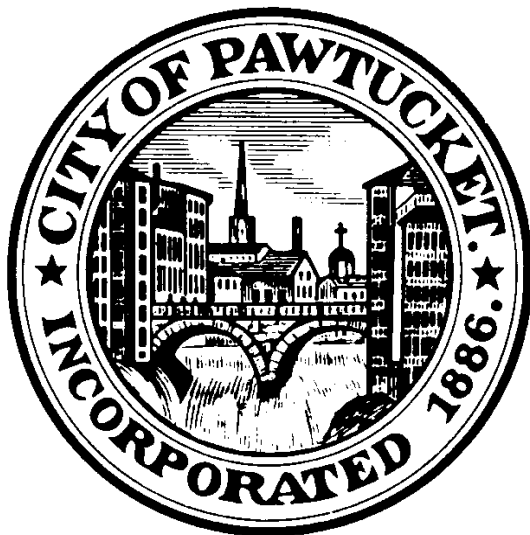


# **ADDENDUM NO. 2**

## **RIVERWALK WEST FINAL PHASE**

**BID #26-012**

**PAWTUCKET, RI**



## **PAWTUCKET, RHODE ISLAND**

DEPARTMENT OF PUBLIC WORKS

250 ARMISTICE BOULEVARD

PAWTUCKET, RHODE ISLAND

**ISSUED: May 14, 2026**

## Addendum #2 –May 14, 2026

# RIVERWALK WEST FINAL PHASE BID #26-012 Pawtucket, RI

The attention of bidders submitting proposals for the above-referenced project is called to the following Addendum to the Request for Proposals indicated above. The items set forth herein, whether of omission, addition, substitution or other change, are all to be included in, and form a part of the proposed Contract Documents for the work.

Inclusion of this Addendum must be acknowledged in the spaces provided in the document entitled “Request for Proposals Bid #26-012; Riverwalk West Final Phase”. Failure to acknowledge any and all addenda in the above specified bid form may be cause for rejection of the bids by the Owner on the grounds that it is not responsive.

This Addendum consists of three (3) pages and three (3) attachments.

### 1. UPDATES TO TECHNICAL SPECIFICATIONS

- Section 31 30 00 – Earthwork
  - Removes references to prior project phase entities & engineers
- Section 32 94 00 – Timber Guide Rail
  - Omit specification

### 2. UPDATES TO PLANS

- Updates to sheets : Title, RM, EC, MA, LA, GU, PR, LS-1, SE-1, SE-2, SD-2, SD-5
  - Provides clarifications to removals
  - Provides clarifications to cap type limits
  - Realigns riverwalk and interface with Taft Street. Associated impacts are identified.
  - Adds notes regarding truck access and stockpiling.
  - Removes Timber Guide Rail detail
  - Replaces Granite Seat detail with Placed Boulder
  - Adds Sign Post Footing detail
  - Adds reference to RIDOT details at Taft Street
  - Adds yard drain and storm pipe details, path underdrain limits

*Please note that the full plan set is attached to this addendum.*

### 3. QUESTIONS & ANSWERS RECEIVED AT THE PRE-BID CONFERENCE AND VIA EMAIL

**Q1: Can an equivalent be used for the NZ14 sheeting?**

**A1:** Response: An alternative may be proposed provided the width is appropriate to carry the granite cap. The work is intended to match the adjacent condition.

**Q2: Please clarify if the 8' HT Chain-link Fence with Mesh is temporary or permanent fence?**

**A2:** Response: Fencing shall be temporary construction fencing.

- Q3:** Can you please provide a copy of the geotechnical report. At the prebid meeting, they thought it was included in the environmental report but it was not.
- **Please provide GZA and Fuss & O'Neill soil Borings**
- A3:** Response: See Attachment A for the complete report.
- Q4:** Can you also provide a copy of the Site Investigation Report as well.
- A4:** A link to the SIR can be made available upon award. All relevant clean-up objectives and remedial actions are described and approved in the provided RAWP within the bid package.
- Q5:** Sheet EC - The drawing shows the 1' cap outside the limits of the work line. Please clarify that this is correct.
- A5:** Response: C.L.L. limit was corrected to correspond with earthwork. Work within the C.L.L. line will be capped per the legend.
- Q6:** Please clarify that Alternate 1 is for all the benches called for on the plans - 7 each along the path and 4 each located on the pavers or is this alternate for any additional benches.
- A6:** Response: Alternate 1 includes the seven (7) benches and pads along the asphalt path. Include the four (4) benches in the plaza space under the pricing for Alternate 3. *Note that ALL light poles shall be included in the Base Bid along the path.*
- Q7:** Please clarify if Alternate 3 includes the CIP Wall as detailed on SD-4 and Concrete Wall detailed on sheet SD-3.
- A7:** Response: Yes. concrete wall "A" on SD-3 and the C.I.P wall (between the plaza and adjacent concrete sidewalk) on SD-4 are part of Alternate 3.
- Q8:** Please clarify if small rip rap under deck is included in Alternate 3.
- A8:** Response: Yes. For the Base Bid, the area will be restored to lawn with the 12" clean fill & topsoil cap as detailed.
- Q9:** Please clarify the color of the granite seats and cap.
- A9:** Response: For the granite cap, we will inquire with the City for submittal data from the previous Town Landing project for details and provide in the next addenda. For the Granite cut stone seating, the detail has been replaced with a "Placed Boulder" detail to match what was installed at the Stadium Project. See Detail and notes added to Addendum 02 plans.
- Q11:** Sheet GU - Please clarify the size of the Area Drainage and Manholes.
- **Also clarify if the 12" HDPE is being connected to an existing Drainage MH.**
- A11:** Response: Information has been added to the sheet GU and details (SD-5). The proposed drainage will connect to a stub installed under the existing walk. Pipe is 18" HDPE.
- Q12:** If excess soil is generated and can be used on the construction site, where on the remaining site can the soil be disposed of? Do we have to cover the area with clean soil?
- A12:** Response: Cut and fill calculations estimate this to be a fill job without excess cut.

**Q13: Riverwalk Detail on sheet SD-1 shows 4" perforated subdrain under porous pavement. Please provide a layout detail of the subdrain on the utilities plan.**

**A13:** Response- Underdrain has been added to sheet GU

**Q14: The proposed 18" HDPE Pipe extends into the existing riverwalk trail. Please clarify if a permanent patch is required or the limits of the new river walk should be extended to connection of the 18" HDPE Pipe.**

**A14:** Response- A stub extension was installed under the existing pervious asphalt walk. Assume only removal of gravel or soil cover to expose it for connection. If an as-built is available, we will provide in the next addendum.

**Q15: Can you provide further detail on the electrical. Are you able to provide a spec, supplier or details on the light pole and fixture. Is there room in the panel for these additional loads? Is there a timer required? More details on the electrical scope would be helpful since it is design build.**

**A15:** Response- City & Owner to provide information in the next addendum. The proposed lighting will be fed from the utility pole and will not be metered with the existing stadium property lighting.

**Q16: Can you provide further detail on the railings. No specification was provided. Is this a custom rail system? Are we going to have to stamp the design to meet the 250 pounds per lf ? The railing post bracket detail shows the bracket connected to a cast in place wall. However, the typical amphitheater overlook section shows a 2 foot overhang. The posts would only be anchored into the deck and not the concrete**

**A16:** *Response- to be provided in next addendum*

#### **ATTACHMENTS:**

- A. Geotechnical Report prepared by GZA, dated February 2022
- B. Plans (Addendum 02 dated May 11, 2026), 20 pages
- C. Section 313000 – Earthwork (revised pg 3)

Please contact Michael Wilcox (401-728-0500 ext 447), City of Pawtucket, with any questions.

## Addendum #2 –May 12, 2026

# RIVERWALK WEST FINAL PHASE BID #26-012 Pawtucket, RI

The attention of bidders submitting proposals for the above-referenced project is called to the following Addendum to the Request for Proposals indicated above. The items set forth herein, whether of omission, addition, substitution or other change, are all to be included in, and form a part of the proposed Contract Documents for the work.

Inclusion of this Addendum must be acknowledged in the spaces provided in the document entitled “Request for Proposals Bid #26-012; Riverwalk West Final Phase”. Failure to acknowledge any and all addenda in the above specified bid form may be cause for rejection of the bids by the Owner on the grounds that it is not responsive.

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- Section 31 30 00 – Earthwork
  - Removes references to prior project phase entities & engineers
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*Please note that the full plan set is attached to this addendum.*

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**A1:** Response: An alternative may be proposed provided the width is appropriate to carry the granite cap. The work is intended to match the adjacent condition.

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**A2:** Response: Fencing shall be temporary construction fencing.

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- **Please provide GZA and Fuss & O'Neill soil Borings**
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- A7:** Response: Yes. concrete wall "A" on SD-3 and the C.I.P wall (between the plaza and adjacent concrete sidewalk) on SD-4 are part of Alternate 3.
- Q8:** Please clarify if small rip rap under deck is included in Alternate 3.
- A8:** Response: Yes. For the Base Bid, the area will be restored to lawn with the 12" clean fill & topsoil cap as detailed.
- Q9:** Please clarify the color of the granite seats and cap.
- A9:** Response: Granite wall cap shall be a light grey similar to Williams Blue Sky by Williams Stone Co., East Otis, MA. We will inquire whether the City has submittal data available for the product installed and update the response by the 5/22 response deadline.  
Response: the Granite cut stone seating has been replaced with a "placed boulder" detail to match what was installed at the Stadium Project. See Detail and notes added to Addendum 02 plans.
- Q11:** Sheet GU - Please clarify the size of the Area Drainage and Manholes.  
• **Also clarify if the 12" HDPE is being connected to an existing Drainage MH.**
- A11:** Response: Information has been added to the sheet GU and details (SD-5). The proposed drainage will connect to a stub installed under the existing walk. Pipe is 18" HDPE.
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- A12:** Response: Cut and fill calculations estimate this to be a fill job without excess cut.

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**Q15: Can you provide further detail on the electrical. Are you able to provide a spec, supplier or details on the light pole and fixture. Is there room in the panel for these additional loads? Is there a timer required? More details on the electrical scope would be helpful since it is design build.**

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#### **ATTACHMENTS:**

- A. Geotechnical Report prepared by GZA, dated February 2022
- B. Plans (Addendum 02 dated May 11, 2026), 20 pages
- C. Section 313000 – Earthwork (revised)

Please contact Michael Wilcox (401-728-0500 ext 447), City of Pawtucket, with any questions.

**Attachment A: Geotechnical Report prepared by GZA,  
dated February 2022**



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## GEOTECHNICAL REPORT

# TIDEWATER DEVELOPMENT - TOWN LANDING SITE PAWTUCKET, RHODE ISLAND

February 2022

File No. 03.0034847.03



### PREPARED FOR:

Fortuitous Tidewater LLC  
Los Angeles, California

### GZA GeoEnvironmental, Inc.

188 Valley Street, Suite 300 | Providence, RI 02909  
401-421-4140

30 Offices Nationwide  
[www.gza.com](http://www.gza.com)

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www.gza.com



February 4, 2022  
File No. 03.0034847.03

Mr. Daniel Kroeber  
Director of Development  
Fortuitous Tidewater LLC  
953 Chattanooga Avenue  
Los Angeles, CA 90272

Re: Geotechnical Report  
Tidewater Development (Town Landing Site)  
Pawtucket, Rhode Island 02910

Dear Mr. Kroeber:

GZA GeoEnvironmental, Inc. is pleased to provide you with this Geotechnical Report for the above-referenced project. This report was prepared in accordance with our proposal dated April 20, 2021 and is subject to the limitations included in **Appendix A**.

## BACKGROUND

The Town Landing Site (see **Photo 1**) is located west of the Seekonk River within an artificial fill area. Based on historical aerial photography, the majority of the site was used as a commercial waterfront property from before 1939 to approximately 1980. Aerial photography from 1981 shows that the buildings, structures, and laydown areas that had existed at the site from before 1939 to about 1980 had been demolished, and the site had been regraded. The majority of the Town Landing Site (southern portion) has remained undeveloped since 1981 and was vegetated with dense brush and trees of varying maturity. Between 1997 and 2002, a public boat ramp, paved parking and a pedestrian walkway leading to a waterfront park were constructed in the far northern portion of the site. Where the park abuts the Seekonk River, a combination of steel sheet pile and granite block bulkhead wall runs along the water's edge.



Photo 1: Site Locus

Grade elevations vary across the site significantly. On the west side of the property along Taft Street, ground surface elevations vary between elevation 12 feet at the northwestern site limits to 38 feet at the southwestern site limits. From the high ground along Taft Street, the grade generally slopes down eastward to elevations between 6 to 4 feet along the banks of the Seekonk River. All elevations in this report are referenced relative to the North American Vertical Datum of 1988 (NAVD88) unless specifically indicated otherwise.



## **PROPOSED DEVELOPMENT**

GZA's understanding of the proposed development is based on progress plans provided by SLR Consulting (SLR) as well as information provided by Fortuitous and Odell Architects, transmitted to GZA by SLR between October 2020 and December 2021. During Phase 1, the proposed development at the Town Landing site will consist of general site improvements, temporary grading for parking, construction staging, and material stockpiling areas. Installation of temporary sedimentation controls and construction of a temporary access road to support the development and construction of a new soccer stadium to the south (Tidewater Stadium Site) are also planned as part of the Phase-1 development. After construction of the soccer stadium to the south has been completed, the second phase of development at the Town Landing site will include construction of a new mixed-use building consisting at the core of a 5-level parking garage, surrounded by five to six levels of residential and commercial space. The proposed Phase-2 development at the Town Landing Site will also include a pedestrian bridge connecting the western and eastern banks of the Seekonk River, and associated river walks.

Planned improvements beyond the Pawtucket Town Landing site that are included in the overall conceptual development include a soccer stadium to the south to be constructed prior to the Town Landing development and a mixed-use residential / commercial and hotel development on the adjacent eastern bank of the Seekonk River (Division Street Site – Phase 3).

## **GEOLOGIC SETTING**

Available USGS publications were reviewed in order to obtain an understanding of the area geology. The following sections of this report describe those findings.

### **Surface Geology**

According to the 1956 Surficial Geology Map of the Providence Quadrangle, Rhode Island, the majority of surficial soils in the vicinity of the site consist of artificial fill soil that has been historically placed along the western riverbanks of the Seekonk River. A band of native and granular river terrace material is mapped along Taft Street and a small portion of the river terrace band encroaches onto the project site. River terrace deposits are described as medium to coarse sand and in places thin beds of gravel, deposited as early alluvium. The surficial Geology map notes that the terraces along the Seekonk River probably are erosional.

### **Bedrock Geology**

According to the 1959 Bedrock Geologic Map of the Providence Quadrangle, Rhode Island, the site is underlain by the Rhode Island Formation. The Rhode Island formation is described as greenish, gray, dark-gray, to black, graywacke, conglomerate, sandstone, shale, and meta-anthracite. The Rhode Island formation also includes a few beds of red sandstone and shale that are found in the northeastern portion of the Providence quadrangle, where the development site is located. Irregular bedding and crossbedding are common for the different rock types.

## **PRIOR SUBSURFACE EXPLORATIONS**

Several prior geotechnical and environmental subsurface exploration programs were conducted by others on the Town Landing property. GZA has reviewed available subsurface data from those prior boring programs at the proposed development site to supplement the subsurface exploration program carried out as part of this current study; however, only certain prior borings included geotechnically relevant data such as Standard Penetration Test (SPT) blow counts or SPT-N values, and/or detailed soil sample descriptions using the USCS or Burmister classification system. The SPT test consists of driving a 1-3/8 inch inside diameter standard split-spoon sampler at least 18 inches with a 140-pound hammer dropping from a height of 30 inches. The SPT blow count (N-value) is the number of blows required to drive the sampler from 6 to 18 inches of penetration and is a commonly used indicator of soil density and consistency. Records of prior borings that did not contain SPT data, groundwater data, or where only limited soil sample descriptions were available, were considered to be of limited relevance relative to the geotechnical data needs required as part of this study.



Based on our review of records from prior subsurface exploration programs, GZA has identified and integrated relevant subsurface data from the following prior exploration programs at the Tidewater Landing Site. The respective exploration locations of the new and prior test borings are shown on attached **Figure 2 – Exploration Location Plan**. Logs of the referenced borings are included in **Appendix B – Subsurface Exploration Logs**.

#### **Fuss & O’Neill – 2011 MW/SB Series**

Between August and September of 2011, Fuss & O’Neill drilled nine (9) soil borings, presumably for a remedial investigation study at the Tidewater Landing Site. While the nine (9) explorations are located along the perimeter of the site, some of the soil borings and monitoring well locations are located within or near the now-proposed building development footprint and the proposed pedestrian bridge. These test borings are designated MW-01 through MW-03, SB-04, MW-05, MW-06, SB-07, SB-08, and MW-09. The borings were completed using direct-push methods and extended to depths of between approximately 7 to 27 feet below the existing ground surface. The borings did not include standard penetration testing and no groundwater observations and/or measurements were included on the boring logs. GZA reviewed the available boring logs from this boring program as summarized below.

Typically, topsoil and fill were encountered near the ground surface, overlying granular outwash soils. In borings MW-06 and SB-07 near Taft Street, a seven to nine foot thick layer of silt was encountered at a depth of about 10 feet below the ground surface. Borings MW-03, SB-04, and MW-05 in the northern portion of the site encountered shallow refusal at 8, 7, and 12 feet below the ground surface, respectively. It is presumed that these borings were primarily completed to install groundwater monitoring wells and obtain soil and groundwater samples for environmental and analytical testing. Groundwater monitoring wells that had been installed in some of the 2011 borings were still accessible at the time of the current study. New measurements were made during the 2021 drilling work and documented as summarized in the groundwater section of this report. Subsurface data from borings considered relevant to this study was included into the geotechnical / subsurface database for this study.

#### **McMillen Jacobs Associates – 2019 B Series**

In September of 2019 and February of 2020, McMillen Jacobs Associates drilled thirteen (13) soil borings for a geotechnical investigation study for a proposed combined sewer overflow (CSO) tunnel project along the Taft Street and Tidewater Street. One (1) of the soil borings (Boring B-3) was located southwest of the now-proposed Town Landing development. This boring was completed using mud rotary drill methods and extended to a depth of approximately 37 feet below the existing ground surface. Bedrock was encountered approximately 27 feet below the existing ground surface and approximately ten feet of rock was cored and sampled. While this boring was primarily completed to obtain subsurface data for a proposed CSO tunnel alignment, the test boring included standard penetration testing at each of the soil sampling depths. SPT-N blow counts were recorded on the boring logs for each sample interval. Subsurface data from this boring considered relevant to this study was included into the geotechnical / subsurface database for this study.

#### **Prior Subsurface Exploration Locations – General**

The locations and ground surface elevations of the prior explorations were taken from the respective boring logs and from respective exploration location plans. The grade surface elevations of the prior borings generally appear to be referenced to the National Geodetic Vertical Datum – Mean Sea Level of 1929 (NGVD29), which differs by about 0.8 feet from NAVD88 at the site. Rhode Island State Plane (Northing and Easting) coordinates have been used to establish the boring locations where available. Where coordinates were not available, the exploration locations were approximated by overlaying scans of historic exploration plans onto the current digital site plan. Some of the prior exploration locations and elevations have been estimated by interpolating between contours on site plans provided by National Grid and SLR. These data should be considered approximate and accurate only to the degree implied by the methods used.



## CURRENT SUBSURFACE EXPLORATIONS

### GZA GeoEnvironmental – 2021 GZ-SB-100 Series

Based on our review of the past subsurface data, we identified eleven (11) areas on the Town Landing site that required additional borings to further investigate subsurface conditions within and around the proposed development limits. Eleven (11) supplemental test borings were advanced for this study. The locations of the borings were selected based on layout of new proposed structures, and review of available drawings and aerial photography showing historical site features and utilities, to avoid areas with potential underground structures or subsurface utilities. The proposed exploration locations were located and marked out by GZA personnel in the field. Generally, minor field adjustments were made to the boring locations depending on access of the drilling equipment at each of the planned boring locations. Following the completion of the test borings, the as-drilled exploration locations were surveyed with GPS equipment to obtain northing and easting coordinates for each location.

Test borings GZ-SB-101 through GZ-SB-111 were drilled by New England Boring Contractors of Brockton, Massachusetts between March 31 and April 8, 2020. The borings were advanced to depths between 19 and 40.5 feet below the existing ground surface. All borings were drilled using a Diedrich D-120 track-mounted all-terrain drill rig utilizing drive and wash drilling methods.

Split spoon soil samples were obtained at 2 to 5-foot intervals in general accordance with ASTM D-1586, the Standard Penetration Test (SPT). The soil samples were classified according to the modified Burmister classification system. Groundwater elevations were inferred by reviewing soil sample moisture content as observed in the split spoon sampler and by measuring depth to water inside the casing upon completion of the borings. Where rock coring was performed, the casing was seated into the weathered top of bedrock, and the rock core barrel was extended through the casing to near the top of the competent bedrock to start the rock coring process.

## CONCURRENT ENVIRONMENTAL SUBSURFACE EXPLORATIONS

SLR performed a concurrent subsurface exploration program that consisted of several shallowing borings and overburden groundwater monitoring wells for environmental testing purposes. Monitoring wells SLR-MW-A and SLR-MW-B were installed within the footprint of the parking garage portion of the proposed five-to-six story building. GZA was provided stabilized groundwater readings taken by SLR. For additional information relative to environmental site conditions, refer to the site investigation report (SIR) prepared by SLR.

## SUBSURFACE CONDITIONS

The generalized subsurface profile across the site generally consisted of a layer of topsoil/forest mat and/or a layer of artificial fill of varying thickness at the ground surface. These strata were underlain by glacial outwash deposits consisting of varying amounts of sand, silt, and gravel, overlying weathered rock and bedrock. The subsurface conditions are described in greater detail in the following paragraphs. Refer to the boring logs in **Appendix B** for more specific descriptions of the conditions encountered in each exploration.

### Topsoil / Forest Mat

At some of the boring locations, a layer of topsoil / forest mat was encountered. Generally, the topsoil/forest mat thickness was variable across the site and was observed to range from approximately three to nine inches on average. The topsoil / forest mat contained varying amounts of organic material such as roots, leaves, and plant matter. In general, the transition between the surficial topsoil / forest mat and the underlying fill material appeared to be gradual, and no distinct interface between the surficial topsoil layer and the underlying fill was observed.



### **Artificial Fill**

Fill was encountered at the previous and current explorations at the ground surface or below the topsoil / forest mat. The fill thickness was highly variable across the site and was observed to extend to depths ranging from 2 to 14 feet below the existing ground surface. Consistent with the present topography and the historic shoreline location, observed fill thicknesses generally increase eastward across the site with the most significant thickness of the fill material encountered along the present shoreline.

The artificial fill typically consisted of fine to coarse sand with varying amounts of gravel, silt, and urban debris such as ash, coal, asphalt, glass, brick, and concrete. Approximately 5 to 6 feet of rock fill consisting of completely weathered siltstone was encountered below the sandy fill at boring locations GZ-SB-103 and GZ-SB-104 from 9 to 14 feet below ground surface (bgs) and 4 to 10.25 feet bgs, respectively. SPT N-values in the fill material ranged from weight-of-hammer (WOH) to over 100 blows per foot indicating relative densities of “very loose” to “very dense”. The average relative density of the outwash was considered primarily “loose to medium dense”.

### **Outwash**

Glacial outwash was encountered beneath the fill in all the test boring locations. The glacial outwash deposits typically consisted of silty sand, sand, and silt with varying amounts of gravel. The top of the glacial outwash layer was encountered at depths ranging from 2 to 14 feet below the existing ground surface and elevations ranging from approximately 32 to 35 feet in the western portion of the site near Taft Street to elevations ranging from approximately -8 to 2 feet in the eastern portion of the site proximate to the Seekonk River. Layer thicknesses ranged from 7 feet to approximately 27 feet at the test boring locations. Generally, the deepest deposits of natural outwash materials were encountered in the western portion of the site along Taft Street. SPT N-values in the glacial outwash material ranged from 1 to 59 blows per foot indicating relative densities of “very loose” to “very dense”. The average relative density of the outwash was considered primarily “medium dense”. Borings GZ-SB-102 and GZ-SB-104 were terminated within or at the bottom of the outwash layer with spoon refusals of 50 blows for 0 inches of penetration. Split spoon refusal is defined as 50 blows for less than one inch of penetration or 100 blows for less than 6 inches of penetration.

### **Weathered Rock**

A layer of weathered rock was encountered below the naturally deposited materials at boring locations GZ-SB-105 through GZ-SB-111. The weathered rock material generally consisted of a highly to completely weathered siltstone. The top of the weathered rock layer was encountered at depths ranging from 17 to 30 feet below the existing ground surface and elevations ranging from approximately 8 to 11 feet in the western portion of the site near Taft Street to elevations ranging from approximately 0 to -17 feet in the eastern portion of the site proximate to the Seekonk River. Layer thicknesses ranged from 1 to 3 feet in borings that extended to competent bedrock. Borings GZ-SB-105 through GZ-SB-107, GZ-SB-109, and GZ-SB-110 terminated within the weathered bedrock layer with split spoon refusals. Split spoon refusal is defined as 50 blows for less than one inch of penetration or 100 blows for less than 6 inches of penetration.

### **Bedrock**

Bedrock was encountered either below the weathered bedrock layer or directly below the glacial outwash layer in borings GZ-SB-101, GZ-SB-103, GZ-SB-108, and GZ-SB-111. As previously discussed, the top of the bedrock generally slopes downward from west to east towards the Seekonk River. Bedrock along the western limits of the site was encountered 34 feet below the ground surface corresponding to approximate elevation of 3 feet. Bedrock within the central to eastern portion of the site was encountered at depths ranging from 14 to 21 feet below the ground surface and elevations ranging from -2 to -14 feet.

Where rock cores were obtained, rock core recoveries ranged from 63 to 100 percent. Bedrock at the site was typically described as hard, slightly weathered, sound to moderately fractured, amorphous, gray to purple siltstone. The Rock Quality Designation (RQD) ranged from 0 to 87 percent in the rock, indicating highly weathered and fractured rock of very poor rock mass quality to slightly weathered and fractured rock of good rock mass quality.



**Groundwater**

Stabilized (equilibrated) groundwater elevations were measured in groundwater monitoring wells installed in recent and prior borings. Measurements were obtained at recent boring location GZ-SB-108, SLR-MW-B, and at additional accessible groundwater monitoring wells that remained from prior subsurface studies at the site. While no historic groundwater measurement data was included on the respective boring logs, GZA surveyed the ground surface elevation and obtained additional stabilized groundwater measurements from these wells in April 2021 and January 2022. Please note that ground surface elevations in the table below refer to the as-surveyed elevations referenced to NAVD88. Ground surface elevations reported on the boring logs have been rounded to the nearest foot. The groundwater measurements are summarized below:

Well ID	Approx. Ground Surface Elev. (ft)	Approx. Bottom of Boring Elev. (ft)	Groundwater Depths and Elevations		
			Date	Depth (ft)	Elev. (ft)
GZ-SB-108 (ow) (SLR-MW-A)	17.1	-7	4/6/2021	11.1	6.0
			5/3/2021	11.0	6.1
			1/24/2022	11.7	5.4
SLR-MW-B	38.0	8.0	5/3/2021	dry	below 9.5
			1/24/2022	30	9.5
MW-01	6.4	-8.0	3/31/2021	4.6	1.8
			4/6/2021	6.7	-0.3
			5/3/2021	7.1	-0.7
			1/24/2022	5.6	0.9
MW-02	5.8	-9.0	3/31/2021	5.2*	0.6
			4/6/2021	5.8	0.0
			5/3/2021	6.1	-0.3
			1/24/2022	5.0	0.8
MW-03	7.7	-2.0	3/31/2021	2.5*	5.2
			4/6/2021	2.4	5.3
			5/3/2021	3.1	4.6
			1/24/2022	3.7	4.0
MW-05	11.3	0.0	3/31/2021	1.6*	9.7
			4/6/2021	1.4	9.9
			5/3/2021	1.6	9.7
			1/24/2022	3.2	8.2
MW-06	35.2	8.0	3/31/2021	14.1*	21.1
			4/6/2021	13.5	21.7
			5/3/2021	14.0	21.2
			1/24/2022	16.3	18.9
MW-09	7.0	-12.0	3/31/2021	4.4*	2.6
			4/6/2021	7.1	-0.1
			5/3/2021	7.6	-0.6
			1/24/2022	6.0	1.0

“\*” = Indicates groundwater measured prior to purging existing wells



Additional groundwater elevations at the recent borings were inferred based on water level inside the drill casing at the end of drilling operations and/or soil sample moisture content observed in the soil samples obtained during drilling. It is noted that groundwater observations in these explorations were made at the time and under the conditions stated in the exploration logs. These measurements were taken after the introduction of water as drilling fluid into the borehole and may not be representative of equilibrated groundwater conditions.

Well ID	Approx. Ground Surface Elev. (ft)	Approx. Bottom of Boring Elev. (ft)	Inferred Groundwater Depths and Elevations *		
			Date	Depth (ft)	Elev. (ft)
GZ-SB-101	7.9	-11.0	3/31/2021	4.3	3.6
GZ-SB-102	15.2	-12.0	4/6/2021	15.0	0.2
GZ-SB-103	5.6	-17.0	4/1/2021	3.3	2.3
GZ-SB-104	5.8	-13.5	4/2/2021	7.1	-1.3
GZ-SB-105	6.8	-18.0	4/2/2021	7.7	-0.9
GZ-SB-106	14.3	-16.0	4/2/2021	13.0	1.3
GZ-SB-107	17.9	-9.5	4/5/2021	11.6	6.3
GZ-SB-108	17.1	-7.0	4/6/2021	9.0	8.1
GZ-SB-109	33.9	10.0	4/7/2021	N.O.	N.O.
GZ-SB-110	38.3	4.25	4/7/2021	26.4	11.9
GZ-SB-111	37.4	-3.5	4/8/2021	22.3	15.1

“\*” = Indicates groundwater was inferred from soil sample moisture and observations during drilling and may be influenced by drill fluids  
 “N.O.” = Indicates groundwater was not observed

The data suggests that groundwater beneath the site flows from west to east towards the Seekonk River. Based on the available data, the average groundwater table is considered to range between approximate elevations 10 to 22 feet near the western limits of the site along Taft Street. Notes in the boring logs from the 2011 study, and an unusually high groundwater elevation recorded in monitoring well MW-06 suggest that areas may exist along Taft Street where groundwater may be perched on a low-permeability layer of silt. Generally, the groundwater elevations across the site appear to gradually decrease towards the east and average groundwater elevations of between approximately -1 to 4 feet were recorded along the Seekonk River, where groundwater is likely tidally influenced. Note that groundwater may mound in areas where the flow of groundwater to the river is impeded by a sheet pile bulkhead as is the case in the far northern portion of the site near monitoring well MW-03.

Based on groundwater data obtained for the Town Landing site and the Tidewater Stadium site located immediately to the south, it is anticipated that the tidal fluctuation range in the monitoring wells proximate to the Seekonk River may vary between 4 to 6 feet, depending on the tide cycle and proximity to the riverfront. Based on the prior study, it is suggested to consider the area within approximately 100 feet of the riverfront to be tidally influenced. In general, the groundwater table appears to be located predominantly within the outwash layer in the western portion of the site and within the fill stratum within the eastern portion of the site.

It is anticipated that groundwater levels will vary due to variations in rainfall and other factors different than those prevailing at the time the explorations were performed, and the measurements were made. It should be noted that the seasonally lowest groundwater levels typically occur during the late summer and fall months, and the highest levels typically occur during the spring months. Refer to the boring logs in **Appendix B** for additional details on groundwater observations.

**GEOTECHNICAL LABORATORY TESTING**

Twelve (12) soil samples were submitted to Thielsch Engineering in Cranston for laboratory grain size analysis in general accordance with ASTM D6913 and three (3) samples were tested for water content in general accordance with ASTM D2216 and organic content in general accordance with ASTM D2974. A summary of the laboratory test results is included in the tables below, and the laboratory



data sheets are included in **Appendix C**.

Boring	Sample	Depth (ft)	Material	Water Content (%)	Fines Content (%)	Organic Content (%)	Burmister Classification
GZ-SB-102	S-3	4-6	Fill		3.1		Gray f-c GRAVEL and f-c SAND, trace Silt
GZ-SB-102	S-8	19-21	Outwash	57.1		15.5	Organic Content Only
GZ-SB-103	S-4	6-8	Fill		10.2		Brown f-c SAND and f-c GRAVEL, little Silt
GZ-SB-103	S-6	14-16	Outwash	25.6		2.0	Organic Content Only
GZ-SB-103	S-7	16-18	Outwash		10.7		Brown f-c GRAVEL and f-c SAND, little Silt
GZ-SB-105	S-5	8-10	Outwash		67.2		Brown SILT, some f-c Sand, trace fine Gravel
GZ-SB-105	S-7	14-16	Outwash		51.5		Brown CLAYEY SILT, some f-c Gravel, some f-c Sand
GZ-SB-106	S-9	19-21	Outwash		30.0		Brown f-c SAND, some Silt, little fine Gravel
GZ-SB-107	S-2	2-4	Fill		18.5		Brown f-c SAND, some f-c Gravel, little Silt
GZ-SB-107	S-8	14-16	Outwash		73.7		Brown CLAYEY SILT, some f-c Sand, trace fine Gravel
GZ-SB-108	S-2	2-2.9	Fill		11.3		Dark Brown f-c SAND, some f-c Gravel, little Silt
GZ-SB-108	S-4	6-8	Fill	16.4		3.7	Organic Content Only
GZ-SB-110	S-2	2-4	Fill		15.6		Brown f-c GRAVEL, some f-c Sand, little Silt
GZ-SB-110	S-6	14-16	Outwash		96.1		Brown CLAYEY SILT, trace f-m Sand, trace fine Gravel
GZ-SB-111	S-6	14-16	Outwash		96.2		Brown CLAYEY SILT, trace f-m Sand

Four (4) soil samples collected from borings GZ-SB-102, GZ-SB-103, GZ-SB-107, and GZ-SB-108 were submitted to ESS’s analytical laboratory in Cranston, RI for sulfate, chloride, pH, and electrical resistivity testing. The purpose of the testing was to evaluate corrosivity of the existing fill soils. The samples were obtained from depths of 2 to 8 feet below the existing grade surface. The test results are included in **Appendix C** and are summarized below.

Boring	Sample	Depth (ft)	Material	Resistivity (ohms-cm)	Sulfate (mg/kg)	Chloride (mg/kg)	pH
GZ-SB-102	S-2	2-4	Fill	600	ND	ND	11.6
GZ-SB-103	S-4	6-8	Fill	700	111	185	8.25
GZ-SB-107	S-3	4-6	Fill	3,000	104	55	10.1
GZ-SB-108	S-3	4-6	Fill	10,000	ND	ND	7.40

ND = Not Detectable



## EVALUATION OF CORROSION POTENTIAL

In general, sulfates, chlorides as well as low-resistivity soils or soils with extreme pH can degrade concrete and corrode steel. Soil resistivity is typically used and considered to be the dominant variable in assessing a soils corrosion potential, especially for carbon steel and cast-iron alloy materials in the subsurface environment. The pH-value of the soils, together with concentrations of sulfates and chlorides is typically evaluated in order to determine other potential sources of possible soil corrosivity and long-term performance of concrete and steel foundation structures. These parameters were analyzed by U.S. EPA approved methodologies and National Environmental Laboratory Accreditation Conference (NELAC) requirements were met. Based on the laboratory test results, the following should be considered:

### Soil Resistivity

The soil resistivity parameter is generally used to assess the potential corrosivity of a soil by measuring the soils potential to conduct electrical currents. Soil resistivity can therefore be used as an indicator in assessing a soils potential for corrosive attack of cast iron alloy or carbon steel materials as used for steel piles, concrete reinforcement, or utility piping. Soil resistivity is affected by both the amount of dissolved salts in the soil, as well as the moisture content of the soil. The conductivity typically increases with the salinity of the groundwater. The resistivity of dry soil tends to be very high. As the moisture content increases, the resistivity will decrease.

The laboratory testing is performed under the worst-case condition, on fully saturated soil samples. The saturated electrical resistivity of the samples is typically one order of magnitude lower than resistivity measured on dry soil samples, providing a conservative estimate of soil resistivity in terms of corrosion potential. Based on the samples of the predominantly granular artificial fill that were tested, the electrical resistivity of the fill is estimated to be between approximately 600 and 10,000 ohms/cm. According to Design Manual DM-5 (U.S. Department of the Navy, 1974), soils with electrical resistivity less than 2,000 ohms/cm can cause severe corrosion to cast iron and carbon steel. The general relation of soil corrosion potential to electrical resistivity according to DM-5 is shown below, where the soils are divided into four classes.

Soil Class	Corrosion Resistance	Electrical Resistivity (ohms/cm)
1	Excellent	> 10,000 – 6,000
2	Good	6,000 – 4,500
3	Fair	4,500 -2,000
4	Bad	2,000 - 0

Based on the laboratory test results, potentially contaminated fill soils were encountered in borings GZ-SB-102 and GZ-SB-103. The soil samples selected for testing were obtained at a depth below the current ground surface of approximately 2 to 4 feet in boring GZ-SB-102 and 6 to 8 feet in boring GZ-SB-103, corresponding to approximate elevations of 11 feet to 13 feet in boring GZ-SB-102 and approximate elevations of -2 feet to 0 feet in boring GZ-SB-103. These materials should be considered to be in Soil Class 4, and to be potentially corrosive. Please note that fill material above and below the tested elevations may also be of similar, potentially corrosive nature. The fill materials sampled in boring GZ-SB-107 can be considered to provide fair corrosion resistance and the fill materials sampled in boring GZ-SB-108 can be considered to provide excellent corrosion resistance. The resistivity test results should be reviewed by the Structural Design Engineer to determine if special corrosion protection is needed for any or all below grade foundations or proposed conduit elements and underground utilities.

### Soil pH

pH is a measure of how acidic (pH<7) or alkaline (pH>7) the soil is. Soils usually have a pH range of 5 to 8. In this range, pH is not considered to be the dominant variable affecting corrosion rates. More acidic soils, however, represent a serious corrosion or degradation risk to common construction materials such as steel and concrete. The test results showed that the pH-values of the tested soil samples were typically alkaline, with the exception of the fill sample obtained in boring GZ-SB-108, which showed a pH value within the typical soil range. The pH test results should be reviewed by the Structural Engineer to determine if additional or



special corrosion protection is required for any or all below grade foundation or conduit elements, as well as for proposed underground utilities.

### Sulfate

The sulfate concentration in the selected soil samples was evaluated to determine if special precautions need to be taken with respect to reinforced concrete foundation structures. Reaction between sulfate ions in groundwater and Portland cement results in a chemical product of greater volume which may cause cracking of the concrete. Precast concrete piles and shallow concrete foundations are susceptible to sulfate attack. However, if concrete foundation elements are bearing above the groundwater table, the potential of sulfate attack is greatly reduced since the sulfate has to be in solution. No sulfate was detected in the soil samples obtained from borings GZ-SB-102 and GZ-SB-108. The sulfate concentrations of the tested soil samples from borings GZ-SB-103 and GZ-SB-107 were between 104 and 111 mg/kg (or between 0.010 to 0.015 percent by weight). Table 4.3.1 of the ACI Building Code 318/318R lists the requirements for concrete exposed to sulfate containing solutions. Sulfate exposure ranges according to the ACI Table are as follows:

Sulfate Exposure	Water Soluble Sulfate in Soil (percent by weight)
Negligible	0.00 - 0.10
Moderate†	0.10 - 0.20
Severe	0.20 - 2.00
Very Severe	> 2.00

† Exposure to seawater is equivalent to moderate sulfate exposure (ACI Table 4.3.1)

Two of the tested samples were within the moderate exposure range and some of the surficial artificial fill soils show sulfate concentrations that are considered generally at the onset of sulfate attack. In addition, foundations or other below-ground structures proximate to the tidally influenced Seekonk River may at times be exposed to seawater. The sulfate test results should be reviewed by the Structural Engineer to determine if additional or special protection is required for any or all below grade foundation or conduit elements, as well as for proposed underground utilities.

### Chloride

Chlorides are generally harmful, as they participate directly in the electrochemical reactions that take place during the corrosion process. Chlorides typically attack metals and also have the ability to migrate through porous concrete and attack the steel reinforcement, causing corrosion and swelling which can lead to cracks in the concrete and therefore accelerated corrosion activity.

According to DM-5 (U.S. Department of the Navy, 1974), concentrations of chloride in water greater than 500 ppm can be “extremely corrosive” to carbon steel and cast iron. Table 4.2.2 of the ACI Building Code 318/318R lists the requirements for special exposure conditions for concrete. For reinforced concrete exposed to chlorides, the maximum recommended water-cementitious materials ratio, by weight, for normal weight aggregate concrete is 0.40 and the minimum recommended compressive strength ( $f_c'$ ) is 5,000 psi.

Relatively low chloride concentrations of 185ppm and 55 ppm were detected in soil samples from GZ-SB-103 and GZ-SB-107, respectively. However, higher chloride concentrations could be present in other areas of the site, given the historic use of the site. Depending on the location and depth of proposed foundations, the Geotechnical and Structural Design Engineer should review if the above noted requirements for concrete should be incorporated into the contract specifications for the proposed foundation or if additional or special corrosion protection is needed for any or all below grade foundation and conduit elements.

### Corrosion Testing Results

The laboratory testing showed evidence of existing fill soils with relatively high corrosion potential as indicated in the soil resistivity



results of the fill at GZ-SB-102 and GZ-SB-103. Soils with unusually high (alkaline) pH levels were also identified. In general, the existing fill soils at the site should be considered as a potentially mildly to highly corrosive environment. Special corrosion protection over the design life of the proposed structures is recommended if subsurface utilities or foundations are expected to come in contact with the existing artificial fill soils. Proposed earthwork and interim site grading should be evaluated with respect to the locations and elevations of new foundation elements for the proposed mixed-use development. It may be beneficial to design the interim and final site grading such that proposed foundations, site utilities, and below-slab piping will be located above the seasonal high groundwater table so that concrete or steel foundations, below-ground conduits, and utilities and saturated soils will not come in contact with saturated existing artificial fill soils that may potentially be of a corrosive nature.

General recommendations are given for steel and concrete foundations in the following paragraphs. These recommendations should be reviewed by the Structural and Civil Engineers to assess whether additional or special corrosion protection is required for below grade foundation or conduit elements, as well as for proposed underground utilities.

Other sources of potential corrosion include groundwater chemistry and stray electric currents. Our present scope does not include testing or evaluation of sources of stray currents within the area of the site. Finally, we have not tested groundwater for potential corrosion elements. For detailed laboratory test results refer to the “laboratory testing results – corrosion testing” and the detailed laboratory results included in **Appendix C**.

#### **Concrete**

If pre-cast or cast-in-place concrete is used, adequate protection can typically be achieved by using Portland cement or sulfate resisting cement and increasing the cement content and decreasing the water/cement ratio. This provides a dense, less permeable concrete which is less likely to suffer from sulfate and chloride attack and which better protects the embedded steel used for reinforcement or pre-stressing of the concrete. The dense, less permeable concrete is also better suited to resist acidic groundwater conditions. As indicated above, sulfates and chlorides have to be in solution to pose a threat to concrete foundation structures. If shallow footings and raft foundations bearing in clean, imported structural fill above the groundwater table are used, the requirements for special precautions may be reduced.

#### **Steel**

Steel is generally susceptible to corrosion if located in disturbed soils such as artificial fill and if located in marine environments such as proximate to the tidal Seekonk River. Evidence for relatively high corrosion potential was indicated in the corrosion testing results of some of the soil samples selected for testing. Should steel piles or other steel elements be used for foundation support or below-ground utilities, GZA recommends using a corrosion allowance of 4 mils per year to account for the anticipated typical corrosion of steel in moderately corrosive environments. This corresponds to 0.12 inches of corrosion occurring during a design life of 30 years. In lieu of sacrificial thickness of steel, the use of protective coatings could be considered. The Structural Engineer should review the susceptibility for corrosion and select the appropriate method of protection. If site utilities can be placed above the groundwater and in clean, imported structural fill above the proposed remedial cap, the requirements for special precautions may be reduced.

### **IMPLICATIONS OF SUBSURFACE CONDITIONS**

Based on progress drawings, preliminary site grading information, and stadium structural and site civil design information available at the time of preparation of this geotechnical report, the proposed earthwork within the limits of the Town Landing site will be performed in 2 phases:

#### **Implications for Phase 1 – Site Work in Support of Stadium Construction**

Phase 1 consists of clearing and grubbing across the site and interim site grading to establish construction staging, parking, and material stockpile areas to support the construction of the Tidewater Stadium. As part of the stadium construction, a temporary



access road and associated sedimentation controls will need to be established. In addition to general site improvement and temporary earthwork, placement and compaction of permanent structural fill along the southern site limits of the Town Landing site will be performed to raise site grades up to the foundation levels of the proposed buildings, stairs, walkways, and other improvements on the north side of the proposed stadium. Due to the environmentally impacted nature of some of the existing site soils, it is anticipated that earthwork and site development at the Town Landing site will consist of retaining all existing soil materials on-site and stockpiling of materials that cannot immediately be used as structural fill during Phase 1. On-site excavated material will need to be segregated and stockpiled consistent with proposed future re-use.

To achieve the above-described objectives, the relatively thin layer of topsoil and forest mat, typically about 6 to 9 inches in thickness where present, should be stripped and excavated from the across the site. This material should be handled separately from other excavated materials and may be stockpiled and later re-used on-site where it can be placed in non-structural landscaped areas and between the proposed river walk and the Seekonk River.

