichlorophenol	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
2,4-Dimethylphenol	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
2,4-Dinitrophenol	ND (1.59)		8270D		1	09/26/20 4:01	D0I0374	DI02511
2,4-Dinitrotoluene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
2,6-Dinitrotoluene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
2-Chloronaphthalene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
2-Chlorophenol	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
2-Methylnaphthalene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
2-Methylphenol	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
2-Nitrophenol	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
3,3´-Dichlorobenzidine	ND (0.634)		8270D		1	09/26/20 4:01	D0I0374	DI02511
3+4-Methylphenol	ND (0.634)		8270D		1	09/26/20 4:01	D0I0374	DI02511
4-Bromophenyl-phenylether	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
4-Chloroaniline	ND (0.634)		8270D		1	09/26/20 4:01	D0I0374	DI02511
4-Nitrophenol	ND (1.59)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Acenaphthene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Acenaphthylene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Acetophenone	ND (0.634)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Aniline	ND (1.59)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Anthracene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Azobenzene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Benzo(a)anthracene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Benzo(a)pyrene	ND (0.159)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Benzo(b)fluoranthene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Benzo(g,h,i)perylene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Benzo(k)fluoranthene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-8
Date Sampled: 09/24/20 12:00
Percent Solids: 99
Initial Volume: 15.9
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-08
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
bis(2-Chloroethoxy)methane	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
bis(2-Chloroethyl)ether	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
bis(2-chloroisopropyl)Ether	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
bis(2-Ethylhexyl)phthalate	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Butylbenzylphthalate	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Chrysene	ND (0.159)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Dibenzo(a,h)Anthracene	ND (0.159)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Dibenzofuran	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Diethylphthalate	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Dimethylphthalate	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Di-n-butylphthalate	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Di-n-octylphthalate	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Fluoranthene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Fluorene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Hexachlorobenzene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Hexachlorobutadiene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Hexachloroethane	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Indeno(1,2,3-cd)Pyrene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Isophorone	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Naphthalene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Nitrobenzene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
N-Nitrosodimethylamine	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Pentachlorophenol	ND (1.59)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Phenanthrene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Phenol	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511
Pyrene	ND (0.317)		8270D		1	09/26/20 4:01	D0I0374	DI02511

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichlorobenzene-d4	*50 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*60 %*		*30-130*
Surrogate: 2-Chlorophenol-d4	*52 %*		*30-130*
Surrogate: 2-Fluorobiphenyl	*58 %*		*30-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-8
Date Sampled: 09/24/20 12:00
Percent Solids: 99
Initial Volume: 15.9
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-08
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Surrogate: 2-Fluorophenol		*49 %*		*30-130*				
Surrogate: Nitrobenzene-d5		*47 %*		*30-130*				
Surrogate: Phenol-d6		*50 %*		*30-130*				
Surrogate: p-Terphenyl-d14		*76 %*		*30-130*				

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-9
Date Sampled: 09/24/20 13:00
Percent Solids: 98

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-09
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Arsenic	**2.70** (2.28)		6010C		1	KJK	10/01/20 7:23	2.24	100	DI02530
Barium	**6.17** (2.28)		6010C		1	KJK	10/01/20 7:23	2.24	100	DI02530
Cadmium	ND (0.46)		6010C		1	KJK	10/01/20 7:23	2.24	100	DI02530
Chromium	ND (0.91)		6010C		1	KJK	10/01/20 7:23	2.24	100	DI02530
Lead	**6.30** (4.56)		6010C		1	KJK	10/01/20 7:23	2.24	100	DI02530
Mercury	ND (0.028)		7471B		1	MKS	09/28/20 12:44	0.71	40	DI02519
Selenium	ND (4.56)		6010C		1	KJK	10/01/20 7:23	2.24	100	DI02530
Silver	ND (0.46)		6010C		1	KJK	10/01/20 7:23	2.24	100	DI02530

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-9
Date Sampled: 09/24/20 13:00
Percent Solids: 98
Initial Volume: 7.3
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-09
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,1,1-Trichloroethane	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,1,2,2-Tetrachloroethane	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,1,2-Trichloroethane	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,1-Dichloroethane	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,1-Dichloroethene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,1-Dichloropropene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,2,3-Trichlorobenzene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,2,3-Trichloropropane	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,2,4-Trichlorobenzene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,2,4-Trimethylbenzene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,2-Dibromo-3-Chloropropane	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,2-Dibromoethane	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,2-Dichlorobenzene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,2-Dichloroethane	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,2-Dichloropropane	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,3,5-Trimethylbenzene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,3-Dichlorobenzene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,3-Dichloropropane	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,4-Dichlorobenzene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
1,4-Dioxane	ND (0.0559)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
2,2-Dichloropropane	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
2-Butanone	ND (0.0350)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
2-Chlorotoluene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
2-Hexanone	ND (0.0350)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
4-Chlorotoluene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
4-Isopropyltoluene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
4-Methyl-2-Pentanone	ND (0.0350)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Acetone	ND (0.0350)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Benzene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Bromobenzene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Bromochloromethane	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-9
Date Sampled: 09/24/20 13:00
Percent Solids: 98
Initial Volume: 7.3
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-09
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Bromoform	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Bromomethane	ND (0.0070)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Carbon Disulfide	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Carbon Tetrachloride	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Chlorobenzene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Chloroethane	ND (0.0070)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Chloroform	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Chloromethane	ND (0.0070)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
cis-1,2-Dichloroethene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
cis-1,3-Dichloropropene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Dibromochloromethane	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Dibromomethane	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Dichlorodifluoromethane	ND (0.0070)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Diethyl Ether	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Di-isopropyl ether	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Ethyl tertiary-butyl ether	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Ethylbenzene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Hexachlorobutadiene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Isopropylbenzene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Methyl tert-Butyl Ether	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Methylene Chloride	ND (0.0175)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Naphthalene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
n-Butylbenzene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
n-Propylbenzene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
sec-Butylbenzene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Styrene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
tert-Butylbenzene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Tertiary-amyl methyl ether	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Tetrachloroethene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Tetrahydrofuran	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Toluene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-9
Date Sampled: 09/24/20 13:00
Percent Solids: 98
Initial Volume: 7.3
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-09
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
trans-1,2-Dichloroethene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
trans-1,3-Dichloropropene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Trichloroethene	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Trichlorofluoromethane	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Vinyl Chloride	ND (0.0070)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Xylene O	ND (0.0035)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Xylene P,M	ND (0.0070)		8260B Low		1	09/28/20 17:51	D0I0416	DI02845
Xylenes (Total)	ND (0.00699)		8260B Low		1	09/28/20 17:51		[CALC]

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*109 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*101 %*		*70-130*
Surrogate: Dibromofluoromethane	*106 %*		*70-130*
Surrogate: Toluene-d8	*90 %*		*70-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-9
Date Sampled: 09/24/20 13:00
Percent Solids: 98
Initial Volume: 19
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-09
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MJV
Prepared: 9/25/20 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.05)		8082A		1	09/28/20 16:22		DI02513
Aroclor 1221	ND (0.05)		8082A		1	09/28/20 16:22		DI02513
Aroclor 1232	ND (0.05)		8082A		1	09/28/20 16:22		DI02513
Aroclor 1242	ND (0.05)		8082A		1	09/28/20 16:22		DI02513
Aroclor 1248	ND (0.05)		8082A		1	09/28/20 16:22		DI02513
Aroclor 1254	ND (0.05)		8082A		1	09/28/20 16:22		DI02513
Aroclor 1260	ND (0.05)		8082A		1	09/28/20 16:22		DI02513
Aroclor 1262	ND (0.05)		8082A		1	09/28/20 16:22		DI02513
Aroclor 1268	ND (0.05)		8082A		1	09/28/20 16:22		DI02513

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*90 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*88 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*67 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*78 %*		*30-150*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-9
Date Sampled: 09/24/20 13:00
Percent Solids: 98
Initial Volume: 19.6
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-09
Sample Matrix: Soil
Units: mg/kg dry
Analyst: NXL
Prepared: 9/25/20 13:30

8100M Total Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Total Petroleum Hydrocarbons	ND (10.4)		8100M		1	09/29/20 16:18	D0I0410	DI02512

	%Recovery	Qualifier	Limits
Surrogate: O-Terphenyl	*82 %*		*40-140*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-9
Date Sampled: 09/24/20 13:00
Percent Solids: 98
Initial Volume: 14.4
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-09
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,2,4-Trichlorobenzene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
1,2-Dichlorobenzene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
1,3-Dichlorobenzene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
1,4-Dichlorobenzene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
2,4,5-Trichlorophenol	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
2,4,6-Trichlorophenol	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
2,4-Dichlorophenol	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
2,4-Dimethylphenol	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
2,4-Dinitrophenol	ND (1.78)		8270D		1	09/26/20 4:30	D0I0374	DI02511
2,4-Dinitrotoluene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
2,6-Dinitrotoluene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
2-Chloronaphthalene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
2-Chlorophenol	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
2-Methylnaphthalene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
2-Methylphenol	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
2-Nitrophenol	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
3,3´-Dichlorobenzidine	ND (0.709)		8270D		1	09/26/20 4:30	D0I0374	DI02511
3+4-Methylphenol	ND (0.709)		8270D		1	09/26/20 4:30	D0I0374	DI02511
4-Bromophenyl-phenylether	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
4-Chloroaniline	ND (0.709)		8270D		1	09/26/20 4:30	D0I0374	DI02511
4-Nitrophenol	ND (1.78)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Acenaphthene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Acenaphthylene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Acetophenone	ND (0.709)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Aniline	ND (1.78)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Anthracene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Azobenzene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Benzo(a)anthracene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Benzo(a)pyrene	ND (0.178)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Benzo(b)fluoranthene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Benzo(g,h,i)perylene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Benzo(k)fluoranthene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-9
Date Sampled: 09/24/20 13:00
Percent Solids: 98
Initial Volume: 14.4
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-09
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
bis(2-Chloroethoxy)methane	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
bis(2-Chloroethyl)ether	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
bis(2-chloroisopropyl)Ether	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
bis(2-Ethylhexyl)phthalate	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Butylbenzylphthalate	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Chrysene	ND (0.178)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Dibenzo(a,h)Anthracene	ND (0.178)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Dibenzofuran	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Diethylphthalate	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Dimethylphthalate	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Di-n-butylphthalate	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Di-n-octylphthalate	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Fluoranthene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Fluorene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Hexachlorobenzene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Hexachlorobutadiene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Hexachloroethane	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Indeno(1,2,3-cd)Pyrene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Isophorone	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Naphthalene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Nitrobenzene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
N-Nitrosodimethylamine	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Pentachlorophenol	ND (1.78)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Phenanthrene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Phenol	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511
Pyrene	ND (0.354)		8270D		1	09/26/20 4:30	D0I0374	DI02511

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichlorobenzene-d4	*53 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*60 %*		*30-130*
Surrogate: 2-Chlorophenol-d4	*54 %*		*30-130*
Surrogate: 2-Fluorobiphenyl	*60 %*		*30-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-9
Date Sampled: 09/24/20 13:00
Percent Solids: 98
Initial Volume: 14.4
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-09
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Surrogate: 2-Fluorophenol		*52 %*		*30-130*				
Surrogate: Nitrobenzene-d5		*50 %*		*30-130*				
Surrogate: Phenol-d6		*52 %*		*30-130*				
Surrogate: p-Terphenyl-d14		*88 %*		*30-130*				

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-10
Date Sampled: 09/24/20 13:30
Percent Solids: 97

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-10
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Arsenic	**2.09** (1.97)		6010C		1	KJK	10/01/20 7:28	2.6	100	DI02530
Barium	**5.71** (1.97)		6010C		1	KJK	10/01/20 7:28	2.6	100	DI02530
Cadmium	ND (0.39)		6010C		1	KJK	10/01/20 7:28	2.6	100	DI02530
Chromium	**0.80** (0.79)		6010C		1	KJK	10/01/20 7:28	2.6	100	DI02530
Lead	ND (3.95)		6010C		1	KJK	10/01/20 7:28	2.6	100	DI02530
Mercury	ND (0.025)		7471B		1	MKS	09/28/20 12:51	0.8	40	DI02519
Selenium	ND (3.95)		6010C		1	KJK	10/01/20 7:28	2.6	100	DI02530
Silver	ND (0.79)		6010C		2	KJK	10/01/20 19:10	2.6	100	DI02530

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-10
Date Sampled: 09/24/20 13:30
Percent Solids: 97
Initial Volume: 8.5
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-10
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,1,1-Trichloroethane	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,1,2,2-Tetrachloroethane	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,1,2-Trichloroethane	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,1-Dichloroethane	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,1-Dichloroethene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,1-Dichloropropene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,2,3-Trichlorobenzene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,2,3-Trichloropropane	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,2,4-Trichlorobenzene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,2,4-Trimethylbenzene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,2-Dibromo-3-Chloropropane	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,2-Dibromoethane	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,2-Dichlorobenzene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,2-Dichloroethane	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,2-Dichloropropane	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,3,5-Trimethylbenzene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,3-Dichlorobenzene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,3-Dichloropropane	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,4-Dichlorobenzene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
1,4-Dioxane	ND (0.0483)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
2,2-Dichloropropane	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
2-Butanone	ND (0.0302)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
2-Chlorotoluene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
2-Hexanone	ND (0.0302)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
4-Chlorotoluene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
4-Isopropyltoluene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
4-Methyl-2-Pentanone	ND (0.0302)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Acetone	ND (0.0302)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Benzene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Bromobenzene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Bromochloromethane	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-10
Date Sampled: 09/24/20 13:30
Percent Solids: 97
Initial Volume: 8.5
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-10
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Bromoform	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Bromomethane	ND (0.0060)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Carbon Disulfide	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Carbon Tetrachloride	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Chlorobenzene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Chloroethane	ND (0.0060)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Chloroform	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Chloromethane	ND (0.0060)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
cis-1,2-Dichloroethene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
cis-1,3-Dichloropropene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Dibromochloromethane	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Dibromomethane	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Dichlorodifluoromethane	ND (0.0060)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Diethyl Ether	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Di-isopropyl ether	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Ethyl tertiary-butyl ether	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Ethylbenzene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Hexachlorobutadiene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Isopropylbenzene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Methyl tert-Butyl Ether	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Methylene Chloride	ND (0.0151)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Naphthalene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
n-Butylbenzene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
n-Propylbenzene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
sec-Butylbenzene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Styrene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
tert-Butylbenzene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Tertiary-amyl methyl ether	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Tetrachloroethene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Tetrahydrofuran	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Toluene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-10
Date Sampled: 09/24/20 13:30
Percent Solids: 97
Initial Volume: 8.5
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-10
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
trans-1,2-Dichloroethene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
trans-1,3-Dichloropropene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Trichloroethene	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Trichlorofluoromethane	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Vinyl Chloride	ND (0.0060)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Xylene O	ND (0.0030)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Xylene P,M	ND (0.0060)		8260B Low		1	09/28/20 18:17	D0I0416	DI02845
Xylenes (Total)	ND (0.00604)		8260B Low		1	09/28/20 18:17		[CALC]

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*107 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*100 %*		*70-130*
Surrogate: Dibromofluoromethane	*105 %*		*70-130*
Surrogate: Toluene-d8	*90 %*		*70-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-10
Date Sampled: 09/24/20 13:30
Percent Solids: 97
Initial Volume: 19.9
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-10
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MJV
Prepared: 9/25/20 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.05)		8082A		1	09/28/20 16:42		DI02513
Aroclor 1221	ND (0.05)		8082A		1	09/28/20 16:42		DI02513
Aroclor 1232	ND (0.05)		8082A		1	09/28/20 16:42		DI02513
Aroclor 1242	ND (0.05)		8082A		1	09/28/20 16:42		DI02513
Aroclor 1248	ND (0.05)		8082A		1	09/28/20 16:42		DI02513
Aroclor 1254	ND (0.05)		8082A		1	09/28/20 16:42		DI02513
Aroclor 1260	ND (0.05)		8082A		1	09/28/20 16:42		DI02513
Aroclor 1262	ND (0.05)		8082A		1	09/28/20 16:42		DI02513
Aroclor 1268	ND (0.05)		8082A		1	09/28/20 16:42		DI02513

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*84 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*83 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*72 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*81 %*		*30-150*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-10
Date Sampled: 09/24/20 13:30
Percent Solids: 97
Initial Volume: 20.8
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-10
Sample Matrix: Soil
Units: mg/kg dry
Analyst: NXL
Prepared: 9/25/20 13:30

8100M Total Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Total Petroleum Hydrocarbons	ND (9.9)		8100M		1	09/29/20 16:51	D0I0410	DI02512

	%Recovery	Qualifier	Limits
Surrogate: O-Terphenyl	*78 %*		*40-140*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-10
Date Sampled: 09/24/20 13:30
Percent Solids: 97
Initial Volume: 15.3
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-10
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,2,4-Trichlorobenzene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
1,2-Dichlorobenzene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
1,3-Dichlorobenzene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
1,4-Dichlorobenzene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
2,4,5-Trichlorophenol	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
2,4,6-Trichlorophenol	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
2,4-Dichlorophenol	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
2,4-Dimethylphenol	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
2,4-Dinitrophenol	ND (1.68)		8270D		1	09/26/20 4:59	D0I0374	DI02511
2,4-Dinitrotoluene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
2,6-Dinitrotoluene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
2-Chloronaphthalene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
2-Chlorophenol	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
2-Methylnaphthalene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
2-Methylphenol	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
2-Nitrophenol	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
3,3´-Dichlorobenzidine	ND (0.671)		8270D		1	09/26/20 4:59	D0I0374	DI02511
3+4-Methylphenol	ND (0.671)		8270D		1	09/26/20 4:59	D0I0374	DI02511
4-Bromophenyl-phenylether	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
4-Chloroaniline	ND (0.671)		8270D		1	09/26/20 4:59	D0I0374	DI02511
4-Nitrophenol	ND (1.68)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Acenaphthene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Acenaphthylene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Acetophenone	ND (0.671)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Aniline	ND (1.68)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Anthracene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Azobenzene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Benzo(a)anthracene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Benzo(a)pyrene	ND (0.168)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Benzo(b)fluoranthene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Benzo(g,h,i)perylene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Benzo(k)fluoranthene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-10
Date Sampled: 09/24/20 13:30
Percent Solids: 97
Initial Volume: 15.3
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-10
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
bis(2-Chloroethoxy)methane	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
bis(2-Chloroethyl)ether	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
bis(2-chloroisopropyl)Ether	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
bis(2-Ethylhexyl)phthalate	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Butylbenzylphthalate	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Chrysene	ND (0.168)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Dibenzo(a,h)Anthracene	ND (0.168)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Dibenzofuran	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Diethylphthalate	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Dimethylphthalate	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Di-n-butylphthalate	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Di-n-octylphthalate	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Fluoranthene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Fluorene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Hexachlorobenzene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Hexachlorobutadiene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Hexachloroethane	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Indeno(1,2,3-cd)Pyrene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Isophorone	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Naphthalene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Nitrobenzene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
N-Nitrosodimethylamine	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Pentachlorophenol	ND (1.68)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Phenanthrene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Phenol	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511
Pyrene	ND (0.335)		8270D		1	09/26/20 4:59	D0I0374	DI02511

	%Recovery	*Qualifier*	*Limits*
Surrogate: 1,2-Dichlorobenzene-d4	*41 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*47 %*		*30-130*
Surrogate: 2-Chlorophenol-d4	*42 %*		*30-130*
Surrogate: 2-Fluorobiphenyl	*46 %*		*30-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-10
Date Sampled: 09/24/20 13:30
Percent Solids: 97
Initial Volume: 15.3
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-10
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Surrogate: 2-Fluorophenol		*39 %*		*30-130*				
Surrogate: Nitrobenzene-d5		*38 %*		*30-130*				
Surrogate: Phenol-d6		*40 %*		*30-130*				
Surrogate: p-Terphenyl-d14		*70 %*		*30-130*				

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-11
Date Sampled: 09/24/20 14:00
Percent Solids: 98

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-11
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Arsenic	ND (4.24)		6010C		2	KJK	10/01/20 19:14	2.4	100	DI02530
Barium	**10.8** (4.24)		6010C		2	KJK	10/01/20 19:14	2.4	100	DI02530
Cadmium	ND (0.85)		6010C		2	KJK	10/01/20 19:14	2.4	100	DI02530
Chromium	ND (1.70)		6010C		2	KJK	10/01/20 19:14	2.4	100	DI02530
Lead	ND (8.49)		6010C		2	KJK	10/01/20 19:14	2.4	100	DI02530
Mercury	ND (0.028)		7471B		1	MKS	09/28/20 12:53	0.72	40	DI02519
Selenium	ND (8.49)		6010C		2	KJK	10/01/20 19:14	2.4	100	DI02530
Silver	ND (0.85)		6010C		2	KJK	10/01/20 19:14	2.4	100	DI02530

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-11
Date Sampled: 09/24/20 14:00
Percent Solids: 98
Initial Volume: 8.1
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-11
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,1,1-Trichloroethane	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,1,2,2-Tetrachloroethane	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,1,2-Trichloroethane	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,1-Dichloroethane	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,1-Dichloroethene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,1-Dichloropropene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,2,3-Trichlorobenzene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,2,3-Trichloropropane	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,2,4-Trichlorobenzene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,2,4-Trimethylbenzene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,2-Dibromo-3-Chloropropane	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,2-Dibromoethane	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,2-Dichlorobenzene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,2-Dichloroethane	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,2-Dichloropropane	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,3,5-Trimethylbenzene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,3-Dichlorobenzene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,3-Dichloropropane	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,4-Dichlorobenzene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
1,4-Dioxane	ND (0.0503)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
2,2-Dichloropropane	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
2-Butanone	ND (0.0314)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
2-Chlorotoluene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
2-Hexanone	ND (0.0314)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
4-Chlorotoluene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
4-Isopropyltoluene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
4-Methyl-2-Pentanone	ND (0.0314)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Acetone	ND (0.0314)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Benzene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Bromobenzene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Bromochloromethane	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-11
Date Sampled: 09/24/20 14:00
Percent Solids: 98
Initial Volume: 8.1
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-11
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Bromoform	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Bromomethane	ND (0.0063)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Carbon Disulfide	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Carbon Tetrachloride	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Chlorobenzene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Chloroethane	ND (0.0063)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Chloroform	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Chloromethane	ND (0.0063)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
cis-1,2-Dichloroethene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
cis-1,3-Dichloropropene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Dibromochloromethane	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Dibromomethane	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Dichlorodifluoromethane	ND (0.0063)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Diethyl Ether	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Di-isopropyl ether	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Ethyl tertiary-butyl ether	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Ethylbenzene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Hexachlorobutadiene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Isopropylbenzene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Methyl tert-Butyl Ether	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Methylene Chloride	ND (0.0157)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Naphthalene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
n-Butylbenzene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
n-Propylbenzene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
sec-Butylbenzene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Styrene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
tert-Butylbenzene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Tertiary-amyl methyl ether	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Tetrachloroethene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Tetrahydrofuran	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Toluene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-11
Date Sampled: 09/24/20 14:00
Percent Solids: 98
Initial Volume: 8.1
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-11
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
trans-1,2-Dichloroethene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
trans-1,3-Dichloropropene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Trichloroethene	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Trichlorofluoromethane	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Vinyl Chloride	ND (0.0063)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Xylene O	ND (0.0031)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Xylene P,M	ND (0.0063)		8260B Low		1	09/28/20 18:42	D0I0416	DI02845
Xylenes (Total)	ND (0.00629)		8260B Low		1	09/28/20 18:42		[CALC]

	%Recovery	*Qualifier*	*Limits*
Surrogate: 1,2-Dichloroethane-d4	*111 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*101 %*		*70-130*
Surrogate: Dibromofluoromethane	*108 %*		*70-130*
Surrogate: Toluene-d8	*90 %*		*70-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-11
Date Sampled: 09/24/20 14:00
Percent Solids: 98
Initial Volume: 19.5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-11
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MJV
Prepared: 9/25/20 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.05)		8082A		1	09/28/20 17:01		DI02513
Aroclor 1221	ND (0.05)		8082A		1	09/28/20 17:01		DI02513
Aroclor 1232	ND (0.05)		8082A		1	09/28/20 17:01		DI02513
Aroclor 1242	ND (0.05)		8082A		1	09/28/20 17:01		DI02513
Aroclor 1248	ND (0.05)		8082A		1	09/28/20 17:01		DI02513
Aroclor 1254	ND (0.05)		8082A		1	09/28/20 17:01		DI02513
Aroclor 1260	ND (0.05)		8082A		1	09/28/20 17:01		DI02513
Aroclor 1262	ND (0.05)		8082A		1	09/28/20 17:01		DI02513
Aroclor 1268	ND (0.05)		8082A		1	09/28/20 17:01		DI02513

	%Recovery	*Qualifier*	*Limits*
Surrogate: Decachlorobiphenyl	*91 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*90 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*79 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*93 %*		*30-150*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-11
Date Sampled: 09/24/20 14:00
Percent Solids: 98
Initial Volume: 19
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-11
Sample Matrix: Soil
Units: mg/kg dry
Analyst: NXL
Prepared: 9/25/20 13:30

8100M Total Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Total Petroleum Hydrocarbons	ND (10.7)		8100M		1	09/29/20 17:24	D0I0410	DI02512

	%Recovery	Qualifier	Limits
Surrogate: O-Terphenyl	*79 %*		*40-140*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-11
Date Sampled: 09/24/20 14:00
Percent Solids: 98
Initial Volume: 14.2
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-11
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,2,4-Trichlorobenzene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
1,2-Dichlorobenzene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
1,3-Dichlorobenzene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
1,4-Dichlorobenzene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
2,4,5-Trichlorophenol	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
2,4,6-Trichlorophenol	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
2,4-Dichlorophenol	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
2,4-Dimethylphenol	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
2,4-Dinitrophenol	ND (1.80)		8270D		1	09/26/20 5:28	D0I0374	DI02511
2,4-Dinitrotoluene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
2,6-Dinitrotoluene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
2-Chloronaphthalene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
2-Chlorophenol	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
2-Methylnaphthalene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
2-Methylphenol	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
2-Nitrophenol	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
3,3´-Dichlorobenzidine	ND (0.718)		8270D		1	09/26/20 5:28	D0I0374	DI02511
3+4-Methylphenol	ND (0.718)		8270D		1	09/26/20 5:28	D0I0374	DI02511
4-Bromophenyl-phenylether	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
4-Chloroaniline	ND (0.718)		8270D		1	09/26/20 5:28	D0I0374	DI02511
4-Nitrophenol	ND (1.80)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Acenaphthene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Acenaphthylene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Acetophenone	ND (0.718)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Aniline	ND (1.80)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Anthracene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Azobenzene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Benzo(a)anthracene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Benzo(a)pyrene	ND (0.180)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Benzo(b)fluoranthene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Benzo(g,h,i)perylene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Benzo(k)fluoranthene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-11
Date Sampled: 09/24/20 14:00
Percent Solids: 98
Initial Volume: 14.2
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-11
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
bis(2-Chloroethoxy)methane	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
bis(2-Chloroethyl)ether	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
bis(2-chloroisopropyl)Ether	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
bis(2-Ethylhexyl)phthalate	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Butylbenzylphthalate	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Chrysene	ND (0.180)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Dibenzo(a,h)Anthracene	ND (0.180)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Dibenzofuran	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Diethylphthalate	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Dimethylphthalate	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Di-n-butylphthalate	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Di-n-octylphthalate	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Fluoranthene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Fluorene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Hexachlorobenzene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Hexachlorobutadiene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Hexachloroethane	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Indeno(1,2,3-cd)Pyrene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Isophorone	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Naphthalene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Nitrobenzene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
N-Nitrosodimethylamine	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Pentachlorophenol	ND (1.80)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Phenanthrene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Phenol	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511
Pyrene	ND (0.358)		8270D		1	09/26/20 5:28	D0I0374	DI02511

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichlorobenzene-d4	*51 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*51 %*		*30-130*
Surrogate: 2-Chlorophenol-d4	*53 %*		*30-130*
Surrogate: 2-Fluorobiphenyl	*55 %*		*30-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-11
Date Sampled: 09/24/20 14:00
Percent Solids: 98
Initial Volume: 14.2
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-11
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Surrogate: 2-Fluorophenol		*50 %*		*30-130*				
Surrogate: Nitrobenzene-d5		*47 %*		*30-130*				
Surrogate: Phenol-d6		*50 %*		*30-130*				
Surrogate: p-Terphenyl-d14		*76 %*		*30-130*				

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-12
Date Sampled: 09/24/20 13:30
Percent Solids: 98

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-12
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Arsenic	ND (4.57)		6010C		2	KJK	10/01/20 19:19	2.24	100	DI02530
Barium	**5.61** (4.57)		6010C		2	KJK	10/01/20 19:19	2.24	100	DI02530
Cadmium	ND (0.91)		6010C		2	KJK	10/01/20 19:19	2.24	100	DI02530
Chromium	ND (1.83)		6010C		2	KJK	10/01/20 19:19	2.24	100	DI02530
Lead	ND (9.13)		6010C		2	KJK	10/01/20 19:19	2.24	100	DI02530
Mercury	ND (0.028)		7471B		1	MKS	09/28/20 12:55	0.73	40	DI02519
Selenium	ND (9.13)		6010C		2	KJK	10/01/20 19:19	2.24	100	DI02530
Silver	ND (0.91)		6010C		2	KJK	10/01/20 19:19	2.24	100	DI02530

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-12
Date Sampled: 09/24/20 13:30
Percent Solids: 98
Initial Volume: 6.4
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-12
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,1,1-Trichloroethane	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,1,2,2-Tetrachloroethane	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,1,2-Trichloroethane	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,1-Dichloroethane	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,1-Dichloroethene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,1-Dichloropropene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,2,3-Trichlorobenzene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,2,3-Trichloropropane	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,2,4-Trichlorobenzene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,2,4-Trimethylbenzene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,2-Dibromo-3-Chloropropane	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,2-Dibromoethane	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,2-Dichlorobenzene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,2-Dichloroethane	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,2-Dichloropropane	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,3,5-Trimethylbenzene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,3-Dichlorobenzene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,3-Dichloropropane	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,4-Dichlorobenzene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
1,4-Dioxane	ND (0.0639)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
2,2-Dichloropropane	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
2-Butanone	ND (0.0399)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
2-Chlorotoluene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
2-Hexanone	ND (0.0399)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
4-Chlorotoluene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
4-Isopropyltoluene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
4-Methyl-2-Pentanone	ND (0.0399)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Acetone	ND (0.0399)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Benzene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Bromobenzene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Bromochloromethane	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-12
Date Sampled: 09/24/20 13:30
Percent Solids: 98
Initial Volume: 6.4
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-12
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Bromoform	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Bromomethane	ND (0.0080)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Carbon Disulfide	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Carbon Tetrachloride	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Chlorobenzene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Chloroethane	ND (0.0080)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Chloroform	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Chloromethane	ND (0.0080)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
cis-1,2-Dichloroethene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
cis-1,3-Dichloropropene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Dibromochloromethane	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Dibromomethane	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Dichlorodifluoromethane	ND (0.0080)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Diethyl Ether	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Di-isopropyl ether	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Ethyl tertiary-butyl ether	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Ethylbenzene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Hexachlorobutadiene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Isopropylbenzene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Methyl tert-Butyl Ether	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Methylene Chloride	ND (0.0200)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Naphthalene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
n-Butylbenzene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
n-Propylbenzene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
sec-Butylbenzene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Styrene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
tert-Butylbenzene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Tertiary-amyl methyl ether	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Tetrachloroethene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Tetrahydrofuran	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Toluene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-12
Date Sampled: 09/24/20 13:30
Percent Solids: 98
Initial Volume: 6.4
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-12
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
trans-1,2-Dichloroethene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
trans-1,3-Dichloropropene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Trichloroethene	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Trichlorofluoromethane	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Vinyl Chloride	ND (0.0080)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Xylene O	ND (0.0040)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Xylene P,M	ND (0.0080)		8260B Low		1	09/28/20 19:08	D0I0416	DI02845
Xylenes (Total)	ND (0.00799)		8260B Low		1	09/28/20 19:08		[CALC]

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*109 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*100 %*		*70-130*
Surrogate: Dibromofluoromethane	*107 %*		*70-130*
Surrogate: Toluene-d8	*90 %*		*70-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-12
Date Sampled: 09/24/20 13:30
Percent Solids: 98
Initial Volume: 19.1
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-12
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MJV
Prepared: 9/25/20 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.05)		8082A		1	09/28/20 17:21		DI02513
Aroclor 1221	ND (0.05)		8082A		1	09/28/20 17:21		DI02513
Aroclor 1232	ND (0.05)		8082A		1	09/28/20 17:21		DI02513
Aroclor 1242	ND (0.05)		8082A		1	09/28/20 17:21		DI02513
Aroclor 1248	ND (0.05)		8082A		1	09/28/20 17:21		DI02513
Aroclor 1254	ND (0.05)		8082A		1	09/28/20 17:21		DI02513
Aroclor 1260	ND (0.05)		8082A		1	09/28/20 17:21		DI02513
Aroclor 1262	ND (0.05)		8082A		1	09/28/20 17:21		DI02513
Aroclor 1268	ND (0.05)		8082A		1	09/28/20 17:21		DI02513

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*84 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*84 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*71 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*83 %*		*30-150*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-12
Date Sampled: 09/24/20 13:30
Percent Solids: 98
Initial Volume: 20.1
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-12
Sample Matrix: Soil
Units: mg/kg dry
Analyst: NXL
Prepared: 9/25/20 13:30

8100M Total Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Total Petroleum Hydrocarbons	ND (10.2)		8100M		1	09/29/20 17:58	D0I0410	DI02512

	%Recovery	Qualifier	Limits
Surrogate: O-Terphenyl	*78 %*		*40-140*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-12
Date Sampled: 09/24/20 13:30
Percent Solids: 98
Initial Volume: 14.1
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-12
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,2,4-Trichlorobenzene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
1,2-Dichlorobenzene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
1,3-Dichlorobenzene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
1,4-Dichlorobenzene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
2,4,5-Trichlorophenol	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
2,4,6-Trichlorophenol	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
2,4-Dichlorophenol	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
2,4-Dimethylphenol	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
2,4-Dinitrophenol	ND (1.82)		8270D		1	09/26/20 6:54	D0I0374	DI02511
2,4-Dinitrotoluene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
2,6-Dinitrotoluene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
2-Chloronaphthalene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
2-Chlorophenol	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
2-Methylnaphthalene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
2-Methylphenol	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
2-Nitrophenol	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
3,3´-Dichlorobenzidine	ND (0.726)		8270D		1	09/26/20 6:54	D0I0374	DI02511
3+4-Methylphenol	ND (0.726)		8270D		1	09/26/20 6:54	D0I0374	DI02511
4-Bromophenyl-phenylether	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
4-Chloroaniline	ND (0.726)		8270D		1	09/26/20 6:54	D0I0374	DI02511
4-Nitrophenol	ND (1.82)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Acenaphthene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Acenaphthylene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Acetophenone	ND (0.726)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Aniline	ND (1.82)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Anthracene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Azobenzene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Benzo(a)anthracene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Benzo(a)pyrene	ND (0.182)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Benzo(b)fluoranthene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Benzo(g,h,i)perylene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Benzo(k)fluoranthene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-12
Date Sampled: 09/24/20 13:30
Percent Solids: 98
Initial Volume: 14.1
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-12
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
bis(2-Chloroethoxy)methane	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
bis(2-Chloroethyl)ether	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
bis(2-chloroisopropyl)Ether	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
bis(2-Ethylhexyl)phthalate	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Butylbenzylphthalate	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Chrysene	ND (0.182)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Dibenzo(a,h)Anthracene	ND (0.182)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Dibenzofuran	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Diethylphthalate	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Dimethylphthalate	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Di-n-butylphthalate	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Di-n-octylphthalate	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Fluoranthene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Fluorene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Hexachlorobenzene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Hexachlorobutadiene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Hexachloroethane	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Indeno(1,2,3-cd)Pyrene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Isophorone	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Naphthalene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Nitrobenzene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
N-Nitrosodimethylamine	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Pentachlorophenol	ND (1.82)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Phenanthrene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Phenol	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511
Pyrene	ND (0.362)		8270D		1	09/26/20 6:54	D0I0374	DI02511

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichlorobenzene-d4	*58 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*59 %*		*30-130*
Surrogate: 2-Chlorophenol-d4	*61 %*		*30-130*
Surrogate: 2-Fluorobiphenyl	*66 %*		*30-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-12
Date Sampled: 09/24/20 13:30
Percent Solids: 98
Initial Volume: 14.1
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-12
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Surrogate: 2-Fluorophenol		*58 %*		*30-130*				
Surrogate: Nitrobenzene-d5		*54 %*		*30-130*				
Surrogate: Phenol-d6		*58 %*		*30-130*				
Surrogate: p-Terphenyl-d14		*78 %*		*30-130*				

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-13
Date Sampled: 09/24/20 15:00
Percent Solids: 98

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-13
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Arsenic	ND (4.86)		6010C		2	KJK	10/01/20 19:38	2.1	100	DI02530
Barium	**5.48** (4.86)		6010C		2	KJK	10/01/20 19:38	2.1	100	DI02530
Cadmium	ND (0.97)		6010C		2	KJK	10/01/20 19:38	2.1	100	DI02530
Chromium	ND (1.94)		6010C		2	KJK	10/01/20 19:38	2.1	100	DI02530
Lead	ND (9.71)		6010C		2	KJK	10/01/20 19:38	2.1	100	DI02530
Mercury	ND (0.031)		7471B		1	MKS	09/28/20 12:57	0.66	40	DI02519
Selenium	ND (9.71)		6010C		2	KJK	10/01/20 19:38	2.1	100	DI02530
Silver	ND (0.97)		6010C		2	KJK	10/01/20 19:38	2.1	100	DI02530

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-13
Date Sampled: 09/24/20 15:00
Percent Solids: 98
Initial Volume: 7.6
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-13
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,1,1-Trichloroethane	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,1,2,2-Tetrachloroethane	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,1,2-Trichloroethane	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,1-Dichloroethane	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,1-Dichloroethene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,1-Dichloropropene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,2,3-Trichlorobenzene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,2,3-Trichloropropane	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,2,4-Trichlorobenzene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,2,4-Trimethylbenzene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,2-Dibromo-3-Chloropropane	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,2-Dibromoethane	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,2-Dichlorobenzene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,2-Dichloroethane	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,2-Dichloropropane	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,3,5-Trimethylbenzene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,3-Dichlorobenzene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,3-Dichloropropane	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,4-Dichlorobenzene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
1,4-Dioxane	ND (0.0537)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
2,2-Dichloropropane	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
2-Butanone	ND (0.0335)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
2-Chlorotoluene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
2-Hexanone	ND (0.0335)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
4-Chlorotoluene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
4-Isopropyltoluene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
4-Methyl-2-Pentanone	ND (0.0335)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Acetone	ND (0.0335)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Benzene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Bromobenzene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Bromochloromethane	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-13
Date Sampled: 09/24/20 15:00
Percent Solids: 98
Initial Volume: 7.6
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-13
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Bromoform	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Bromomethane	ND (0.0067)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Carbon Disulfide	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Carbon Tetrachloride	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Chlorobenzene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Chloroethane	ND (0.0067)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Chloroform	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Chloromethane	ND (0.0067)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
cis-1,2-Dichloroethene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
cis-1,3-Dichloropropene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Dibromochloromethane	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Dibromomethane	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Dichlorodifluoromethane	ND (0.0067)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Diethyl Ether	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Di-isopropyl ether	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Ethyl tertiary-butyl ether	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Ethylbenzene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Hexachlorobutadiene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Isopropylbenzene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Methyl tert-Butyl Ether	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Methylene Chloride	ND (0.0168)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Naphthalene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
n-Butylbenzene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
n-Propylbenzene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
sec-Butylbenzene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Styrene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
tert-Butylbenzene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Tertiary-amyl methyl ether	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Tetrachloroethene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Tetrahydrofuran	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Toluene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-13
Date Sampled: 09/24/20 15:00
Percent Solids: 98
Initial Volume: 7.6
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-13
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
trans-1,2-Dichloroethene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
trans-1,3-Dichloropropene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Trichloroethene	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Trichlorofluoromethane	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Vinyl Chloride	ND (0.0067)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Xylene O	ND (0.0034)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Xylene P,M	ND (0.0067)		8260B Low		1	09/28/20 19:33	D0I0416	DI02845
Xylenes (Total)	ND (0.00671)		8260B Low		1	09/28/20 19:33		[CALC]

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*111 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*100 %*		*70-130*
Surrogate: Dibromofluoromethane	*108 %*		*70-130*
Surrogate: Toluene-d8	*89 %*		*70-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-13
Date Sampled: 09/24/20 15:00
Percent Solids: 98
Initial Volume: 20.4
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-13
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MJV
Prepared: 9/25/20 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.05)		8082A		1	09/28/20 17:40		DI02513
Aroclor 1221	ND (0.05)		8082A		1	09/28/20 17:40		DI02513
Aroclor 1232	ND (0.05)		8082A		1	09/28/20 17:40		DI02513
Aroclor 1242	ND (0.05)		8082A		1	09/28/20 17:40		DI02513
Aroclor 1248	ND (0.05)		8082A		1	09/28/20 17:40		DI02513
Aroclor 1254	ND (0.05)		8082A		1	09/28/20 17:40		DI02513
Aroclor 1260	ND (0.05)		8082A		1	09/28/20 17:40		DI02513
Aroclor 1262	ND (0.05)		8082A		1	09/28/20 17:40		DI02513
Aroclor 1268	ND (0.05)		8082A		1	09/28/20 17:40		DI02513

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*90 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*89 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*73 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*86 %*		*30-150*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-13
Date Sampled: 09/24/20 15:00
Percent Solids: 98
Initial Volume: 20.2
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-13
Sample Matrix: Soil
Units: mg/kg dry
Analyst: NXL
Prepared: 9/25/20 13:30

8100M Total Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Total Petroleum Hydrocarbons	ND (10.1)		8100M		1	09/29/20 18:31	D0I0410	DI02512

	%Recovery	Qualifier	Limits
Surrogate: O-Terphenyl	*86 %*		*40-140*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-13
Date Sampled: 09/24/20 15:00
Percent Solids: 98
Initial Volume: 15.9
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-13
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,2,4-Trichlorobenzene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
1,2-Dichlorobenzene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
1,3-Dichlorobenzene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
1,4-Dichlorobenzene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
2,4,5-Trichlorophenol	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
2,4,6-Trichlorophenol	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
2,4-Dichlorophenol	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
2,4-Dimethylphenol	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
2,4-Dinitrophenol	ND (1.61)		8270D		1	09/26/20 7:23	D0I0374	DI02511
2,4-Dinitrotoluene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
2,6-Dinitrotoluene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
2-Chloronaphthalene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
2-Chlorophenol	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
2-Methylnaphthalene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
2-Methylphenol	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
2-Nitrophenol	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
3,3´-Dichlorobenzidine	ND (0.642)		8270D		1	09/26/20 7:23	D0I0374	DI02511
3+4-Methylphenol	ND (0.642)		8270D		1	09/26/20 7:23	D0I0374	DI02511
4-Bromophenyl-phenylether	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
4-Chloroaniline	ND (0.642)		8270D		1	09/26/20 7:23	D0I0374	DI02511
4-Nitrophenol	ND (1.61)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Acenaphthene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Acenaphthylene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Acetophenone	ND (0.642)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Aniline	ND (1.61)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Anthracene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Azobenzene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Benzo(a)anthracene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Benzo(a)pyrene	ND (0.161)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Benzo(b)fluoranthene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Benzo(g,h,i)perylene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Benzo(k)fluoranthene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-13
Date Sampled: 09/24/20 15:00
Percent Solids: 98
Initial Volume: 15.9
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-13
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
bis(2-Chloroethoxy)methane	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
bis(2-Chloroethyl)ether	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
bis(2-chloroisopropyl)Ether	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
bis(2-Ethylhexyl)phthalate	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Butylbenzylphthalate	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Chrysene	ND (0.161)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Dibenzo(a,h)Anthracene	ND (0.161)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Dibenzofuran	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Diethylphthalate	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Dimethylphthalate	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Di-n-butylphthalate	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Di-n-octylphthalate	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Fluoranthene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Fluorene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Hexachlorobenzene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Hexachlorobutadiene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Hexachloroethane	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Indeno(1,2,3-cd)Pyrene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Isophorone	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Naphthalene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Nitrobenzene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
N-Nitrosodimethylamine	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Pentachlorophenol	ND (1.61)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Phenanthrene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Phenol	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511
Pyrene	ND (0.320)		8270D		1	09/26/20 7:23	D0I0374	DI02511

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichlorobenzene-d4	*62 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*60 %*		*30-130*
Surrogate: 2-Chlorophenol-d4	*64 %*		*30-130*
Surrogate: 2-Fluorobiphenyl	*65 %*		*30-130*

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
Client Sample ID: C-13
Date Sampled: 09/24/20 15:00
Percent Solids: 98
Initial Volume: 15.9
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 20I0726
ESS Laboratory Sample ID: 20I0726-13
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 9/25/20 14:05

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Surrogate: 2-Fluorophenol		*61 %*		*30-130*				
Surrogate: Nitrobenzene-d5		*57 %*		*30-130*				
Surrogate: Phenol-d6		*60 %*		*30-130*				
Surrogate: p-Terphenyl-d14		*88 %*		*30-130*				

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Total Metals										
Batch DI02519 - 7471B										
Blank										
Mercury	ND	0.033	mg/kg wet							
LCS										
Mercury	24.9	3.14	mg/kg wet	26.60		94	80-120			
LCS Dup										
Mercury	22.9	2.75	mg/kg wet	26.60		86	80-120	9	20	
Batch DI02530 - 3050B										
Blank										
Arsenic	ND	2.50	mg/kg wet							
Barium	ND	2.50	mg/kg wet							
Cadmium	ND	0.50	mg/kg wet							
Chromium	ND	1.00	mg/kg wet							
Lead	ND	5.00	mg/kg wet							
Selenium	ND	5.00	mg/kg wet							
Silver	ND	0.50	mg/kg wet							
LCS										
Arsenic	40.3	7.81	mg/kg wet	43.10		93	80-120			
Barium	538	7.81	mg/kg wet	597.0		90	80-120			
Cadmium	109	1.56	mg/kg wet	118.0		93	80-120			
Chromium	277	3.12	mg/kg wet	299.0		93	80-120			
Lead	140	15.6	mg/kg wet	144.0		97	80-120			
Selenium	139	15.6	mg/kg wet	154.0		90	80-120			
Silver	69.3	1.56	mg/kg wet	73.50		94	80-120			
LCS Dup										
Arsenic	40.2	7.46	mg/kg wet	43.10		93	80-120	0.3	20	
Barium	574	7.46	mg/kg wet	597.0		96	80-120	6	20	
Cadmium	113	1.49	mg/kg wet	118.0		96	80-120	3	20	
Chromium	298	2.99	mg/kg wet	299.0		100	80-120	7	20	
Lead	145	14.9	mg/kg wet	144.0		101	80-120	4	20	
Selenium	145	14.9	mg/kg wet	154.0		94	80-120	4	20	
Silver	74.4	1.49	mg/kg wet	73.50		101	80-120	7	20	
5035/8260B Volatile Organic Compounds / Low Level										
Batch DI02845 - 5035										
Blank										
1,1,1,2-Tetrachloroethane	ND	0.0050	mg/kg wet							
1,1,1-Trichloroethane	ND	0.0050	mg/kg wet							
1,1,2,2-Tetrachloroethane	ND	0.0050	mg/kg wet							
1,1,2-Trichloroethane	ND	0.0050	mg/kg wet							
1,1-Dichloroethane	ND	0.0050	mg/kg wet							
1,1-Dichloroethene	ND	0.0050	mg/kg wet							
1,1-Dichloropropene	ND	0.0050	mg/kg wet							
1,2,3-Trichlorobenzene	ND	0.0050	mg/kg wet							

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DI02845 - 5035										
1,2,3-Trichloropropane	ND	0.0050	mg/kg wet							
1,2,4-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,2,4-Trimethylbenzene	ND	0.0050	mg/kg wet							
1,2-Dibromo-3-Chloropropane	ND	0.0050	mg/kg wet							
1,2-Dibromoethane	ND	0.0050	mg/kg wet							
1,2-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,2-Dichloroethane	ND	0.0050	mg/kg wet							
1,2-Dichloropropane	ND	0.0050	mg/kg wet							
1,3,5-Trimethylbenzene	ND	0.0050	mg/kg wet							
1,3-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,3-Dichloropropane	ND	0.0050	mg/kg wet							
1,4-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,4-Dioxane	ND	0.0800	mg/kg wet							
2,2-Dichloropropane	ND	0.0050	mg/kg wet							
2-Butanone	ND	0.0500	mg/kg wet							
2-Chlorotoluene	ND	0.0050	mg/kg wet							
2-Hexanone	ND	0.0500	mg/kg wet							
4-Chlorotoluene	ND	0.0050	mg/kg wet							
4-Isopropyltoluene	ND	0.0050	mg/kg wet							
4-Methyl-2-Pentanone	ND	0.0500	mg/kg wet							
Acetone	ND	0.0500	mg/kg wet							
Benzene	ND	0.0050	mg/kg wet							
Bromobenzene	ND	0.0050	mg/kg wet							
Bromochloromethane	ND	0.0050	mg/kg wet							
Bromodichloromethane	ND	0.0050	mg/kg wet							
Bromoform	ND	0.0050	mg/kg wet							
Bromomethane	ND	0.0100	mg/kg wet							
Carbon Disulfide	ND	0.0050	mg/kg wet							
Carbon Tetrachloride	ND	0.0050	mg/kg wet							
Chlorobenzene	ND	0.0050	mg/kg wet							
Chloroethane	ND	0.0100	mg/kg wet							
Chloroform	ND	0.0050	mg/kg wet							
Chloromethane	ND	0.0100	mg/kg wet							
cis-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
cis-1,3-Dichloropropene	ND	0.0050	mg/kg wet							
Dibromochloromethane	ND	0.0050	mg/kg wet							
Dibromomethane	ND	0.0050	mg/kg wet							
Dichlorodifluoromethane	ND	0.0100	mg/kg wet							
Diethyl Ether	ND	0.0050	mg/kg wet							
Di-isopropyl ether	ND	0.0050	mg/kg wet							
Ethyl tertiary-butyl ether	ND	0.0050	mg/kg wet							
Ethylbenzene	ND	0.0050	mg/kg wet							
Hexachlorobutadiene	ND	0.0050	mg/kg wet							
Isopropylbenzene	ND	0.0050	mg/kg wet							
Methyl tert-Butyl Ether	ND	0.0050	mg/kg wet							

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DI02845 - 5035										
Methylene Chloride	ND	0.0250	mg/kg wet							
Naphthalene	ND	0.0050	mg/kg wet							
n-Butylbenzene	ND	0.0050	mg/kg wet							
n-Propylbenzene	ND	0.0050	mg/kg wet							
sec-Butylbenzene	ND	0.0050	mg/kg wet							
Styrene	ND	0.0050	mg/kg wet							
tert-Butylbenzene	ND	0.0050	mg/kg wet							
Tertiary-amyl methyl ether	ND	0.0050	mg/kg wet							
Tetrachloroethene	ND	0.0050	mg/kg wet							
Tetrahydrofuran	ND	0.0050	mg/kg wet							
Toluene	ND	0.0050	mg/kg wet							
trans-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
trans-1,3-Dichloropropene	ND	0.0050	mg/kg wet							
Trichloroethene	ND	0.0050	mg/kg wet							
Trichlorofluoromethane	ND	0.0050	mg/kg wet							
Vinyl Chloride	ND	0.0100	mg/kg wet							
Xylene O	ND	0.0050	mg/kg wet							
Xylene P,M	ND	0.0100	mg/kg wet							
Surrogate: 1,2-Dichloroethane-d4	*0.0478*		mg/kg wet	*0.05000*		*96*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0500*		mg/kg wet	*0.05000*		*100*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0476*		mg/kg wet	*0.05000*		*95*	*70-130*			
Surrogate: Toluene-d8	*0.0454*		mg/kg wet	*0.05000*		*91*	*70-130*			
LCS										
1,1,1,2-Tetrachloroethane	0.0500	0.0050	mg/kg wet	0.05000		100	70-130			
1,1,1-Trichloroethane	0.0547	0.0050	mg/kg wet	0.05000		109	70-130			
1,1,2,2-Tetrachloroethane	0.0467	0.0050	mg/kg wet	0.05000		93	70-130			
1,1,2-Trichloroethane	0.0515	0.0050	mg/kg wet	0.05000		103	70-130			
1,1-Dichloroethane	0.0483	0.0050	mg/kg wet	0.05000		97	70-130			
1,1-Dichloroethene	0.0530	0.0050	mg/kg wet	0.05000		106	70-130			
1,1-Dichloropropene	0.0521	0.0050	mg/kg wet	0.05000		104	70-130			
1,2,3-Trichlorobenzene	0.0506	0.0050	mg/kg wet	0.05000		101	70-130			
1,2,3-Trichloropropane	0.0447	0.0050	mg/kg wet	0.05000		89	70-130			
1,2,4-Trichlorobenzene	0.0494	0.0050	mg/kg wet	0.05000		99	70-130			
1,2,4-Trimethylbenzene	0.0484	0.0050	mg/kg wet	0.05000		97	70-130			
1,2-Dibromo-3-Chloropropane	0.0419	0.0050	mg/kg wet	0.05000		84	70-130			
1,2-Dibromoethane	0.0474	0.0050	mg/kg wet	0.05000		95	70-130			
1,2-Dichlorobenzene	0.0463	0.0050	mg/kg wet	0.05000		93	70-130			
1,2-Dichloroethane	0.0488	0.0050	mg/kg wet	0.05000		98	70-130			
1,2-Dichloropropane	0.0501	0.0050	mg/kg wet	0.05000		100	70-130			
1,3,5-Trimethylbenzene	0.0486	0.0050	mg/kg wet	0.05000		97	70-130			
1,3-Dichlorobenzene	0.0467	0.0050	mg/kg wet	0.05000		93	70-130			
1,3-Dichloropropane	0.0506	0.0050	mg/kg wet	0.05000		101	70-130			
1,4-Dichlorobenzene	0.0462	0.0050	mg/kg wet	0.05000		92	70-130			
1,4-Dioxane	0.963	0.0800	mg/kg wet	1.000		96	70-130			
2,2-Dichloropropane	0.0552	0.0050	mg/kg wet	0.05000		110	70-130			

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DI02845 - 5035										
2-Butanone	0.274	0.0500	mg/kg wet	0.2500		110	70-130			
2-Chlorotoluene	0.0456	0.0050	mg/kg wet	0.05000		91	70-130			
2-Hexanone	0.248	0.0500	mg/kg wet	0.2500		99	70-130			
4-Chlorotoluene	0.0458	0.0050	mg/kg wet	0.05000		92	70-130			
4-Isopropyltoluene	0.0474	0.0050	mg/kg wet	0.05000		95	70-130			
4-Methyl-2-Pentanone	0.238	0.0500	mg/kg wet	0.2500		95	70-130			
Acetone	0.294	0.0500	mg/kg wet	0.2500		118	70-130			
Benzene	0.0524	0.0050	mg/kg wet	0.05000		105	70-130			
Bromobenzene	0.0491	0.0050	mg/kg wet	0.05000		98	70-130			
Bromochloromethane	0.0506	0.0050	mg/kg wet	0.05000		101	70-130			
Bromodichloromethane	0.0478	0.0050	mg/kg wet	0.05000		96	70-130			
Bromoform	0.0479	0.0050	mg/kg wet	0.05000		96	70-130			
Bromomethane	0.0452	0.0100	mg/kg wet	0.05000		90	70-130			
Carbon Disulfide	0.0528	0.0050	mg/kg wet	0.05000		106	70-130			
Carbon Tetrachloride	0.0527	0.0050	mg/kg wet	0.05000		105	70-130			
Chlorobenzene	0.0492	0.0050	mg/kg wet	0.05000		98	70-130			
Chloroethane	0.0465	0.0100	mg/kg wet	0.05000		93	70-130			
Chloroform	0.0498	0.0050	mg/kg wet	0.05000		100	70-130			
Chloromethane	0.0432	0.0100	mg/kg wet	0.05000		86	70-130			
cis-1,2-Dichloroethene	0.0515	0.0050	mg/kg wet	0.05000		103	70-130			
cis-1,3-Dichloropropene	0.0517	0.0050	mg/kg wet	0.05000		103	70-130			
Dibromochloromethane	0.0486	0.0050	mg/kg wet	0.05000		97	70-130			
Dibromomethane	0.0497	0.0050	mg/kg wet	0.05000		99	70-130			
Dichlorodifluoromethane	0.0327	0.0100	mg/kg wet	0.05000		65	70-130			B-
Diethyl Ether	0.0555	0.0050	mg/kg wet	0.05000		111	70-130			
Di-isopropyl ether	0.0503	0.0050	mg/kg wet	0.05000		101	70-130			
Ethyl tertiary-butyl ether	0.0493	0.0050	mg/kg wet	0.05000		99	70-130			
Ethylbenzene	0.0503	0.0050	mg/kg wet	0.05000		101	70-130			
Hexachlorobutadiene	0.0495	0.0050	mg/kg wet	0.05000		99	70-130			
Isopropylbenzene	0.0464	0.0050	mg/kg wet	0.05000		93	70-130			
Methyl tert-Butyl Ether	0.0574	0.0050	mg/kg wet	0.05000		115	70-130			
Methylene Chloride	0.0486	0.0250	mg/kg wet	0.05000		97	70-130			
Naphthalene	0.0449	0.0050	mg/kg wet	0.05000		90	70-130			
n-Butylbenzene	0.0477	0.0050	mg/kg wet	0.05000		95	70-130			
n-Propylbenzene	0.0268	0.0050	mg/kg wet	0.05000		54	70-130			B-
sec-Butylbenzene	0.0452	0.0050	mg/kg wet	0.05000		90	70-130			
Styrene	0.0507	0.0050	mg/kg wet	0.05000		101	70-130			
tert-Butylbenzene	0.0475	0.0050	mg/kg wet	0.05000		95	70-130			
Tertiary-amyl methyl ether	0.0521	0.0050	mg/kg wet	0.05000		104	70-130			
Tetrachloroethene	0.0557	0.0050	mg/kg wet	0.05000		111	70-130			
Tetrahydrofuran	0.0483	0.0050	mg/kg wet	0.05000		97	70-130			
Toluene	0.0516	0.0050	mg/kg wet	0.05000		103	70-130			
trans-1,2-Dichloroethene	0.0502	0.0050	mg/kg wet	0.05000		100	70-130			
trans-1,3-Dichloropropene	0.0498	0.0050	mg/kg wet	0.05000		100	70-130			
Trichloroethene	0.0518	0.0050	mg/kg wet	0.05000		104	70-130			

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DI02845 - 5035										
Trichlorofluoromethane	0.0472	0.0050	mg/kg wet	0.05000		94	70-130			
Vinyl Chloride	0.0451	0.0100	mg/kg wet	0.05000		90	70-130			
Xylene O	0.0497	0.0050	mg/kg wet	0.05000		99	70-130			
Xylene P,M	0.104	0.0100	mg/kg wet	0.1000		104	70-130			
Surrogate: 1,2-Dichloroethane-d4	*0.0446*		mg/kg wet	*0.05000*		*89*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0509*		mg/kg wet	*0.05000*		*102*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0473*		mg/kg wet	*0.05000*		*95*	*70-130*			
Surrogate: Toluene-d8	*0.0477*		mg/kg wet	*0.05000*		*95*	*70-130*			
LCS Dup										
1,1,1,2-Tetrachloroethane	0.0505	0.0050	mg/kg wet	0.05000		101	70-130	1	20	
1,1,1-Trichloroethane	0.0561	0.0050	mg/kg wet	0.05000		112	70-130	2	20	
1,1,2,2-Tetrachloroethane	0.0488	0.0050	mg/kg wet	0.05000		98	70-130	4	20	
1,1,2-Trichloroethane	0.0534	0.0050	mg/kg wet	0.05000		107	70-130	4	20	
1,1-Dichloroethane	0.0496	0.0050	mg/kg wet	0.05000		99	70-130	3	20	
1,1-Dichloroethene	0.0537	0.0050	mg/kg wet	0.05000		107	70-130	1	20	
1,1-Dichloropropene	0.0536	0.0050	mg/kg wet	0.05000		107	70-130	3	20	
1,2,3-Trichlorobenzene	0.0527	0.0050	mg/kg wet	0.05000		105	70-130	4	20	
1,2,3-Trichloropropane	0.0470	0.0050	mg/kg wet	0.05000		94	70-130	5	20	
1,2,4-Trichlorobenzene	0.0518	0.0050	mg/kg wet	0.05000		104	70-130	5	20	
1,2,4-Trimethylbenzene	0.0492	0.0050	mg/kg wet	0.05000		98	70-130	2	20	
1,2-Dibromo-3-Chloropropane	0.0453	0.0050	mg/kg wet	0.05000		91	70-130	8	20	
1,2-Dibromoethane	0.0482	0.0050	mg/kg wet	0.05000		96	70-130	2	20	
1,2-Dichlorobenzene	0.0475	0.0050	mg/kg wet	0.05000		95	70-130	3	20	
1,2-Dichloroethane	0.0501	0.0050	mg/kg wet	0.05000		100	70-130	3	20	
1,2-Dichloropropane	0.0513	0.0050	mg/kg wet	0.05000		103	70-130	2	20	
1,3,5-Trimethylbenzene	0.0495	0.0050	mg/kg wet	0.05000		99	70-130	2	20	
1,3-Dichlorobenzene	0.0466	0.0050	mg/kg wet	0.05000		93	70-130	0.09	20	
1,3-Dichloropropane	0.0506	0.0050	mg/kg wet	0.05000		101	70-130	0	20	
1,4-Dichlorobenzene	0.0482	0.0050	mg/kg wet	0.05000		96	70-130	4	20	
1,4-Dioxane	0.995	0.0800	mg/kg wet	1.000		100	70-130	3	20	
2,2-Dichloropropane	0.0565	0.0050	mg/kg wet	0.05000		113	70-130	2	20	
2-Butanone	0.288	0.0500	mg/kg wet	0.2500		115	70-130	5	20	
2-Chlorotoluene	0.0465	0.0050	mg/kg wet	0.05000		93	70-130	2	20	
2-Hexanone	0.261	0.0500	mg/kg wet	0.2500		104	70-130	5	20	
4-Chlorotoluene	0.0466	0.0050	mg/kg wet	0.05000		93	70-130	2	20	
4-Isopropyltoluene	0.0484	0.0050	mg/kg wet	0.05000		97	70-130	2	20	
4-Methyl-2-Pentanone	0.255	0.0500	mg/kg wet	0.2500		102	70-130	7	20	
Acetone	0.313	0.0500	mg/kg wet	0.2500		125	70-130	6	20	
Benzene	0.0539	0.0050	mg/kg wet	0.05000		108	70-130	3	20	
Bromobenzene	0.0501	0.0050	mg/kg wet	0.05000		100	70-130	2	20	
Bromochloromethane	0.0522	0.0050	mg/kg wet	0.05000		104	70-130	3	20	
Bromodichloromethane	0.0489	0.0050	mg/kg wet	0.05000		98	70-130	2	20	
Bromoform	0.0487	0.0050	mg/kg wet	0.05000		97	70-130	2	20	
Bromomethane	0.0460	0.0100	mg/kg wet	0.05000		92	70-130	2	20	
Carbon Disulfide	0.0541	0.0050	mg/kg wet	0.05000		108	70-130	2	20	

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DI02845 - 5035										
Carbon Tetrachloride	0.0537	0.0050	mg/kg wet	0.05000		107	70-130	2	20	
Chlorobenzene	0.0489	0.0050	mg/kg wet	0.05000		98	70-130	0.7	20	
Chloroethane	0.0482	0.0100	mg/kg wet	0.05000		96	70-130	4	20	
Chloroform	0.0508	0.0050	mg/kg wet	0.05000		102	70-130	2	20	
Chloromethane	0.0446	0.0100	mg/kg wet	0.05000		89	70-130	3	20	
cis-1,2-Dichloroethene	0.0526	0.0050	mg/kg wet	0.05000		105	70-130	2	20	
cis-1,3-Dichloropropene	0.0532	0.0050	mg/kg wet	0.05000		106	70-130	3	20	
Dibromochloromethane	0.0489	0.0050	mg/kg wet	0.05000		98	70-130	0.6	20	
Dibromomethane	0.0519	0.0050	mg/kg wet	0.05000		104	70-130	4	20	
Dichlorodifluoromethane	0.0332	0.0100	mg/kg wet	0.05000		66	70-130	1	20	B-
Diethyl Ether	0.0574	0.0050	mg/kg wet	0.05000		115	70-130	3	20	
Di-isopropyl ether	0.0520	0.0050	mg/kg wet	0.05000		104	70-130	3	20	
Ethyl tertiary-butyl ether	0.0512	0.0050	mg/kg wet	0.05000		102	70-130	4	20	
Ethylbenzene	0.0503	0.0050	mg/kg wet	0.05000		101	70-130	0.04	20	
Hexachlorobutadiene	0.0508	0.0050	mg/kg wet	0.05000		102	70-130	3	20	
Isopropylbenzene	0.0480	0.0050	mg/kg wet	0.05000		96	70-130	3	20	
Methyl tert-Butyl Ether	0.0598	0.0050	mg/kg wet	0.05000		120	70-130	4	20	
Methylene Chloride	0.0502	0.0250	mg/kg wet	0.05000		100	70-130	3	20	
Naphthalene	0.0475	0.0050	mg/kg wet	0.05000		95	70-130	6	20	
n-Butylbenzene	0.0489	0.0050	mg/kg wet	0.05000		98	70-130	2	20	
n-Propylbenzene	0.0274	0.0050	mg/kg wet	0.05000		55	70-130	2	20	B-
sec-Butylbenzene	0.0460	0.0050	mg/kg wet	0.05000		92	70-130	2	20	
Styrene	0.0507	0.0050	mg/kg wet	0.05000		101	70-130	0.04	20	
tert-Butylbenzene	0.0485	0.0050	mg/kg wet	0.05000		97	70-130	2	20	
Tertiary-amyl methyl ether	0.0541	0.0050	mg/kg wet	0.05000		108	70-130	4	20	
Tetrachloroethene	0.0587	0.0050	mg/kg wet	0.05000		117	70-130	5	20	
Tetrahydrofuran	0.0520	0.0050	mg/kg wet	0.05000		104	70-130	7	20	
Toluene	0.0532	0.0050	mg/kg wet	0.05000		106	70-130	3	20	
trans-1,2-Dichloroethene	0.0518	0.0050	mg/kg wet	0.05000		104	70-130	3	20	
trans-1,3-Dichloropropene	0.0518	0.0050	mg/kg wet	0.05000		104	70-130	4	20	
Trichloroethene	0.0525	0.0050	mg/kg wet	0.05000		105	70-130	1	20	
Trichlorofluoromethane	0.0480	0.0050	mg/kg wet	0.05000		96	70-130	2	20	
Vinyl Chloride	0.0460	0.0100	mg/kg wet	0.05000		92	70-130	2	20	
Xylene O	0.0498	0.0050	mg/kg wet	0.05000		100	70-130	0.2	20	
Xylene P,M	0.104	0.0100	mg/kg wet	0.1000		104	70-130	0.2	20	
Surrogate: 1,2-Dichloroethane-d4	*0.0443*		mg/kg wet	*0.05000*		*89*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0500*		mg/kg wet	*0.05000*		*100*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0475*		mg/kg wet	*0.05000*		*95*	*70-130*			
Surrogate: Toluene-d8	*0.0461*		mg/kg wet	*0.05000*		*92*	*70-130*			
8082A Polychlorinated Biphenyls (PCB)										
Batch DI02420 - 3540C										
Blank										
Aroclor 1016	ND	0.02	mg/kg wet							
Aroclor 1016 [2C]	ND	0.02	mg/kg wet							

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082A Polychlorinated Biphenyls (PCB)										
Batch DI02420 - 3540C										
Aroclor 1221	ND	0.02	mg/kg wet							
Aroclor 1221 [2C]	ND	0.02	mg/kg wet							
Aroclor 1232	ND	0.02	mg/kg wet							
Aroclor 1232 [2C]	ND	0.02	mg/kg wet							
Aroclor 1242	ND	0.02	mg/kg wet							
Aroclor 1242 [2C]	ND	0.02	mg/kg wet							
Aroclor 1248	ND	0.02	mg/kg wet							
Aroclor 1248 [2C]	ND	0.02	mg/kg wet							
Aroclor 1254	ND	0.02	mg/kg wet							
Aroclor 1254 [2C]	ND	0.02	mg/kg wet							
Aroclor 1260	ND	0.02	mg/kg wet							
Aroclor 1260 [2C]	ND	0.02	mg/kg wet							
Aroclor 1262	ND	0.02	mg/kg wet							
Aroclor 1262 [2C]	ND	0.02	mg/kg wet							
Aroclor 1268	ND	0.02	mg/kg wet							
Aroclor 1268 [2C]	ND	0.02	mg/kg wet							
Surrogate: Decachlorobiphenyl	*0.0197*		mg/kg wet	*0.02500*		*79*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0179*		mg/kg wet	*0.02500*		*72*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0197*		mg/kg wet	*0.02500*		*79*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0203*		mg/kg wet	*0.02500*		*81*	*30-150*			
LCS										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		84	40-140			
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		82	40-140			
Aroclor 1260	0.5	0.02	mg/kg wet	0.5000		90	40-140			
Aroclor 1260 [2C]	0.4	0.02	mg/kg wet	0.5000		78	40-140			
Surrogate: Decachlorobiphenyl	*0.0207*		mg/kg wet	*0.02500*		*83*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0188*		mg/kg wet	*0.02500*		*75*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0210*		mg/kg wet	*0.02500*		*84*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0204*		mg/kg wet	*0.02500*		*81*	*30-150*			
LCS Dup										
Aroclor 1016	0.5	0.02	mg/kg wet	0.5000		93	40-140	9	30	
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		89	40-140	9	30	
Aroclor 1260	0.5	0.02	mg/kg wet	0.5000		99	40-140	10	30	
Aroclor 1260 [2C]	0.4	0.02	mg/kg wet	0.5000		84	40-140	7	30	
Surrogate: Decachlorobiphenyl	*0.0221*		mg/kg wet	*0.02500*		*88*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0199*		mg/kg wet	*0.02500*		*80*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0229*		mg/kg wet	*0.02500*		*92*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0221*		mg/kg wet	*0.02500*		*88*	*30-150*			
Batch DI02513 - 3540C										
Blank										
Aroclor 1016	ND	0.05	mg/kg wet							
Aroclor 1016 [2C]	ND	0.05	mg/kg wet							

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082A Polychlorinated Biphenyls (PCB)										
Batch DI02513 - 3540C										
Aroclor 1221	ND	0.05	mg/kg wet							
Aroclor 1221 [2C]	ND	0.05	mg/kg wet							
Aroclor 1232	ND	0.05	mg/kg wet							
Aroclor 1232 [2C]	ND	0.05	mg/kg wet							
Aroclor 1242	ND	0.05	mg/kg wet							
Aroclor 1242 [2C]	ND	0.05	mg/kg wet							
Aroclor 1248	ND	0.05	mg/kg wet							
Aroclor 1248 [2C]	ND	0.05	mg/kg wet							
Aroclor 1254	ND	0.05	mg/kg wet							
Aroclor 1254 [2C]	ND	0.05	mg/kg wet							
Aroclor 1260	ND	0.05	mg/kg wet							
Aroclor 1260 [2C]	ND	0.05	mg/kg wet							
Aroclor 1262	ND	0.05	mg/kg wet							
Aroclor 1262 [2C]	ND	0.05	mg/kg wet							
Aroclor 1268	ND	0.05	mg/kg wet							
Aroclor 1268 [2C]	ND	0.05	mg/kg wet							
Surrogate: Decachlorobiphenyl	*0.0217*		mg/kg wet	*0.02500*		*87*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0219*		mg/kg wet	*0.02500*		*88*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0192*		mg/kg wet	*0.02500*		*77*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0223*		mg/kg wet	*0.02500*		*89*	*30-150*			
LCS										
Aroclor 1016	0.5	0.05	mg/kg wet	0.5000		102	40-140			
Aroclor 1016 [2C]	0.4	0.05	mg/kg wet	0.5000		88	40-140			
Aroclor 1260	0.5	0.05	mg/kg wet	0.5000		92	40-140			
Aroclor 1260 [2C]	0.4	0.05	mg/kg wet	0.5000		86	40-140			
Surrogate: Decachlorobiphenyl	*0.0232*		mg/kg wet	*0.02500*		*93*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0233*		mg/kg wet	*0.02500*		*93*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0210*		mg/kg wet	*0.02500*		*84*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0226*		mg/kg wet	*0.02500*		*90*	*30-150*			
LCS Dup										
Aroclor 1016	0.5	0.05	mg/kg wet	0.5000		92	40-140	10	30	
Aroclor 1016 [2C]	0.4	0.05	mg/kg wet	0.5000		90	40-140	2	30	
Aroclor 1260	0.5	0.05	mg/kg wet	0.5000		93	40-140	1	30	
Aroclor 1260 [2C]	0.4	0.05	mg/kg wet	0.5000		86	40-140	0.4	30	
Surrogate: Decachlorobiphenyl	*0.0232*		mg/kg wet	*0.02500*		*93*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0233*		mg/kg wet	*0.02500*		*93*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0214*		mg/kg wet	*0.02500*		*86*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0229*		mg/kg wet	*0.02500*		*92*	*30-150*			
Batch DI02903 - 3540C										
Blank										
Aroclor 1016	ND	0.02	mg/kg wet							
Aroclor 1016 [2C]	ND	0.02	mg/kg wet							

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082A Polychlorinated Biphenyls (PCB)										
Batch DI02903 - 3540C										
Aroclor 1221	ND	0.02	mg/kg wet							
Aroclor 1221 [2C]	ND	0.02	mg/kg wet							
Aroclor 1232	ND	0.02	mg/kg wet							
Aroclor 1232 [2C]	ND	0.02	mg/kg wet							
Aroclor 1242	ND	0.02	mg/kg wet							
Aroclor 1242 [2C]	ND	0.02	mg/kg wet							
Aroclor 1248	ND	0.02	mg/kg wet							
Aroclor 1248 [2C]	ND	0.02	mg/kg wet							
Aroclor 1254	ND	0.02	mg/kg wet							
Aroclor 1254 [2C]	ND	0.02	mg/kg wet							
Aroclor 1260	ND	0.02	mg/kg wet							
Aroclor 1260 [2C]	ND	0.02	mg/kg wet							
Aroclor 1262	ND	0.02	mg/kg wet							
Aroclor 1262 [2C]	ND	0.02	mg/kg wet							
Aroclor 1268	ND	0.02	mg/kg wet							
Aroclor 1268 [2C]	ND	0.02	mg/kg wet							
Surrogate: Decachlorobiphenyl	*0.0199*		mg/kg wet	*0.02500*		*80*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0186*		mg/kg wet	*0.02500*		*74*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0196*		mg/kg wet	*0.02500*		*78*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0201*		mg/kg wet	*0.02500*		*80*	*30-150*			
LCS										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		87	40-140			
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		83	40-140			
Aroclor 1260	0.5	0.02	mg/kg wet	0.5000		92	40-140			
Aroclor 1260 [2C]	0.4	0.02	mg/kg wet	0.5000		81	40-140			
Surrogate: Decachlorobiphenyl	*0.0208*		mg/kg wet	*0.02500*		*83*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0189*		mg/kg wet	*0.02500*		*75*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0208*		mg/kg wet	*0.02500*		*83*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0199*		mg/kg wet	*0.02500*		*80*	*30-150*			
LCS Dup										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		85	40-140	3	30	
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		82	40-140	1	30	
Aroclor 1260	0.4	0.02	mg/kg wet	0.5000		89	40-140	3	30	
Aroclor 1260 [2C]	0.4	0.02	mg/kg wet	0.5000		79	40-140	2	30	
Surrogate: Decachlorobiphenyl	*0.0197*		mg/kg wet	*0.02500*		*79*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0181*		mg/kg wet	*0.02500*		*72*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0199*		mg/kg wet	*0.02500*		*80*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0193*		mg/kg wet	*0.02500*		*77*	*30-150*			
8100M Total Petroleum Hydrocarbons										
Batch DI02512 - 3546										
Blank										

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8100M Total Petroleum Hydrocarbons										
Batch DI02512 - 3546										
Decane (C10)	ND	0.2	mg/kg wet							
Docosane (C22)	ND	0.2	mg/kg wet							
Dodecane (C12)	ND	0.2	mg/kg wet							
Eicosane (C20)	ND	0.2	mg/kg wet							
Hexacosane (C26)	ND	0.2	mg/kg wet							
Hexadecane (C16)	ND	0.2	mg/kg wet							
Hexatriacontane (C36)	ND	0.2	mg/kg wet							
Nonadecane (C19)	ND	0.2	mg/kg wet							
Nonane (C9)	ND	0.2	mg/kg wet							
Octacosane (C28)	ND	0.2	mg/kg wet							
Octadecane (C18)	ND	0.2	mg/kg wet							
Tetracosane (C24)	ND	0.2	mg/kg wet							
Tetradecane (C14)	ND	0.2	mg/kg wet							
Total Petroleum Hydrocarbons	ND	10.0	mg/kg wet							
Triacontane (C30)	ND	0.2	mg/kg wet							
Surrogate: O-Terphenyl	*4.60*		mg/kg wet	*5.000*		*92*	*40-140*			
LCS										
Decane (C10)	1.8	0.2	mg/kg wet	2.500		71	40-140			
Docosane (C22)	2.1	0.2	mg/kg wet	2.500		84	40-140			
Dodecane (C12)	1.9	0.2	mg/kg wet	2.500		77	40-140			
Eicosane (C20)	2.1	0.2	mg/kg wet	2.500		84	40-140			
Hexacosane (C26)	2.1	0.2	mg/kg wet	2.500		83	40-140			
Hexadecane (C16)	2.0	0.2	mg/kg wet	2.500		81	40-140			
Hexatriacontane (C36)	2.2	0.2	mg/kg wet	2.500		87	40-140			
Nonadecane (C19)	2.1	0.2	mg/kg wet	2.500		84	40-140			
Nonane (C9)	1.6	0.2	mg/kg wet	2.500		62	30-140			
Octacosane (C28)	2.1	0.2	mg/kg wet	2.500		83	40-140			
Octadecane (C18)	2.0	0.2	mg/kg wet	2.500		82	40-140			
Tetracosane (C24)	2.1	0.2	mg/kg wet	2.500		83	40-140			
Tetradecane (C14)	2.0	0.2	mg/kg wet	2.500		79	40-140			
Total Petroleum Hydrocarbons	28.5	10.0	mg/kg wet	35.00		82	40-140			
Triacontane (C30)	2.0	0.2	mg/kg wet	2.500		81	40-140			
Surrogate: O-Terphenyl	*4.47*		mg/kg wet	*5.000*		*89*	*40-140*			
LCS Dup										
Decane (C10)	1.8	0.2	mg/kg wet	2.500		70	40-140	1	25	
Docosane (C22)	2.3	0.2	mg/kg wet	2.500		91	40-140	8	25	
Dodecane (C12)	1.9	0.2	mg/kg wet	2.500		78	40-140	1	25	
Eicosane (C20)	2.2	0.2	mg/kg wet	2.500		89	40-140	6	25	
Hexacosane (C26)	2.3	0.2	mg/kg wet	2.500		92	40-140	11	25	
Hexadecane (C16)	2.1	0.2	mg/kg wet	2.500		83	40-140	3	25	
Hexatriacontane (C36)	2.5	0.2	mg/kg wet	2.500		101	40-140	15	25	
Nonadecane (C19)	2.2	0.2	mg/kg wet	2.500		88	40-140	5	25	
Nonane (C9)	1.5	0.2	mg/kg wet	2.500		60	30-140	4	25	

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8100M Total Petroleum Hydrocarbons										
Batch DI02512 - 3546										
Octacosane (C28)	2.3	0.2	mg/kg wet	2.500		94	40-140	12	25	
Octadecane (C18)	2.1	0.2	mg/kg wet	2.500		85	40-140	4	25	
Tetracosane (C24)	2.3	0.2	mg/kg wet	2.500		91	40-140	9	25	
Tetradecane (C14)	2.0	0.2	mg/kg wet	2.500		81	40-140	2	25	
Total Petroleum Hydrocarbons	30.6	10.0	mg/kg wet	35.00		87	40-140	7	25	
Triacontane (C30)	2.3	0.2	mg/kg wet	2.500		92	40-140	13	25	
Surrogate: O-Terphenyl	*4.63*		mg/kg wet	*5.000*		*93*	*40-140*			
8270D Semi-Volatile Organic Compounds										
Batch DI02427 - 3546										
Blank										
1,2,4-Trichlorobenzene	ND	0.333	mg/kg wet							
1,2-Dichlorobenzene	ND	0.333	mg/kg wet							
1,3-Dichlorobenzene	ND	0.333	mg/kg wet							
1,4-Dichlorobenzene	ND	0.167	mg/kg wet							
2,4,5-Trichlorophenol	ND	0.333	mg/kg wet							
2,4,6-Trichlorophenol	ND	0.167	mg/kg wet							
2,4-Dichlorophenol	ND	0.167	mg/kg wet							
2,4-Dimethylphenol	ND	0.167	mg/kg wet							
2,4-Dinitrophenol	ND	0.667	mg/kg wet							
2,4-Dinitrotoluene	ND	0.167	mg/kg wet							
2,6-Dinitrotoluene	ND	0.333	mg/kg wet							
2-Chloronaphthalene	ND	0.333	mg/kg wet							
2-Chlorophenol	ND	0.167	mg/kg wet							
2-Methylnaphthalene	ND	0.167	mg/kg wet							
2-Methylphenol	ND	0.333	mg/kg wet							
2-Nitrophenol	ND	0.333	mg/kg wet							
3,3´-Dichlorobenzidine	ND	0.333	mg/kg wet							
3+4-Methylphenol	ND	0.667	mg/kg wet							
4-Bromophenyl-phenylether	ND	0.333	mg/kg wet							
4-Chloroaniline	ND	0.333	mg/kg wet							
4-Nitrophenol	ND	1.67	mg/kg wet							
Acenaphthene	ND	0.333	mg/kg wet							
Acenaphthylene	ND	0.333	mg/kg wet							
Acetophenone	ND	0.667	mg/kg wet							
Aniline	ND	1.67	mg/kg wet							
Anthracene	ND	0.333	mg/kg wet							
Azobenzene	ND	0.333	mg/kg wet							
Benzo(a)anthracene	ND	0.333	mg/kg wet							
Benzo(a)pyrene	ND	0.167	mg/kg wet							
Benzo(b)fluoranthene	ND	0.333	mg/kg wet							
Benzo(g,h,i)perylene	ND	0.333	mg/kg wet							
Benzo(k)fluoranthene	ND	0.333	mg/kg wet							
bis(2-Chloroethoxy)methane	ND	0.333	mg/kg wet							

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8270D Semi-Volatile Organic Compounds										
Batch DI02427 - 3546										
bis(2-Chloroethyl)ether	ND	0.167	mg/kg wet							
bis(2-chloroisopropyl)Ether	ND	0.167	mg/kg wet							
bis(2-Ethylhexyl)phthalate	ND	0.333	mg/kg wet							
Butylbenzylphthalate	ND	0.333	mg/kg wet							
Chrysene	ND	0.167	mg/kg wet							
Dibenzo(a,h)Anthracene	ND	0.167	mg/kg wet							
Dibenzofuran	ND	0.333	mg/kg wet							
Diethylphthalate	ND	0.333	mg/kg wet							
Dimethylphthalate	ND	0.333	mg/kg wet							
Di-n-butylphthalate	ND	0.333	mg/kg wet							
Di-n-octylphthalate	ND	0.333	mg/kg wet							
Fluoranthene	ND	0.333	mg/kg wet							
Fluorene	ND	0.333	mg/kg wet							
Hexachlorobenzene	ND	0.167	mg/kg wet							
Hexachlorobutadiene	ND	0.333	mg/kg wet							
Hexachloroethane	ND	0.167	mg/kg wet							
Indeno(1,2,3-cd)Pyrene	ND	0.333	mg/kg wet							
Isophorone	ND	0.333	mg/kg wet							
Naphthalene	ND	0.333	mg/kg wet							
Nitrobenzene	ND	0.333	mg/kg wet							
N-Nitrosodimethylamine	ND	0.333	mg/kg wet							
Pentachlorophenol	ND	0.667	mg/kg wet							
Phenanthrene	ND	0.333	mg/kg wet							
Phenol	ND	0.333	mg/kg wet							
Pyrene	ND	0.333	mg/kg wet							
Pyridine	ND	1.67	mg/kg wet							
Surrogate: 1,2-Dichlorobenzene-d4	*2.53*		mg/kg wet	*3.333*		*76*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*4.00*		mg/kg wet	*5.000*		*80*	*30-130*			
Surrogate: 2-Chlorophenol-d4	*3.92*		mg/kg wet	*5.000*		*78*	*30-130*			
Surrogate: 2-Fluorobiphenyl	*2.65*		mg/kg wet	*3.333*		*80*	*30-130*			
Surrogate: 2-Fluorophenol	*3.84*		mg/kg wet	*5.000*		*77*	*30-130*			
Surrogate: Nitrobenzene-d5	*2.23*		mg/kg wet	*3.333*		*67*	*30-130*			
Surrogate: Phenol-d6	*3.62*		mg/kg wet	*5.000*		*72*	*30-130*			
Surrogate: p-Terphenyl-d14	*2.94*		mg/kg wet	*3.333*		*88*	*30-130*			
LCS										
1,2,4-Trichlorobenzene	2.48	0.333	mg/kg wet	3.333		74	40-140			
1,2-Dichlorobenzene	2.36	0.333	mg/kg wet	3.333		71	40-140			
1,3-Dichlorobenzene	2.16	0.333	mg/kg wet	3.333		65	40-140			
1,4-Dichlorobenzene	2.28	0.167	mg/kg wet	3.333		68	40-140			
2,4,5-Trichlorophenol	2.98	0.333	mg/kg wet	3.333		90	30-130			
2,4,6-Trichlorophenol	2.62	0.167	mg/kg wet	3.333		78	30-130			
2,4-Dichlorophenol	2.82	0.167	mg/kg wet	3.333		85	30-130			
2,4-Dimethylphenol	2.54	0.167	mg/kg wet	3.333		76	30-130			
2,4-Dinitrophenol	2.15	0.667	mg/kg wet	3.333		64	30-130			
2,4-Dinitrotoluene	3.42	0.167	mg/kg wet	3.333		103	40-140			

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8270D Semi-Volatile Organic Compounds										
Batch DI02427 - 3546										
2,6-Dinitrotoluene	2.96	0.333	mg/kg wet	3.333		89	40-140			
2-Chloronaphthalene	2.29	0.333	mg/kg wet	3.333		69	40-140			
2-Chlorophenol	2.40	0.167	mg/kg wet	3.333		72	30-130			
2-Methylnaphthalene	2.50	0.167	mg/kg wet	3.333		75	40-140			
2-Methylphenol	2.24	0.333	mg/kg wet	3.333		67	30-130			
2-Nitrophenol	2.40	0.333	mg/kg wet	3.333		72	30-130			
3,3´-Dichlorobenzidine	2.69	0.333	mg/kg wet	3.333		81	40-140			
3+4-Methylphenol	4.80	0.667	mg/kg wet	6.667		72	30-130			
4-Bromophenyl-phenylether	2.68	0.333	mg/kg wet	3.333		80	40-140			
4-Chloroaniline	1.69	0.333	mg/kg wet	3.333		51	40-140			
4-Nitrophenol	2.46	1.67	mg/kg wet	3.333		74	30-130			
Acenaphthene	2.39	0.333	mg/kg wet	3.333		72	40-140			
Acenaphthylene	2.32	0.333	mg/kg wet	3.333		70	40-140			
Acetophenone	2.31	0.667	mg/kg wet	3.333		69	40-140			
Aniline	1.13	1.67	mg/kg wet	3.333		34	40-140			B-
Anthracene	2.80	0.333	mg/kg wet	3.333		84	40-140			
Azobenzene	2.00	0.333	mg/kg wet	3.333		60	40-140			
Benzo(a)anthracene	2.89	0.333	mg/kg wet	3.333		87	40-140			
Benzo(a)pyrene	3.10	0.167	mg/kg wet	3.333		93	40-140			
Benzo(b)fluoranthene	2.85	0.333	mg/kg wet	3.333		85	40-140			
Benzo(g,h,i)perylene	3.24	0.333	mg/kg wet	3.333		97	40-140			
Benzo(k)fluoranthene	2.81	0.333	mg/kg wet	3.333		84	40-140			
bis(2-Chloroethoxy)methane	2.09	0.333	mg/kg wet	3.333		63	40-140			
bis(2-Chloroethyl)ether	2.08	0.167	mg/kg wet	3.333		62	40-140			
bis(2-chloroisopropyl)Ether	2.10	0.167	mg/kg wet	3.333		63	40-140			
bis(2-Ethylhexyl)phthalate	2.72	0.333	mg/kg wet	3.333		82	40-140			
Butylbenzylphthalate	2.76	0.333	mg/kg wet	3.333		83	40-140			
Chrysene	2.82	0.167	mg/kg wet	3.333		85	40-140			
Dibenzo(a,h)Anthracene	3.13	0.167	mg/kg wet	3.333		94	40-140			
Dibenzofuran	2.63	0.333	mg/kg wet	3.333		79	40-140			
Diethylphthalate	2.98	0.333	mg/kg wet	3.333		89	40-140			
Dimethylphthalate	2.89	0.333	mg/kg wet	3.333		87	40-140			
Di-n-butylphthalate	3.02	0.333	mg/kg wet	3.333		91	40-140			
Di-n-octylphthalate	2.42	0.333	mg/kg wet	3.333		73	40-140			
Fluoranthene	3.08	0.333	mg/kg wet	3.333		92	40-140			
Fluorene	2.96	0.333	mg/kg wet	3.333		89	40-140			
Hexachlorobenzene	2.59	0.167	mg/kg wet	3.333		78	40-140			
Hexachlorobutadiene	2.36	0.333	mg/kg wet	3.333		71	40-140			
Hexachloroethane	2.07	0.167	mg/kg wet	3.333		62	40-140			
Indeno(1,2,3-cd)Pyrene	3.11	0.333	mg/kg wet	3.333		93	40-140			
Isophorone	1.81	0.333	mg/kg wet	3.333		54	40-140			
Naphthalene	2.34	0.333	mg/kg wet	3.333		70	40-140			
Nitrobenzene	1.92	0.333	mg/kg wet	3.333		57	40-140			
N-Nitrosodimethylamine	1.56	0.333	mg/kg wet	3.333		47	40-140			
Pentachlorophenol	3.07	0.667	mg/kg wet	3.333		92	30-130			

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8270D Semi-Volatile Organic Compounds										
Batch DI02427 - 3546										
Phenanthrene	2.73	0.333	mg/kg wet	3.333		82	40-140			
Phenol	2.33	0.333	mg/kg wet	3.333		70	30-130			
Pyrene	2.73	0.333	mg/kg wet	3.333		82	40-140			
Pyridine	1.42	1.67	mg/kg wet	3.333		43	40-140			
Surrogate: 1,2-Dichlorobenzene-d4	*2.58*		mg/kg wet	*3.333*		*77*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*4.32*		mg/kg wet	*5.000*		*86*	*30-130*			
Surrogate: 2-Chlorophenol-d4	*4.14*		mg/kg wet	*5.000*		*83*	*30-130*			
Surrogate: 2-Fluorobiphenyl	*2.63*		mg/kg wet	*3.333*		*79*	*30-130*			
Surrogate: 2-Fluorophenol	*3.92*		mg/kg wet	*5.000*		*78*	*30-130*			
Surrogate: Nitrobenzene-d5	*2.23*		mg/kg wet	*3.333*		*67*	*30-130*			
Surrogate: Phenol-d6	*3.88*		mg/kg wet	*5.000*		*78*	*30-130*			
Surrogate: p-Terphenyl-d14	*3.02*		mg/kg wet	*3.333*		*91*	*30-130*			
LCS Dup										
1,2,4-Trichlorobenzene	2.69	0.333	mg/kg wet	3.333		81	40-140	8	30	
1,2-Dichlorobenzene	2.41	0.333	mg/kg wet	3.333		72	40-140	2	30	
1,3-Dichlorobenzene	2.29	0.333	mg/kg wet	3.333		69	40-140	6	30	
1,4-Dichlorobenzene	2.40	0.167	mg/kg wet	3.333		72	40-140	5	30	
2,4,5-Trichlorophenol	3.02	0.333	mg/kg wet	3.333		91	30-130	1	30	
2,4,6-Trichlorophenol	2.88	0.167	mg/kg wet	3.333		86	30-130	10	30	
2,4-Dichlorophenol	3.02	0.167	mg/kg wet	3.333		91	30-130	7	30	
2,4-Dimethylphenol	2.73	0.167	mg/kg wet	3.333		82	30-130	7	30	
2,4-Dinitrophenol	2.53	0.667	mg/kg wet	3.333		76	30-130	16	30	
2,4-Dinitrotoluene	3.41	0.167	mg/kg wet	3.333		102	40-140	0.3	30	
2,6-Dinitrotoluene	3.04	0.333	mg/kg wet	3.333		91	40-140	3	30	
2-Chloronaphthalene	2.44	0.333	mg/kg wet	3.333		73	40-140	6	30	
2-Chlorophenol	2.54	0.167	mg/kg wet	3.333		76	30-130	6	30	
2-Methylnaphthalene	2.66	0.167	mg/kg wet	3.333		80	40-140	6	30	
2-Methylphenol	2.32	0.333	mg/kg wet	3.333		70	30-130	3	30	
2-Nitrophenol	2.60	0.333	mg/kg wet	3.333		78	30-130	8	30	
3,3´-Dichlorobenzidine	2.78	0.333	mg/kg wet	3.333		83	40-140	3	30	
3+4-Methylphenol	4.63	0.667	mg/kg wet	6.667		69	30-130	4	30	
4-Bromophenyl-phenylether	2.97	0.333	mg/kg wet	3.333		89	40-140	10	30	
4-Chloroaniline	1.69	0.333	mg/kg wet	3.333		51	40-140	0.2	30	
4-Nitrophenol	2.44	1.67	mg/kg wet	3.333		73	30-130	0.8	30	
Acenaphthene	2.50	0.333	mg/kg wet	3.333		75	40-140	5	30	
Acenaphthylene	2.46	0.333	mg/kg wet	3.333		74	40-140	5	30	
Acetophenone	2.37	0.667	mg/kg wet	3.333		71	40-140	2	30	
Aniline	1.22	1.67	mg/kg wet	3.333		36	40-140	7	30	B-
Anthracene	2.97	0.333	mg/kg wet	3.333		89	40-140	6	30	
Azobenzene	2.19	0.333	mg/kg wet	3.333		66	40-140	9	30	
Benzo(a)anthracene	3.08	0.333	mg/kg wet	3.333		92	40-140	6	30	
Benzo(a)pyrene	3.27	0.167	mg/kg wet	3.333		98	40-140	5	30	
Benzo(b)fluoranthene	2.96	0.333	mg/kg wet	3.333		89	40-140	4	30	
Benzo(g,h,i)perylene	3.22	0.333	mg/kg wet	3.333		97	40-140	0.7	30	
Benzo(k)fluoranthene	3.08	0.333	mg/kg wet	3.333		92	40-140	9	30	

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
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ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8270D Semi-Volatile Organic Compounds										
Batch DI02427 - 3546										
bis(2-Chloroethoxy)methane	2.26	0.333	mg/kg wet	3.333		68	40-140	8	30	
bis(2-Chloroethyl)ether	2.16	0.167	mg/kg wet	3.333		65	40-140	4	30	
bis(2-chloroisopropyl)Ether	2.20	0.167	mg/kg wet	3.333		66	40-140	4	30	
bis(2-Ethylhexyl)phthalate	2.94	0.333	mg/kg wet	3.333		88	40-140	8	30	
Butylbenzylphthalate	2.99	0.333	mg/kg wet	3.333		90	40-140	8	30	
Chrysene	2.99	0.167	mg/kg wet	3.333		90	40-140	6	30	
Dibenzo(a,h)Anthracene	3.16	0.167	mg/kg wet	3.333		95	40-140	1	30	
Dibenzofuran	2.74	0.333	mg/kg wet	3.333		82	40-140	4	30	
Diethylphthalate	3.03	0.333	mg/kg wet	3.333		91	40-140	2	30	
Dimethylphthalate	2.99	0.333	mg/kg wet	3.333		90	40-140	3	30	
Di-n-butylphthalate	3.16	0.333	mg/kg wet	3.333		95	40-140	5	30	
Di-n-octylphthalate	2.71	0.333	mg/kg wet	3.333		81	40-140	11	30	
Fluoranthene	3.10	0.333	mg/kg wet	3.333		93	40-140	0.6	30	
Fluorene	3.05	0.333	mg/kg wet	3.333		91	40-140	3	30	
Hexachlorobenzene	2.85	0.167	mg/kg wet	3.333		86	40-140	10	30	
Hexachlorobutadiene	2.54	0.333	mg/kg wet	3.333		76	40-140	7	30	
Hexachloroethane	2.17	0.167	mg/kg wet	3.333		65	40-140	5	30	
Indeno(1,2,3-cd)Pyrene	3.14	0.333	mg/kg wet	3.333		94	40-140	0.7	30	
Isophorone	1.92	0.333	mg/kg wet	3.333		58	40-140	6	30	
Naphthalene	2.52	0.333	mg/kg wet	3.333		75	40-140	7	30	
Nitrobenzene	2.07	0.333	mg/kg wet	3.333		62	40-140	8	30	
N-Nitrosodimethylamine	1.66	0.333	mg/kg wet	3.333		50	40-140	6	30	
Pentachlorophenol	3.24	0.667	mg/kg wet	3.333		97	30-130	5	30	
Phenanthrene	2.88	0.333	mg/kg wet	3.333		86	40-140	5	30	
Phenol	2.44	0.333	mg/kg wet	3.333		73	30-130	4	30	
Pyrene	3.01	0.333	mg/kg wet	3.333		90	40-140	10	30	
Pyridine	1.49	1.67	mg/kg wet	3.333		45	40-140	4	30	
Surrogate: 1,2-Dichlorobenzene-d4	*2.55*		mg/kg wet	*3.333*		*76*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*4.48*		mg/kg wet	*5.000*		*90*	*30-130*			
Surrogate: 2-Chlorophenol-d4	*4.07*		mg/kg wet	*5.000*		*81*	*30-130*			
Surrogate: 2-Fluorobiphenyl	*2.68*		mg/kg wet	*3.333*		*80*	*30-130*			
Surrogate: 2-Fluorophenol	*3.84*		mg/kg wet	*5.000*		*77*	*30-130*			
Surrogate: Nitrobenzene-d5	*2.28*		mg/kg wet	*3.333*		*68*	*30-130*			
Surrogate: Phenol-d6	*3.83*		mg/kg wet	*5.000*		*77*	*30-130*			
Surrogate: p-Terphenyl-d14	*3.15*		mg/kg wet	*3.333*		*94*	*30-130*			
Batch DI02511 - 3546										
Blank										
1,2,4-Trichlorobenzene	ND	0.333	mg/kg wet							
1,2-Dichlorobenzene	ND	0.333	mg/kg wet							
1,3-Dichlorobenzene	ND	0.333	mg/kg wet							
1,4-Dichlorobenzene	ND	0.333	mg/kg wet							
2,4,5-Trichlorophenol	ND	0.333	mg/kg wet							
2,4,6-Trichlorophenol	ND	0.333	mg/kg wet							
2,4-Dichlorophenol	ND	0.333	mg/kg wet							
2,4-Dimethylphenol	ND	0.333	mg/kg wet							

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Client Name: Beta Engineering
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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8270D Semi-Volatile Organic Compounds										
Batch DI02511 - 3546										
2,4-Dinitrophenol	ND	1.67	mg/kg wet							
2,4-Dinitrotoluene	ND	0.333	mg/kg wet							
2,6-Dinitrotoluene	ND	0.333	mg/kg wet							
2-Chloronaphthalene	ND	0.333	mg/kg wet							
2-Chlorophenol	ND	0.333	mg/kg wet							
2-Methylnaphthalene	ND	0.333	mg/kg wet							
2-Methylphenol	ND	0.333	mg/kg wet							
2-Nitrophenol	ND	0.333	mg/kg wet							
3,3´-Dichlorobenzidine	ND	0.667	mg/kg wet							
3+4-Methylphenol	ND	0.667	mg/kg wet							
4-Bromophenyl-phenylether	ND	0.333	mg/kg wet							
4-Chloroaniline	ND	0.667	mg/kg wet							
4-Nitrophenol	ND	1.67	mg/kg wet							
Acenaphthene	ND	0.333	mg/kg wet							
Acenaphthylene	ND	0.333	mg/kg wet							
Acetophenone	ND	0.667	mg/kg wet							
Aniline	ND	1.67	mg/kg wet							
Anthracene	ND	0.333	mg/kg wet							
Azobenzene	ND	0.333	mg/kg wet							
Benzo(a)anthracene	ND	0.333	mg/kg wet							
Benzo(a)pyrene	ND	0.167	mg/kg wet							
Benzo(b)fluoranthene	ND	0.333	mg/kg wet							
Benzo(g,h,i)perylene	ND	0.333	mg/kg wet							
Benzo(k)fluoranthene	ND	0.333	mg/kg wet							
bis(2-Chloroethoxy)methane	ND	0.333	mg/kg wet							
bis(2-Chloroethyl)ether	ND	0.333	mg/kg wet							
bis(2-chloroisopropyl)Ether	ND	0.333	mg/kg wet							
bis(2-Ethylhexyl)phthalate	ND	0.333	mg/kg wet							
Butylbenzylphthalate	ND	0.333	mg/kg wet							
Chrysene	ND	0.167	mg/kg wet							
Dibenzo(a,h)Anthracene	ND	0.167	mg/kg wet							
Dibenzofuran	ND	0.333	mg/kg wet							
Diethylphthalate	ND	0.333	mg/kg wet							
Dimethylphthalate	ND	0.333	mg/kg wet							
Di-n-butylphthalate	ND	0.333	mg/kg wet							
Di-n-octylphthalate	ND	0.333	mg/kg wet							
Fluoranthene	ND	0.333	mg/kg wet							
Fluorene	ND	0.333	mg/kg wet							
Hexachlorobenzene	ND	0.333	mg/kg wet							
Hexachlorobutadiene	ND	0.333	mg/kg wet							
Hexachloroethane	ND	0.333	mg/kg wet							
Indeno(1,2,3-cd)Pyrene	ND	0.333	mg/kg wet							
Isophorone	ND	0.333	mg/kg wet							
Naphthalene	ND	0.333	mg/kg wet							
Nitrobenzene	ND	0.333	mg/kg wet							

CONFORMED

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Client Name: Beta Engineering
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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8270D Semi-Volatile Organic Compounds										
Batch DI02511 - 3546										
N-Nitrosodimethylamine	ND	0.333	mg/kg wet							
Pentachlorophenol	ND	1.67	mg/kg wet							
Phenanthrene	ND	0.333	mg/kg wet							
Phenol	ND	0.333	mg/kg wet							
Pyrene	ND	0.333	mg/kg wet							
Surrogate: 1,2-Dichlorobenzene-d4	*1.97*		mg/kg wet	*3.333*		*59*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*4.01*		mg/kg wet	*5.000*		*80*	*30-130*			
Surrogate: 2-Chlorophenol-d4	*3.12*		mg/kg wet	*5.000*		*62*	*30-130*			
Surrogate: 2-Fluorobiphenyl	*2.00*		mg/kg wet	*3.333*		*60*	*30-130*			
Surrogate: 2-Fluorophenol	*3.04*		mg/kg wet	*5.000*		*61*	*30-130*			
Surrogate: Nitrobenzene-d5	*1.81*		mg/kg wet	*3.333*		*54*	*30-130*			
Surrogate: Phenol-d6	*3.11*		mg/kg wet	*5.000*		*62*	*30-130*			
Surrogate: p-Terphenyl-d14	*2.88*		mg/kg wet	*3.333*		*86*	*30-130*			
LCS										
1,2,4-Trichlorobenzene	2.16	0.333	mg/kg wet	3.333		65	40-140			
1,2-Dichlorobenzene	2.02	0.333	mg/kg wet	3.333		61	40-140			
1,3-Dichlorobenzene	1.96	0.333	mg/kg wet	3.333		59	40-140			
1,4-Dichlorobenzene	1.97	0.333	mg/kg wet	3.333		59	40-140			
2,4,5-Trichlorophenol	2.59	0.333	mg/kg wet	3.333		78	30-130			
2,4,6-Trichlorophenol	2.41	0.333	mg/kg wet	3.333		72	30-130			
2,4-Dichlorophenol	2.30	0.333	mg/kg wet	3.333		69	30-130			
2,4-Dimethylphenol	2.33	0.333	mg/kg wet	3.333		70	30-130			
2,4-Dinitrophenol	2.94	1.67	mg/kg wet	3.333		88	30-130			
2,4-Dinitrotoluene	2.70	0.333	mg/kg wet	3.333		81	40-140			
2,6-Dinitrotoluene	2.49	0.333	mg/kg wet	3.333		75	40-140			
2-Chloronaphthalene	2.03	0.333	mg/kg wet	3.333		61	40-140			
2-Chlorophenol	2.04	0.333	mg/kg wet	3.333		61	30-130			
2-Methylnaphthalene	2.11	0.333	mg/kg wet	3.333		63	40-140			
2-Methylphenol	2.08	0.333	mg/kg wet	3.333		62	30-130			
2-Nitrophenol	2.07	0.333	mg/kg wet	3.333		62	30-130			
3,3´-Dichlorobenzidine	2.58	0.667	mg/kg wet	3.333		77	40-140			
3+4-Methylphenol	4.19	0.667	mg/kg wet	6.667		63	30-130			
4-Bromophenyl-phenylether	3.00	0.333	mg/kg wet	3.333		90	40-140			
4-Chloroaniline	1.77	0.667	mg/kg wet	3.333		53	40-140			
4-Nitrophenol	2.22	1.67	mg/kg wet	3.333		67	30-130			
Acenaphthene	2.14	0.333	mg/kg wet	3.333		64	40-140			
Acenaphthylene	2.01	0.333	mg/kg wet	3.333		60	40-140			
Acetophenone	2.11	0.667	mg/kg wet	3.333		63	40-140			
Aniline	1.24	1.67	mg/kg wet	3.333		37	40-140			B-
Anthracene	2.62	0.333	mg/kg wet	3.333		79	40-140			
Azobenzene	2.16	0.333	mg/kg wet	3.333		65	40-140			
Benzo(a)anthracene	2.75	0.333	mg/kg wet	3.333		83	40-140			
Benzo(a)pyrene	2.83	0.167	mg/kg wet	3.333		85	40-140			
Benzo(b)fluoranthene	2.58	0.333	mg/kg wet	3.333		77	40-140			
Benzo(g,h,i)perylene	2.71	0.333	mg/kg wet	3.333		81	40-140			