Large amounts of boulders and concrete debris remaining from prior site development (pre-1980) are present at the ground surface. These materials should be separately stockpiled during Phase 1, so that they can be crushed and beneficially re-used as stone fill where required during Phase 2 of construction.

The existing artificial fill encountered across the site, while not considered suitable for the support of shallow building foundations in its present state, is considered suitable to support the temporary staging, laydown, and stockpile areas that are planned for Phase 1 of construction. All prepared surfaces that are intended to support construction traffic should be proof-rolled to identify possible soft zones. If isolated soft zones are found during proof rolling, installation of a layer of crushed stone, reinforced with a geotextile fabric such as Mirafi HP570 or equal is recommended to limit rutting and enhance support for wheeled or tracked equipment.

For construction of the temporary access road, it is recommended to place a layer of geotextile fabric such as Mirafi HP570 onto the previously cleared, grubbed, and proof-rolled existing ground. Following the placement of the geotextile, an 18-inch layer of 2-inch crushed stone should be placed as subbase for the temporary access road to limit rutting and enhance support for wheeled or tracked equipment. The crushed stone should be static-rolled and then covered with a non-woven geotextile such as Mirafi 160N or equal to facilitate placement and compaction of 12 inches of dense graded aggregate up to the proposed access road surface. Separation of the roadway backfill materials with geotextile fabric is expected to enhance roadway stability and longevity, as well as ease of re-use of the roadway backfill materials during the second phase of development when the temporary roadway materials may be re-used as structural fill for other purposes on-site.

### **Implications for Phase 2 – Final Site Development / Building Construction**

During Phase 2, the additional development at the Town Landing site will consist of construction of a new mixed-use building consisting at the core of a 5-level parking garage, surrounded by five to six levels of residential and commercial space. The proposed Phase-2 development at the Town Landing Site is also expected to include a pedestrian bridge connecting the western and eastern banks of the Seekonk River, and associated river walks. Existing site grades at the time of survey and the proposed finish grade surfaces along select transects, based on preliminary site grading plans, are presented in the attached **Figure 3 through Figure 6 – Subsurface Profiles** for Phase-2 construction.

The existing artificial fill encountered across the site is not considered suitable for the support of shallow foundations for buildings and structures on spread footings in its present state, due to the undocumented placement history and/or variable compressibility of this material. In addition to the artificial fill, very loose to loose silty subsurface material was encountered in portions of the naturally-deposited glacial outwash that underlies the artificial fill in the central and southern portion of the site. Naturally deposited glacial outwash soils in other portions of the site were generally medium dense to dense and are considered adequate to provide foundation support for shallow building foundations at allowable foundation bearing pressures of up to 4000 pounds per square foot (psf) if these soils remain undisturbed during construction.



The artificial fill and soils with elevated silt content across the western and northern portion of the site and the loose outwash soils in the central and southeastern portion of the site are not considered suitable for foundation support at the desired bearing pressures in their present state. In-place ground improvement methods can be used to homogenize the soil to improve the density and bearing capacity for support of footings within the proposed development footprint (Phase 2). It is expected that a limited area within the central-southeastern portion of the proposed building footprint will require some form of deep ground improvement. The foundation subgrade within the northern and western portions of the remaining building footprint, however, may be improved by shallow over-excavation and re-compaction of any exposed artificial fill soils.

Within portions of the western and northern building footprint, the artificial fill and silty soils at the foundation bearing level will require shallow ground improvement consisting of over-excavation and replacement of the soils immediately below the foundation level. After ground improvement and surface compaction has been performed within this area, properly placed and compacted structural fill installed over the above-described soil strata is considered suitable for support of foundations at allowable foundation bearing pressures of up to 4000 psf.

Within the southeastern portion of the proposed building footprint, the artificial fill and loose outwash were observed to extend to depths ranging from approximately 15 to 20 feet below the existing ground surface. Due to the depth of the potentially loose and unsuitable materials, the shallow groundwater table, and the presence of environmentally impacted material, excavation and replacement of the fill and loose outwash material is not considered feasible. Instead, foundations for the proposed five to six story building may be constructed on intermediate foundations or on shallow foundations bearing on the existing subgrade after in-situ ground improvement and associated SPT testing has been performed within this area. Based on progress plans, we understand that the majority of the proposed foundations within the eastern side of the proposed building are expected to bear at or within a few feet below the current existing ground surface. After ground improvement and surface compaction has been performed within the southeastern portion of the building footprint, properly placed and compacted structural fill installed over the above-described soil strata is considered suitable for support of foundations at allowable foundation bearing pressures of up to 4000 psf. If allowable foundation bearing pressures in excess of 4000 psf are required, intermediate foundations (shallow footings bearing on aggregate piers or rigid inclusions installed to sufficient depth) should be considered at all high-load bearing footings and areas.

During review and selection of ground improvement and foundation alternatives, considerations will need to be given to required foundation bearing capacities, ground improvement installation methods and equipment, duration of installation, ground vibrations, and costs. Possible below-ground obstructions from existing structure foundations and underground utilities that may have remained in the ground during the pre-1981 demolition of the previous site developments should be expected. Consideration should also be given to possible presence of cobbles, boulders, or concrete debris in the existing fill materials at the site, as demolition materials may have been moved across the site during the re-grading associated with the pre-1981 demolition.

To establish the proposed building foundation subgrade elevations for construction of the mixed-use, five to six story building, substantial amounts of artificial fill and natural outwash material will need to be excavated along the western side of the building footprint along Taft Street. It is expected that the excavated soils will consist of surficial artificial fill and underlying silty outwash. The existing fill is generally of a granular nature and it is expected that it can be re-used as structural fill provided that the material is placed in controlled lifts and properly compacted. Depending on the silt content of the excavated outwash, the material may be difficult to work with if it becomes saturated during construction. Portions of the outwash are expected to contain elevated amounts of silt and clay and may not be suitable for re-use in structural fill areas. Re-use of these materials may be difficult, particularly if they become wet, saturated, or otherwise disturbed during excavation or handling. It is critical that the earthwork contractor manage the soils to be re-used by segregating materials according to the suitability for re-use, protect stockpiles from precipitation, and maintain positive drainage during earthwork operations to avoid ponding of stormwater runoff.

Cobbles, boulders, and concrete debris were encountered at the ground surface. Concrete and rock fragments were observed in the test borings in the existing fill layer indicating potential presence of buried concrete debris and cobbles/boulders. These cobbles, boulders, and other larger debris will need to be culled from excavated materials prior to re-use as structural fill. The earthwork specifications for the project should reflect the need to cull and crush or otherwise process cobbles, boulders, or other



large debris to facilitate the re-use of the artificial fill materials. These obstructions in the fill may impact installation of intermediate foundation elements or performance of vibratory ground improvement. If vibratory probe compaction is selected for ground improvement, the probe location can typically be adjusted or shifted within a few feet of the proposed locations to avoid obstructions. If intermediate foundations are considered, pre-drilling or pre-augering at proposed intermediate foundation locations may be required to remove obstructions prior to installation of these elements.

Boulders and concrete debris that were previously stockpiled during Phase-1 construction, will need to be processed to be re-used at the site. It is expected that boulders and concrete debris will need to be crushed on-site so that the material can be used on-site for stone fill and structural fill. Soil materials previously stockpiled should be re-used if the soil composition meets the criteria for structural fill and satisfactory compaction in controlled lifts can be achieved. Materials with elevated fines content such as the silty outwash soils present at the site may be limited to re-use as non-structural fill in landscaped areas where requirements for compaction are less stringent.

Intermediate foundation installation, vibratory ground improvement, and vibratory compaction of loose outwash, existing artificial fill, or newly placed structural fill will produce ground vibrations. While the project site is largely undeveloped and ground vibrations are expected to be tolerable in the vast majority of the site, there are areas along the western perimeter of the site where existing active below-ground gas piping and other utilities are present. In this area along Taft Street, residential buildings, roadways, and other utilities are located within 200 feet of the of proposed earthwork. Damage to these surrounding structures could result from construction vibrations. Requirements for minimum offsets to vibration-inducing compaction equipment, ground improvement operations, or intermediate foundation installation are recommended, and detailed preconstruction surveys are recommended prior to construction to document the existing conditions of adjacent structures and utilities. Construction vibrations could also be disturbing to nearby residents. Vibration and settlement/displacement monitoring programs should be implemented during construction so that construction methods can be adjusted to mitigate potential damage to adjacent structures. Project specifications should include permissible vibration thresholds in accordance with U.S. Bureau of Mines criteria and National Grid.

Groundwater elevations at the site were observed to be generally below elevations at which earthwork or soil disturbance will be required to achieve the proposed building foundation elevations and final site grades. However, groundwater measurements at one monitoring well and two soil borings along Taft Street indicate that during certain times of the year, elevated groundwater could be perched on top of a silty outwash layer at elevations above the proposed bearing elevation of the 5-story parking garage. Based on an approximate parking garage / building finish floor elevation of 16-17 feet, a perimeter foundation drain is recommended to collect seeping groundwater along the western side and around the southwestern corner of the lowest portion of the proposed building footprint. The perimeter foundation drain is recommended to prevent buildup of hydrostatic pressures on the western and southern sides of the buried basement walls and to provide positive drainage for high groundwater towards the river. In the eastern half of the Town Landing site, measurements indicate that the groundwater level is not expected to rise to or above proposed foundation bearing or building slab levels, and as such, the extent of the perimeter drainage system can likely be limited to the western and southwestern portions of the building footprint.

Groundwater may also be encountered during sloped open-cut excavations or during installation of excavation support along the western and/or southern perimeter of the parking garage, where cuts of approximately 20-to-25-foot depth below the Taft Street pavement elevation are anticipated. In the central and eastern portion of the site, general site grading, earthwork, or foundation construction at the elevations currently anticipated in the progress drawings are not expected to encounter groundwater and require construction dewatering. However, if excavations of limited extent are required proximate to the Seekonk River, it is anticipated that work that is required to be performed in-the-dry could proceed during the low tide cycle assisted with the use of sump pumps. Isolated and deeper excavations within the building footprint, such as elevator pits, may also require groundwater control through the use of sumps and pumps.

The development site has recognized environmental impacts and contaminated groundwater, fill, and outwash materials may be present at the site. Soil samples obtained during the recent test borings were screened using a PID and the measurements suggest that portions of the existing subsurface materials may be environmentally impacted. For additional information relative to environmental site conditions, refer to the site investigation report (SIR) prepared by SLR. If the site development and building



construction will require possible off-site disposal of existing topsoil, fill, or impacted naturally deposited soil materials, an environmental characterization of these materials will be mandated by the receiving facility. However, we understand that the current development approach is based on retaining all on-site materials within the project limits and the site grading approach has been developed to balance cuts and fills so that all existing material can be placed on-site.

## CONCLUSIONS AND RECOMMENDATIONS

The following sections present geotechnical design and related earthwork recommendations for the proposed development. The recommendations have been developed based on the results of the recent and prior subsurface explorations and preliminary design information provided by Odell Architects, SLR Consulting, and Dimeo Construction Company. If the design is modified, GZA should be provided the opportunity to revise our recommendations as/if needed.

### Foundations and Slabs

#### Northern and Western Building Footprint: Shallow Ground Improvement (Over-excavate and Replace)

Foundation support for the northern and western portion of the proposed mixed-use building can be provided using shallow spread foundations bearing on dense, undisturbed naturally deposited glacial outwash, or properly placed and compacted structural fill. Based on the subsurface data encountered at the test borings, it is anticipated that sandy glacial outwash will be present at the foundation bearing elevation in the majority of the northern and western building footprint. The existing artificial fill is considered unsuitable for support of shallow foundations. However, there may be areas within the proposed building foundation subgrade where artificial fill or glacial outwash of predominantly silty nature is present, and where additional over-excavation and placement and compaction of structural fill is recommended. A geotechnical engineer should be present during all excavations for foundation subgrade to observe and visually classify subgrade soil conditions and review proof-compaction performance and requirements for additional over-excavation and removal of silty soils or artificial fill.

Where undocumented artificial fill is present at the exposed foundation bearing subgrade, the fill should be over-excavated and removed from the building area to a minimum of 3 feet below the foundation grade or to undisturbed naturally deposited glacial soils prior to proof rolling, structural fill placement, and/or foundation construction.

Where outwash of predominantly silty nature (>50% fines content) is encountered, the foundation subgrade should also be over-excavated to a minimum of 3 feet below the foundation or footing bearing elevation. Excavation of silt should be performed with a smooth edge bucket to avoid disturbance of the silty material. After over-excavation of the silt, placement of 18 inches of crushed stone onto a woven geotextile fabric such as Mirafi HP570 or equal is recommended to prepare a foundation working mat to limit rutting and enhance support for wheeled or tracked equipment. The crushed stone should be static-rolled and then covered with a non-woven geotextile such as Mirafi 160N or equal to facilitate placement and compaction of 18 inches of structural backfill up to the proposed foundation bearing levels.

Spread-footing foundations on improved subgrade prepared in accordance with the above procedures can be designed using a net allowable bearing pressure of 4,000 pounds per square foot (psf). For footings less than three feet wide, the allowable bearing pressure should be reduced proportionately, and in no case should continuous footings be less than 18 inches wide, nor isolated footings be less than 24 inches wide.

All over-excavation and removal of unsuitable materials should be performed in the foundation bearing zone to a limit defined by a 1-horizontal to 1-vertical slope extending downward and outward from 2 feet outside the edges of the footings to firm soils or bedrock. The exposed subgrade should then be proof-compacted and new structural fill should be placed and compacted up to the proposed foundation bearing level. All placement and compaction procedures should be performed as later described in this report.



If building and parking garage foundations require allowable bearing pressures in excess of 4,000 psf, intermediate foundations installed within high-load footprints may be advantageous to provide elevated allowable bearing pressures at reduced total and/or differential settlement for select foundation elements. Intermediate foundation should then be designed and installed as described further below.

#### Southeast Building Footprint: Combination of Deep and Shallow Ground Improvement

The central-southeastern portion of the proposed building is located in the vicinity of borings that indicated a very loose to loose silty outwash layer to depths of about 20 feet below the ground surface. In this area, the proposed building foundations may be supported on shallow spread footings over a combination of a deep and shallow ground-improved subgrade. The foundation recommendations for the southeastern portion of the building are described in further detail in the following sections.

#### Option 1: Vibratory Probe Ground Improvement

The proposed building may be constructed on shallow spread-footing foundations and slabs-on-grade over a ground-improved subgrade. The existing fill and loose outwash in the southeastern portion of the site may be improved through in-place compaction techniques such as vibratory probe compaction (VPC), formerly known as “Terra-Probe”. The VPC method should be carried out across the southeastern portion of the proposed building footprint in the area where loose and silty outwash was identified in the test borings in order to uniformly densify the existing fill and loose outwash material and mitigate the susceptibility to excessive total and differential settlements. This area should include a buffer zone around the respective boring locations and encompass the proposed handicap ramp southeast of the proposed building footprint. VPC should be completed prior to the placement of the additional site fill. An outline of the recommended VPC area is included as **Figure 7, Schematic Ground Improvement Area**.

VPC consists of repeatedly driving and extracting an open-ended, large-diameter pipe into the material to be densified. At each VPC grid location, a large vibratory hammer, typically operating in the 900-1200 cycles/minute range, is used to drive and extract the probe typically between 2 to 4 times. The probe would be lowered through the surficial fill layer into the existing outwash layer. The vibratory probe should be lowered to a minimum depth of 20 feet below the ground surface or to the bottom of the outwash layer, whichever is reached first. The probe is generally a 30-inch diameter, 1/2 to 3/4-inch wall steel pipe that has 1/2-inch thick by 6-inch-wide plate straps (ribs) welded to the outside surface. Spaced at approximately 5 feet on center, the 6-inch straps form a series of ribs that transfer vertical vibrations to the granular soil to be densified. The procedure is carried out in a grid pattern across the site, with probes typically spaced at six to eight feet on center.

Following VPC, the area should then be stripped to a minimum of 3 feet below the ridges of the VPC craters that develop during probing, or to the bottom of any surface craters whichever is deeper. The exposed surface should then be heavily surface compacted with a minimum of six passes of a vibratory roller having a drum weight of at least 10,000 pounds and a dynamic force of at least 20,000 pounds. Structural fill above this level is then placed and compacted in lifts with normal vibratory equipment such as vibratory rollers or plate compactors in hard-to access areas.

Spread-footing foundations on a VPC-improved subgrade and 3-feet of properly placed and compacted "Granular Fill" above the improved subgrade can be designed using a net allowable bearing pressure of 4,000 pounds per square foot (psf). For footings less than three feet wide, the allowable bearing pressure should be reduced proportionately, and in no case should continuous footings be less than 18 inches wide, nor isolated footings be less than 24 inches wide.

Post-VPC test borings may be drilled to assess the achieved densification of loose soil layers. The test borings are typically completed after the first day of VPC, and the SPT N-values recorded within the compacted material are reviewed to assess the efficiency of the VPC procedure. The proposed VPC program is often modified depending on the results of the test boring program. Satisfactory performance of the VPC ground improvement method can typically be assessed by observation of changes in the probing effort during the operation and by review of ground settlement after VPC compaction



has been completed in a defined area. An experienced earthwork contractor and full-time monitoring of this operation are recommended for the successful implementation of this method.

Cobbles, boulders, and large concrete debris were encountered during the subsurface investigations. Therefore, the project specifications should reflect the possible need for removal of buried obstructions at the VPC locations if they are substantial enough to prevent vibratory compaction at several probe locations. If isolated obstructions are encountered, probe locations can typically be shifted to densify the general area around the smaller obstructions.

VPC causes ground vibrations and settlements which may impact existing nearby structures or utilities. The level of potential vibration damage to structures is related to the peak particle velocity, a measurement of ground vibration caused by VPC, and the distance from the vibration source. Limits on peak particle velocity for the proposed VPC work at nearby structures, utilities and buildings should be set in the construction specifications.

#### Option 2: Intermediate Foundations

Intermediate foundations involve the construction of aggregate piers or rigid inclusions and would allow for the use of spread footing foundations and a slab-on-grade. These methods consist of constructing densified columns of compacted gravel or unreinforced concrete inclusions beneath the proposed footings and slabs. These elements would be constructed by advancing a 10- to 16-inch diameter mandrel or reverse-flight auger through the existing fill and loose outwash to the top of the underlying dense outwash and glacial till deposits. As the tooling is extracted, concrete or aggregate is placed through the tooling. Little to no spoils are generated with these displacement-based installation methods. The intermediate foundation elements increase bearing capacity of the soil and reduce settlement potential by transferring the vertical loads through the undocumented fill and loose outwash to the top of the underlying glacial till. As noted above, pre-drilling or pre-augering at intermediate foundation locations may be required to remove obstructions prior to or during installation.

Intermediate foundation elements are typically installed in a closely spaced grid below proposed footings, at approximately 3- to 4-foot center-to-center spacing. The spacing is typically increased to approximately 6- to 8-foot centers in slab areas. The elements would likely be approximately 15 to 25 feet deep, depending on the depth to the dense outwash or glacial till layer. It is recommended that the intermediate foundation elements be designed to support an allowable bearing capacity of 4,000 to 6,000 pounds per square-foot (psf) for footings bearing on the intermediate foundations. Intermediate foundation elements should be installed after a temporary working mat has been established at the proposed foundation bearing elevation. Depending on the element spacing, some intermediate foundation systems also require a 12 to 24-inch-thick load-transfer layer between the tops of the elements and the bottom of the shallow foundations. The load transfer layer is typically comprised of crushed stone or dense-graded aggregate and bridges gaps between the tops of individual foundation elements.

Intermediate foundations are typically more costly per area as compared to the above described VPC ground improvement method but may be designed to support higher allowable bearing pressures while limiting expected settlement. If building and parking garage foundations require allowable bearing pressures in excess of 4,000 psf, intermediate foundations installed within high-load footprints may be advantageous to provide elevated allowable bearing pressures at reduced total and/or differential settlement for select foundation elements.

Please note that due to the potential impact of ground vibrations and settlement on nearby buildings, foundations, utilities, and other structures, the VPC program should not be performed within approximately 30-50 feet of completed stadium structures to the south of the Town Landing site. However, during the ground improvement program that was implemented for the stadium construction, a buffer zone has already been considered and it is expected no additional ground improvement within 30-50 feet of the stadium structures will be required during the Phase-2 development and building construction at the Town Landing site.



### **General Foundation and Slab Recommendations**

Building foundations and slabs, bridge abutment support, and other foundations should be constructed over a ground-improved subgrade as described above. If isolated foundations are required beyond the zones of ground improvement, all unsuitable materials, including existing asphalt, topsoil and subsoil, and artificial fill containing deleterious materials or organic content should be removed from the proposed foundation area to a limit defined by a 1 horizontal to 1 vertical (1H:1V) slope extending downward and outward from two feet outside the edge of the footings to suitable bearing soils. Following the removal of the unsuitable materials, structural fill and backfill should be placed and compacted in horizontal lifts. The maximum loose lift thickness should be 12 inches for vibratory rollers and 6 inches for plate compactors.

Structural fill below the building areas and in foundation bearing zones should be compacted to 95% of the maximum dry density as determined by the modified Proctor test (ASTM D1557). Fill placed outside the bearing zone, beyond the 1H:1V slope defined above, should consist of "Granular Fill" compacted to 92% of the maximum dry density. Soils placed within 3 feet of paved surfaces as either the subbase or base course for pavement or as structural backfill for retaining walls or other structures should be compacted to 95% of the maximum dry density as determined by the modified Proctor test. The excavated existing fill material can be reused as backfill in this area, provided that it is culled of boulders, debris, and other deleterious material and that proper placement and compaction techniques are followed.

For frost protection, exterior footings should extend at least 4'-0" feet below final exterior grade. Interior footings should be constructed at least 18 inches below the bottom of the slab to develop sufficient bearing capacity. If freezing weather occurs during construction, measures should be taken to protect exposed footings/pile caps and subgrade soils.

Settlements of foundations bearing on properly placed and compacted "Granular Fill" over ground-improved subgrade and on intermediate foundations, are anticipated to be less than 1 inch, and may be expected to occur during construction. The maximum differential settlement between adjacent footings is expected to be less than ½ inch.

Building slabs-on-grade supported by intermediate foundations or a ground improved subgrade should be constructed over a compacted base course consisting of a minimum 6-inch thick layer of "Sand-Gravel Fill" compacted to 95% of the maximum dry density as determined by the Modified Proctor test (ASTM D1557). For slab-on-grade design over compacted ground-improved subgrade, a subgrade modulus value of 150 pci may be used.

### **Shallow Bedrock**

While bedrock at the site generally appears to be at depths well below the proposed foundations for the proposed building and associated improvements, review of the available boring information suggests that relatively shallow bedrock, approximately 20 feet below the ground surface, may be present in the vicinity where the western pedestrian bridge abutment is planned.

If bridge abutment support will require allowable bearing capacities in excess of 4000 psf, it may be feasible to install piles to transfer foundation loads to competent bearing layers and to limit substantial concrete spread footings and associated deep excavations proximate to the Seekonk River. Depending on location of proposed bridge abutment foundations in relation to the river's edge, a pile-supported bridge foundation should be considered if shallow foundations cannot be adequately protected from scour during design flooding and storm surge events.

### **Earthwork Recommendations**

From progress drawings provided to us, we understand that most of the structure foundations will be constructed approximately at or below the current existing ground surface. Should construction schedules require earthwork during the winter or spring months, and if foundations are required to be installed where naturally deposited existing silty soils are present, it may be advantageous to initially over-excavate these footing excavations in silty soils by six inches and place a working mat



of ¾-inch crushed stone underlain by a layer of filter fabric (Mirafi 160N or equivalent). The intent of the crushed stone is to mitigate the potential for the subgrade to become disturbed due to groundwater or precipitation which may saturate the silty soils before concrete can be placed and may eliminate the need to re-excavate areas which become disturbed. It is recommended that contract specifications and budgeting reflect the possible need for the use of crushed stone and filter fabric to stabilize wet subgrades in isolated areas.

### **Demolition of Existing Structures and Utilities**

Historical aerial photography indicates that demolition of buildings, silos, tanks, and other above-grade structures occurred at the Town Landing site some time before 1981. Large amounts of concrete and other debris, likely remaining from the aforementioned demolition and site regrading that occurred approximately 40 years ago, remains at the site and can be observed at the grade surface and along the site slopes. Survey drawings indicate the presence of an active water line in the northern portion of the site, and two stormwater drain lines with associated outfalls are noted along the northern and southern limits of the site. Based on site observations, the southern stormwater drain line includes an intermediate manhole between Taft Street and the outfall location that is currently not indicated on the survey drawings, and discharges into an open swale running towards the Seekonk River. No other active utilities are indicated on current survey drawings.

Given the historic site development, there is potential for encountering uncharted buried structures, tanks, and utilities during then work. If during site development and earthwork construction, other existing structures, foundations, and abandoned underground utilities are encountered to interfere with the proposed ground improvement program, or interfere with the installation of building foundations, they should be completely demolished and removed from the respective area prior to commencing earthwork operations. All soils disturbed during the demolition phase below the proposed building slabs and foundations should be excavated and replaced in compacted lifts with material meeting “Granular Fill” specifications. Any open excavations left by removal of existing structures or utilities should be backfilled in compacted lifts with “Granular Fill”. The backfilling and compaction of the disturbed areas should be performed in accordance with the recommendations provided in this report.

### **Temporary Earth Support and Underpinning**

Excavations for foundations and utilities should be sloped back in accordance with the Occupational Safety Health Administration (OSHA) Construction Industry Standards. In areas where sloping is not possible, excavation support should be designed in accordance with OSHA 29 CFR Part 1926 Occupational Safety Health Standards – Excavations, latest edition.

### **Support of Excavation**

With a proposed lowest level finish floor elevation of about 16 to 17 feet, and an existing roadway grade surface of about elevation 32 to 37 feet, it is anticipated that up to 25-foot deep cuts into the existing slope leading up to Taft Street along the western limits of the proposed development will be required for the construction of the five-to-six story mixed-use building. If sloped open cut excavations into the surficial fill and the underlying silty outwash materials are not feasible or not desired when establishing foundation subgrade for the lowest level of the parking garage and building footprint, a temporary earth support system may be required to support the required cuts. Based on progress drawings, the western perimeter of the deep portion of the proposed building is located about 50 feet from the Taft Street right-of-way, and open cut excavations may be feasible. At the southeastern corner of the building footprint, the low floor-elevation level extends to within about 25 feet of the Taft Street right-of-way, and an excavation support system will likely be required. Once the construction of the proposed foundations and basement walls are complete, the space between the earth support system and the building can be backfilled. The earth support system will likely have to be abandoned in place.

One option for earth support consists of a system of H-piles, timber lagging, and tieback soil anchors installed at least 4 feet from the perimeter of the proposed parking garage structure. The 4-foot space is required for workers to place and strip forms. As the soils are excavated, timber lagging is placed between the H-piles and tieback anchors are installed through the H-piles or



through wales that span the distance between the H-piles. Steel sheet piles stabilized with soil anchors could alternatively be used instead of H-piles and timber lagging. Consideration will need to be given to required soil anchor lengths and permitting requirements if anchors extend below the Taft Street right-of-way. Possible interference with buried utilities below the Taft Street sidewalk and roadway may exist.

An alternative option for earth support is a soil nail wall. Soil nails are reinforcing bars installed with the use of a drilling operation that extend back from the face of the excavation into the soil mass and are grouted in place. Soil nail walls consist of multiple soil nails installed in a grid pattern, with a steel wire mesh and shotcrete cover over the external wall face. The soil nails would be spaced at roughly 5 feet on center. The length of the soil nails is a function of the height of the excavation, surcharge loading, and the engineering properties of the soil. Soil nail walls are constructed from the top of the wall down. Initially an excavation up to 5 feet is performed along the wall alignment and soil nails, wire mesh, and shotcrete are installed. Upon completion of the first level, additional levels are excavated. The array of steel nails work to effectively reinforce the embankment in order to maintain stability. Due to the sandy nature of the site soils, a slight batter to the wall face and installation of drainage and/or support panels may be required to maintain stability in the open cuts prior to shotcreting.

Care will need to be taken in the design and installation of both tieback soil anchors or soil nails to avoid existing utilities within the limits of the site or below the sidewalks and roadway along Taft Street. Soil nails tend to be substantially shorter than soil or rock anchors; however, soil nails are typically spaced closer together. Due to the higher starting elevation and tighter spacing of the soil nails, the use of tieback soil anchors may be more advantageous for construction in order to avoid existing utilities.

### **Retaining Walls**

New foundation walls designed to resist lateral earth pressures should be designed as retaining walls. It is recommended that retaining walls be supported by foundations prepared in accordance with the above recommendations. It is recommended that the walls be backfilled with free draining “Granular Fill” compacted to at least 95% of the maximum dry density (ASTM D1557) (93 % maximum within 5 feet of the wall stem). For wall design, a moist unit weight of 135 pcf and an internal angle of friction of 32 degrees are recommended for granular backfill. A drainage system should be provided to prevent the buildup of hydrostatic pressures behind the wall. The walls should be designed for any surcharge loads that may occur, including construction traffic.

For walls that are unrestrained at the top, an active soil pressure coefficient ( $K_a$ ) of 0.3 is recommended. For foundation and retaining walls that are restrained at the top, an at-rest soil pressure coefficient ( $K_o$ ) of 0.5 is recommended. For foundations and walls designed to resist lateral forces, a passive pressure coefficient ( $K_p$ ) of 1.6 is recommended (factor of safety of 2 included due to strain considerations), provided that all backfill is compacted to a minimum of 95% of ASTM D1557 on both sides of the wall. Foundation walls not designed for lateral earth pressures should be backfilled evenly on both sides with a maximum difference of 2 feet between the height of the backfilled and compacted material on each side.

Progress drawings indicate that the finish floor elevation within the westernmost portion of the proposed building footprint adjacent to Taft Street will be at approximate elevation 37 feet. If supported on shallow foundations, it is expected that foundation bearing loads from this portion of the building will add lateral load imparted onto the adjacent basement walls of the deeper parking garage portion of the mixed-use building that will extend to elevations of around 15 of 16 feet. The western parking garage wall will need to be designed as a retaining wall to support the lateral earth pressure resulting from the 5-story building surcharge to the west in addition to lateral earth pressure generated by approximately 20-feet of retained soil below the westernmost building portion.

### **Construction Vibrations and Pre-Construction Survey**

Ground improvement, installation of intermediate/deep foundations, and subgrade compaction will result in ground-born vibrations. Since there are a number of active existing utilities and residential structures adjacent to the site, it is recommended that



a preconstruction survey of structures and properties located within 200 feet of any earthwork activities be completed prior to construction. It is also recommended that vibration monitoring be performed during periods of vibration-intensive activities. Project specifications should include permissible vibration thresholds in accordance with the U.S. Bureau of Mines criteria and National Grid.

### **Underground Utilities**

Underground pipes and utilities should be placed on bedding in accordance with the manufacturer's specifications. "Granular Fill" should be placed in lifts on the sides and above the utilities and compacted to at least 92 percent of the maximum dry density as determined in accordance with ASTM D1557 (modified Proctor test). Compaction should be performed with hand-operated equipment with lift thickness depending on the size of equipment used. Should utilities be placed below building slabs and foundations, backfill material should be compacted to at least 95 percent of the maximum dry density. The 95 percent compaction should also be carried out on the base and subbase courses, where utilities are placed below pavements.

If construction occurs during the winter months, utility trenches should be excavated and backfilled before saturated materials on the bottom of the trench can freeze. If frost develops in disturbed saturated soils, these soils may not be able to be properly compacted, and post-construction settlement of the subgrade may occur upon thawing of the frost.

### **Groundwater and Site Drainage**

An average groundwater level between elevation 10 and 15 feet has been measured along the western perimeter of the site, and groundwater levels between elevation 4 and 7 feet were recorded in the central portion of the site. Proximate to the Seekonk River, groundwater levels were recorded at elevations between typically 0 to 5 feet. However, extreme groundwater levels in areas adjoining the Seekonk River could range as high as elevation 4 to 6 feet due to tidal influence.

Perched water may be encountered during foundation excavations in the western portion of the site. It is anticipated that water can be controlled with sump pumps and typical construction dewatering techniques. During construction, run-off from precipitation should be diverted away from excavations. Sumping of ponded rainfall within excavations may be required. If silty soils in foundation excavations become saturated and disturbed, it is recommended that these soils be excavated and replaced with compacted "Granular Fill" or "¾-Inch Crushed Stone" wrapped in filter fabric. Roof drains and surface water runoff should also be directed away from the buildings.

Based on progress drawings, the approximate finished floor elevation for the parking garage and deeper portion of the building is at approximately 16-17 feet and an anticipated bearing elevation of interior and perimeter footings is at elevation 11 feet or higher.

#### **Eastern Side of Development:**

Based on the groundwater levels measured in the eastern portion of the site proximate to the Seekonk River, and the average and probable high groundwater levels estimated based on prior groundwater studies at the adjacent stadium site, it is not anticipated that groundwater will be encountered during general earthwork and foundation construction for the eastern portion of the proposed development. Therefore, it is anticipated that underslab or foundation perimeter drainage systems are required in the eastern portion of the building footprint unless there are isolated depressed sections of the foundation for special uses such as elevator pits. However, installation of underground utilities, storm drainage piping, stormwater management systems and associated structures may encounter groundwater depending on the season of work and the tide cycles at the time of excavation.

#### **Western Side of Development:**

The western and southwestern portion of the building footprint is located in the vicinity where groundwater levels up to elevation 21.7 feet were recorded, and where potentially perched groundwater was inferred at as high as elevation 28 feet. It



is recommended that the project documents and specifications be prepared to include requirements for installation of a perimeter foundation drainage system around the western and southwestern portions of the proposed building.

**Seismic Design Considerations**

The following seismic design guidelines are based on subsurface information collected during the subsurface exploration program as well as current preliminary design information provided to GZA. Site soils are not considered susceptible to seismic liquefaction. Should conditions vary from those stated in this report, the following should be verified to maintain compliance with the applicable guidelines and codes. In accordance with the Rhode Island State Building Code 12th Edition, with amendments to the 2018 International Building Code the following seismic design parameters should be used at the site:

<u>Definition</u>	<u>Value</u>
Site Class	D
Design Spectral Response Acceleration for 0.2-second Period ( $S_{DS}$ )	0.19 g
Design Spectral Response Acceleration for 1-second Period ( $S_{D1}$ )	0.10 g

**Paved Areas**

All existing topsoil, asphalt, existing fill, or other unsuitable materials in paved areas, within 3 feet of the proposed final grade should be removed prior to filling. The subgrade should then be surface compacted with a minimum of six passes of a vibratory roller having a drum weight of at least 10,000 pounds and a dynamic force of at least 20,000 pounds. Caution will have to be used when compacting the subgrade, if wet, in order to avoid weaving and disturbance from vibrations.

For paved areas where only light car traffic is anticipated, a minimum of 10 inches of compacted free draining "Granular Fill" subbase should be placed immediately below a 6-inch-thick "Sand-Gravel Fill" base course. The subbase course should be increased to 12 inches for areas with heavy duty or truck traffic. Subbase and base courses should be compacted in 1-foot (maximum) lifts to at least 95% of the maximum dry density as determined in accordance with ASTM D1557. Fill below the subbase should be compacted to at least 95 percent of the maximum dry density in heavy duty areas, and 92% in the light duty areas. It is recommended that at least 3 inches (1-1/2 inches binder and 1-1/2 inches surface) of asphalt pavement be provided for parking areas, and 4 inches (2-1/2 inches binder and 1-1/2 inches surface) for access roadways. The following are the recommended flexible layered pavement sections:

Pavement Layer	Flexible Pavement Layer Thickness	
	Standard Duty (Cars)	Heavy Duty (Trucks)
Bituminous Finish Course	1-1/2 inches	1-1/2 inches
Bituminous Binder Course	1-1/2 inches	2-1/2 inches
Sand-Gravel Fill Base Course	6 inches	6 inches
Granular Fill Subbase Course	10 inches	12 inches

Asphalt finish and binder materials should conform to section M.03 of the Rhode Island Standard Specifications for Road and Bridge Construction, latest edition.

For areas to be paved with Portland cement-based concrete, 6-inch-thick slabs on grade are recommended, with a minimum 8-inch-thick "Sand-Gravel Fill" base course and a 12-inch-thick "Granular Fill" subbase. The concrete should have a minimum unconfined compressive strength of 4,000 pounds per square inch, with air entrainment of 4 to 6 percent. The thickness is



based on a modulus of subgrade reaction of 150 pounds per cubic inch. Grade-60 six-inch by six-inch W5.5 x W5.5 welded wire fabric ( $A_s = 0.11 \text{ inches}^2/\text{foot}$ ) reinforcement is recommended to control crack openings.

Concrete pavement should have expansion joints at a maximum spacing of 80 feet with a joint filler thickness based on the thermal expansion. All expansion joints should be sealed with an AASHTO approved elastomeric joint sealer. Slabs separated by an expansion joint should be tied together with dowels that are 2 feet 6 inches long at a spacing of 18 inches. Dowels must be sleeved on one side of the joint to allow for movement without cracking. In addition to expansion joints, contraction (crack control) joints should be constructed at a spacing of approximately 15 feet in both directions.

**Fill Materials**

All fill should be free from ice, snow, roots, sod, rubbish, rubble, and other deleterious or organic matter. Gradation requirements for the fill materials should meet the requirements tabulated below.

Sieve Size	Percent Finer by Weight		
	Sand-Gravel Fill	Granular Fill	¾-Inch Crushed Stone
*	100	100	-
1½-inch	-	-	-
1¼-inch	-	-	-
¾-inch	-	-	90-100
½-inch	50-85	-	10-50
No. 4	40-75	-	0-5
No. 10	30-60	30-95	-
No. 40	10-35	10-70	-
No. 100	5-20**	-	-
No. 200	0-8	0-10	-

\* The maximum recommended stone size is 4 inches, where used as a base course below slabs and pavement; elsewhere, maximum stone sizes should be 2/3 of the loose lift thickness.

\*\* The amount passing the No. 100 sieve should be between forty percent (40%) and seventy percent (70%) of that amount passing the No. 40 sieve.

Based on review of the results of the geotechnical laboratory testing of representative soil samples from within the artificial fill at the site, it is anticipated that a considerable portion of the onsite artificial fill soils consist of granular material with a limited percentage of fines. These materials are expected to substantially meet the above-referenced gradation requirements for “Granular Fill” and can likely be re-used on-site as general fill when properly placed and compacted.

If fill materials are encountered that are relatively silty, these materials will likely not meet the above-referenced gradation specifications. Excavated silty glacial outwash will likely not meet the requirements for “Granular Fill” due to a higher fines content. These materials may still be re-used, however, they may be particularly difficult to work with when wet, and may require discing or harrowing to reduce the moisture content prior to compaction. It is not recommended that the silty materials be used where free-draining materials are desired, such as retaining wall backfill and pavement base and subbase layers. Silty glacial outwash may only be usable in non-structural areas where gradation and compaction requirements are less stringent.

**Contract Documents and Construction Monitoring**

It is recommended that GZA be retained throughout the design development and final design phases of the project. GZA can assist the project team in evaluating ground improvement and foundation alternatives based on cost, performance, constructability, vibrations/impacts to adjacent structures, and other criteria. GZA services could also include preparation of earthwork and ground improvement specifications, review of the foundation and site work drawings, and review of Contractor



submittals. It is also recommended that GZA be retained for construction observation and Special Inspection services during the ground improvement, earthwork, and foundation construction phases of the project. Services may include observation and removal of unsuitable materials, demolition, removal, or flow-filling of underground utilities, ground improvement, proof rolling operations, placement of fill, performance of field density tests, and general observation of compliance with recommendations in this report and the contract documents. Given the extensive earthwork required and potentially difficult subsurface conditions, construction oversight is considered an important part of obtaining quality site improvements.

We trust that this report addresses the current geotechnical needs of this project. We appreciate the opportunity to have been of service to you and look forward to working with you and the rest of the design team as the project progresses. Please do not hesitate to contact Alexander Haag at (401) 427-2721 or [alexander.haag@gza.com](mailto:alexander.haag@gza.com) if there are any questions.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

Alexander Haag, Dipl. Ing.  
Project Manager

David R. Carchedi, Ph.D., P.E.  
Consultant Reviewer

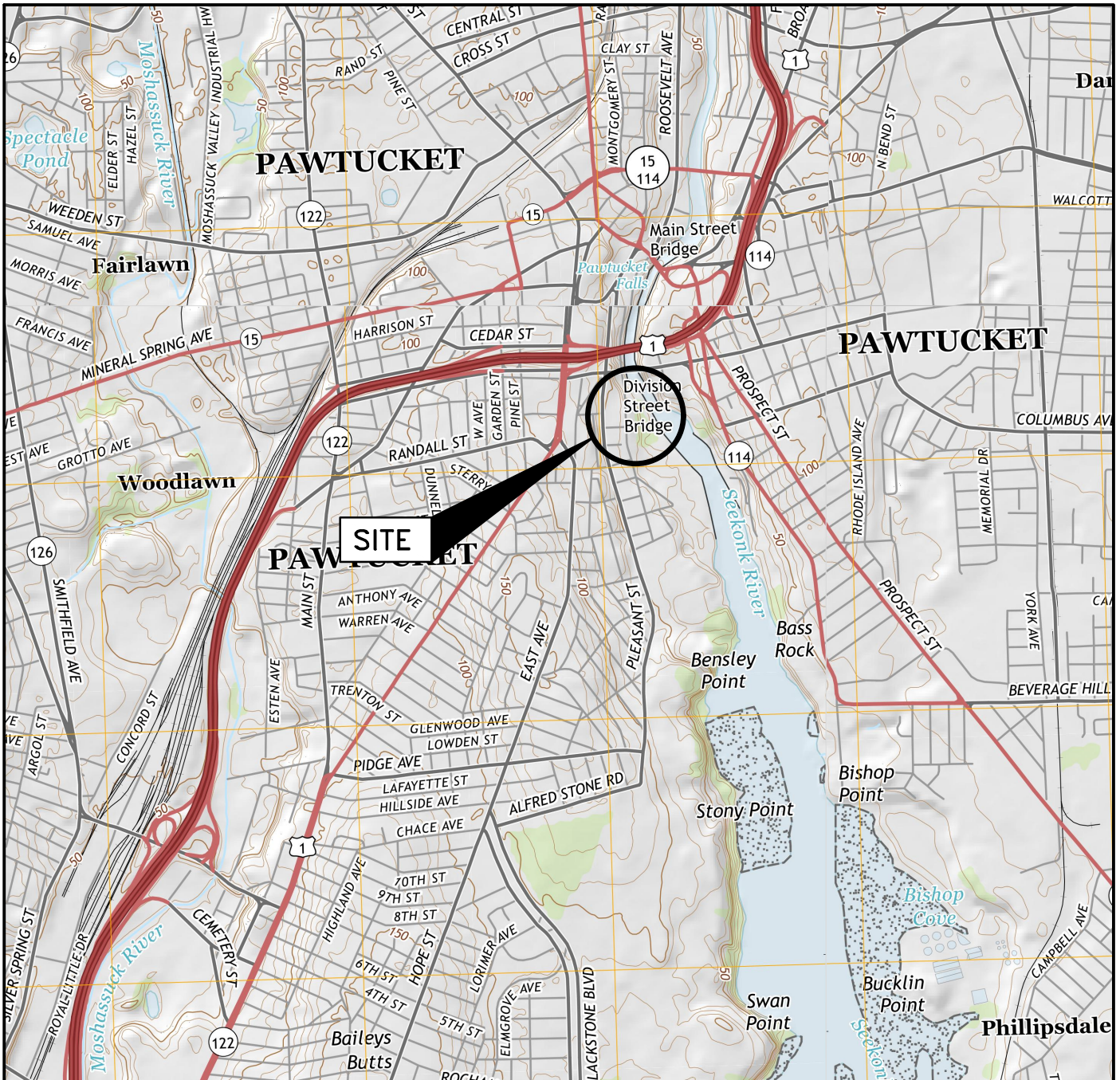
Todd R. Greene, P.E.  
Associate Principal

Attachments:	Figure 1:	Locus Plan
	Figure 2:	Exploration Location Plan
	Figures 3-6:	Subsurface Profiles
	Figure 7:	Schematic Ground Improvement Area
	Appendix A:	Limitations
	Appendix B:	Subsurface Exploration Logs
	Appendix C:	Geotechnical Laboratory Test Results
	Appendix D:	Historic Aerial Imagery

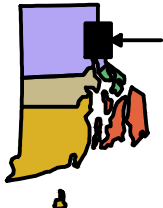


## FIGURES

© 2016 - GZA GeoEnvironmental, Inc. GZA-J:\GEO\34847.03\FIGURES\CAD\DWGS\TOWN LANDING\34847.03 - TOWN LANDING - LOCUS.DWG FIG 1 JUNE 12, 2014 ALEXANDER HAAG



RHODE ISLAND

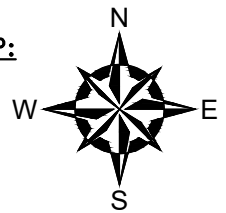


QUADRANGLE LOCATION

SOURCE:

**BASE MAP FROM THE FOLLOWING USGS QUADRANGLE MAP:  
 PROVIDENCE, RI (2015), EAST PROVIDENCE, RI (2015),  
 PAWTUCKET, RI (2015), ATTLEBORO, MA (2015)**

DIGITAL TOPOGRAPHIC MAPS PROVIDED BY USGSSTORE.GOV.  
 CONTOUR ELEVATIONS REFERENCE NAVD 88,  
 CONTOURS ARE SHOWN IN FEET AT 10' INTERVALS



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TIDEWATER DEVELOPMENT  
 TOWN LANDING SITE  
 PAWTUCKET, RHODE ISLAND

PREPARED BY:



PREPARED FOR:

FORTUITOUS TIDEWATER LLC

**LOCUS PLAN**

PROJ MGR: AH	REVIEWED BY: AH	CHECKED BY: AH	FIGURE <b>1</b> SHEET NO. 1 OF 2
DESIGNED BY: AGD	DRAWN BY: TRM	SCALE: AS NOTED	
DATE: FEBRUARY 2022	PROJECT NO. 34847.03	REVISION NO. 0	

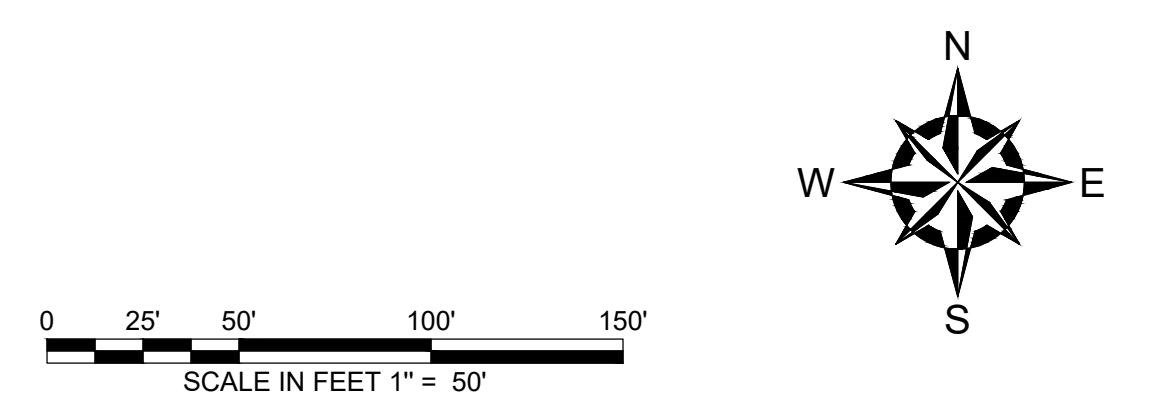
© 2022 - GZA GeoEnvironmental, Inc. GZA - \\GZAPROVIDENCE\JOBS\GEO\34847.03\TOWN LANDING\TOWN LANDING\34847.03 - TOWN LANDING - EXP (AH EDITS 2022.02.03).DWG FIG 2 February 3, 2022 MICHAEL AUBIN



**GENERAL NOTES:**  
 BASE MAP DEVELOPED FROM THE FOLLOWING ELECTRONIC DRAWING FILES:  
 • "TIDEWATER - BASE MAP" PREPARED BY SLR TRANSMITTED TO GZA ON 4/15/2021  
 • "TIDEWATER - BORINGS (WITH AS-DRILLED) AH EDITS.DWG" PREPARED BY SLR TRANSMITTED TO GZA ON 5/21/2021.  
 • "TIDEWATER - LAYOUT.DWG" PREPARED BY SLR TRANSMITTED TO GZA ON 4/15/2021.