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8270D Semi-Volatile Organic Compounds										
Batch DI02511 - 3546										
Benzo(k)fluoranthene	2.98	0.333	mg/kg wet	3.333		89	40-140			
bis(2-Chloroethoxy)methane	1.93	0.333	mg/kg wet	3.333		58	40-140			
bis(2-Chloroethyl)ether	1.93	0.333	mg/kg wet	3.333		58	40-140			
bis(2-chloroisopropyl)Ether	1.93	0.333	mg/kg wet	3.333		58	40-140			
bis(2-Ethylhexyl)phthalate	2.97	0.333	mg/kg wet	3.333		89	40-140			
Butylbenzylphthalate	2.89	0.333	mg/kg wet	3.333		87	40-140			
Chrysene	2.73	0.167	mg/kg wet	3.333		82	40-140			
Dibenzo(a,h)Anthracene	2.67	0.167	mg/kg wet	3.333		80	40-140			
Dibenzofuran	2.36	0.333	mg/kg wet	3.333		71	40-140			
Diethylphthalate	2.78	0.333	mg/kg wet	3.333		83	40-140			
Dimethylphthalate	2.58	0.333	mg/kg wet	3.333		78	40-140			
Di-n-butylphthalate	2.92	0.333	mg/kg wet	3.333		87	40-140			
Di-n-octylphthalate	2.81	0.333	mg/kg wet	3.333		84	40-140			
Fluoranthene	2.82	0.333	mg/kg wet	3.333		85	40-140			
Fluorene	2.53	0.333	mg/kg wet	3.333		76	40-140			
Hexachlorobenzene	2.92	0.333	mg/kg wet	3.333		88	40-140			
Hexachlorobutadiene	2.22	0.333	mg/kg wet	3.333		67	40-140			
Hexachloroethane	1.97	0.333	mg/kg wet	3.333		59	40-140			
Indeno(1,2,3-cd)Pyrene	2.69	0.333	mg/kg wet	3.333		81	40-140			
Isophorone	1.70	0.333	mg/kg wet	3.333		51	40-140			
Naphthalene	2.00	0.333	mg/kg wet	3.333		60	40-140			
Nitrobenzene	1.84	0.333	mg/kg wet	3.333		55	40-140			
N-Nitrosodimethylamine	1.58	0.333	mg/kg wet	3.333		47	40-140			
Pentachlorophenol	3.35	1.67	mg/kg wet	3.333		100	30-130			
Phenanthrene	2.55	0.333	mg/kg wet	3.333		77	40-140			
Phenol	1.93	0.333	mg/kg wet	3.333		58	30-130			
Pyrene	2.73	0.333	mg/kg wet	3.333		82	40-140			
Surrogate: 1,2-Dichlorobenzene-d4	*1.99*		mg/kg wet	*3.333*		*60*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*4.92*		mg/kg wet	*5.000*		*98*	*30-130*			
Surrogate: 2-Chlorophenol-d4	*3.27*		mg/kg wet	*5.000*		*65*	*30-130*			
Surrogate: 2-Fluorobiphenyl	*2.20*		mg/kg wet	*3.333*		*66*	*30-130*			
Surrogate: 2-Fluorophenol	*3.08*		mg/kg wet	*5.000*		*62*	*30-130*			
Surrogate: Nitrobenzene-d5	*1.96*		mg/kg wet	*3.333*		*59*	*30-130*			
Surrogate: Phenol-d6	*3.24*		mg/kg wet	*5.000*		*65*	*30-130*			
Surrogate: p-Terphenyl-d14	*2.92*		mg/kg wet	*3.333*		*88*	*30-130*			
LCS Dup										
1,2,4-Trichlorobenzene	2.11	0.333	mg/kg wet	3.333		63	40-140	2	30	
1,2-Dichlorobenzene	1.95	0.333	mg/kg wet	3.333		59	40-140	4	30	
1,3-Dichlorobenzene	1.85	0.333	mg/kg wet	3.333		55	40-140	6	30	
1,4-Dichlorobenzene	1.92	0.333	mg/kg wet	3.333		58	40-140	3	30	
2,4,5-Trichlorophenol	2.60	0.333	mg/kg wet	3.333		78	30-130	0.4	30	
2,4,6-Trichlorophenol	2.43	0.333	mg/kg wet	3.333		73	30-130	0.8	30	
2,4-Dichlorophenol	2.33	0.333	mg/kg wet	3.333		70	30-130	2	30	
2,4-Dimethylphenol	2.34	0.333	mg/kg wet	3.333		70	30-130	0.4	30	
2,4-Dinitrophenol	3.15	1.67	mg/kg wet	3.333		95	30-130	7	30	

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8270D Semi-Volatile Organic Compounds										
Batch DI02511 - 3546										
2,4-Dinitrotoluene	2.73	0.333	mg/kg wet	3.333		82	40-140	1	30	
2,6-Dinitrotoluene	2.58	0.333	mg/kg wet	3.333		77	40-140	4	30	
2-Chloronaphthalene	1.99	0.333	mg/kg wet	3.333		60	40-140	2	30	
2-Chlorophenol	2.03	0.333	mg/kg wet	3.333		61	30-130	0.3	30	
2-Methylnaphthalene	2.06	0.333	mg/kg wet	3.333		62	40-140	2	30	
2-Methylphenol	2.05	0.333	mg/kg wet	3.333		62	30-130	1	30	
2-Nitrophenol	2.02	0.333	mg/kg wet	3.333		61	30-130	2	30	
3,3´-Dichlorobenzidine	2.58	0.667	mg/kg wet	3.333		77	40-140	0.2	30	
3+4-Methylphenol	4.20	0.667	mg/kg wet	6.667		63	30-130	0.3	30	
4-Bromophenyl-phenylether	2.75	0.333	mg/kg wet	3.333		82	40-140	9	30	
4-Chloroaniline	1.72	0.667	mg/kg wet	3.333		52	40-140	3	30	
4-Nitrophenol	2.27	1.67	mg/kg wet	3.333		68	30-130	2	30	
Acenaphthene	2.15	0.333	mg/kg wet	3.333		65	40-140	0.4	30	
Acenaphthylene	2.01	0.333	mg/kg wet	3.333		60	40-140	0.2	30	
Acetophenone	2.09	0.667	mg/kg wet	3.333		63	40-140	0.7	30	
Aniline	1.24	1.67	mg/kg wet	3.333		37	40-140	0.6	30	B-
Anthracene	2.64	0.333	mg/kg wet	3.333		79	40-140	0.8	30	
Azobenzene	2.14	0.333	mg/kg wet	3.333		64	40-140	0.6	30	
Benzo(a)anthracene	2.81	0.333	mg/kg wet	3.333		84	40-140	2	30	
Benzo(a)pyrene	2.88	0.167	mg/kg wet	3.333		86	40-140	2	30	
Benzo(b)fluoranthene	2.64	0.333	mg/kg wet	3.333		79	40-140	2	30	
Benzo(g,h,i)perylene	2.72	0.333	mg/kg wet	3.333		82	40-140	0.2	30	
Benzo(k)fluoranthene	3.02	0.333	mg/kg wet	3.333		91	40-140	1	30	
bis(2-Chloroethoxy)methane	1.88	0.333	mg/kg wet	3.333		56	40-140	3	30	
bis(2-Chloroethyl)ether	1.89	0.333	mg/kg wet	3.333		57	40-140	2	30	
bis(2-chloroisopropyl)Ether	1.94	0.333	mg/kg wet	3.333		58	40-140	0.2	30	
bis(2-Ethylhexyl)phthalate	2.98	0.333	mg/kg wet	3.333		89	40-140	0.5	30	
Butylbenzylphthalate	2.92	0.333	mg/kg wet	3.333		87	40-140	0.9	30	
Chrysene	2.76	0.167	mg/kg wet	3.333		83	40-140	1	30	
Dibenzo(a,h)Anthracene	2.71	0.167	mg/kg wet	3.333		81	40-140	1	30	
Dibenzofuran	2.40	0.333	mg/kg wet	3.333		72	40-140	1	30	
Diethylphthalate	2.84	0.333	mg/kg wet	3.333		85	40-140	2	30	
Dimethylphthalate	2.67	0.333	mg/kg wet	3.333		80	40-140	3	30	
Di-n-butylphthalate	2.92	0.333	mg/kg wet	3.333		88	40-140	0.07	30	
Di-n-octylphthalate	2.88	0.333	mg/kg wet	3.333		86	40-140	2	30	
Fluoranthene	2.80	0.333	mg/kg wet	3.333		84	40-140	0.9	30	
Fluorene	2.58	0.333	mg/kg wet	3.333		77	40-140	2	30	
Hexachlorobenzene	2.93	0.333	mg/kg wet	3.333		88	40-140	0.2	30	
Hexachlorobutadiene	2.15	0.333	mg/kg wet	3.333		65	40-140	3	30	
Hexachloroethane	1.89	0.333	mg/kg wet	3.333		57	40-140	4	30	
Indeno(1,2,3-cd)Pyrene	2.71	0.333	mg/kg wet	3.333		81	40-140	1	30	
Isophorone	1.67	0.333	mg/kg wet	3.333		50	40-140	2	30	
Naphthalene	1.96	0.333	mg/kg wet	3.333		59	40-140	2	30	
Nitrobenzene	1.79	0.333	mg/kg wet	3.333		54	40-140	3	30	
N-Nitrosodimethylamine	1.61	0.333	mg/kg wet	3.333		48	40-140	2	30	

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8270D Semi-Volatile Organic Compounds										
Batch DI02511 - 3546										
Pentachlorophenol	3.39	1.67	mg/kg wet	3.333		102	30-130	1	30	
Phenanthrene	2.58	0.333	mg/kg wet	3.333		77	40-140	0.8	30	
Phenol	1.93	0.333	mg/kg wet	3.333		58	30-130	0.1	30	
Pyrene	2.80	0.333	mg/kg wet	3.333		84	40-140	3	30	
Surrogate: 1,2-Dichlorobenzene-d4	*1.88*		mg/kg wet	*3.333*		*57*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*4.72*		mg/kg wet	*5.000*		*94*	*30-130*			
Surrogate: 2-Chlorophenol-d4	*3.13*		mg/kg wet	*5.000*		*63*	*30-130*			
Surrogate: 2-Fluorobiphenyl	*2.12*		mg/kg wet	*3.333*		*64*	*30-130*			
Surrogate: 2-Fluorophenol	*2.95*		mg/kg wet	*5.000*		*59*	*30-130*			
Surrogate: Nitrobenzene-d5	*1.84*		mg/kg wet	*3.333*		*55*	*30-130*			
Surrogate: Phenol-d6	*3.13*		mg/kg wet	*5.000*		*63*	*30-130*			
Surrogate: p-Terphenyl-d14	*2.86*		mg/kg wet	*3.333*		*86*	*30-130*			

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River
ESS Laboratory Work Order: 20I0726

Notes and Definitions

U	Analyte included in the analysis, but not detected
Q	Calibration required quadratic regression (Q).
EL	Elevated Method Reporting Limits due to sample matrix (EL).
D	Diluted.
CD+	Continuing Calibration %Diff/Drift is above control limit (CD+).
CD-	Continuing Calibration %Diff/Drift is below control limit (CD-).
B-	Blank Spike recovery is below lower control limit (B-).
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probably Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

CONFORMED

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: FRRA - Fall River

ESS Laboratory Work Order: 20I0726

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

CONFORMED

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

Shipped/Delivered Via: Client

ESS Project ID: 2010726
Date Received: 9/25/2020
Project Due Date: 10/2/2020
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
   Temp: -0.4 Iced with: Ice
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? ~~Yes~~ NO TD 9/25/20
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** Yes / No / NA
10. Were any analyses received outside of hold time? Yes / No

11. Any Subcontracting needed? Yes / No
    ESS Sample IDs:
    Analysis:
    TAT:
12. Were VOAs received? Yes / No
    a. Air bubbles in aqueous VOAs? Yes / No
    b. Does methanol cover soil completely? Yes / No / NA

13. Are the samples properly preserved? Yes / No
    a. If metals preserved upon receipt: Date: Time: By:
    b. Low Level VOA vials frozen: Date: 9/25/20 Time: 11:55 By: C

Sample Receiving Notes:

Sample 11 ID COC = C-11 ; container = C-10 (times match)

14. Was there a need to contact Project Manager? TD 9/25/20 Yes / No
    a. Was there a need to contact the client? Yes / No
    Who was contacted: Date: Time: By:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	88138	Yes	N/A	Yes	4 oz. Jar	NP	
1	88139	Yes	N/A	Yes	4 oz. Jar	NP	
1	88140	Yes	N/A	Yes	4 oz. Jar	NP	
1	88177	Yes	N/A	Yes	VOA Vial	DI Water	
1	88178	Yes	N/A	Yes	VOA Vial	DI Water	
1	88203	Yes	N/A	Yes	VOA Vial	MeOH	
1	88216	Yes	N/A	Yes	4 oz. Jar	NP	
2	88141	Yes	N/A	Yes	4 oz. Jar	NP	
2	88142	Yes	N/A	Yes	4 oz. Jar	NP	
2	88143	Yes	N/A	Yes	4 oz. Jar	NP	
2	88179	Yes	N/A	Yes	VOA Vial	DI Water	
2	88180	Yes	N/A	Yes	VOA Vial	DI Water	
2	88204	Yes	N/A	Yes	VOA Vial	MeOH	
2	88217	Yes	N/A	Yes	4 oz. Jar	NP	
3	88144	Yes	N/A	Yes	4 oz. Jar	NP	
3	88145	Yes	N/A	Yes	4 oz. Jar	NP	
3	88146	Yes	N/A	Yes	4 oz. Jar	NP	

CONFORMED

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

ESS Project ID: 2010726
Date Received: 9/25/2020

3	88181	Yes	N/A	Yes	VOA Vial	DI Water
3	88182	Yes	N/A	Yes	VOA Vial	DI Water
3	88205	Yes	N/A	Yes	VOA Vial	MeOH
3	88218	Yes	N/A	Yes	4 oz. Jar	NP
4	88147	Yes	N/A	Yes	4 oz. Jar	NP
4	88148	Yes	N/A	Yes	4 oz. Jar	NP
4	88149	Yes	N/A	Yes	4 oz. Jar	NP
4	88183	Yes	N/A	Yes	VOA Vial	DI Water
4	88184	Yes	N/A	Yes	VOA Vial	DI Water
4	88206	Yes	N/A	Yes	VOA Vial	MeOH
4	88219	Yes	N/A	Yes	4 oz. Jar	NP
5	88150	Yes	N/A	Yes	4 oz. Jar	NP
5	88151	Yes	N/A	Yes	4 oz. Jar	NP
5	88152	Yes	N/A	Yes	4 oz. Jar	NP
5	88185	Yes	N/A	Yes	VOA Vial	DI Water
5	88186	Yes	N/A	Yes	VOA Vial	DI Water
5	88207	Yes	N/A	Yes	VOA Vial	MeOH
5	88220	Yes	N/A	Yes	4 oz. Jar	NP
6	88153	Yes	N/A	Yes	4 oz. Jar	NP
6	88154	Yes	N/A	Yes	4 oz. Jar	NP
6	88155	Yes	N/A	Yes	4 oz. Jar	NP
6	88187	Yes	N/A	Yes	VOA Vial	DI Water
6	88188	Yes	N/A	Yes	VOA Vial	DI Water
6	88208	Yes	N/A	Yes	VOA Vial	MeOH
6	88221	Yes	N/A	Yes	4 oz. Jar	NP
7	88156	Yes	N/A	Yes	4 oz. Jar	NP
7	88157	Yes	N/A	Yes	4 oz. Jar	NP
7	88158	Yes	N/A	Yes	4 oz. Jar	NP
7	88189	Yes	N/A	Yes	VOA Vial	DI Water
7	88190	Yes	N/A	Yes	VOA Vial	DI Water
7	88209	Yes	N/A	Yes	VOA Vial	MeOH
7	88222	Yes	N/A	Yes	4 oz. Jar	NP
8	88159	Yes	N/A	Yes	4 oz. Jar	NP
8	88160	Yes	N/A	Yes	4 oz. Jar	NP
8	88161	Yes	N/A	Yes	4 oz. Jar	NP
8	88191	Yes	N/A	Yes	VOA Vial	DI Water
8	88192	Yes	N/A	Yes	VOA Vial	DI Water
8	88210	Yes	N/A	Yes	VOA Vial	MeOH
8	88223	Yes	N/A	Yes	4 oz. Jar	NP
9	88162	Yes	N/A	Yes	4 oz. Jar	NP
9	88163	Yes	N/A	Yes	4 oz. Jar	NP
9	88164	Yes	N/A	Yes	4 oz. Jar	NP
9	88193	Yes	N/A	Yes	VOA Vial	DI Water
9	88194	Yes	N/A	Yes	VOA Vial	DI Water
9	88211	Yes	N/A	Yes	VOA Vial	MeOH
9	88224	Yes	N/A	Yes	4 oz. Jar	NP
10	88165	Yes	N/A	Yes	4 oz. Jar	NP
10	88166	Yes	N/A	Yes	4 oz. Jar	NP
10	88167	Yes	N/A	Yes	4 oz. Jar	NP
10	88195	Yes	N/A	Yes	VOA Vial	DI Water
10	88196	Yes	N/A	Yes	VOA Vial	DI Water
10	88212	Yes	N/A	Yes	VOA Vial	MeOH
10	88225	Yes	N/A	Yes	4 oz. Jar	NP

CONFORMED

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

ESS Project ID: 20I0726
Date Received: 9/25/2020

11	88168	Yes	N/A	Yes	4 oz. Jar	NP
11	88169	Yes	N/A	Yes	4 oz. Jar	NP
11	88170	Yes	N/A	Yes	4 oz. Jar	NP
11	88197	Yes	N/A	Yes	VOA Vial	DI Water
11	88198	Yes	N/A	Yes	VOA Vial	DI Water
11	88213	Yes	N/A	Yes	VOA Vial	MeOH
11	88226	Yes	N/A	Yes	4 oz. Jar	NP
12	88171	Yes	N/A	Yes	4 oz. Jar	NP
12	88172	Yes	N/A	Yes	4 oz. Jar	NP
12	88173	Yes	N/A	Yes	4 oz. Jar	NP
12	88199	Yes	N/A	Yes	VOA Vial	DI Water
12	88200	Yes	N/A	Yes	VOA Vial	DI Water
12	88214	Yes	N/A	Yes	VOA Vial	MeOH
12	88227	Yes	N/A	Yes	4 oz. Jar	NP
13	88174	Yes	N/A	Yes	4 oz. Jar	NP
13	88175	Yes	N/A	Yes	4 oz. Jar	NP
13	88176	Yes	N/A	Yes	4 oz. Jar	NP
13	88201	Yes	N/A	Yes	VOA Vial	DI Water
13	88202	Yes	N/A	Yes	VOA Vial	DI Water
13	88215	Yes	N/A	Yes	VOA Vial	MeOH
13	88228	Yes	N/A	Yes	4 oz. Jar	NP

2nd Review

Were all containers scanned into storage/lab? Initials TD

Are barcode labels on correct containers? Yes / No

Are all Flashpoint stickers attached/container ID # circled? Yes / No / NA

Are all Hex Chrome stickers attached? Yes / No / NA

Are all QC stickers attached? Yes / No / NA

Are VOA stickers attached if bubbles noted? Yes / No / NA

Completed By: Taylor Davis Date & Time: 9/25/20 11:57

Reviewed By: Date & Time: 9/25/20 11:57

Delivered By: 9/25/20 11:57

CONFORMED

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

Shipped/Delivered Via: Client

ESS Project ID: 2010726
Date Received: 9/25/2020
Project Due Date: 10/2/2020
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
   Temp: -0.4 Iced with: Ice
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? ~~Yes~~ NO TD 9/25/20
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** Yes / No / NA
10. Were any analyses received outside of hold time? Yes / No

11. Any Subcontracting needed? Yes / No
    ESS Sample IDs:
    Analysis:
    TAT:
12. Were VOAs received? Yes / No
    a. Air bubbles in aqueous VOAs? Yes / No
    b. Does methanol cover soil completely? Yes / No / NA

13. Are the samples properly preserved? Yes / No
    a. If metals preserved upon receipt: Date: Time: By:
    b. Low Level VOA vials frozen: Date: 9/25/20 Time: 11:55 By: C

Sample Receiving Notes:

Sample 11 ID COC = C-11 ; container = C-10 (times match)

14. Was there a need to contact Project Manager? TD 9/25/20 Yes / No
    a. Was there a need to contact the client? Yes / No
    Who was contacted: Date: Time: By:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	88138	Yes	N/A	Yes	4 oz. Jar	NP	
1	88139	Yes	N/A	Yes	4 oz. Jar	NP	
1	88140	Yes	N/A	Yes	4 oz. Jar	NP	
1	88177	Yes	N/A	Yes	VOA Vial	DI Water	
1	88178	Yes	N/A	Yes	VOA Vial	DI Water	
1	88203	Yes	N/A	Yes	VOA Vial	MeOH	
1	88216	Yes	N/A	Yes	4 oz. Jar	NP	
2	88141	Yes	N/A	Yes	4 oz. Jar	NP	
2	88142	Yes	N/A	Yes	4 oz. Jar	NP	
2	88143	Yes	N/A	Yes	4 oz. Jar	NP	
2	88179	Yes	N/A	Yes	VOA Vial	DI Water	
2	88180	Yes	N/A	Yes	VOA Vial	DI Water	
2	88204	Yes	N/A	Yes	VOA Vial	MeOH	
2	88217	Yes	N/A	Yes	4 oz. Jar	NP	
3	88144	Yes	N/A	Yes	4 oz. Jar	NP	
3	88145	Yes	N/A	Yes	4 oz. Jar	NP	
3	88146	Yes	N/A	Yes	4 oz. Jar	NP	

CONFORMED

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

ESS Project ID: 2010726
Date Received: 9/25/2020

3	88181	Yes	N/A	Yes	VOA Vial	DI Water
3	88182	Yes	N/A	Yes	VOA Vial	DI Water
3	88205	Yes	N/A	Yes	VOA Vial	MeOH
3	88218	Yes	N/A	Yes	4 oz. Jar	NP
4	88147	Yes	N/A	Yes	4 oz. Jar	NP
4	88148	Yes	N/A	Yes	4 oz. Jar	NP
4	88149	Yes	N/A	Yes	4 oz. Jar	NP
4	88183	Yes	N/A	Yes	VOA Vial	DI Water
4	88184	Yes	N/A	Yes	VOA Vial	DI Water
4	88206	Yes	N/A	Yes	VOA Vial	MeOH
4	88219	Yes	N/A	Yes	4 oz. Jar	NP
5	88150	Yes	N/A	Yes	4 oz. Jar	NP
5	88151	Yes	N/A	Yes	4 oz. Jar	NP
5	88152	Yes	N/A	Yes	4 oz. Jar	NP
5	88185	Yes	N/A	Yes	VOA Vial	DI Water
5	88186	Yes	N/A	Yes	VOA Vial	DI Water
5	88207	Yes	N/A	Yes	VOA Vial	MeOH
5	88220	Yes	N/A	Yes	4 oz. Jar	NP
6	88153	Yes	N/A	Yes	4 oz. Jar	NP
6	88154	Yes	N/A	Yes	4 oz. Jar	NP
6	88155	Yes	N/A	Yes	4 oz. Jar	NP
6	88187	Yes	N/A	Yes	VOA Vial	DI Water
6	88188	Yes	N/A	Yes	VOA Vial	DI Water
6	88208	Yes	N/A	Yes	VOA Vial	MeOH
6	88221	Yes	N/A	Yes	4 oz. Jar	NP
7	88156	Yes	N/A	Yes	4 oz. Jar	NP
7	88157	Yes	N/A	Yes	4 oz. Jar	NP
7	88158	Yes	N/A	Yes	4 oz. Jar	NP
7	88189	Yes	N/A	Yes	VOA Vial	DI Water
7	88190	Yes	N/A	Yes	VOA Vial	DI Water
7	88209	Yes	N/A	Yes	VOA Vial	MeOH
7	88222	Yes	N/A	Yes	4 oz. Jar	NP
8	88159	Yes	N/A	Yes	4 oz. Jar	NP
8	88160	Yes	N/A	Yes	4 oz. Jar	NP
8	88161	Yes	N/A	Yes	4 oz. Jar	NP
8	88191	Yes	N/A	Yes	VOA Vial	DI Water
8	88192	Yes	N/A	Yes	VOA Vial	DI Water
8	88210	Yes	N/A	Yes	VOA Vial	MeOH
8	88223	Yes	N/A	Yes	4 oz. Jar	NP
9	88162	Yes	N/A	Yes	4 oz. Jar	NP
9	88163	Yes	N/A	Yes	4 oz. Jar	NP
9	88164	Yes	N/A	Yes	4 oz. Jar	NP
9	88193	Yes	N/A	Yes	VOA Vial	DI Water
9	88194	Yes	N/A	Yes	VOA Vial	DI Water
9	88211	Yes	N/A	Yes	VOA Vial	MeOH
9	88224	Yes	N/A	Yes	4 oz. Jar	NP
10	88165	Yes	N/A	Yes	4 oz. Jar	NP
10	88166	Yes	N/A	Yes	4 oz. Jar	NP
10	88167	Yes	N/A	Yes	4 oz. Jar	NP
10	88195	Yes	N/A	Yes	VOA Vial	DI Water
10	88196	Yes	N/A	Yes	VOA Vial	DI Water
10	88212	Yes	N/A	Yes	VOA Vial	MeOH
10	88225	Yes	N/A	Yes	4 oz. Jar	NP

CONFORMED

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

ESS Project ID: 20I0726
Date Received: 9/25/2020

11	88168	Yes	N/A	Yes	4 oz. Jar	NP
11	88169	Yes	N/A	Yes	4 oz. Jar	NP
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11	88197	Yes	N/A	Yes	VOA Vial	DI Water
11	88198	Yes	N/A	Yes	VOA Vial	DI Water
11	88213	Yes	N/A	Yes	VOA Vial	MeOH
11	88226	Yes	N/A	Yes	4 oz. Jar	NP
12	88171	Yes	N/A	Yes	4 oz. Jar	NP
12	88172	Yes	N/A	Yes	4 oz. Jar	NP
12	88173	Yes	N/A	Yes	4 oz. Jar	NP
12	88199	Yes	N/A	Yes	VOA Vial	DI Water
12	88200	Yes	N/A	Yes	VOA Vial	DI Water
12	88214	Yes	N/A	Yes	VOA Vial	MeOH
12	88227	Yes	N/A	Yes	4 oz. Jar	NP
13	88174	Yes	N/A	Yes	4 oz. Jar	NP
13	88175	Yes	N/A	Yes	4 oz. Jar	NP
13	88176	Yes	N/A	Yes	4 oz. Jar	NP
13	88201	Yes	N/A	Yes	VOA Vial	DI Water
13	88202	Yes	N/A	Yes	VOA Vial	DI Water
13	88215	Yes	N/A	Yes	VOA Vial	MeOH
13	88228	Yes	N/A	Yes	4 oz. Jar	NP

2nd Review

Were all containers scanned into storage/lab?	Initials TD	
Are barcode labels on correct containers?		Yes / No
Are all Flashpoint stickers attached/container ID # circled?		Yes / No / NA
Are all Hex Chrome stickers attached?		Yes / No / NA
Are all QC stickers attached?		Yes / No / NA
Are VOA stickers attached if bubbles noted?		Yes / No / NA

Completed By: Taylor Davis Date & Time: 9/25/20 11:57

Reviewed By: [signature] Date & Time: 9/25/20 11:57

Delivered By: [signature] 9/25/20 11:57

CONFORMED

CHAIN OF CUSTODY

185 Frances Avenue
Cranston, RI 02921
Phone: 401-461-7181
Fax: 401-461-4486
www.esslaboratory.com

ESS Lab # 20I07216 | Page 1 of 2

Turn Time: ☐ >5 ☒ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ Same Day

Regulatory State: MA Criteria: S-1

Is this project for any of the following?: ☐ CT RCP ☐ MA MCP ☐ RGP ☐ Permit ☐ 401 WQ

ELECTRONIC DELIVERABLES (Final Reports are PDF)

☐ Limit Checker ☐ State Forms ☐ EQuIS
☒ Excel ☐ Hard Copy ☐ Enviro Data
☐ CLP-Like Package ☐ Other (Specify) → pdf

CLIENT INFORMATION

Client: Beta Group
Address: 701 George Washington Hwy, Lincoln, RI
Phone: 401.333.2382
Email Distribution List: JMcLoughlin@Beta-Inc.com

PROJECT INFORMATION

Project Name: FRRA - Fall River
Project Location: Fall River
Project Number: 7171
Project Manager: Joe McLoughlin
Bill to: Cindy Lesperance
PO#:
Quote#:

Client acknowledges that sampling is compliant with all EPA / State regulatory programs

REQUESTED ANALYSES

ESS Lab ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	TPH	PCB (Soxhlet)	SVOC	VOC	RCRA 8 Metals	Total Number of Bottles
1	9-24-20	9:00	Grab	Soil	C-1	X	X	X	X	X	
2	↓	9:30	↓	↓	C-2	X	X	X	X	X	
3	↓	10:00	↓	↓	C-3	X	X	X	X	X	
4	↓	10:30	↓	↓	C-4	X	X	X	X	X	
5	↓	11:00	↓	↓	C-5	X	X	X	X	X	
6	↓	11:30	↓	↓	C-6	X	X	X	X	X	
7	↓	11:45	↓	↓	C-7	X	X	X	X	X	
8	↓	12:00	↓	↓	C-8	X	X	X	X	X	
9	↓	13:00	↓	↓	C-9	X	X	X	X	X	
10	↓	13:30	↓	↓	C-10	X	X	X	X	X	
Container Type:			AC-Air Cassette AG-Amber Glass B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial			J	J	J	V	J	
Container Volume:			1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other*			9	9	9	6	9	
Preservation Code:			1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAce, NaOH 9-NH4Cl 10-DI H2O 11-Other*			1	1	1	6	1	

Sampled by: CO + CM

Chain needs to be filled out neatly and completely for on time delivery.

Comments: * Please specify "Other" preservative and containers types in this space

Use extra soil for % solids

All samples submitted are subject to ESS Laboratory's payment terms and conditions.

Dissolved Filtration: ☐ Lab Filter

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
[signature]	9/24/20	16:30	Lincoln Fridge	Lincoln Fridge	9/24/20	10:00	[signature]
Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
[signature]	9/25/20	10:35	[signature]				

ESS LABORATORY
185 Frances Avenue
Cranston, RI 02921
Phone: 401-461-7181
Fax: 401-461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS Lab # 20I0726 | Page 2 of 2

Turn Time: ☐ >5 ☒ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ Same Day

Regulatory State: MA Criteria: S-1

Is this project for any of the following?: ☐ CT RCP ☒ MA MCP ☐ RGP ☐ Permit ☐ 401 WQ

ELECTRONIC DELIVERABLES (Final Reports are PDF)

☐ Limit Checker ☐ State Forms ☐ EQuIS
☒ Excel ☐ Hard Copy ☐ Enviro Data
☐ CLP-Like Package ☐ Other (Specify) → pdf

CLIENT INFORMATION

Client: Beta Group
Address: 701 George Washington Hwy, Lincoln, RI
Phone: 401.333.2382
Email Distribution List: JMcLoughlin@Beta-Inc.com

PROJECT INFORMATION

Project Name: FRRA- Fall River
Project Location: Fall River
Project Number: 7171
Project Manager: Joe McLoughlin
Bill to:
PO#:
Quote#:

Client acknowledges that sampling is compliant with all EPA / State regulatory programs

REQUESTED ANALYSES

ESS Lab ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	TPH	PCB (soxhlet)	SVOC	VOC	RCRA-8 Metals	Total Number of Bottles
11	9-24-20	14:00	Grab	Soil	C-11	X	X	X	X	X	
12	↓	13:30	↓	↓	C-12	X	X	X	X	X	
13	↓	15:00	↓	↓	C-13	X	X	X	X	X	

Container Type:	AC-Air Cassette AG-Amber Glass B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial					J	J	J	V	J	
Container Volume:	1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other*					9	9	9	7	9	
Preservation Code:	1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAce, NaOH 9-NH4Cl 10-DI H2O 11-Other*					1	1	1	6	1	

Sampled by: CO+CM

Chain needs to be filled out neatly and completely for on time delivery.

Comments: * Please specify "Other" preservative and containers types in this space
see comments on Page 1.
.1

All samples submitted are subject to ESS Laboratory's payment terms and conditions.

Dissolved Filtration: ☐ Lab Filter

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
[signature]	9/24/20	16:30	Lincoln Fridge	Lincoln Fridge	9/24/20	10:00	[signature]
[signature]	9/25/20	10:35	[signature]				

CONFORMED

CITY PIER
SITE IMPROVEMENTS

CITY OF FALL RIVER, MA
IFB#21-30

Issued for Bid
May 6, 2021

OWNER:

FALL RIVER REDEVELOPMENT AUTHORITY
CITY OF FALL RIVER
ONE GOVERNMENT CENTER, ROOM 610
FALL RIVER, MASSACHUSETTS, 02722
508.324.2662

PROJECT ADDRESS

FALL RIVER CITY PIER
600 DAVOL STREET
FALL RIVER, MASSACHUSETTS, 02722

PROJECT LOCATION

LOCATION MAP
1" = 500' - 0"

PLAN INDEX

DESCRIPTION	SHEET NO.
COVER	L1.0
GENERAL NOTES	L2.0
LEGEND & ABBREVIATIONS	L3.0
PRE-EXISTING CONDITIONS SURVEY	L4.0
EXISTING CONDITIONS AS-BUILT	L5.0
SITE PREPARATION PLAN	L6.0
SITE PREPARATION DETAILS	L6.1
LAYOUT PLAN	L7.0
SITE IMPROVEMENT PLAN	L7.1
SITE GRADING PLAN	L8.0
SITE SECTIONS - 1-3	L9.0-L9.2
DRAINAGE AND UTILITIES PLAN	C1.0
DRAINAGE DETAILS	C2.0
LIGHTING AND ELECTRICAL PLAN	E1.0
ELECTRICAL UTILITIES ENLARGEMENT	E2.0
LIGHTING AND ELECTRICAL DETAILS - 1 - 3	E3.0 - E3.2
PLANTING PLAN - 1 - 3	L10.0 - L10.2
PEDESTRIAN RAILING SYSTEM LAYOUT	L11.0
PEDESTRIAN RAILING DETAILS - 1 - 4	L11.1- L11.4
SITE IMPROVEMENTS DETAILS - 1 - 3	L12.0 - L12.2
PLANTING DETAILS	L13.0
SITE AMENITIES	L14.0
IRRIGATION PLAN	IR - 1.0
IRRIGATION DETAILS	IR - 2.0 - IR - 2.1

REGISTERED PROFESSIONAL _____ DATE _____

PREPARED BY:

BETA
www.BETA-Inc.com

CONFORMED

GENERAL NOTES:

1. ANY DAMAGE TO EXISTING PAVEMENT, BRIDGES, CONDUIT, SIDEWALK, FENCES, ETC., CAUSED BY THE CONTRACTOR SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO OWNER.
2. THE CONTRACTOR SHALL PLACE ALL EQUIPMENT AND MATERIAL AS FAR AWAY AS POSSIBLE FROM STREETS AND SIDEWALKS SO AS NOT TO CAUSE A SAFETY HAZARD.
3. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE EXISTING CONDITIONS ARE NOT OBLITERATED BEFORE CONTROL POINTS ARE LOCATED AND CONSTRUCTION LAYOUT IS ESTABLISHED. THE CONSTRUCTION LAYOUT SHALL BE PROVIDED IN SUFFICIENT DETAIL, THEREBY ENABLING HIM TO CONSTRUCT THE PROJECT IN CONFORMITY WITH THE PLANS AND SPECIFICATIONS. SURVEY WILL BE PROVIDED BY THE CONTRACTOR. THE OWNER'S REPRESENTATIVE WILL NOT AUTHORIZE CONSTRUCTION ACTIVITIES TO BEGIN UNTIL HE IS SATISFIED THAT ALL GROUND CONTROL HAS BEEN ESTABLISHED, TIED DOWN, AND DULY RECORDED IN STANDARD FIELD BOOKS.
4. THE FREQUENCY AND APPLICATION RATES FOR THE DUST CONTROL ITEMS WILL BE AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
5. ALL SIDEWALK AND DRIVEWAYS DESIGNATED FOR SHALL BE CUT AND MATCHED AT LOCATIONS SHOWN ON THE PLANS OR AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
6. ASPHALT EMULSION TACK COAT SHALL BE PLACED PRIOR TO PAVEMENT PLACEMENT ON THE CONCRETE BASE OR COLD PLANED PAVEMENT, AND ON ANY NEW COURSE WHICH HAS BEEN OPEN TO TRAFFIC, OR ANY NEW COURSE WHICH HAS BEEN EXPOSED FOR MORE THAN 3 DAYS, AND/OR AS DIRECTED BY THE OWNER'S REPRESENTATIVE. IT SHALL ALSO BE APPLIED TO VERTICAL PAVEMENT FACES BETWEEN ADJOINING PAVEMENT SECTIONS. ALL APPLICATIONS ON BOTH HORIZONTAL AND VERTICAL SURFACES.
7. THE LIMITS OF SURFACE DISTURBANCE MUST BE STRICTLY ADHERED TO IN ALL AREAS. IN ADDITION TO THOSE AREAS SPECIFICALLY DESIGNATED ON THE PLANS, THE CONTRACTOR WILL BE RESPONSIBLE FOR PROVIDING AND PLACING, AT HIS OWN EXPENSE, PLANTABLE SOIL AND SEED IN AREAS WHICH ARE OUTSIDE OF THE PROJECT'S AREAS OF DISTURBANCE AND WHICH ARE IMPACTED BY CONSTRUCTION OPERATIONS INCLUDING THOSE AREAS WHERE VEHICLES, EQUIPMENT AND MATERIALS ARE STORED WITH THE PERMISSION OF THE OWNER'S REPRESENTATIVE.
8. CLEANING AND SWEEPING OF PAVEMENT WILL INCLUDE REMOVAL OF ALL PAVEMENT DEBRIS PRIOR TO THE PLACEMENT OF EACH BITUMINOUS PAVEMENT LIFT. ALL CLEANING AND SWEEPING SHALL BE DONE TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE.
9. PRIOR TO INSTALLATION, ALL SIGNS, MOUNTINGS AND LOCATIONS SHALL BE APPROVED OR MODIFIED BY THE OWNER'S REPRESENTATIVE.
10. PAVEMENT OPERATIONS FOR CURBED SECTIONS: IN AREAS WHERE CURBING IS SET TO FINISH LINE AND GRADE, THE CONTRACTOR WILL BE ALLOWED TO MANUALLY ADJUST THE BITUMINOUS SURFACE TO ESTABLISH POSITIVE PITCH.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL ROADWAYS FREE OF DEBRIS RESULTING FROM THEIR CONSTRUCTION OPERATIONS. ALL DEBRIS SHALL BE REMOVED TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE AT NO ADDITIONAL COST TO THE OWNER.
12. NO FUEL STORAGE, VEHICLE REFUELING, OR EQUIPMENT STORAGE SHALL TAKE PLACE NOR WITHIN 100' OF ANY WATER BODY. THIS REQUIREMENT SHALL NOT SUPERSEDE ANY FEDERAL, STATE OR LOCAL LAW, ORDINANCE, RULE OR REGULATION THAT APPLIES TO THE SAME, UNLESS THIS REQUIREMENT IS MORE STRINGENT THAN SAID LAW, ORDINANCE, RULE OR REGULATION.
13. THE CONTRACTOR SHALL BE RESPONSIBLE TO ENSURE THAT AT THE END OF FINAL PAVING OPERATIONS, STORM WATER FLOW TO EXISTING DRAINAGE STRUCTURES HAS BEEN REESTABLISHED AND THAT NO ISOLATED DEPRESSIONS REMAIN.
14. ALL EMBANKMENTS SHALL BE PLACED IN HORIZONTAL LAYERS NOT EXCEEDING 12" (AFTER COMPACTION) AND SHALL BE COMPACTED AS SPECIFIED BEFORE THE NEXT LAYER IS PLACED.
15. THE CONTRACTOR SHALL READ, BECOME FAMILIAR WITH, AND ADHERE TO ALL OF THE PROVISIONS, CONDITIONS, AND STIPULATIONS STATED IN THE ENVIRONMENTAL APPROVALS ISSUED FOR THE PROJECT FROM THE ALL COSTS ASSOCIATED WITH THESE CONDITIONS SHALL BE CONSIDERED INCIDENTAL TO THE CONSTRUCTION AND INCLUDED WITH THE COST FOR THE ASSOCIATED BID.
16. THE CONTRACTOR SHALL READ, BECOME FAMILIAR WITH, AND ADHERE TO ALL OF THE CONSTRUCTION RELATED PROVISIONS, CONDITIONS, AND STIPULATIONS OF ANY REMEDIAL PLANS DEVELOPED FOR THE PROJECT. COPIES OF THESE DOCUMENTS ARE INCLUDED IN THE CS PAGES OF THE CONTRACT DOCUMENTS. ALL COSTS ASSOCIATED WITH COMPLIANCE WITH THESE DOCUMENTS SHALL BE CONSIDERED INCIDENTAL TO THE CONSTRUCTION AND INCLUDED WITH THE COST FOR THE ASSOCIATED BID.

DRAINAGE AND EROSION CONTROL NOTES:

1. PROJECTS WITH AT LEAST ONE(1) ACRE OF SOIL DISTURBANCE ARE REQUIRED TO DEVELOP AND ENFORCE A SITE SPECIFIC STORM WATER POLLUTION PREVENTION PLAN (SWPPP) IN ORDER TO REMAIN IN COMPLIANCE WITH THE MASSACHUSETTS DEP FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL READ, BECOME FAMILIAR WITH, AND ADHERE TO ALL OF THE PROVISIONS, CONDITIONS, AND STIPULATIONS OF THE GENERAL PERMIT AND THE SITE SPECIFIC SWPPP FOR THIS PROJECT. ALL COSTS ASSOCIATED WITH ADHERENCE TO THE SWPPP SHALL BE CONSIDERED INCIDENTAL TO THE CONSTRUCTION AND INCLUDED WITH THE COST FOR THE ASSOCIATED BID.
2. ALL DISTURBED SOILS EXPOSED PRIOR TO OCTOBER 15 OF ANY CALENDAR YEAR SHALL BE SEEDED OR PROTECTED BY THAT DATE. ANY SUCH AREAS THAT DO NOT HAVE ADEQUATE VEGETATIVE STABILIZATION, AS DETERMINED BY THE OWNER'S REPRESENTATIVE, BY NOVEMBER 15 OF ANY CALENDAR YEAR, MUST BE STABILIZED THROUGH THE USE OF EROSION CONTROL MATTING OR HAY MULCH, IN ACCORDANCE WITH MASSACHUSETTS DEP SPECIFICATIONS. IF WORK CONTINUES WITHIN ANY OF THESE AREAS DURING THE PERIOD FROM OCTOBER 15 THROUGH APRIL 15, CARE MUST BE TAKEN TO ENSURE THAT ONLY THE AREA REQUIRED FOR THAT DAY'S WORK IS EXPOSED, AND ALL ERODIBLE SOIL MUST BE RESTABILIZED WITHIN 5 WORKING DAYS. ANY WORK TO CORRECT PROBLEMS RESULTING FROM FAILURE TO COMPLY WITH THIS PROVISION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THERE WILL BE NO SEPARATE PAYMENT FOR THIS PROVISION, IT SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION OPERATIONS. STABILIZATION OF ONE FORM OR ANOTHER AS DESCRIBED ABOVE SHALL BE ACHIEVED WITHIN 2 WEEKS OF FINAL GRADING.
3. STOCKPILES OF MATERIAL SHALL NOT BE LOCATED WITHIN REGULATED WETLANDS OR BUFFER ZONE AREAS. THEY SHALL HAVE SIDE SLOPES NO GREATER THAN 30% AND STOCKPILES OF ERODABLE MATERIAL SHALL ALSO BE SEEDED AND RINGED EROSION CONTROL.
4. IF THE PLANS INCLUDE SPECIFIC AREAS FOR PLACEMENT OF CONSTRUCTION EQUIPMENT AND MATERIALS STORAGE AND STOCKPILING, AND IF THE CONTRACTOR ELECTS TO UTILIZE ANY OTHER AREAS FOR THESE PURPOSES, THIS SHALL BE APPROVED BY THE OWNER'S REPRESENTATIVE ONLY AFTER OBTAINING ANY NECESSARY PERMITS AND/OR PERMIT MODIFICATIONS FROM THE APPROPRIATE REGULATORY AUTHORITY(IES). ANY PERMITTING REQUIREMENTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE ACCOMPLISHED AT NO COST TO THE OWNER.
5. JUTE MESH SHALL BE USED TO STABILIZE PLANTABLE SOIL AND/OR LOAM IN ALL DITCHES, ON ALL SLOPES ADJACENT TO WETLANDS AND WETLAND PERIMETERS, AND ON ALL SLOPES WITHIN WATER QUALITY BASINS. JUTE MESH IN DITCHES SHALL EXTEND TO AN ELEVATION 2 FEET ABOVE THE BOTTOM OF THE DITCH.
6. UNVEGETATED AREAS SHALL NOT BE UNATTENDED OR EXPOSED FOR PERIODS IN EXCESS OF 2 WEEKS OR THROUGH THE INACTIVE WINTER SEASON.
7. PRIOR TO DRAINAGE AND UTILITY CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION (HORIZONTAL AND VERTICAL) OF ALL EXISTING PIPES AND/OR STRUCTURES WHICH ARE TO BE CONNECTED. ANY VARIATION FOUND FROM THE PLANS MUST BE BROUGHT TO THE ENGINEER'S ATTENTION PRIOR TO DRAINAGE AND UTILITY CONSTRUCTION. WORK CAN COMMENCE ONLY UPON THE OWNER'S REPRESENTATIVE AUTHORIZATION.
8. DURING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING DRAINAGE AND RUNOFF FLOW DURING STORMS AND PERIODS OF RAINFALL THROUGHOUT THE WORK AREA.
9. CATCH BASIN RIM GRADES NOTED ON PLANS ARE DEPRESSED 0.1' LOWER THAN THE GUTTER GRADE. RIM ELEVATIONS SHOWN ARE FINAL GRADES. THE CONTRACTOR SHALL PLACE FRAMES AND GRATES 0.1' BELOW THE GRADE CONSTRUCTED IN THIS CONTRACT OR AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
10. SILT SACK INLET PROTECTION SHALL BE INSTALLED AT ALL CATCH BASINS AND INLETS WHENEVER SUBBASE IS EXPOSED, AND SHALL REMAIN IN PLACE UNTIL THE ABUTTING GROUND SURFACES ARE STABILIZED.
11. ALL INLET PROTECTION USED AT CATCH BASINS, THEY SHALL BE REMOVED AT THE END OF THE PROJECT OR AS DIRECTED BY THE OWNER'S REPRESENTATIVE IN ORDER TO PREVENT CLOGGING OF THE INLET.

DRAINAGE AND EROSION CONTROL NOTES (CONTINUED):

14. THE TOE OF ANY FILL SLOPE IS TO REMAIN AT LEAST 1' INSIDE OF ALL EROSION CONTROLS. UNDER NO CIRCUMSTANCES SHALL THE CONTRACTOR COVER ANY PORTION OF THE EROSION CONTROL MEASURES WITH MATERIAL. ANY MATERIAL THAT IS PLACED ON ANY EROSION CONTROLS BY THE CONTRACTOR, OR ANY AGENT OF THE CONTRACTOR, SHALL BE IMMEDIATELY REMOVED BY THE CONTRACTOR, AND ANY NECESSARY REPAIRS TO THE EROSION CONTROLS ACCOMPLISHED.
15. PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES, EROSION AND SEDIMENTATION CONTROLS SHALL BE INSTALLED AT THOSE AREAS INDICATED ON THE PLANS. CLEARING MAY OCCUR PRIOR TO INSTALLATION OF SUCH CONTROLS, HOWEVER NO GRUBBING, GRADING, FILLING, OR OTHER SOIL DISTURBANCE SHALL OCCUR PRIOR TO INSTALLATION. THE LIMITS OF CLEARING AND SURFACE DISTURBANCE MUST BE STRICTLY ADHERED TO IN ALL AREAS.
16. ALL EROSION CONTROL MEASURES OR TEMPORARY PROTECTION SHALL REMAIN IN PLACE UNTIL AN ACCEPTABLE STAND OF GRASS IS ESTABLISHED. IF NEEDED, TEMPORARY SEEDING SHALL BE USED TO MINIMIZE EROSION.
17. THE CONTRACTOR MUST REPAIR AND/OR RESEED ANY AREAS THAT DO NOT DEVELOP WITHIN THE PERIOD OF ONE YEAR AND HE SHALL DO SO AT NO ADDITIONAL EXPENSE TO THE OWNER.
18. THE NORMAL ACCEPTABLE SEASONAL SEEDING DATES ARE CONTAINED IN THE SPECIFICATIONS.
19. UNDER SEVERE WEATHER EVENTS ADDITIONAL EROSION CONTROLS MAYBE REQUIRED AND SHALL BE INSTALLED AS DIRECTED BY THE OWNER'S REPRESENTATIVE.

UTILITY NOTES:

1. EXISTING UTILITIES HAVE BEEN SHOWN ON THE PLANS USING THE BEST AVAILABLE INFORMATION AND ARE APPROXIMATE. BUILDING SERVICE CONNECTIONS (ELECTRIC, GAS, TELEPHONE, WATER AND SANITARY) ARE NOT SHOWN. CONTRACTOR IS TO ASSUME SERVICES ARE PRESENT AND ACTIVE IN ALL ADJACENT BUILDINGS.
2. THE CONTRACTOR SHALL VERIFY THE LOCATIONS OF ALL EXISTING DRAINAGE AND UTILITIES BOTH UNDERGROUND AND OVERHEAD BEFORE EXCAVATION BEGINS. THE CONTRACTOR SHOULD UNDERSTAND THAT NOT ALL UTILITIES SUBSCRIBE TO THE DIG SAFE PROGRAM. IT IS THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY ALL UTILITY COMPANIES AND ENSURE THAT ALL UTILITIES HAVE BEEN MARKED PRIOR TO COMMENCING THEIR WORK. ANY DAMAGE TO EXISTING UTILITIES MARKED IN THE FIELD, OR AS A RESULT OF FAILING TO CONTACT THE APPROPRIATE UTILITY COMPANY, SHALL BE REPAIRED OR REPLACED AT NO ADDITIONAL COST TO THE OWNER.
3. ALL EXISTING UTILITIES TO BE ABANDONED SHALL BE CAPPED.
4. IF INTERRUPTED ALL EXISTING WATER SERVICES SHALL BE RECONNECTED TO THE NEW WATER MAINS.
5. UTILITY SERVICE CONNECTIONS SHALL BE MAINTAINED TO ALL EXISTING FACILITIES TO REMAIN.
6. ALL NEW WATER LINES SHALL BE DISINFECTED TO THE SATISFACTION OF THE WATER AUTHORITY IN ACCORDANCE WITH THE SPECIFICATIONS.
7. ALL UTILITY RELATED WORK SHALL BE BY OTHERS.

SITE IMPROVEMENT NOTES

1. ALL SURFACES SHALL BE CONSTRUCTED WITH POSITIVE DRAINAGE.
2. INSTALL UNDER DRAINS FOR SITE IMPROVEMENTS AS SHOWN.
3. TIE UNDER DRAINS IN TO NEAREST EXISTING CATCH BASINS.
4. PROVIDE SUPPLEMENTAL TRENCH OR AREA DRAINS AS NEEDED.
5. EXCAVATE, STOCKPILE, AND REUSE EXISTING GRANULAR SOIL CAP.
6. CREATE EARTHWORK BERMS AS DIRECTED BY THE OWNER'S REPRESENTATIVE TO MAKE THE RE-USE OF GRANULAR CAP SOIL ON SITE.

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SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

GENERAL NOTES

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
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LEGEND

GENERAL SYMBOLS

EXISTING	PROPOSED	
		CURB OR BERM (TYPE AS NOTED)
		EDGE OF PAVEMENT
CB	CB	CATCH BASIN (OR GUTTER INLET, LEACHING BASIN, DROP INLET, CATCH BASIN CURB INLET)
EHH	EHH	ELECTRIC HANDHOLE (NUMBER AS NOTED)
E	EMH	ELECTRIC MANHOLE
T	TMH	TELEPHONE MANHOLE
W	WMH	WATER MANHOLE
S	SMH	SEWER MANHOLE
D	DMH	DRAINAGE MANHOLE
GG	GG	GAS GATE
WG	WG	WATER GATE
CS	CS	CURB STOP
HYD.	HYD	HYDRANT
FA	FAB	FIRE ALARM BOX
PM	PM	PARKING METER
LP		STREET LIGHT POLE
UP	UP	UTILITY POLE
UPL	UPL	UTILITY POLE w/ LIGHT
		SIGN
GUY	GUY	GUY POLE
12" RCP D	10'-12" RCP	DRAIN PIPE (SIZE AS NOTED)
8" VCP S	10'-8" PVC	SEWER MAIN (SIZE AS NOTED)
	10'-8" PVC	ELECTRIC DUCT
4" HP G	10'-4" HP	GAS MAIN (SIZE AS NOTED)
8" CI W	10'-8" DI	WATER MAIN (SIZE AS NOTED)
T	10'-8" PVC	TELEPHONE DUCT (SIZE AS NOTED)
	OHW	OVERHEAD WIRE
MB	MB	MAIL BOX
		WOOD GUARD RAIL STEEL BEAM GUARD, WOOD OR STEEL POSTS (TYPE AS NOTED)
		STEEL GUARD RAIL, STEEL POSTS (TYPE NOTED)
		STONE WALL
		RETAINING WALL (TYPE NOTED)
BND	BND	HIGHWAY/PROPERTY BOUND (TYPE AS NOTED)
SHLO (Date of Layout)		STATE HIGHWAY LAYOUT LINE (SHLO)
		CITY, TOWN OR COUNTY LAYOUT LINE (R.O.W.)
Boundary Name		CITY, TOWN, COUNTY OR STATE BOUNDARY LINE
℄		PROPERTY LINE
		EASEMENT LINE (TYPE NOTED)
	2+00	CONSTRUCTION BASELINE
N00°00'00"E 000.00'		SURVEY LINE
		RAILROAD OR STREET RAILWAY TRACKS WITH SIDELINES
		WHEELCHAIR RAMP
24" PINE		TREE (SIZE AND TYPE AS NOTED)
		HEDGE/SHRUBS
		FENCE (SIZE AND TYPE AS NOTED)
WF-1		EDGE OF WETLAND W/ FLAGGED NUMBER
		EDGE OF RIVER/STREAM LINE
		100-FT. WETLAND BUFFER LIMIT
		100-FT. RIVER FRONT LIMIT
		200-FT. RIVER FRONT LIMIT
		WOODED AREA / LIMIT OF CLEARING
× 00.0	x 00.00	SPOT GRADE
		SAW CUT LINE
	TP-1	TEST PIT
	B-1	BORING LOCATION
		EROSION CONTROL BARRIER/COMPOST FILTER TUBES

ABBREVIATIONS

GENERAL

ABAN.	ABANDON
ADJ.	ADJUST
ALT.	ALTERATION
APPROX.	APPROXIMATE
℄	BASELINE
B.B.	BITUMINOUS BERM
B.C.	BITUMINOUS CURB
BD OR BND	BOUND
BLDG.	BUILDING
B.O.	BY OTHERS
BOS	BOTTOM OF SLOPE
BOW	BOTTOM OF WALL
BSW	BACK OF SIDEWALK
C.C.	CONCRETE CURB
CEM.	CEMENT
CLF	CHAIN LINK FENCE
CONC.	CONCRETE
CONST.	CONSTRUCTION
CONT.	CONTINUOUS
DWY	DRIVEWAY
E.P., EOP	EDGE OF PAVEMENT
EL.	ELEVATION
ESMT.	EASEMENT
EXIST.	EXISTING
FDN.	FOUNDATION
GRAN.	GRANITE
GC	GRANITE CURB
HOR.	HORIZONTAL
IP	IRON PIPE
JCT	JUNCTION
LOW	LIMIT OF WORK
LP	LOW POINT
MB	MAIL BOX
MHB	MASSACHUSETTS HIGHWAY BOUND
O.C.	ON CENTER
PCC	POINT OF COMPOUND CURVATURE
PC	POINT OF CURVATURE
PRC	POINT OF REVERSE CURVATURE
PI	POINT OF INTERSECTION
PT	POINT OF TANGENCY
PVC	POINT OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
PERM.	PERMANENT
PGL	PROFILE GRADE LINE
PROP.	PROPOSED
PVC	POINT OF VERTICAL CURVATURE
PVMT.	PAVEMENT
R	RADIUS OF CURVATURE
R&D	REMOVE AND DISCARD
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
REM.	REMOVE
REMOD.	REMODEL
RET.	RETAIN
RR	RAILROAD
RT.	RIGHT
SB	SOUTH BOUND OR STONE BOUND
SDWK.	SIDEWALK
SHT.	SHEET
SHLD.	SHOULDER
STA.	STATION
TEMP.	TEMPORARY
TOS	TOP OF SLOPE
TOW	TOP OF WALL
TYP.	TYPICAL
VAR.	VARIABLE
VERT.	VERTICAL
VGC	VERTICAL GRANITE CURB
WCR	WHEELCHAIR RAMP

TRAFFIC SIGNAL SYSTEMS

R	STEADY CIRCULAR RED
Y	STEADY CIRCULAR AMBER
G	STEADY CIRCULAR GREEN
FR	FLASHING CIRCULAR RED
FY	FLASHING CIRCULAR AMBER
←FY	FLASHING YELLOW LEFT ARROW
R→	STEADY RED RIGHT ARROW
Y→	STEADY AMBER RIGHT ARROW
G→	STEADY GREEN RIGHT ARROW
←R	STEADY RED LEFT ARROW
←Y	STEADY AMBER LEFT ARROW
←G	STEADY GREEN LEFT ARROW
W	STEADY WALK (PERSON WALKING) - LUNAR WHITE
DW	STEADY DON'T WALK (HAND) - PORTLAND ORANGE
FDW	FLASHING DON'T WALK (FLASHING HAND) - PORTLAND ORANGE

UTILITIES

ACCMP	ASPHALT COATED CORRUGATED METAL PIPE
CAP	CORRUGATED ALUMINUM PIPE
CB	CATCH BASIN
CBCI	CATCH BASIN WITH CURB INLET
CI	CURB INLET
CIP	CAST IRON PIPE
CIT	CHANGE IN TYPE
CMP	CORRUGATED METAL PIPE
C	CONDUIT
CPP	CORRUGATED PLASTIC PIPE
CSP	CORRUGATED STEEL PIPE
DI	DROP INLET
DIP	DUCTILE IRON PIPE
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FM	FORCE MAIN
GI	GUTTER INLET
GIP	GALVANIZED IRON PIPE
GG	GAS GATE
HDW	HEADWALL
HYD.	HYDRANT
INV.	INVERT ELEVATION
LP	LIGHT POLE
MH	MANHOLE
PVC	POLY-VINYL-CHLORIDE PIPE
PWW	PAVED WATER WAY
RCP	REINFORCED CONCRETE PIPE (CLASS III UNLESS NOTED)
SD	SUBDRAIN
SMH	SEWER MANHOLE
TS	TRAFFIC SIGNAL
TSV&B	TAPPING SLEEVE, VALVE AND BOX
UP	UTILITY POLE
UPL	UTILITY POLE w/ LIGHT
UPT	UTILITY POLE w/ TRANSFORMER
VCP	VITRIFIED CLAY PIPE
WIP	WROUGHT IRON PIPE
WG	WATER GATE
WM	WATER METER/WATER MAIN

PAVEMENT MARKINGS AND SIGNING SYMBOLS

PROPOSED

CW	CROSSWALK, 2 - 12" WHITE LINES (8" WIDTH)
SL	STOP LINE - 12" WHITE LINE 4' BEHIND CW (TYP.)
SWEL	SOLID WHITE EDGE LINE - 4"
SWCHL	SOLID WHITE CHANNELIZING LINES - 12" (SPACING NOTED)
SWGL	SOLID WHITE GORE LINE 12" @ 33°, (SPACING NOTED)
SWLL	SOLID WHITE LANE LINE - 4"
SWPL	SOLID WHITE PARKING LINE - 4"
BWLL	BROKEN WHITE LANE LINE - 4"
DWLEx	DOTTED WHITE LANE EXTENSION LINE - 4" (2' LINE & 6' GAP)
DYLEx	DOTTED YELLOW LANE EXTENSION LINE - 4" (2' LINE & 6' GAP)
BYCL	BROKEN YELLOW CENTERLINE - 4"
DYCL	DOUBLE YELLOW CENTERLINE - 2 - 4" LINES
SYEL	SOLID YELLOW EDGE LINE - 4"
SYGL	SOLID YELLOW GORE LINE 12" @ 33°, (SPACING NOTED)
SYLL	SOLID YELLOW LANE LINE - 4"
SYCTEL	SOLID YELLOW CYCLE TRACK EDGE LINE - 4"
DYCTCL	DOTTED YELLOW CYCLE TRACK CENTERLINE - 4" (3' LINE & 9' GAP)
SCHOOL	SCHOOL ZONE - WHITE
	HANDICAP SYMBOL - WHITE
	PAVEMENT ARROW - WHITE
ONLY	LEGEND "ONLY" - WHITE

TRAFFIC SIGNAL SYMBOLS

EXISTING	PROPOSED	
		CONTROL CABINET GROUND MOUNTED WITH FOUNDATION
		CONTROL CABINET POLE MOUNTED
	Ø2	CONTROLLER PHASE
	MA-1	MAST ARM, SHAFT & BASE (ARM LENGTH AS NOTED)
		VEHICULAR SIGNAL HEAD (ALPHA-NUMERIC DESIGNATION AS NOTED)
		VEHICULAR SIGNAL HEAD, OPTICALLY PROGRAMMED
		VEHICULAR SIGNAL HEAD (REMOVED & RESET)
		FLASHING BEACON
		PEDESTRIAN SIGNAL HEAD
		PEDESTRIAN SIGNAL HEAD, OPTICALLY PROGRAMMED
HH		PULL BOX 12"x12" OR HANDHOLE
		LOOP DETECTOR
		PEDESTRIAN PUSH BUTTON, SIGN (DIRECTIONAL ARROW AS SHOWN) AND SADDLE
		PRE-EMPTION DETECTOR
		PRE-EMPTION CONFIRMATION STROBE
		SIGNAL CONDUIT (SINGLE RUN)
		SIGNAL CONDUIT (DOUBLE RUN)
		SIGNAL POST & BASE
M	M	MAGNETIC DETECTOR
		SCHOOL ZONE SPEED LIMIT SIGN
		MICROWAVE OR ULTRASONIC DETECTOR
		VIDEO DETECTION CAMERA
		VIDEO DETECTION ZONE

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COMMONWEALTH OF MASSACHUSETTS
WILLIAM P. McGRATH
CIVIL
No. 33716
REGISTERED PROFESSIONAL ENGINEER

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

LEGEND & ABBREVIATIONS

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SCALE

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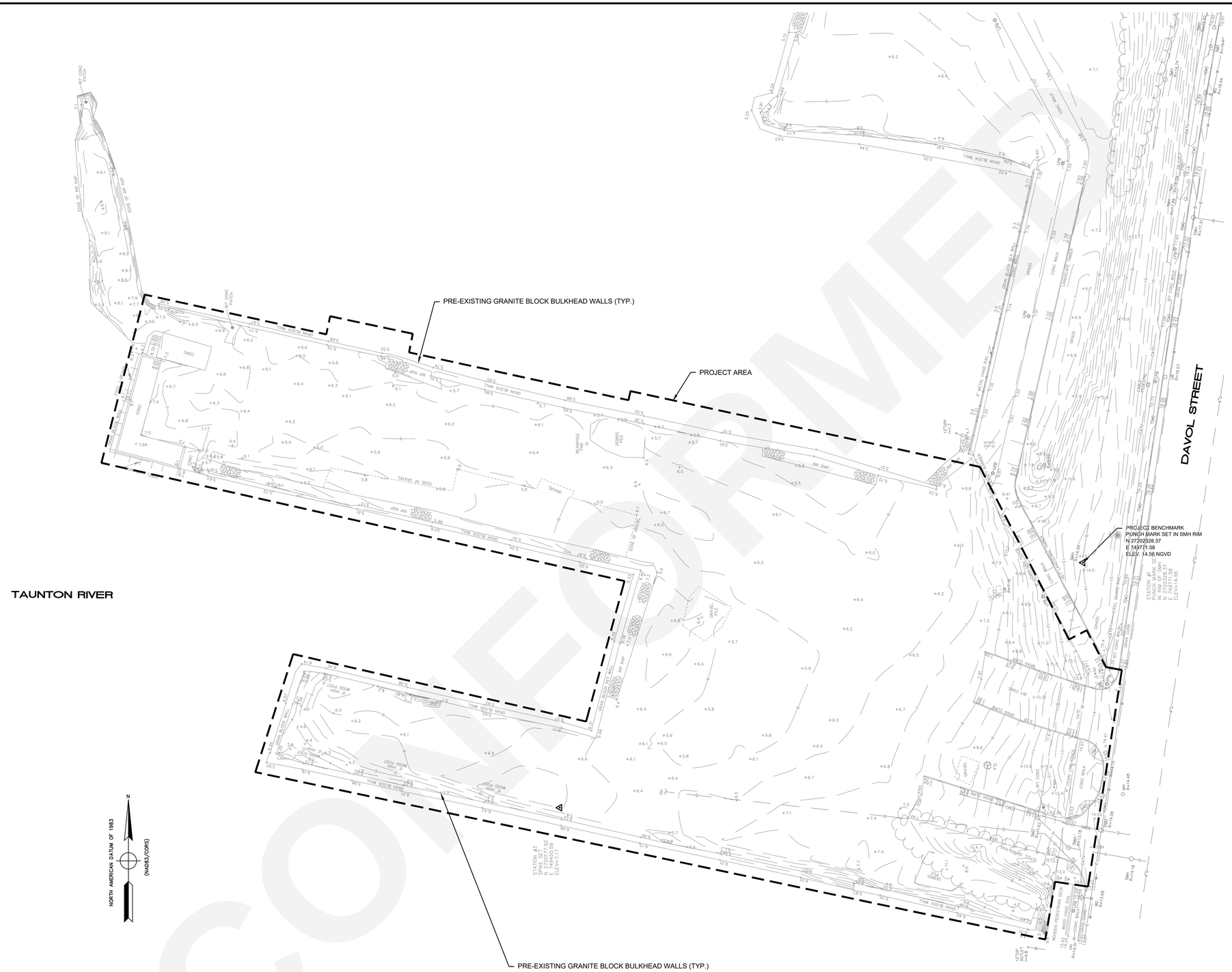

NOTES:
1. SURVEY BY SURVEYING AND MAPPING CONSULTANTS ON AUGUST 31, 2010
2. VERTICAL DATUM NGVD 1929
3. MAP 0-22 LOT 12

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FALL RIVER CITY PIER SITE IMPROVEMENTS

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PRE-EXISTING CONDITIONS SURVEY

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30 0 30 60

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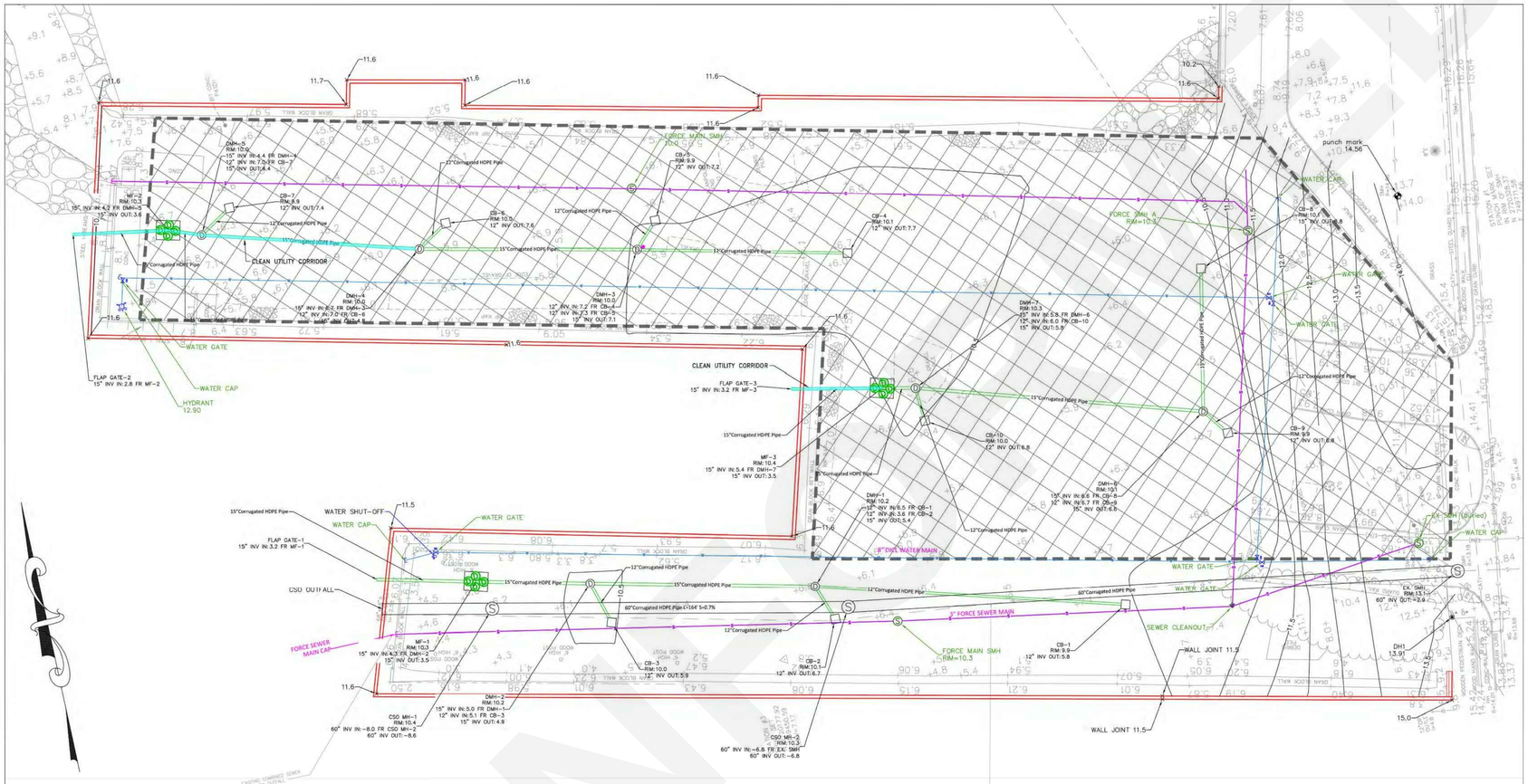

Legend

x 10.5 Final As-Built spot survey points, grade in feet above mean sea level (NGVD 1929), as surveyed by Gorodetsky Engineering 6/2019.

+ 5.6 Pre-Cap placement grade in feet above mean sea level (NGVD 1929). Spot survey points as surveyed by Surveying and Mapping Consultants 8/31/2010.

Zones identified with the hatched area denote limits of PCB Capped area. Soils outside this area have PCBs < 1ppm. Utilities are located within clean overburden.

FALL RIVER CITY PIER
BULKHEAD REHABILITATION - PHASE II
DAVOL STREET
FALL RIVER, MASSACHUSETTS

AS-BUILT SITE PLAN AND PCB LIMITS

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FALL RIVER
CITY PIER
SITE IMPROVEMENTS

Fall River, MA

TITLE

EXISTING CONDITIONS
AS-BUILT

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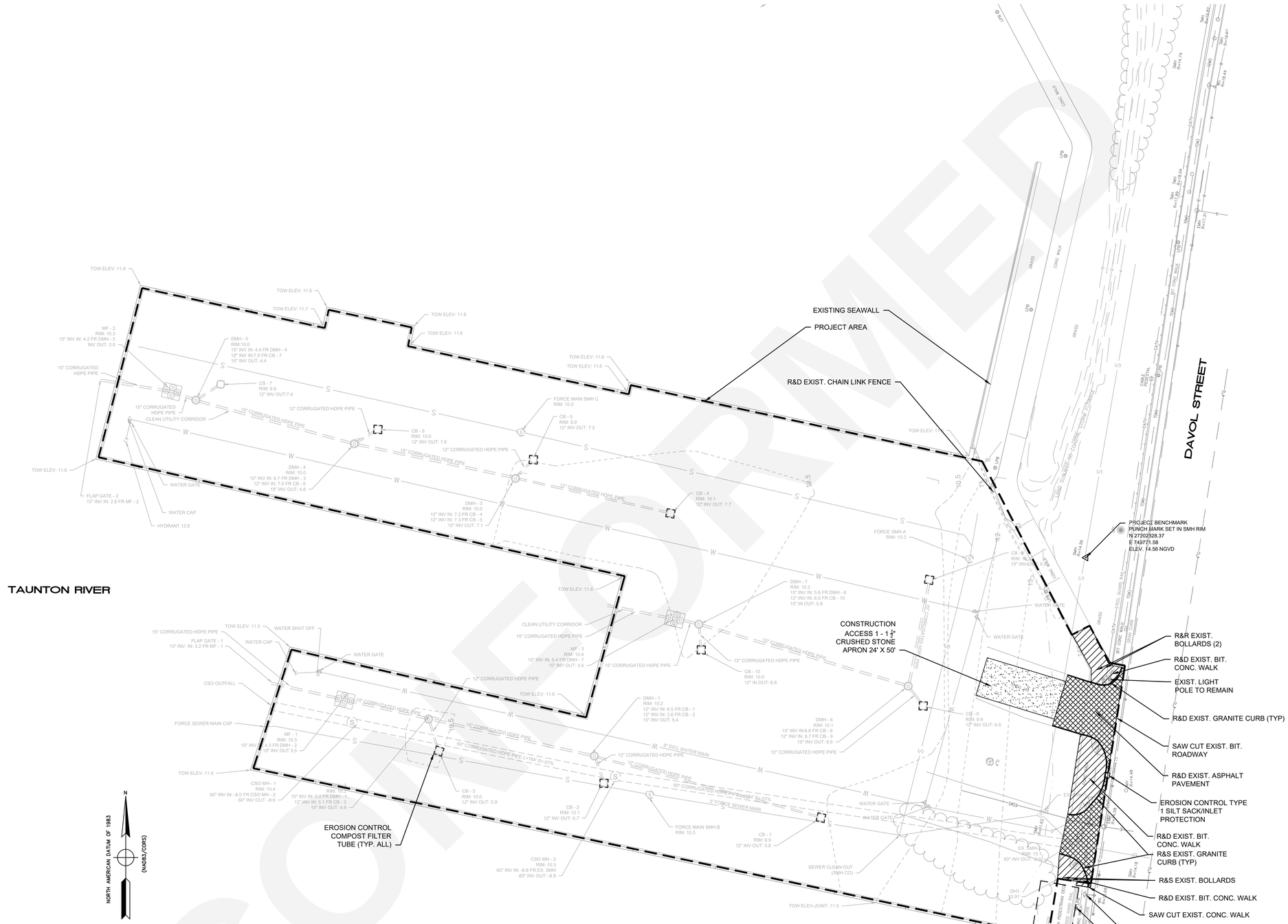

NOTES

1. COORDINATE ANY VEHICULAR TRAVEL LANE CLOSE WITH THE OWNER.
2. MAINTAIN ONE LANE OF TRAVEL AT ALL TIMES.
3. ESTABLISH TEMPORARY SIDEWALK CONNECTION AS NECESSARY TO MAINTAIN SIDEWALK ACCESS AT ALL TIMES.
4. EXISTING CHAIN LINK FENCE SHALL BECOME THE PROPERTY OF THE CONTRACTOR AT THE COMPLETION OF THE WORK AND SHALL BE REMOVED AT SUCH A TIME THAT THE SITE IS SUBSTANTIALLY COMPLETE OR WHEN AUTHORIZED BY THE OWNER. THE CONTRACTOR SHALL UTILIZE EXISTING GATES.
5. SITE SOIL COVER CONSISTS OF CLEAN GRANULAR FILL 36"-60" DEEP OVER PRE-EXISTING SOIL SURFACE.
6. DRAWING INFORMATION COMPILED FROM PARE CORP. "AS-BUILT SITE PLAN AND PCB LIMITS" DATED JUNE 2019.
7. CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY ALL UTILITIES.
8. CONTRACTOR SHALL ESTABLISH VERTICAL AND HORIZONTAL CONTROL PRIOR TO START OF WORK.
9. INSTALL CATCH BASIN EROSION CONTROL PROTECTION (SILT SACK) AT ALL CATCH BASINS.
10. INSTALL COMPOST FILTER TUBES SURROUNDING ALL CATCH BASIN STRUCTURES WHERE MOVEMENT OF SOIL IS TO OCCUR.

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FALL RIVER CITY PIER SITE IMPROVEMENTS

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TITLE

SITE PREPARATION PLAN

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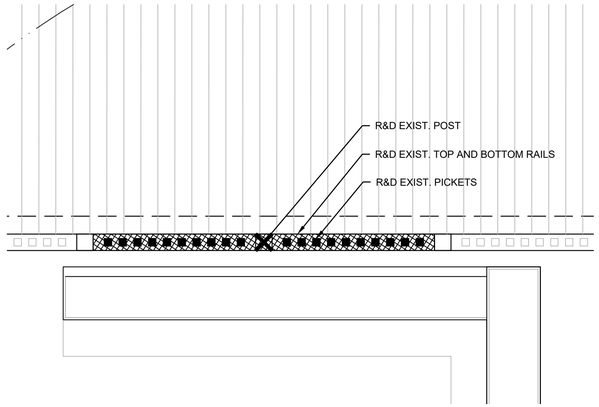
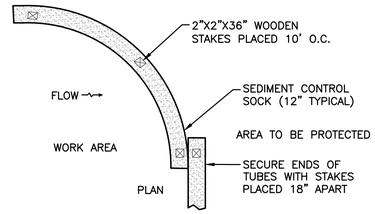


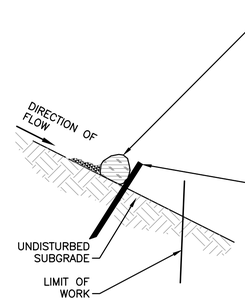
MODIFICATIONS TO EXISTING BOARDWALK RAIL - PLAN

SCALE: $\frac{1}{2}$" = 1' - 0"



CONSTRUCTION SPECIFICATIONS

1. TUBES SHALL BE PLACED IN A ROW WITH ENDS OVERLAPPING THE ADJACENT SOCK.
2. TUBES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES DRIVEN THOUGH THE SOCKS.
3. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
4. SOCKS SHALL BE REMOVED WHEN WORK IS COMPLETE AN THE AREA HAS STABILIZED.
5. PROVIDE AT LEASET 3' OVERLAP AT ENDS OF TUBES.



SECTION A–A

COMPOSITE FILTER TUBE. MINIMUM 12 IN. DIA.WITH AN EFFECTIVE HEIGHT OF 9.5 INCHES.

TUBES FOR COMPOSITE FILTERS SHALL BE JUTE MESH OR APPROVED BIODEGRADABLE MATERIAL. ADDITIONAL TUBES SHALL BE USED AT THE DIRECTION OF THE ENGINEER.

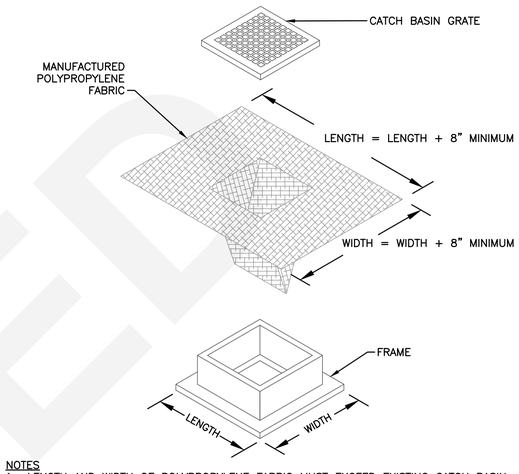
TAMP TUBES IN PLACE TO ENSURE GOOD CONTACT WITH SOIL SURFACE. IT IS NOT NECESSARY TO TRENCH TUBES INTO EXISTING GRADE.

2 INCH X 2 INCH X 3 FEET UNTREATED HARDWOOD STAKES, UP TO 5 FT. APART OR AS REQUIRED TO SECURE TUBES IN PLACE.

WHEN STAKING IS NOT POSSIBLE, SUCH AS WHEN TUBES MUST BE PLACED ON PAVEMENT, HEAVY CONCRETE OR CINDER BLOCKS CAN BE USED BEHIND TUBES UP TO 5 FT. APART OR AS REQUIRED TO SECURE TUBES IN PLACE.

COMPOST FILTER (SOCK) TUBE

SCALE:NTS



NOTES

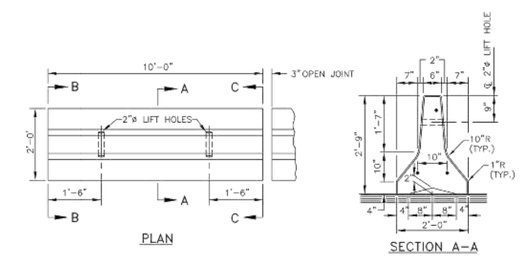
1. LENGTH AND WIDTH OF POLYPROPYLENE FABRIC MUST EXCEED EXISTING CATCH BASIN FRAME DIMENSIONS BY A MINIMUM OF 8".
2. REMOVE CATCH BASIN GRATE AND INSTALL POLYPROPYLENE FABRIC OVER CATCH BASIN FRAME. REPLACE CATCH BASIN GRATE TO SECURE POLYPROPYLENE FABRIC IN PLACE.

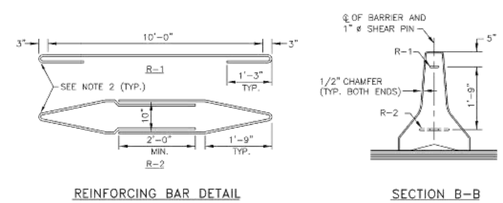
TYPICAL CATCH BASIN EROSION CONTROL PROTECTION

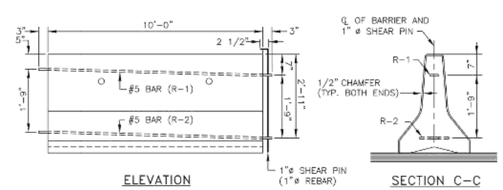
NOT TO SCALE

MODIFICATIONS TO EXISTING BOARDWALK RAIL - ELEVATION

SCALE: $\frac{1}{2}$" = 1' - 0"

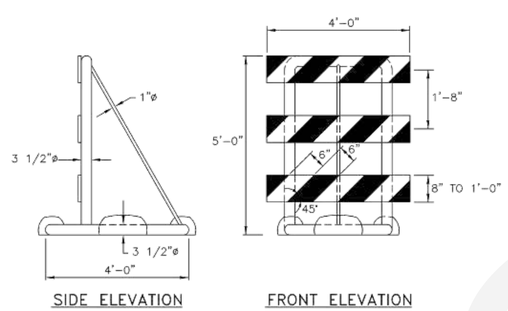






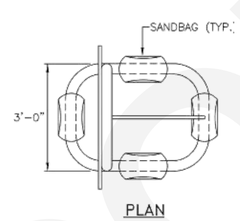
UNANCHORED PRECAST CONCRETE BARRIER FOR TEMPORARY TRAFFIC CONTROL

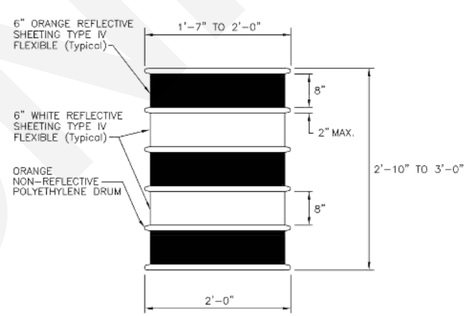
SCALE: $\frac{1}{2}$" = 1' - 0"



PLASTIC PIPE BARRICADE

SCALE: $\frac{1}{2}$" = 1' - 0"





POLYETHYLENE DRUM WITH MARKINGS

SCALE: 1" = 1' - 0"

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WILLIAM P. McGRATH
CIVIL
No. 33216
REGISTERED PROFESSIONAL ENGINEER

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

SITE PREPARATION DETAILS

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	AG
ISSUE DATE:	5/6/2021
BETA JOB NO.:	7171

SCALE

AS SHOWN

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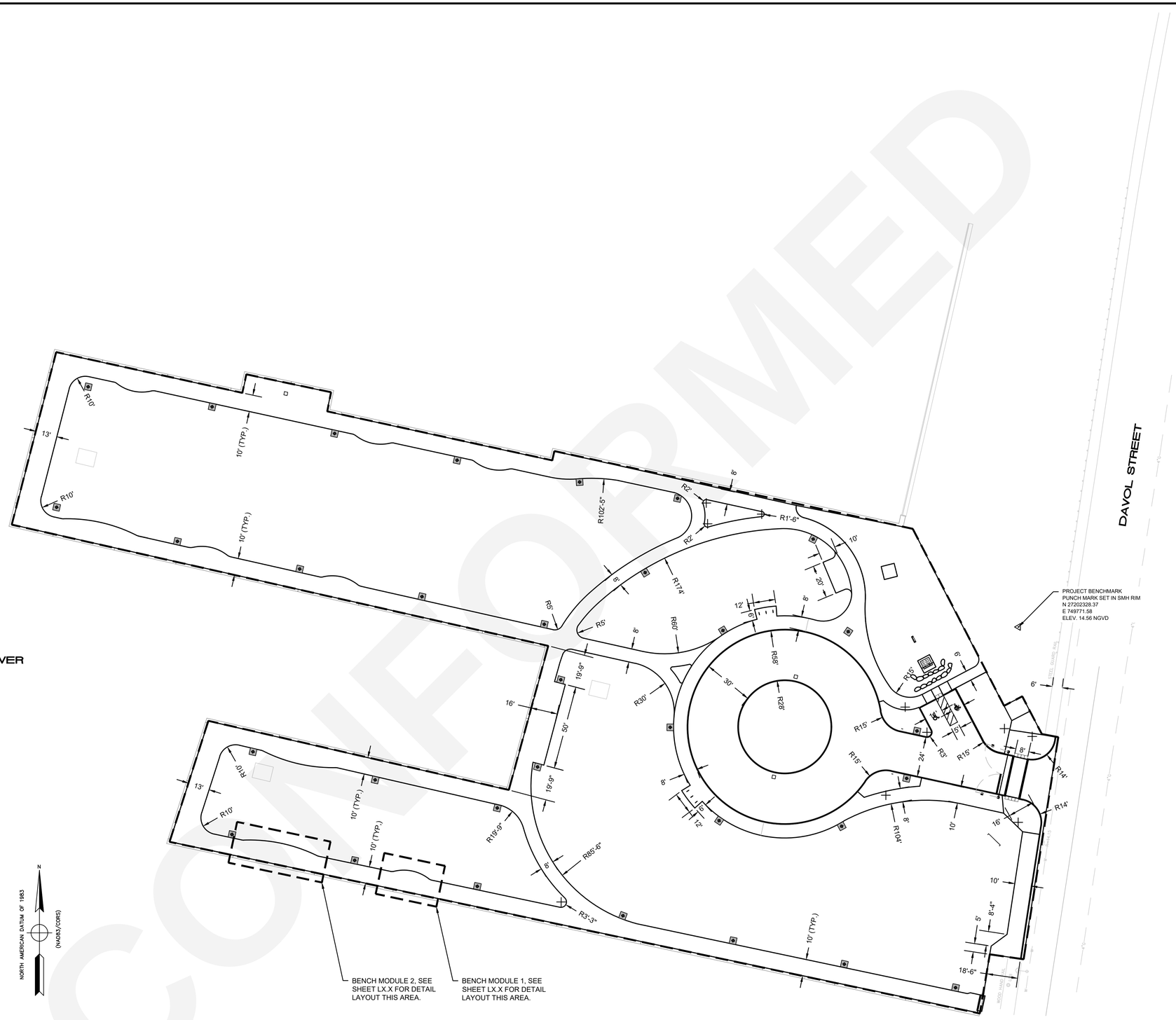
SHEET NO.

L6.1

5/5/2021 12:56 PM G:\PLANNING\LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\7171 - DETAILS.DWG (BETA STB BW.STB)



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PROJECT

FALL RIVER
CITY PIER
SITE IMPROVEMENTS

Fall River, MA

TITLE

LAYOUT PLAN

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	AG
ISSUE DATE:	5/6/2021
BETA JOB NO.:	7171

SCALE

HOR. SCALE IN FEET: 1"=30'

30 0 30 60

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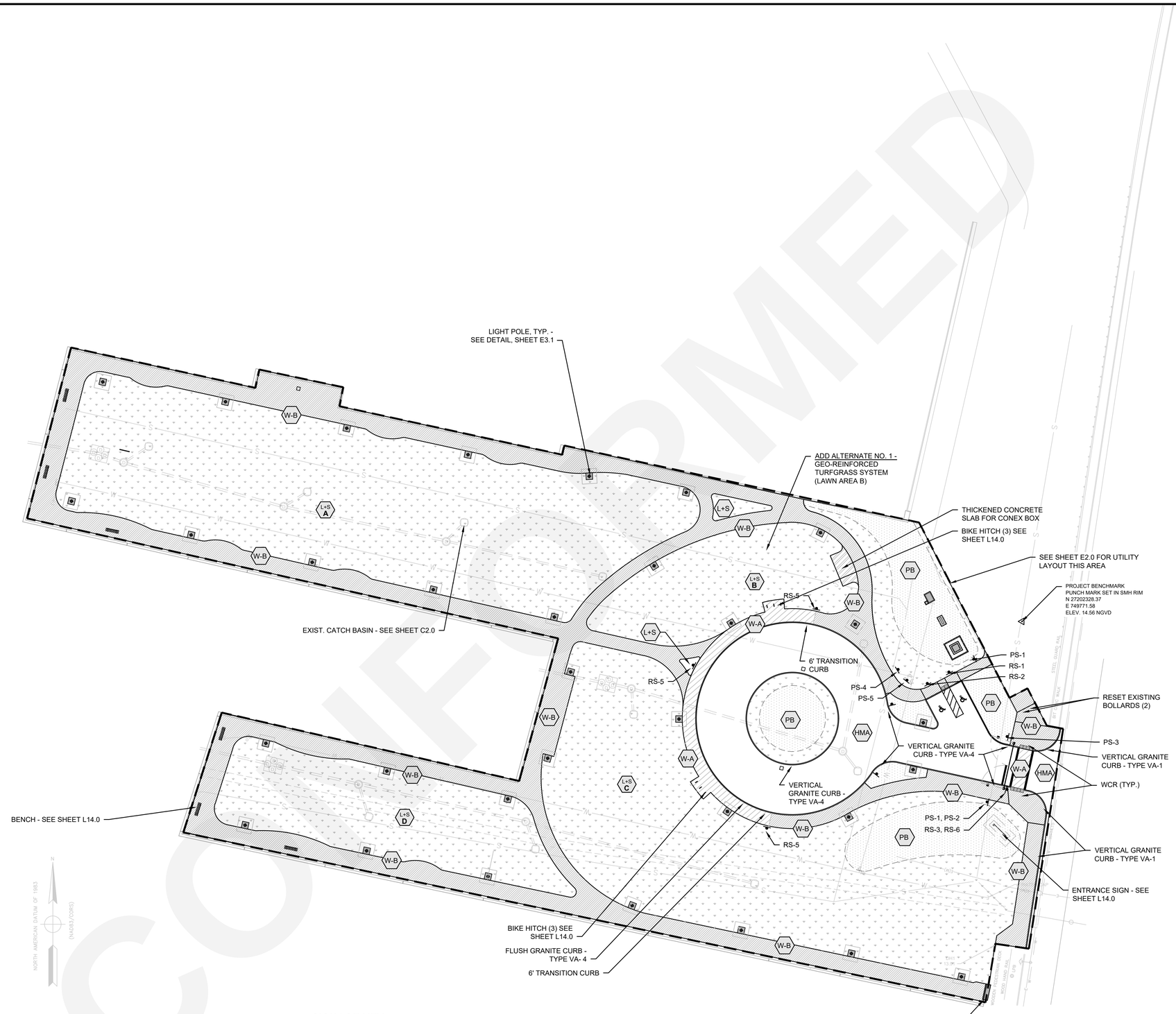
SHEET NO.

L7.0

5/5/2021 1:01 PM G:\PLANNING LANDSCAPE7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\7171 - LAYOUT.DWG (BETA STB BW.STB)



LEGEND

		DETAIL SHEET
W-A	WALKWAY - TYPE A	L12.0
W-B	WALKWAY - TYPE B	L12.0
L+S	LOAM AND SEED	L12.0
PB	PLANTING BED	L12.2, L15.0
HMA	HOT MIX ASPHALT PAVEMENT	L12.0

SIGNAGE KEY

RS-1	REGULATORY SIGN 1
RS-2	REGULATORY SIGN 2
RS-3	REGULATORY SIGN 3
RS-4	REGULATORY SIGN 4
RS-5	REGULATORY SIGN 5
RS-6	REGULATORY SIGN 6
PS-1	PIER SIGN 1
PS-2	PIER SIGN 2
PS-3	PIER SIGN 3
PS-4	PIER SIGN 4
PS-5	PIER SIGN 5

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FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

SITE IMPROVEMENT PLAN

NO.	REVISIONS	DATE
1	ADDENDUM NO. 3	6/4/21

DRAWN BY: AKP/ALG

DESIGNED BY: AG

CHECKED BY: AG

ISSUE DATE: 5/6/2021

BETA JOB NO.: 7171

SCALE

HOR. SCALE IN FEET: 1"=30'

30 0 30 60

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SHEET NO.

L7.1

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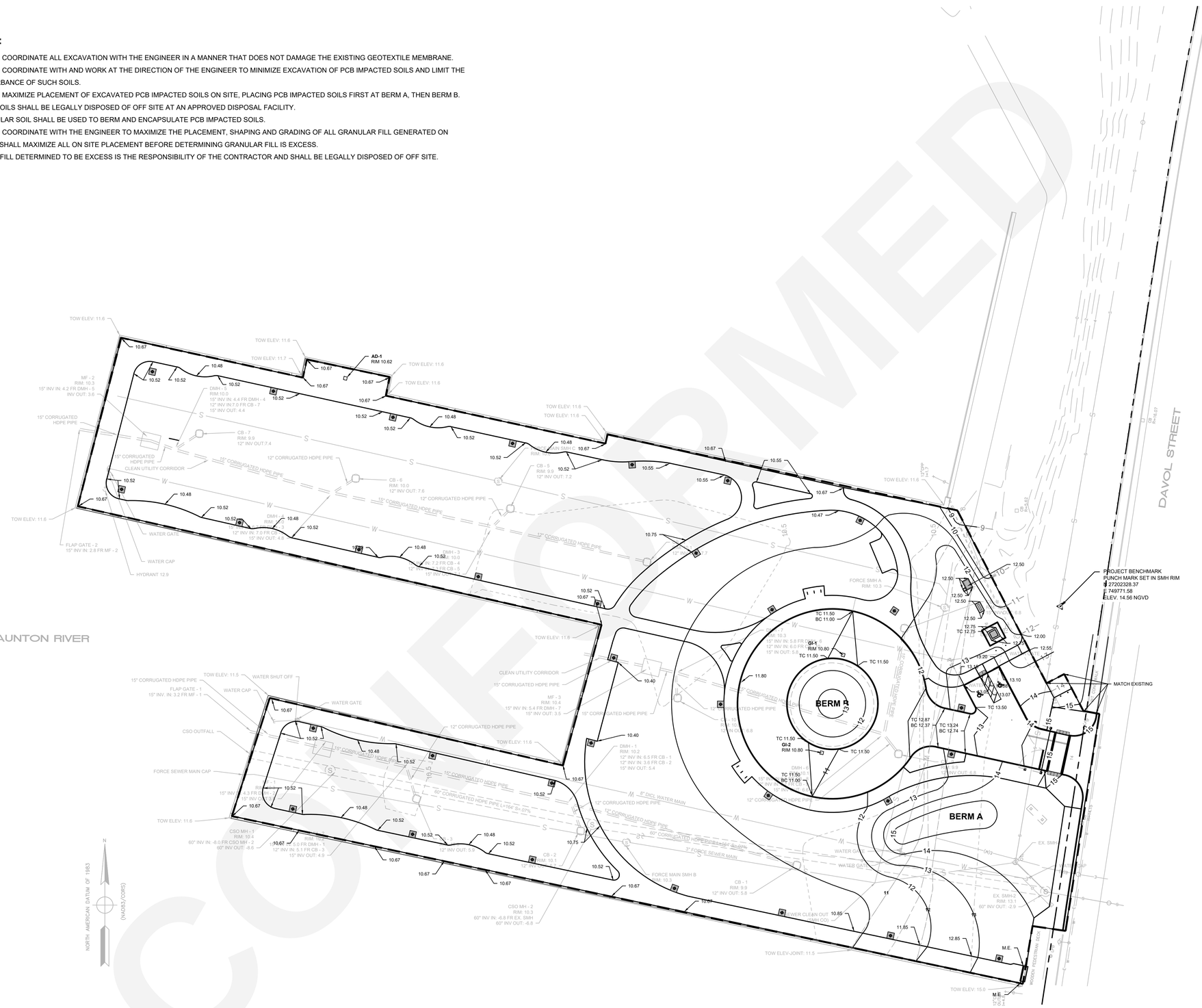
EARTHWORK NOTES:

1. THE CONTRACTOR SHALL COORDINATE ALL EXCAVATION WITH THE ENGINEER IN A MANNER THAT DOES NOT DAMAGE THE EXISTING GEOTEXTILE MEMBRANE.
2. THE CONTRACTOR SHALL COORDINATE WITH AND WORK AT THE DIRECTION OF THE ENGINEER TO MINIMIZE EXCAVATION OF PCB IMPACTED SOILS AND LIMIT THE EXCAVATION AND DISTURBANCE OF SUCH SOILS.
3. THE CONTRACTOR SHALL MAXIMIZE PLACEMENT OF EXCAVATED PCB IMPACTED SOILS ON SITE, PLACING PCB IMPACTED SOILS FIRST AT BERM A, THEN BERM B.
4. EXCESS PCB IMPACTED SOILS SHALL BE LEGALLY DISPOSED OF OFF SITE AT AN APPROVED DISPOSAL FACILITY.
5. EXISTING ON-SITE GRANULAR SOIL SHALL BE USED TO BERM AND ENCAPSULATE PCB IMPACTED SOILS.
6. THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER TO MAXIMIZE THE PLACEMENT, SHAPING AND GRADING OF ALL GRANULAR FILL GENERATED ON SITE. THE CONTRACTOR SHALL MAXIMIZE ALL ON SITE PLACEMENT BEFORE DETERMINING GRANULAR FILL IS EXCESS.
7. DISPOSAL OF GRANULAR FILL DETERMINED TO BE EXCESS IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE LEGALLY DISPOSED OF OFF SITE.



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FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

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SITE GRADING PLAN

NO.	REVISIONS	DATE
1	ADDENDUM NO. 3	6/4/21

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	AG
ISSUE DATE:	5/6/2021
BETA JOB NO.:	7171

SCALE

HOR. SCALE IN FEET: 1"=30"

30 0 30 60

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SHEET NO.