**LEGEND:**

- SB-04 INDICATES BORINGS DRILLED BY FUSS & O'NEILL BETWEEN AUGUST AND SEPTEMBER 2011 AND OBSERVED BY FUSS & O'NEILL.
- MW-02 INDICATES BORINGS DRILLED AND MONITORING WELLS INSTALLED BY FUSS & O'NEILL BETWEEN AUGUST AND SEPTEMBER 2011 AND OBSERVED BY FUSS & O'NEILL.
- B-3 INDICATES BORINGS DRILLED BY GEOLOGIC EARTH EXPLORATION BETWEEN SEPTEMBER 2019 AND FEBRUARY 2020 AND OBSERVED BY MCMILLAN JACOBS ASSOCIATES.
- GZ-SB-103 INDICATES BORINGS DRILLED BY NEW ENGLAND BORING CONTRACTORS BETWEEN MARCH AND APRIL 2021 AND OBSERVED BY GZA PERSONNEL.



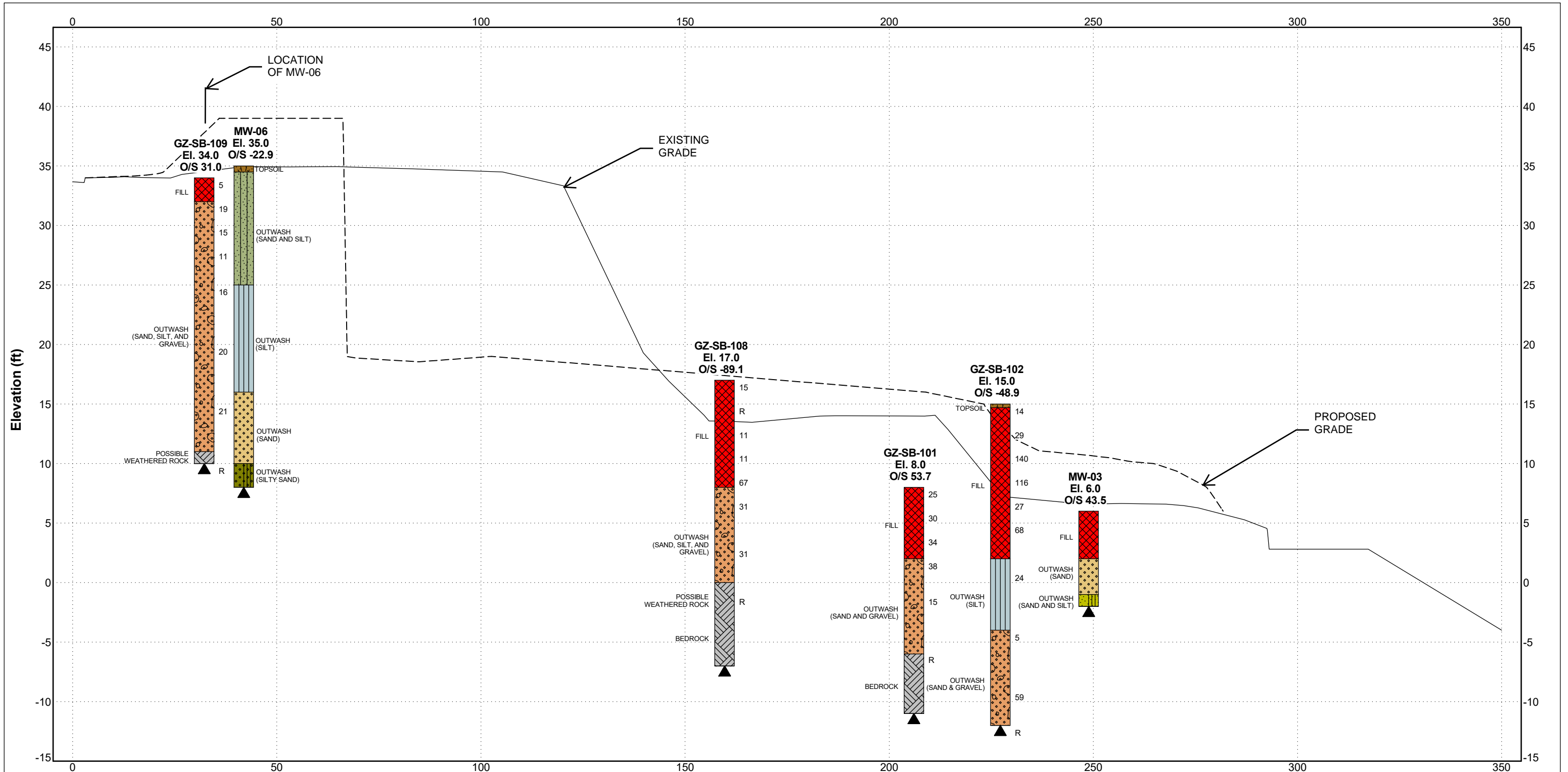
NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

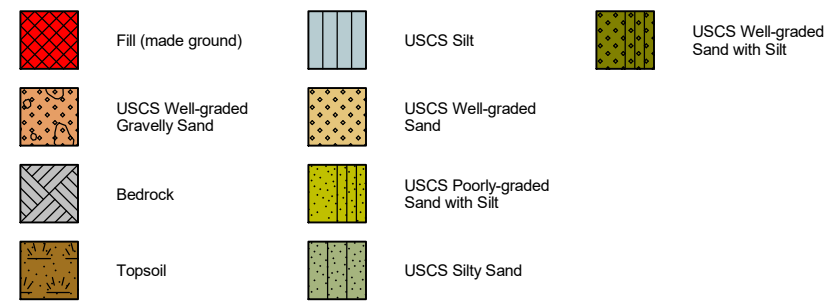
**TIDEWATER DEVELOPMENT  
 TOWN LANDING SITE, TAFT STREET  
 PAWTUCKET, RHODE ISLAND**

**EXPLORATION LOCATION PLAN**

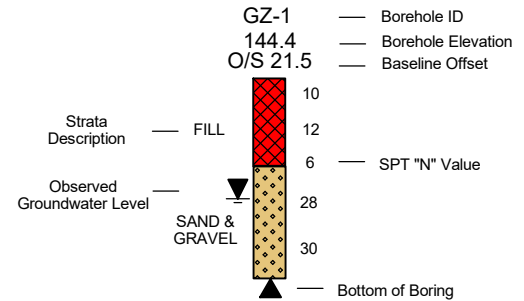
PREPARED BY: <b>GZA</b> GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: FORTUITOUS TIDEWATER LLC	
PROJ MGR: AH	REVIEWED BY: AH	CHECKED BY: AH	FIGURE <b>2</b>
DESIGNED BY: AGD	DRAWN BY: TRM	SCALE: AS NOTED	
DATE: FEBRUARY, 2022	PROJECT NO. 34847.03	REVISION NO. 0	SHEET NO. 2 OF 2



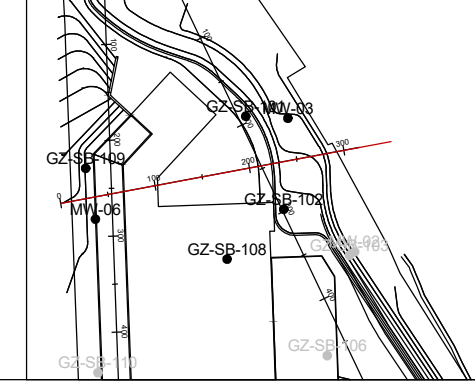
**SUBSURFACE STRATIGRAPHY LEGEND**



**BOREHOLE LEGEND**



**SITE MAP KEY**

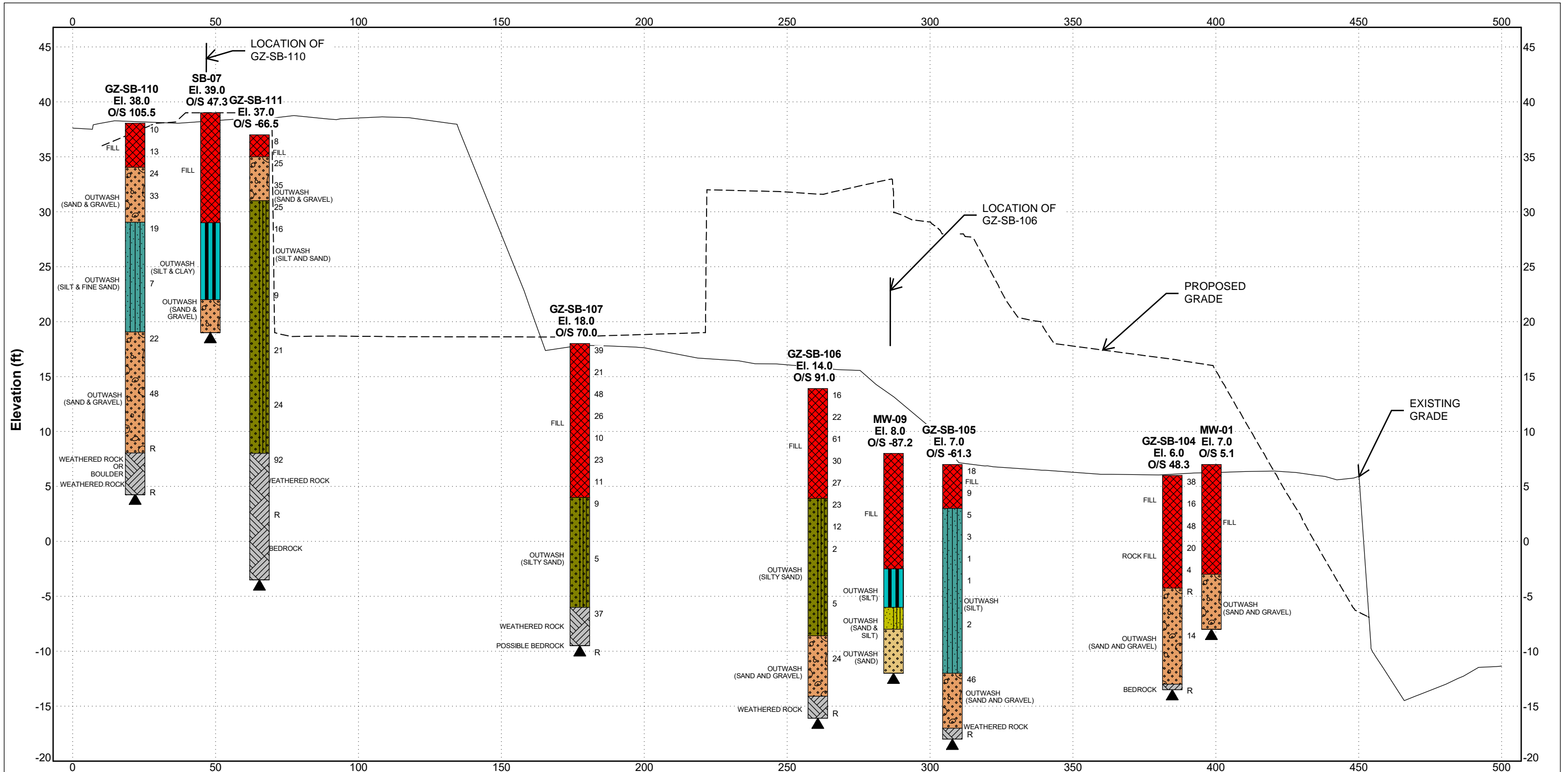


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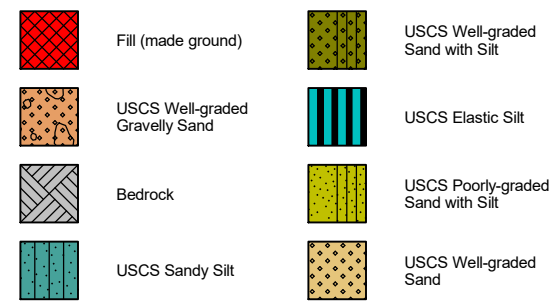
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- 2.) ELEVATIONS OF PRIOR BORINGS ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM - MEAN SEA LEVEL OF 1929 (NGVD 29) OR (MSL).
- 3.) DIFFERENCE BETWEEN NAVD88 AND NGVD29/MSL IS APPROXIMATELY 0.8 FT.
- 4.) REFER TO THE BORING LOGS IN APPENDIX B FOR A MORE DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS.

<b>GZA</b> GeoEnvironmental, Inc. <i>Engineers and Scientists</i>	<b>Town Landing Development</b> <b>Taft Street</b> <b>Pawtucket, Rhode Island</b>	
	Project No.: 34847.03 Date: 9/1/2021	Title: <b>Subsurface Profile A-A'</b>

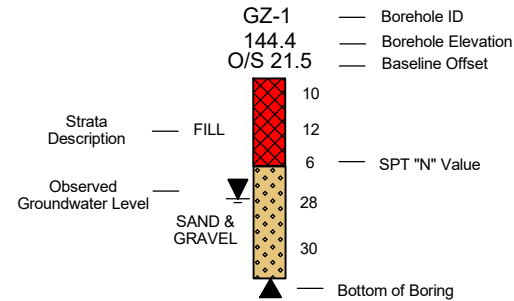
I:\WATER\_LANDINGS\9-1-21\34847.03 - SUBSURFACE PROFILE A-A' TOWN LANDING.GDW



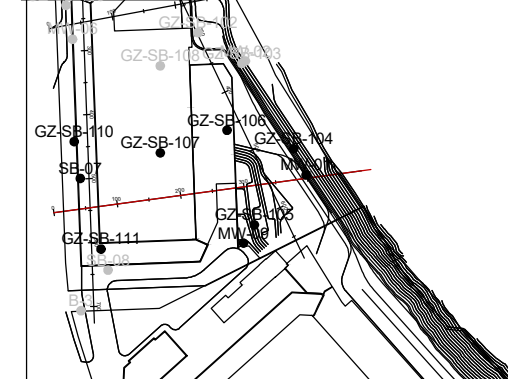
**SUBSURFACE STRATIGRAPHY LEGEND**



**BOREHOLE LEGEND**



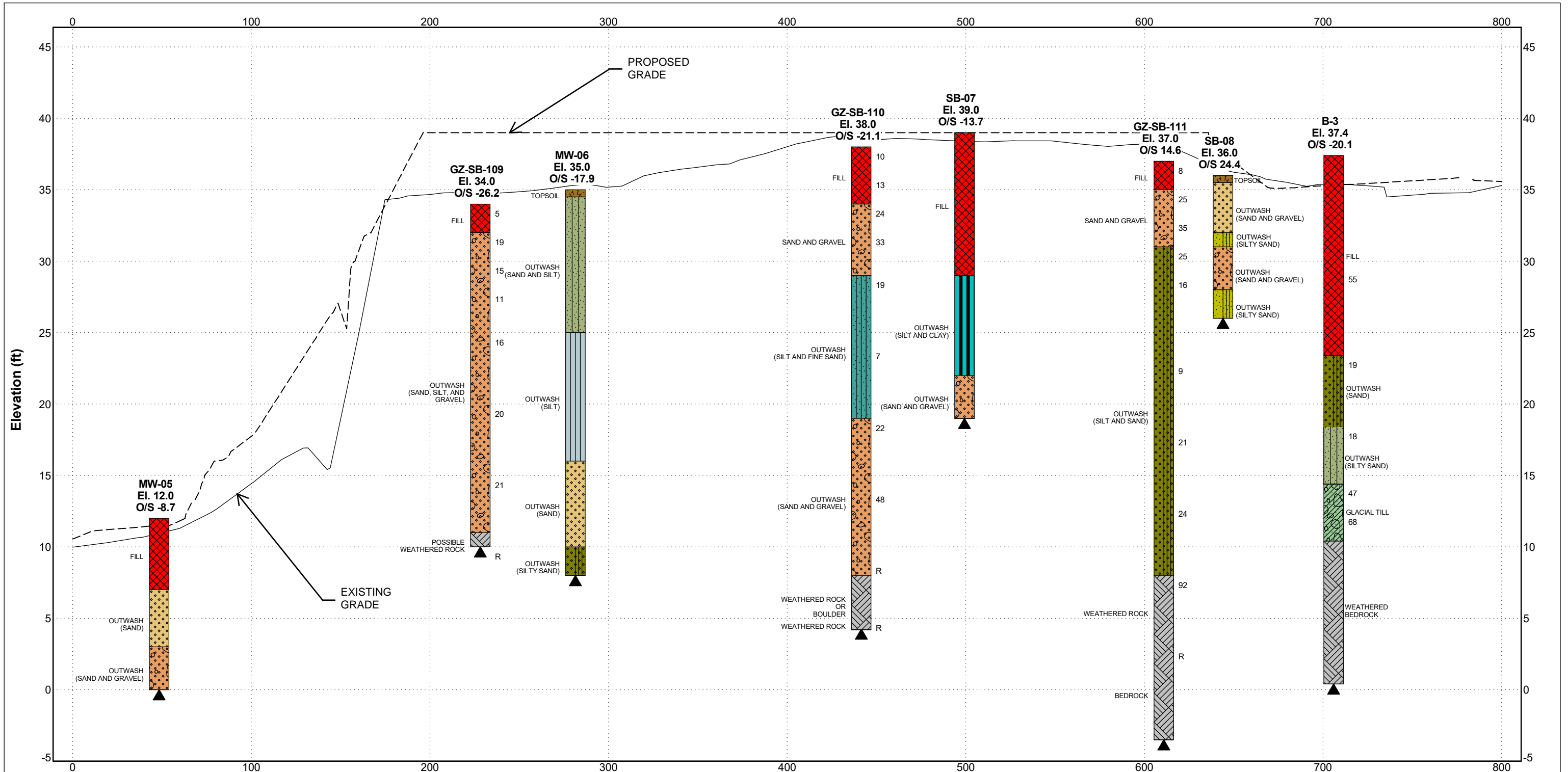
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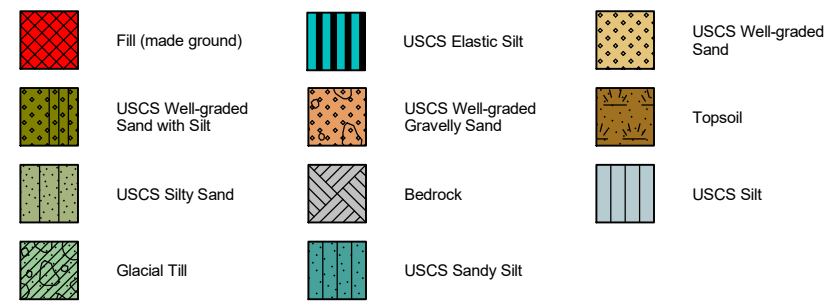
**NOTES:**

- 1.) ELEVATIONS OF RECENT BORINGS (GZ-SB-SERIES) AND EXISTING AND PROPOSED SITE ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
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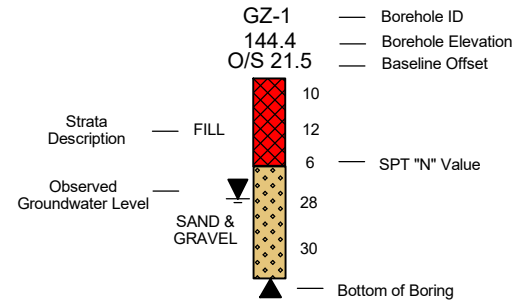
<b>GZA</b> GeoEnvironmental, Inc. <i>Engineers and Scientists</i>	<b>Town Landing Development</b> <b>Taft Street</b> <b>Pawtucket, Rhode Island</b>	
	Project No.: 34847.03 Date: 9/1/2021	Title: <b>Subsurface Profile B-B'</b>



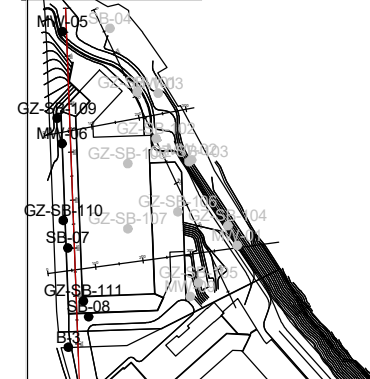
**SUBSURFACE STRATIGRAPHY LEGEND**



**BOREHOLE LEGEND**



**SITE MAP KEY**



**NOTES:**

- ELEVATIONS OF RECENT BORINGS (GZ-SB-SERIES) AND EXISTING AND PROPOSED SITE ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
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Town Landing Development  
Taft Street  
Pawtucket, Rhode Island

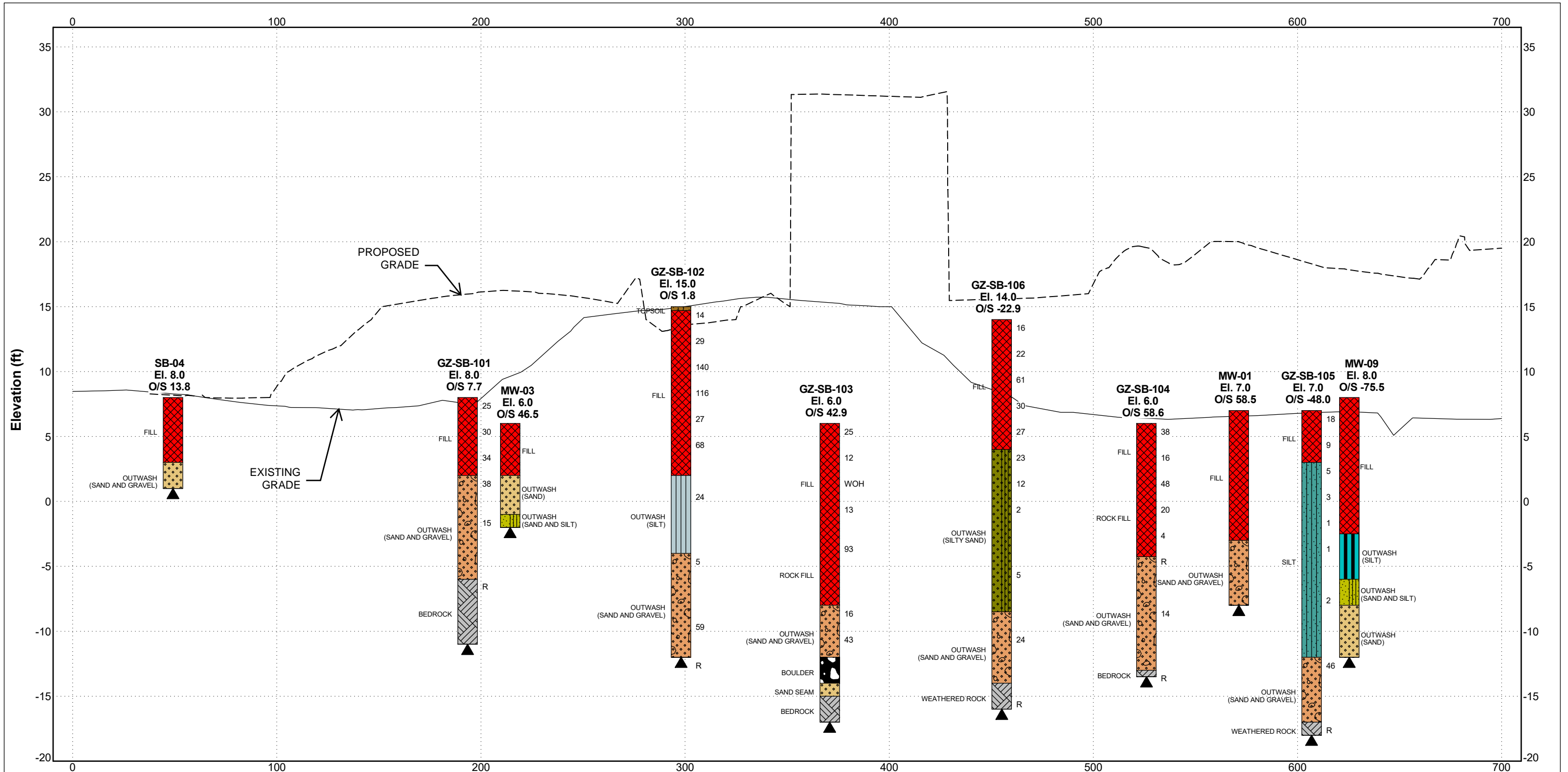
Project No.: 34847.03

Title:  
Subsurface Profile C-C'

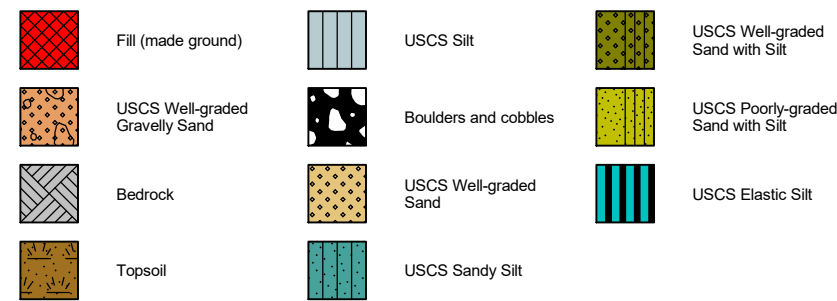
Figure No.:

Date: 9/1/2021

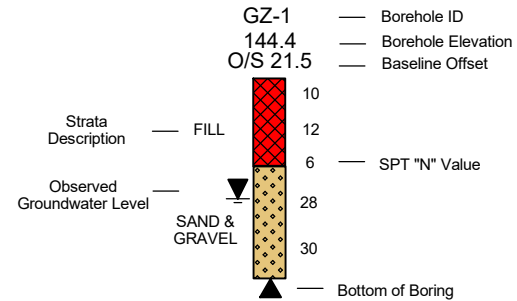
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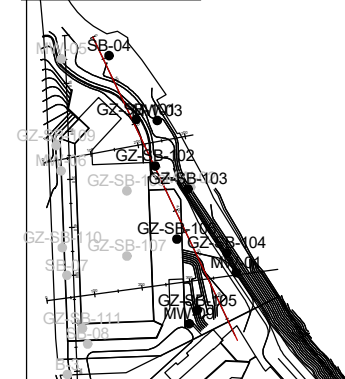
**SUBSURFACE STRATIGRAPHY LEGEND**



**BOREHOLE LEGEND**



**SITE MAP KEY**

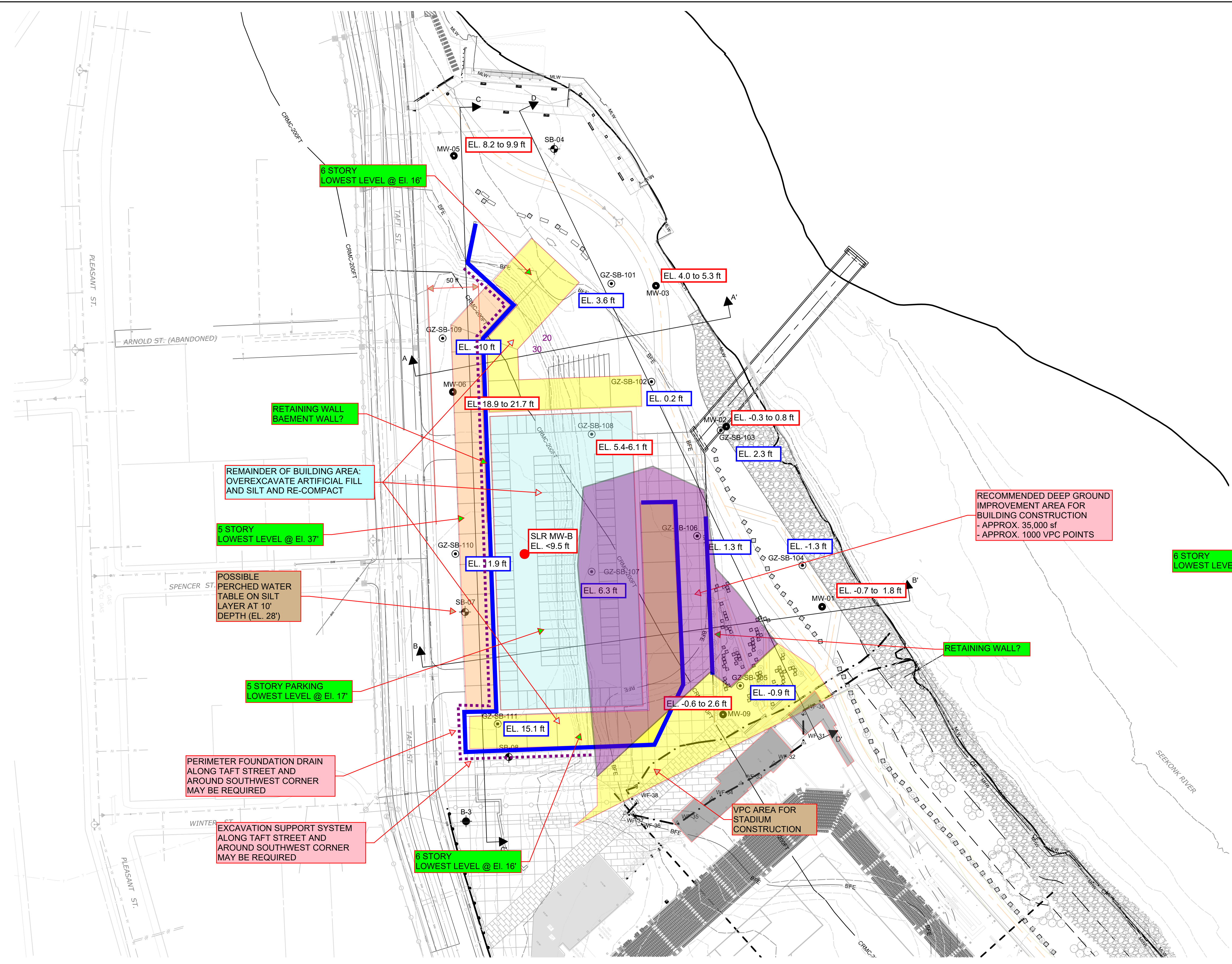


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- 3.) DIFFERENCE BETWEEN NAVD88 AND NGVD29/MSL IS APPROXIMATELY 0.8 FT.
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<p><b>GZA</b> GeoEnvironmental, Inc. Engineers and Scientists</p>	<p>Town Landing Development Taft Street Pawtucket, Rhode Island</p>	
	<p>Project No.: 34847.03</p>	<p>Title: Subsurface Profile D-D'</p>
<p>Date: 9/1/2021</p>		

© 2022 - GZA GeoEnvironmental, Inc. GZA - \\GZA\PROVIDENCE\JOBS\GEO\34847.03\TOWN LANDING\34847.03 - TOWN LANDING - EXP. (AH EDITS 2022.02.03).DWG FIG 2 February 3, 2022 MICHAEL AUBIN



**GENERAL NOTES:**

BASE MAP DEVELOPED FROM THE FOLLOWING ELECTRONIC DRAWING FILES:

- "TIDEWATER - BASE MAP" PREPARED BY SLR TRANSMITTED TO GZA ON 4/15/2021
- "TIDEWATER - BORINGS (WITH AS-DRILLED) AH EDITS.DWG" PREPARED BY SLR TRANSMITTED TO GZA ON 5/21/2021.
- "TIDEWATER - LAYOUT.DWG" PREPARED BY SLR TRANSMITTED TO GZA ON 4/15/2021.

**LEGEND:**

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- GZ-SB-103 INDICATES BORINGS DRILLED BY NEW ENGLAND BORING CONTRACTORS BETWEEN MARCH AND APRIL 2021 AND OBSERVED BY GZA PERSONNEL.

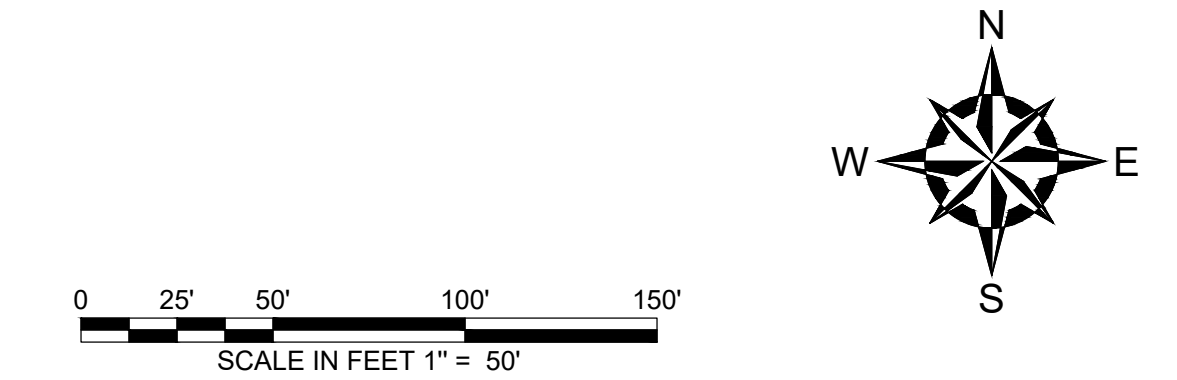
EL. -0.3 to 0.8 ft INDICATES APPROXIMATE GROUNDWATER ELEVATION IN GW OBSERVATION WELL

EL. 3.6 ft INDICATES APPROXIMATE GROUNDWATER ELEVATION INFERRED IN SOIL BORING

REFER TO GEOTECHNICAL REPORT FOR DETAILS

6 STORY LOWEST LEVEL @ EL. 16' PRELIMINARY DEVELOPMENT INFORMATION PROVIDED TO GZA IN APRIL 2021

PRELIMINARY DEVELOPMENT INFORMATION PROVIDED TO GZA IN APRIL 2021



6 STORY LOWEST LEVEL @ EL. 16'

RETAINING WALL BAEMENT WALL?

REMAINDER OF BUILDING AREA: OVEREXCAVATE ARTIFICIAL FILL AND SILT AND RE-COMPACT

5 STORY LOWEST LEVEL @ EL. 37'

POSSIBLE PERCHED WATER TABLE ON SILT LAYER AT 10' DEPTH (EL. 28')

5 STORY PARKING LOWEST LEVEL @ EL. 17'

PERIMETER FOUNDATION DRAIN ALONG TAFT STREET AND AROUND SOUTHWEST CORNER MAY BE REQUIRED

EXCAVATION SUPPORT SYSTEM ALONG TAFT STREET AND AROUND SOUTHWEST CORNER MAY BE REQUIRED

6 STORY LOWEST LEVEL @ EL. 16'

RECOMMENDED DEEP GROUND IMPROVEMENT AREA FOR BUILDING CONSTRUCTION  
- APPROX. 35,000 sf  
- APPROX. 1000 VPC POINTS

RETAINING WALL?

VPC AREA FOR STADIUM CONSTRUCTION

NO.	ISSUE/DESCRIPTION	BY	DATE

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TIDEWATER DEVELOPMENT  
TOWN LANDING SITE, TAFT STREET  
PAWTUCKET, RHODE ISLAND

**SCHEMATIC GROUND IMPROVEMENT PLAN**

PREPARED BY:	<b>GZA</b> GeoEnvironmental, Inc. Engineers and Scientists www.gza.com	PREPARED FOR:	FORTUITOUS TIDEWATER LLC
PROJ MGR:	AH	REVIEWED BY:	AH
DESIGNED BY:	AGD	DRAWN BY:	TRM
DATE:	FEBRUARY, 2022	PROJECT NO.:	34847.03
		CHECKED BY:	AH
		SCALE:	AS NOTED
		REVISION NO.:	0
		FIGURE	7
		SHEET NO.	7 OF 7



**APPENDIX A**  
**LIMITATIONS**



## GEOTECHNICAL LIMITATIONS

### Use of Report

1. GZA GeoEnvironmental, Inc. (GZA) prepared this report on behalf of, and for the exclusive use of our Client for the stated purpose(s) and location(s) identified in the Proposal for Services and/or Report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not expressly identified in the agreement, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to GZA.

### Standard of Care

2. GZA's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in Proposal for Services and/or Report, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the limited data gathered during the course of our work. If conditions other than those described in this report are found at the subject location(s), or the design has been altered in any way, GZA shall be so notified and afforded the opportunity to revise the report, as appropriate, to reflect the unanticipated changed conditions.
3. GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

### Subsurface Conditions

4. The generalized soil profile(s) provided in our Report are based on widely-spaced subsurface explorations and are intended only to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and were based on our assessment of subsurface conditions. The composition of strata, and the transitions between strata, may be more variable and more complex than indicated. For more specific information on soil conditions at a specific location refer to the exploration logs.
5. In preparing this report, GZA relied on certain information provided by the Client, state and local officials, and other parties referenced therein which were made available to GZA at the time of our evaluation. GZA did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.
6. Water level readings have been made in test holes (as described in the Report) and monitoring wells at the specified times and under the stated conditions. These data have been reviewed and interpretations have been made in this Report. Fluctuations in the level of the groundwater however occur due to temporal or spatial variations in areal recharge rates, soil heterogeneities, the presence of subsurface utilities, and/or natural or artificially induced perturbations. The water table encountered in the course of the work may differ from that indicated in the Report.



7. GZA's services did not include an assessment of the presence of oil or hazardous materials at the property. Consequently, we did not consider the potential impacts (if any) that contaminants in soil or groundwater may have on construction activities, or the use of structures on the property.
8. Recommendations for foundation drainage, waterproofing, and moisture control address the conventional geotechnical engineering aspects of seepage control. These recommendations may not preclude an environment that allows the infestation of mold or other biological pollutants.

#### Compliance with Codes and Regulations

9. We used reasonable care in identifying and interpreting applicable codes and regulations. These codes and regulations are subject to various, and possibly contradictory, interpretations. Compliance with codes and regulations by other parties is beyond our control.

#### Cost Estimates

10. Unless otherwise stated, our cost estimates are only for comparative and general planning purposes. These estimates may involve approximate quantity evaluations. Note that these quantity estimates are not intended to be sufficiently accurate to develop construction bids, or to predict the actual cost of work addressed in this Report. Further, since we have no control over either when the work will take place, or the labor and material costs required to plan and execute the anticipated work, our cost estimates were made by relying on our experience, the experience of others, and other sources of readily available information. Actual costs may vary over time and could be significantly more, or less, than stated in the Report.

#### Additional Services

11. GZA recommends that we be retained to provide services during any future: site observations, design, implementation activities, construction and/or property development/redevelopment. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design; and iv) assess the consequences of changes in technologies and/or regulations.