L8.0

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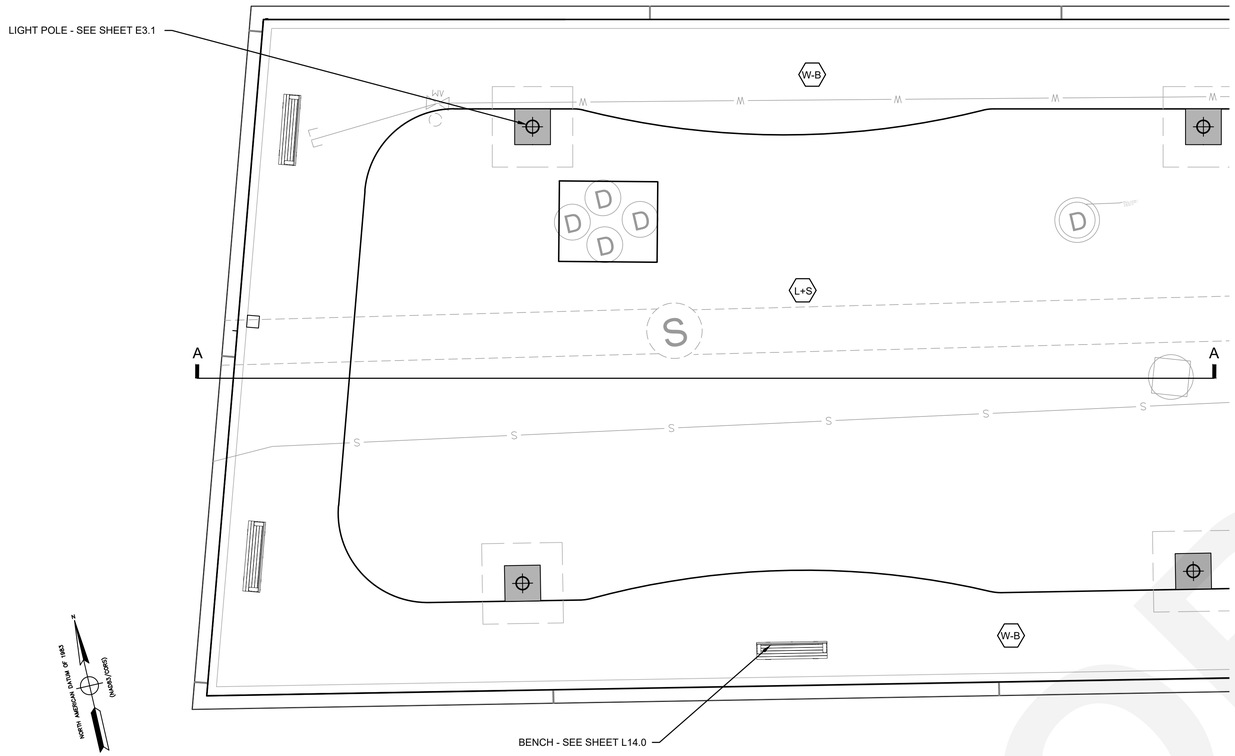
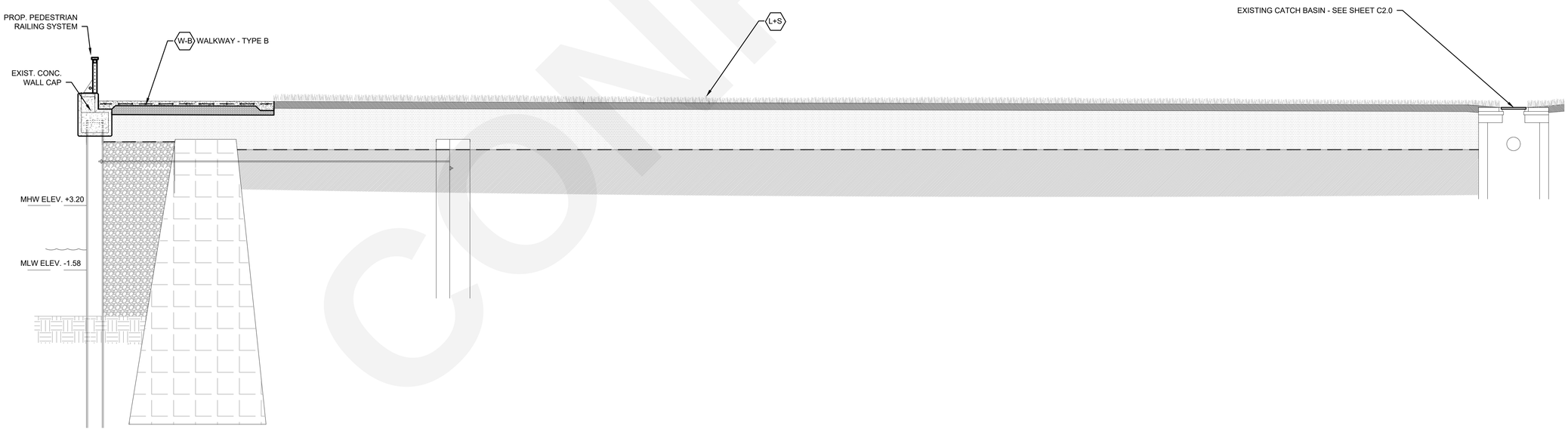


ENLARGEMENT - SOUTH PIER

SCALE: $\frac{1}{8}$" = 1' - 0"

LEGEND		DETAIL SHEET
W-A	WALKWAY - TYPE A	L12.0
W-B	WALKWAY - TYPE B	L12.0
L+S	LOAM AND SEED	L13.0
HMA	HOT MIX ASPHALT PAVEMENT	L12.0



PROPOSED PEDESTRIAN RAILING SYSTEM SOUTH PIER SECTION/ELEVATION A-A

SCALE: $\frac{1}{4}$" = 1' - 0"

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FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

SITE SECTIONS - 1

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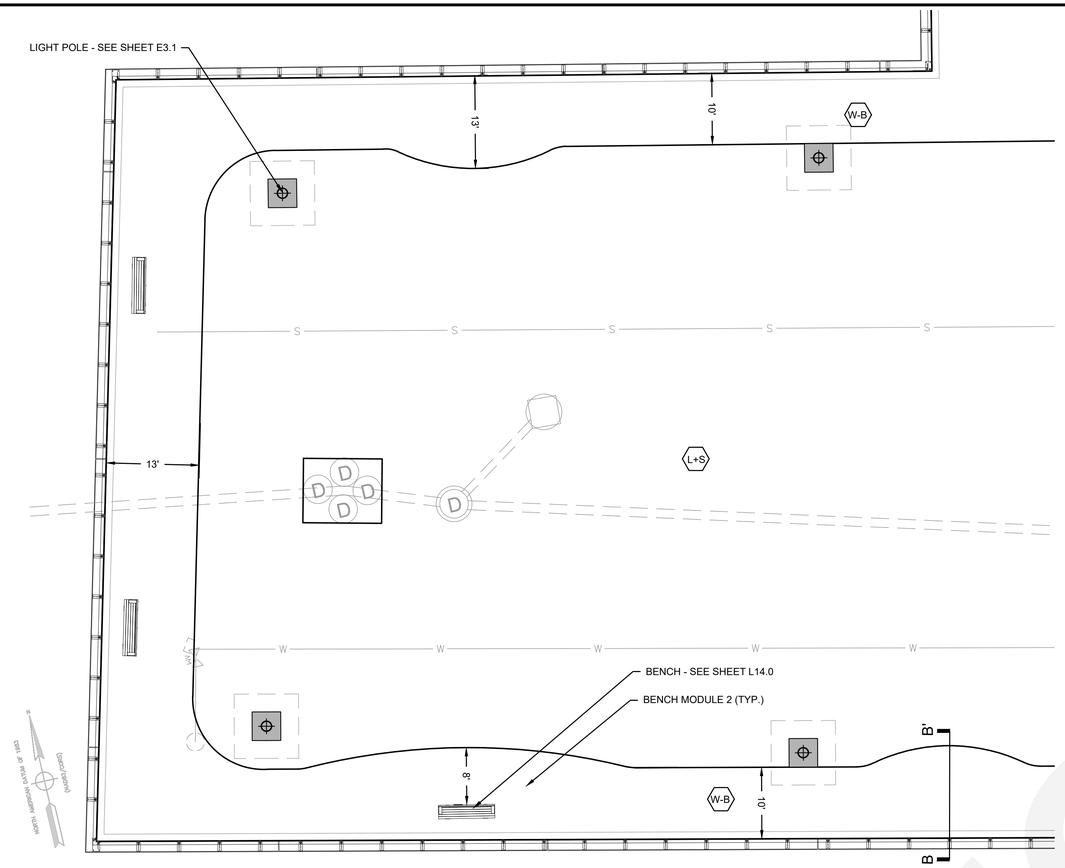
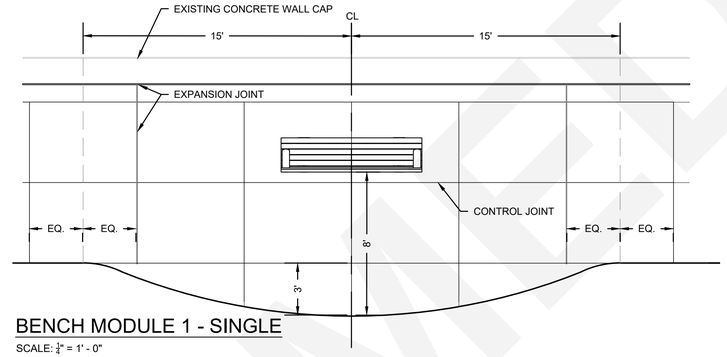


ENLARGEMENT - NORTH PIER

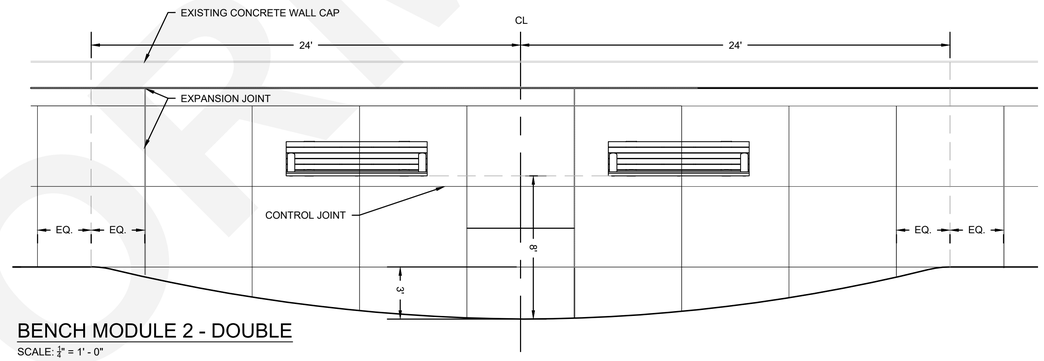
SCALE: 1" = 10' - 0"

LEGEND		DETAIL SHEET
W-A	WALKWAY - TYPE A	L12.0
W-B	WALKWAY - TYPE B	L12.0
L+S	LOAM AND SEED	L13.0
HMA	HOT MIX ASPHALT PAVEMENT	L12.0



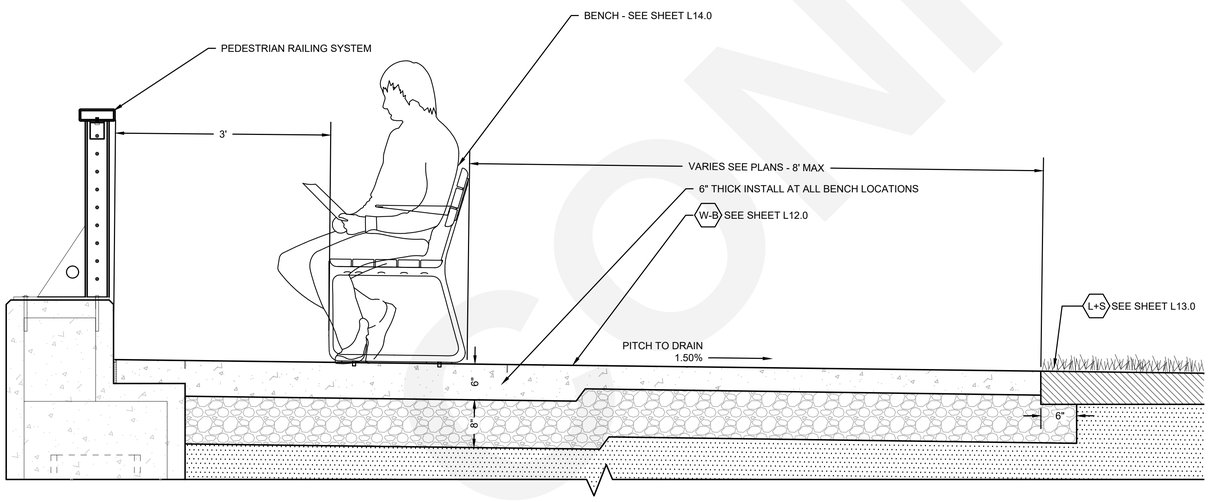
BENCH MODULE 1 - SINGLE

SCALE: $\frac{1}{4}$" = 1' - 0"



BENCH MODULE 2 - DOUBLE

SCALE: $\frac{1}{4}$" = 1' - 0"



BENCH MODULE (TYP.) B-B'

SCALE: 1" = 1' - 0"

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FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

SITE SECTIONS - 2

NO.	REVISIONS	DATE

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DESIGNED BY:	AG
CHECKED BY:	AG
ISSUE DATE:	5/6/2021
BETA JOB NO.:	7171

SCALE

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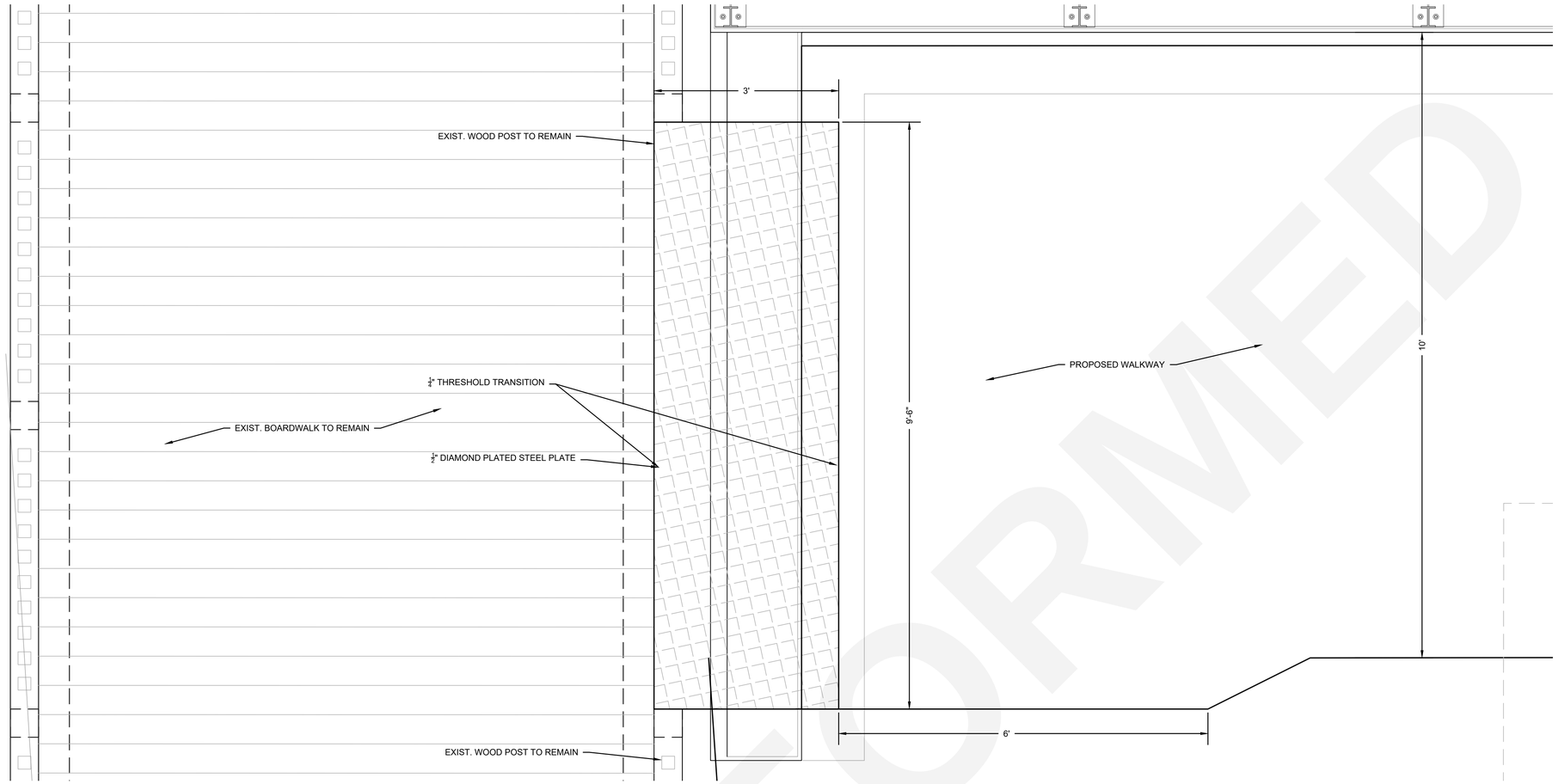
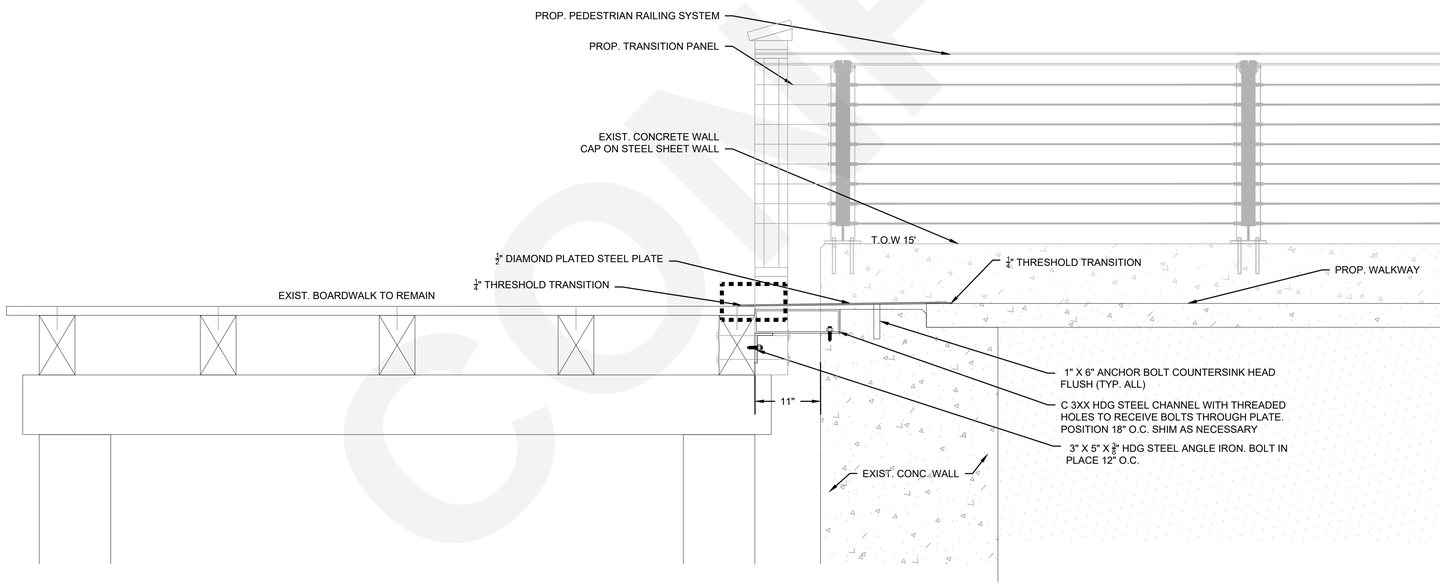


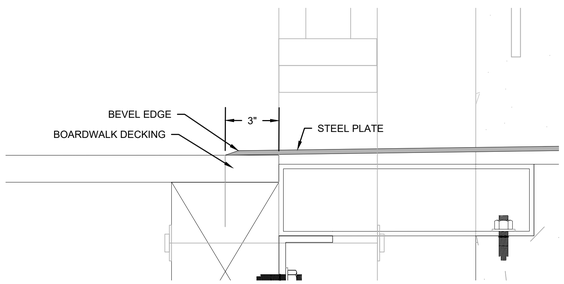
WALKWAY TRANSITION AT BOARDWALK - PLAN

SCALE: 1" = 1' - 0"



WALKWAY TRANSITION AT BOARDWALK - SECTION

SCALE: 1" = 1' - 0"



THRESHOLD TRANSITION (TYP. BOTH SIDES)

SCALE: 3" = 1' - 0"

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FALL RIVER
CITY PIER
SITE IMPROVEMENTS

Fall River, MA

TITLE

SITE SECTIONS - 3

NO.	REVISIONS	DATE

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DESIGNED BY:	AG
CHECKED BY:	AG
ISSUE DATE:	
BETA JOB NO.:	7171

SCALE

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L9.2

5/5/2021 11:58 AM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\LA SECTIONS.DWG (BETA STB BW.STB)

PROPOSED DRAINAGE STRUCTURES

STRUCTURE ID	PROP. RIM ELEV.	PROP. INV. OUT	NOTES
GI-1	10.8	8"Ø - 8.0	8" DI - SLOPE = .010 FT/FT
GI-2	10.8	8"Ø - 8.0	8" DI - SLOPE = .010 FT/FT
AD-1	10.62	6"Ø - 7.7	6" HDPE

EXISTING CATCH BASIN SCHEDULE

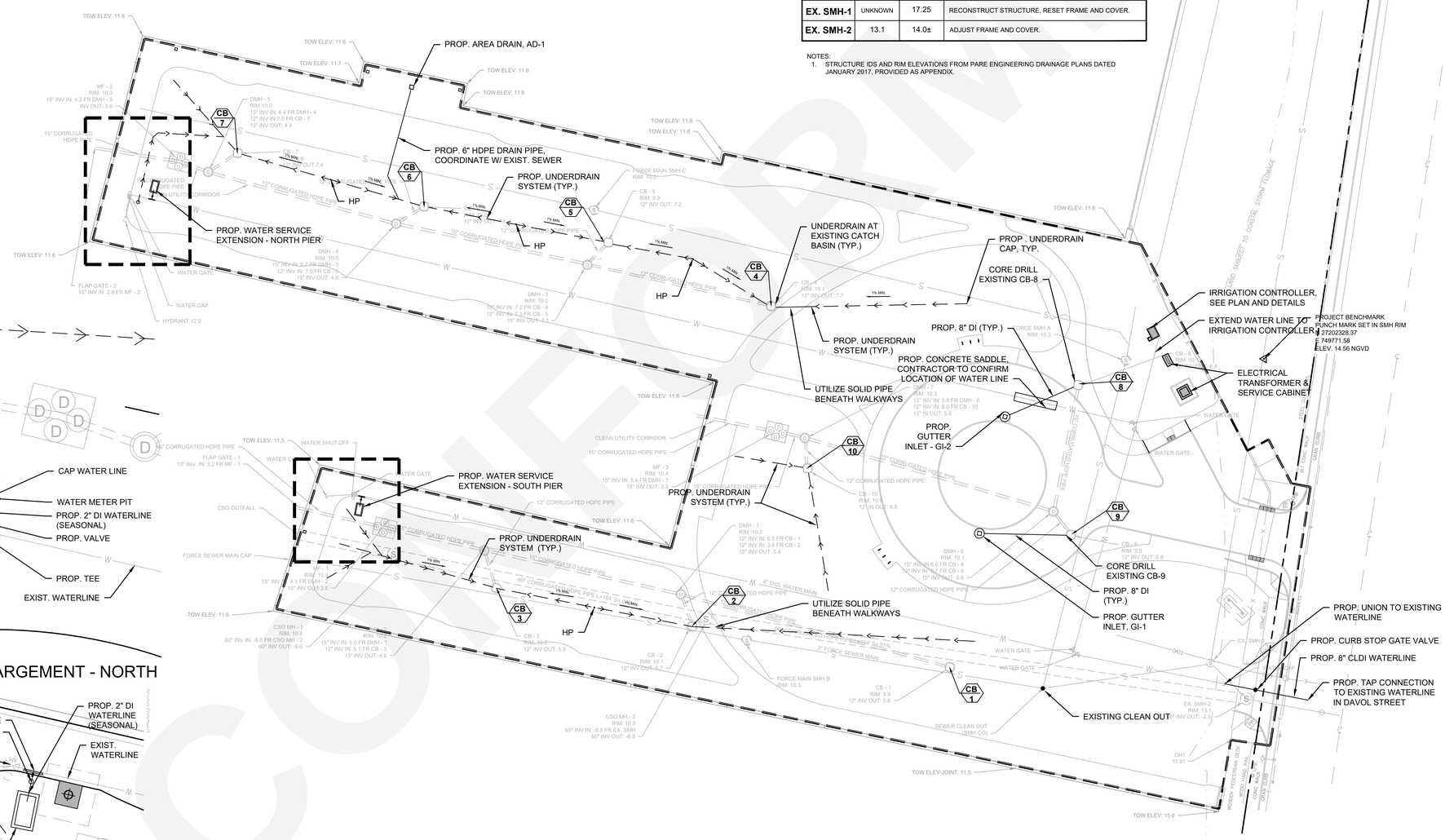
STRUCTURE ID	EXIST. RIM ELEV.	PROP. RIM ELEV.	PROPOSED MODIFICATIONS
CB-1	9.9	11.0	RECONSTRUCT STRUCTURE, RESET FRAME AND GRATE.
CB-2	10.1	10.70	CORE DRILL FOR UNDERDRAIN, ADJUST FRAME, AND GRATE.
CB-3	10.0	---	CORE DRILL FOR UNDERDRAIN AND GRATE.
CB-4	10.1	10.70	CORE DRILL FOR UNDERDRAIN, ADJUST FRAME AND GRATE.
CB-5	9.9	---	CORE DRILL FOR UNDERDRAIN AND GRATE.
CB-6	10.0	---	CORE DRILL FOR UNDERDRAIN AND GRATE.
CB-7	9.9	---	CORE DRILL FOR UNDERDRAIN AND GRATE.
CB-8	10.1	11.95	CORE DRILL FOR 8" DI (INV=8.61), RECONSTRUCT STRUCTURE, RESET FRAME AND REPLACE WITH SOLID COVER.
CB-9	9.9	11.9	CORE DRILL FOR 8" DI (INV.=8.00), RECONSTRUCT STRUCTURE, RESET FRAME AND REPLACE WITH SOLID COVER.
CB-10	10.0	11.0	CORE DRILL FOR UNDERDRAIN, RECONSTRUCT STRUCTURE, RESET FRAME, AND REPLACE GRATE.

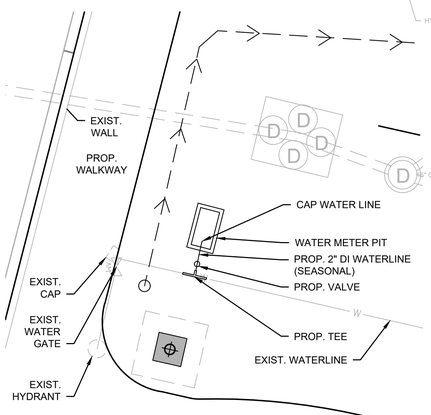
NOTES:
1. STRUCTURE ID NUMBER AND RIM ELEVATIONS FROM PARE ENGINEERING DRAINAGE PLANS DATED JANUARY 2017.

EXISTING MANHOLE SCHEDULE

STRUCTURE ID	EXIST. RIM ELEV.	PROP. RIM ELEV.	PROPOSED MODIFICATIONS
DMH-1	10.2	10.65	ADJUST FRAME AND COVER.
DMH-2	10.2	10.35	ADJUST FRAME AND COVER.
DMH-3	10.0	10.08	ADJUST FRAME AND COVER.
DMH-4	10.0	10.2	ADJUST FRAME AND COVER.
DMH-5	10.0	10.15	ADJUST FRAME AND COVER.
DMH-6	10.1	11.85	RECONSTRUCT STRUCTURE, ADJUST FRAME AND COVER.
DMH-7	10.3	11.00	ADJUST FRAME AND COVER.
CSO MH-1	10.4		NO ACTION REQUIRED.
CSO MH-2	10.0	10.75	ADJUST FRAME AND COVER.
MF-1	10.3	10.47±	ADJUST ALL FOUR FRAMES AND COVERS.
MF-2	10.3	10.35±	ADJUST ALL FOUR FRAMES AND COVERS.
MF-3	10.4	10.8±	ADJUST ALL FOUR FRAMES AND COVERS.
SMH A	10.3	16.1	RECONSTRUCT STRUCTURE, RESET FRAME AND COVER.
SMH B	10.3	10.75	ADJUST FRAME AND COVER.
SMH C	10.0	10.2	ADJUST FRAME AND COVER.
SMH CO	10.0	12.0	REMOVE AND RESET BOX AND EXTEND CLEANOUT.
EX. SMH-1	UNKNOWN	17.25	RECONSTRUCT STRUCTURE, RESET FRAME AND COVER.
EX. SMH-2	13.1	14.0±	ADJUST FRAME AND COVER.

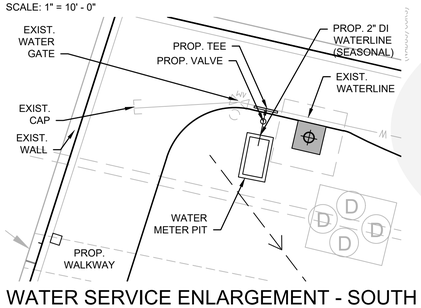
NOTES:
1. STRUCTURE IDS AND RIM ELEVATIONS FROM PARE ENGINEERING DRAINAGE PLANS DATED JANUARY 2017, PROVIDED AS APPENDIX.





WATER SERVICE ENLARGEMENT - NORTH

SCALE: 1" = 10' - 0"



WATER SERVICE ENLARGEMENT - SOUTH

SCALE: 1" = 10' - 0"

CONFORMED

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REGISTERED PROFESSIONAL

COMMONWEALTH OF MASSACHUSETTS
WILLIAM P. McGRATH
CIVIL
No. 33716
REGISTERED PROFESSIONAL ENGINEER

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

DRAINAGE AND UTILITIES PLAN

NO.	REVISIONS	DATE
1	ADDENDUM NO. 4	6/9/21

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	AG
ISSUE DATE:	5/6/2021
BETA JOB NO.:	7171

SCALE

HOR. SCALE IN FEET: 1"=30"

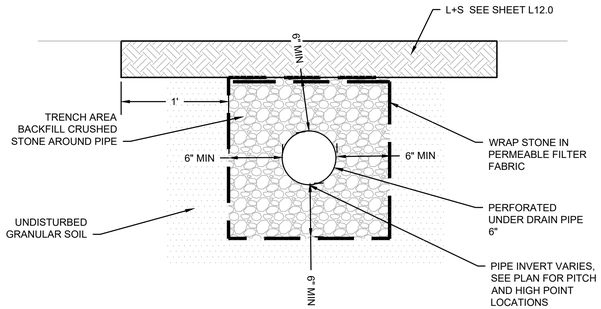
30 0 30 60

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.

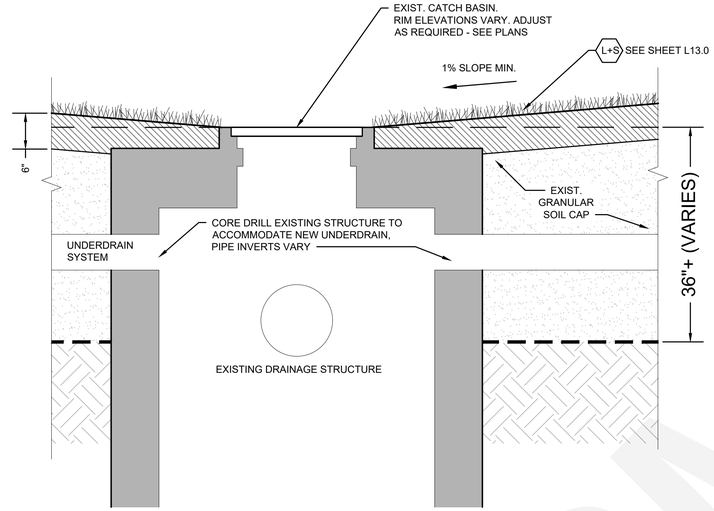
C1.0

6/8/2021 5:04 PM G:\PLANNING LANDSCAPE7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\ADDENDA NO. 4\C1.0_DRAINAGE + UTILITIES PLAN.DWG (BETA STB BW.STB)



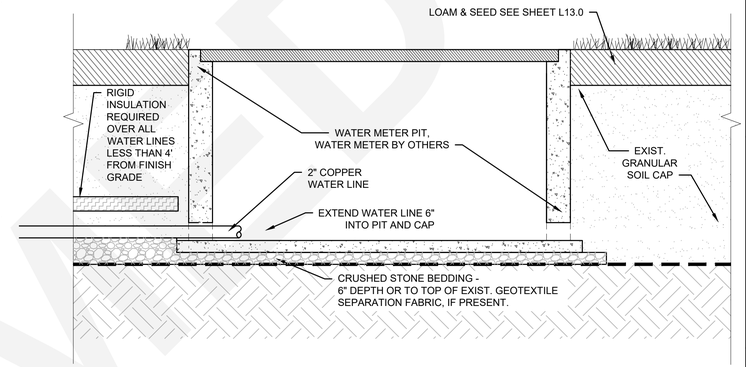
TYPICAL SECTION - UNDER DRAIN SYSTEM

SCALE: 1 1/2" = 1' - 0"



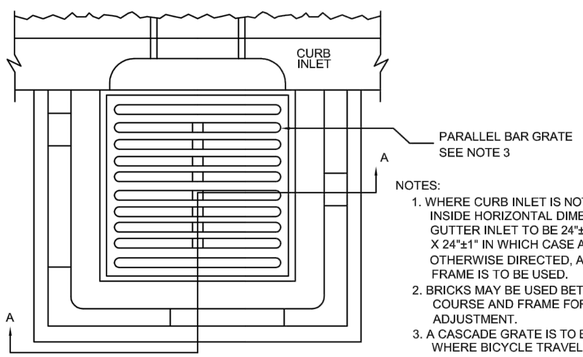
UNDERDRAIN AT EXIST. CATCH BASIN

SCALE: 1" = 1'-0"



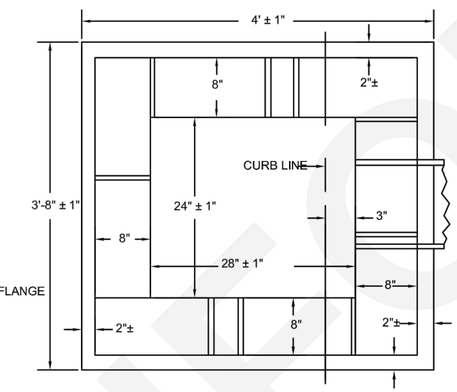
WATER METER PIT

SCALE: 1" = 1'-0"

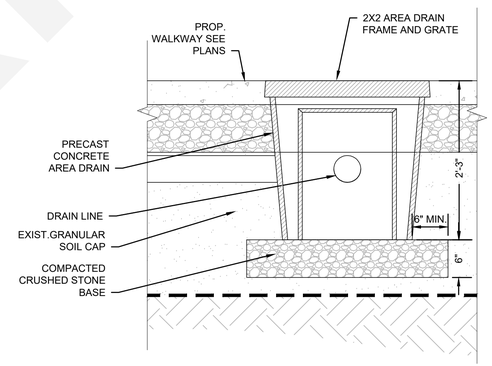


NOTES:

1. WHERE CURB INLET IS NOT USED THE INSIDE HORIZONTAL DIMENSIONS OF GUTTER INLET TO BE 24"±1" X 24"±1" IN WHICH CASE AND UNLESS OTHERWISE DIRECTED, A STANDARD 4-FLANGE FRAME IS TO BE USED.
2. BRICKS MAY BE USED BETWEEN TOP COURSE AND FRAME FOR GRADE ADJUSTMENT.
3. A CASCADE GRATE IS TO BE USED WHERE BICYCLE TRAVEL IS ALLOWED.
4. FOR DESCRIPTION, MATERIALS AND CONSTRUCTION METHODS, SEE STANDARD SPECIFICATIONS.

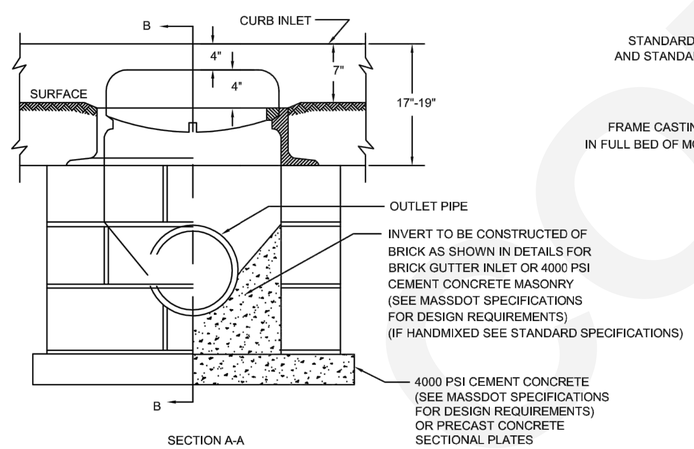


SECTION C-C

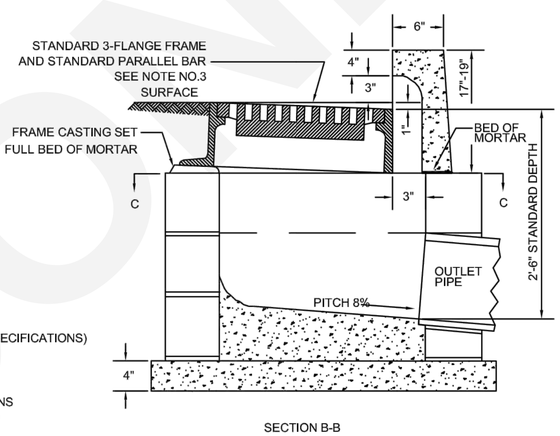


AREA DRAIN

SCALE: 1" = 1'-0"



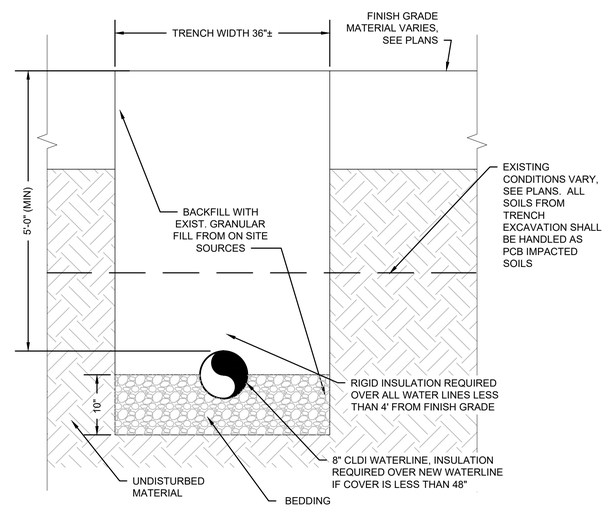
SECTION A-A



SECTION B-B

GUTTER INLET

SCALE: NTS



WATERLINE TRENCH

SCALE: 1" = 1'-0"

CONFORMED

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REGISTERED PROFESSIONAL

COMMONWEALTH OF MASSACHUSETTS
WILLIAM P McGRATH
CIVIL
No. 33716
REGISTERED PROFESSIONAL ENGINEER

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

DRAINAGE DETAILS

NO.	REVISIONS	DATE
1	ADDENDUM NO. 4	6/9/21

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	AG
ISSUE DATE:	5/6/2021
BETA JOB NO.:	7171

SCALE

AS SHOWN

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

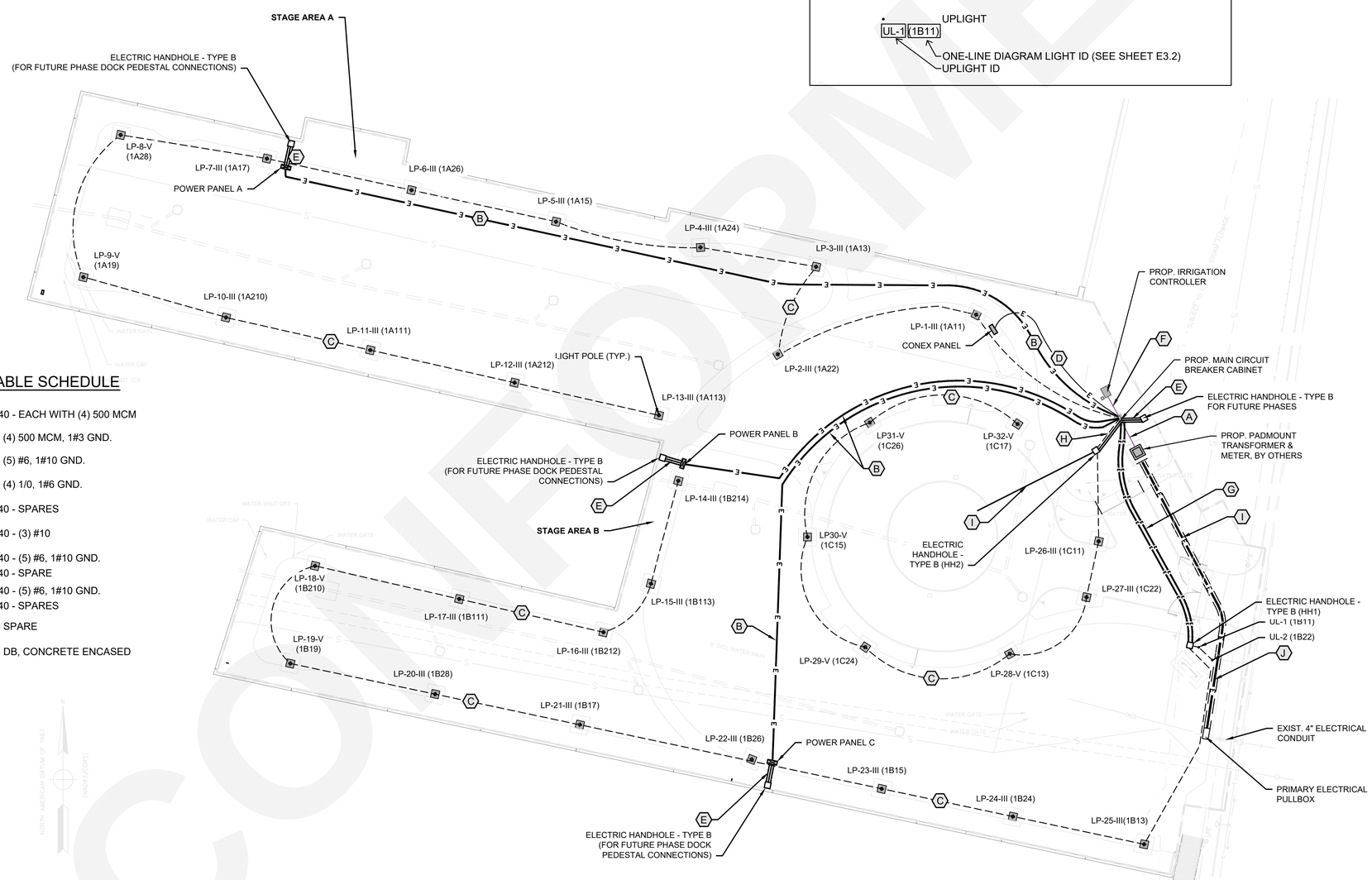
SHEET NO.

C2.0

6/9/2021 11:43 AM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\ADDENDA NO. 4\C2.0_DRAINAGE DETAILS.DWG (BETA STB BW.STB)

LEGEND

- ENCLOSURE / POWER PANEL
- HANDHOLE
- (A) CONDUIT & CABLE, SEE ONE-LINE DIAGRAM, SHEET E3.2
- LIGHT POLE
  - LP-1-III (1A11)
  - ONE-LINE DIAGRAM LIGHT ID (SEE SHEET E3.2)
  - LIGHT DISTRIBUTION TYPE
  - LIGHT POLE ID
- UPLIGHT
  - UL-1 (1B11)
  - ONE-LINE DIAGRAM LIGHT ID (SEE SHEET E3.2)
  - UPLIGHT ID



CONDUIT & CABLE SCHEDULE

- (A) (2) 4"C, SCH 40 - EACH WITH (4) 500 MCM
- (B) 4"C, SCH 40 - (4) 500 MCM, 1#3 GND.
- (C) 2"C, SCH 40 - (5) #6, 1#10 GND.
- (D) 2"C, SCH 40 - (4) 1/0, 1#6 GND.
- (E) (3) 4"C, SCH 40 - SPARES
- (F) (1) 2"C, SCH 40 - (3) #10
- (G) (1) 4"C, SCH 40 - (5) #6, 1#10 GND.
  (1) 4"C, SCH 40 - SPARE
- (H) (1) 4"C, SCH 40 - (5) #6, 1#10 GND.
  (2) 4"C, SCH 40 - SPARES
- (I) 2"C, SCH 40 - SPARE
- (J) (2) 4"C, TYPE DB, CONCRETE ENCASED

CONFORMED

PREPARED BY

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SUBCONSULTANT

PROJECT

FALL RIVER
CITY PIER
SITE IMPROVEMENTS

Fall River, MA

TITLE

LIGHTING AND
ELECTRICAL PLAN

NO.	REVISIONS	DATE
1	ADDENDUM NO. 4	6/9/21

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	AG
ISSUE DATE:	5/6/2021
BETA JOB NO.:	7171

SCALE

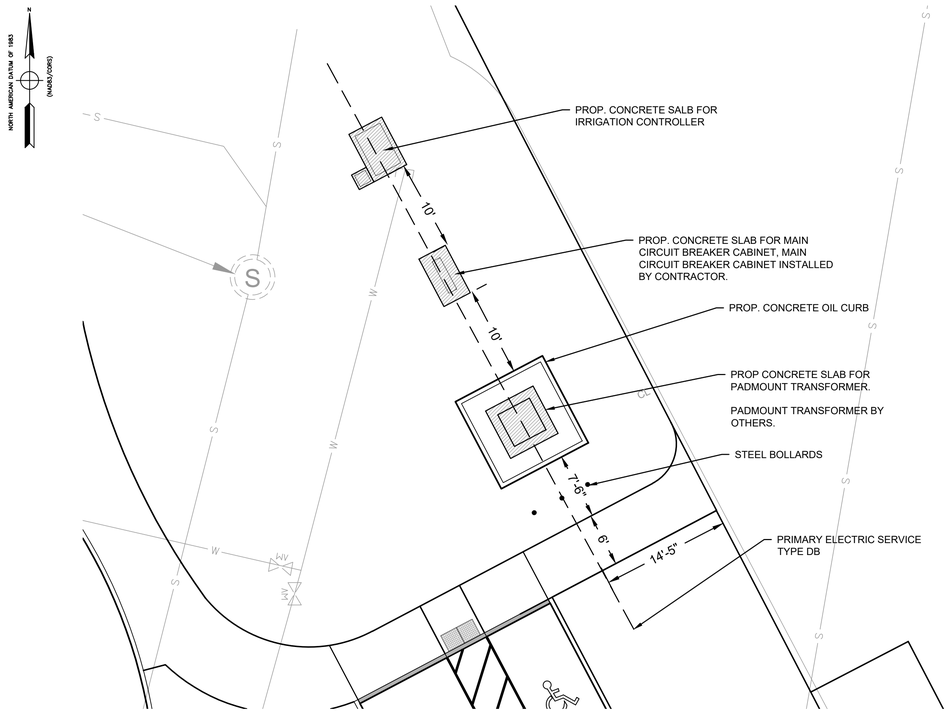
HOR. SCALE IN FEET: 1"=30'
30 0 30 60

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.

E1.0

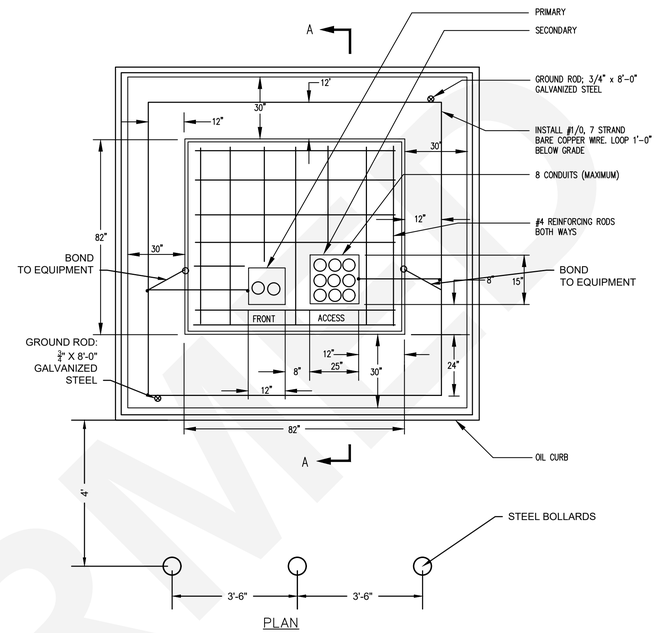
6/8/2021 4:48 PM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\ADDENDA NO. 4\E1.0_LIGHTING + ELECTRICAL PLAN.DWG (BETA STB BW.STB)



CITY PIER ELECTRICAL UTILITIES PLAN

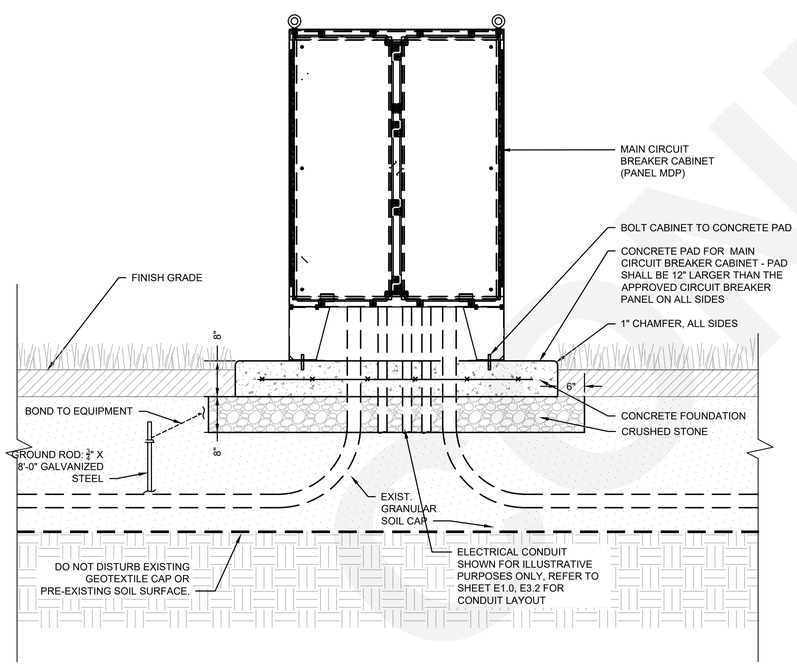
SCALE: 1" = 10' - 0"

NOTE: SEE SHEET E1.0 - LIGHTING & ELECTRICAL PLAN FOR CONDUIT LAYOUT.



CONCRETE PAD FOR PADMOUNT TRANSFORMER

SCALE: NTS (CONFORM TO POWER COMPANY STANDARDS)



MAIN CIRCUIT BREAKER

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

CONFORMED

PREPARED BY

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REGISTERED PROFESSIONAL

COMMONWEALTH OF MASSACHUSETTS
ROBERT W. McLAUGHLIN
ELECTRICAL
No. 34457
REGISTERED PROFESSIONAL ENGINEER

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

ELECTRICAL UTILITIES ENLARGEMENT

NO.	REVISIONS	DATE
1	ADDENDUM NO. 4	6/9/21

DRAWN BY: AKP/ALG

DESIGNED BY: AG

CHECKED BY: AG

ISSUE DATE: 5/6/2021

BETA JOB NO.: 7171

SCALE

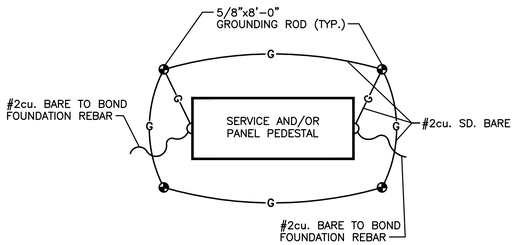
AS SHOWN

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.

E2.0

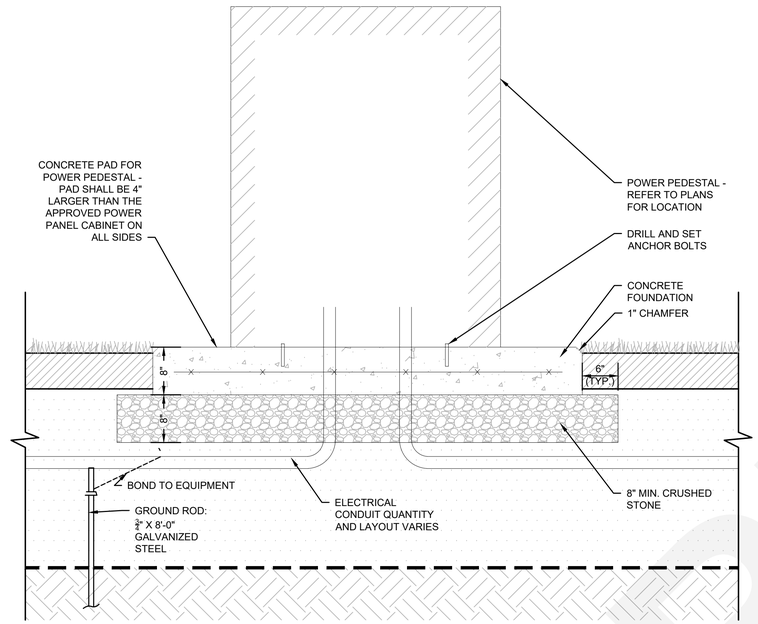
6/8/2021 4:50 PM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\ADDENDA NO. 4\LA SECTIONS - ADDENDA NO 2.DWG (BETA STB BW.STB)



NOTES:
1. SHALL BE IN ACCORDANCE WITH LATEST NATIONAL ELECTRICAL CODE.
   #2cu. BARE GROUND WIRE 1'-0" BELOW GRADE. ALLOW 3'-0" SLACK LEADS TO BOND
2. AT GROUNDING LUGS IN CABINET.
   GROUND RODS MUST BE SPACED A MINIMUM OF 6'-0" FROM EACH OTHER.
3.

SERVICE PEDESTAL - GROUNDING DETAIL

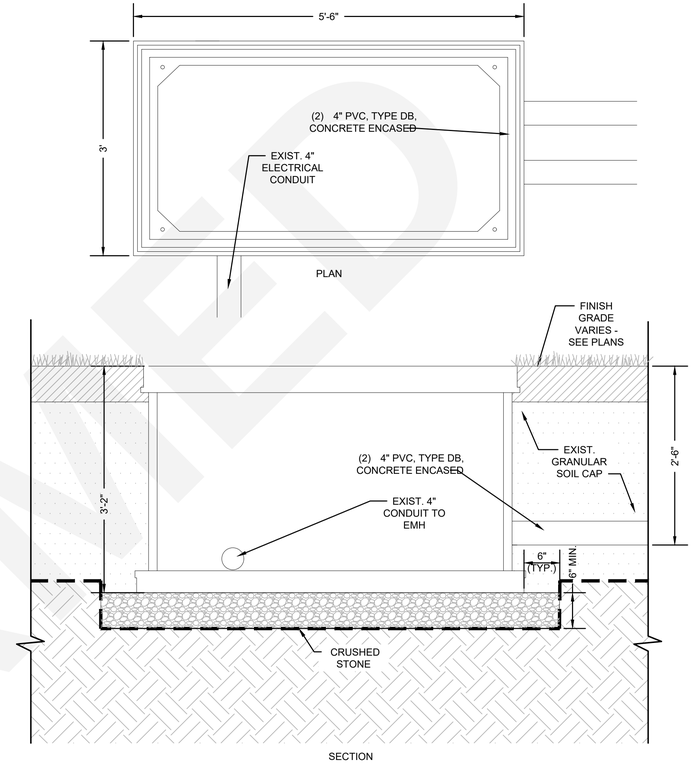
SCALE: NTS



NOTES:
1. CONCRETE FOUNDATIONS SHALL BE A MINIMUM OF 4" LARGE THAN THE FOOTPRINT OF THE ENCLOSURE MEASURED FROM EACH FACE.
2. FOUNDATIONS SHALL HAVE WELDED WIRE FABRIC
3. FOUNDATIONS MAY BE PRECAST WITH CONDUIT BOND OUT
4. SIZE AND NUMBER OF ELECTRICAL CONDUITS VARY
5. REFER TO PLANS AND CONDUIT SCHEDULE

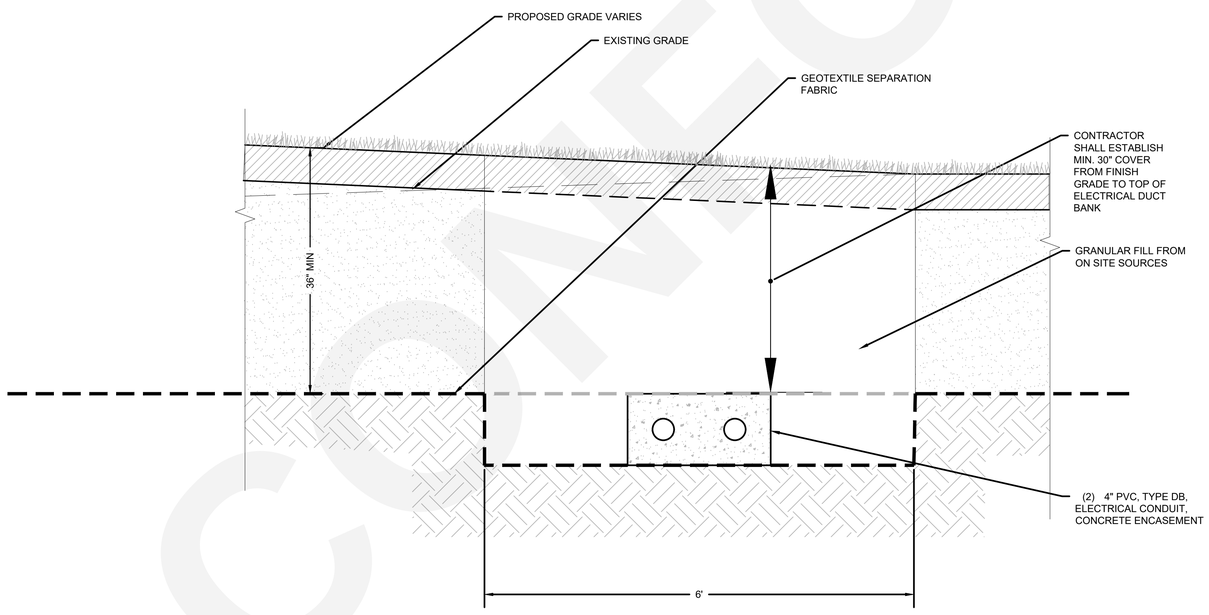
POWER PEDESTAL CONCRETE FOUNDATION

SCALE: 1" = 1'-0"



PRIMARY ELECTRIC PULLBOX

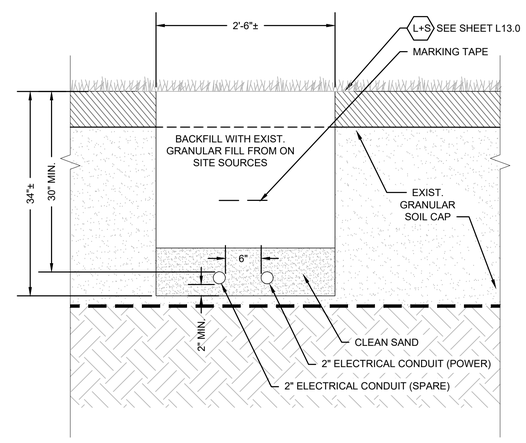
SCALE: 1" = 1'-0"



NOTE: CONTRACTOR SHALL ESTABLISH MIN. 30" COVER OVER ELECTRICAL DUCT BANK FROM FINISH GRADE. THIS MAY REQUIRE EXCAVATION OF PCB IMPACTED SOILS. DEPTHS OF EXCAVATION VARY:

4" PVC, TYPE DB, ELECTRICAL CONDUIT, CONCRETE ENCASEMENT TRENCH

SCALE: 1" = 1'-0"



ELECTRICAL CONDUIT TRENCH

SCALE: 1" = 1'-0"

PREPARED BY

BETA
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REGISTERED PROFESSIONAL

COMMONWEALTH OF MASSACHUSETTS
ROBERT M. McLAUGHLIN
ELECTRICAL
No. 34457
REGISTERED
PROFESSIONAL ENGINEER

SUBCONSULTANT

PROJECT

FALL RIVER
CITY PIER
SITE IMPROVEMENTS

Fall River, MA

TITLE

LIGHTING AND
ELECTRICAL DETAILS - 1

NO.	REVISIONS	DATE
1	ADDENDUM NO. 4	6/9/21

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	AG
ISSUE DATE:	5/6/2021
BETA JOB NO.:	7171

SCALE

AS SHOWN

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

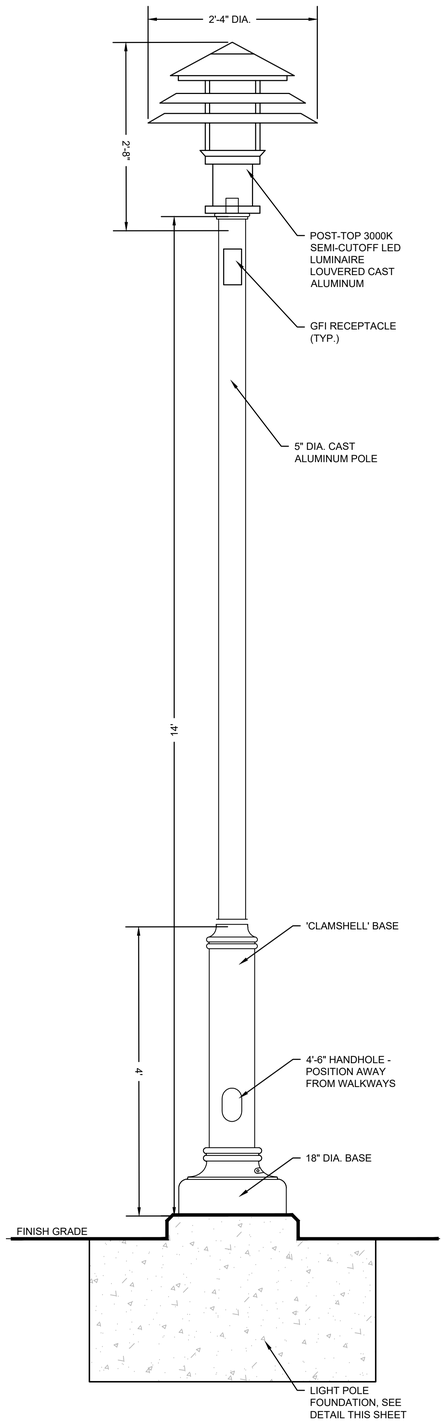
SHEET NO.

E3.0

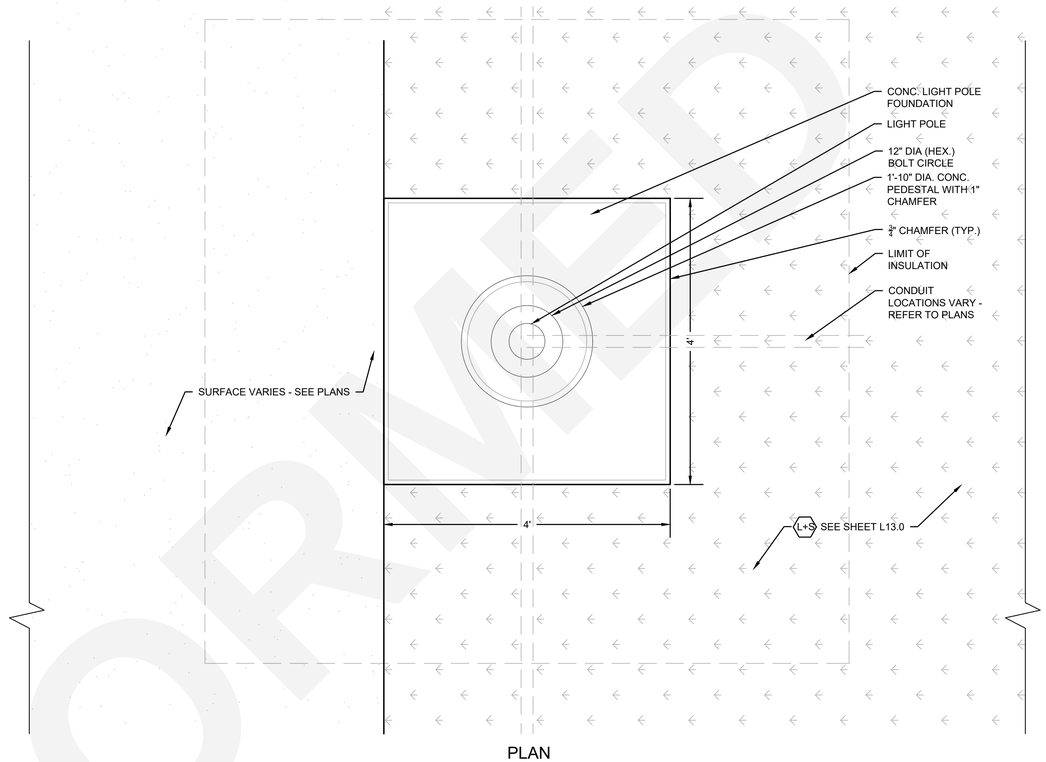
CONFORMED

6/9/2021 11:57 AM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER_MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\ADDENDA NO. 4\E3.0 - E3.2_ELECTRICAL DETAILS.DWG (BETA STB BW.STB)

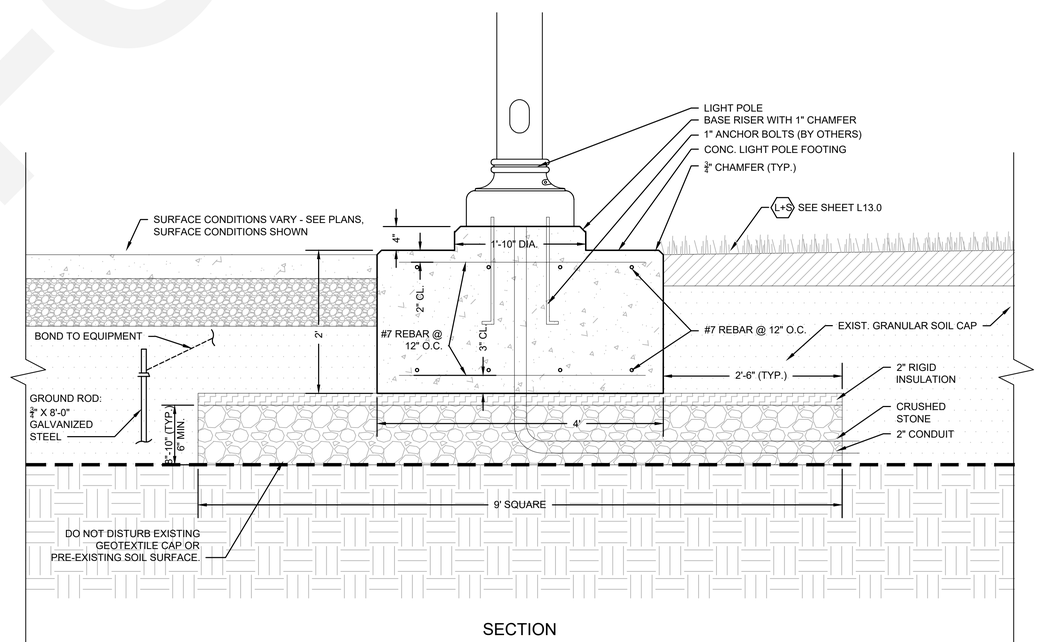
NOTES:
1. LIGHT POLE AND ANCHORAGE TO FOOTING TO BE DESIGNED BY OTHERS.
2. LIGHT POLE AND ANCHORAGE TO BE DESIGNED BY A PROFESSIONAL ENGINEER REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS. DESIGN SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
3. FOOTING SIZE ASSUMES LIGHT POLE BASE REACTIONS OF M=1.90 K-FT AND V=250 LB. IF ACTUAL BASE REACTIONS ARE GREATER, THE FOOTING SIZE WILL NEED TO BE INCREASED. IT IS THE CONTRACTORS RESPONSIBILITY TO OBTAIN CALCULATIONS STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS FOR FOOTING RE-DESIGN. CALCULATIONS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
4. CONCRETE TO HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4000 PSI.
5. REINFORCING STEEL TO HAVE A MINIMUM YIELD STRENGTH OF Fy=60 KSI.



LIGHT POLE
SCALE: 1" = 1'-0"



PLAN



SECTION

LIGHT POLE FOUNDATION
SCALE: 1" = 1'-0"

NOTE: COORDINATE LIGHT POLE ANCHORAGE WITH MANUFACTURER TO ACCOMMODATE SHALLOW FOOTING DESIGN

CONFORMED

PREPARED BY

BETA
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REGISTERED PROFESSIONAL

COMMONWEALTH OF MASSACHUSETTS
ROBERT W. McLAUGHLIN
ELECTRICAL
No. 34457
REGISTERED PROFESSIONAL ENGINEER

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

LIGHTING AND ELECTRICAL DETAILS - 2

NO.	REVISIONS	DATE
1	ADDENDUM NO. 4	6/9/21

DRAWN BY: AKP/ALG
DESIGNED BY: AG
CHECKED BY: AG
ISSUE DATE: 5/6/2021
BETA JOB NO.: 7171

SCALE

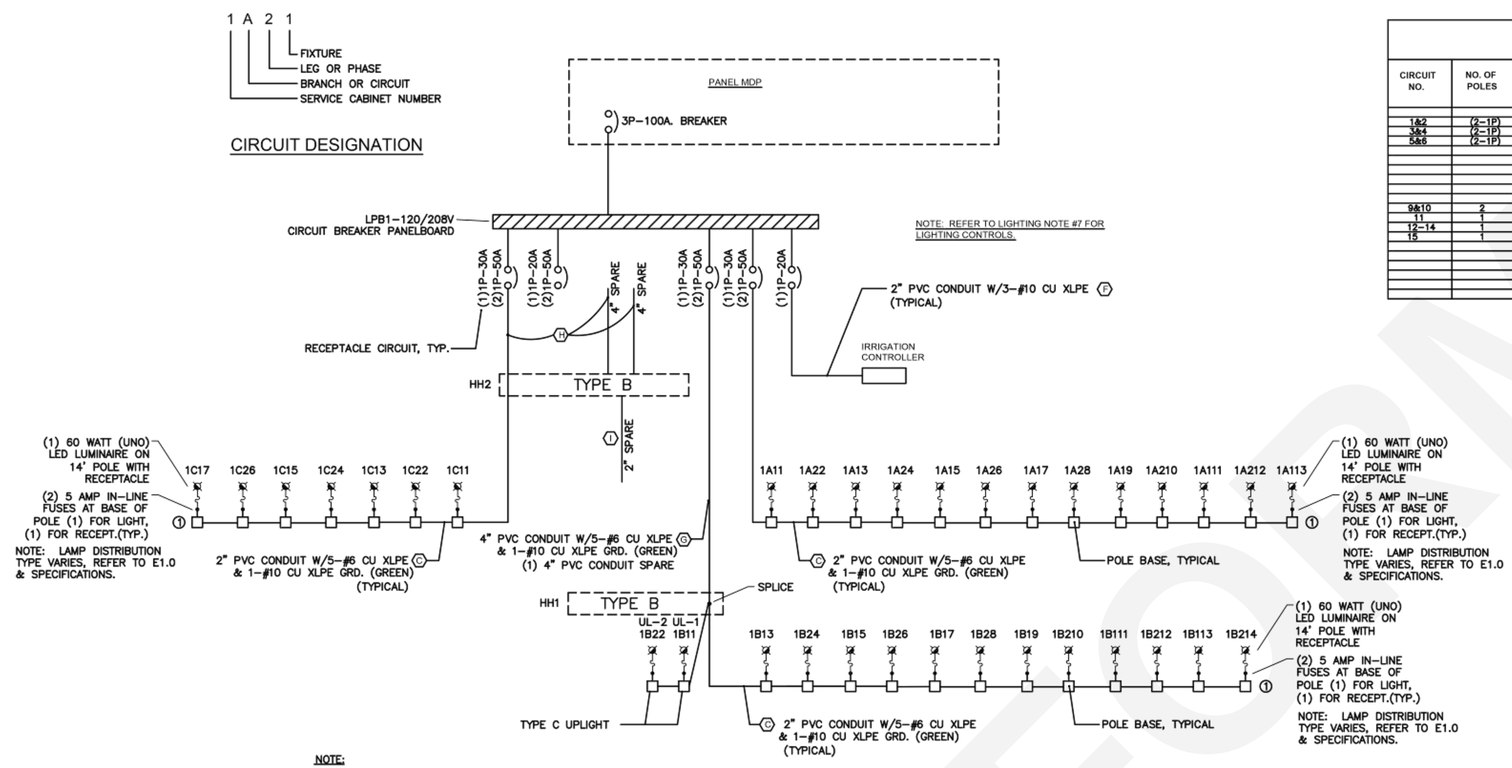
AS SHOWN

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.

E3.1

6/8/2021 4:52 PM G:\PLANNING LANDSCAPE7000S\7171 - FRRA CITY PIER - FALL RIVER. MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\ADDENDA NO. 4\E3.0 - E3.2_ELECTRICAL DETAILS.DWG (BETA STB BW.STB)

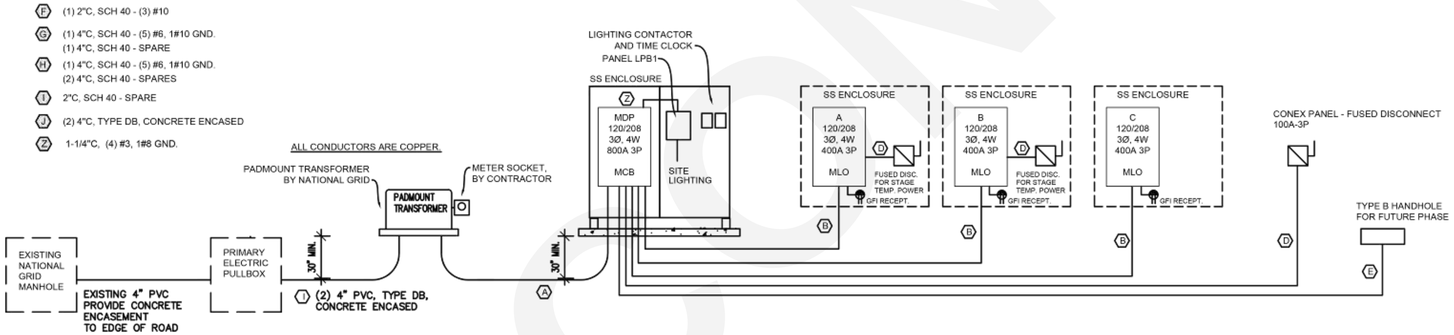


NOTE:
① CONTRACTOR TO LIVE CAP UNUSED PHASE CONDUCTOR AT LAST POLE IN EACH CIRCUIT.

ONE LINE WIRING DIAGRAM
LIGHTING #1
NOT TO SCALE

CONDUIT & CABLE SCHEDULE

- (A) (2) 4"C, SCH 40 - EACH WITH (4) 500 MCM
- (B) 4"C, SCH 40 - (4) 500 MCM, 1#3 GND.
- (C) 2"C, SCH 40 - (5) #6, 1#10 GND.
- (D) 2"C, SCH 40 - (4) 1/0, 1#6 GND.
- (E) (3) 4"C, SCH 40 - SPARES
- (F) (1) 2"C, SCH 40 - (3) #10
- (G) (1) 4"C, SCH 40 - (5) #6, 1#10 GND. (1) 4"C, SCH 40 - SPARE
- (H) (1) 4"C, SCH 40 - (5) #6, 1#10 GND. (2) 4"C, SCH 40 - SPARES
- (I) 2"C, SCH 40 - SPARE
- (J) (2) 4"C, TYPE DB, CONCRETE ENCASED
- (Z) 1-1/4"C, (4) #3, 1#8 GND.



POWER ONE LINE DIAGRAM
NOT TO SCALE

PANEL SCHEDULE

CIRCUIT NO.	NO. OF POLES	TRIPS SETTINGS	DESCRIPTION PANEL LPB1	K.W.	AMPS L1	AMPS L2	WIRE SIZE	REMARKS
			LIGHTING PANELBOARD 100 AMP – 3 PHASE 120/208 VOLTS–4 WIRE					
1&2	(2-1P)	50	BRANCH A	.8	3	3	#6	
3&4	(2-1P)	50	BRANCH B	.72	3	3	#6	
5&6	(2-1P)	50	BRANCH C	.42	2	2	#6	
			SUBTOTAL	2.0	8	8		
			MISC. LOADS					
9&10	2	20	HEATER	0.5	2.08	2.08	#12	INSIDE PANEL
11	1	20	DUPLEX OUTLET/100 WATT INC.	0.70	0	5.8	#12	INSIDE PANEL
12-14	1	30	RECEPTACLES MOUNTED ON POLE LIGHTS	4.8	20	20		
15	1	20	IRRIGATION CONTROLLER		4			
			SUBTOTAL	6.0	26.08	29.88		
			TOTAL	12.1	42.08	45.88		

PANEL SCHEDULE

PANEL NAME	CIRCUIT NUMBER	CIRCUIT BREAKER	CIRCUIT WIRE	CIRCUIT DUTY	REMARKS
MDP	1,3,5 2,4,6 7,9,11 8,10,12 13,15,17 18-30	400A-3P 400A-3P 400A-3P 100A-3P 100A-3P -	500 MCM 500 MCM 500 MCM #3 1/0 -	PANEL A PANEL B PANEL C PANEL LPB1 CONEX PANEL SPACE	800 AMPS, 120/208 VOLTS, 3 PHASE, 4 WIRE, WITH MAIN 800 AMP CIRCUIT BREAKER, 30 SPACES, SURFACE MOUNT, 22,000 AIC.
A,B	1,3,5 6-25* 26	100A-3P 90A-2P 20A-1P	1/0 - #12	TEMP. STAGE POWER FUTURE DOCK PEDESTALS RECEPTACLE	400 AMPS, 120/208 VOLTS, 3 PHASE, 4 WIRE, MLO, 42 SPACES, SURFACE MOUNT, 22,000 AIC. *10 CIRCUIT BREAKERS TOTAL
C	1-20* 21	90A-2P 20A-1P	- #12	FUTURE DOCK PEDESTALS RECEPTACLE	400 AMPS, 120/208 VOLTS, 3 PHASE, 4 WIRE, MLO, 42 SPACES, SURFACE MOUNT, 22,000 AIC. *10 CIRCUIT BREAKERS TOTAL

ABBREV.	DESCRIPTION
A	AMPERES
A.F.F.	ABOVE FINISH FLOOR
AHJ	AUTHORITY HAVING JURISDICTION
AIC	AMPS INTERRUPTING CAPACITY
ARCH	ARCHITECTURAL
ATS	AUTOMATIC TRANSFER SWITCH
C	CONDUIT
C.B.	CIRCUIT BREAKER
CEF	CEILING EXHAUST FAN
CKT	CIRCUIT
CTR	COUNTER
CUH	CABINET UNIT HEATER
E.C.	ELECTRICAL CONTRACTOR
EMT	ELECTRICAL METALLIC TUBING
ETR	EXISTING TO REMAIN
G.C.	GENERAL CONTRACTOR
GFI	GROUND FAULT INTERRUPTING
GND	GROUND
M.C.	MECHANICAL CONTRACTOR
M/C	METAL CLAD CABLE
MCB	MAIN CIRCUIT BREAKER
MLO	MAIN LUGS ONLY
J	JUNCTION BOX
P	POLE
REF	ROOF EXHAUST FAN
REM	REMOVE
REP	REPLACE
RGS	RIGID GALVANIZED STEEL
RN	RELOCATED IN NEW POSITION
RR	REMOVE AND RELOCATE
RTU	ROOF TOP UNIT
SS	STAINLESS STEEL
UNO	UNLESS NOTED OTHERWISE
V	VOLTS
WP	WEATHERPROOF
PH	PHASE

GENERAL ELECTRICAL NOTES

1. ALL WORK SHALL CONFORM TO THE LATEST REVISIONS OF THE NATIONAL ELECTRICAL CODE, THE STATE OF MASSACHUSETTS AND MADOT STANDARDS, AND THE REQUIREMENTS OF THE CITY OF FALL RIVER.
2. ALL WORK TO BE COORDINATED WITH THE LOCAL PUBLIC UTILITIES. NO CONSTRUCTION SHALL COMMENCE UNTIL THE CONTRACTOR HAS NOTIFIED "DIG-SAFE" AND ALL UTILITIES HAVE BEEN PROPERLY IDENTIFIED. COORDINATE WORK WITH NATIONAL GRID THROUGH THOMAS BELLROSE.
3. LOCATION AND DEPTH OF EXISTING UTILITIES ARE APPROXIMATE AND HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. CONTRACTOR SHALL CHECK AND VERIFY LOCATIONS OF ALL EXISTING UTILITIES BOTH UNDERGROUND AND OVERHEAD. ANY DAMAGE TO THESE UTILITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
4. ALL LIGHTING CONDUITS TO BE 2" PVC SCHEDULE 40, AND INSTALLED AT A DEPTH OF 18" BELOW GRADE FOR DIRECT BURIED INSTALLATIONS. INSTALL PULLING NYLON ROPE ON ALL SPARE CONDUITS FOR FUTURE USE. SERVICE CONDUIT TO RISER POLE SHALL BE 2" RIGID STEEL. CONDUIT FROM HANDHOLE TO POLE FOUNDATION SHALL BE 2" RIGID STEEL CONDUIT.
5. PROVIDE ENOUGH SLACK (CABLE) AT ALL HANDHOLES AND PULLBOXES TO ALLOW FOR SPLICING AND REPAIRS TO BE MADE.
6. IDENTIFY AND TAG ALL CIRCUITS AT EACH HANDHOLE. PROVIDE NUMBERING TAGS ACCORDING TO CIRCUIT DESIGNATION AND AS SHOWN ON PLANS.
7. PROVIDE AN 8 POLE LIGHTING CONTACTOR, AND 7 DAY PROGRAMMABLE TIME CLOCK, INTERMATIC #ET8015C WITH PHOTOCELL, OR APPROVED EQUAL.
8. PROVIDE COMMON NEUTRALS FOR ALL LIGHTING CIRCUITS. PROVIDE SEPARATE NEUTRALS FOR ALL RECEPTACLE CIRCUITS.

CONFORMED

PREPARED BY

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REGISTERED PROFESSIONAL

COMMONWEALTH OF MASSACHUSETTS
ROBERT W. GRAHAM
ELECTRICAL
No. 34457
REGISTERED PROFESSIONAL ENGINEER
5/6/21

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

LIGHTING AND ELECTRICAL DETAILS - 3

NO.	REVISIONS	DATE
1	ADDENDUM NO. 4	6/9/21

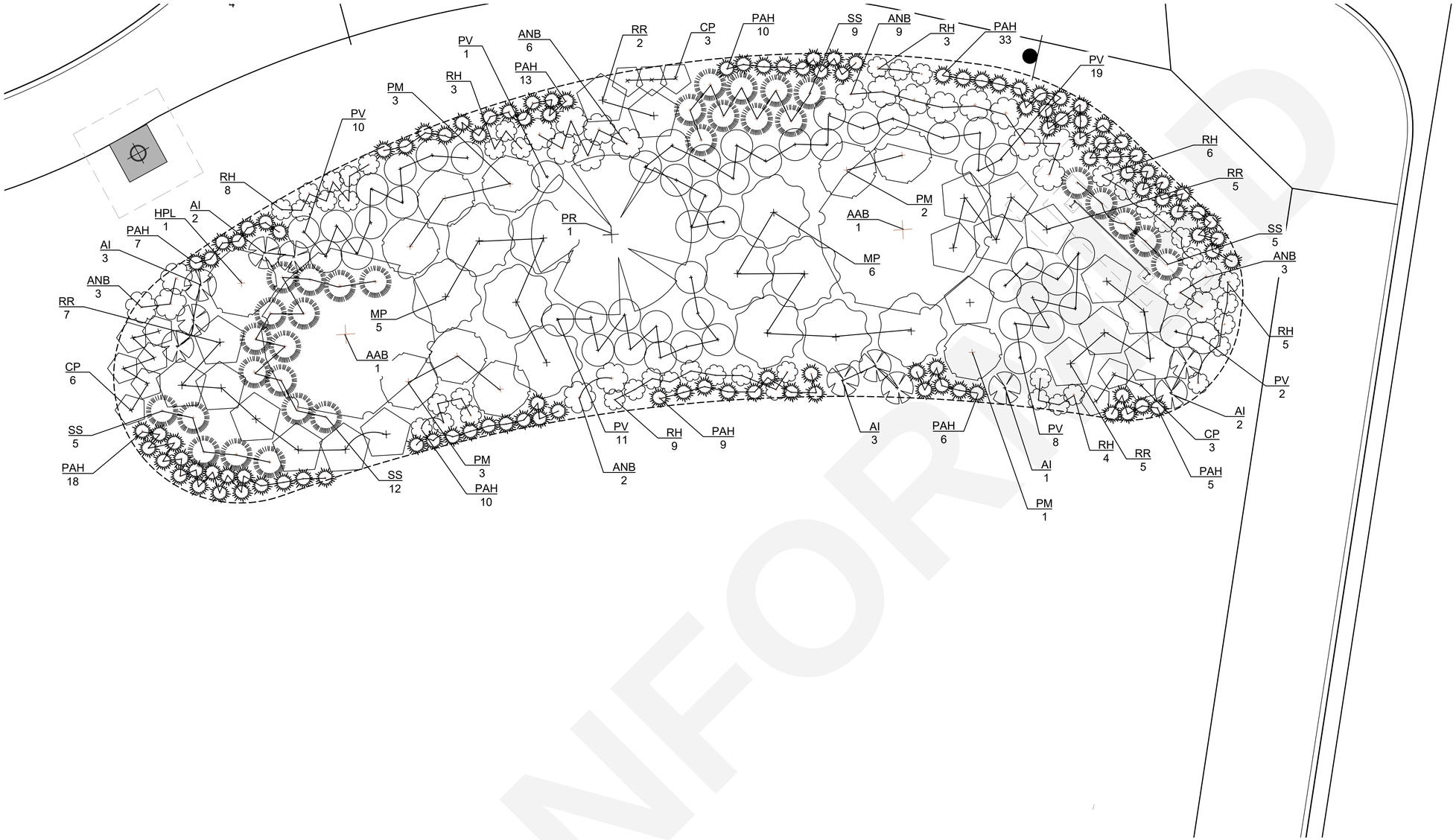
DRAWN BY: AKP/ALG
DESIGNED BY: AG
CHECKED BY: AG
ISSUE DATE: 5/6/2021
BETA JOB NO.: 7171

SCALE
AS SHOWN

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.
E3.2

6/9/2021 11:43 AM G:\PLANNING\LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\ADDENDA NO. A\E3.0 - E3.2_ELECTRICAL DETAILS.DWG (BETA STB BW.STB)



SCALE: 1" = 5' - 0"

PLANT SCHEDULE

KEY	QTY.	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	SPACING
AAB	2	Amelanchier x grandiflora 'Autumn Brilliance'	Autumn Brilliance Serviceberry	8-10'	CLUMP	15' O.C.
AI	11	Asclepias incarnata	Pink Milkweed	#1	CONT.	3' O.C.
ANB	23	Aster novi-belgii	New York Aster	#1	CONT.	3' O.C.
CP	12	Comptonia peregrina	Sweetfern	#1	CONT.	18" O.C.
HPL	1	Hydrangea paniculata 'Lime Light'	Lime Light Panicle Hydrangea	#3	CONT.	6' O.C.
MP	11	Myrica pensylvanica	Bayberry	#3	CONT.	6' O.C.
PV	52	Panicum virgatum 'Dallas Blues'	Dallas Blues Switchgrass	#1	CONT.	3' O.C.
PAH	111	Pennisetum alopecuroides 'Hameln'	Hameln Dwarf Fountain Grass	#1	CONT.	2' O.C.
PR	1	Pinus rigida	Pitch Pine	6-7'	B&B	15' O.C.
PM	9	Prunus maritima	Beach Plum	#3	CONT.	4' O.C.
RR	19	Rosa rugosa - Pink	Pink Beach Rose	#3	CONT.	4' O.C.
RH	37	Rudbeckia hirta	Black eyed susan	#1	CONT.	18" O.C.
SS	31	Schizachyrium scoparium	Little Bluestem	#1	CONT.	18" O.C.

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REGISTERED PROFESSIONAL

MASSACHUSETTS
ALEX W. GALLE
5.5.21
NO. 1211
REGISTERED LANDSCAPE ARCHITECT

SUBCONSULTANT

PROJECT

FALL RIVER
CITY PIER
SITE IMPROVEMENTS

Fall River, MA

TITLE

PLANTING PLAN - 1

NO.	REVISIONS	DATE
1	ADDENDUM NO. 3	6/4/21

DRAWN BY: AKP/ALG

DESIGNED BY: AG

CHECKED BY: AG

ISSUE DATE: 5/6/2021

BETA JOB NO.: 7171

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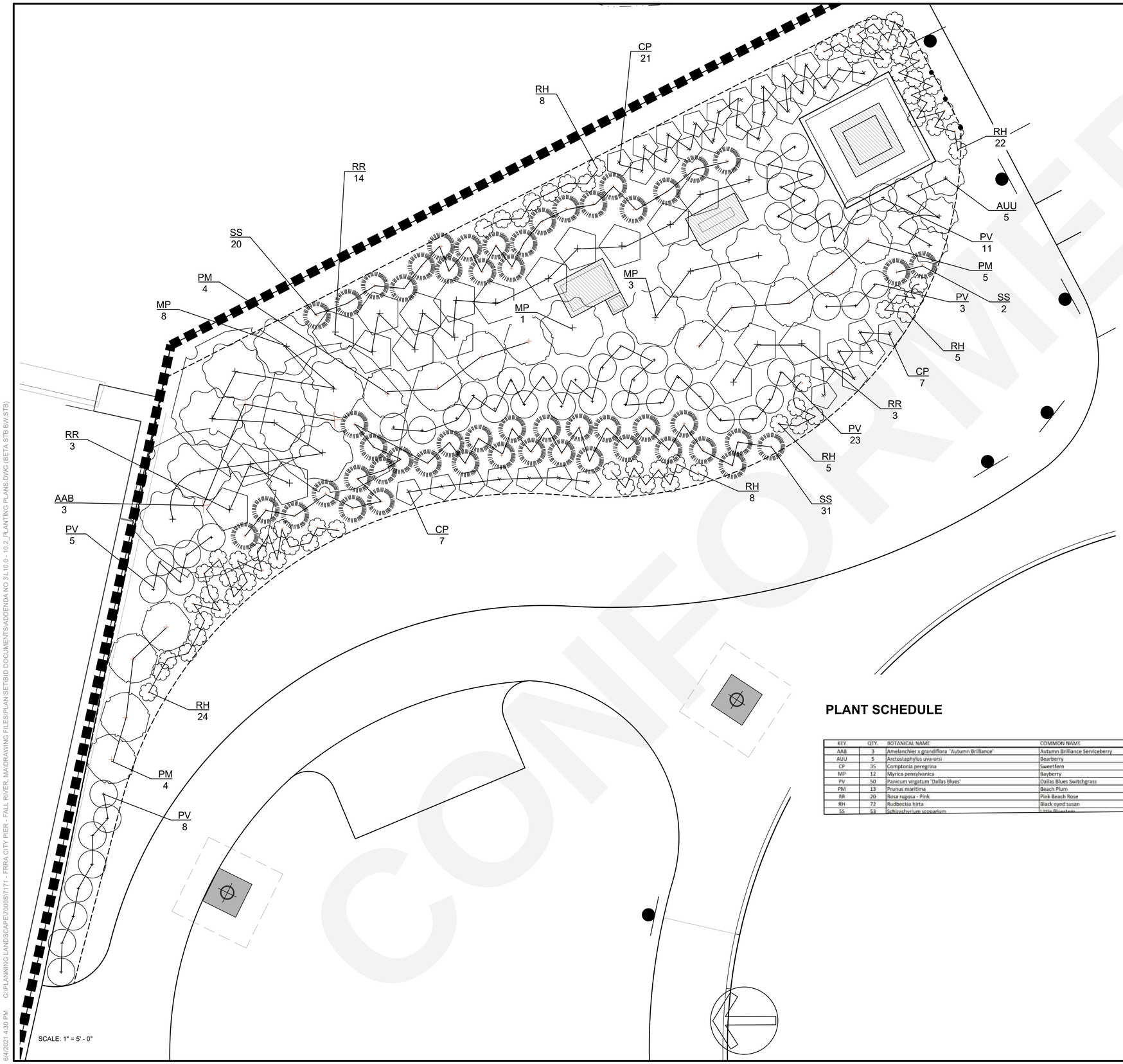
L10.0

6/4/2021 4:14 PM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\ADDENDA NO 3\L10.0 - 10.2_PLANTING PLANS.DWG (BETA STB BW.STB)



PLANT SCHEDULE

KEY	QTY.	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	SPACING
AAB	3	Amelanchier x grandiflora 'Autumn Brilliance'	Autumn Brilliance Serviceberry	8-10'	CLUMP	15' O.C.
AUU	5	Arctostaphylus uva-ursi	Bearberry	#1	CONT.	4' O.C.
CP	35	Comptonia peregrina	Sweetfern	#1	CONT.	18" O.C.
MP	12	Myrica pensylvanica	Bayberry	#3	CONT.	6' O.C.
PV	50	Panicum virgatum 'Dallas Blues'	Dallas Blues Switchgrass	#1	CONT.	3' O.C.
PM	13	Prunus maritima	Beach Plum	#3	CONT.	4' O.C.
RR	20	Rosa rugosa - Pink	Pink Beach Rose	#3	CONT.	4' O.C.
RH	72	Rudbeckia hirta	Black eyed susan	#1	CONT.	18" O.C.
SS	53	Schizachyrium scoparium	Little Bluestem	#1	CONT.	18" O.C.

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6/4/2021 4:30 PM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER. MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\ADDENDA NO 3\L10.0 - 10.2_PLANTING PLANS.DWG (BETA STB BW.STB)

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MASSACHUSETTS JACK W. GALLO REGISTERED LANDSCAPE ARCHITECT 5.5.21 NO. 1215

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

PLANTING PLAN - 2

NO.	REVISIONS	DATE
1	ADDENDUM NO. 3	6/4/21

DRAWN BY: AKP/ALG

DESIGNED BY: AG

CHECKED BY: AG

ISSUE DATE: 5/6/2021

BETA JOB NO.: 7171

SCALE

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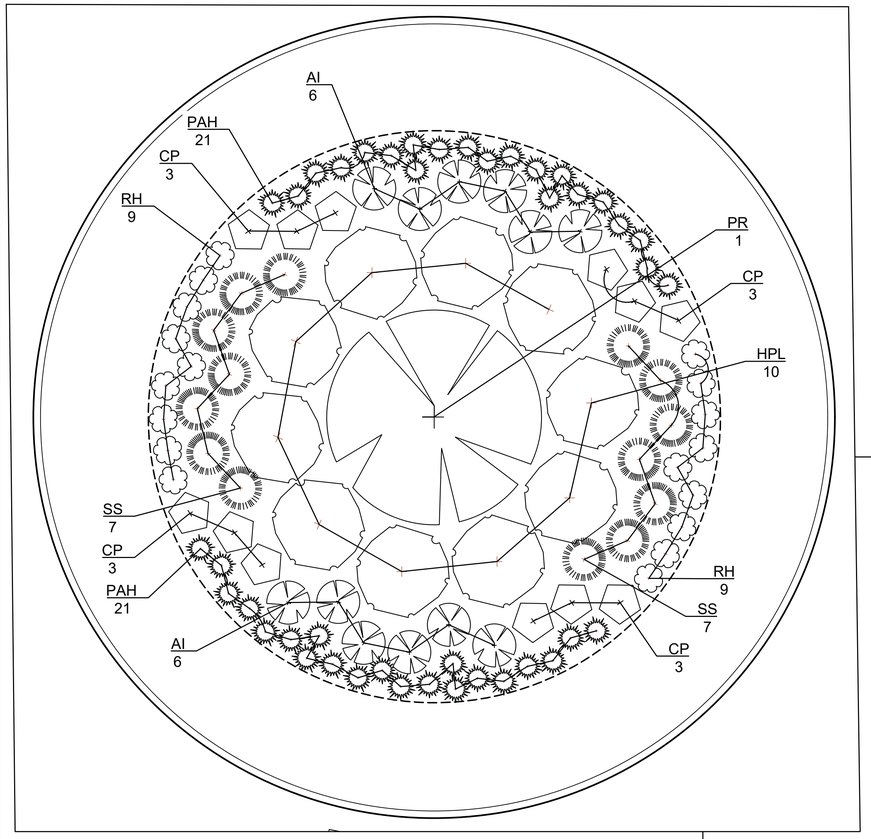
UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.

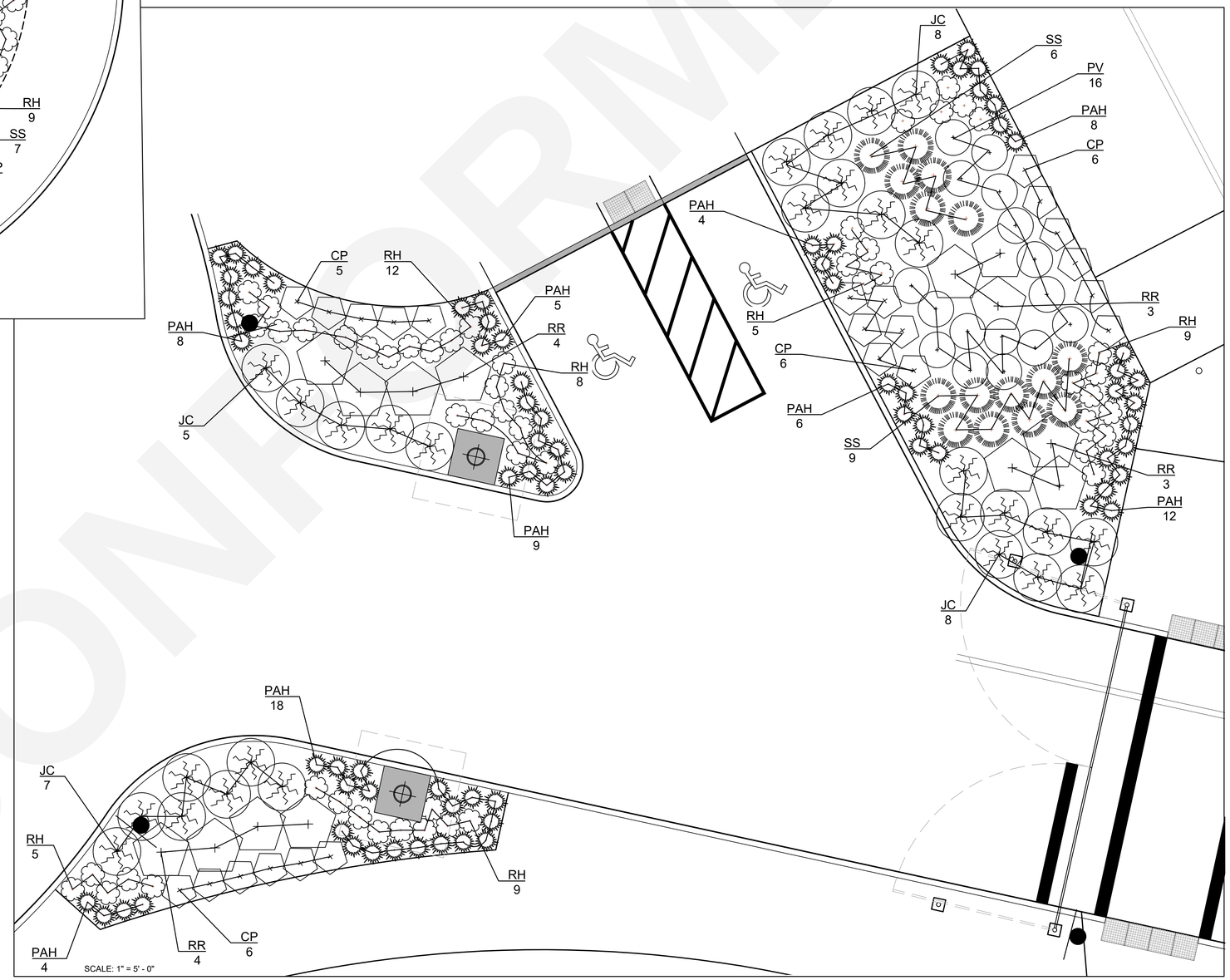
L10.1

PLANT SCHEDULE

KEY	QTY.	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	SPACING
AI	12	Asclepias incarnata	Pink Milkweed	#1	CONT.	3' O.C.
CP	35	Comptonia peregrina	Sweetfern	#1	CONT.	18" O.C.
HPL	10	Hydrangea paniculata 'Lime Light'	Lime Light Panicle Hydrangea	#3	CONT.	6' O.C.
JC	28	Juniperus conferta 'Blue Pacific'	Blue Pacific Shore Juniper	#3	CONT.	4' O.C.
PV	16	Panicum virgatum 'Dallas Blues'	Dallas Blues Switchgrass	#1	CONT.	3' O.C.
PAH	112	Pennisetum alopecuroides 'Hameln'	Hameln Dwarf Fountain Grass	#1	CONT.	2' O.C.
PR	1	Pinus rigida	Pitch Pine	6-7'	B&B	15' O.C.
RR	14	Rosa rugosa - Pink	Pink Beach Rose	#3	CONT.	4' O.C.
RH	66	Rudbeckia hirta	Black eyed susan	#1	CONT.	18" O.C.
SS	29	Schizachyrium scoparium	Little Bluestem	#1	CONT.	18" O.C.



SCALE: 1" = 5' - 0"



SCALE: 1" = 5' - 0"

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MASSACHUSETTS
ARIK W. GALLE
5.5.21
NO. 1211
REGISTERED LANDSCAPE ARCHITECT

SUBCONSULTANT

PROJECT

FALL RIVER
CITY PIER
SITE IMPROVEMENTS

Fall River, MA

TITLE

PLANTING PLAN - 3

NO.	REVISIONS	DATE
1	ADDENDUM NO. 3	6/4/21

DRAWN BY: AKP/ALG
DESIGNED BY: AG
CHECKED BY: AG
ISSUE DATE: 5/6/2021
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SCALE

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SHEET NO.

L10.2

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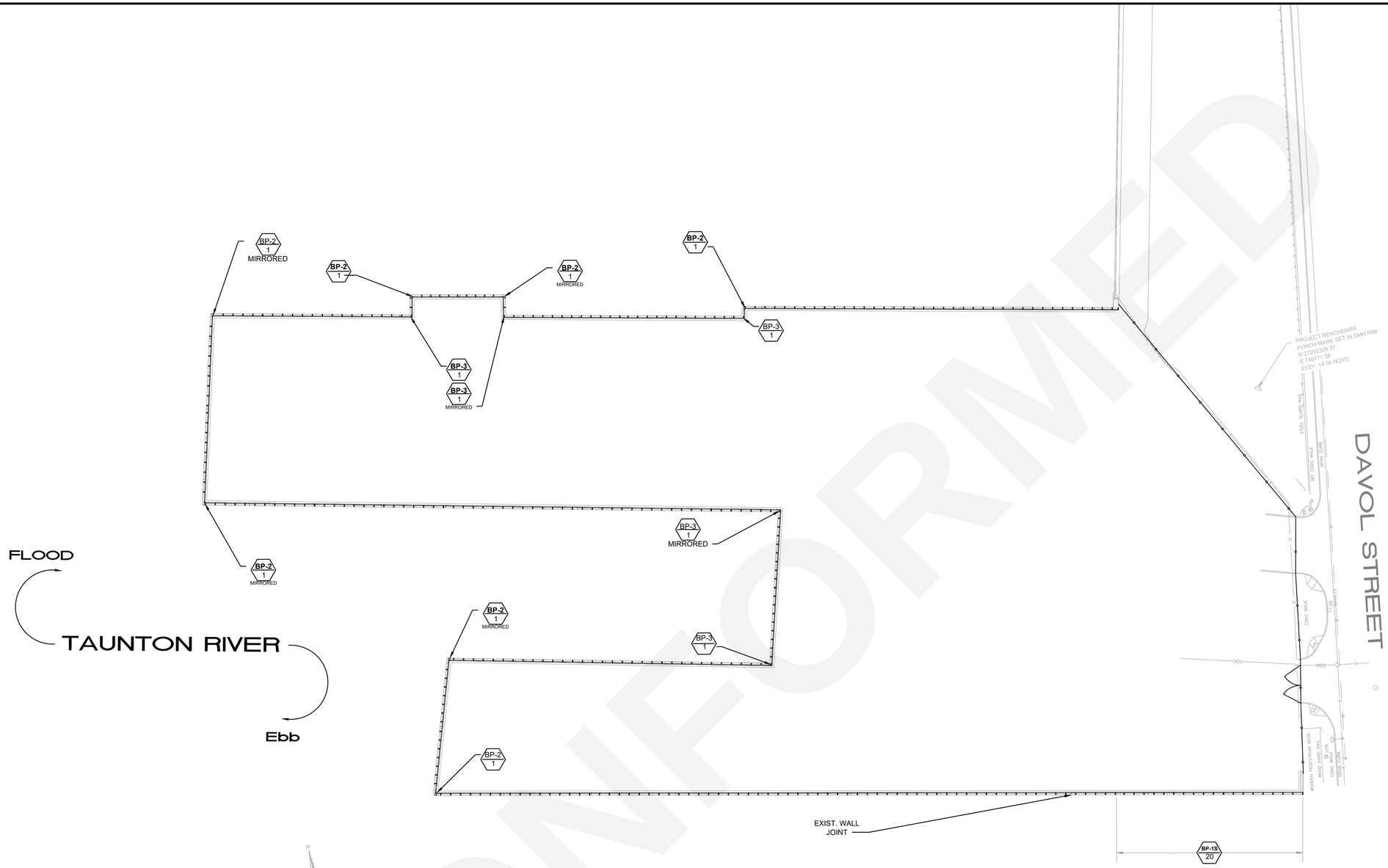

NOTES

1. ALL BASE PLATES SHALL BE BASE PLATE TYPE BP-1 UNLESS NOTED OTHERWISE ON PLAN.
2. BASE PLATES NOTED AS MIRRORED SHALL BE MIRRORED HORIZONTALLY.