## **APPENDIX B**

### **SUBSURFACE EXPLORATION LOGS**

#### **CURRENT**

GZA GeoEnvironmental – 2021 GZ-SB-100 Series

#### **PRIOR**

Fuss & O’Neill (F&O) – 2011 SB/MW-Series

McMillen & Jacobs (M&J) – 2019 B-Series



## SUBSURFACE EXPLORATION LOGS

### **CURRENT**

GZA GeoEnvironmental – 2021 GZ-SB-100 Series

### TEST BORING LOG



**GZA**  
GeoEnvironmental, Inc.  
*Engineers and Scientists*

SLR Consulting  
Tidewater Landing - Town Landing Site  
Pawtucket, Rhode Island

EXPLORATION NO.: GZ-SB-101  
SHEET: 1 of 1  
PROJECT NO: 34847.03  
REVIEWED BY: Alexander Haag

**Logged By:** Jessie Batalon  
**Drilling Co.:** New England Boring Contractors  
**Foreman:** Matt Ferreira

**Type of Rig:** Track  
**Rig Model:** Diedrich D-120  
**Drilling Method:**  
Drive & Wash

**Boring Location:** See Plan  
**Ground Surface Elev. (ft.):** 8  
**Final Boring Depth (ft.):** 19  
**Date Start - Finish:** 3/31/2021 - 3/31/2021

**H. Datum:** NAD83  
**V. Datum:** NAVD88

**Hammer Type:** Automatic Hammer  
**Hammer Weight (lb.):** 140  
**Hammer Fall (in.):** 30  
**Auger or Casing O.D./I.D Dia (in.):** 4

**Sampler Type:** SS  
**Sampler O.D. (in.):** 2.0  
**Sampler Length (in.):** 24  
**Rock Core Size:** NX

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
03/31/2021	02:15 PM	10 min	4.3	14.0

Depth (ft)	Casing Blows/ (Core Rate)	Sample						Stratum Description (Modified Burmister Classification)	PID (ppm)	Remark	Depth (ft.)	Stratum Description	Elev. (ft.)
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value						
5		S-1	0.0-2.0	24	19	6 9 16 21	25	S-1: medium dense, dark brown, fine to coarse SAND, little fine to coarse Gravel, trace Silt, trace Asphalt (moist)	0.0	1	FILL		
		S-2	2.0-4.0	24	19	9 10 20 34	30	S-2: dense, dark brown, fine to coarse SAND, little fine to coarse Gravel, little Silt, trace Debris, Asphalt, Concrete (moist)	0.2				
		S-3A	4.0-6.0	24	10	13 16 18 33	34	S-3A: Top 8" - dense, brown, fine SAND, little fine to coarse Gravel, little Silt (moist)	0.2				
		S-4	6.0-8.0	24	10	19 18 20 18	38	S-3B: Bottom 2" - dense, black, fine to coarse SAND and Silt, some fine Gravel (moist) S-4: dense, gray, SILT and fine to coarse Sand, some fine Gravel, moderate fuel-like odor (moist)	3.0				
		S-5	9.0-11.0	24	9	7 7 8 7	15	S-5: medium dense, brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt (wet)	0.2				
15	(3:05)	S-6	13.9-13.9	0	0	50 /0"	R	S-6: NO RECOVERY				6	2.0
	(3:07) (3:40) (3:20) (3:27)	C-1	14.0-19.0	60	60	RQD= 87%		C-1: hard, fresh, slightly fractured to sound, amorphous, purple/gray, SILTSTONE. RQD = 87%.				14	-6.0
20								End of exploration at 19 feet				19	-11.0

**REMARKS**  
1 - The headspace of soil samples was screened for Volatile Organic Compounds (VOCs) using a MiniRae Plus (5 gas meter). ND indicates non-detected reading below the instrument's detection of approximately 0.1 ppm.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

**Exploration No.:**  
**GZ-SB-101**

TEST BORING W/ PID - GZA PLOG DATA TEMPLATE 03-20-18.GDT - 9/1/21 13:42 - J:\GEO\34847.03.AH\WORKLOGS\GINT\34847.01.TIDEWATER LANDING.GPJ

**TEST BORING LOG**



**GZA**  
**GeoEnvironmental, Inc.**  
*Engineers and Scientists*

**SLR Consulting**  
**Tidewater Landing - Town Landing Site**  
**Pawtucket, Rhode Island**

**EXPLORATION NO.:** GZ-SB-102  
**SHEET:** 1 of 1  
**PROJECT NO:** 34847.03  
**REVIEWED BY:** Alexander Haag

**Logged By:** Jessie Batalon  
**Drilling Co.:** New England Boring Contractors  
**Foreman:** Nick Crowley

**Type of Rig:** Track  
**Rig Model:** Diedrich D-120  
**Drilling Method:**  
Drive & Wash

**Boring Location:** See Plan  
**Ground Surface Elev. (ft.):** 15  
**Final Boring Depth (ft.):** 27  
**Date Start - Finish:** 4/6/2021 - 4/6/2021

**H. Datum:** NAD83  
**V. Datum:** NAVD88

**Hammer Type:** Automatic Hammer  
**Hammer Weight (lb.):** 140  
**Hammer Fall (in.):** 30  
**Auger or Casing O.D./I.D Dia (in.):** 4

**Sampler Type:** SS  
**Sampler O.D. (in.):** 2.0  
**Sampler Length (in.):** 24  
**Rock Core Size:** N/A

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
04/06/2021	12:00 PM	30 min	15.0	15'

Depth (ft)	Casing Blows/ (Core Rate)	Sample						Stratum Description (Modified Burmister Classification)	PID (ppm)	Remark	Depth (ft.)	Stratum Description	Elev. (ft.)			
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value									
5		S-1A	0.0-2.0	24	20	7 7 7 8	14	S-1A: Top 3" - medium dense, dark brown, TOPSOIL	0.3	1	0.3	TOPSOIL	14.7			
		S-2	2.0-4.0	24	6	8 19 10 7	29	S-1B: Bottom 17" - medium dense, brown/black, fine to coarse SAND, little Debris (Asphalt, Brick), trace (+) fine to coarse Gravel, trace Silt, trace Organics and Roots (dry)	0.1							
		S-3	4.0-6.0	24	14	1 57 83 23	140	S-2: medium dense, brown/gray CONCRETE, some fine to coarse Sand, some fine to coarse Gravel, trace Silt (dry)	0.0							
		S-4	6.0-8.0	24	16	45 98 18 31	116	S-3: very dense, brown/gray, CONCRETE, trace fine Gravel, trace fine to coarse Sand, trace Silt (dry)	0.0					FILL		
		S-5A	8.0-10.0	24	16	9 11 16 18	27	S-4: very dense, black, ASPHALT, trace fine Gravel, trace fine to coarse Sand, trace Silt, trace Brick (moist)	0.0							
		S-6	10.0-12.0	24	13	17 27 41 29	68	S-5A: Top 11" - medium dense, black, fine to coarse SAND, little fine Gravel, little Asphalt, trace (+) Silt (wet)	0.0							
			S-6	10.0-12.0	24	13	17 27 41 29	68	S-5B: Bottom 5" - medium dense, brown/orange, fine to medium SAND, some Silt (moist)		0.0			13		2.0
			S-7	14.0-16.0	24	13	7 5 19 12	24	S-6: very dense, brown, fine to medium SAND, little Silt, trace fine Gravel, trace Debris, Asphalt, Brick (moist)		0.0				OUTWASH (SILT)	
			S-8	19.0-21.0	24	8	5 3 2 2	5	S-7: medium dense, brown, SILT, trace fine Gravel, trace fine to coarse Sand (wet)		0.0			19		-4.0
			S-8	19.0-21.0	24	8	5 3 2 2	5	S-8: loose, black, fine to coarse SAND, little fine to coarse Gravel, little Organics and Wood, trace Silt (wet)		0.0				OUTWASH (SAND AND GRAVEL)	
		S-9	24.0-26.0	24	12	7 22 37 61	59	S-9: very dense, brown, fine to coarse GRAVEL and fine to coarse Sand, trace Silt (wet)	0.2			27		-12.0		
		S-10	27.0-27.0	0	0	50 /0"	R	S-10: NO RECOVERY End of exploration at 27 feet								

**REMARKS** 1 - The headspace of soil samples was screened for Volatile Organic Compounds (VOCs) using a MiniRae Plus (5 gas meter). ND indicates non-detected reading below the instrument's detection of approximately 0.1 ppm.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

**Exploration No.:**  
**GZ-SB-102**

TEST BORING W/ PID - GZA PLOG DATA TEMPLATE 03-20-18.GDT - 9/1/21 13:42 - J:\GEO\34847.03.AH\WORKLOGS\GINT\34847.01 TIDEWATER LANDING.GPJ

### TEST BORING LOG



**GZA**  
GeoEnvironmental, Inc.  
*Engineers and Scientists*

SLR Consulting  
Tidewater Landing - Town Landing Site  
Pawtucket, Rhode Island

EXPLORATION NO.: GZ-SB-103  
SHEET: 1 of 1  
PROJECT NO: 34847.03  
REVIEWED BY: Alexander Haag

**Logged By:** Jessie Batalon  
**Drilling Co.:** New England Boring Contractors  
**Foreman:** Matt Ferreira

**Type of Rig:** Track  
**Rig Model:** Diedrich D-120  
**Drilling Method:**  
Drive & Wash

**Boring Location:** See Plan  
**Ground Surface Elev. (ft.):** 6  
**Final Boring Depth (ft.):** 23  
**Date Start - Finish:** 4/1/2021 - 4/1/2021

**H. Datum:** NAD83  
**V. Datum:** NAVD88

**Hammer Type:** Automatic Hammer  
**Hammer Weight (lb.):** 140  
**Hammer Fall (in.):** 30  
**Auger or Casing O.D./I.D Dia (in.):** 4

**Sampler Type:** SS  
**Sampler O.D. (in.):** 2.0  
**Sampler Length (in.):** 24  
**Rock Core Size:** NX

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
04/01/2021	11:50 AM	15 min	3.3	15.0

Depth (ft)	Casing Blows/ (Core Rate)	Sample						Stratum Description (Modified Burmister Classification)	PID (ppm)	Remark	Depth (ft.)	Stratum Description	Elev. (ft.)
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value						
5		S-1	0.0-2.0	24	20	6 10 15 9	25	S-1: medium dense, brown/black, fine to coarse SAND, some Silt, trace fine Gravel, trace Organics and Roots (moist)	0.2	1			
		S-2	2.0-4.0	24	8	6 7 5 5	12	S-2: medium dense, brown, fine to coarse SAND, some fine to coarse Gravel, little Silt (wet)	0.3				
		S-3	4.0-6.0	24	4	1 WOH WOH 3	WOH	S-3: very loose, brown, fine to coarse SAND, some fine to coarse Gravel, little Silt (wet)	0.4			FILL	
		S-4	6.0-8.0	24	9	1 4 9 16	13	S-4: medium dense, brown, fine to coarse SAND, some fine to coarse Gravel, little Silt, trace Debris, Brick, Asphalt (wet)	0.3				
		S-5	9.0-11.0	24	20	43 23 70 55	93	S-5: very dense, completely weathered, extremely fractured, amorphous, gray, ROCK FILL	0.3			9 ----- -3.0	ROCK FILL
		S-6	14.0-16.0	24	10	WOH 4 12 10	16	S-6: medium dense, brown/gray, fine to coarse SAND and SILT, some fine Gravel, trace Organics and Roots (wet)	0.2		2	14 ----- -8.0	OUTWASH (SAND AND GRAVEL)
		S-7	16.0-18.0	24	12	14 24 19 25	43	S-7: dense, brown, fine to coarse GRAVEL, some fine to coarse Sand, trace Silt (wet)	0.3			18 ----- -12.0	BOULDER
	C-1A	18.0-23.0	60	38	RQD= 19%		C-1A: Top 20" - hard, fresh, slightly fractured, fine-grained, gray, SCHIST C-1B: Bottom 18" - hard, slightly weathered, moderately fractured, amorphous, gray, SILTSTONE. RQD = 19%.		20 ----- -14.0	SAND SEAM			
	(2:39)										21 ----- -15.0	BEDROCK	
	(3:17)										23 ----- -17.0		
	(0:21)												
	(2:42)												
	(2:55)												
								End of exploration at 23 feet					

**REMARKS**

1 - The headspace of soil samples was screened for Volatile Organic Compounds (VOCs) using a MiniRae Plus (5 gas meter). ND indicates non-detected reading below the instrument's detection of approximately 0.1 ppm.  
2 - Wood pieces observed in drill cuttings while rollerbitting from 13' - 14'. Organic odor observed.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

**Exploration No.:**  
**GZ-SB-103**

TEST BORING W/ PID - GZA PLOG DATA TEMPLATE 03-20-18.GDT - 9/1/21 13:42 - J:\GEO\34847.03.AH\WORKLOGS\GINT\34847.01.TIDEWATER LANDING.GPJ



### TEST BORING LOG



**GZA**  
**GeoEnvironmental, Inc.**  
*Engineers and Scientists*

SLR Consulting  
 Tidewater Landing - Town Landing Site  
 Pawtucket, Rhode Island

**EXPLORATION NO.:** GZ-SB-105  
**SHEET:** 1 of 1  
**PROJECT NO:** 34847.03  
**REVIEWED BY:** Alexander Haag

**Logged By:** Jessie Batalon  
**Drilling Co.:** New England Boring Contractors  
**Foreman:** Matt Ferreira

**Type of Rig:** Track  
**Rig Model:** Diedrich D-120  
**Drilling Method:**  
 Drive & Wash

**Boring Location:** See Plan  
**Ground Surface Elev. (ft.):** 7  
**Final Boring Depth (ft.):** 25  
**Date Start - Finish:** 4/2/2021 - 4/2/2021

**H. Datum:** NAD83  
**V. Datum:** NAVD88

**Hammer Type:** Automatic Hammer  
**Hammer Weight (lb.):** 140  
**Hammer Fall (in.):** 30  
**Auger or Casing O.D./I.D Dia (in.):** 4

**Sampler Type:** SS  
**Sampler O.D. (in.):** 2.0  
**Sampler Length (in.):** 24  
**Rock Core Size:** N/A

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
04/02/2021	10:30 AM	10 min	7.7	24.0

Depth (ft)	Casing Blows/ (Core Rate)	Sample						Stratum Description (Modified Burmister Classification)	PID (ppm)	Remark	Depth (ft.)	Stratum Description	Elev. (ft.)
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value						
5		S-1	0.0-2.0	24	3	7 10 8 5	18	S-1: medium dense, dark brown/black, SILT and fine Sand, trace fine Gravel, trace Organics (Roots, Leaves) (moist)	0.7	1	FILL		
		S-2	2.0-4.0	24	8	8 5 4 4	9	S-2: loose, brown, SILT, some fine Sand, trace fine Gravel (moist)	1.5			4	3.0
		S-3	4.0-6.0	24	6	4 3 2 2	5	S-3: loose, brown, SILT and fine to coarse Sand, little fine to coarse Gravel (wet)	2.4	2	SILT		
		S-4	6.0-8.0	24	8	2 2 1 2	3	S-4: very loose, brown, SILT, some fine to coarse SAND, trace fine Gravel (wet)	2.9				
		S-5	8.0-10.0	24	10	WOH WOH	1	S-5: very loose, brown, SILT, some fine to coarse SAND, trace fine Gravel (wet)	1.2				
		S-6	10.0-12.0	24	0	1 1 WOH WOH	1	S-6: NO RECOVERY					
		S-7	14.0-16.0	24	8	1 2 WOH 1	2	S-7: very loose, brown, SILT, some fine to coarse Gravel, little fine to coarse Sand (wet)	2.1				
		S-8	19.0-21.0	24	12	21 25 21 55	46	S-8: dense, brown, fine to coarse Gravel and fine to coarse Sand, little Silt (wet)	1.7		19	-12.0	
		S-9A	24.0-25.0	12	12	55 80 50 /0"	R	S-9A: Top 12" - very dense, gray, SILT, some fine to coarse Sand, little fine to coarse Gravel (moist) S-9B: Tip of Spoon - very dense, gray, WEATHERED SILTSTONE End of exploration at 25 feet	1.2		24	-17.0	25 WEATHERED ROCK 18.0

**REMARKS**

1 - The headspace of soil samples was screened for Volatile Organic Compounds (VOCs) using a MiniRae Plus (5 gas meter). ND indicates non-detected reading below the instrument's detection of approximately 0.1 ppm.  
 2 - Spoon driven from 4' - 6' removed from borehole wet. Driller had not introduced water (drive & wash) yet.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

**Exploration No.:**  
**GZ-SB-105**

TEST BORING W/ PID - GZA PLOG DATA TEMPLATE 03-20-18.GDT - 9/1/21 13:42 - J:\GEO\34847.03.AH\WORKLOGS\GINT\34847.01 TIDEWATER LANDING.GPJ

### TEST BORING LOG



**GZA**  
GeoEnvironmental, Inc.  
*Engineers and Scientists*

SLR Consulting  
Tidewater Landing - Town Landing Site  
Pawtucket, Rhode Island

EXPLORATION NO.: GZ-SB-106  
SHEET: 1 of 1  
PROJECT NO: 34847.03  
REVIEWED BY: Alexander Haag

**Logged By:** Jessie Batalon  
**Drilling Co.:** New England Boring Contractors  
**Foreman:** Matt Ferreira

**Type of Rig:** Track  
**Rig Model:** Diedrich D-120  
**Drilling Method:**  
Drive & Wash

**Boring Location:** See Plan  
**Ground Surface Elev. (ft.):** 14  
**Final Boring Depth (ft.):** 30  
**Date Start - Finish:** 4/2/2021 - 4/2/2021

**H. Datum:** NAD83  
**V. Datum:** NAVD88

**Hammer Type:** Automatic Hammer  
**Hammer Weight (lb.):** 140  
**Hammer Fall (in.):** 30  
**Auger or Casing O.D./I.D Dia (in.):** 4

**Sampler Type:** SS  
**Sampler O.D. (in.):** 2.0  
**Sampler Length (in.):** 24  
**Rock Core Size:** N/A

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
04/02/2021	02:30 PM	10 min	13.0	24.0

Depth (ft)	Casing Blows/ (Core Rate)	Sample						Stratum Description (Modified Burmister Classification)	PID (ppm)	Remark	Depth (ft.)	Stratum Description	Elev. (ft.)
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value						
5		S-1	0.0-2.0	24	10	11 12 4 6	16	S-1: medium dense, brown/black, fine to coarse SAND, little fine to coarse Gravel, trace Asphalt, trace Silt (dry)	0.2	1	FILL		
		S-2	2.0-4.0	24	13	6 11 11 6	22	S-2: medium dense, brown/black, fine to coarse SAND and fine to coarse Gravel, trace Asphalt, trace Silt (dry)	0.0				
		S-3	4.0-6.0	24	19	14 35 26 18	61	S-3: very dense, brown/black, fine to coarse SAND, little Debris (Asphalt, Concrete), trace fine Gravel, trace Silt (dry)	0.7				
		S-4	6.0-8.0	24	12	14 11 19 24	30	S-4: dense, brown/black, fine to coarse SAND, little Debris (Asphalt, Brick), little fine Gravel, trace Organics and Roots, trace Silt (wet)	0.2				
		S-5	8.0-10.0	24	17	31 16 11 13	27	S-5: medium dense, brown/black, fine to coarse SAND, little fine to coarse Gravel, trace Debris (Brick, Asphalt), trace Silt (moist)	0.1				
		S-6	10.0-12.0	24	7	18 10 13 10	23	S-6: medium dense, brown, fine to coarse GRAVEL, some fine to coarse Sand, some Silt (wet)	2.0				
		S-7	12.0-14.0	24	10	9 8 4 5	12	S-7: medium dense, brown, fine to coarse SAND, some Silt, trace fine Gravel (wet)	1.1				
		S-8	14.0-16.0	24	4	3 2 WOH 2	2	S-8: very loose, brown, fine to coarse SAND, some fine to coarse Gravel, little Silt (wet)	2.2				
		S-9	19.0-21.0	24	9	7 4 1 2	5	S-9: loose, brown, fine to coarse SAND, some Silt, trace fine Gravel (wet)	0.1				
		S-10	24.0-26.0	24	9	8 8 16 32	24	S-10: medium dense, brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt (wet)	0.2				
	S-11	29.0-30.0	12	6	32 63 50 /0"	R	S-11: very soft, completely weathered, extremely fractured, amorphous, gray, SILTSTONE	0.3	2	WEATHERED ROCK	-16.0		
End of exploration at 30 feet													

**REMARKS**

1 - The headspace of soil samples was screened for Volatile Organic Compounds (VOCs) using a MiniRae Plus (5 gas meter). ND indicates non-detected reading below the instrument's detection of approximately 0.1 ppm.  
2 - Slow rollerbit advancement from 28' - 29'. Likely top of weathered rock.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

**Exploration No.:**  
**GZ-SB-106**

TEST BORING W/ PID - GZA PLOG DATA TEMPLATE 03-20-18.GDT - 9/1/21 13:42 - J:\GEO\34847.03.AH\WORKLOGS\GINT\34847.01 TIDEWATER LANDING.GPJ

### TEST BORING LOG



**GZA**  
GeoEnvironmental, Inc.  
Engineers and Scientists

SLR Consulting  
Tidewater Landing - Town Landing Site  
Pawtucket, Rhode Island

EXPLORATION NO.: GZ-SB-107  
SHEET: 1 of 1  
PROJECT NO: 34847.03  
REVIEWED BY: Alexander Haag

Logged By: Jessie Batalon  
Drilling Co.: New England Boring Contractors  
Foreman: Nick Crowley

Type of Rig: Track  
Rig Model: Diedrich D-120  
Drilling Method:  
Drive & Wash

Boring Location: See Plan  
Ground Surface Elev. (ft.): 18  
Final Boring Depth (ft.): 27.5  
Date Start - Finish: 4/5/2021 - 4/5/2021

H. Datum: NAD83  
V. Datum: NAVD88

Hammer Type: Automatic Hammer  
Hammer Weight (lb.): 140  
Hammer Fall (in.): 30  
Auger or Casing O.D./I.D Dia (in.): 4

Sampler Type: SS  
Sampler O.D. (in.): 2.0  
Sampler Length (in.): 24  
Rock Core Size: N/A

#### Groundwater Depth (ft.)

Date	Time	Stab. Time	Water	Casing
04/05/2021	11:00 AM	15 min	11.6	27.0

Depth (ft)	Casing Blows/ (Core Rate)	Sample						Stratum Description (Modified Burmister Classification)	PID (ppm)	Remark	Depth (ft.)	Stratum Description	Elev. (ft.)	
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value							
5		S-1	0.0-2.0	24	21	5 21 18 20	39	S-1: dense, brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt, trace Brick, trace Organics and Roots (moist)	0.0	1	FILL			
		S-2	2.0-4.0	24	10	2 12 9 15	21	S-2: medium dense, brown, fine to coarse SAND, little fine to coarse Gravel, trace Brick, trace Silt (moist)	0.0					
		S-3	4.0-6.0	24	9	9 6 42 14	48	S-3: dense, brown/black, fine to coarse GRAVEL, some fine to coarse Sand, trace Debris (Asphalt, Brick), trace Silt (moist)	0.0					
		S-4	6.0-8.0	24	9	5 10 16 7	26	S-4: medium dense, brown/black, fine to coarse GRAVEL and fine to coarse Sand, little Asphalt, trace Silt (moist)	0.0					
		S-5	8.0-10.0	24	11	6 2 8 9	10	S-5: medium dense, black, fine to coarse SAND, some Silt, little fine to coarse Gravel (wet)	0.0					
		S-6	10.0-12.0	24	11	7 12 11 8	23	S-6: medium dense, brown/black, fine to coarse SAND, some Silt, trace fine to coarse Gravel, trace Brick (moist)	0.0					
		S-7A	12.0-14.0	24	12	7 5 6 6	11	S-7A: Top 8" - medium dense, brown/black, fine to coarse SAND, some Silt, little fine to coarse Gravel, trace Brick (wet)	14				4.0	
		S-7B	14.0-16.0	24	12	8 6 3 5	9	S-7B: Bottom 4" - medium dense, brown, fine to coarse GRAVEL, some fine to medium Sand, trace Silt (wet)						
		S-8	14.0-16.0	24	12	8 6 3 5	9	S-8: loose, brown, SILT, some fine to coarse Sand, trace fine Gravel (wet)	0.0				24	-6.0
		S-9	19.0-21.0	24	18	3 2 3 20	5	S-9: loose, brown, fine to coarse SAND, some Silt, piece of coarse Gravel stuck in tip of spoon (wet)	0.0					
	S-10	24.0-26.0	24	12	18 21 16 9	37	S-10: dense, gray, fine to coarse GRAVEL, little fine to coarse Sand, little Silt (wet)	0.3	27	-9.0				
	S-11	27.5-27.5	0	0	50 /0"	R	S-11: NO RECOVERY End of exploration at 27.5 feet							

**REMARKS**  
1 - The headspace of soil samples was screened for Volatile Organic Compounds (VOCs) using a MiniRae Plus (5 gas meter). ND indicates non-detected reading below the instrument's detection of approximately 0.1 ppm.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

**Exploration No.:**  
**GZ-SB-107**

TEST BORING W/ PID - GZA PLOG DATA TEMPLATE 03-20-18.GDT - 9/1/21 13:43 - J:\GEO\34847.03.AH\WORKLOGS\GINT\34847.01 TIDEWATER LANDING.GPJ

**TEST BORING LOG**



**GZA**  
GeoEnvironmental, Inc.  
*Engineers and Scientists*

SLR Consulting  
Tidewater Landing - Town Landing Site  
Pawtucket, Rhode Island

EXPLORATION NO.: GZ-SB-108  
SHEET: 1 of 1  
PROJECT NO: 34847.03  
REVIEWED BY: Alexander Haag

**Logged By:** Jessie Batalon  
**Drilling Co.:** New England Boring Contractors  
**Foreman:** Nick Crowley

**Type of Rig:** Track  
**Rig Model:** Diedrich D-120  
**Drilling Method:**  
Drive & Wash

**Boring Location:** See Plan  
**Ground Surface Elev. (ft.):** 17  
**Final Boring Depth (ft.):** 24  
**Date Start - Finish:** 4/5/2021 - 4/8/2021

**H. Datum:** NAD83  
**V. Datum:** NAVD88

**Hammer Type:** Automatic Hammer  
**Hammer Weight (lb.):** 140  
**Hammer Fall (in.):** 30  
**Auger or Casing O.D./I.D Dia (in.):** 4

**Sampler Type:** SS  
**Sampler O.D. (in.):** 2.0  
**Sampler Length (in.):** 24  
**Rock Core Size:** NX

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
04/06/2021	07:15 AM	16 hrs	1.4	14.0
04/06/2021	12:05 PM	3.5 hrs	11.1	18.0

Depth (ft)	Casing Blows/ (Core Rate)	Sample						Stratum Description (Modified Burmister Classification)	PID (ppm)	Remark	Depth (ft.)	Stratum Description	Elev. (ft.)
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value						
5 10 15 20 25		S-1	0.0-2.0	24	17	10 9 6 8	15	S-1: medium dense, brown/black, fine to coarse SAND, little fine to coarse Gravel, trace Silt, trace Asphalt, trace Organics and Roots (dry)	0.0	1	FILL		
		S-2	2.0-2.9	11	6	12 100 /5"	R	S-2: very dense, brown, fine to coarse SAND, little fine to coarse Gravel, little Silt, trace Asphalt (moist)	0.0	2			
		S-3	4.0-6.0	24	9	8 4 7 7	11	S-3: medium dense, brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt (wet)	0.0				
		S-4	6.0-8.0	24	10	4 1 10 30	11	S-4: medium dense, brown/black, fine to coarse SAND, some fine to coarse Gravel, little Silt, trace Organics and Roots (moist)	0.0				
		S-5A	8.0-10.0	24	17	13 28 39 32	67	S-5A: Top 8" - very dense, black, fine to coarse SAND, some fine to coarse Gravel, trace Silt (wet)	0.0	9		8.0	
		S-6	10.0-12.0	24	8	14 16 15 9	31	S-5B: Bottom 9" - very dense, brown, fine to medium SAND, little Silt (moist) S-6: dense, brown/gray, fine to coarse GRAVEL and Silt, trace fine to coarse Sand (moist)	0.0			OUTWASH (SAND, SILT, AND GRAVEL)	
		S-7	14.0-16.0	24	12	21 19 12 12	31	S-7: dense, brown/gray, fine to coarse SAND, some fine to coarse Gravel, some Silt (wet)	0.0				
		S-8	18.0-18.0	0	0	50 /0"	R	S-8: NO RECOVERY				17	0.0
	(4:02) (3:45) (5:31) (3:02) (4:14)	C-1	19.0-24.0	60	49	RQD= 0%		C-1: hard, highly to slightly weathered, extremely to moderately fractured, amorphous, purple/gray, SILTSTONE. RQD = 0%.		19	POSSIBLE WEATHERED ROCK	-2.0	
								End of exploration at 24 feet		3	24	BEDROCK	-7.0

**REMARKS**

1 - The headspace of soil samples was screened for Volatile Organic Compounds (VOCs) using a MiniRae Plus (5 gas meter). ND indicates non-detected reading below the instrument's detection of approximately 0.1 ppm.  
 2 - Obstructed at approximately 2.9'. Moved approximately 3' east, drilled down to 4' bgs, and continued continuous sampling.  
 3 - Installed groundwater monitoring well to 24' bgs. 2" diameter slotted PVC pipe 24' - 9'; 2" diameter solid PVC pipe 9' - 0'; Filter sand 24' - 7'; Bentonite seal 7' - 5'; Additional filter sand 5' - 0'; finished at the ground surface with a standpipe cemented in place.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

**Exploration No.:**  
**GZ-SB-108**

TEST BORING W/ PID - GZA PLOG DATA TEMPLATE 03-20-18.GDT - 9/1/21 13:43 - J:\GEO\34847.03.AH\WORKLOGS\GINT\34847.01 TIDEWATER LANDING.GPJ

**TEST BORING LOG**



**GZA**  
**GeoEnvironmental, Inc.**  
*Engineers and Scientists*

**SLR Consulting**  
**Tidewater Landing - Town Landing Site**  
**Pawtucket, Rhode Island**

**EXPLORATION NO.:** GZ-SB-109  
**SHEET:** 1 of 1  
**PROJECT NO:** 34847.03  
**REVIEWED BY:** Alexander Haag

**Logged By:** Jessie Batalon  
**Drilling Co.:** New England Boring Contractors  
**Foreman:** Nick Crowley

**Type of Rig:** Track  
**Rig Model:** Diedrich D-120  
**Drilling Method:**  
Drive & Wash

**Boring Location:** See Plan  
**Ground Surface Elev. (ft.):** 34  
**Final Boring Depth (ft.):** 24  
**Date Start - Finish:** 4/6/2021 - 4/7/2021

**H. Datum:** NAD83  
**V. Datum:** NAVD88

**Hammer Type:** Automatic Hammer  
**Hammer Weight (lb.):** 140  
**Hammer Fall (in.):** 30  
**Auger or Casing O.D./I.D Dia (in.):** 4

**Sampler Type:** SS  
**Sampler O.D. (in.):** 2.0  
**Sampler Length (in.):** 24  
**Rock Core Size:** N/A

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
04/07/2021	07:15 AM	16 hrs	Not Enc. to	24' 24.0

Depth (ft)	Casing Blows/ (Core Rate)	Sample						Stratum Description (Modified Burmister Classification)	PID (ppm)	Remark	Depth (ft.)	Stratum Description	Elev. (ft.)
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value						
5		S-1A	0.0-2.0	24	16	2 2 3 5	5	S-1A: Top 5" - loose, dark brown, fine to medium SAND, little fine to coarse Gravel, trace Organics (Wood), trace Silt (dry)	0.0	1	FILL	32.0	
		S-2	2.0-4.0	24	19	5 9 10 10	19	S-1B: Bottom 11" - loose, brown, fine to coarse SAND, trace fine Gravel, trace Silt (moist)	0.0				
		S-3	4.0-6.0	24	16	7 8 7 8	15	S-2: medium dense, brown, fine SAND, trace (+) Silt (moist)	0.0				
		S-4	6.0-8.0	24	15	6 6 5 6	11	S-3: medium dense, brown, fine SAND, little Silt (moist)	0.1				
								S-4: medium dense, brown, SILT and fine Sand (wet)	0.2				
		S-5A	9.0-11.0	24	13	5 3 13 16	16	S-5A: Top 10" - medium dense, brown, SILT, little fine Sand (wet)	0.0				
								S-5B: Bottom 3" - medium dense, brown, fine to coarse SAND, trace fine Gravel, trace Silt (wet)	0.0				
		S-6	14.0-16.0	24	11	11 9 11 7	20	S-6: medium dense, brown, fine to coarse SAND and fine to coarse Gravel, trace Silt (wet)	0.2				
20		S-7	19.0-21.0	24	15	7 8 13 18	21	S-7: medium dense, brown, fine to coarse SAND, some Silt, trace fine Gravel (wet)	0.0				
25		S-8	24.0-24.0	0	0	50 /0"	R	S-8: NO RECOVERY End of exploration at 24 feet		2	POSSIBLE WEATHERED ROCK	11.0 10.0	

**REMARKS**

1 - The headspace of soil samples was screened for Volatile Organic Compounds (VOCs) using a MiniRae Plus (5 gas meter). ND indicates non-detected reading below the instrument's detection of approximately 0.1 ppm.  
2 - Driller reported drilling through a hard material from 23' - 24'. Possible weathered rock.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

**Exploration No.:**  
**GZ-SB-109**

TEST BORING W/ PID - GZA PLOG DATA TEMPLATE 03-20-18.GDT - 9/11/21 13:43 - J:\GEO\34847.03.AH\WORKLOGS\GINT\34847.01.TIDEWATER LANDING.GPJ

### TEST BORING LOG



**GZA**  
GeoEnvironmental, Inc.  
*Engineers and Scientists*

SLR Consulting  
Tidewater Landing - Town Landing Site  
Pawtucket, Rhode Island

EXPLORATION NO.: GZ-SB-110  
SHEET: 1 of 2  
PROJECT NO: 34847.03  
REVIEWED BY: Alexander Haag

**Logged By:** Jessie Batalon  
**Drilling Co.:** New England Boring Contractors  
**Foreman:** Nick Crowley

**Type of Rig:** Track  
**Rig Model:** Diedrich D-120  
**Drilling Method:**  
Drive & Wash

**Boring Location:** See Plan  
**Ground Surface Elev. (ft.):** 38  
**Final Boring Depth (ft.):** 33.75  
**Date Start - Finish:** 4/7/2021 - 4/7/2021

**H. Datum:** NAD83  
**V. Datum:** NAVD88

**Hammer Type:** Automatic Hammer  
**Hammer Weight (lb.):** 140  
**Hammer Fall (in.):** 30  
**Auger or Casing O.D./I.D Dia (in.):** 4

**Sampler Type:** SS  
**Sampler O.D. (in.):** 2.0  
**Sampler Length (in.):** 24  
**Rock Core Size:** NX

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
04/07/2021	11:45 AM	30 min	26.4	30'

Depth (ft)	Casing Blows/ (Core Rate)	Sample						Stratum Description (Modified Burmister Classification)	PID (ppm)	Remark	Depth (ft.)	Stratum Description	Elev. (ft.)
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value						
5		S-1	0.0-2.0	24	20	5 6 4 4	10	S-1: medium dense, brown, fine to coarse SAND, little fine to coarse Gravel, trace Asphalt, trace Silt, trace Organics, Grass, Roots (dry)	0.0	1	FILL		
		S-2	2.0-4.0	24	10	7 7 6 6	13	S-2: medium dense, brown, fine to coarse SAND and fine to coarse Gravel, trace Silt (dry)	0.0			4	34.0
		S-3	4.0-6.0	24	15	10 11 13 13	24	S-3: medium dense, brown, fine to coarse SAND and fine to coarse Gravel, trace Silt (moist)	0.0				
		S-4	6.0-8.0	24	15	17 17 16 18	33	S-4: dense, brown, fine to coarse SAND and fine to coarse Gravel, trace Silt (moist)	0.0				
		S-5	9.0-11.0	24	15	6 10 9 12	19	S-5: medium dense, brown, fine SAND, little Silt (moist)	0.0		9	29.0	
		S-6	14.0-16.0	24	14	WOH 3 4 4	7	S-6: loose, brown/gray, SILT, trace fine Sand, trace fine Gravel (wet)	0.0				
		S-7	19.0-21.0	24	12	10 11 11 15	22	S-7: medium dense, brown, fine to coarse SAND, little fine to coarse Gravel, trace Silt (wet)	0.0		19	19.0	
		S-8	24.0-26.0	24	15	16 27 21 23	48	S-8: dense, brown, fine to coarse SAND, some fine to coarse Gravel, some Silt (wet)	0.0				
		S-9	29.0-30.3	16	13	18 14 100 /4"	R	S-9: very dense, brown, fine to coarse SAND, some fine to coarse Gravel, some Silt (wet). Weathered rock in tip of spoon.	0.0		30	8.0	
	(1:09)	C-1	31.0-33.0	24	14			C-1: SILTSTONE BOULDER				WEATHERED ROCK OR BOULDER	

**REMARKS**  
1 - The headspace of soil samples was screened for Volatile Organic Compounds (VOCs) using a MiniRae Plus (5 gas meter). ND indicates non-detected reading below the instrument's detection of approximately 0.1 ppm.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

**Exploration No.:**  
**GZ-SB-110**

TEST BORING W/ PID - GZA PLOG DATA TEMPLATE 03-20-18.GDT - 9/1/21 13:43 - J:\GEO\34847.03.AH\WORKLOGS\GINT\34847.01 TIDEWATER LANDING.GPJ

**TEST BORING LOG**



**GZA**  
**GeoEnvironmental, Inc.**  
*Engineers and Scientists*

SLR Consulting  
Tidewater Landing - Town Landing Site  
Pawtucket, Rhode Island

**EXPLORATION NO.:** GZ-SB-110  
**SHEET:** 2 of 2  
**PROJECT NO:** 34847.03  
**REVIEWED BY:** Alexander Haag

**Logged By:** Jessie Batalon  
**Drilling Co.:** New England Boring Contractors  
**Foreman:** Nick Crowley

**Type of Rig:** Track  
**Rig Model:** Diedrich D-120  
**Drilling Method:**  
Drive & Wash

**Boring Location:** See Plan  
**Ground Surface Elev. (ft.):** 38  
**Final Boring Depth (ft.):** 33.75  
**Date Start - Finish:** 4/7/2021 - 4/7/2021

**H. Datum:** NAD83  
**V. Datum:** NAVD88

**Hammer Type:** Automatic Hammer  
**Hammer Weight (lb.):** 140  
**Hammer Fall (in.):** 30  
**Auger or Casing O.D./I.D Dia (in.):** 4

**Sampler Type:** SS  
**Sampler O.D. (in.):** 2.0  
**Sampler Length (in.):** 24  
**Rock Core Size:** NX

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
04/07/2021	11:45 AM	30 min	26.4	30'

Depth (ft)	Casing Blows/ (Core Rate)	Sample						SPT Value	Stratum Description (Modified Burmister Classification)	PID (ppm)	Remark	Depth (ft.)	Stratum Description	Elev. (ft.)
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	Blows (per 6 in.)							
	(1:42)													
		S-10	33.0-33.8	9	9	25	100	R	S-10: very dense, brown/purple WEATHERED ROCK	0.0		33	WEATHERED ROCK	5.0
35						13"			End of exploration at 33.75 feet			33.8	WEATHERED ROCK	4.2
40														
45														
50														
55														
60														

**REMARKS**

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

**Exploration No.:**  
**GZ-SB-110**

TEST BORING W/ PID - GZA PLOG DATA TEMPLATE 03-20-18.GDT - 9/1/21 13:43 - J:\GEO\34847.03.AH\WORKLOGS\GINT\34847.01.TIDEWATER LANDING.GPJ







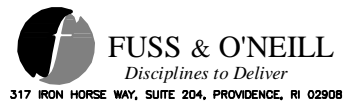
## SUBSURFACE EXPLORATION LOGS

### **PRIOR**

Fuss & O'Neill (F&O) – 2011 SB/MW-Series

Project Name: Town Landing  
 Project Location: Pawtucket, Rhode Island

Site Id: MW-01  
 Project Number: 2010-1382 A10



Location: SE corner of site  
 Description: Monitoring Well, Shallow  
 Date(s): 09/06/11 - 09/06/11  
 Completed Depth: 15.00'  
 Total Depth: 15.00'

Datum:  
 Ground Elevation: 0.00'  
 Coordinate X: 0.000  
 Coordinate Y: 0.000

Logged By: P. Gagnon  
 Contractor: Fuss & O'Neill  
 Drilling Method: Geoprobe  
 Blank Casing: type: PVC dia: 2.00in fm: -2.5' to: 5.00'

Driller: D. Levesque  
 Borehole Dia.: 2.25in

Remarks: Field Instrument: OVM MiniRAE  
 Development Method: Peristaltic pump on 09/08/2011  
 No refusal.

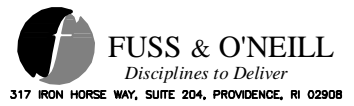
Screens:  
 type: Slotted size: 0.010in dia: 2.00in fm: 5.00' to: 15.00'

Annular Fill:  
 type: Concrete fm: 0.00' to: 0.75'  
 type: Fill fm: 0.75' to: 1.00'  
 type: Bentonite Pellets fm: 1.00' to: 3.00'  
 type: Sand Pack (generic) fm: 3.00' to: 15.00'

Elevation	Depth	Sample No.	Recovery	Material Description	Graphic Log	USCS Code	Well Construction	OVM
0							MP. EL. 0.00	
-16				Sand, M-C and coal and coal ash; black (10YR 2/1). (Fill).				0.4 ppm
-2	2							
-4	4							
-17				Sand, M-C and gravel; some rock fragments; trace coal; light brown, wet. (Fill).		FI		0.2 ppm
-6	6							
-8	8							
-10	10	N/A		SAND, F-C; some silt; little clay; little gravel and rock fragments; gray, wet.		SW		0.1 ppm
-12	12							
-14	14							
-16	16			End of boring at 15 feet.				

Project Name: Town Landing  
 Project Location: Pawtucket, Rhode Island

Site Id: MW-02  
 Project Number: 2010-1382 A10



Location: E central along river  
 Description: Monitoring Well, Shallow  
 Date(s): 08/30/11 - 08/30/11  
 Completed Depth: 13.00'  
 Total Depth: 15.00'

Datum:  
 Ground Elevation: 0.00'  
 Coordinate X: 0.000  
 Coordinate Y: 0.000

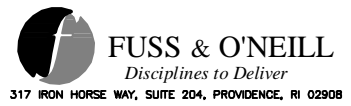
Logged By: P. Gagnon  
 Contractor: Fuss & O'Neill  
 Drilling Method: Geoprobe  
 Blank Casing: type: PVC dia: 2.00in fm: -3.0' to: 3.00'  
 Screens: type: Slotted size: 0.010in dia: 2.00in fm: 3.00' to: 13.00'  
 Annular Fill:  
 type: Concrete fm: 0.00' to: 0.75'  
 type: Bentonite Pellets fm: 0.75' to: 1.00'  
 type: Sand Pack (generic) fm: 1.00' to: 13.00'  
 type: Native Material fm: 13.00' to: 15.00'

Remarks: Field Instrument: OVM MiniRAE  
 Development Method: Peristaltic pump on 09/08/2011  
 No refusal.

Elevation	Depth	Sample No.	Recovery	Material Description	Graphic Log	USCS Code	Well Construction		OVM
							MP.	EL.	
0		-11		0-3.0': Coal and coal ash and M-C sand; black (10YR 2/1). (Fill). 3.0-5.0': SAND, M-C; some rock fragments; little coal; trace brick; trace concrete; Various colors. (Fill).		FI		0.00	0 ppm
-2	2	N/A							0 ppm
-4	4			Sand, M-C and gravel; some rock fragments; dark brown (10YR 3/3), wet.		SW			0 ppm
-6	6	-12							0 ppm
-8	8								0 ppm
-10	10	N/A		10-11': Same as above. 11-13': Silt and clay; trace sand; brown (10YR 5/3), wet. 13-15': Sand, F and silt; very dark grayish brown (10YR 3/2).		ML			0 ppm
-12	12								0 ppm
-14	14					SM			0 ppm
-16	16			End of boring at 15 feet.					

Project Name: Town Landing  
 Project Location: Pawtucket, Rhode Island

Site Id: MW-03  
 Project Number: 2010-1382 A10



Location: NE along river  
 Description: Monitoring Well, Shallow  
 Date(s): 08/30/11 - 08/30/11  
 Completed Depth: 8.00'  
 Total Depth: 8.00'

Datum:  
 Ground Elevation: 0.00'  
 Coordinate X: 0.000  
 Coordinate Y: 0.000

Logged By: P. Gagnon  
 Contractor: Fuss & O'Neill  
 Drilling Method: Geoprobe  
 Blank Casing:  
 type: PVC dia: 2.00in fm: -3.0' to: 2.00'

Driller: D. Levesque  
 Borehole Dia.: 2.25in

Remarks: Field Instrument: OVM MiniRAE  
 Development Method: Peristaltic pump on  
 09/08/2011

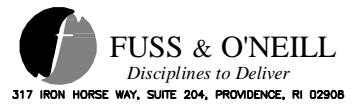
Screens:  
 type: Slotted size: 0.010in dia: 2.00in fm: 2.00' to: 8.00'

Annular Fill:  
 type: Concrete fm: 0.00' to: 0.75'  
 type: Bentonite Pellets fm: 0.75' to: 1.50'  
 type: Sand Pack (generic) fm: 1.50' to: 8.00'  
 type: fm: to:

Elevation	Depth	Sample No.	Recovery	Material Description	Graphic Log	USCS Code	Well Construction		OVM
							MP.	EL.	
0		N/A		0-1.5': Brick and coal and coal ash and M-C sand; various colors. (Fill). 1.5-2.0': Concrete and rock fragments. 2.0-4.0': Coal and coal ash and M-C sand; black (10YR 2/1). (Fill). 4.0-5.0': Sand, M-C and rock fragments; dark yellowish brown (10YR 4/4), wet.		FI		0.00	0 ppm
-2	2	-09				CR			0 ppm
-4	4					FI			0 ppm
-6	6	-10		5.0-7.0': Same as above. 7.0-8.0': Sand, F and silt; some rock fragments; dark yellowish brown (10YR 4/4), wet.		SW			0 ppm
-8	8			Refusal and end of boring at 8.0 feet.		SM			0 ppm
-10	10								
-12	12								
-14	14								
-16	16								

Project Name: Town Landing  
 Project Location: Pawtucket, Rhode Island

Site Id: SB-04  
 Project Number: 2010-1382 A10



Location: E grassy area  
 Description: Soil Boring  
 Date(s): 08/30/11 - 08/30/11  
 Total Depth: 7.00'  
 Remarks: Field Instrument: OVM MiniRAE

Datum:  
 Ground Elevation: 0.00'  
 Coordinate X: 0.000  
 Coordinate Y: 0.000

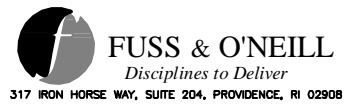
Logged By: P. Gagnon  
 Contractor: Fuss & O'Neill  
 Drilling Method: Geoprobe  
 Back Fill:  
 type: Native Material

Driller: D. Levesque  
 Borehole Dia.: 2.25in  
 fm: 0.00' to: 7.00'  
 fm: to:  
 fm: to:  
 fm: to:  
 fm: to:

Elevation	Depth	Sample No.	Recovery	Material Description	Graphic Log	USCS Code	OVM
0		N/A		0-0.5': TOPSOIL. 0.5-3.0': Coal and coal ash; some M-C sand; black (10YR 2/1). (Fill). 3.0-5.0': SAND, M-C; little coal; trace rock fragments; brown (10YR 4/3), wet. (Fill).		TS	0 ppm
-2	2					FI	0 ppm
-4	4						0 ppm
-6	6	-08		Sand, M-C and gravel; some rock fragments.		SW	
-8	8			Refusal and end of boring at 7.0 feet.			
-10	10						
-12	12						
-14	14						
-16	16						
-18	18						

Project Name: Town Landing  
 Project Location: Pawtucket, Rhode Island

Site Id: MW-05  
 Project Number: 2010-1382 A10



Location: **W grassy area** Datum: Logged By: **P. Gagnon** Driller: **D. Levesque**  
 Description: **Monitoring Well, Shallow** Ground Elevation: **0.00'** Contractor: **Fuss & O'Neill** Borehole Dia.: **2.25in**  
 Date(s): **08/30/11 - 08/30/11** Coordinate X: **0.000** Drilling Method: **Geoprobe**  
 Completed Depth: **12.00'** Coordinate Y: **0.000** Blank Casing: type: **PVC** dia: **2.00in** fm: **-2.0'** to: **2.00'**  
 Total Depth: **12.00'** Screens: type: **Slotted size: 0.010in dia: 2.00in** fm: **2.00'** to: **12.00'**  
 Remarks: Field Instrument: **OVM MiniRAE** Annular Fill: type: **Concrete** fm: **0.00'** to: **0.75'**  
 Development Method: **Peristaltic pump on** type: **Bentonite Pellets** fm: **0.75'** to: **1.50'**  
**09/08/2011** type: **Sand Pack (generic)** fm: **1.50'** to: **12.00'**  
 type: fm: to:

Elevation	Depth	Sample No.	Recovery	Material Description	Graphic Log	USCS Code	Well Construction	OVM
0		N/A		0-1.0': Topsoil and rock fragments; black (10YR 2/1). 1.0-5.0': SAND, M-C; some rock fragments; little coal and brick; black (10YR 2/1), wet at 4.5 feet. (Fill).		TS	MP. EL. 0.00	0 ppm
-05								
-2	2					FI		
-4	4							
		N/A		SAND, M-C; some rock fragments; dark yellowish brown (10YR 3/6), wet.				0 ppm
-6	6							
-8	8					SW		
-10	10	N/A		Sand, C and gravel; some rock fragments; dark yellowish brown (10YR 3/6).				0 ppm
-12	12			Refusal and end of boring at 12 feet.				
-14	14							
-16	16							

Project Name: Town Landing  
 Project Location: Pawtucket, Rhode Island

Site Id: MW-06  
 Project Number: 2010-1382 A10



Location: W central portion of site  
 Description: Monitoring Well, Shallow  
 Date(s): 08/30/11 - 09/06/11  
 Completed Depth: 27.00'  
 Total Depth: 27.00'

Datum:  
 Ground Elevation: 0.00'  
 Coordinate X: 0.000  
 Coordinate Y: 0.000

Logged By: P. Gagnon  
 Contractor: Fuss & O'Neill  
 Drilling Method: Geoprobe  
 Blank Casing:  
 type: PVC dia: 2.00in fm: -2.5' to: 17.00'

Driller: D. Levesque  
 Borehole Dia.: 2.25in

Remarks: Field Instrument: OVM MiniRAE  
 Development Method: Peristaltic pump on  
 09/08/2011

Screens:  
 type: Slotted size: 0.010in dia: 2.00in fm: 17.00' to: 27.00'

Annular Fill:  
 type: Concrete fm: 0.00' to: 0.75'  
 type: Fill fm: 0.75' to: 13.00'  
 type: Bentonite Pellets fm: 13.00' to: 15.00'  
 type: Sand Pack (generic) fm: 15.00' to: 27.00'

Elevation	Depth	Sample No.	Recovery	Material Description	Graphic Log	USCS Code	Well Construction		OVM
							MP.	EL.	
0		N/A		0-0.5': TOPSOIL, black (10YR 2/1). 0.5-4.0': Sand, F and silt; trace rock fragments; yellowish brown (10YR 5/6). 4.0-5.0': Sand, M-C and rock fragments; grayish brown (10YR 5/2).		TS		0.00	0 ppm
-2	2	-02, -03				SM			
-4	4	N/A				SW			0 ppm
-6	6	N/A		Sand, F and silt; some clay; dark yellowish brown (10YR 4/4), moist. Dense.		SM			0 ppm
-8	8								
-10	10	N/A		Silt and clay; very dark grayish brown (10YR 3/2), wet. Dense.					0 ppm
-12	12								
-14	14					ML			
-16	16	N/A		15-19': Same as above. 19-20': Sand, M-C and rock fragments; dry.					