LEGEND

BASE PLATES

EX: BP-1 / 12 — BASE PLATE TYPE; QUANTITY

			TOTAL ESTIMATED QTY.
BP-1 XX	BASE PLATE TYPE 1	SEE SHEET L5.4	302
BP-1S XX	BASE PLATE TYPE 1 SLOPED	SEE SHEET L5.4	20
BP-2 XX	BASE PLATE TYPE 2	SEE SHEET L5.4	7
BP-3 XX	BASE PLATE TYPE 3	SEE SHEET L5.4	5

POST CAPS

EX: PC-1 / 12 — POST CAP TYPE; QUANTITY

			TOTAL ESTIMATED QTY.
PC-1 XX	POST CAP TYPE 1	SEE SHEET L5.3	16

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REGISTERED PROFESSIONAL

COMMONWEALTH OF MASSACHUSETTS
WILLIAM P McGRATH
CIVIL
No. 33716
REGISTERED PROFESSIONAL ENGINEER

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

PEDESTRIAN RAILING SYSTEM LAYOUT

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	AG
ISSUE DATE:	5/6/2021
BETA JOB NO.:	7171

SCALE

HOR. SCALE IN FEET: 1"=30'
30 0 30 60

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

FOR REVIEW ONLY

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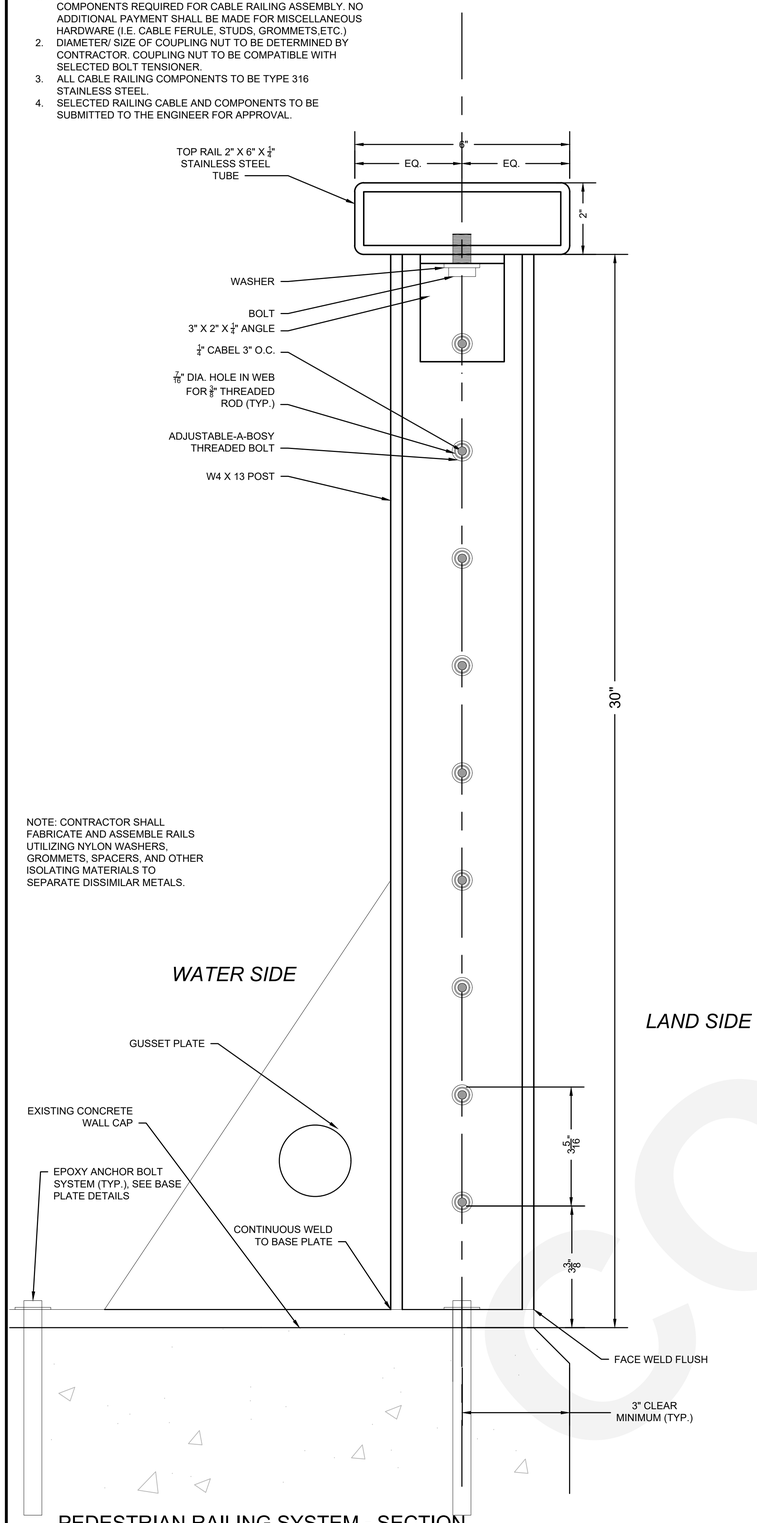
L11.0

5/5/2021 12:19 PM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\7171 - RAILING LAYOUT PLAN.DWG (BETA STB BW STB)

NOTES:
1. CONTRACTOR IS RESPONSIBLE TO FURNISH ALL COMPONENTS REQUIRED FOR CABLE RAILING ASSEMBLY. NO ADDITIONAL PAYMENT SHALL BE MADE FOR MISCELLANEOUS HARDWARE (I.E. CABLE FERULE, STUDS, GROMMETS,ETC.)
2. DIAMETER/ SIZE OF COUPLING NUT TO BE DETERMINED BY CONTRACTOR. COUPLING NUT TO BE COMPATIBLE WITH SELECTED BOLT TENSIONER.
3. ALL CABLE RAILING COMPONENTS TO BE TYPE 316 STAINLESS STEEL.
4. SELECTED RAILING CABLE AND COMPONENTS TO BE SUBMITTED TO THE ENGINEER FOR APPROVAL.



PEDESTRIAN RAILING SYSTEM - SECTION

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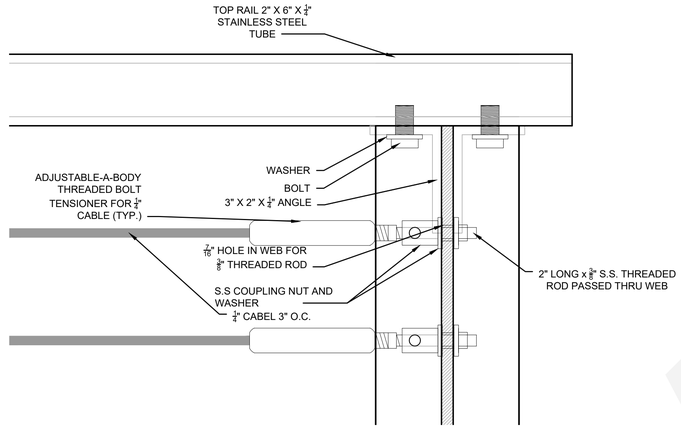
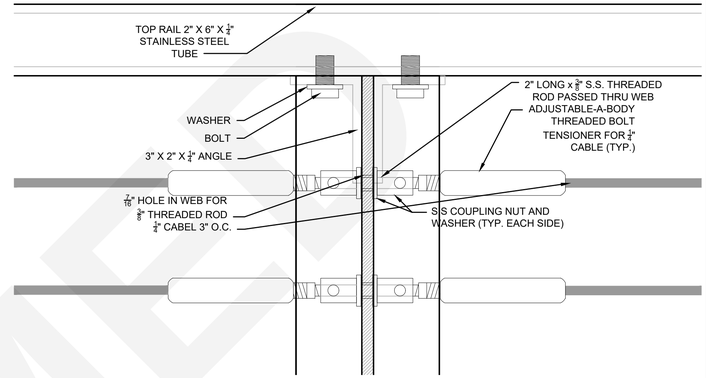


TENSION POST ASSEMBLY DOUBLE ENLARGEMENT

SCALE: 6" = 1' - 0"



TENSION POST ASSEMBLY DOUBLE ENLARGEMENT

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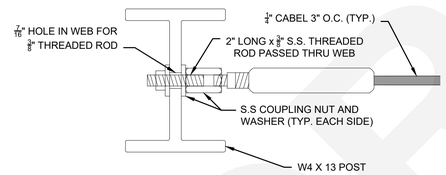
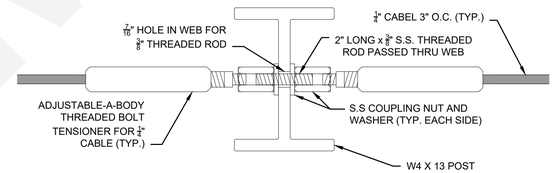


TPA-S: TENSION POST ASSEMBLY SINGLE - PLAN VIEW

SCALE: 6" = 1' - 0"



TPA-D: TENSION POST ASSEMBLY DOUBLE - PLAN VIEW

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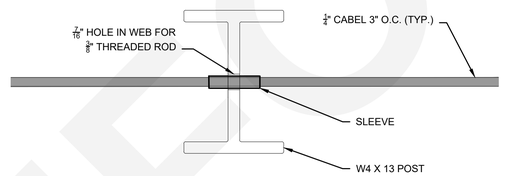
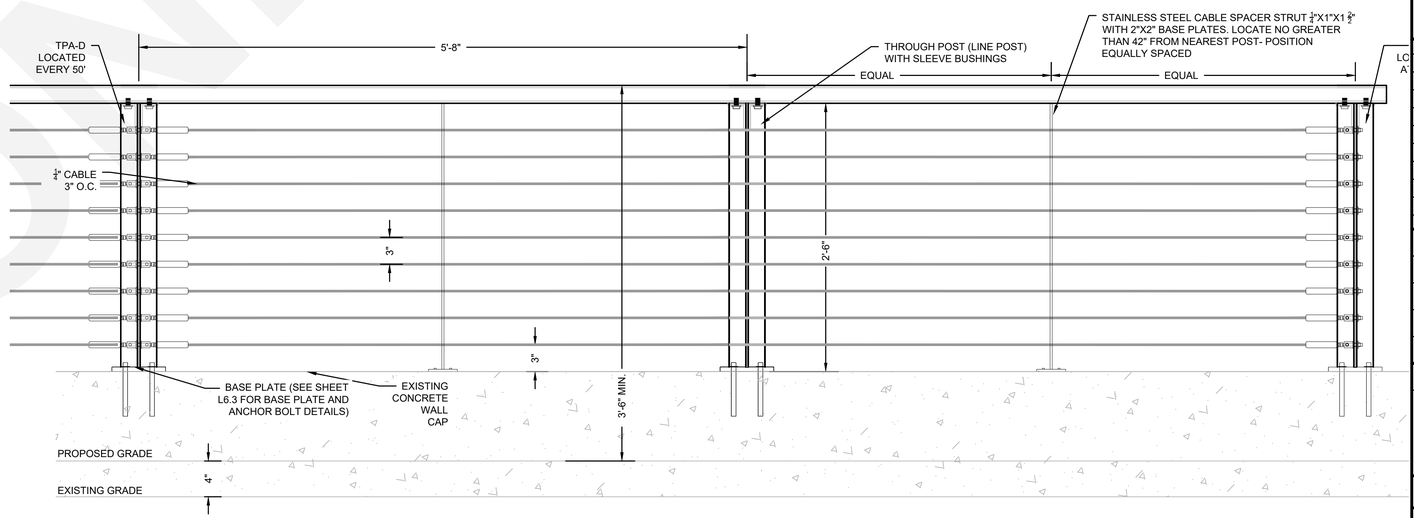


THROUGH POST (LINE POST) - PLAN VIEW

SCALE: 6" = 1' - 0"



PEDESTRIAN RAILING SYSTEM ELEVATION

SCALE: 1 1/2"=1'

PREPARED BY

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REGISTERED PROFESSIONAL

COMMONWEALTH OF MASSACHUSETTS
TODD M. WARZECKI
CIVIL ENGINEER
No. 47357
REGISTERED PROFESSIONAL ENGINEER

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

PEDESTRIAN RAILING DETAILS - 1

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	AG
ISSUE DATE:	5/6/2021
BETA JOB NO.:	7171

SCALE

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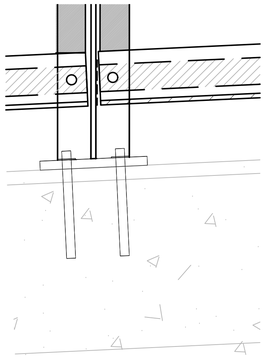
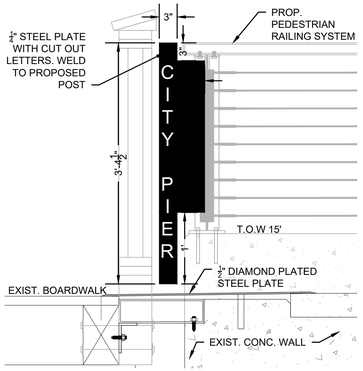


BASE PLATE BP- 1S - ELEVATION

SCALE: 3" = 1' - 0"

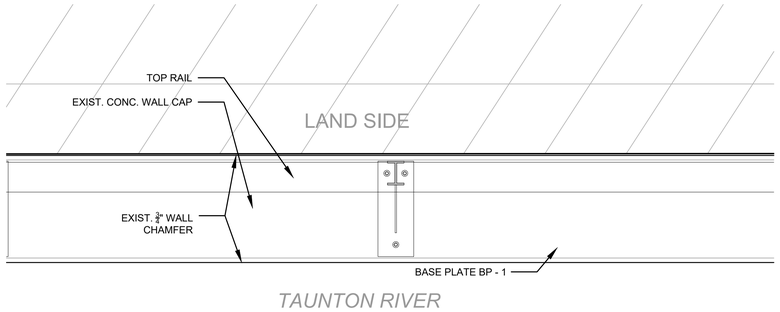


TRANSITION PANEL

SCALE: 1" = 1' - 0"

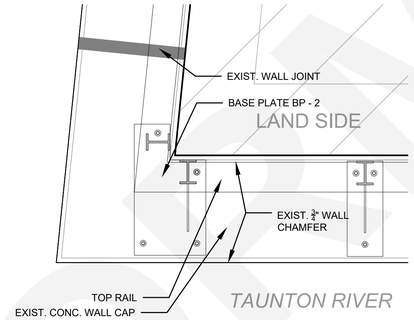
NOTES:

1. ADJUST BASE PLATE AND POST ANGLES AS REQUIRED AND COORDINATE WITH EXISTING CONCRETE CAP GEOMETRY AS REQUIRED TO MAINTAIN A UNIFORM RAILING ALIGNMENT AT LAND SIDE FACE.
2. ANGLES SHOWN ARE APPROXIMATE AND THE CONTRACTOR IS RESPONSIBLE TO VERIFY IN THE FIELD ALL CONDITIONS AND MEASUREMENTS TO INSURE A UNIFORM RAILING SYSTEM FIT AND FINISH.



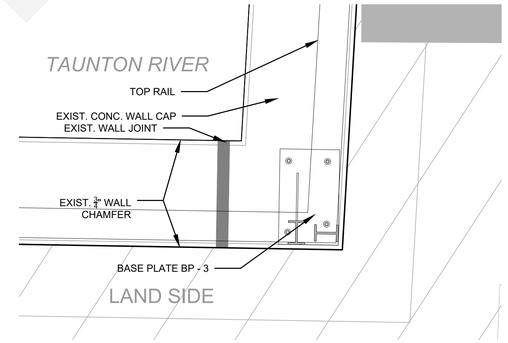
BASE PLATE BP - 1 & BP - 1S (TYPICAL)

SCALE: 1" = 1' - 0"



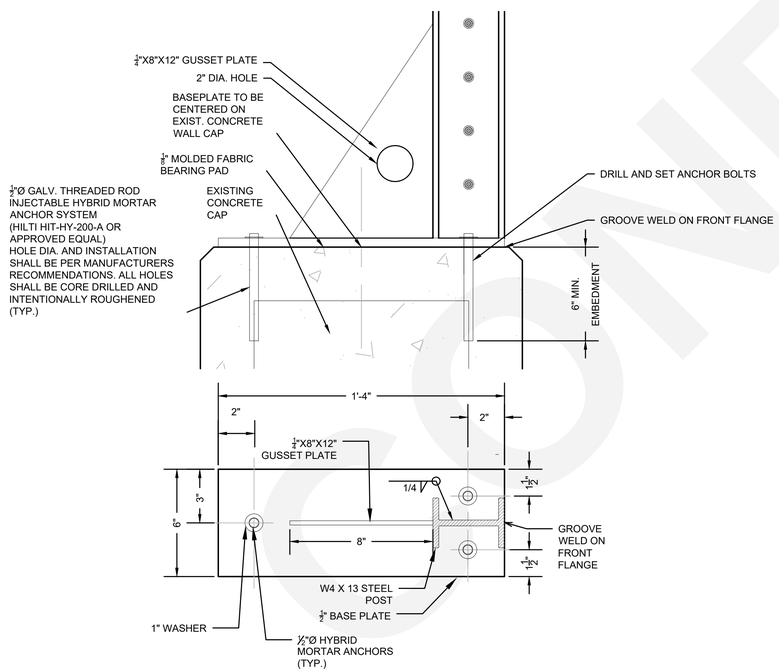
BASE PLATE BP - 2 ('OUTSIDE CORNER')

SCALE: 1" = 1' - 0"



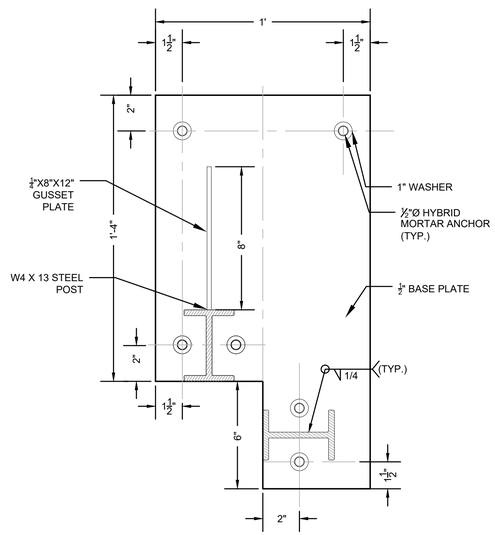
BASE PLATE BP - 2 ('OUTSIDE CORNER')

SCALE: 1" = 1' - 0"



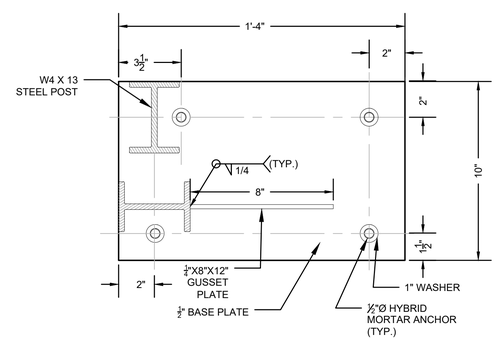
BASE PLATE BP - 1 AND BP -1S (ON SLOPE) - PLAN

SCALE: 3" = 1' - 0"



BASE PLATE BP - 2 - PLAN (4 STANDARD, 3 MIRRORED)

SCALE: 3" = 1' - 0"



BASE PLATE BP - 3 PLAN (3 STANDARD, 2 MIRRORED)

SCALE: 3" = 1' - 0"

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REGISTERED PROFESSIONAL

COMMONWEALTH OF MASSACHUSETTS
TODD M. WARZECKI
CIVIL ENGINEER
No. 47367
REGISTERED PROFESSIONAL ENGINEER

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

PEDESTRIAN RAILING DETAILS - 2

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	AG
ISSUE DATE:	5/6/2021
BETA JOB NO.:	7171

SCALE

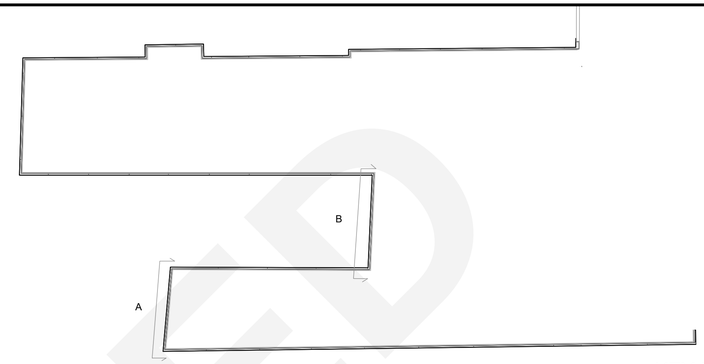
AS SHOWN

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

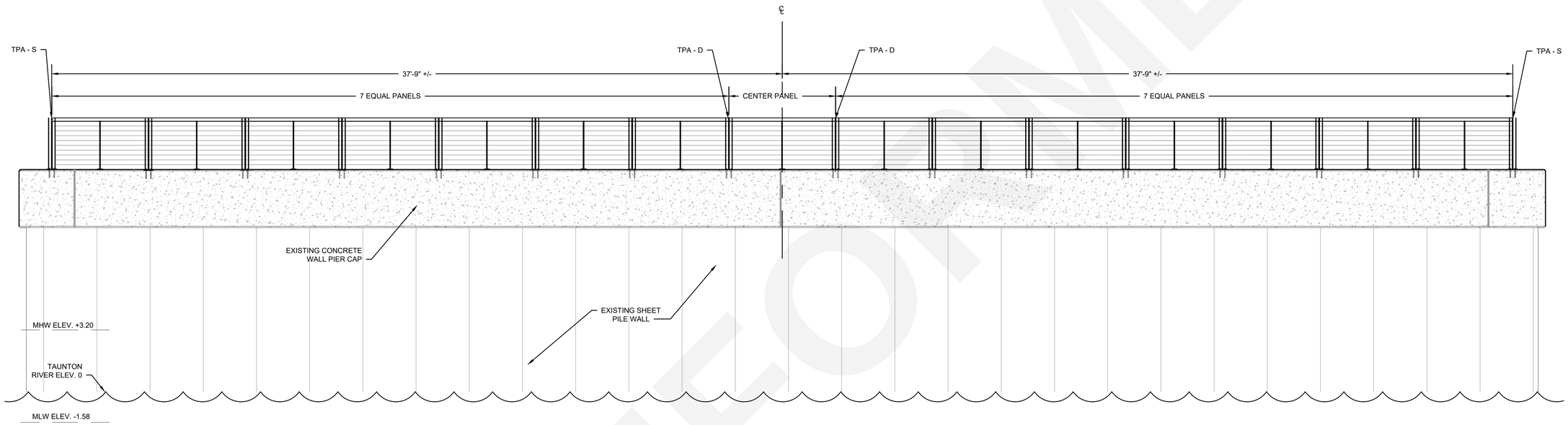
SHEET NO.

L11.2

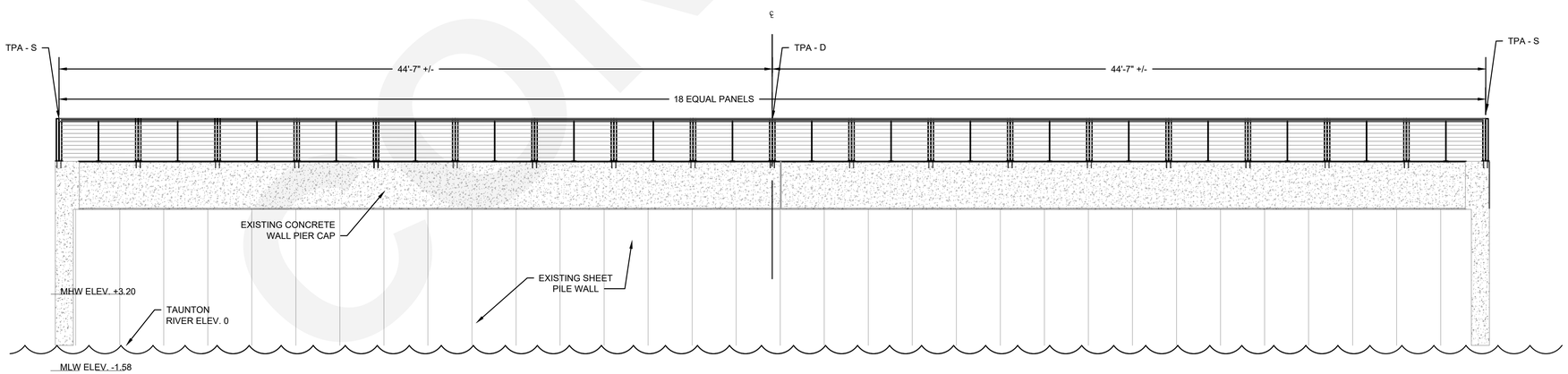
5/5/2021 12:28 PM G:\PLANNING\LANDSCAPE7\000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\LA SECTIONS.DWG (BETA STB BW.STB)



KEY PLAN
NTS



SOUTH PIER WEST ELEVATION 'A'
SCALE: 3/8" = 1' - 0"



CENTER PIER WEST ELEVATION 'B'
SCALE: 3/8" = 1' - 0"

CONFORMED

PREPARED BY

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REGISTERED PROFESSIONAL

COMMONWEALTH OF MASSACHUSETTS
TODD M. WARZECKI
CIVIL ENGINEER
No. 47367
REGISTERED PROFESSIONAL ENGINEER

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

PEDESTRIAN RAILING DETAILS - 3

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	AG
ISSUE DATE:	5/6/2021
BETA JOB NO.:	7171

SCALE

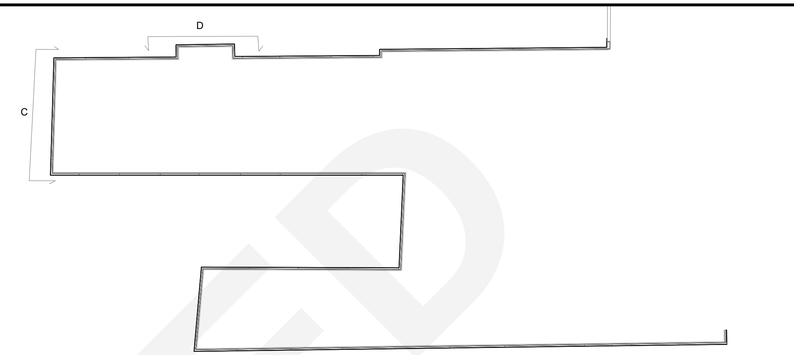
AS SHOWN

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

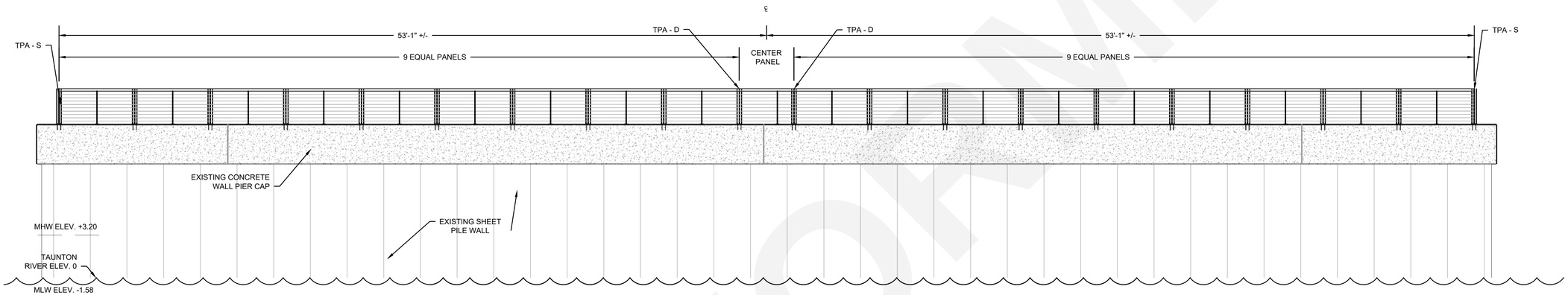
SHEET NO.

L11.3

5/5/2021 12:29 PM G:\PLANNING\LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\LA SECTIONS.DWG (BETA STB BW.STB)

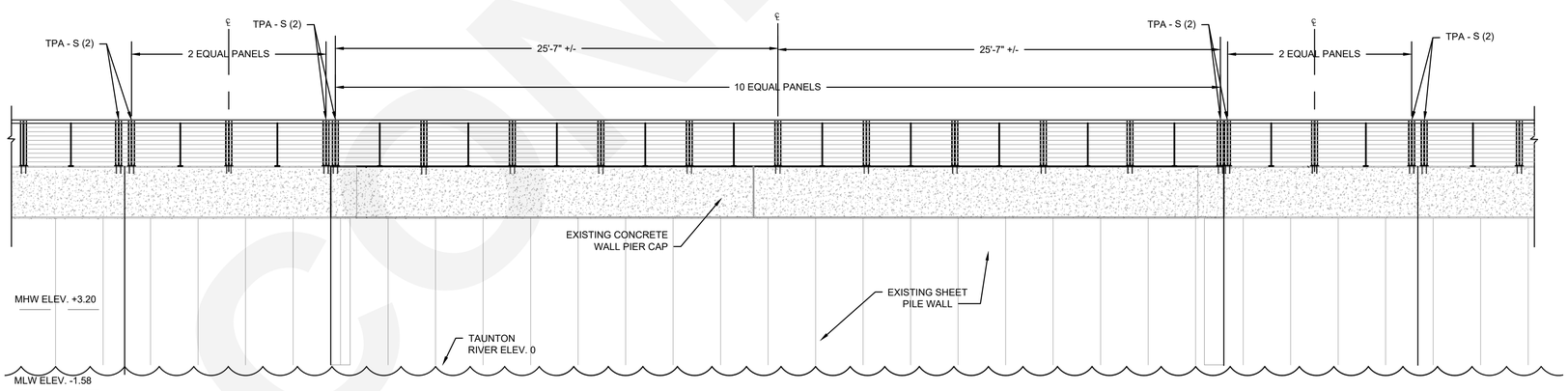


KEY PLAN
NTS



NORTH PIER WEST ELEVATION 'C'

SCALE: $\frac{1}{4}$" = 1' - 0"



NORTH PIER OVERLOOK ELEVATION 'D'

SCALE: $\frac{1}{4}$" = 1' - 0"

CONFORMED

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COMMONWEALTH OF MASSACHUSETTS
TODD M. WARZECKI
CIVIL ENGINEER
No. 47367
REGISTERED PROFESSIONAL ENGINEER

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

PEDESTRIAN RAILING DETAILS - 4

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	AG
ISSUE DATE:	5/6/2021
BETA JOB NO.:	7171

SCALE

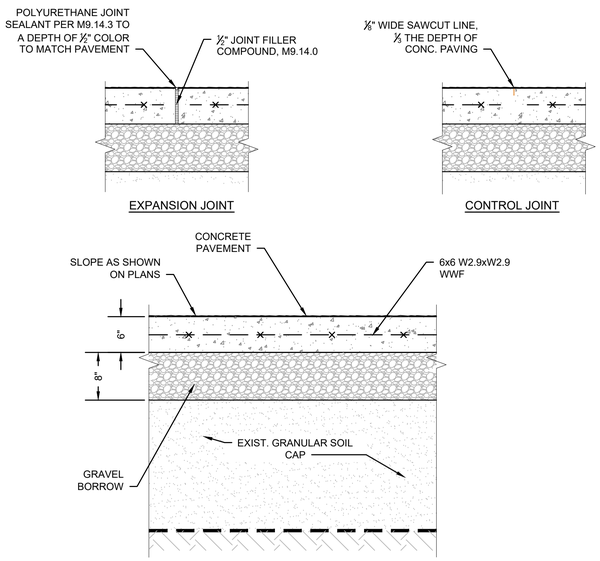
AS SHOWN

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.

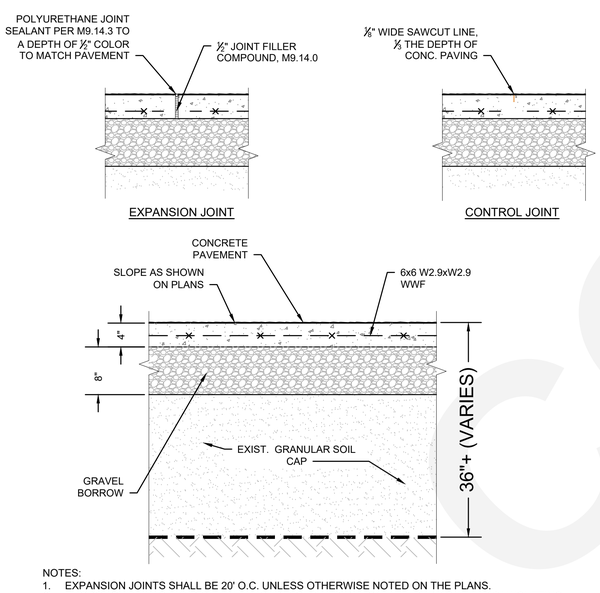
L11.4

5/5/2021 12:29 PM G:\PLANNING LANDSCAPE\7000\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\LA SECTIONS.DWG (BETA STB BW.STB)



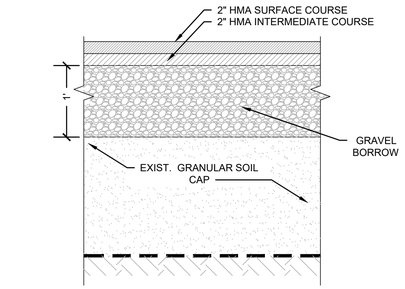
NOTES:
1. EXPANSION JOINTS SHALL BE 20' O.C. UNLESS OTHERWISE NOTED ON THE PLANS.
2. THOROUGHLY WASH AND CLEAN ALL SURFACES AND REMOVE ALL DEBRIS AFTER SAWCUTTING.
3. CONTROL JOINTS SHALL BE 5' O.C. UNLESS OTHERWISE NOTED ON THE PLANS.

W-A WALKWAY - TYPE A
SCALE: 1" = 1'-0"



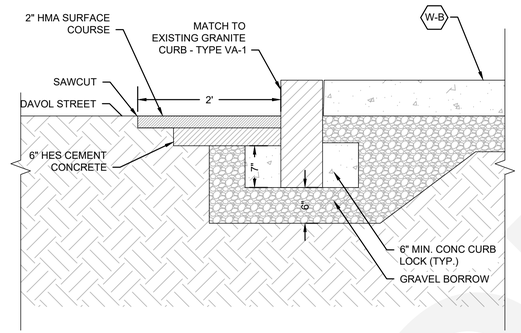
NOTES:
1. EXPANSION JOINTS SHALL BE 20' O.C. UNLESS OTHERWISE NOTED ON THE PLANS.
2. THOROUGHLY WASH AND CLEAN ALL SURFACES AND REMOVE ALL DEBRIS AFTER SAWCUTTING.
3. CONTROL JOINTS SHALL BE 5' O.C. UNLESS OTHERWISE NOTED ON THE PLANS.

W-B WALKWAY - TYPE B
SCALE: 1" = 1'-0"

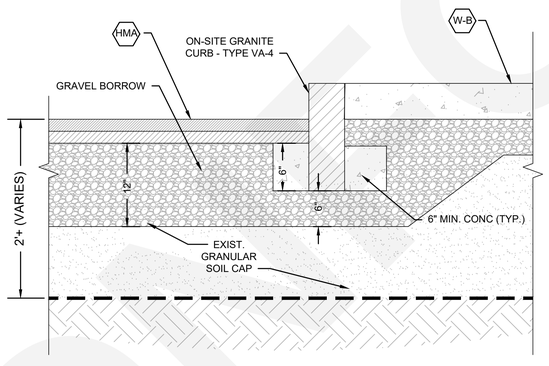


NOTE: DAVOL STREET REQUIRES 3" HMA INTERMEDIATE COURSE

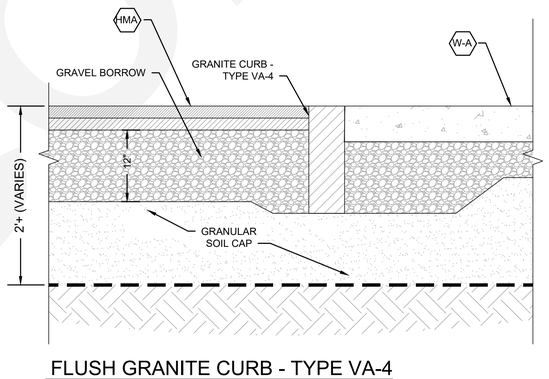
HMA HOT MIX ASPHALT PAVEMENT
SCALE: 1" = 1'-0"



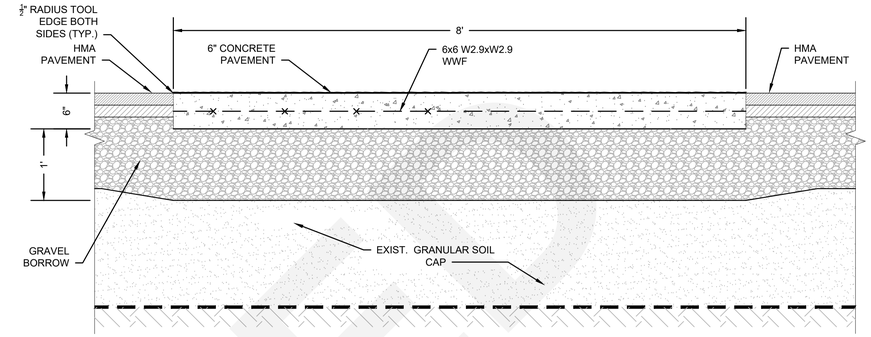
GRANITE CURB - TYPE VA-1
SCALE: 1" = 1'-0"



GRANITE CURB - TYPE VA-4
SCALE: 1" = 1'-0"

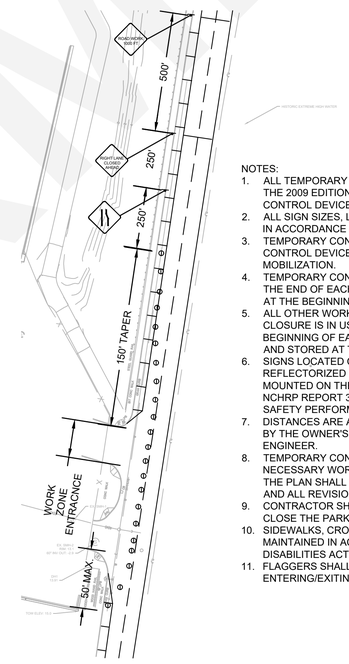


FLUSH GRANITE CURB - TYPE VA-4
SCALE: 1" = 1'-0"



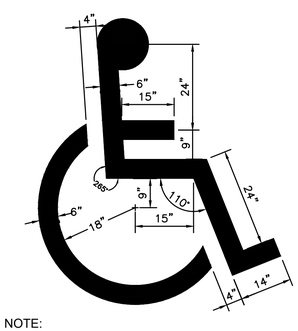
NOTES:
1. EXPANSION JOINTS SHALL BE 20' O.C. UNLESS OTHERWISE NOTED ON THE PLANS.
2. THOROUGHLY WASH AND CLEAN ALL SURFACES AND REMOVE ALL DEBRIS AFTER SAWCUTTING.
3. CONTROL JOINTS SHALL BE 5' O.C. UNLESS OTHERWISE NOTED ON THE PLANS.

CONCRETE CROSSWALK
SCALE: 1" = 1'-0"



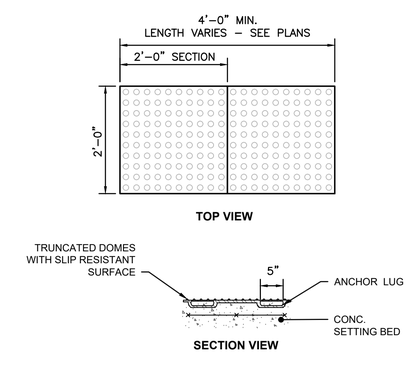
NOTES:
1. ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM TO THE 2009 EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND ALL REVISIONS.
2. ALL SIGN SIZES, LEGENDS, BORDERS AND MOUNTING SHALL BE IN ACCORDANCE WITH THE MUTCD.
3. TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO MOBILIZATION.
4. TEMPORARY CONSTRUCTION SIGNING SHALL BE COVERED AT THE END OF EACH WORKING DAY AND SHALL BE UNCOVERED AT THE BEGINNING OF EACH WORKING DAY.
5. ALL OTHER WORK ZONE TRAFFIC CONTROL WHEN LANE CLOSURE IS IN USE ROADWAY SHALL BE INSTALLED AT THE BEGINNING OF EACH WORKING DAY AND SHALL BE REMOVED AND STORED AT THE END OF EACH WORKING DAY.
6. SIGNS LOCATED ON OR NEAR THE TRAVELED WAY, AND REFLECTORIZED PLASTIC DRUMS WITH LIGHTING DEVICES MOUNTED ON THEM, MUST PASS THE CRITERIA SET FORTH IN NCHRP REPORT 350, "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES."
7. DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE OWNER'S REPRESENTATIVE OR CONSULTING ENGINEER.
8. TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER NECESSARY WORK ZONE TRAFFIC CONTROL NOT COVERED IN THE PLAN SHALL REFER TO THE 2009 EDITION OF THE MUTCD AND ALL REVISIONS.
9. CONTRACTOR SHALL MAINTAIN SIDEWALK AND TEMPORARILY CLOSE THE PARKING LANE.
10. SIDEWALKS, CROSSWALKS, AND ACCESS WAYS SHALL BE MAINTAINED IN ACCORDANCE WITH AMERICAN WITH DISABILITIES ACT (ADA) REQUIREMENTS.
11. FLAGGERS SHALL BE UTILIZED WHEN TRUCKS ARE ENTERING/EXITING THE SITE DRIVEWAY

LANE CLOSURE DETAIL
SCALE: NTS



NOTE:
1. HANDICAP SYMBOLS SHALL BE WHITE EPOXY.
2. HANDICAP SYMBOLS SHALL BE INSTALLED, ORIENTED AS SHOWN IN EACH LOCATION AND CENTERED IN THE PARKING STALL.

HANDICAP LOGO PAVING MARKER
SCALE: NTS



NOTES:
1. LOCATE AT ALL LOCATIONS AS SHOWN ON THE PLANS.
2. COMPONENTS AND INSTALLATION SHALL COMPLY FULL WITH ALL REQUIREMENTS OF THE AMERICANS WITH DISABILITIES ACT (ADA)

DETECTABLE WARNING PANEL
SCALE: 3/4" = 1'-0"

PREPARED BY

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REGISTERED PROFESSIONAL

COMMONWEALTH OF MASSACHUSETTS
WILLIAM P. McGRATH
CIVIL
No. 33716
REGISTERED PROFESSIONAL ENGINEER

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

SITE IMPROVEMENTS DETAILS - 1

NO.	REVISIONS	DATE
1	ADDENDUM NO. 3	6/4/21

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	AG
ISSUE DATE:	5/6/2021
BETA JOB NO.:	7171

SCALE

AS SHOWN

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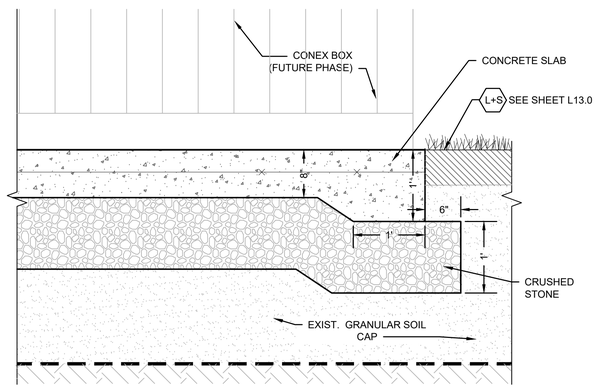
SHEET NO.

L12.0

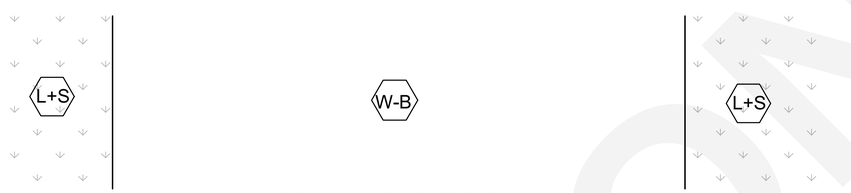
CONFORMED

6/4/2021 3:40 PM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER_MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\ADDENDA NO 3\C2.0_DRAINAGE DETAILS.DWG (BETA STB BW, STB)

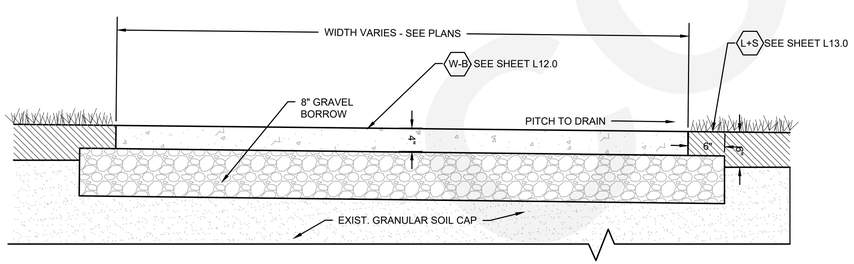


THICKENED CONCRETE SLAB FOR CONEX BOX

SCALE: 1" = 1'-0"

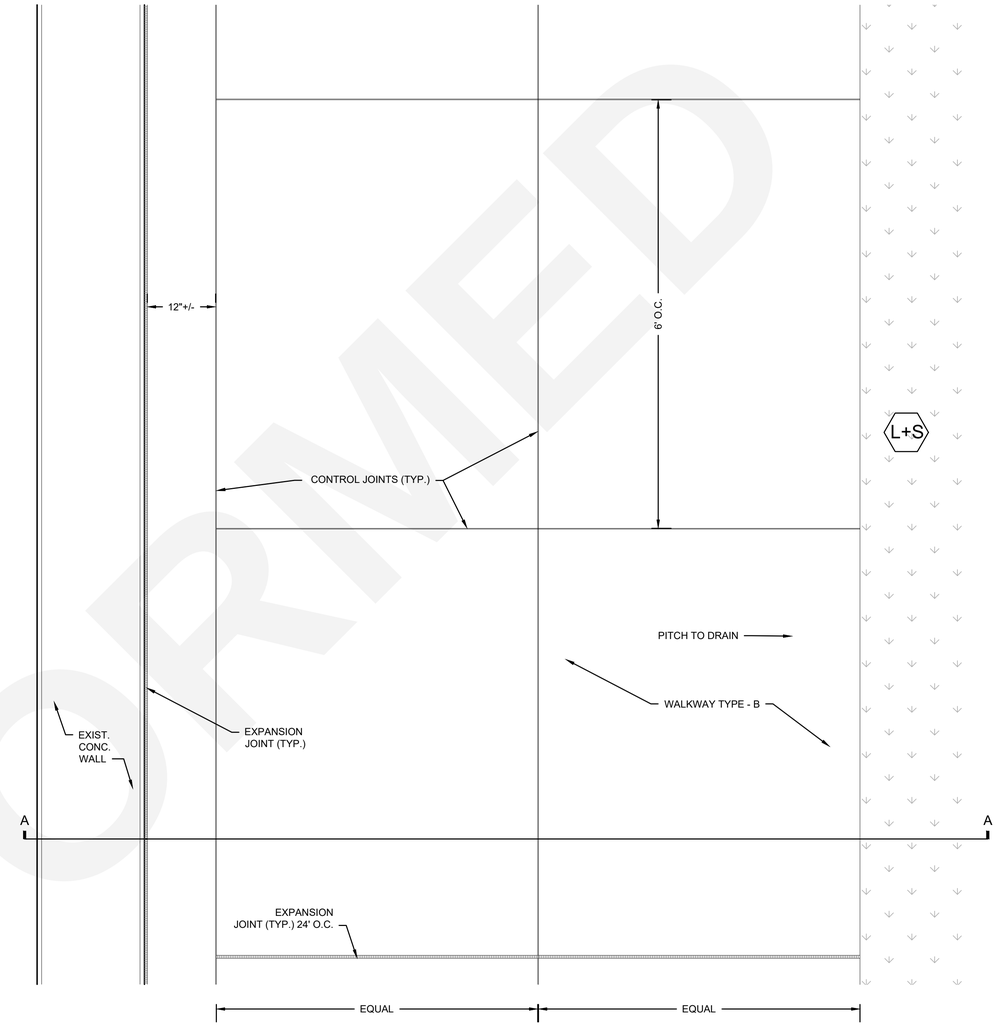


PARK WALKWAY @ LAWN AREAS - PLAN

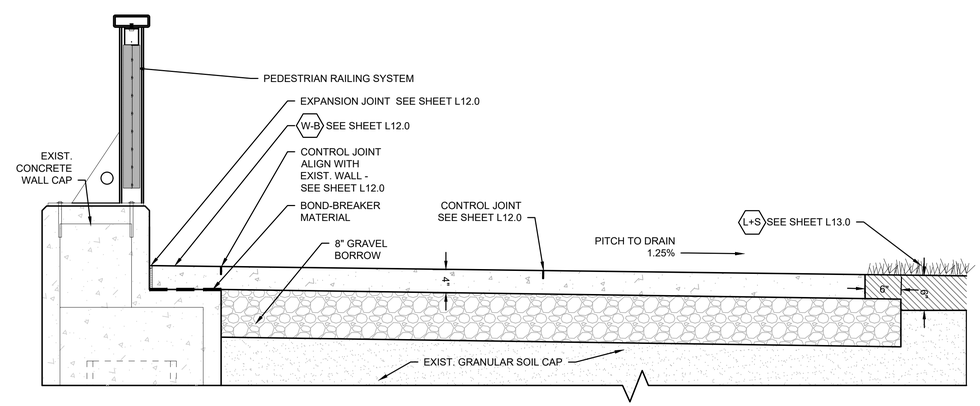


PARK WALKWAY SECTION @ LAWN AREAS (TYP.)

SCALE: 1" = 1'-0"



WALKWAY @ EXISTING WALL - PLAN



WALKWAY SECTION @ EXISTING WALL (TYP.)

SCALE: 1" = 1'-0"

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PROJECT

**FALL RIVER
CITY PIER
SITE IMPROVEMENTS**

Fall River, MA

TITLE

SITE IMPROVEMENTS
DETAILS - 2

NO.	REVISIONS	DATE

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	AG
ISSUE DATE:	5/6/2021
BETA JOB NO.:	7171

SCALE

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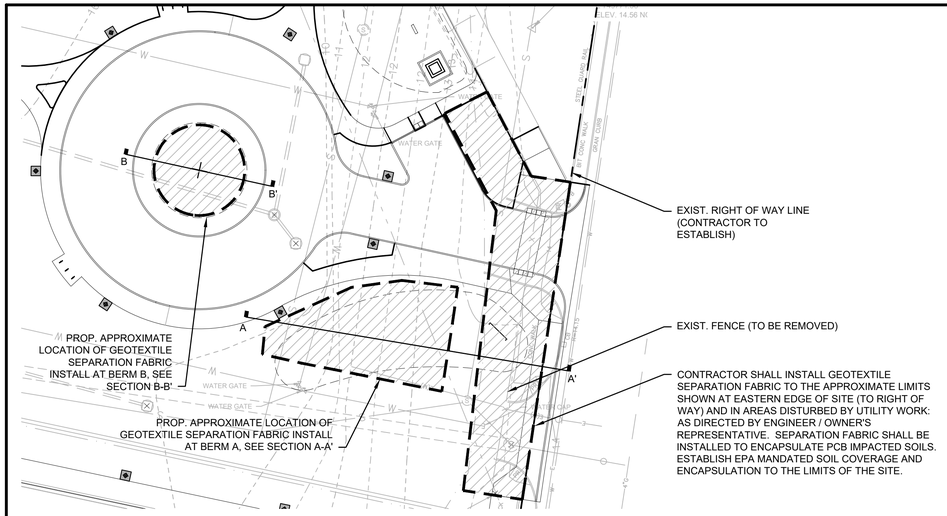
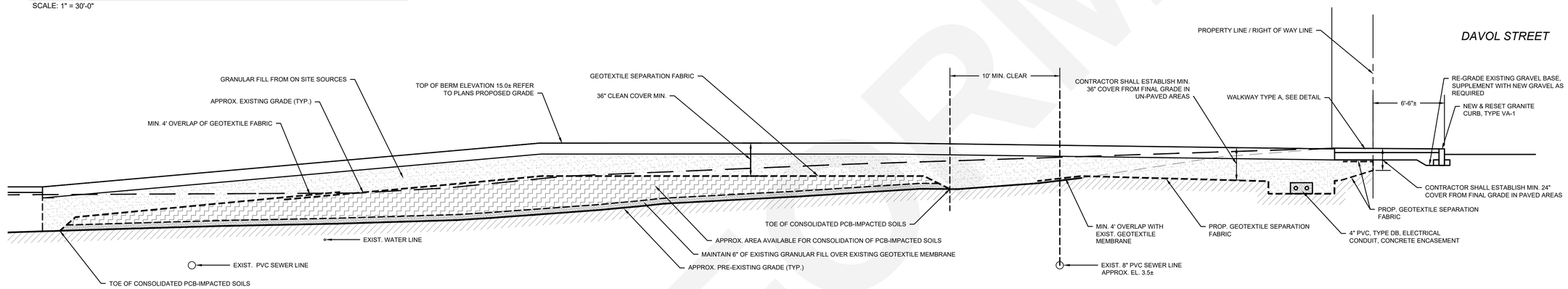
5/5/2021 11:36 AM G:\PLANNING LANDSCAPE\7000S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\7171 - DETAILS.DWG (BETA STB BW.STB)



GEOTEXTILE SEPARATION FABRIC - LOCATION PLAN

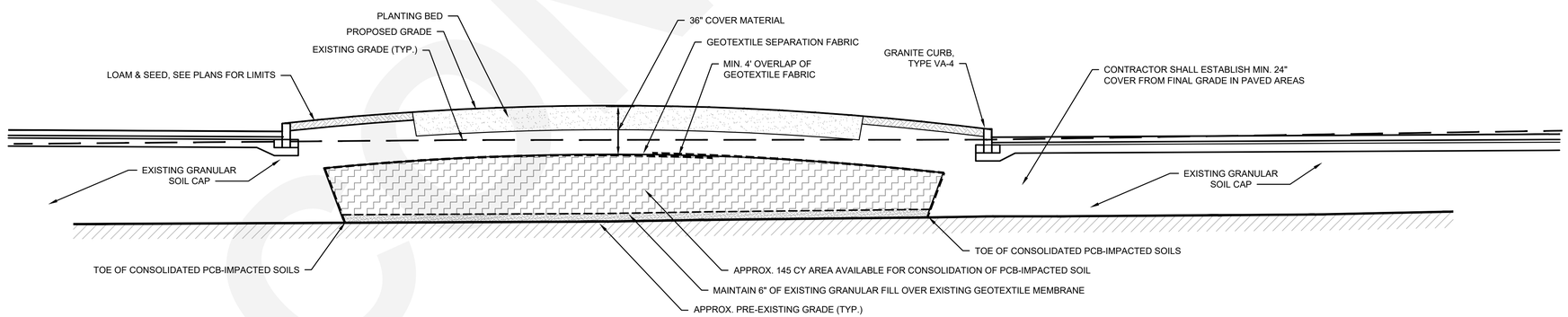
SCALE: 1" = 30'-0"



SECTION A-A' - BERM A

SCALE: 1/4" = 1'-0"

NOTES:
1. CONTRACTOR SHALL USE CAUTION TO AVOID DAMAGE TO EXISTING GEOTEXTILE SEPARATION MEMBRANE.
2. ENCAPSULATE ON-SITE PCB IMPACTED SOILS INITIALLY ENCOUNTERED AS DIRECTED BY THE OWNER'S REPRESENTATIVE INTO BERM A.
3. ANY AREA THAT IS UNPAVED SHALL HAVE 36" MIN. COVER OVER THE PROPOSED SURFACE OF THE NEW OR EXISTING GEOTEXTILE FABRIC / MEMBRANE.
4. FINAL BERM CONFIGURATION AND SIZE SHALL BE AS DIRECTED BY OWNER'S REPRESENTATIVE BASED ON FIELD CONDITIONS ENCOUNTERED AND VOLUME OF PCB IMPACTED SOILS GENERATED. FINAL SIZE OF CONSOLIDATION BERMS MAY VARY BASED ON EXISTING SITE CONDITIONS.