Checked By: PHG

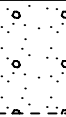
Elevation	Depth	Sample No.	Recovery	Material Description	Graphic Log	USCS Code	Well Construction	OM
-18	18							
-20	20	N/A		Same as above.				0 ppm
-22	22					SW		
-24	24							
-26	26	-04		Sand, F and silt; some clay and M sand; little rock fragments; moist.		SM		0 ppm
-28	28			Refusal and end of boring at 27 feet.				
-30	30							
-32	32							
-34	34							
-36	36							
-38	38							

Location: <b>Center of driveway</b> Description: <b>Soil Boring</b> Date(s): <b>09/06/11 - 09/06/11</b> Total Depth: <b>20.00'</b> Remarks: <b>Field Instrument: OVM MiniRAE</b>	Datum: Ground Elevation: <b>0.00'</b> Coordinate X: <b>0.000</b> Coordinate Y: <b>0.000</b>	Logged By: <b>P. Gagnon</b> Contractor: <b>Fuss &amp; O'Neill</b> Drilling Method: <b>Geoprobe</b> Back Fill: type: <b>Native Material</b> type: type: type: type:	Driller: <b>D. Levesque</b> Borehole Dia.: <b>2.25in</b> fm: <b>0.00'</b> to: <b>20.00'</b> fm:                    to: fm:                    to: fm:                    to: fm:                    to:
--	--	--	---

Elevation	Depth	Sample No.	Recovery	Material Description	Graphic Log	USCS Code	OVM
0				0-1.0': TOPSOIL. 1.0-2.0': Sand, M-C and rock fragments; grayish white. (Fill). 2.0-4.0': Sand, F and silt; trace rock fragments; reddish brown. 4.0-5.0': Sand, M-C and rock fragments. (Fill).		TS	0.2 ppm
-2	2						0.2 ppm
-4	4	N/A					0.1 ppm
-6	6	N/A		Same as above. (Fill).		FI	0.1 ppm
-10	10	N/A		Silt and clay; light brown, wet. Dense. (Perched water table).			0.2 ppm
-14	14	N/A				MH	
-16	16			15-17': Same as above. 17-18': SAND, M-C; little gravel and rock fragments; various colors, dry.			
-18	18	N/A		Same as above.			0.2 ppm

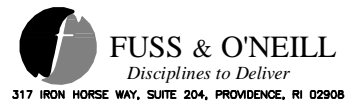
Project Name: Town Landing  
Project Location: Pawtucket, Rhode Island

Site Id: SB-07  
Project Number: 2010-1382 A10

Elevation	Depth	Sample No.	Recovery	Material Description	Graphic Log	USCS Code	OM
-20	20			Refusal and end of boring at 20 feet.		SW	
-22	22						
-24	24						
-26	26						
-28	28						
-30	30						
-32	32						
-34	34						
-36	36						
-38	38						
-40	40						

Project Name: Town Landing  
 Project Location: Pawtucket, Rhode Island

Site Id: SB-08  
 Project Number: 2010-1382 A10

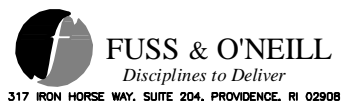


Location: SW corner of site	Datum:	Logged By: P. Gagnon	Driller: D. Levesque
Description: Soil Boring	Ground Elevation: 0.00'	Contractor: Fuss & O'Neill	Borehole Dia.: 2.25in
Date(s): 08/30/11 - 08/30/11	Coordinate X: 0.000	Drilling Method: Geoprobe	
Total Depth: 10.00'	Coordinate Y: 0.000	Back Fill:	
Remarks: Field Instrument: OVM MiniRAE Could not get past 10 feet due to collapse.		type: Native Material	fm: 0.00' to: 10.00'
		type:	fm: to:
		type:	fm: to:
		type:	fm: to:
		type:	fm: to:

Elevation	Depth	Sample No.	Recovery	Material Description	Graphic Log	USCS Code	OVM
0		N/A		0-0.5': Topsoil and roots and leaves.		TS	0 ppm
	-01			0.5-4.0': Sand, M and rock fragments; very pale brown (10YR 7/3).		SW	
				4.0-5.0': Sand, F and silt; yellowish brown (10YR 5/4).		SM	0 ppm
	4	N/A					
		N/A		5.0-8.0': Sand, M and rock fragments; yellowish brown (10YR 5/4).		SW	0 ppm
				8.0-10': Sand, F and silt; yellowish brown (10YR 5/4). Dense.		SM	0 ppm
	10			End of boring at 10 feet.			
	12						
	14						
	16						
	18						

Project Name: Town Landing  
 Project Location: Pawtucket, Rhode Island

Site Id: MW-09  
 Project Number: 2010-1382 A10

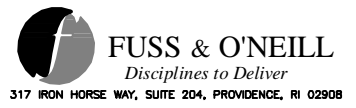


Location: S central Datum: Logged By: P. Gagnon Driller: D. Levesque  
 Description: Monitoring Well, Shallow Ground Elevation: 0.00' Contractor: Fuss & O'Neill Borehole Dia.: 2.25in  
 Date(s): 09/06/11 - 09/06/11 Coordinate X: 0.000 Drilling Method: Geoprobe  
 Completed Depth: 17.00' Coordinate Y: 0.000 Blank Casing: type: PVC dia: 2.00in fm: -3.0' to: 7.00'  
 Total Depth: 20.00' Screens: type: Slotted size: 0.010in dia: 2.00in fm: 7.00' to: 17.00'  
 Remarks: Field Instrument: OVM MiniRAE Annular Fill: type: Concrete fm: 0.00' to: 0.75'  
 Development Method: Peristaltic pump on type: Fill fm: 0.75' to: 3.00'  
 09/08/2011 type: Bentonite Pellets fm: 3.00' to: 6.00'  
 No refusal. type: Sand Pack (generic) fm: 6.00' to: 17.00'  
 type: Native Material fm: 17.00' to: 20.00'

Elevation	Depth	Sample No.	Recovery	Material Description	Graphic Log	USCS Code	Well Construction		OVM
							MP.	EL.	
0		-18		0-0.5': TOPSOIL. 0.5-2.0': Sand, M-C and coal and coal ash. (Fill). 2.0-3.0': SAND, M-C; some silt; some coal; trace rock fragments; trace brick. (Fill). 3.0-5.0': Sand, M-C and gravel and rock fragments; light brown. (Fill).		TS		0.00	0.1 ppm
-2	2	N/A							0.1 ppm
-4	4	N/A							0.1 ppm
-6	6	N/A	No recovery.			FI			
-8	8								
-10	10	N/A		10-10.5': SAND, M-C; some gravel; little brick. (Fill). 10.5-14': Silt and clay; light brown, wet. 14-15': Sand, F and silt; some clay; grayish brown, wet.		MH			0.1 ppm
-12	12	-19							0 ppm
-14	14	N/A							0 ppm
-16	16	N/A		15-16': Same as above. 16-20': Sand, M-C and rock fragments; light brown, wet.		SM			0 ppm

Project Name: Town Landing  
 Project Location: Pawtucket, Rhode Island

Site Id: MW-09  
 Project Number: 2010-1382 A10



Elevation	Depth	Sample No.	Recovery	Material Description	Graphic Log	USCS Code	Well Construction	OVM
-18	18					SW		
-20	20			End of boring at 20 feet.				
-22	22							
-24	24							
-26	26							
-28	28							
-30	30							
-32	32							
-34	34							
-36	36							
-38	38							



## SUBSURFACE EXPLORATION LOGS

**PRIOR**

McMillen & Jacobs (M&J) – 2019 B-Series

**Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits**  
**Project Location: Pawtucket, RI**  
**Project Number: 5980.0**

**Boring B-3**

Date(s) Drilled 09/06/2019 - 09/09/2019	Geotechnical Consultant McMillen Jacobs Associates	Logged By S. Wilbur	Checked By W. Kilker
Drilling Method/ Rig Type Mud Rotary/CME 45	Drilling Contractor Geologic Earth Exploration, Inc.	Total Depth of Borehole 37.0 ft	
Borehole Diameter/ Sampler Diameter 4.00 in I.D. / 2 & 3 in I.D.	Hammer Weight/Drop (lb/in.)/Type 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum 37.4 ft / NGVD 1929	
Location Northwestern corner of Tidewater Site	Coordinates 359575.63E,286640.16N	Elevation Source Field Survey	

ELEV. (ft)	WATER LEVEL DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
33	5							Vacuum Excavated from about 0 to 6 ft (FILL)	
								Drilled from 6 to 8 ft without sampling (FILL)	Rig Chatter/Slow Drilling
28	10	8-10	S-1	19/24	15-35-20-19 (N=55)	SP-SM		Moist, very dense, brown, SAND, little gravel and silt. Fragments of brick (FILL)	PID=0
23	15	14-16	S-2	9/24	14-10-9-8 (N=19)	SM		Wet, medium dense, tan, coarse to fine SAND trace gravel and fines (ALLUVIUM)	PID=0
18								Wet, medium dense, tan, coarse to fine SAND, trace gravel and fines (ALLUVIUM)	



DRAFT (3/13/20)

**Boring B-3**

**Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits**  
**Project Location: Pawtucket, RI**  
**Project Number: 5980.0**

**Boring B-3**

Date(s) Drilled 09/06/2019 - 09/09/2019	Geotechnical Consultant McMillen Jacobs Associates	Logged By S. Wilbur	Checked By W. Kilker
Drilling Method/ Rig Type Mud Rotary/CME 45	Drilling Contractor Geologic Earth Exploration, Inc.	Total Depth of Borehole 37.0 ft	
Borehole Diameter/ Sampler Diameter 4.00 in I.D. / 2 & 3 in I.D.	Hammer Weight/Drop (lb/in.)/Type 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum 37.4 ft / NGVD 1929	
Location Northwestern corner of Tidewater Site	Coordinates 359575.63E,286640.16N	Elevation Source Field Survey	

ELEV. (ft)	WATER LEVEL DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS				
13	25	19-21	S-3	9/24	10-9-9-9 (N=18)	SM		Wet, medium dense, tan, coarse to fine SAND, trace gravel and fines (ALLUVIUM)	PID=0				
		23-25	S-4	10/24	15-21-26-38 (N=47)					CL-GC		Wet, hard, brown, SANDY CLAY and coarse to fine GRAVEL (GLACIAL TILL)	PID=0
		25-27	S-5	13/24	16-34-34-28 (N=68)								
8	30						Top of Bedrock at 27.0 ft. See Core Boring Report for Rock Details						
3	35												
-2													



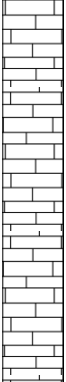
DRAFT (3/13/20)

**Boring B-3**

**Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits**  
**Project Location: Pawtucket, RI**  
**Project Number: 5980.0**

**Core Boring B-3**

Date(s) Drilled: <b>09/06/2019 - 09/09/2019</b>	Geotechnical Consultant: <b>McMillen Jacobs Associates</b>	Logged By: <b>S. Wilbur</b>	Checked By: <b>W. Kilker</b>
Drilling Method/ Rig Type: <b>Mud Rotary/CME 45</b>	Drilling Contractor: <b>Geologic Earth Exploration, Inc.</b>	Total Depth of Borehole: <b>37.0 ft</b>	
Borehole Diameter: <b>4.00 in</b>	Core Barrel Type / Size: <b>NX / 2 in</b>	Ground Surface Elevation/Datum: <b>37.4 ft / NGVD 1929</b>	
Location: <b>Northwestern corner of Tidewater Site</b>	Coordinates: <b>359575.63E,286640.16N</b>	Elevation Source: <b>Field Survey</b>	

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES				
											TYPE	DIP	RGH	APT (mm)	WEATHERING
13	25								See Test Boring Report for Overburden Details						
			3							27.3	J	30	SR	1.00	FR
										27.4	J	30	SR	1.00	FR
		27-32	1	2	C-1	22/ 37%	14/ 24		Strong, slightly weathered, purple SILTSTONE. No water return while coring run C-1.	28.4	J	20	SR	1.00	FR
8			2												





DRAFT (3/13/20)

**Boring B-3**

**Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits**  
**Project Location: Pawtucket, RI**  
**Project Number: 5980.0**

**Core Boring B-3**

Date(s) Drilled: 09/06/2019 - 09/09/2019	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: S. Wilbur	Checked By: W. Kilker
Drilling Method/Rig Type: Mud Rotary/CME 45	Drilling Contractor: Geologic Earth Exploration, Inc.	Total Depth of Borehole: 37.0 ft	
Borehole Diameter: 4.00 in	Core Barrel Type / Size: NX / 2 in	Ground Surface Elevation/Datum: 37.4 ft / NGVD 1929	
Location: Northwestern corner of Tidewater Site	Coordinates: 359575.63E,286640.16N	Elevation Source: Field Survey	

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES					
											TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
			1	2	C-1	22/ 37%	14/ 24		Strong, slightly weathered, purple SILTSTONE. No water return while coring run C-1.							
		2														
3	35	32-37	2	2	C-2	16/ 27%	0/ 0		Strong, slightly weathered and highly fractured, purple SILTSTONE and gray SANDSTONE. No water return while coring run C-2.							
			2													
			2													
			1													
			4													
									Bottom of borehole at 37.0 ft.							
-2																



DRAFT (3/13/20)

**Boring B-3**



## **APPENDIX C**

### **GEO TECHNICAL LABORATORY TEST RESULTS**



195 Frances Avenue  
 Cranston RI, 02910  
 Phone: (401)-467-6454  
 Fax: (401)-467-2398  
[thielsch.com](http://thielsch.com)  
*Let's Build a Solid Foundation*

Client Information:  
 GZA GeoEnvironmental  
 Providence, RI  
 PM: Alexander Haag  
 Assigned By: Alexander Haag  
 Collected By: Jessi Batalon

Project Information:  
**Tidewater Landing Development Site**  
**Taft St., Pawtucket, RI**  
 GZA Project Number: 03.0034847.01 Task 4  
 Summary Page: 1 of 2  
 Report Date: 04.22.21

**LABORATORY TESTING DATA SHEET, Report No.: 7421-D-160**

Boring ID	Sample No.	Depth (ft)	Laboratory No.	Identification Tests								Corrosivity Tests								Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org %	Resistivity (Mohms-cm)	Sulfate (mg/kg)	Chloride (mg/kg)	Sulfide (mg/kg)	Redox Potential (mv)	pH	Electrical Resist. As Received Ohm-cm @ 60°F	Electrical Resist. Saturated Ohm-cm @ 60°F		
				D2216	D4318		D6913			D2974	EPA			G57						
GZ-SB-102	S-2	2-4	21-S-1314									0.0006	ND	ND			11.6			Corrosivity Only
GZ-SB-102	S-3	4-6	21-S-1315				61.1	35.8	3.1											Gray f-c GRAVEL and f-c SAND, trace Silt
GZ-SB-102	S-8	19-21	21-S-1316	57.1						15.5										Organic Content Only
GZ-SB-103	S-4	6-8	21-S-1317				39.6	50.2	10.2		0.0007	111	185				8.25			Brown f-c SAND and f-c GRAVEL, little Silt
GZ-SB-103	S-6	14-16	21-S-1318	25.6						2.0										Organic Content Only
GZ-SB-103	S-7	16-18	21-S-1319				48.1	41.2	10.7											Brown f-c GRAVEL and f-c SAND, little Silt
GZ-SB-105	S-5	8-10	21-S-1320				9.9	22.9	67.2											Brown SILT, some f-c Sand, trace fine Gravel
GZ-SB-105	S-7	14-16	21-S-1321				24.5	24.0	51.5											Brown CLAYEY SILT, some f-c Gravel, some f-c Sand
GZ-SB-106	S-9	19-21	21-S-1322				12.6	57.4	30.0											Brown f-c SAND, some Silt, little fine Gravel
GZ-SB-107	S-2	2-4	21-S-1323				30.8	50.7	18.5											Brown f-c SAND, some f-c Gravel, little Silt
GZ-SB-107	S-3	4-6	21-S-1324								0.003	104	55				10.10			Corrosivity Only
GZ-SB-107	S-8	14-16	21-S-1325				3.6	22.7	73.7											Brown CLAYEY SILT, some f-c Sand, trace fine Gravel

Date Received: 04.16.21

Reviewed By: *Star*

Date Reviewed: 04.23.21

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195 Frances Avenue  
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[thielsch.com](http://thielsch.com)  
*Let's Build a Solid Foundation*

Client Information:  
 GZA GeoEnvironmental  
 Providence, RI  
 PM: Alexander Haag  
 Assigned By: Alexander Haag  
 Collected By: Jessi Batalon

Project Information:  
**Tidewater Landing Development Site**  
**Taft St., Pawtucket, RI**  
 GZA Project Number: 03.0034847.01 Task 4  
 Summary Page: 2 of 2  
 Report Date: 04.22.21

**LABORATORY TESTING DATA SHEET, Report No.: 7421-D-160**

Boring ID	Sample No.	Depth (ft)	Laboratory No.	Identification Tests								Corrosivity Tests								Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org %	Resistivity (Mohms-cm)	Sulfate (mg/kg)	Chloride (mg/kg)	Sulfide (mg/kg)	Redox Potential (mv)	pH	Electrical Resist. As Received Ohm-cm @ 60°F	Electrical Resist. Saturated Ohm-cm @ 60°F		
				D2216	D4318		D6913			D2974	EPA			G57						
GZ-SB-108	S-2	2-2.9	21-S-1326				28.3	60.4	11.3											Dark Brown f-c SAND, some f-c Gravel, little Silt
GZ-SB-108	S-3	4-6	21-S-1327								0.010	ND	ND				7.40			Corrosivity Only
GZ-SB-108	S-4	6-8	21-S-1328	16.4						3.7										Organic Content Only
GZ-SB-110	S-2	2-4	21-S-1329				50.6	33.8	15.6											Brown f-c GRAVEL, some f-c Sand, little Silt
GZ-SB-110	S-6	14-16	21-S-1330				1.3	2.6	96.1											Brown CLAYEY SILT, trace f-m Sand, trace fine Gravel
GZ-SB-111	S-6	14-16	21-S-1331				0.0	3.8	96.2											Brown CLAYEY SILT, trace f-m Sand

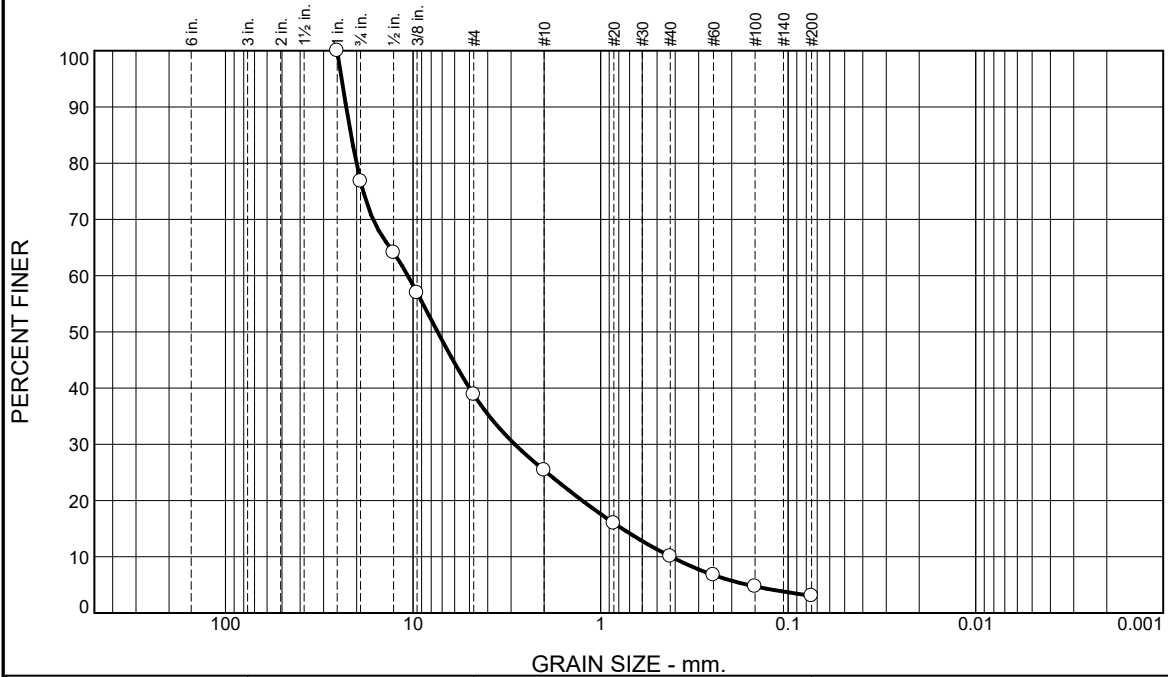
Date Received: 04.16.21

Reviewed By: *SKW*

Date Reviewed: 04.23.21

This report only relates to items inspect and/or tested. No warranty, expressed or implied, is made.  
 This report shall not be reproduced, except in full, without prior written approval from the Agency, as defined in ASTM E329.

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	23.2	37.9	13.5	15.3	7.0	3.1	

Test Results (D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	76.8		
0.5"	64.1		
0.375"	57.0		
#4	38.9		
#10	25.4		
#20	16.0		
#40	10.1		
#60	6.8		
#100	4.7		
#200	3.1		

\* (no specification provided)

**Material Description**

Gray f-c GRAVEL and f-c SAND, trace Silt

**Atterberg Limits (ASTM D 4318)**

PL= NP                      LL= NV                      PI= NP

**Classification**

USCS (D 2487)= GW                      AASHTO (M 145)= A-1-a

**Coefficients**

D<sub>90</sub>= 22.7242                      D<sub>85</sub>= 21.4040                      D<sub>60</sub>= 10.6760  
D<sub>50</sub>= 7.3925                      D<sub>30</sub>= 2.8656                      D<sub>15</sub>= 0.7667  
D<sub>10</sub>= 0.4205                      C<sub>u</sub>= 25.39                      C<sub>c</sub>= 1.83

**Remarks**

Date Received: 04.16.21                      Date Tested: 04.20.21

Tested By: AV / JM

Checked By: Steven Accetta

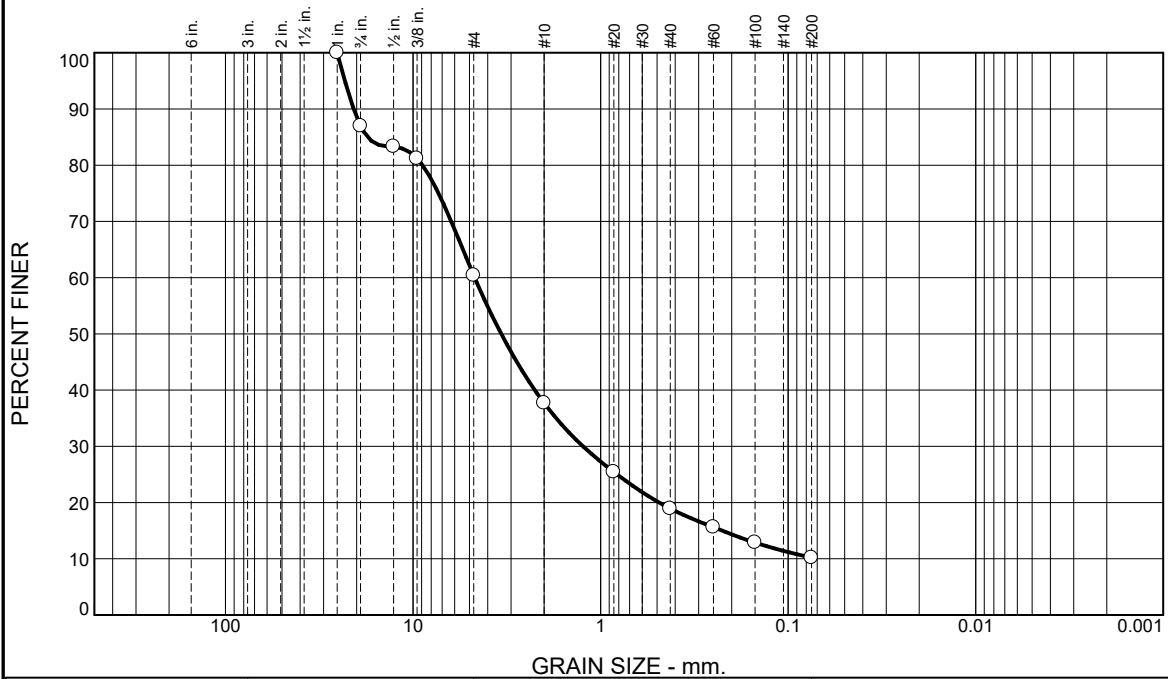
Title: Laboratory Coordinator

Source of Sample: Boring                      Depth: 4-6'  
Sample Number: GZ-SB-102 / S-3

Date Sampled:

<b>Thielsch Engineering Inc.</b>  <b>Cranston, RI</b>	<b>Client:</b> GZA GeoEnvironmental <b>Project:</b> Tidewater Landing Development Site Taft St., Pawtucket, RI <b>Project No:</b> 03.0034847.01 Task 4 <b>Figure</b> 21-S-1315
---	---

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.0	26.6	22.7	18.8	8.7	10.2	

Test Results (D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	87.0		
0.5"	83.3		
0.375"	81.2		
#4	60.4		
#10	37.7		
#20	25.4		
#40	18.9		
#60	15.6		
#100	12.9		
#200	10.2		

**Material Description**

Brown f-c SAND and f-c GRAVEL, little Silt

**Atterberg Limits (ASTM D 4318)**

PL= NP                      LL= NV                      PI= NP

**Classification**

USCS (D 2487)= SP-SM    AASHTO (M 145)= A-1-a

**Coefficients**

D<sub>90</sub>= 20.7273      D<sub>85</sub>= 17.4773      D<sub>60</sub>= 4.6916  
D<sub>50</sub>= 3.3855      D<sub>30</sub>= 1.2402      D<sub>15</sub>= 0.2245  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

Date Received: 04.16.21      Date Tested: 04.22.21

Tested By: RR / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

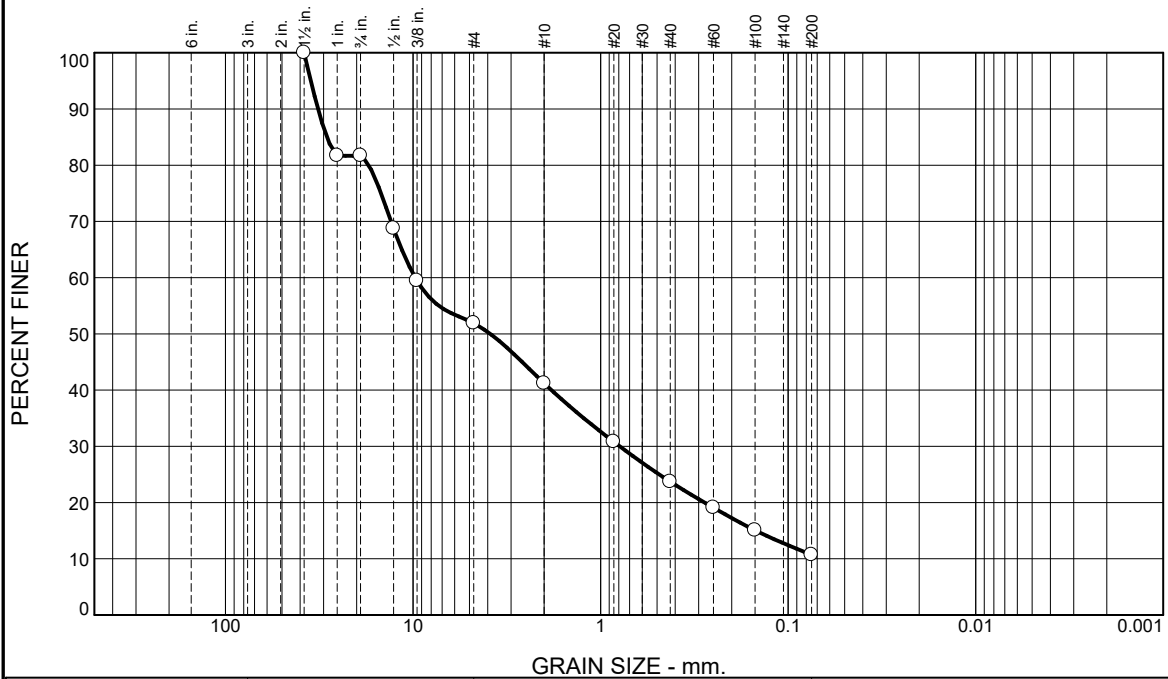
\* (no specification provided)

Source of Sample: Boring      Depth: 6-8'  
Sample Number: GZ-SB-103 / S-4

Date Sampled:

<p><b>Thielsch Engineering Inc.</b></p> <p style="text-align: center;"><b>Cranston, RI</b></p>	<p>Client: GZA GeoEnvironmental</p> <p>Project: Tidewater Landing Development Site Taft St., Pawtucket, RI</p> <p>Project No: 03.0034847.01 Task 4</p>
<p>Figure 21-S-1317</p>	

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	18.3	29.8	10.7	17.5	13.0	10.7	

Test Results (D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	81.7		
3/4"	81.7		
1/2"	68.7		
3/8"	59.4		
#4	51.9		
#10	41.2		
#20	30.8		
#40	23.7		
#60	19.1		
#100	15.1		
#200	10.7		

\* (no specification provided)

**Material Description**

Brown f-c GRAVEL and f-c SAND, little Silt

**Atterberg Limits (ASTM D 4318)**

PL= NP                      LL= NV                      PI= NP

**Classification**

USCS (D 2487)= GP-GM    AASHTO (M 145)= A-1-a

**Coefficients**

D<sub>90</sub>= 32.0968      D<sub>85</sub>= 28.7909      D<sub>60</sub>= 9.7417  
D<sub>50</sub>= 3.8736        D<sub>30</sub>= 0.7902        D<sub>15</sub>= 0.1486  
D<sub>10</sub>=                    C<sub>u</sub>=                    C<sub>c</sub>=

Remarks

Date Received: 04.16.21      Date Tested: 04.20.21

Tested By: AV / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring      Depth: 16-18'  
Sample Number: GZ-SB-103 / S-7

Date Sampled:

**Thielsch Engineering Inc.**

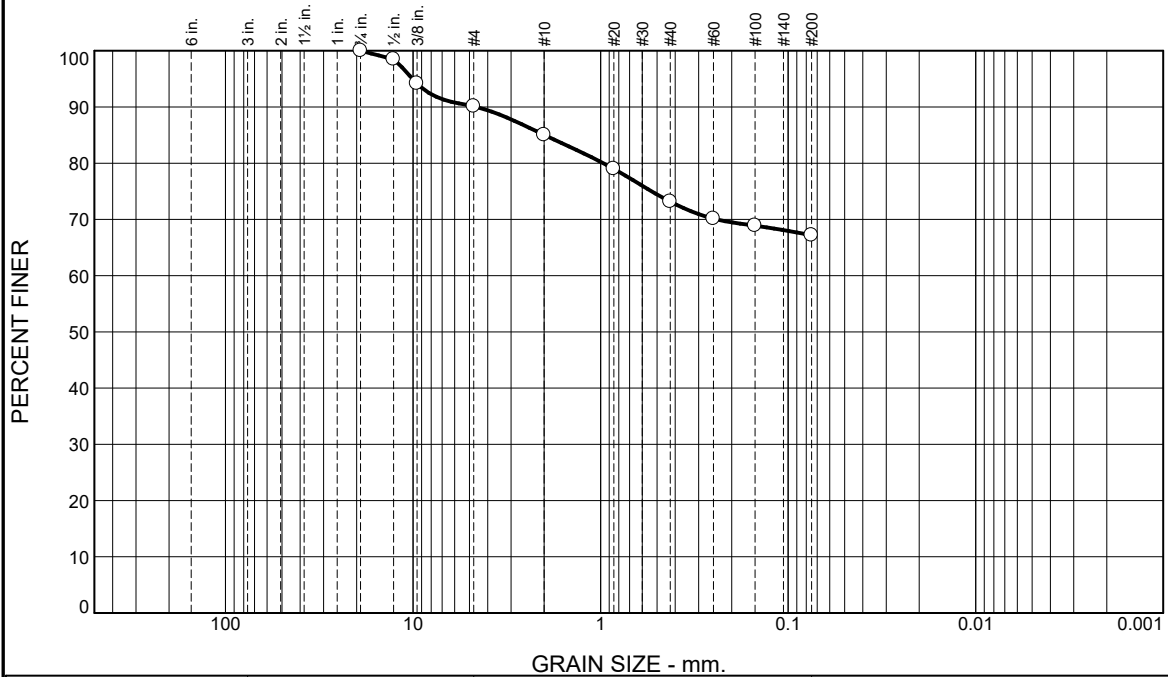
**Cranston, RI**

Client: GZA GeoEnvironmental  
Project: Tidewater Landing Development Site  
Taft St., Pawtucket, RI

Project No: 03.0034847.01 Task 4

Figure 21-S-1319

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.9	5.1	11.8	6.0	67.2	

Test Results (D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	98.5		
0.375"	94.2		
#4	90.1		
#10	85.0		
#20	79.0		
#40	73.2		
#60	70.1		
#100	68.9		
#200	67.2		

\* (no specification provided)

**Material Description**

Brown SILT, some f-c Sand, trace fine Gravel

**Atterberg Limits (ASTM D 4318)**

PL= NP                      LL= NV                      PI= NP

**Classification**

USCS (D 2487)= ML                      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 4.5880                      D<sub>85</sub>= 1.9873                      D<sub>60</sub>=  
D<sub>50</sub>=                                      D<sub>30</sub>=                                      D<sub>15</sub>=  
D<sub>10</sub>=                                      C<sub>u</sub>=                                      C<sub>c</sub>=

**Remarks**

Sample visually classified as non-plastic. Sample received with standing water.

Date Received: 04.16.21                      Date Tested: 04.20.21

Tested By: AV / JM

Checked By: Steven Accetta

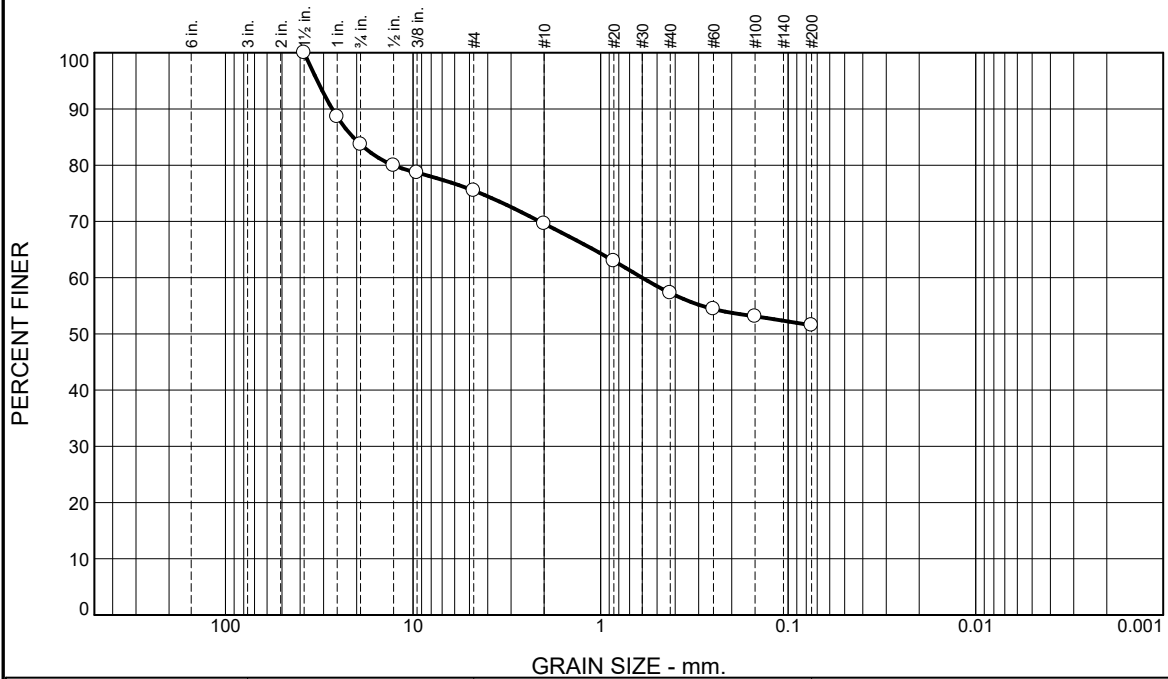
Title: Laboratory Coordinator

Source of Sample: Boring                      Depth: 8-10'  
Sample Number: GZ-SB-105 / S-5

Date Sampled:

<b>Thielsch Engineering Inc.</b>  <b>Cranston, RI</b>	<b>Client:</b> GZA GeoEnvironmental <b>Project:</b> Tidewater Landing Development Site Taft St., Pawtucket, RI <b>Project No:</b> 03.0034847.01 Task 4 <b>Figure</b> 21-S-1320
---	---

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	16.3	8.2	5.9	12.3	5.8	51.5	

Test Results (D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	88.6		
3/4"	83.7		
1/2"	80.0		
3/8"	78.7		
#4	75.5		
#10	69.6		
#20	63.0		
#40	57.3		
#60	54.4		
#100	53.1		
#200	51.5		

\* (no specification provided)

**Material Description**

Brown CLAYEY SILT, some f-c Gravel, some f-c Sand

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= ML                      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 26.9561                      D<sub>85</sub>= 20.8879                      D<sub>60</sub>= 0.6009  
D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

**Remarks**

Sample visually classified as plastic. Sample rolled to 1/4".

Date Received: 04.16.21                      Date Tested: 04.20.21

Tested By: AV / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring                      Depth: 14-16'  
Sample Number: GZ-SB-105 / S-7

Date Sampled:

**Thielsch Engineering Inc.**

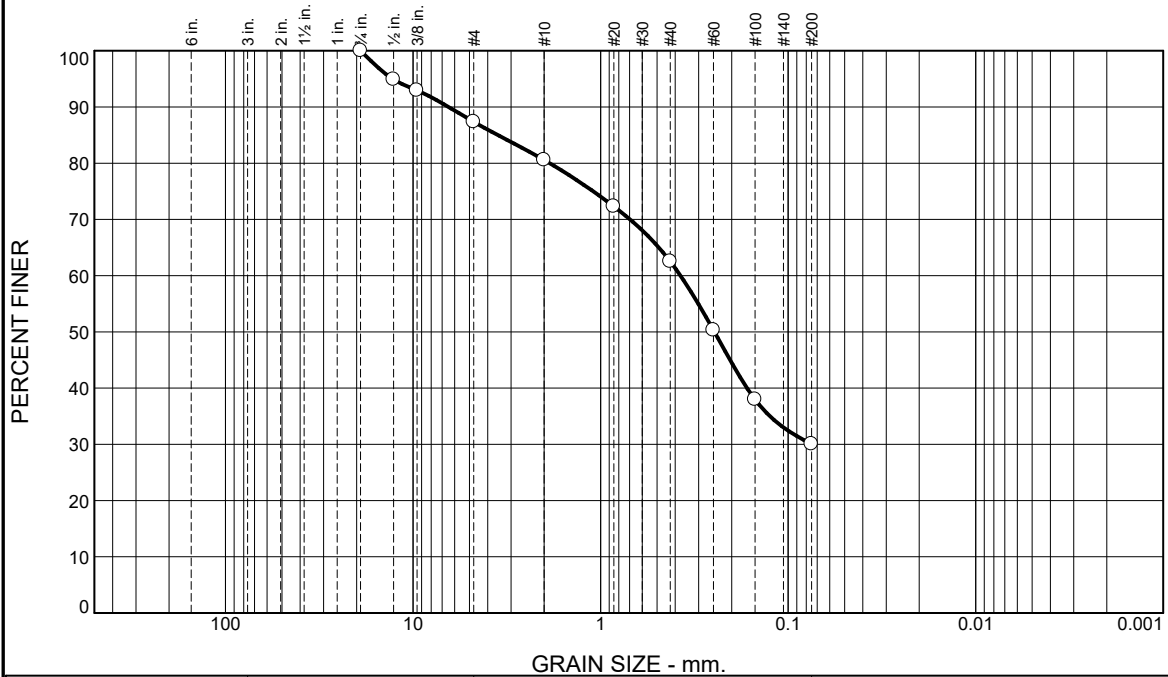
**Cranston, RI**

Client: GZA GeoEnvironmental  
Project: Tidewater Landing Development Site  
Taft St., Pawtucket, RI

Project No: 03.0034847.01 Task 4

Figure 21-S-1321

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	12.6	6.8	18.1	32.5	30.0	

Test Results (D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	94.9		
0.375"	93.0		
#4	87.4		
#10	80.6		
#20	72.3		
#40	62.5		
#60	50.3		
#100	38.0		
#200	30.0		

\* (no specification provided)

**Material Description**

Brown f-c SAND, some Silt, little fine Gravel

**Atterberg Limits (ASTM D 4318)**

PL= NP                      LL= NV                      PI= NP

**Classification**

USCS (D 2487)= SM                      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 6.4609                      D<sub>85</sub>= 3.5276                      D<sub>60</sub>= 0.3751  
D<sub>50</sub>= 0.2471                      D<sub>30</sub>=                                      D<sub>15</sub>=  
D<sub>10</sub>=                                      C<sub>u</sub>=                                      C<sub>c</sub>=

**Remarks**

Sample visually classified as non-plastic. Sample received with standing water.

Date Received: 04.16.21                      Date Tested: 04.20.21

Tested By: AV / JM

Checked By: Steven Accetta

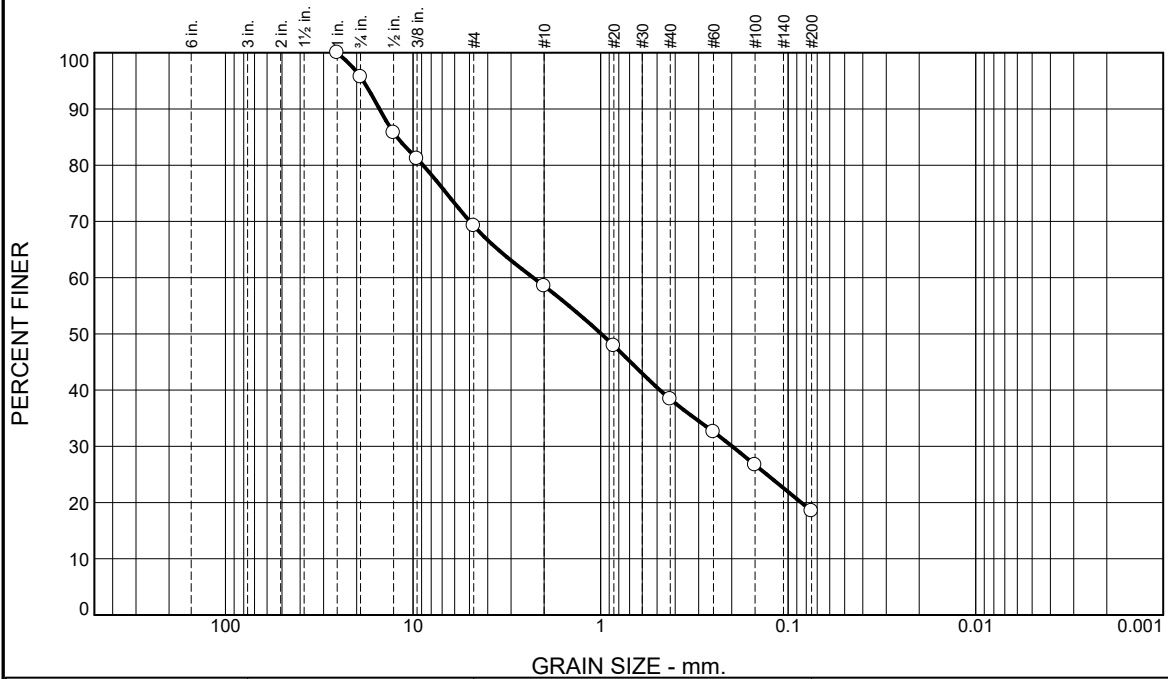
Title: Laboratory Coordinator

Source of Sample: Boring                      Depth: 19-21'  
Sample Number: GZ-SB-106 / S-9

Date Sampled:

<b>Thielsch Engineering Inc.</b>  <b>Cranston, RI</b>	<b>Client:</b> GZA GeoEnvironmental <b>Project:</b> Tidewater Landing Development Site Taft St., Pawtucket, RI <b>Project No:</b> 03.0034847.01 Task 4 <b>Figure</b> 21-S-1322
---	---

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.3	26.5	10.7	20.1	19.9	18.5	

Test Results (D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	95.7		
0.5"	85.8		
0.375"	81.2		
#4	69.2		
#10	58.5		
#20	47.9		
#40	38.4		
#60	32.6		
#100	26.7		
#200	18.5		

\* (no specification provided)

**Material Description**

Brown f-c SAND, some f-c Gravel, little Silt

**Atterberg Limits (ASTM D 4318)**

PL= NP                      LL= NV                      PI= NP

**Classification**

USCS (D 2487)= SM                      AASHTO (M 145)= A-1-b

**Coefficients**

D<sub>90</sub>= 15.1101                      D<sub>85</sub>= 12.1933                      D<sub>60</sub>= 2.2869  
D<sub>50</sub>= 0.9923                      D<sub>30</sub>= 0.1988                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

Date Received: 04.16.21                      Date Tested: 04.20.21

Tested By: AV / JM

Checked By: Steven Accetta

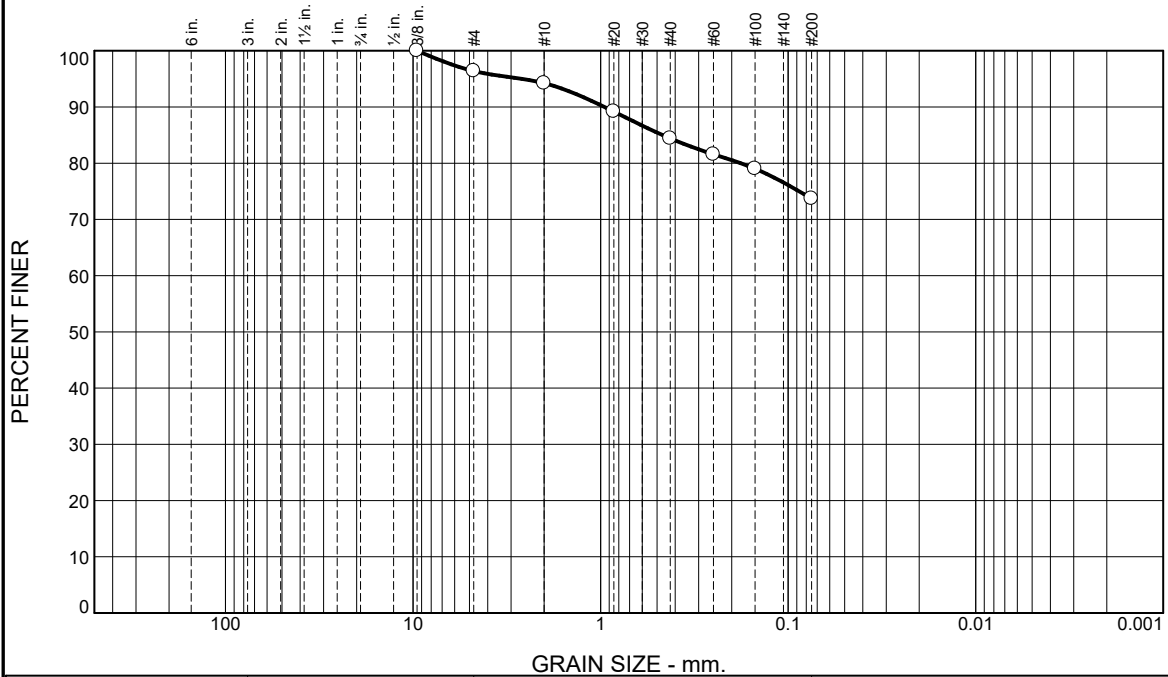
Title: Laboratory Coordinator

Source of Sample: Boring                      Depth: 2-4'  
Sample Number: GZ-SB-107 / S-2

Date Sampled:

<b>Thielsch Engineering Inc.</b>  <b>Cranston, RI</b>	<b>Client:</b> GZA GeoEnvironmental <b>Project:</b> Tidewater Landing Development Site Taft St., Pawtucket, RI <b>Project No:</b> 03.0034847.01 Task 4 <b>Figure</b> 21-S-1323
---	---

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.6	2.2	9.8	10.7	73.7	

Test Results (D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.375"	100.0		
#4	96.4		
#10	94.2		
#20	89.2		
#40	84.4		
#60	81.6		
#100	79.0		
#200	73.7		

\* (no specification provided)

**Material Description**

Brown CLAYEY SILT, some f-c Sand, trace fine Gravel

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= ML                      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 0.9539                      D<sub>85</sub>= 0.4668                      D<sub>60</sub>=

D<sub>50</sub>=                                      D<sub>30</sub>=                                      D<sub>15</sub>=

D<sub>10</sub>=                                      C<sub>u</sub>=                                      C<sub>c</sub>=

**Remarks**

Sample visually classified as plastic. Sample rolled to 1/4".

Date Received: 04.16.21                      Date Tested: 04.20.21

Tested By: AV / JM

Checked By: Steven Accetta

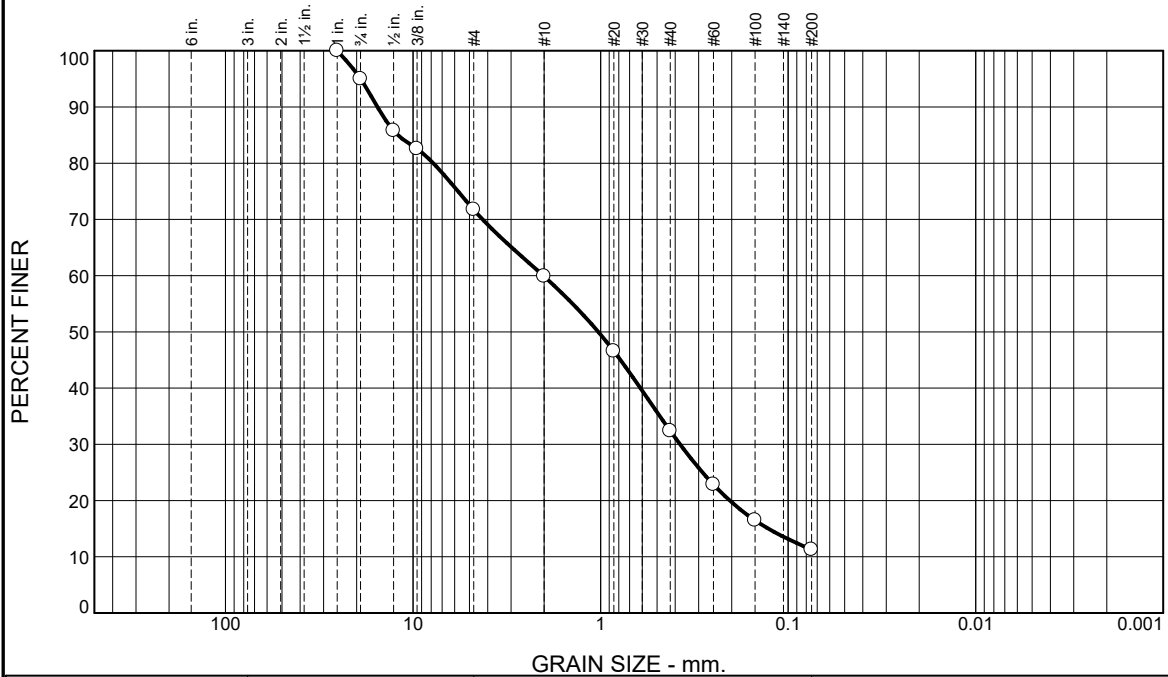
Title: Laboratory Coordinator

Source of Sample: Boring                      Depth: 14-16'  
 Sample Number: GZ-SB-107 / S-8

Date Sampled:

<b>Thielsch Engineering Inc.</b>	Client: GZA GeoEnvironmental
<b>Cranston, RI</b>	Project: Tidewater Landing Development Site Taft St., Pawtucket, RI
	Project No: 03.0034847.01 Task 4                      Figure 21-S-1325

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.0	23.3	11.8	27.5	21.1	11.3	

Test Results (D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	95.0		
0.5"	85.8		
0.375"	82.6		
#4	71.7		
#10	59.9		
#20	46.6		
#40	32.4		
#60	22.8		
#100	16.5		
#200	11.3		

\* (no specification provided)

**Material Description**

Dark Brown f-c SAND, some f-c Gravel, little Silt

**Atterberg Limits (ASTM D 4318)**

PL= NP                      LL= NV                      PI= NP

**Classification**

USCS (D 2487)= SP-SM    AASHTO (M 145)= A-1-b

**Coefficients**

D<sub>90</sub>= 15.4778      D<sub>85</sub>= 12.0594      D<sub>60</sub>= 2.0209  
D<sub>50</sub>= 1.0289      D<sub>30</sub>= 0.3768      D<sub>15</sub>= 0.1275  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 04.16.21      Date Tested: 04.20.21

Tested By: AV / JM

Checked By: Steven Accetta

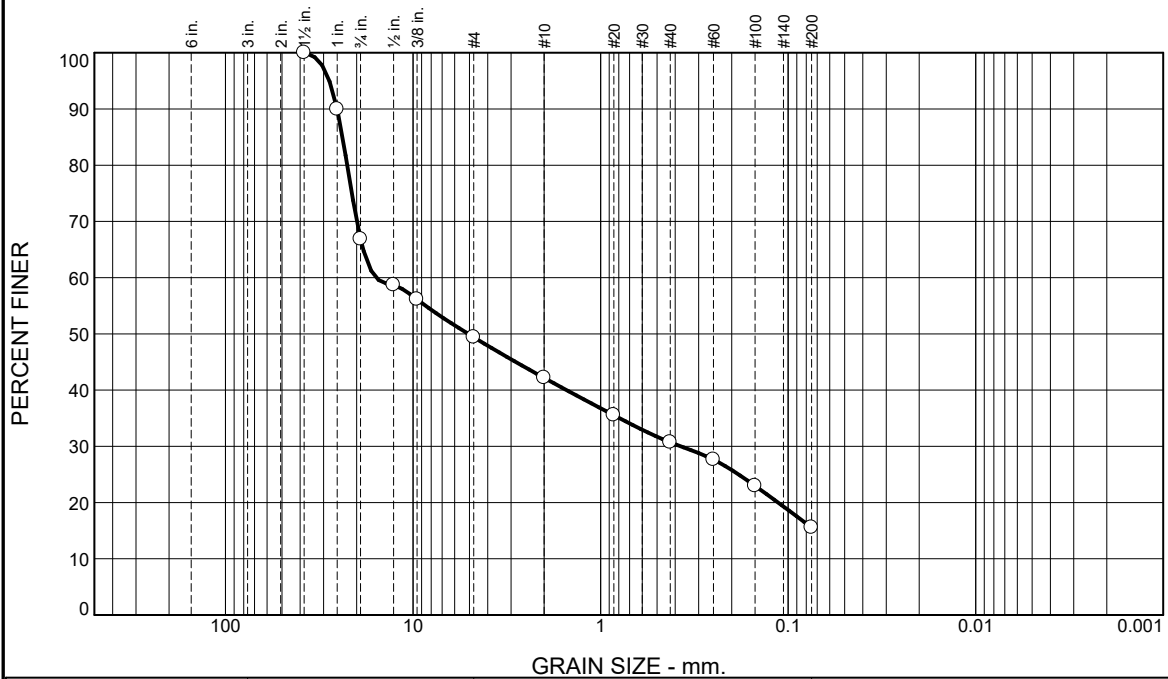
Title: Laboratory Coordinator

Source of Sample: Boring      Depth: 2-2.9'  
Sample Number: GZ-SB-108 / S-2

Date Sampled:

<b>Thielsch Engineering Inc.</b>	Client: GZA GeoEnvironmental
<b>Cranston, RI</b>	Project: Tidewater Landing Development Site Taft St., Pawtucket, RI
	Project No: 03.0034847.01 Task 4      Figure 21-S-1326

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	33.1	17.5	7.2	11.5	15.1	15.6	

Test Results (D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	90.0		
3/4"	66.9		
1/2"	58.7		
3/8"	56.1		
#4	49.4		
#10	42.2		
#20	35.5		
#40	30.7		
#60	27.6		
#100	23.0		
#200	15.6		

**Material Description**

Brown f-c GRAVEL, some f-c Sand, little Silt

**Atterberg Limits (ASTM D 4318)**

PL= NP                      LL= NV                      PI= NP

**Classification**

USCS (D 2487)= GM                      AASHTO (M 145)= A-1-b

**Coefficients**

D<sub>90</sub>= 25.4154                      D<sub>85</sub>= 23.7822                      D<sub>60</sub>= 15.7549  
D<sub>50</sub>= 5.0759                      D<sub>30</sub>= 0.3736                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 04.16.21                      Date Tested: 04.20.21

Tested By: AV / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

\* (no specification provided)

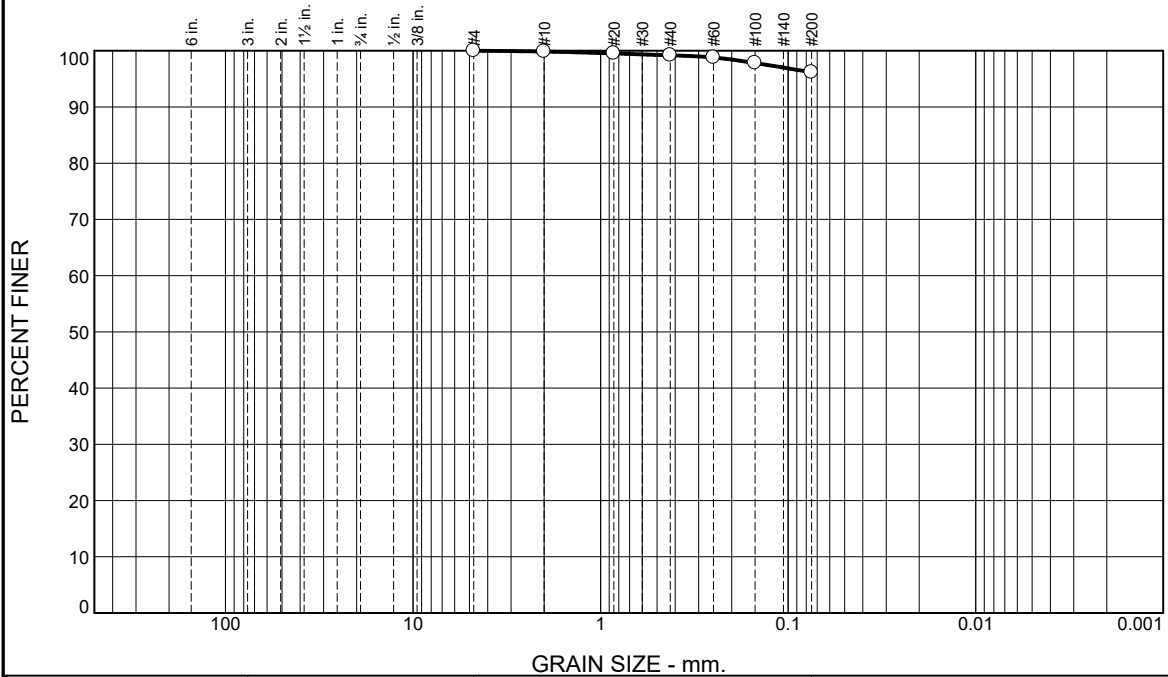
Source of Sample: Boring                      Depth: 2-4'  
Sample Number: GZ-SB-110 / S-2

Date Sampled:

<b>Thielsch Engineering Inc.</b>	Client: GZA GeoEnvironmental
<b>Cranston, RI</b>	Project: Tidewater Landing Development Site Taft St., Pawtucket, RI
	Project No: 03.0034847.01 Task 4                      Figure 21-S-1329



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.7	3.0	96.2	

Test Results (D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	99.9		
#20	99.5		
#40	99.2		
#60	98.8		
#100	97.8		
#200	96.2		

**Material Description**  
Brown CLAYEY SILT, trace f-m Sand

**Atterberg Limits (ASTM D 4318)**  
PL=                      LL=                      PI=

**Classification**  
USCS (D 2487)= ML                      AASHTO (M 145)= A-4(0)

**Coefficients**  
D<sub>90</sub>=                      D<sub>85</sub>=                      D<sub>60</sub>=  
D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

**Remarks**  
Sample visually classified as plastic. Sample rolled to 1/4".  
Sample received with standing water.

Date Received: 04.16.21                      Date Tested: 04.20.21

Tested By: AV / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

\* (no specification provided)

Source of Sample: Boring                      Depth: 14-16'  
Sample Number: GZ-SB-111 / S-6

Date Sampled:

<b>Thielsch Engineering Inc.</b>  <b>Cranston, RI</b>	Client: GZA GeoEnvironmental Project: Tidewater Landing Development Site Taft St., Pawtucket, RI Project No: 03.0034847.01 Task 4                      Figure 21-S-1331
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*CERTIFICATE OF ANALYSIS*

Steve Accetta  
Thielsch Engineering, Inc.  
195 Frances Avenue  
Cranston, RI 02910

**RE: Tidewater Landing Development Site GZA (03.0034847.01)**  
**ESS Laboratory Work Order Number: 21D0546**

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

**REVIEWED**  
*By ESS Laboratory at 12:28 pm, Apr 21, 2021*

**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.



*CERTIFICATE OF ANALYSIS*

Client Name: Thielsch Engineering, Inc.

Client Project ID: Tidewater Landing Development Site GZA

ESS Laboratory Work Order: 21D0546

**SAMPLE RECEIPT**

The following samples were received on April 15, 2021 for the analyses specified on the enclosed Chain of Custody Record.

<b>Lab Number</b>	<b>Sample Name</b>	<b>Matrix</b>	<b>Analysis</b>
21D0546-01	GZ-SB-102 S-2 2-4 FT	Soil	9038, 9045, 9050A, 9250
21D0546-02	GZ-SB-103 S-4 6-8 FT	Soil	9038, 9045, 9050A, 9250
21D0546-03	GZ-SB-107 S-3 4-6 FT	Soil	9038, 9045, 9050A, 9250
21D0546-04	GZ-SB-108 S-3 4-6 FT	Soil	9038, 9045, 9050A, 9250



CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.

Client Project ID: Tidewater Landing Development Site GZA

ESS Laboratory Work Order: 21D0546

**PROJECT NARRATIVE**

**No unusual 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](http://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](#)



*CERTIFICATE OF ANALYSIS*

Client Name: Thielsch Engineering, Inc.

Client Project ID: Tidewater Landing Development Site GZA

ESS Laboratory Work Order: 21D0546

**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.



*CERTIFICATE OF ANALYSIS*

Client Name: Thielsch Engineering, Inc.  
Client Project ID: Tidewater Landing Development Site GZA  
Client Sample ID: GZ-SB-102 S-2 2-4 FT  
Date Sampled: 04/15/21 14:00  
Percent Solids: 93

ESS Laboratory Work Order: 21D0546  
ESS Laboratory Sample ID: 21D0546-01  
Sample Matrix: Soil

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Chloride	WL ND (32)		9250		1	EEM	04/20/21 14:38	mg/kg dry	DD12022
Corrosivity (pH)	11.6 (N/A)		9045		1	EAM	04/15/21 20:43	S.U.	DD11569
Corrosivity (pH) Sample Temp	Soil pH measured in water at 20.6 °C.								
Resistivity	0.0006 (N/A)		9050A		1	LAB	04/19/21 12:32	Mohms-cm	DD11930
Sulfate	WL ND (53)		9038		1	EEM	04/19/21 17:00	mg/kg dry	DD11929



*CERTIFICATE OF ANALYSIS*

Client Name: Thielsch Engineering, Inc.  
Client Project ID: Tidewater Landing Development Site GZA  
Client Sample ID: GZ-SB-103 S-4 6-8 FT  
Date Sampled: 04/15/21 14:00  
Percent Solids: 79

ESS Laboratory Work Order: 21D0546  
ESS Laboratory Sample ID: 21D0546-02  
Sample Matrix: Soil

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Chloride	WL 185 (38)		9250		1	EEM	04/20/21 14:39	mg/kg dry	DD12022
Corrosivity (pH)	8.25 (N/A)		9045		1	EAM	04/15/21 20:43	S.U.	DD11569
Corrosivity (pH) Sample Temp	Soil pH measured in water at 20.5 °C.								
Resistivity	0.0007 (N/A)		9050A		1	LAB	04/19/21 12:32	Mohms-cm	DD11930
Sulfate	WL 111 (64)		9038		1	EEM	04/19/21 17:00	mg/kg dry	DD11929



*CERTIFICATE OF ANALYSIS*

Client Name: Thielsch Engineering, Inc.  
Client Project ID: Tidewater Landing Development Site GZA  
Client Sample ID: GZ-SB-107 S-3 4-6 FT  
Date Sampled: 04/15/21 14:00  
Percent Solids: 87

ESS Laboratory Work Order: 21D0546  
ESS Laboratory Sample ID: 21D0546-03  
Sample Matrix: Soil

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Chloride	WL 55 (34)		9250		1	EEM	04/20/21 14:44	mg/kg dry	DD12022
Corrosivity (pH)	10.1 (N/A)		9045		1	EAM	04/15/21 20:43	S.U.	DD11569
Corrosivity (pH) Sample Temp	Soil pH measured in water at 20.5 °C.								
Resistivity	0.003 (N/A)		9050A		1	LAB	04/19/21 12:32	Mohms-cm	DD11930
Sulfate	WL 104 (57)		9038		1	EEM	04/19/21 17:00	mg/kg dry	DD11929



*CERTIFICATE OF ANALYSIS*

Client Name: Thielsch Engineering, Inc.  
Client Project ID: Tidewater Landing Development Site GZA  
Client Sample ID: GZ-SB-108 S-3 4-6 FT  
Date Sampled: 04/15/21 14:00  
Percent Solids: 86

ESS Laboratory Work Order: 21D0546  
ESS Laboratory Sample ID: 21D0546-04  
Sample Matrix: Soil

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Chloride	WL ND (35)		9250		1	EEM	04/20/21 14:45	mg/kg dry	DD12022
Corrosivity (pH)	7.40 (N/A)		9045		1	EAM	04/15/21 20:43	S.U.	DD11569
Corrosivity (pH) Sample Temp	Soil pH measured in water at 20.1 °C.								
Resistivity	0.010 (N/A)		9050A		1	LAB	04/19/21 12:32	Mohms-cm	DD11930
Sulfate	WL ND (58)		9038		1	EEM	04/19/21 17:00	mg/kg dry	DD11929



*CERTIFICATE OF ANALYSIS*

Client Name: Thielsch Engineering, Inc.

Client Project ID: Tidewater Landing Development Site GZA

ESS Laboratory Work Order: 21D0546

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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Classical Chemistry

**Batch DD11929 - General Preparation**

**Blank**

Sulfate	ND	5	mg/kg wet							
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**LCS**

Sulfate	10		mg/L	9.988		97	80-120			
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**Batch DD12022 - General Preparation**

**Blank**

Chloride	ND	3	mg/kg wet							
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**LCS**

Chloride	31		mg/L	30.00		102	90-110			
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*CERTIFICATE OF ANALYSIS*

Client Name: Thielsch Engineering, Inc.

Client Project ID: Tidewater Landing Development Site GZA

ESS Laboratory Work Order: 21D0546

**Notes and Definitions**

- Z-10b Soil pH measured in water at 20.6 °C.
- Z-10a Soil pH measured in water at 20.5 °C.
- Z-10 Soil pH measured in water at 20.1 °C.
- WL Results obtained from a deionized water leach of the sample.
- U Analyte included in the analysis, but not detected
- 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



*CERTIFICATE OF ANALYSIS*

Client Name: Thielsch Engineering, Inc.

Client Project ID: Tidewater Landing Development Site GZA

ESS Laboratory Work Order: 21D0546

**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](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/meecd/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](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>

## ESS Laboratory Sample and Cooler Receipt Checklist

Client: Thielsch Engineering, Inc - ESS

ESS Project ID: 21D0546

Date Received: 4/15/2021

Shipped/Delivered Via: Client

Project Due Date: 4/22/2021

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?  No  
Temp: 18.9 Iced with: None
- 5. Was COC signed and dated by client?  Yes

- 6. Does COC match bottles?  Yes
- 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: \_\_\_\_\_ Time: \_\_\_\_\_ By: \_\_\_\_\_

Sample Receiving Notes:

\_\_\_\_\_

\_\_\_\_\_

14. Was there a need to contact Project Manager? 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	154854	Yes	N/A	Yes	Driller Jar	NP	
2	154855	Yes	N/A	Yes	Driller Jar	NP	
3	154856	Yes	N/A	Yes	Driller Jar	NP	
4	154857	Yes	N/A	Yes	Driller Jar	NP	

**2nd Review**

Were all containers scanned into storage/lab? Initials C

- 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: [Signature] Date & Time: 4/15/21 17:00

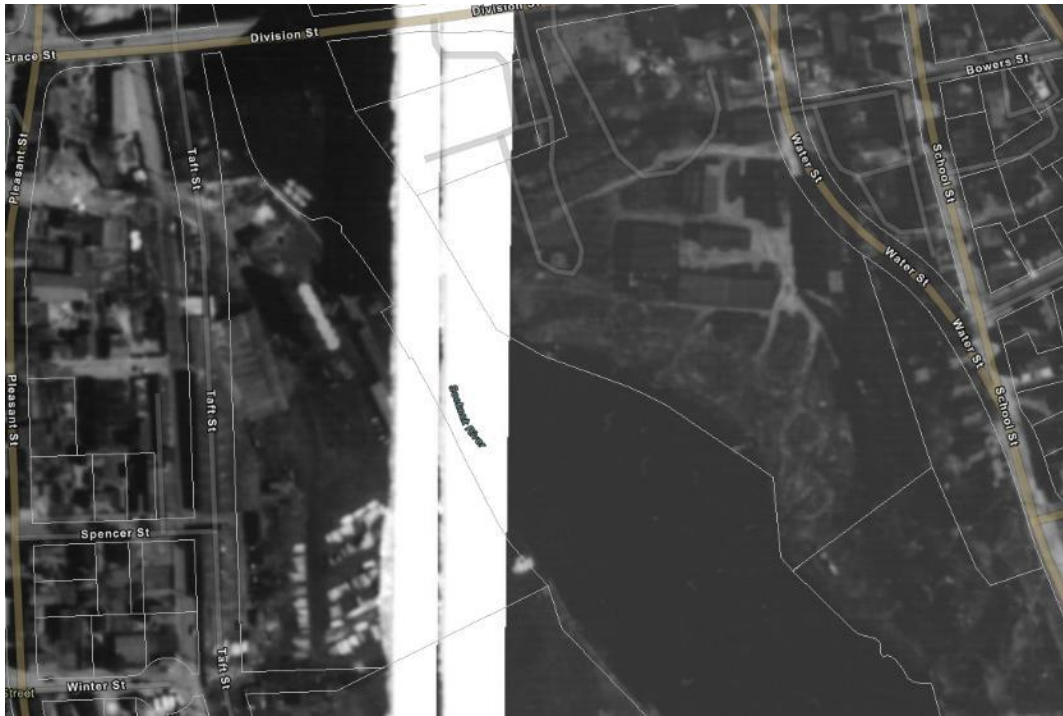
Reviewed By: [Signature] Date & Time: 4/15/21 17:16





## **APPENDIX D**

### **HISTORIC AERIAL IMAGERY**



AERIAL IMAGE #1) 1939



AERIAL IMAGE #2) 1951-52



AERIAL IMAGE #3) 1962



AERIAL IMAGE #4) 1972



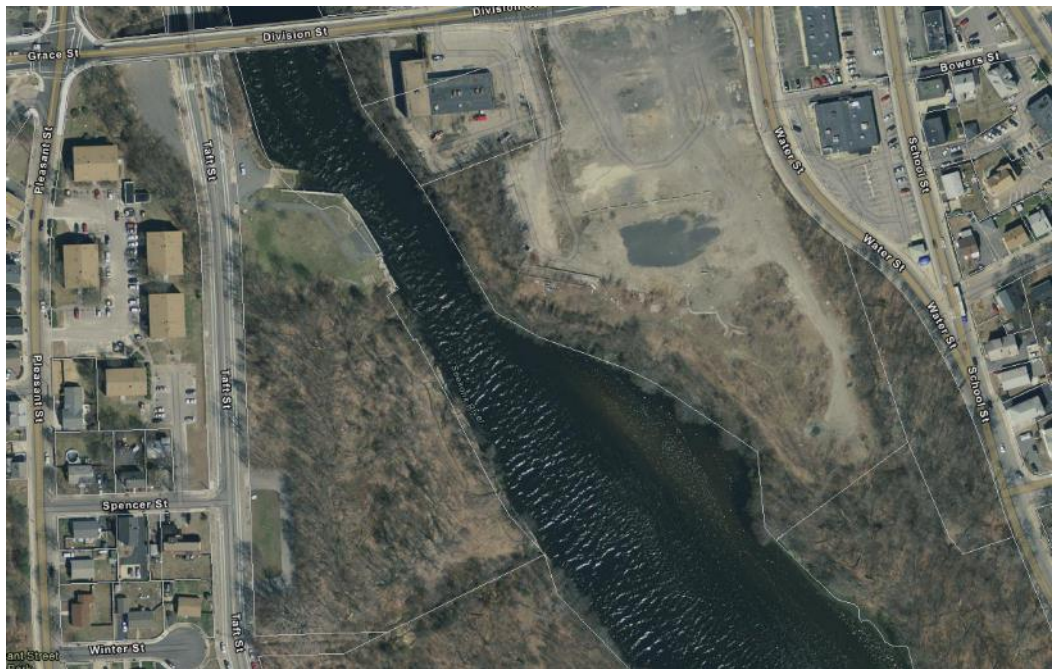
AERIAL IMAGE #5) 1981



AERIAL IMAGE #6) 1997



AERIAL IMAGE #7) 2002



AERIAL IMAGE #8) 2014



GZA GeoEnvironmental, Inc.

**Attachment B: Plans (Addendum 02, dated May 7, 2026)**

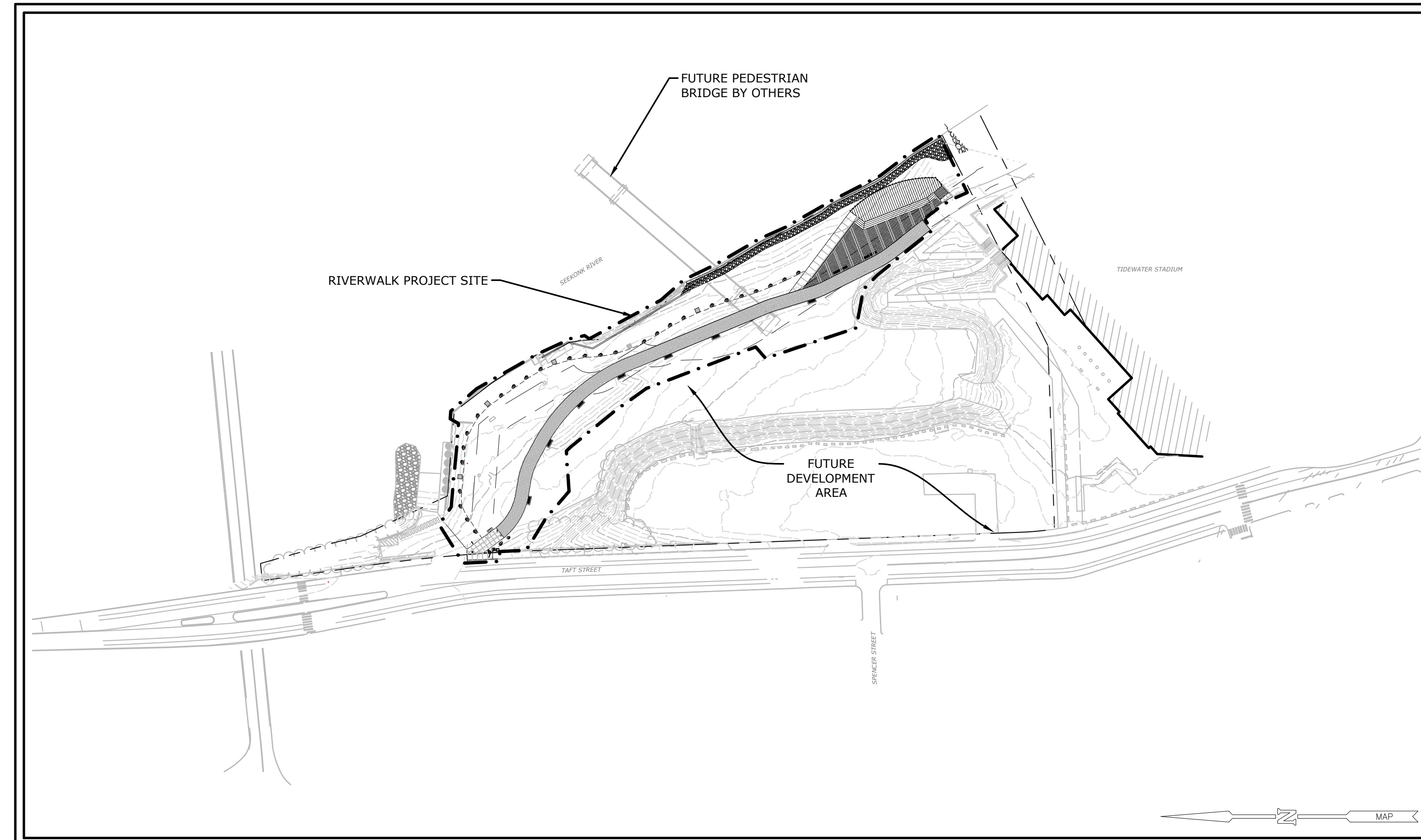
# RIVERWALK WEST FINAL PHASE SITE IMPROVEMENTS

## TAFT STREET PAWTUCKET, RHODE ISLAND

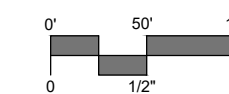
CONSTRUCTION DOCUMENTS - ISSUED FOR BID  
APRIL 15, 2026  
ADDENDUM 02: MAY 11, 2026

### GENERAL NOTES

- THE PARCEL IS LOCATED ON THE CITY OF PAWTUCKET ASSESSOR'S RECORDS AS PLAT 54 LOT 827.
- THE PARCEL IS 5.3 ACRES AND IS ZONED RIVERFRONT TIDEWATER ZONE (RTW).
- THE OWNER OF AP 54 LOT 827 IS:  
CITY OF PAWTUCKET  
137 ROOSEVELT AVENUE  
PAWTUCKET, RI, 02860
- THIS SITE IS LOCATED IN FEMA FLOOD ZONES VE-13, AE-12 AND X. REFERENCE FEMA FLOOD INSURANCE RATE MAP 44007C0307, MAP REVISED OCTOBER 2, 2015. FEMA FLOOD LINES AS SHOWN ARE BASED ON AVAILABLE CITY OF PAWTUCKET GIS DATA.
- THE PROPERTY REQUIRES REMEDIAL ACTION AND OVERSIGHT FOR COMPLIANCE WITH THE RIDEM. A COMBINATION OF ENGINEER CONTROLS WILL BE IMPLEMENTED DURING CONSTRUCTION AS DESCRIBED IN THE REMEDIAL ACTION WORK PLAN APPROVED BY THE RIDEM. REFER TO REMEDIAL APPROVAL LETTER - FILE NO. SR-26-1570 DATED SEPTEMBER 14, 2022, FROM RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT - OFFICE OF LAND REVITALIZATION & SUSTAINABLE MATERIALS MANAGEMENT.
- THE BOUNDARY LINES AS SHOWN ON THE ENGINEERING PLAN SET DEPICTS THE RESULTS TAKEN FROM TOPOGRAPHIC SURVEY PLAN PERFORMED BY DIPRETE ENGINEERING ON OCTOBER 21 & 24, 2025.
- EXISTING TOPOGRAPHIC INFORMATION IS TAKEN FROM A MAP ENTITLED "TOPOGRAPHIC SURVEY PLAN, TIDEWATER LANDING, ASSESSORS PLAT 54 LOT 827, PAWTUCKET, RHODE ISLAND", PREPARED FOR: CITY OF PAWTUCKET BY DIPRETE ENGINEERING, SCALE 1"=30', DATED 10-21-25.
- HORIZONTAL DATUM: NORTH ARROW, BEARINGS AND COORDINATES ARE BASED UPON THE RHODE ISLAND STATE PLANE COORDINATE SYSTEM (NAD 1983).
- VERTICAL DATUM: ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88)
- INFORMATION REGARDING THE LOCATION OF EXISTING UTILITIES HAS BEEN BASED UPON AVAILABLE INFORMATION, MAY BE INCOMPLETE, AND WHERE SHOWN SHOULD BE CONSIDERED APPROXIMATE. THE LOCATION OF ALL EXISTING UTILITIES SHOULD BE CONFIRMED PRIOR TO BEGINNING CONSTRUCTION. CALL "DIG SAFE", 1-888-DIGSAFE (1-888-344-7233). ALL UTILITY LOCATIONS THAT DO NOT MATCH THE VERTICAL OR HORIZONTAL CONTROL SHOWN ON THE PLANS SHALL IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR RESOLUTION.
- ALL WORK PERFORMED HEREIN IS TO BE GOVERNED BY CURRENT EDITIONS OF THE RHODE ISLAND STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, CITY OF PAWTUCKET STANDARD SPECIFICATIONS AND DETAILS AND SPECIFICATIONS INCLUDED AS PART OF THE DRAWINGS. IN AREAS OF CONFLICT BETWEEN THE DIFFERENT SPECIFICATIONS, THE DESIGN PLANS AND PROJECT SPECIFICATIONS WILL TAKE PRECEDENCE OVER THE GENERAL SPECIFICATIONS AND THE DESIGN ENGINEER WILL INTERPRET THE CONSTRUCTION REQUIREMENT. THE CONTRACTOR IS ADVISED TO SUBMIT A REQUEST FOR INFORMATION (RFI) FOR ANY AREAS OF CONFLICT BEFORE COMMITTING TO CONSTRUCTION.
- THE FOLLOWING DOCUMENTS ARE CONSIDERED PART OF THE PROJECT PLANS AND THE CONTRACTOR/OWNER MUST MAINTAIN THESE DOCUMENTS AS PART OF A FULL PLAN SET:  
SOIL EROSION AND SEDIMENT CONTROL PLAN (SESC). THE SESC CONTAINS THE FOLLOWING:  
#1.EROSION CONTROL MEASURES  
#2.SHORT TERM MAINTENANCE  
#3.ESTABLISHMENT OF VEGETATIVE COVER  
#4.CONSTRUCTION POLLUTION PREVENTION  
#5.SEQUENCE OF CONSTRUCTION  
STORMWATER OPERATION AND MAINTENANCE PLAN (O&M). THE O&M CONTAINS:  
#1.LONG TERM MAINTENANCE  
#2.LONG TERM POLLUTION PREVENTION
- REMEDIAL ACTION WORK PLAN. -THE RAWP CONTAINS:  
1. REMEDIAL ACTION PLAN REPORT  
2. PRELIMINARY CONSTRUCTION PLANS  
3. CONSTRUCTION SOIL MANAGEMENT PLAN  
4. DRAFT ELUR AND POST CONSTRUCTION SMP  
5. EXAMPLE CONTINGENCY HASP
- THIS PLAN SET REFERENCES RIDOT STANDARD DETAILS (DESIGNATED AS RIDOT STD X.X.X). RIDOT STANDARD DETAILS ARE AVAILABLE FROM RIDOT AND ONLINE AT: [HTTP://WWW.DOT.RI.GOV/BUSINESS/CONTRACTORSANDCONSULTANTS.PHP](http://www.dot.rhodeisland.gov/business/contractorsandconsultants.php).
- THE DRAINAGE SYSTEM IS DESIGNED TO MEET THE CITY OF PAWTUCKET SUBDIVISION AND LAND DEVELOPMENT REGULATIONS WITH THE USE OF CATCH BASINS, CULVERTS, AND UNDERGROUND DRAINAGE SYSTEMS. THE STORMWATER MANAGEMENT SYSTEM MEETS THE RIDEM BEST MANAGEMENT PRACTICES.
- SLR CONSULTING ACCEPTS NO RESPONSIBILITY FOR THE ACCURACY OF MAPS AND DATA WHICH HAVE BEEN SUPPLIED BY OTHERS.
- ALL UTILITY SERVICES ARE TO BE UNDERGROUND. THE EXACT LOCATION AND SIZE OF ELECTRIC, TELEPHONE, CABLE TELEVISION AND GAS ARE TO BE DETERMINED BY THE RESPECTIVE UTILITY COMPANIES.
- ALL DIMENSIONS AND ELEVATIONS SHALL BE VERIFIED IN THE FIELD PRIOR TO CONSTRUCTION. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
- ALL DISTURBED AREAS SHALL RECEIVE A MINIMUM OF 12" SCREENED TOPSOIL, AND BE SEEDED WITH GRASS OR SODDED, IN ACCORDANCE WITH THE REMEDIAL ACTION PLAN.
- ALL PROPOSED CONTOURS AND SPOT ELEVATIONS INDICATE FINISHED GRADE.
- THE PLANS REQUIRE A CONTRACTOR'S WORKING KNOWLEDGE OF LOCAL, MUNICIPAL, WATER AUTHORITY, AND STATE CODES FOR UTILITY SYSTEMS. ANY CONFLICTS BETWEEN MATERIALS AND LOCATIONS SHOWN, AND LOCAL REQUIREMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO THE EXECUTION OF WORK. THE ENGINEER WILL NOT BE HELD LIABLE FOR COSTS INCURRED TO IMPLEMENT OR CORRECT WORK WHICH DOES NOT CONFORM TO LOCAL CODE.
- ALL FUEL, OIL, PAINT, OR OTHER HAZARDOUS MATERIALS SHOULD BE STORED IN A SECONDARY CONTAINER AND REMOVED TO A LOCKED INDOOR AREA WITH AN IMPERVIOUS FLOOR DURING NON-WORK HOURS.
- COMPLIANCE WITH THE PERMIT CONDITIONS IS THE RESPONSIBILITY OF BOTH THE CONTRACTOR AND THE PERMITTEE.
- THE CONTRACTOR MUST MAINTAIN (REPAIR/REPLACE WHEN NECESSARY) THE SILTATION CONTROL UNTIL ALL DEVELOPMENT ACTIVITY IS COMPLETED AND ALL DISTURBED AREAS ARE PERMANENTLY STABILIZED.
- OVERSIGHT BY ENVIRONMENTAL PROFESSIONAL DURING ALL EXCAVATION PER RIPDEM AND RAWP.
- THE PROPERTY IS SUBJECT TO A CRMC ASSENT PERMIT #A2025-10-002 APPROVED ON JANUARY 16, 2026 AS PART OF THE PROPOSED DEVELOPMENT OF THIS PARCEL. THE PROPOSED IMPROVEMENTS MUST BE COMPLETED IN ACCORDANCE WITH THE ASSENT PERMIT REQUIREMENTS AND ANY CONDITIONS ASSOCIATED WITH THAT PERMIT.