SECTION B-B' - BERM B

SCALE: 1/4" = 1'-0"

NOTES:
1. CONTRACTOR SHALL USE CAUTION TO AVOID DAMAGE TO EXISTING GEOTEXTILE SEPARATION MEMBRANE.
2. ENCAPSULATE ON-SITE PCB IMPACTED SOILS INITIALLY ENCOUNTERED AS DIRECTED BY THE OWNER'S REPRESENTATIVE INTO BERM A.
3. ANY AREA THAT IS UNPAVED SHALL HAVE 36" MIN. COVER OVER THE PROPOSED SURFACE OF THE NEW OR EXISTING GEOTEXTILE FABRIC / MEMBRANE.
4. FINAL BERM CONFIGURATION AND SIZE SHALL BE AS DIRECTED BY OWNER'S REPRESENTATIVE BASED ON FIELD CONDITIONS ENCOUNTERED AND VOLUME OF PCB IMPACTED SOILS GENERATED. FINAL SIZE OF CONSOLIDATION BERMS MAY VARY BASED ON EXISTING SITE CONDITIONS.

CONFORMED

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

COMMONWEALTH OF MASSACHUSETTS
WILLIAM P. McGRATH
CIVIL
No. 33216
REGISTERED PROFESSIONAL ENGINEER

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

SITE IMPROVEMENTS DETAILS - 3

NO.	REVISIONS	DATE
1	ADDENDUM NO. 4	6/9/21

DRAWN BY:	AKP/ALG
DESIGNED BY:	AG
CHECKED BY:	AG
ISSUE DATE:	5/6/2021
BETA JOB NO.:	7171

SCALE

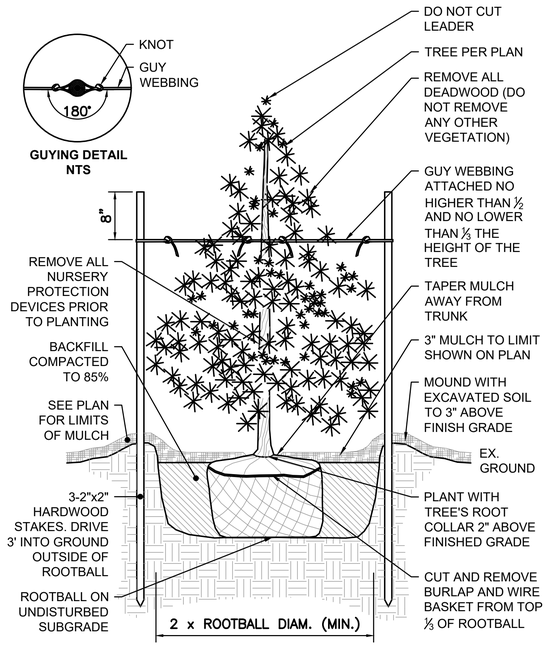
AS SHOWN

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.

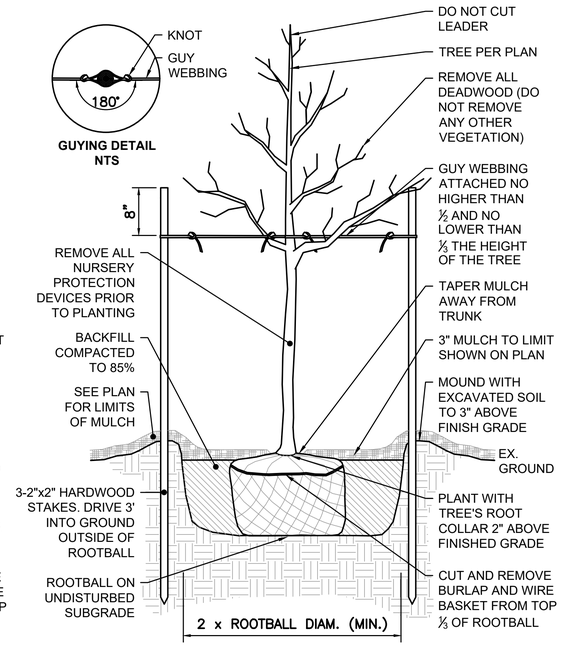
L12.2

6/9/2021 1:01 PM G:\PLANNING\LANDSCAPE\7000\S\7171 - FRRA CITY PIER - FALL RIVER, MA\DRAWING FILES\PLAN SET\BID DOCUMENTS\ADDENDA NO. 4\L12.2_SITE IMPROVEMENTS DETAILS_BERMS.DWG (BETA STB BW.STB)



NOTE:
AFTER THE GUARANTEE PERIOD THE CONTRACTOR WILL BE RESPONSIBLE FOR THE REMOVAL OF STAKES AND GUY WEBBING.

EVERGREEN TREE STAKING & PLANTING
NOT TO SCALE

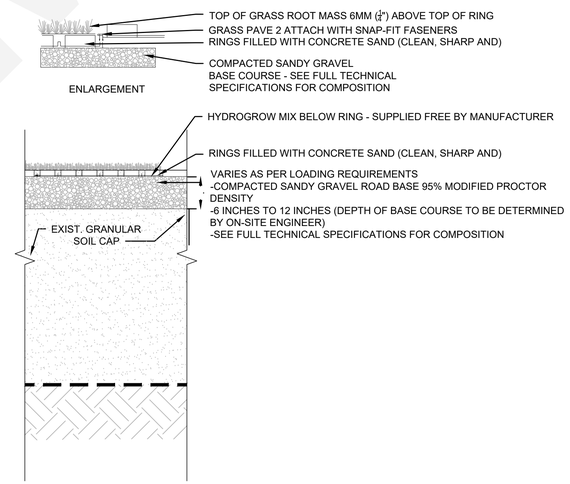


NOTE:
AFTER THE GUARANTEE PERIOD THE CONTRACTOR WILL BE RESPONSIBLE FOR THE REMOVAL OF STAKES AND GUY WEBBING.

DECIDUOUS TREE STAKING & PLANTING
NOT TO SCALE

MASTER PLANT SCHEDULE

KEY	QTY.	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	SP
AAB	5	Amelanchier x grandiflora 'Autumn Brilliance'	Autumn Brilliance Serviceberry	8-10'	CLUMP	15
AUU	5	Arctostaphylus uva-ursi	Bearberry	#1	CONT.	4
AI	23	Asclepias incarnata	Pink Milkweed	#1	CONT.	3
ANB	23	Aster novi-belgii	New York Aster	#1	CONT.	3
CP	82	Comptonia peregrina	Sweetfern	#1	CONT.	18
HPL	11	Hydrangea paniculata 'Lime Light'	Lime Light Panicle Hydrangea	#3	CONT.	6
JC	28	Juniperus conferta 'Blue Pacific'	Blue Pacific Shore Juniper	#3	CONT.	4
MP	23	Myrica pensylvanica	Bayberry	#3	CONT.	6
PV	118	Panicum virgatum 'Dallas Blues'	Dallas Blues Switchgrass	#1	CONT.	3
PAH	223	Pennisetum alopecuroides 'Hameln'	Hameln Dwarf Fountain Grass	#1	CONT.	3
PR	2	Pinus rigida	Pitch Pine	6-7'	B&B	15
PM	22	Prunus maritima	Beach Plum	#3	CONT.	4
RR	53	Rosa rugosa - Pink	Pink Beach Rose	#3	CONT.	4
RH	175	Rudbeckia hirta	Black eyed susan	#1	CONT.	18
SS	113	Schizachyrium scoparium	Little Bluestem	#1	CONT.	18



ADD ALTERNATE 1 -GEO-REINFORCED TURFGRASS
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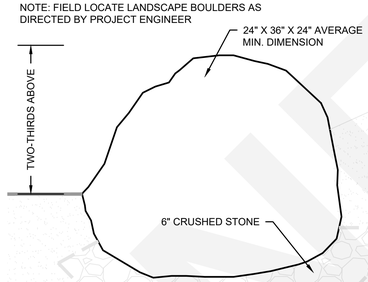

WEATHERED LANDSCAPE BOULDER
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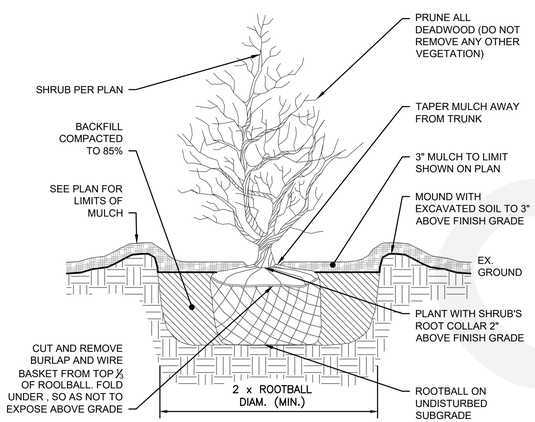

SHRUB PLANTING
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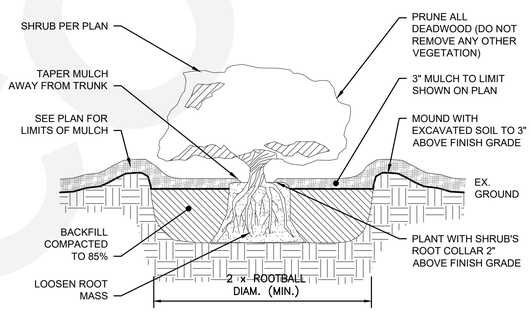
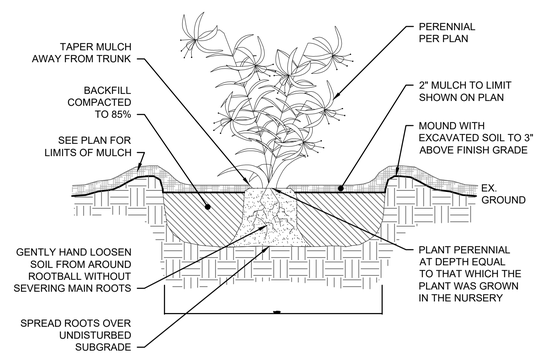
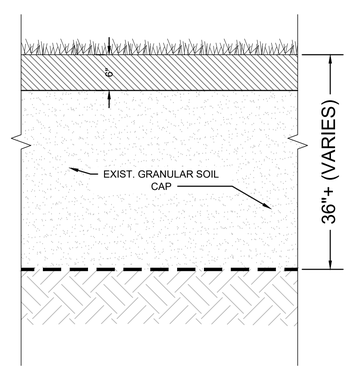


CONTAINER GROWN TREE & SHRUB PLANTING
NOT TO SCALE



PERENNIALS & GRASSES PLANTING
NOT TO SCALE



L+S **LOAM AND SEED**
SCALE: 1" = 1'-0"

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

MASSACHUSETTS ALAN W. GATES 5.5.21 NO. 1031 REGISTERED LANDSCAPE ARCHITECT

SUBCONSULTANT

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

PLANTING DETAILS

NO.	REVISIONS	DATE
1	ADDENDUM NO. 3	6/4/21

DRAWN BY: AKP/ALG
DESIGNED BY: AG
CHECKED BY: AG
ISSUE DATE: 5/6/2021
BETA JOB NO.: 7171

SCALE
AS SHOWN

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.
L13.0

CONFORMED

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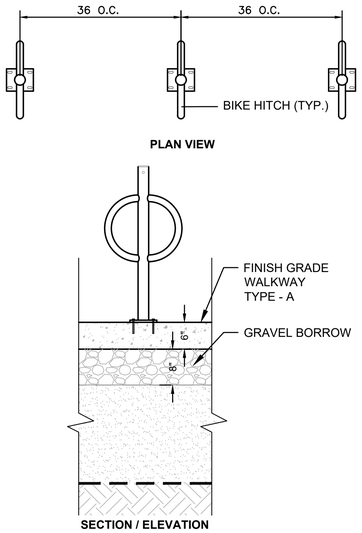
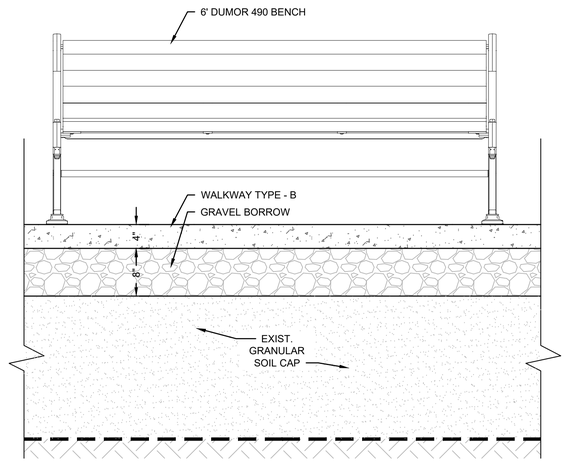


BIKE HITCH
SCALE: 3/4" = 1'-0"



BENCH
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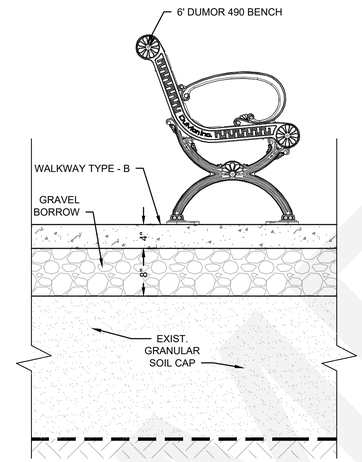

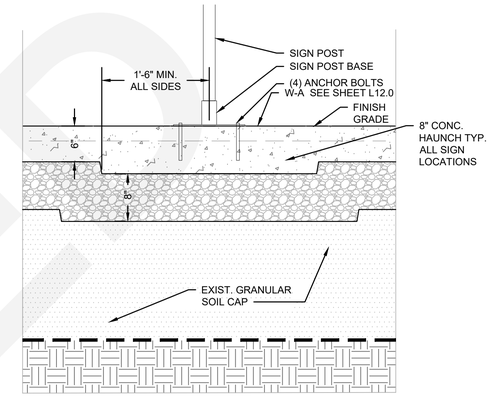

SIGN POST BASE
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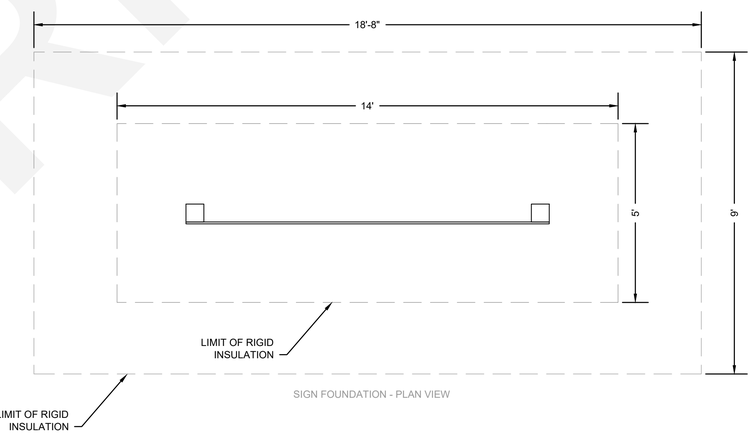
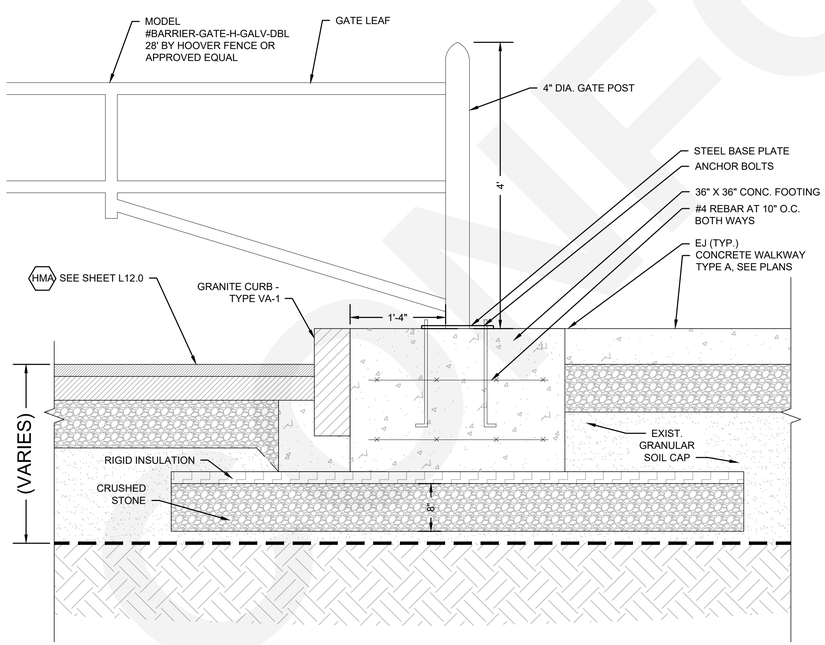
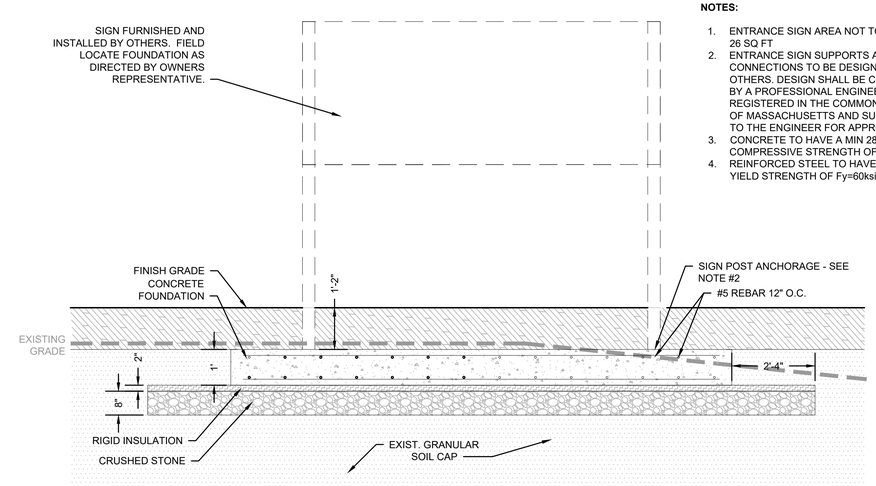


SIGN FOUNDATION - PLAN VIEW



ENTRANCE GATE
SCALE: 1" = 1'-0"



ENTRANCE SIGN FOUNDATION
SCALE: 1/2" = 1'-0"

NOTES:

1. ENTRANCE SIGN AREA NOT TO EXCEED 26 SQ FT
2. ENTRANCE SIGN SUPPORTS AND CONNECTIONS TO BE DESIGNED BY OTHERS. DESIGN SHALL BE COMPLETED BY A PROFESSIONAL ENGINEER REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS AND SUBMITTED TO THE ENGINEER FOR APPROVAL.
3. CONCRETE TO HAVE A MIN 28-DAY COMPRESSIVE STRENGTH OF 4000 PSI.
4. REINFORCED STEEL TO HAVE A MIN. YIELD STRENGTH OF Fy=60ksi

CONFORMED

PREPARED BY
BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL
MASSACHUSETTS REGISTERED LANDSCAPE ARCHITECT 5.5.21 NO. 1271

SUBCONSULTANT

PROJECT
FALL RIVER CITY PIER SITE IMPROVEMENTS
Fall River, MA

TITLE
SITE AMENITIES

NO.	REVISIONS	DATE
1	ADDENDUM NO. 4	6/9/21

DRAWN BY: AKP/ALG
DESIGNED BY: AG
CHECKED BY: AG
ISSUE DATE: 5/6/2021
BETA JOB NO.: 7171

SCALE
AS SHOWN
UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.
L14.0

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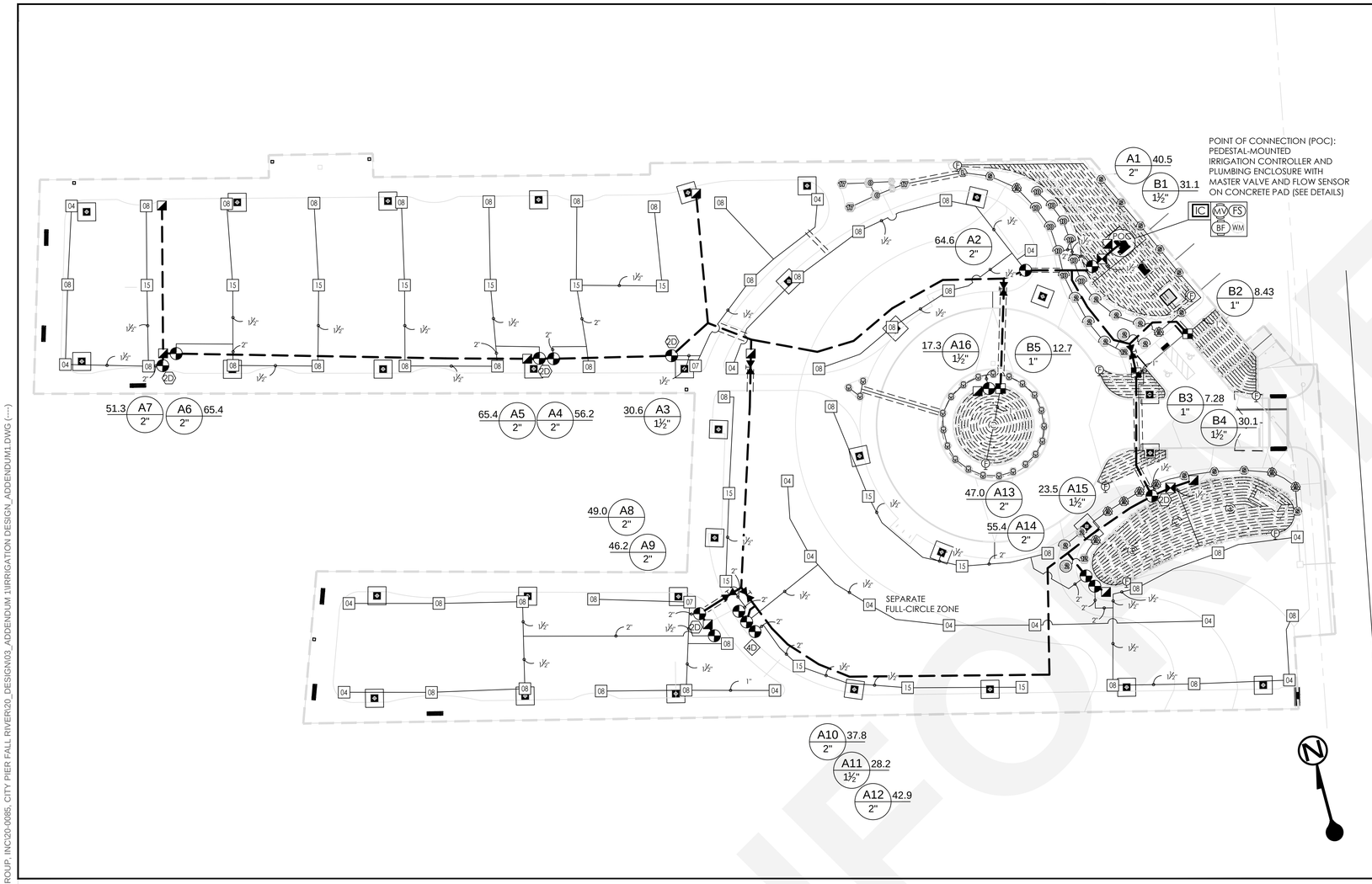

IRRIGATION NOTES

1. SEE IRRIGATION DETAILS AND SPECIFICATIONS FOR ADDITIONAL REQUIRED INFORMATION.
2. CONTRACTORS DEEMED NOT QUALIFIED BASED ON EXPERIENCE AND REFERENCES PROVIDED AS PER OWNER'S REPRESENTATIVE AND ENGINEER WILL HAVE THEIR BIDS DISQUALIFIED.
3. COORDINATE FINAL LOCATION OF SPRINKLERS, NOZZLES, DRIP IRRIGATION, AND VALVE BOXES WITH FINAL APPROVED LANDSCAPE.
4. ALL PIPE AND VALVE LOCATIONS ARE DIAGRAMMATIC FOR CLARITY; CONTRACTOR SHALL FIELD VERIFY.
5. SPECIFIED VALVE BOXES IN NATURAL TURF AREAS SHALL BE APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.
6. ALL CONTROL WIRE SHALL BE 14/2 AWG TWO-WIRE FOR DECODERS, GROUNDED IN ACCORDANCE WITH THIS PLAN AND IRRIGATION CONTROLLER MANUFACTURER (WHICHEVER IS MORE RESTRICTIVE).
7. IRRIGATION SYSTEM IS DESIGNED FOR DOMESTIC WATER SUPPLY. PROVIDE NEW BACKFLOW PREVENTER AND PURCHASE CITY-ISSUED WATER METER TO BE PLACED WITHIN ENCLOSURE LOCATION SHOWN ON PLAN. SYSTEM REQUIRES 70 GALLONS PER MINUTE MAXIMUM AT 75 POUNDS PER SQUARE INCH (PSI) DYNAMIC PRESSURE OUTSIDE OF BACKFLOW ENCLOSURE (DOWNSTREAM) TO MEET SPRINKLER PRESSURE REQUIREMENTS.
8. INSTALL NEW IRRIGATION CONTROLLER IN OUTDOOR STAINLESS STEEL PEDESTAL ENCLOSURE GENERALLY WHERE SHOWN ON DRAWING AS DIRECTED BY OWNER'S REPRESENTATIVE. HARD WIRE TO 120 VOLT, DEDICATED 20-AMP CIRCUIT POWER SUPPLY USING LICENSED ELECTRICIAN. ROUTE ALL TWO-WIRE TO CONTROLLER IN CONDUIT THROUGH PEDESTAL CONCRETE PAD. GROUND IRRIGATION CONTROLLER AND DECODERS AS PER MANUFACTURER, GENERALLY AS SHOWN ON DRAWINGS, DETAILS, AND DESCRIBED IN SPECIFICATIONS.
9. ALL ABOVE GROUND WIRING SHALL BE INSTALLED IN RIGID, METALLIC CONDUIT FOR VANDALISM PROTECTION.
10. COORDINATE LOCATION OF ALL EXISTING AND FUTURE UTILITIES ON SITE. CONTACT PROPER AUTHORITIES AND UTILITY COMPANIES BEFORE THE START OF WORK.
11. FLUSH ALL LATERAL LINES BEFORE INSTALLING SPRINKLERS (NO INTERNALS).
12. CONTRACTOR MUST SUBMIT IRRIGATION PRODUCTS AS PER THE WRITTEN SPECIFICATIONS TO REVIEW ENGINEER FOR APPROVAL PRIOR TO ORDERING MATERIAL AND BEGINNING WORK.
13. MATERIAL SUBSTITUTIONS WHICH VARY FROM THE SPECIFIED PRODUCTS MUST BE SUBMITTED TO REVIEW ENGINEER FOR APPROVAL AS PART OF THE SUBMITTAL PROCESS.
14. ONCE APPROVED SUBMITTALS HAVE BEEN RETURNED TO THE CONTRACTOR, WORK MAY BEGIN. OWNER'S REPRESENTATIVE MUST BE NOTIFIED 7 DAYS IN ADVANCE OF THE START OF WORK TO COORDINATE ON-SITE SUPERVISION AND ADMINISTRATION.
15. FINAL LOCATION AND CONFIGURATION OF IRRIGATION SYSTEM SHALL BE APPROVED BY OWNER'S REPRESENTATIVE AND PER LOCAL AUTHORITIES.
16. CALL 811 OR DIG-SAFE 72 HOURS PRIOR TO CONSTRUCTION START.

IRRIGATION LEGEND

SYMBOL	MANUFACTURER/MODEL	PSI
08 ES, 08 LCS, 08 RCS, 08 CS, 08 SS	Hunter PROS-06-PRS30-CV 5' strip spray sprinkler	30
EST, CST, SST	Hunter PROS-06-PRS30-CV 9' side strip spray sprinkler	30
10 Q, 10 T, 10 H, 10 F	Hunter PROS-06-PRS30-CV 10' radius sprinkler	30
12 Q, 12 T, 12 H, 12 TT, 12 TQ, 12 F	Hunter PROS-06-PRS30-CV 12' radius sprinkler	30
08	Hunter PROS-06-PRS30-CV adjustable arc sprinkler	30

SYMBOL	MANUFACTURER/MODEL	PSI	GPM	RADIUS
04	Hunter I-25-06-SS Gear-Driven Rotor Sprinkler	60	4.70	42'
07	Hunter I-25-06-SS Gear-Driven Rotor Sprinkler	60	7.50	48'
08	Hunter I-25-06-SS Gear-Driven Rotor Sprinkler	60	9.20	50'
15	Hunter I-25-06-SS Gear-Driven Rotor Sprinkler	60	14.3	57'

SYMBOL	MANUFACTURER/MODEL
	Hunter ICZ-101-40 1-Inch Drip Zone Valve Kit, Filter, and Pressure Regulator
	Hunter ICZ-151-XL-40 1.5-Inch Drip Zone Valve Kit, Filter, and Pressure Regulator
F	Netafim TLSOV Manual Flush Valve
	Area to Receive Dripline Netafim TLCV-06-12 with 18-Inch Rows — Tree Drip Rings Added to Drip Zone

SYMBOL	MANUFACTURER/MODEL
	Hunter ICV-G-FS Sprinkler Zone Valve
	Hunter HQ-44RC-AW Quick Coupler Valve
	Nibco T-113-K Cross Handle Isolation Gate Valve
MV	Hunter IBV 2-Inch Master Valve
BF	2-Inch RPZ Backflow Preventer
IC	2-Wire Irrigation Controller with Cellular Card and Stainless Steel Pedestal
2D	2-Station Decoder
4D	4-Station Decoder
WM	2-Inch City of Fall River Water Meter
FS	2-Inch Flow Sensor
POC	Irrigation Point of Connection (POC) Downstream of Plumbing Enclosure
	Irrigation Lateral Line: PVC Class 200 SDR 21 (Size as Noted, Unlabeled Pipe = 1-Inch)
	Irrigation Mainline: 2.5-Inch PVC Class 200 SDR 21
	Pipe Sleeve: 6-Inch PVC Schedule 40

Valve Callout
- Valve Number
- Valve Flow
- Valve Size

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

COMMONWEALTH OF MASSACHUSETTS
MICHAEL IGO
CIVIL
No. 46486
REGISTERED PROFESSIONAL ENGINEER

SUBCONSULTANT

Aqueous
AQUEOUS CONSULTANTS, LLC
IRRIGATION & WATER RESOURCE ENGINEERS
2 Dundee Park Drive, Suite B07
Andover, MA 01810
(978) 470-1695 | www.aqueous.net

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

IRRIGATION PLAN

NO.	REVISIONS	DATE
1	Addenda No. 3	6/4/21

DRAWN BY: NP
DESIGNED BY: NP
CHECKED BY: MI
ISSUE DATE: 5/26/21
BETA JOB NO.: 7171

SCALE
HOR. SCALE IN FEET: 1"=30'
30 0 30 60

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SHEET NO.
IR-1.0

CONFORMED

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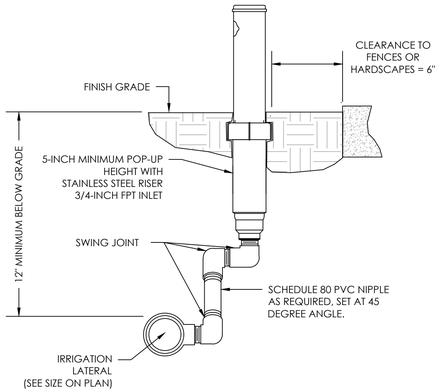
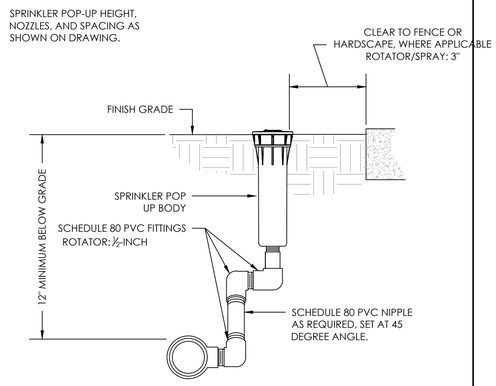
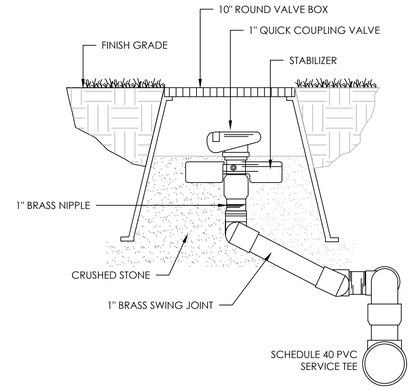


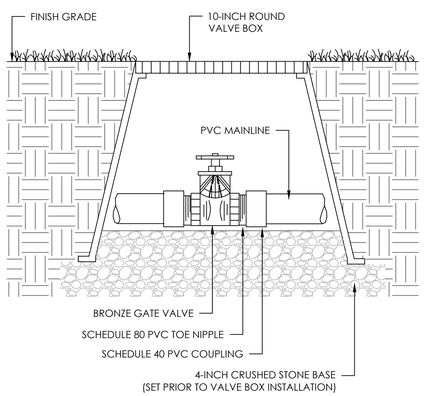
1 GEAR-DRIVEN ROTOR SPRINKLER
NOT TO SCALE



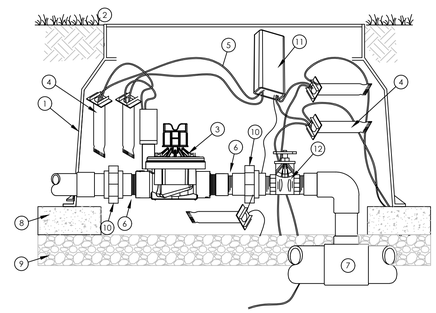
2 6-INCH & 12-INCH POP-UP SPRAY SPRINKLER
NOT TO SCALE



3 QUICK COUPLING VALVE
NOT TO SCALE



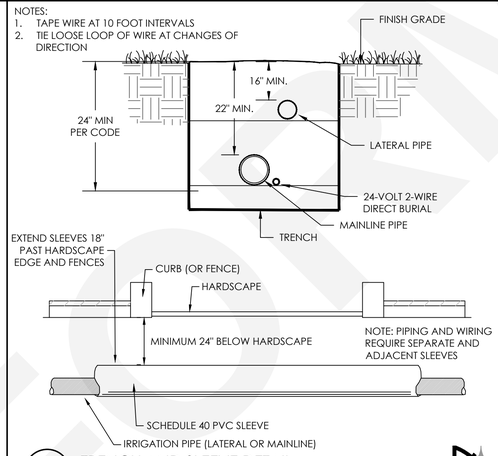
4 MAINLINE ISOLATION VALVE
NOT TO SCALE



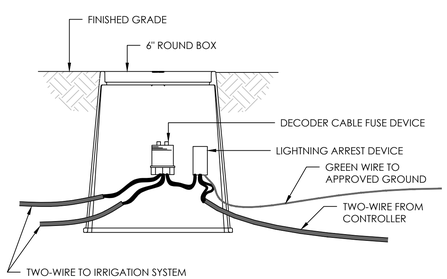
1. VALVE BOX (SEE SPECIFICATIONS)
2. FINISH GRADE
3. ELECTRIC CONTROL VALVE
4. WATERPROOF DBY-6 CONNECTORS
5. TWO WIRE
6. SCH 80 TOE NIPPLE
7. MAINLINE SERVICE TEE
8. BRICK SUPPORTS (4)
9. 4" WASHED 3/4" GRAVEL
10. PVC SLIP UNIONS
11. DECODER
12. BRONZE GATE VALVE

5 ELECTRIC ZONE VALVE WITH DECODER AND ISOLATION VALVE
NOT TO SCALE

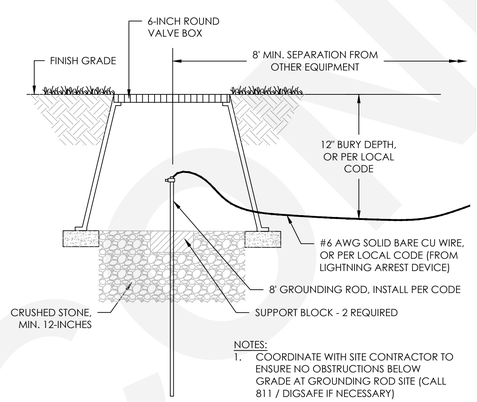
NOTES:
1. TAPE WIRE AT 10 FOOT INTERVALS
2. TIE LOOSE LOOP OF WIRE AT CHANGES OF DIRECTION



6 TRENCH AND SLEEVE DETAIL
NOT TO SCALE



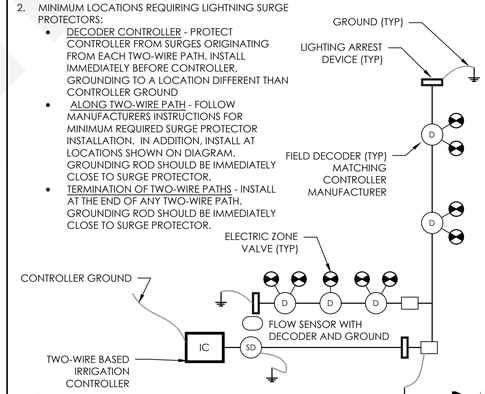
7 LIGHTNING ARREST AND DECODER FUSE DEVICE
NOT TO SCALE



NOTES:
1. COORDINATE WITH SITE CONTRACTOR TO ENSURE NO OBSTRUCTIONS BELOW GRADE AT GROUNDING ROD SITE (CALL 811 / DIGSSAFE IF NECESSARY)

8 DECODER GROUNDING DETAIL
NOT TO SCALE

NOTES:
1. LIGHTNING SURGE PROTECTOR
   - MATCHING IRRIGATION CONTROLLER MANUFACTURER.
2. MINIMUM LOCATIONS REQUIRING LIGHTNING SURGE PROTECTORS:
   - DECODER CONTROLLER - PROTECT CONTROLLER FROM SURGES ORIGINATING FROM EACH TWO-WIRE PATH. INSTALL IMMEDIATELY BEFORE CONTROLLER, GROUNDING TO A LOCATION DIFFERENT THAN CONTROLLER GROUND
   - ALONG TWO-WIRE PATH - FOLLOW MANUFACTURERS INSTRUCTIONS FOR MINIMUM REQUIRED SURGE PROTECTOR INSTALLATION. IN ADDITION, INSTALL AT LOCATIONS SHOWN ON DIAGRAM. GROUNDING ROD SHOULD BE IMMEDIATELY CLOSE TO SURGE PROTECTOR.
   - TERMINATION OF TWO-WIRE PATHS - INSTALL AT THE END OF ANY TWO-WIRE PATH. GROUNDING ROD SHOULD BE IMMEDIATELY CLOSE TO SURGE PROTECTOR.



9 SCHEMATIC ELECTRICAL DIAGRAM
NOT TO SCALE

PREPARED BY

BETA
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REGISTERED PROFESSIONAL

COMMONWEALTH OF MASSACHUSETTS
MICHAEL IGO
CIVIL
No. 46486
REGISTERED PROFESSIONAL ENGINEER

SUBCONSULTANT

Aqueous

AQUEOUS CONSULTANTS, LLC
IRRIGATION & WATER RESOURCE ENGINEERS
2 Dundee Park Drive, Suite B07
Andover, MA 01810
(978) 470-1695 | www.aqueous.net

PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

IRRIGATION DETAILS

NO.	REVISIONS	DATE
1	Addenda No. 3	6/4/21

DRAWN BY: NP
DESIGNED BY: NP
CHECKED BY: MI
ISSUE DATE: 5/26/21
BETA JOB NO.: 7171

SCALE
HOR. SCALE IN FEET: 1"=30'
30 0 30 60

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IR-2.0

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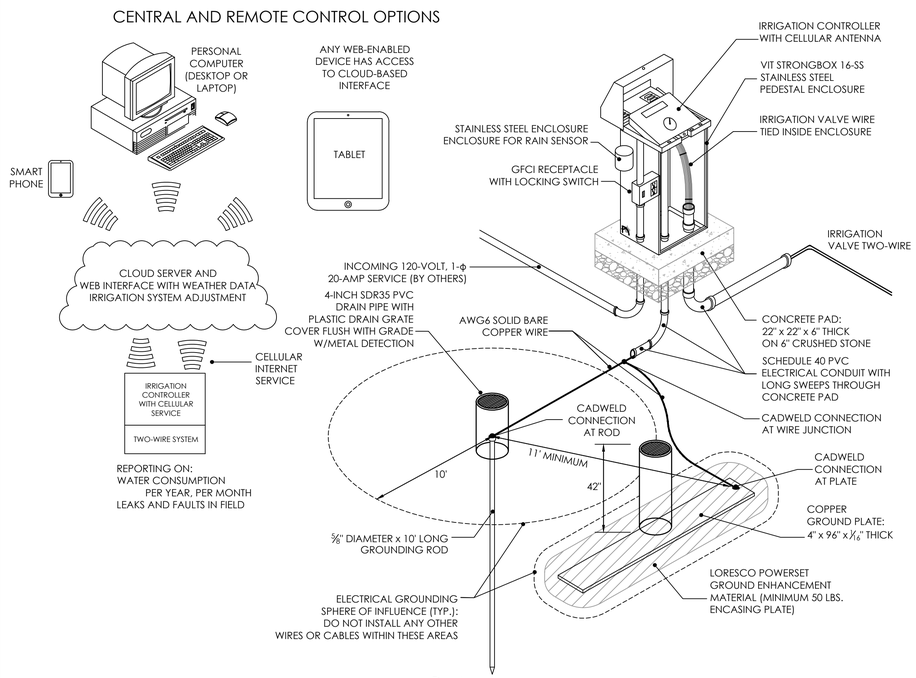
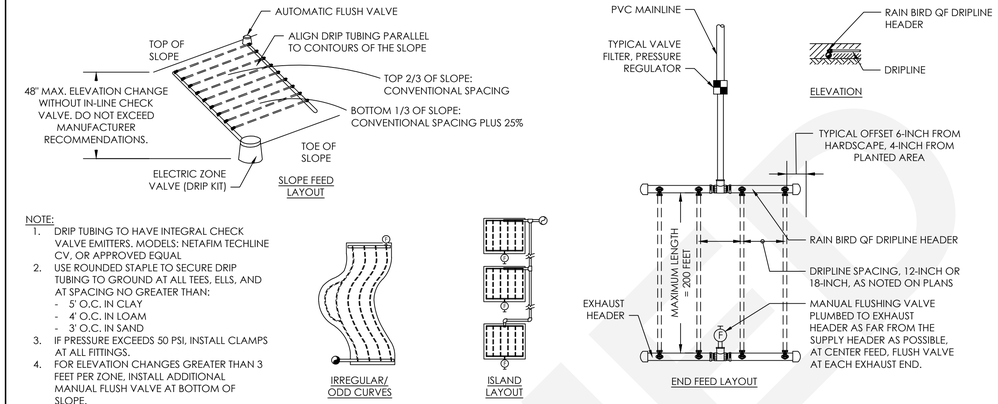
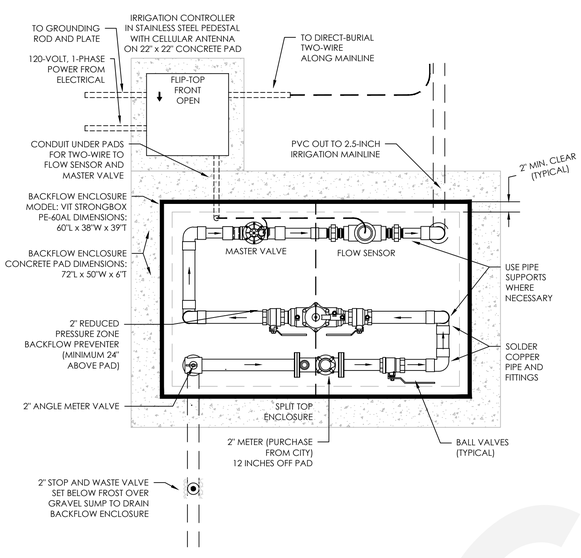


10 PEDESTAL MOUNT CONTROLLER
NOT TO SCALE



NOTE:
1. DRIP TUBING TO HAVE INTEGRAL CHECK VALVE EMITTERS. MODELS: NETAFIM TECHLINE CV, OR APPROVED EQUAL
2. USE ROUNDED STAPLE TO SECURE DRIP TUBING TO GROUND AT ALL TEES, ELLS, AND AT SPACING NO GREATER THAN:
   - 5' O.C. IN CLAY
   - 4' O.C. IN LOAM
   - 3' O.C. IN SAND
3. IF PRESSURE EXCEEDS 50 PSI, INSTALL CLAMPS AT ALL FITTINGS.
4. FOR ELEVATION CHANGES GREATER THAN 3 FEET PER ZONE, INSTALL ADDITIONAL MANUAL FLUSH VALVE AT BOTTOM OF SLOPE.

12 PLANTER BED IRRIGATION
NOT TO SCALE



BACKFLOW & METER ENCLOSURE SHALL BE VIT STRONGBOX, MODEL PE-60AL OR APPROVED EQUAL MEETING FOLLOWING SPECIFICATIONS:

DIMENSIONS: 60" LONG x 38" WIDE x 39" TALL

ENCLOSURE SHALL BE CONSTRUCTED OF A VANDAL AND WEATHER RESISTANT NATURE. MANUFACTRED ENTIRELY OF MARINE GRADE ALUMINUM ALLOY 5052-H32 WITH A WALL THICKNESS OF 1/8-INCH.

MOUNTING BASE SHALL BE MANUFACTRED ENTIRELY OF STAINLESS STEEL.

MAIN HOUSING SHALL BE A SOLID SHEET CONSTRUCTION PUNCHED ON THE ENDS WITH LOUVERS FOR VENTILATION.

ENCLOSURE SHALL BE A CENTER SPLIT DESIGN, HAVING MOUNTING LIPS ON EACH END.

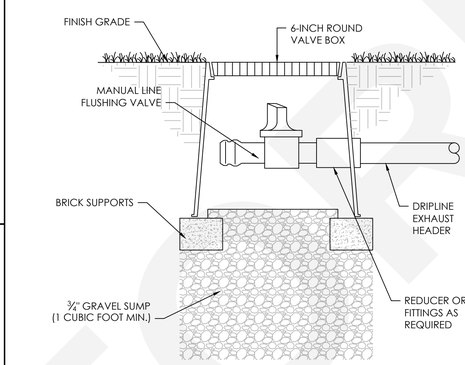
MOUNTING BASE SHALL BE SUBMERGED INTO CONCRETE PAD A MINIMUM OF 2 INCHES, POSITIONING ENCLOSURE 2½ INCHES ABOVE CONCRETE FOR DRAINAGE.

LOCKING MECHANISM SHALL BE A FULL RELEASE TYPE WHICH ALLOWS FOR COMPLETE REMOVAL OF THE ENCOSURE FROM ITS MOUNTIGN BASE WITHOUT USE OF TOOLS.

LOCKING MECHANISM SHALL BE A STAINLESS STEEL CROSS BAR STYLE AND PROVIDE FOR A PADLOCK.

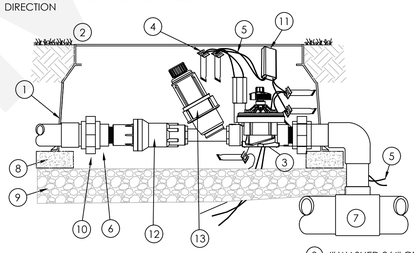
ALTERNATIVES AND APPROVED EQUALS FOR BACKFLOW & METER ENCLOSURE SHALL ALSO SUBMIT SHOP DRAWINGS TO DEMONSTRATE ADEQUATE SPACE FOR BACKFLOW PREVENTER AND CITY METER.

11 BACKFLOW & METER ENCLOSURE WITH FLOW SENSOR AND MASTER VALVE
NOT TO SCALE



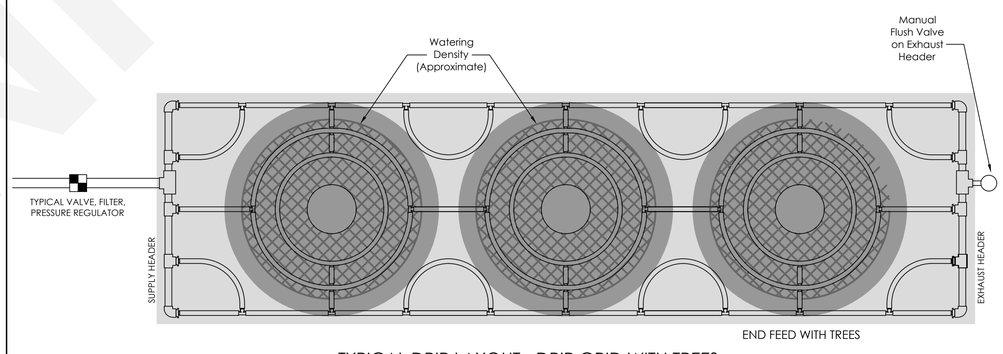
13 MANUAL FLUSH VALVE
NOT TO SCALE

NOTES:
1. WIRE SHALL BE TAPED AT 12' INTERVALS
2. TIE LOOSE LOOP OF WIRE AT CHANGES OF DIRECTION



1. VALVE BOX (SEE SPECIFICATIONS)
2. FINISH GRADE
3. ELECTRIC CONTROL VALVE
4. WATERPROOF DBY-6 CONNECTORS
5. TWO WIRE
6. SCH 80 TOE NIPPLE
7. MAINLINE SERVICE TEE
8. BRICK SUPPORTS (4)
9. 4" WASHED 3/4" GRAVEL
10. PVC SLIP UNIONS
11. DECODER
12. PRESSURE REGULATOR
13. SCREEN FILTER

14 DRIP ZONE VALVE WITH DECODER
NOT TO SCALE



TYPICAL DRIP LAYOUT - DRIP GRID WITH TREES

15 TREE AND PLANTER DRIP IRRIGATION
NOT TO SCALE

PREPARED BY

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PROJECT

FALL RIVER CITY PIER SITE IMPROVEMENTS

Fall River, MA

TITLE

IRRIGATION DETAILS

NO.	REVISIONS	DATE
1	Addenda No. 3	6/4/21

DRAWN BY: NP
DESIGNED BY: NP
CHECKED BY: MI
ISSUE DATE: 5/26/21
BETA JOB NO.: 7171

SCALE
HOR. SCALE IN FEET: 1"=30'
30 0 30 60

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.
IR-2.1

CONFORMED

5/25/2021 7:14 PM C:\USERS\MIKE\AQUEOUS CONSULTANTS\AQUEOUS CONSULTANTS - DOCUMENTS\PROJECTS\BETA GROUP, INC\20-0085, CITY PIER FALL RIVER\20_DESIGN\03_ADDENDUM 1\IRRIGATION DESIGN_ADDENDUM1.DWG (---)