PROJECT SITE VICINITY MAP:



### PROJECT DATA

EXISTING ZONE:	RIVERFRONT TIDEWATER (RTW)
PROPOSED ZONE:	RIVERFRONT TIDEWATER (RTW)

### ZONING DATA

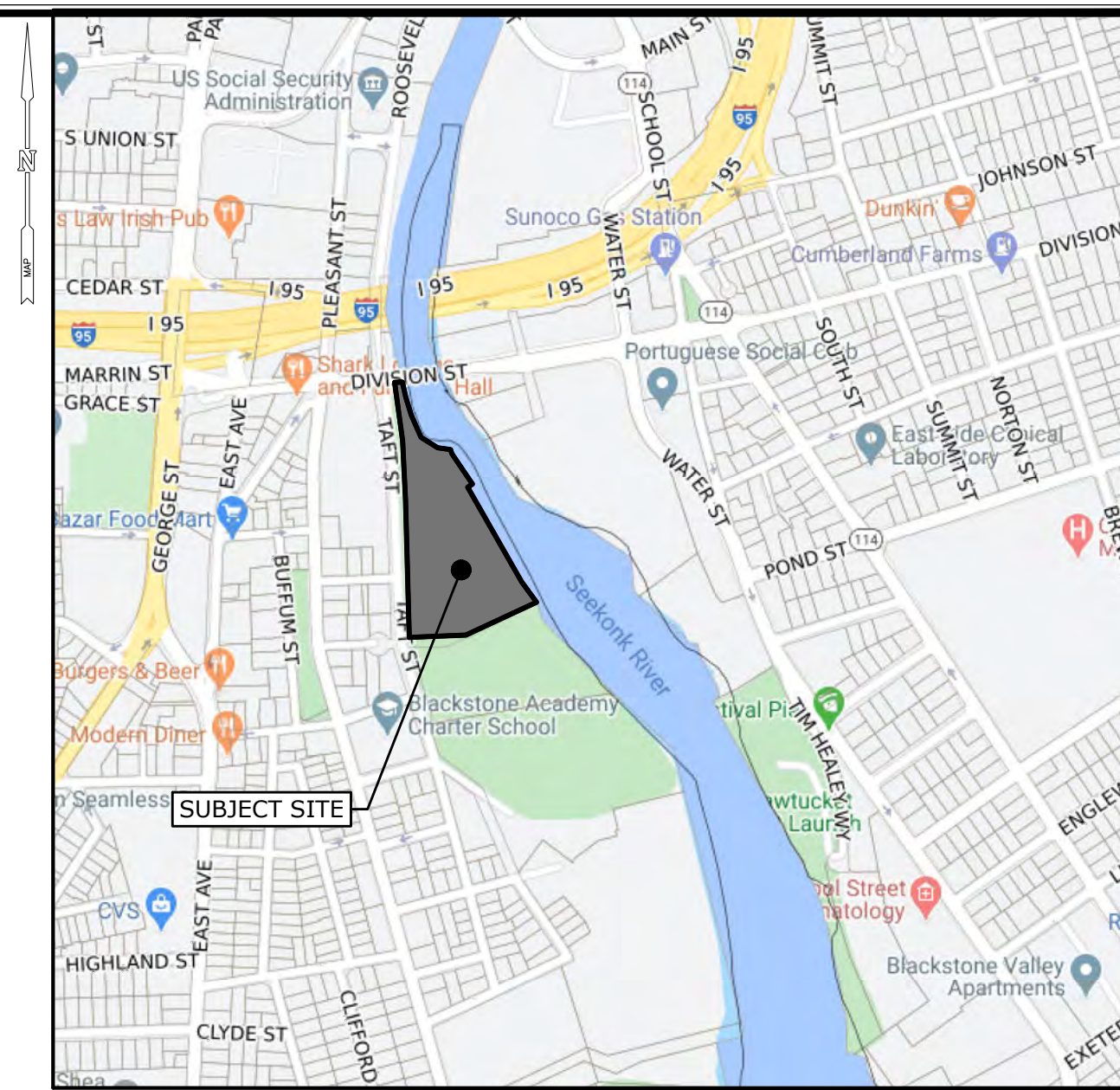
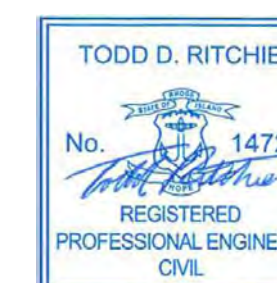
Map 58, Zone 826

DIMENSIONAL CRITERIA	REQUIRED	PROPOSED
MIN LOT AREA	5,000 SF	226,402 SF
MIN LOT FRONTAGE	50 FT	±148 FT
MAX LOT COVERAGE	100%	NO CHANGE
MIN. FRONT SETBACK	0 FT	NO CHANGE
MIN. SIDE SETBACK	0 FT	NO CHANGE
MIN. REAR SETBACK	0 FT	NO CHANGE
MAX BUILDING HEIGHT (MAIN)	120 FT	NO CHANGE
MAX BUILDING HEIGHT (ACCESSORY)	15 FT	NO CHANGE

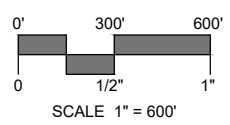
PREPARED BY:



99 REALTY DRIVE  
CHESHIRE, CT 06410  
203.271.1773  
SLRCONSULTING.COM



LOCATION MAP:



### PREPARED FOR:

CITY OF PAWTUCKET  
137 ROOSEVELT AVE  
PAWTUCKET, 02860  
**BID. NO. 26-012**

### LIST OF DRAWINGS

NO.	NAME	TITLE
01	-	TITLE SHEET
02	1 of 1	TOPOGRAPHIC SURVEY
03	RM	REMOVALS PLAN
04	EC	ENGINEERED CONTROL
05	MA	SITE PLAN - MATERIALS
06	LA	SITE PLAN - LAYOUT
07	GU	SITE PLAN - GRADING & UTILITIES
08	PR	SITE PLAN - SIDEWALK PLAN AND PROFILE
09	LS-1	SITE PLAN - LANDSCAPING
10	LS-2	SITE PLAN - LANDSCAPING
11	SE-1	SITE PLAN - SEDIMENT & EROSION CONTROL
12	SE-2	SEDIMENT & EROSION CONTROL DETAILS
13-17	SD-1-5	SITE DETAILS
18-20	STR-1-3	SITE STRUCTURAL DETAILS



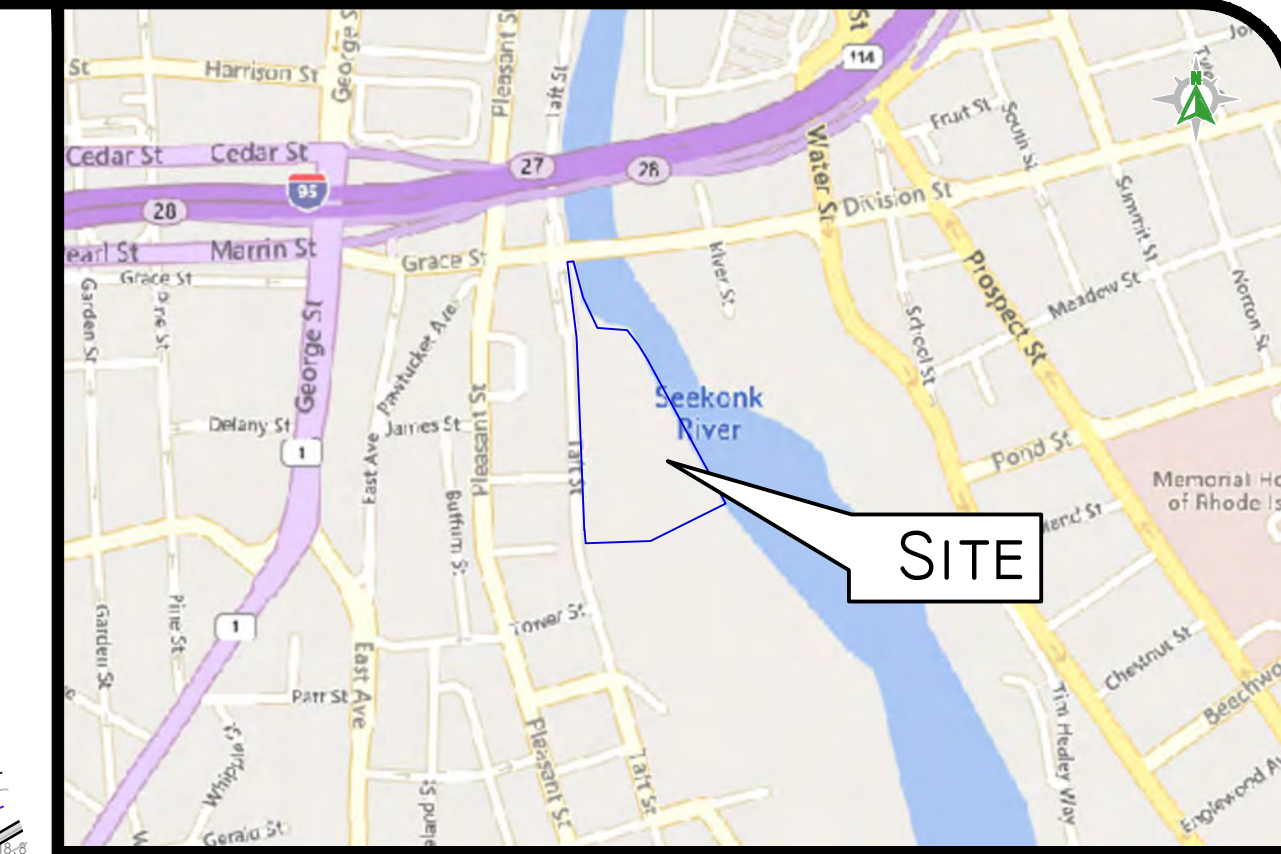
Know what's below.  
Call before you dig.  
[www.cbyd.com](http://www.cbyd.com)

**LEGEND**

	WATER LINE	123/1234 DEED BOOK/PAGE		UNKNOWN MANHOLE
	SEWER LINE	AP ASSESSOR'S PLAT		BOLLARD
	SEWER FORCE MAIN	N/F NOW OR FORMERLY		SOIL EVALUATION
	GAS LINE	(R) RECORD		CATCH BASIN
	ELECTRIC LINE	(CA) CHORD ANGLE		DOUBLE CATCH BASIN
	OVERHEAD WIRES	(D) DEED		WATER VALVE
	DRAINAGE LINE	(M) MEASURED		GAS VALVE
	MINOR CONTOUR LINE			WETLAND FLAG
	MAJOR CONTOUR LINE			DRAINAGE MANHOLE
	PROPERTY LINE			FLARED END SECTION
	ASSESSORS LINE			GUY POLE
	TREELINE			ELECTRIC MANHOLE
	GUARDRAIL			UTILITY/POWER POLE
	RETAINING WALL	LC LANDSCAPING		LIGHTPOST
	STONE WALL			SIGN POST
				WELL
				MONITORING WELL
				BENCH MARK
				TREE

**GENERAL NOTES**

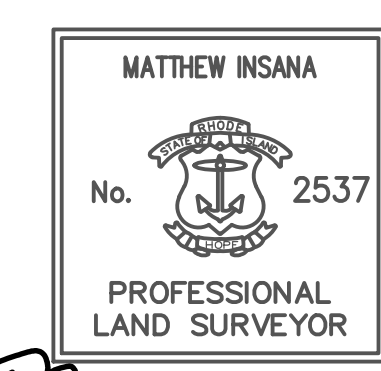
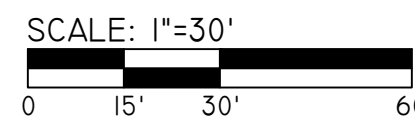
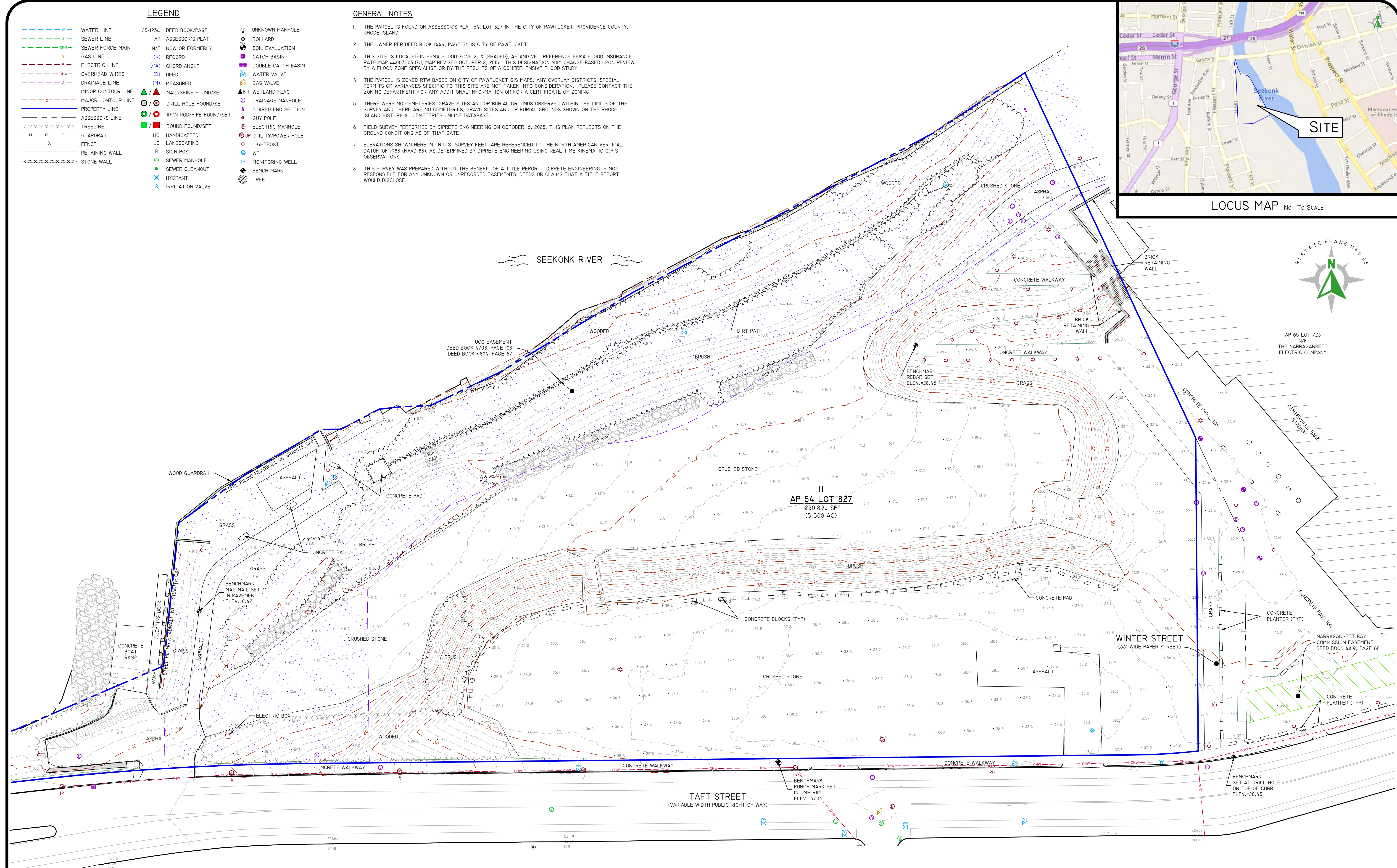
1. THE PARCEL IS FOUND ON ASSESSOR'S PLAT 54, LOT 827 IN THE CITY OF PAWTUCKET, PROVIDENCE COUNTY, RHODE ISLAND.
2. THE OWNER PER DEED BOOK 1449, PAGE 56 IS CITY OF PAWTUCKET.
3. THIS SITE IS LOCATED IN FEMA FLOOD ZONE X, X (SHADED), AE AND VE. REFERENCE FEMA FLOOD INSURANCE RATE MAP 44070307J, MAP REVISED OCTOBER 2, 2015. THIS DESIGNATION MAY CHANGE BASED UPON REVIEW BY A FLOOD ZONE SPECIALIST OR BY THE RESULTS OF A COMPREHENSIVE FLOOD STUDY.
4. THE PARCEL IS ZONED RTW BASED ON CITY OF PAWTUCKET GIS MAPS. ANY OVERLAY DISTRICTS, SPECIAL PERMITS OR VARIANCES SPECIFIC TO THIS SITE ARE NOT TAKEN INTO CONSIDERATION. PLEASE CONTACT THE ZONING DEPARTMENT FOR ANY ADDITIONAL INFORMATION OR FOR A CERTIFICATE OF ZONING.
5. THERE WERE NO CEMETERIES, GRAVE SITES AND OR BURIAL GROUNDS OBSERVED WITHIN THE LIMITS OF THE SURVEY AND THERE ARE NO CEMETERIES, GRAVE SITES AND OR BURIAL GROUNDS SHOWN ON THE RHODE ISLAND HISTORICAL CEMETERIES ONLINE DATABASE.
6. FIELD SURVEY PERFORMED BY DIPRETE ENGINEERING ON OCTOBER 16, 2025. THIS PLAN REFLECTS ON THE GROUND CONDITIONS AS OF THAT DATE.
7. ELEVATIONS SHOWN HEREON, IN U.S. SURVEY FEET, ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88), AS DETERMINED BY DIPRETE ENGINEERING USING REAL TIME KINEMATIC G.P.S. OBSERVATIONS.
8. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT. DIPRETE ENGINEERING IS NOT RESPONSIBLE FOR ANY UNKNOWN OR UNRECORDED EASEMENTS, DEEDS OR CLAIMS THAT A TITLE REPORT WOULD DISCLOSE.



LOCUS MAP NOT TO SCALE



AP 65 LOT 723  
N/F  
THE NARRAGANSETT  
ELECTRIC COMPANY



Matthew Insana 10/24/2025  
MATTHEW INSANA, R.I.P.L.S. #2537, COA #LS.000A160

**SURVEYOR'S CERTIFICATE**

THIS SURVEY HAS BEEN CONDUCTED AND THE PLAN HAS BEEN PREPARED PURSUANT TO 435-RICR-00-00-1.9 OF THE RULES AND REGULATIONS ADOPTED BY THE RHODE ISLAND STATE BOARD OF REGISTRATION FOR PROFESSIONAL LAND SURVEYORS ON NOVEMBER 25, 2015, AS FOLLOWS:

- TOPOGRAPHIC SURVEY CLASS T-2
- DATA ACCUMULATION SURVEY (PLANIMETRIC) CLASS III
- COMPILATION PLAN (NOT A BOUNDARY SURVEY) CLASS IV

THIS COMPILATION PLAN HAS BEEN PREPARED FROM SOURCES OF INFORMATION AND DATA WHOSE POSITIONAL ACCURACY AND RELIABILITY HAS NOT BEEN VERIFIED. THE PROPERTY LINES DEPICTED HEREON DO NOT REPRESENT A BOUNDARY OPINION.

THE PURPOSE FOR THE CONDUCT OF THE SURVEY AND FOR THE PREPARATION OF THE PLAN IS AS FOLLOWS: TOPOGRAPHY FOR SITE ENGINEERING AND PERMITTING.

**TOPOGRAPHIC SURVEY PLAN**

TIDEWATER LANDING  
ASSESSOR'S PLAT 54, LOT 827  
PAWTUCKET, RHODE ISLAND  
PREPARED FOR:  
CITY OF PAWTUCKET  
137 ROOSEVELT AVENUE, PAWTUCKET, RHODE ISLAND 02860

R.O.	DRAWN	DATE	DESCRIPTION

**DiPrete Engineering**  
Engineers • Planners • Surveyors  
www.diprete-eng.com  
Two Stafford Court, Cranston, RI 02920 • Tel 401-943-1000

**EXISTING CONDITIONS LEGEND**

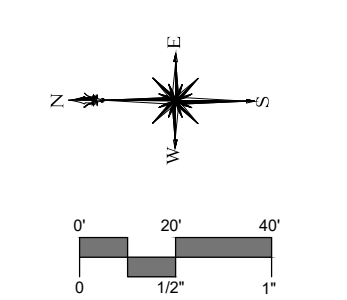
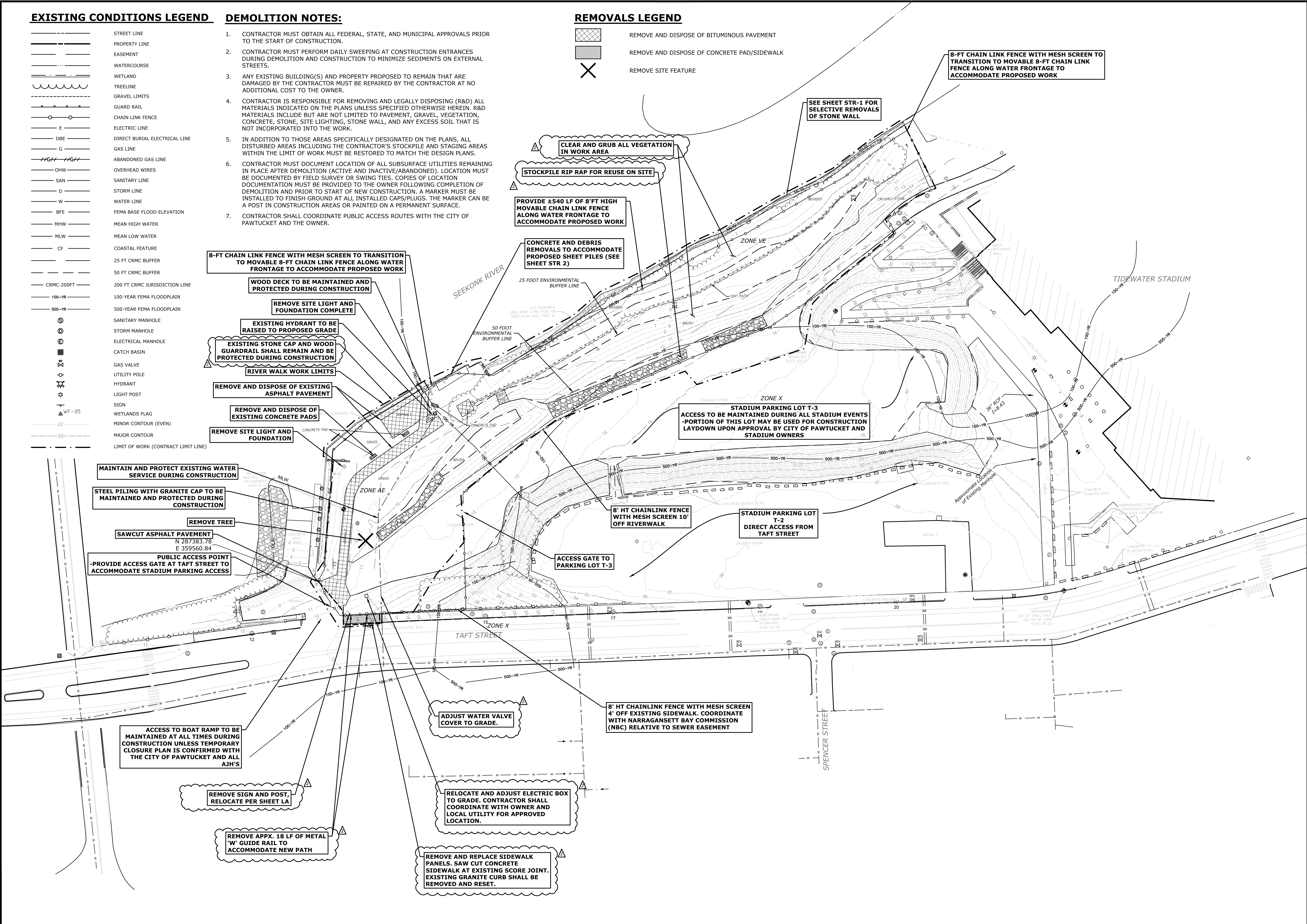
---	STREET LINE
---	PROPERTY LINE
---	EASEMENT
---	WATERCOURSE
---	WETLAND
---	TREELINE
---	GRAVEL LIMITS
---	GUARD RAIL
---	CHAIN LINK FENCE
---	ELECTRIC LINE
---	DIRECT BURIAL ELECTRICAL LINE
---	GAS LINE
---	ABANDONED GAS LINE
---	OVERHEAD WIRES
---	SANITARY LINE
---	STORM LINE
---	WATER LINE
---	FEMA BASE FLOOD ELEVATION
---	MEAN HIGH WATER
---	MEAN LOW WATER
---	COASTAL FEATURE
---	25 FT CRMC BUFFER
---	50 FT CRMC BUFFER
---	200 FT CRMC JURISDICTION LINE
---	100-YR FEMA FLOODPLAIN
---	500-YR FEMA FLOODPLAIN
⊙	SANITARY MANHOLE
⊙	STORM MANHOLE
⊙	ELECTRICAL MANHOLE
⊙	CATCH BASIN
⊙	GAS VALVE
⊙	UTILITY POLE
⊙	HYDRANT
⊙	LIGHT POST
⊙	SIGN
⊙	WETLANDS FLAG
---	MINOR CONTOUR (EVEN)
---	MAJOR CONTOUR
---	LIMIT OF WORK (CONTRACT LIMIT LINE)

**DEMOLITION NOTES:**

1. CONTRACTOR MUST OBTAIN ALL FEDERAL, STATE, AND MUNICIPAL APPROVALS PRIOR TO THE START OF CONSTRUCTION.
2. CONTRACTOR MUST PERFORM DAILY SWEEPING AT CONSTRUCTION ENTRANCES DURING DEMOLITION AND CONSTRUCTION TO MINIMIZE SEDIMENTS ON EXTERNAL STREETS.
3. ANY EXISTING BUILDING(S) AND PROPERTY PROPOSED TO REMAIN THAT ARE DAMAGED BY THE CONTRACTOR MUST BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
4. CONTRACTOR IS RESPONSIBLE FOR REMOVING AND LEGALLY DISPOSING (R&D) ALL MATERIALS INDICATED ON THE PLANS UNLESS SPECIFIED OTHERWISE HEREIN. R&D MATERIALS INCLUDE BUT ARE NOT LIMITED TO PAVEMENT, GRAVEL, VEGETATION, CONCRETE, STONE, SITE LIGHTING, STONE WALL, AND ANY EXCESS SOIL THAT IS NOT INCORPORATED INTO THE WORK.
5. IN ADDITION TO THOSE AREAS SPECIFICALLY DESIGNATED ON THE PLANS, ALL DISTURBED AREAS INCLUDING THE CONTRACTOR'S STOCKPILE AND STAGING AREAS WITHIN THE LIMIT OF WORK MUST BE RESTORED TO MATCH THE DESIGN PLANS.
6. CONTRACTOR MUST DOCUMENT LOCATION OF ALL SUBSURFACE UTILITIES REMAINING IN PLACE AFTER DEMOLITION (ACTIVE AND INACTIVE/ABANDONED). LOCATION MUST BE DOCUMENTED BY FIELD SURVEY OR SWING TIES. COPIES OF LOCATION DOCUMENTATION MUST BE PROVIDED TO THE OWNER FOLLOWING COMPLETION OF DEMOLITION AND PRIOR TO START OF NEW CONSTRUCTION. A MARKER MUST BE INSTALLED TO FINISH GROUND AT ALL INSTALLED CAPS/PLUGS. THE MARKER CAN BE A POST IN CONSTRUCTION AREAS OR PAINTED ON A PERMANENT SURFACE.
7. CONTRACTOR SHALL COORDINATE PUBLIC ACCESS ROUTES WITH THE CITY OF PAWTUCKET AND THE OWNER.

**REMOVALS LEGEND**

⊗	REMOVE AND DISPOSE OF BITUMINOUS PAVEMENT
⊗	REMOVE AND DISPOSE OF CONCRETE PAD/SIDEWALK
⊗	REMOVE SITE FEATURE



TODD D. RITCHIE  
 No. 14720  
 REGISTERED PROFESSIONAL ENGINEER  
 CIVIL



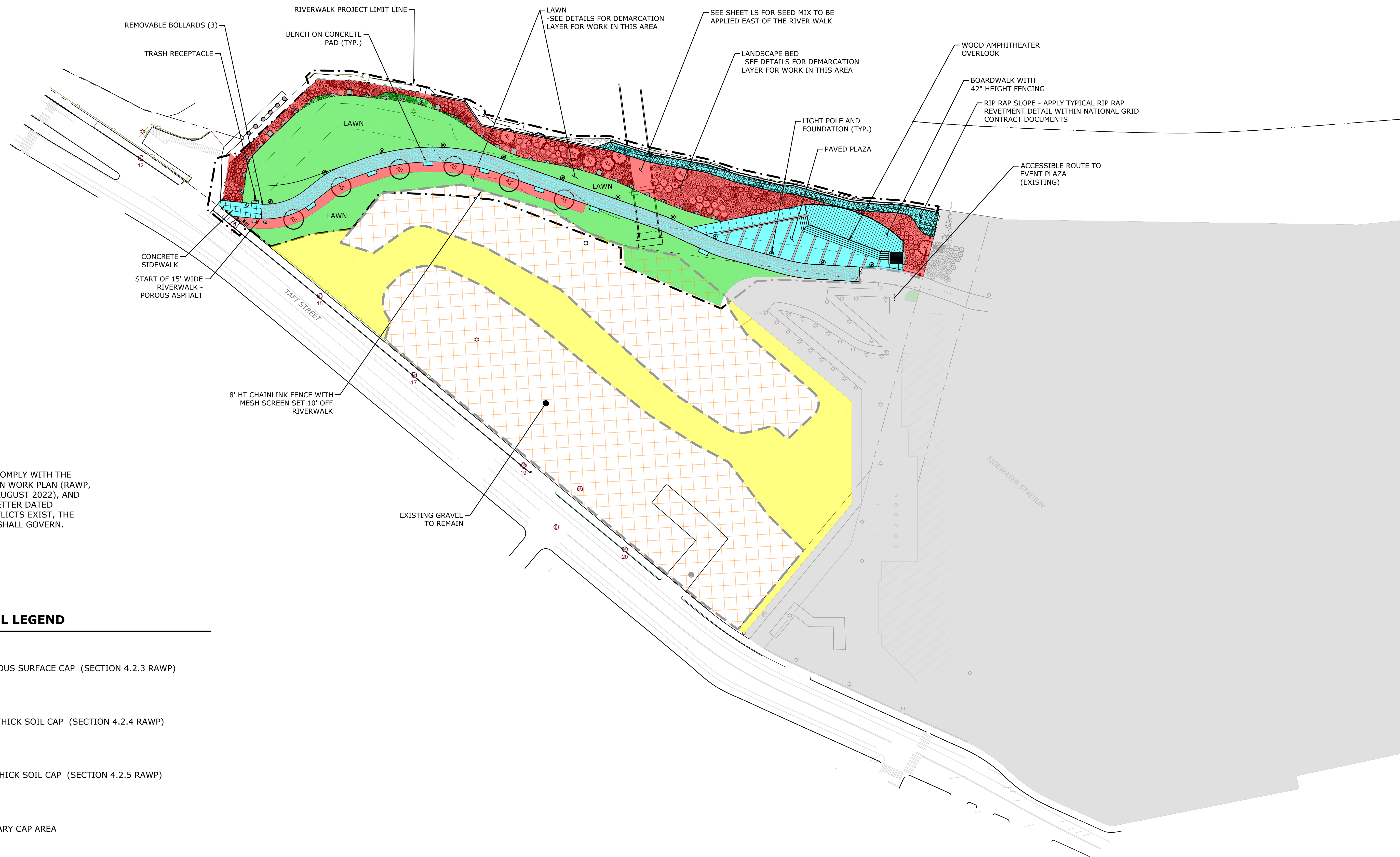
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CONSTRUCTION DOCUMENTS	2026-02-27	JRH
UPDATED REVIEW SET	2026-03-27	JRH
ADDENDUM 02	MAY 11, 2026	SRS

CONSTRUCTION DOCUMENTS - ISSUED FOR BID

**SITE PLAN - REMOVALS**  
 RIVERWALK WEST FINAL PHASE  
 SITE IMPROVEMENTS  
 TAFT STREET  
 PAWTUCKET, RHODE ISLAND

BK	PJP	BK
DESIGNED	DRAWN	CHECKED
1"=40'		
DATE: APRIL 15, 2026		
PROJECT NO: 15842.00001		
SHEET NO: 03 OF 20		
<b>RM</b>		

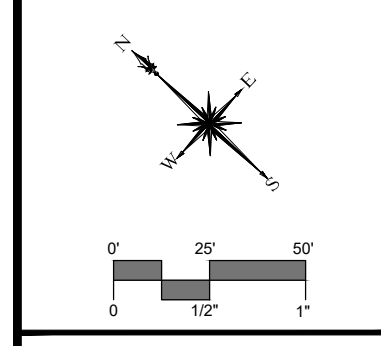
SHEET NO. 04 OF 20  
 PROJECT NO. 15842.00001  
 DATE: APRIL 15, 2026  
 SCALE: 1"=50'  
 DRAWN BY: JRH  
 CHECKED BY: DLO  
 DESIGNED BY: JRH



**NOTE:** SITE REMEDIATION SHALL COMPLY WITH THE RIDEM APPROVED REMEDIAL ACTION WORK PLAN (RAWP, MARCH 2022), RAWP ADDENDUM (AUGUST 2022), AND THE RIDEM REMEDIAL APPROVAL LETTER DATED SEPTEMBER 14, 2022. WHERE CONFLICTS EXIST, THE MORE STRINGENT REQUIREMENTS SHALL GOVERN.

**ENGINEERED CONTROL LEGEND**

	IMPERVIOUS SURFACE CAP (SECTION 4.2.3 RAWP)
	1-FOOT THICK SOIL CAP (SECTION 4.2.4 RAWP)
	2-FEET THICK SOIL CAP (SECTION 4.2.5 RAWP)
	TEMPORARY CAP AREA
	EXISTING GRADES & VEGETATION TO REMAIN



TODD D. RITCHIE  
 No. 14720  
 REGISTERED PROFESSIONAL ENGINEER  
 CIVIL

**SLR**  
 99 REALTY DRIVE  
 SUITE 100  
 283.271.1773  
 SLRCONSULTING.COM

DESCRIPTION	DATE	BY
CONSTRUCTION DOCUMENTS	2026-02-27	JRH
ADDENDUM 02	MAY 11, 2026	SRS

**ENGINEERED CONTROL**  
 RIVERWALK WEST FINAL PHASE  
 SITE IMPROVEMENTS  
 TAFT STREET  
 PAWTUCKET, RHODE ISLAND

CONSTRUCTION DOCUMENTS - ISSUED FOR BID

JRH	JRH	DLO
DESIGNED	DRAWN	CHECKED
1"=50'		
DATE: APRIL 15, 2026		
PROJECT NO. 15842.00001		
SHEET NO. 04 OF 20		

EC



**LAYOUT NOTES**

1. SLR INTERNATIONAL CORPORATION ACCEPTS NO RESPONSIBILITY FOR MAPS AND DATA THAT HAVE BEEN PREPARED AND SUPPLIED BY OTHERS.
2. CONCRETE SIDEWALKS, ENTRY AREAS, AND TERRACES SHALL INCORPORATE EXPANSION JOINTS, SCORE JOINTS, AND CONSTRUCTION JOINTS PER THE SPECIFICATIONS AND DETAILS, TYPICALLY NO MORE THAN 144 SQUARE FEET SHALL CONSTITUTE A CONTIGUOUS SLAB. SEE STRUCTURAL PLANS FOR JOINTING PERTAINING TO THESE DISCIPLINES.
3. ALL DIMENSIONS AND ELEVATIONS SHALL BE VERIFIED IN THE FIELD PRIOR TO CONSTRUCTION. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
4. SITE REMEDIATION SHALL COMPLY WITH THE RIDEM APPROVED REMEDIAL ACTION WORK PLAN (RAWP, MARCH 2022), RAWP ADDENDUM (AUGUST 2022), AND THE RIDEM REMEDIAL APPROVAL LETTER DATED SEPTEMBER 14, 2022. WHERE CONFLICTS EXIST, THE MORE STRINGENT REQUIREMENTS SHALL GOVERN.
5. SHOP DRAWING TO BE PROVIDED BY CONTRACTOR TO CONNECT LIGHTING TO EXISTING LIGHTING CIRCUIT. (SEE ELECTRICAL NOTES, SHEET GU)

**LEGEND**

- BANK ARMORING
- POROUS ASPHALT
- PLACED BOULDER
- 5'x5' CONCRETE PAD
- BOLLARDS
- LIGHT POST
- PROPERTY LINE

TODD D. RITCHIE  
No. 14720  
REGISTERED PROFESSIONAL ENGINEER  
CIVIL

SLR  
99 REALTY DRIVE  
SUITE 100  
280 271 1773  
SLRCONSULTING.COM

DESCRIPTION	DATE	BY
CRAC COMMENTS	2025-12-16	JRH
CONSTRUCTION DOCUMENTS	2026-02-27	JRH
UPDATED REVIEW SET	2026-03-27	JRH
ADDENDUM 02	MAY 11, 2026	SRS

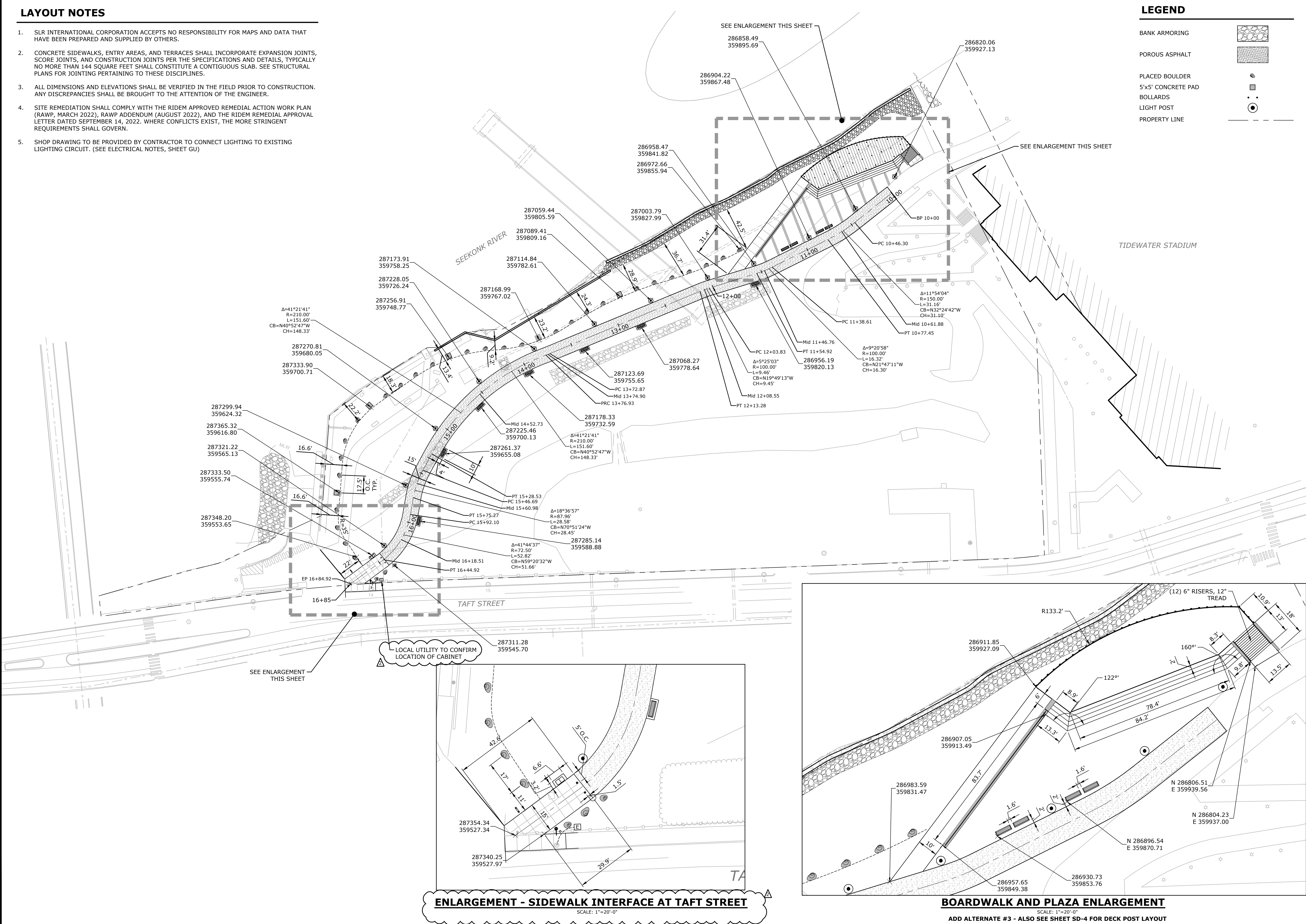
CONSTRUCTION DOCUMENTS - ISSUED FOR BID

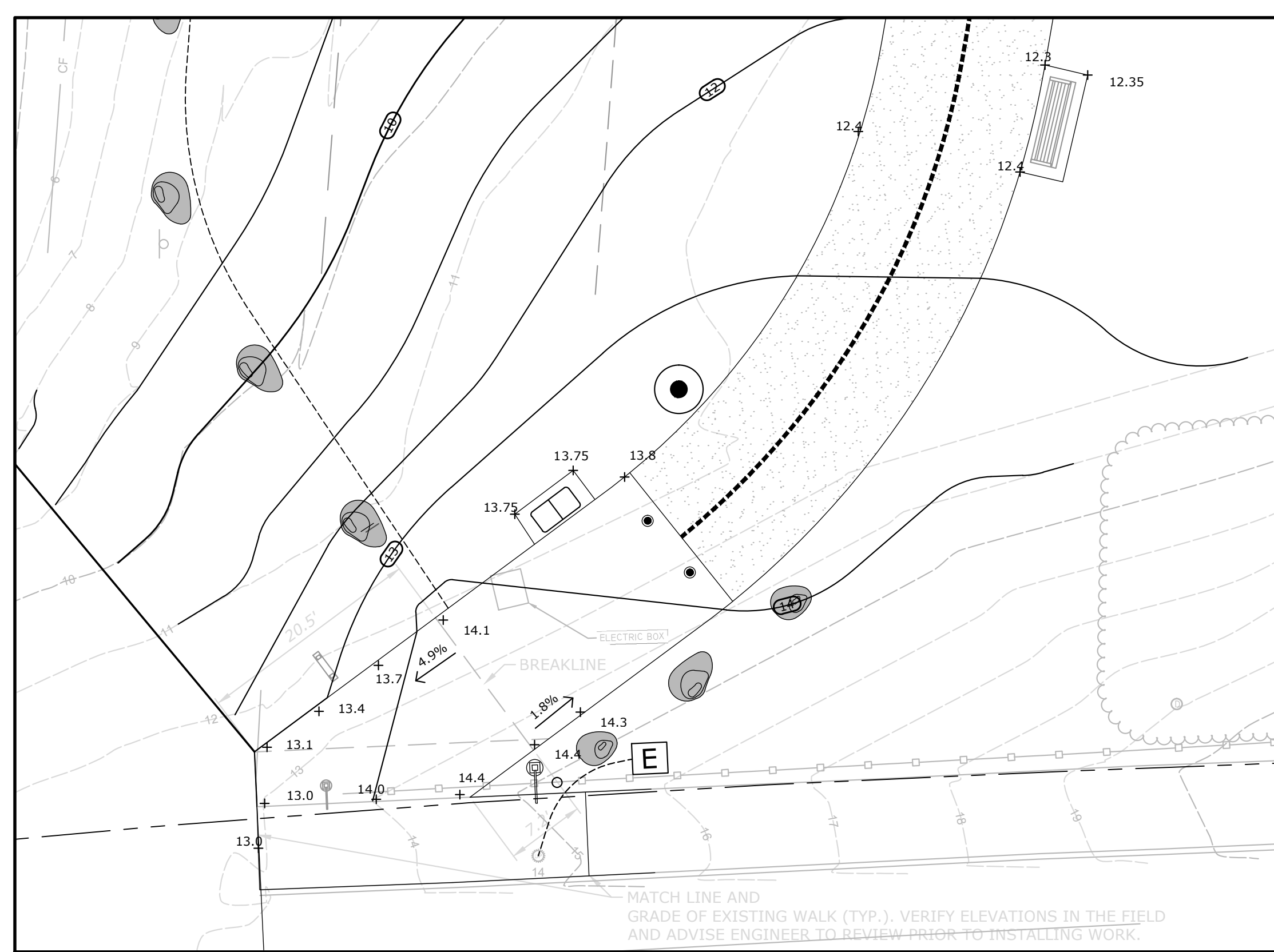
SITE PLAN - LAYOUT  
RIVERWALK WEST FINAL PHASE  
SITE IMPROVEMENTS  
TAFT STREET  
PAWTUCKET, RHODE ISLAND

BK	PJP	BK
DESIGNED	DRAWN	CHECKED

SCALE: 1"=40'  
DATE: APRIL 15, 2026  
PROJECT NO.: 15842.00001  
SHEET NO.: 06 OF 20

LA





**RIVERWALK ENTRANCE PLAZA ENLARGEMENT**

SCALE: 1"=10'-0"

**GRADING LEGEND**

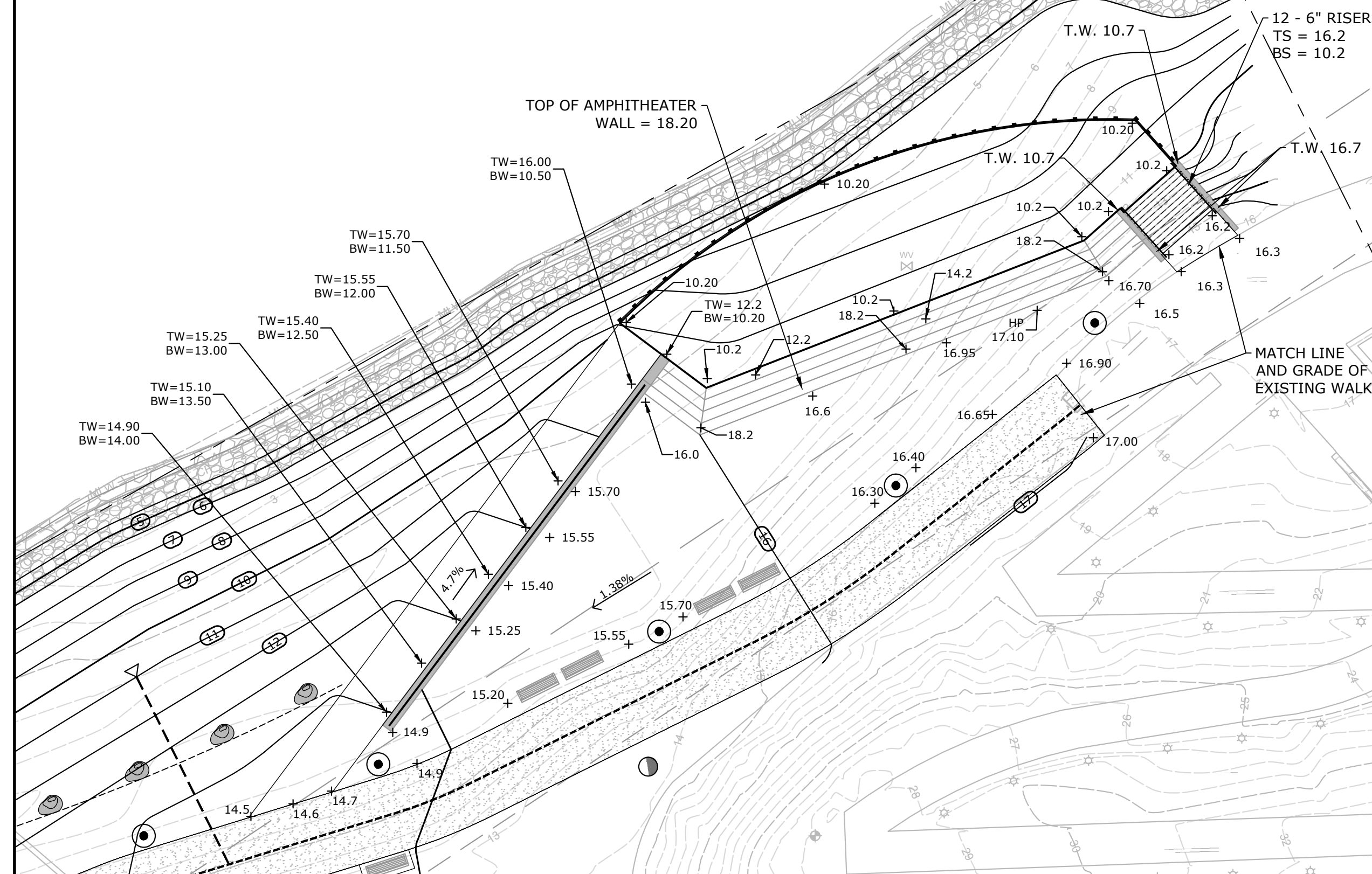
- 22 --- MINOR EXISTING CONTOUR
- 20 --- MAJOR PROPOSED CONTOUR
- + 17.2 PROPOSED SPOT ELEVATION
- TW=17.2 PROPOSED TOP OF WALL ELEVATION
- BW=17.2 PROPOSED BOTTOM OF WALL ELEVATION
- 22 --- MINOR PROPOSED CONTOUR
- 20 --- MAJOR PROPOSED CONTOUR

**GRADING NOTES**

1. SIDEWALK LONGITUDINAL SLOPES SHALL BE 1:20 (5%) OR LESS AND CROSS SLOPES SHALL BE 0.5 TO 1.8% (NOT TO EXCEED 1:50 OR 2%).
2. CHANGES IN LEVELS SHALL NOT BE GREATER THAN 1/4 INCH, AND SLOPES SHALL NOT BE GREATER THAN 1:20 UNLESS RAMPS OR LIFTS ARE PROVIDED.
3. ALL SIDEWALK INTERSECTIONS SHALL BE A MINIMUM OF 5' x 5' CLEAR WITH A MAXIMUM SLOPE AND CROSS-PITCH OF 2% IN ANY DIRECTION.
4. IN ALL CASES IN WHICH PROPOSED ROADS, SIDEWALKS AND CURBING WILL BE TIED INTO EXISTING ROAD/SIDEWALK AND/OR CURBS THE CONTRACTOR SHALL MATCH THE LINE AND GRADE OF THE EXISTING SITE ELEMENT.
5. ANY DISCREPANCY OR CONFLICT IN GRADES SHOWN SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER, LANDSCAPE ARCHITECT, AND ENGINEER IMMEDIATELY AND PRIOR TO INSTALLATION OF ANY IMPROVEMENT. ANY IMPROVEMENTS INSTALLED INCORRECTLY DUE TO A PLAN DISCREPANCY THAT WAS NOT FIELD CHECKED AND APPROVED WILL BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE.
6. ANY LENGTHS OF SIDEWALKS EXCEEDING 5% LONGITUDINAL GRADIENT OR SLABS EXCEEDING 2% CROSS SLOPE SHALL BE REMOVED AND REPLACED AT THE PROPER GRADES BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
7. ALL PROPOSED CONTOURS AND SPOT ELEVATIONS INDICATE FINISHED GRADE.

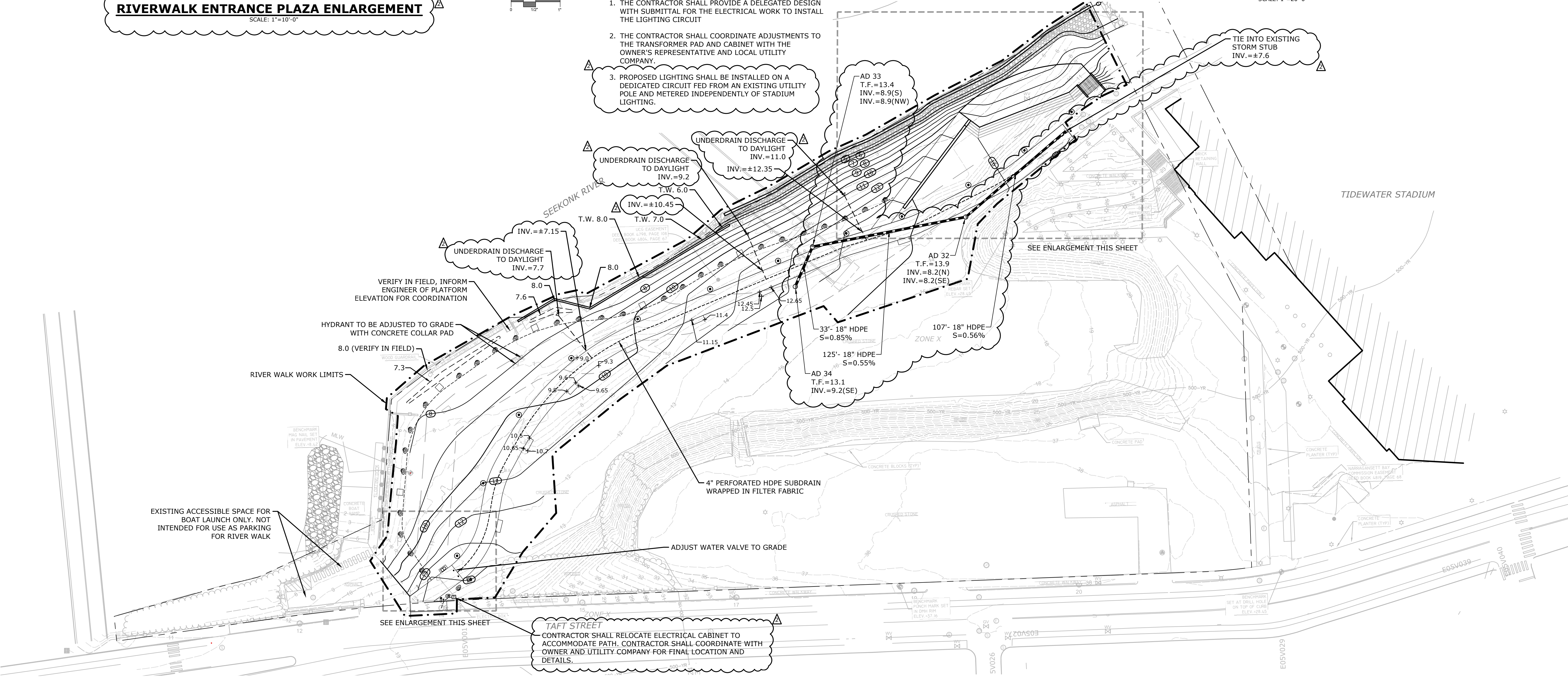
**ELECTRICAL NOTES:**

1. THE CONTRACTOR SHALL PROVIDE A DELEGATED DESIGN WITH SUBMITTAL FOR THE ELECTRICAL WORK TO INSTALL THE LIGHTING CIRCUIT
2. THE CONTRACTOR SHALL COORDINATE ADJUSTMENTS TO THE TRANSFORMER PAD AND CABINET WITH THE OWNER'S REPRESENTATIVE AND LOCAL UTILITY COMPANY.
3. PROPOSED LIGHTING SHALL BE INSTALLED ON A DEDICATED CIRCUIT FED FROM AN EXISTING UTILITY POLE AND METERED INDEPENDENTLY OF STADIUM LIGHTING.



**BOARDWALK AND PLAZA ENLARGEMENT**

SCALE: 1"=20'-0"



TODD D. RITCHIE  
 No. 14720  
 REGISTERED PROFESSIONAL ENGINEER  
 CIVIL

**SLR**  
 99 REALTY DRIVE  
 SUITE 100  
 PANTUCKET, RHODE ISLAND 02876  
 401.271.1773  
 SLRCONSTRUCTING.COM

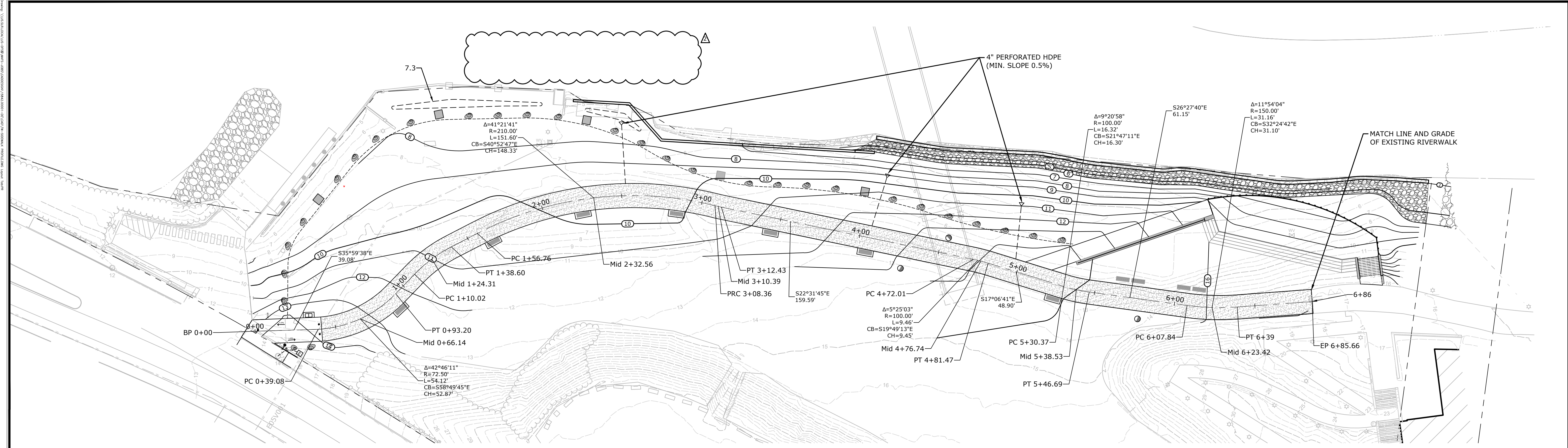
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CONSTRUCTION DOCUMENTS	2026-02-27	JRH
UPDATED REVIEW SET	2026-03-27	JRH
ADDENDUM 02	MAY 11, 2026	SRS

**SITE PLAN - GRADING & UTILITIES**  
**RIVERWALK WEST FINAL PHASE**  
**SITE IMPROVEMENTS**  
 TAFT STREET  
 PANTUCKET, RHODE ISLAND

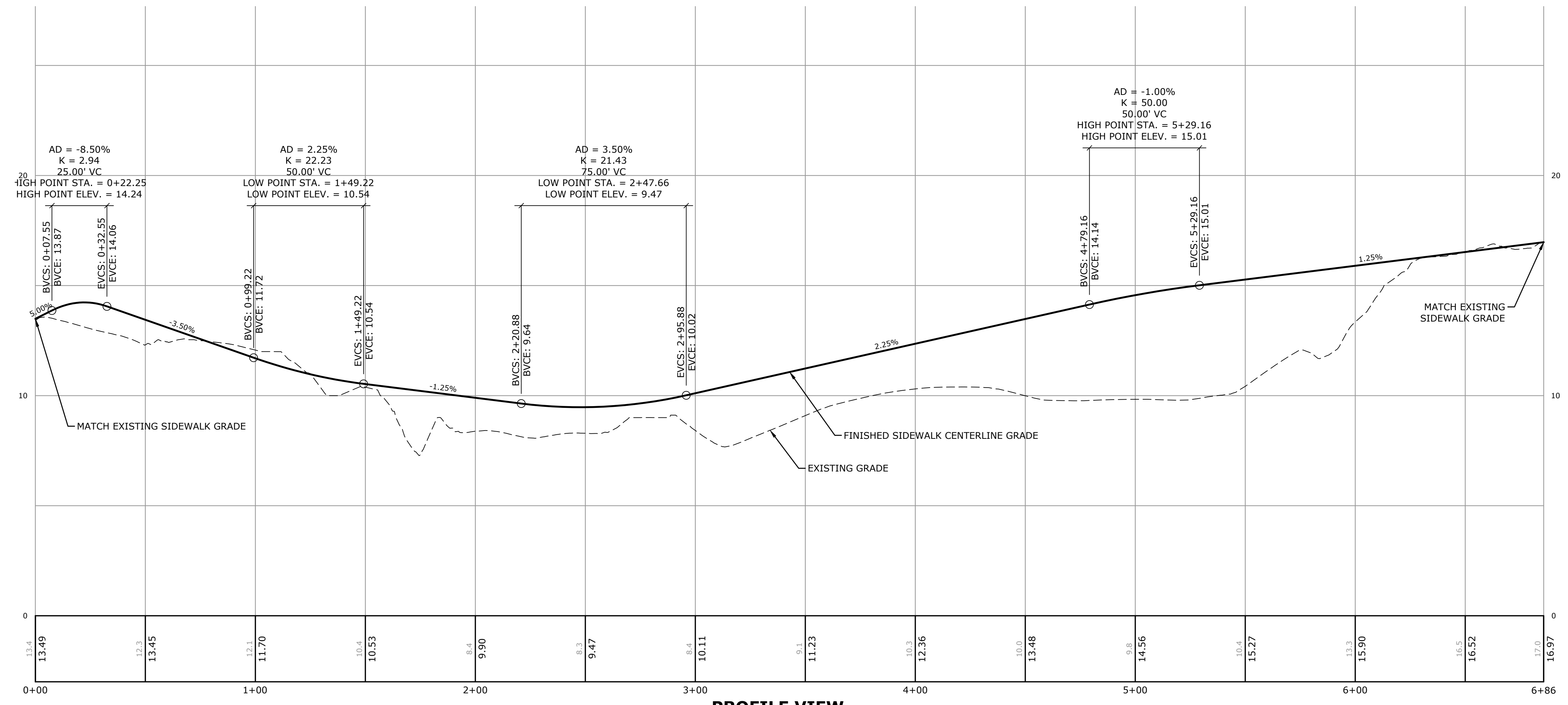
BK	PJP	BK
DESIGNED	DRAWN	CHECKED

SCALE: 1"=40'  
 DATE: APRIL 15, 2026  
 PROJECT NO: 15842.00001  
 SHEET NO: 07 OF 20

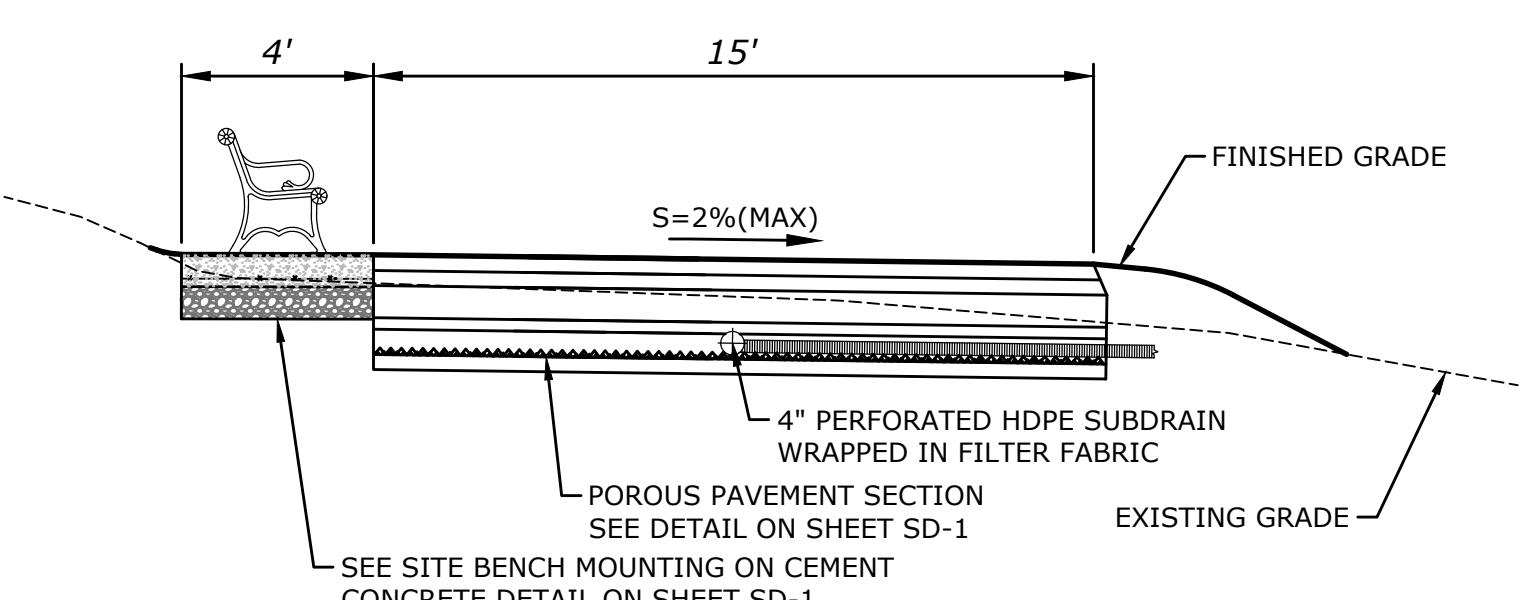
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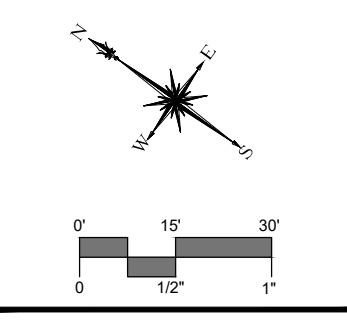
**PLAN VIEW**  
SCALE: 1"=30'



**PROFILE VIEW**  
SCALE: 1"=30'H 1"=3'V



**TYPICAL SIDEWALK SECTION**  
SCALE: 1"=4'



TODD D. RITCHIE  
No. 14720  
REGISTERED PROFESSIONAL ENGINEER  
CIVIL



DESCRIPTION	DATE	BY
CRMC COMMENTS	2025-12-16	JRH
CONSTRUCTION DOCUMENTS	2026-02-27	JRH
UPDATED REVIEW SET	2026-03-27	JRH
ADDENDUM 02	MAY 11, 2026	JRH

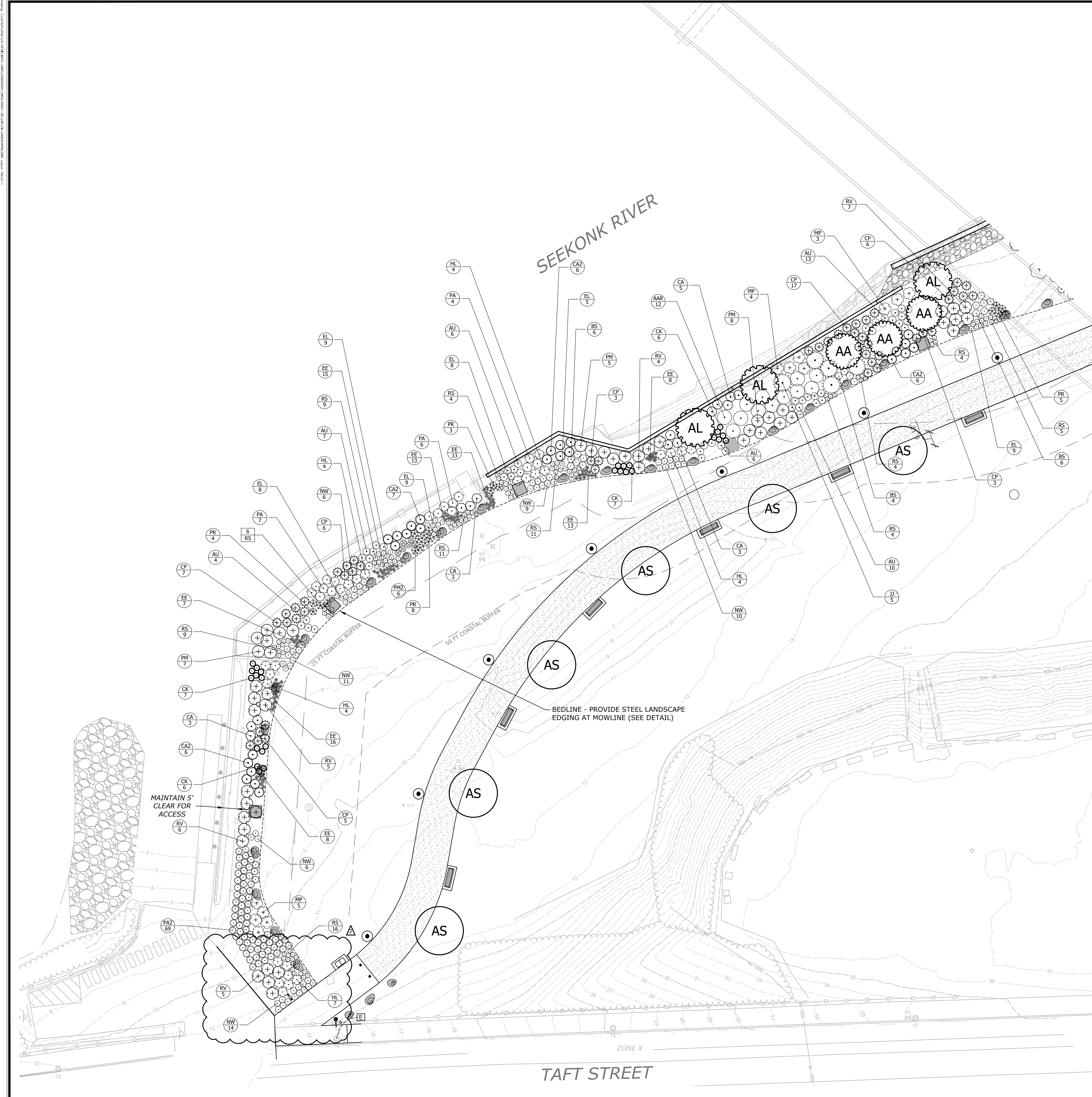
**SITE PLAN - SIDEWALK PLAN AND PROFILE**  
**RIVERWALK WEST FINAL PHASE**  
**SITE IMPROVEMENTS**  
TAFT STREET  
PAWTUCKET, RHODE ISLAND

JRH	JRH	DLO
DESIGNED	DRAWN	CHECKED

AS NOTED  
APRIL 15, 2026  
DATE  
PROJECT NO. 15842.00001  
SHEET NO. 08 OF 20



CONSTRUCTION DOCUMENTS - ISSUED FOR BID



**PLANT SCHEDULE RIVER WALK**

CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	COMMENTS
<b>TREES</b>					
AS	6	Acer rubrum 'Red Sunset'	Red Sunset Maple	2.5"-3.0" Cal.	B&B
AA	4	Amelanchier arborea	Downy Serviceberry	1.5"-2.0" Cal.	B&B
AL	4	Amelanchier laevis	Allegheny Serviceberry	1.5"-2.0" Cal.	B&B
BP	5	Betula populifolia	Gray Birch	#20 cont.	
<b>GRASSES</b>					
CK	26	Calamagrostis acutiflora 'Karl Foerster'	Feather Reed Grass	#3	
PA	17	Pennisetum alopecuroides	Fountain Grass	#1 cont.	#1
PA2	69	Pennisetum alopecuroides 'Hamel'	Dwarf Fountain Grass	---	#3
<b>GROUNDCOVERS</b>					
AU	115	Arctostaphylos uva-ursi 'Massachusetts'	Massachusetts Kinnikinnick	#1 cont.	#1
LB	112	Liriope muscari 'Big Blue'	Big Blue Lilyturf	---	#1
<b>PERENNIALS</b>					
BS	22	Boltonia asteroides 'Snowbank'	Snowbank False Aster	#1 cont.	
CA2	49	Ceanothus americanus	New Jersey Tea	#1 cont.	#1
EE	93	Echinacea x 'PAS702917' TM	Pow Wow Wildberry Coneflower	---	#1
EL	53	Eupatorium dubium 'Little Joe'	Little Joe Pye Weed	#1 cont.	
NW	56	Nepeta x faassenii 'Walkers Low'	Walkers Low Catmint	---	#3
PR	27	Phlox paniculata 'Robert Poore'	Robert Poore Garden Phlox	#1 cont.	
PM2	9	Pycnanthemum muticum	Blunt Mountainmint	#1 cont.	
RV	79	Rosa virginiana	Virginia Rose	#1 cont.	#1
RS	105	Rudbeckia hirta 'Indian Summer'	Indian Summer Black-eyed Susan	#1 cont.	
<b>BUFFER SHRUBS</b>					
CP	66	Comptonia peregrina	Sweet Fern	#1 cont.	#1
HL	23	Hydrangea paniculata 'Little Lime'	Little Lime Hydrangea	---	#3
MP	46	Morella pensylvanica	Bayberry	#1 cont.	#1
MP2	11	Myrica pensylvanica	Northern Bayberry	#5 cont.	#5
<b>LARGE SHRUBS</b>					
AC	9	Amelanchier canadensis	Shadbush	#1 cont.	#1
AAR	12	Aronia arbutifolia	Red Chokeberry	#1 cont.	#1
AM	3	Aronia melanocarpa	Black Chokeberry	#1 cont.	#1
CA	54	Clethra alnifolia	Sweet Pepper Bush	#1 cont.	#1
JJ	10	Juniperus communis	Common Juniper	#1 cont.	#1
PM	36	Prunus maritima	Beach Plum	#1 cont.	#1

**NOTE:**  
**PLANT SCHEDULE AND QUANTITIES ABOVE ARE FOR ENTIRE RIVERWALK**

**LANDSCAPING NOTES**

- ALL LANDSCAPING WITHIN EMBANKMENT TO EDGE OF WATER TO BE IN COMPLIANCE WITH ASSENTS 2021-08-048 AND 2025-02-055.
- THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES PRIOR TO EXCAVATING PLANT PITS.
- SEED ALL DISTURBED AREAS TO LAWN WITHIN CONTRACT LIMIT LINE UNLESS OTHERWISE NOTED. THE CONTRACTOR SHALL PROVIDE A 6" MINIMUM DEPTH OF SCREENED TOPSOIL FOR ALL LAWN AREAS TO BE PLACED ABOVE THE REQUIRED CLEAN FILL AND DEMARCATION LAYER AS DETAILED.
- ALL PLANTING BEDS SHALL HAVE 12" MINIMUM DEPTH OF TOPSOIL TO BE PLACED ABOVE THE REQUIRED CLEAN FILL AND DEMARCATION LAYER AS DETAILED.
- THE CONTRACTOR SHALL PROVIDE A 4" MIN. DEPTH OF DARK BROWN SHREDDED MULCH OVER TREE PLANTINGS OUTSIDE OF THE EMBANKMENT ZONE.
- ALL PLANT MATERIAL IS SUBJECT TO INSPECTION AND APPROVAL BY THE LANDSCAPE ARCHITECT PRIOR TO AND AFTER PLANTING.
- PLANT SPECIES MAY BE ADJUSTED BASED ON AVAILABILITY AT TIME OF PLANTING. ALL PLANT MATERIAL SUBSTITUTIONS ARE SUBJECT TO REVIEW AND APPROVAL BY THE LANDSCAPE ARCHITECT.
- WHERE A SIZE RANGE IS SPECIFIED AT LEAST 50% OF PLANTS PROVIDED SHALL BE OF THE LARGER SIZE.
- CONTRACTOR TO REMOVE TREE STAKES AFTER ONE GROWING SEASON.
- ALL PLANT MATERIALS SHALL CARRY A FULL GUARANTEE FOR A PERIOD OF ONE YEAR FROM THE DATE OF ACCEPTANCE, TO INCLUDE PROMPT TREATMENT OR REMOVAL AND REPLACEMENT OF ANY PLANTS FOUND TO BE IN AN UNHEALTHY CONDITION BY THE LANDSCAPE ARCHITECT. ALL REPLACEMENTS SHALL BE OF THE SAME KIND AND SIZE OF PLANTS SPECIFIED IN THE PLANT LIST.
- MAINTENANCE SHALL BEGIN IMMEDIATELY AFTER PLANTING AND SHALL CONTINUE UNTIL ACCEPTANCE BY THE LANDSCAPE ARCHITECT. MAINTENANCE SHALL INCLUDE WATERING, MULCHING, TIGHTENING & REPLACING OF GUYS, REPLACEMENT OF SICK OR DEAD PLANTS, RESETTING PLANTS TO PROPER GRADE OR UPRIGHT (PLUMB) POSITION, RESTORATION OF SAUCERS, AND ALL OTHER CARE NEEDED FOR PROPER GROWTH OF THE PLANTS.
- PLANTING SEASON: SPRING: MARCH 15 TO JUNE 30 (INCLUSIVE) OR FALL: FROM SEPTEMBER 1 TO DECEMBER 15, OR UNTIL THE GROUND FREEZES. NO PLANTING SHALL BE DONE IN FROZEN GROUND OR WHEN SNOW COVERS THE GROUND, OR THE SOIL IS OTHERWISE IN AN UNSATISFACTORY CONDITION FOR PLANTING. PLANTING OUTSIDE THESE LIMITS SHALL ONLY BE CONSIDERED AFTER WRITTEN APPROVAL BY OWNER AND LANDSCAPE ARCHITECT.

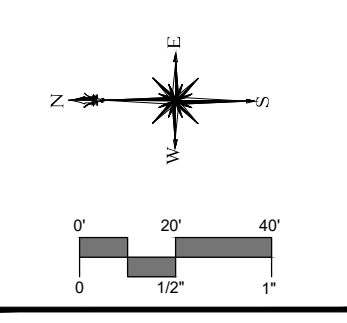
**SEED MIX LEGEND**

**NEW ENGLAND WILDFLOWER MIX:** TO BE SEEDED THROUGHOUT PLANT BED EAST OF THE RIVER WALK.

**APPLICATION RATE:** 23 lbs/acre | 1900 sq ft/lb

**SPECIES:** Little Bluestem (Schizachyrium scoparium), Red Fescue (Festuca rubra), Indian Grass (Sorghastrum nutans), Partridge Pea (Chamaecrista fasciculata), Canada Wild Rye (Elymus canadensis), Virginia Wild Rye (Elymus virginicus), Blue Vervain (Verbena hastata), Butterfly Milkweed (Asclepias tuberosa), Narrowleafed Blue Eyed Grass (Sisyrinchium angustifolium), Black Eyed Susan (Rudbeckia hirta), New England Aster (Symphyotrichum novae-angliae), Spiked Gayfeather/ Marsh Blazing Star (Liatris spicata), Starved/Calico Aster (Aster lateriflorus/Symphotrichum lateriflorum), Early Goldenrod (Solidago juncea), Hollow-Stem Joe Pye Weed (Eupatorium fistulosum/Eutrochium fistulosum)

AS MANUFACTURED BY:  
**NEW ENGLAND WETLAND PLANTS INC.**, AMHERST, MA  
 413-548-8000

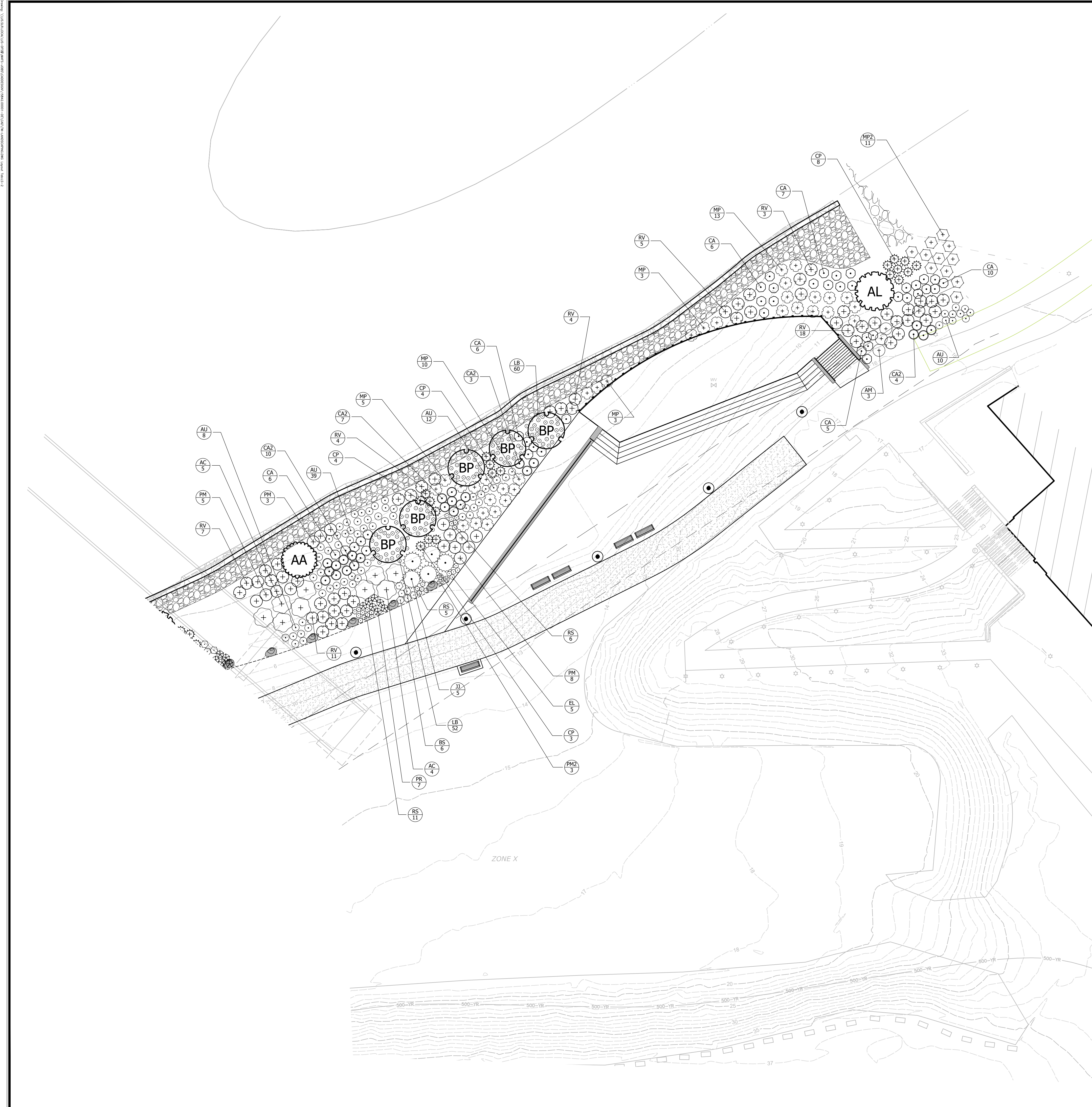


DESCRIPTION	DATE	BY
CRMC COMMENTS	2025-12-16	JRH
CONSTRUCTION DOCUMENTS	2026-02-27	JRH
UPDATED REVIEW SET	2026-03-27	JRH
ADDENDUM 02	MAY 11, 2026	SRS

CONSTRUCTION DOCUMENTS - ISSUED FOR BID

SITE PLAN - LANDSCAPING  
 RIVERWALK WEST FINAL PHASE  
 SITE IMPROVEMENTS  
 TAFT STREET  
 PANTUCKET, RHODE ISLAND

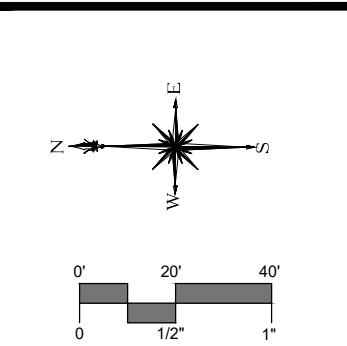
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SCALE: 1"=40'		
DATE: APRIL 15, 2026		
PROJECT NO: 15842.00001		
SHEET NO: 9 OF 20		
SHEET NAME: LS-1		



**PLANT SCHEDULE RIVER WALK**

CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	COMMENTS
<b>TREES</b>					
AS	6	Acer rubrum 'Red Sunset'	Red Sunset Maple	2.5"-3.0" Cal.	B&B
AA	4	Amelanchier arborea	Downy Serviceberry	1.5"-2.0" Cal.	B&B
AL	4	Amelanchier laevis	Allegheny Serviceberry	1.5"-2.0" Cal.	B&B
BP	5	Betula populifolia	Gray Birch	#20 cont.	
<b>GRASSES</b>					
CK	26	Calamagrostis acutiflora 'Karl Foerster'	Feather Reed Grass	#3	
PA	17	Pennisetum alopecuroides	Fountain Grass	#1 cont.	#1
PA2	69	Pennisetum alopecuroides 'Hameln'	Dwarf Fountain Grass	---	#3
<b>GROUNDCOVERS</b>					
AU	115	Arctostaphylos uva-ursi 'Massachusetts'	Massachusetts Kinnikinnick	#1 cont.	#1
LB	112	Liriope muscari 'Big Blue'	Big Blue Lilyturf	---	#1
<b>PERENNIALS</b>					
BS	22	Boltonia asteroides 'Snowbank'	Snowbank False Aster	#1 cont.	#1
CA2	49	Ceanothus americanus	New Jersey Tea	#1 cont.	#1
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**NOTE:**  
**PLANT SCHEDULE AND QUANTITIES ABOVE ARE FOR ENTIRE RIVERWALK**  
**SEE SHEET LS-1 FOR PLANTING NOTES**







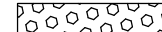




DESCRIPTION	DATE	BY
CRAC COMMENTS	2025-12-16	JRH
CONSTRUCTION DOCUMENTS	2026-02-27	JRH
UPDATED REVIEW SET	2026-03-27	JRH

**SITE PLAN - LANDSCAPING**  
**RIVERWALK WEST FINAL PHASE**  
**SITE IMPROVEMENTS**  
 TAFT STREET  
 PAWTUCKET, RHODE ISLAND  
**CONSTRUCTION DOCUMENTS - ISSUED FOR BID**

PJP	PJP	BK
DESIGNED	DRAWN	CHECKED
1"=40'		
DATE: APRIL 15, 2026		
PROJECT NO: 15842.00001		
SHEET NO: 10 OF 20		
<b>LS-2</b>		

**SOIL EROSION CONTROL LEGEND**

- DIVERSION RUNOFF CONVEYANCE MEASURE (SWALE AND/OR BERM) 
- TEMPORARY SEDIMENT TRAP 
- LIMIT OF DISTURBANCE (NO SEDIMENT CONTROL) 
- LIMIT OF DISTURBANCE (WITH SEDIMENT CONTROL) 
- SILT FENCE 
- INLET PROTECTION 
- CONSTRUCTION ENTRANCE (RIDOT STD 9.9.0) 
- EROSION CONTROL BLANKET 
- FINAL CONTOUR GRADE 






**1. SOIL EROSION AND SEDIMENT CONTROL NOTES:**

2. TEMPORARY WASTE STOCKPILE AREA (WSA): ALL SOIL STOCKPILES (CONTROLLED OR IMPORTED SOIL) MUST BE LOCATED WITHIN DESIGNATED WSA. CONTRACTOR FINAL SELECTION OF WSA PENDING ENGINEER APPROVAL.
3. LOCATE WSA ON STABLE SLOPE OUTSIDE OF FLOODPLAIN. ACTUAL LOCATION SHALL BE COORDINATED WITH THE OWNER/ENGINEER AND PLACED IN UPLAND/STABLE AREA.
4. ALL CONTROLLED MATERIALS SHALL BE STOCKPILED ONLY WITHIN WSA, INDIVIDUAL TEMPORARY WASTE STOCKPILES SHALL NOT BE PLACED OUTSIDE OF THIS AREA.
5. ALL SOIL EROSION AND SEDIMENT CONTROLS (SESC) TO BE COORDINATED WITH ACTIVE REMEDIAL ACTIVITIES IN ACCORDANCE WITH THE RIDEM APPROVED REMEDIAL ACTION WORK PLAN (RAWP, MARCH 2022), RAWP ADDENDUM (AUGUST 2022), AND THE RIDEM REMEDIAL APPROVAL LETTER DATED SEPTEMBER 14, 2022. AFTER REMEDIAL ACTIVITIES ARE COMPLETE, THAT PORTION OF THE SITE IS TO BE LEFT WITH 6" OF STONE OR APPROVED STABILIZED, NON-ERODIBLE, SURFACE. CONTRACTOR TO MAINTAIN THIS SURFACE THROUGHOUT CONSTRUCTION. REFER TO PLANS AND SPECIFICATIONS BY SLR CONSULTING AS PART OF THE "FORMER TIDEWATER FACILITY REMEDIAL ACTIVITIES" PERMIT. CONTRACTOR TO UPDATE EXISTING SESC PLAN AS NEEDED TO INCORPORATE ANY ADDITIONAL CONTROLS TO CONSTRUCT THE PROPOSED DEVELOPMENT.
6. THE CONTRACTOR IS RESPONSIBLE FOR ALL SOIL EROSION AND SEDIMENT CONTROL ON SITE WHICH MUST BE CONSTRUCTED AND MAINTAINED IN ACCORDANCE WITH THE APPLICABLE REGULATIONS AND AUTHORITY HAVING JURISDICTION. THE CONTRACTOR MUST NOTIFY THE DESIGN ENGINEER, THE TOWN ENGINEER, AND THE RI COASTAL RESOURCES MANAGEMENT COUNCIL AT LEAST 48 HOURS PRIOR TO THE START OF CONSTRUCTION.
7. ALL EROSION CONTROLS INCLUDING (BUT NOT LIMITED TO) TEMPORARY SWALES, CONSTRUCTION ENTRANCES, PERIMETER SILT FENCE & TEMPORARY SEDIMENT TRAPS, MUST BE INSTALLED PER THE LATEST EDITION OF THE RHODE ISLAND SOIL EROSION AND SEDIMENT CONTROL (RISESC) HANDBOOK AND THE SOIL EROSION AND SEDIMENT CONTROL PLANS. NOTE THE SOIL EROSION AND SEDIMENT CONTROL SHOWN ON THESE PLANS ARE THE MINIMUM QUANTITY/TYPE OF EROSION CONTROL DEVICES AND MATERIALS DEEMED REQUIRED BY SLR CONSULTING TO MEET THE OBJECTIVES OF THE RISESC HANDBOOK, BUT IS CONSIDERED A GUIDE ONLY. ADDITIONAL MEASURES/ALTERNATE CONFIGURATIONS MAY BE REQUIRED IN ORDER TO MEET THE RISESC HANDBOOK BASED ON FACTORS INCLUDING (BUT NOT LIMITED TO) SITE PARAMETERS, WEATHER, INSPECTIONS AND UNIQUE FEATURES. THE SESC WILL CONTINUE TO EVOLVE THROUGHOUT CONSTRUCTION/PHASES. PURSUANT TO NOTE 1 ABOVE, SESC REMAINS THE RESPONSIBILITY OF THE CONTRACTOR UNTIL THE SITE IS FULLY STABILIZED AND/OR SESC RESPONSIBILITIES ARE ASSUMED BY THE OWNER IN WRITING.

8. SILT FENCE SHOWN ON THIS PLAN IS INTENDED FOR PERIMETER EROSION ONLY, NOT FOR FULL CONSTRUCTION SEDIMENT LOAD. INTERIOR EROSION CONTROLS TO BE INSTALLED AND MAINTAINED AS NECESSARY IN ACCORDANCE WITH THE APPROVED SESC PLANS BY SLR CONSULTING.
9. TEMPORARY SWALES MUST BE USED TO CONTROL RUNOFF DURING CONSTRUCTION OF THE PROPOSED SITE WORK. EROSION CONTROL MATS MUST BE INSTALLED, IF NECESSARY, TO PREVENT EROSION AND SUPPORT VEGETATION. AFTER CONSTRUCTION IS COMPLETE AND TRIBUTARY AREAS TO THE SWALES HAVE BEEN STABILIZED, THE TEMPORARY SWALES MUST BE CLEARED AND BROUGHT TO FINAL GRADE PER THE DESIGN PLANS.
10. CONTRACTOR MAY MODIFY SEQUENCE OF CONSTRUCTION WITH APPROVAL FROM DESIGN ENGINEER AND OWNER.

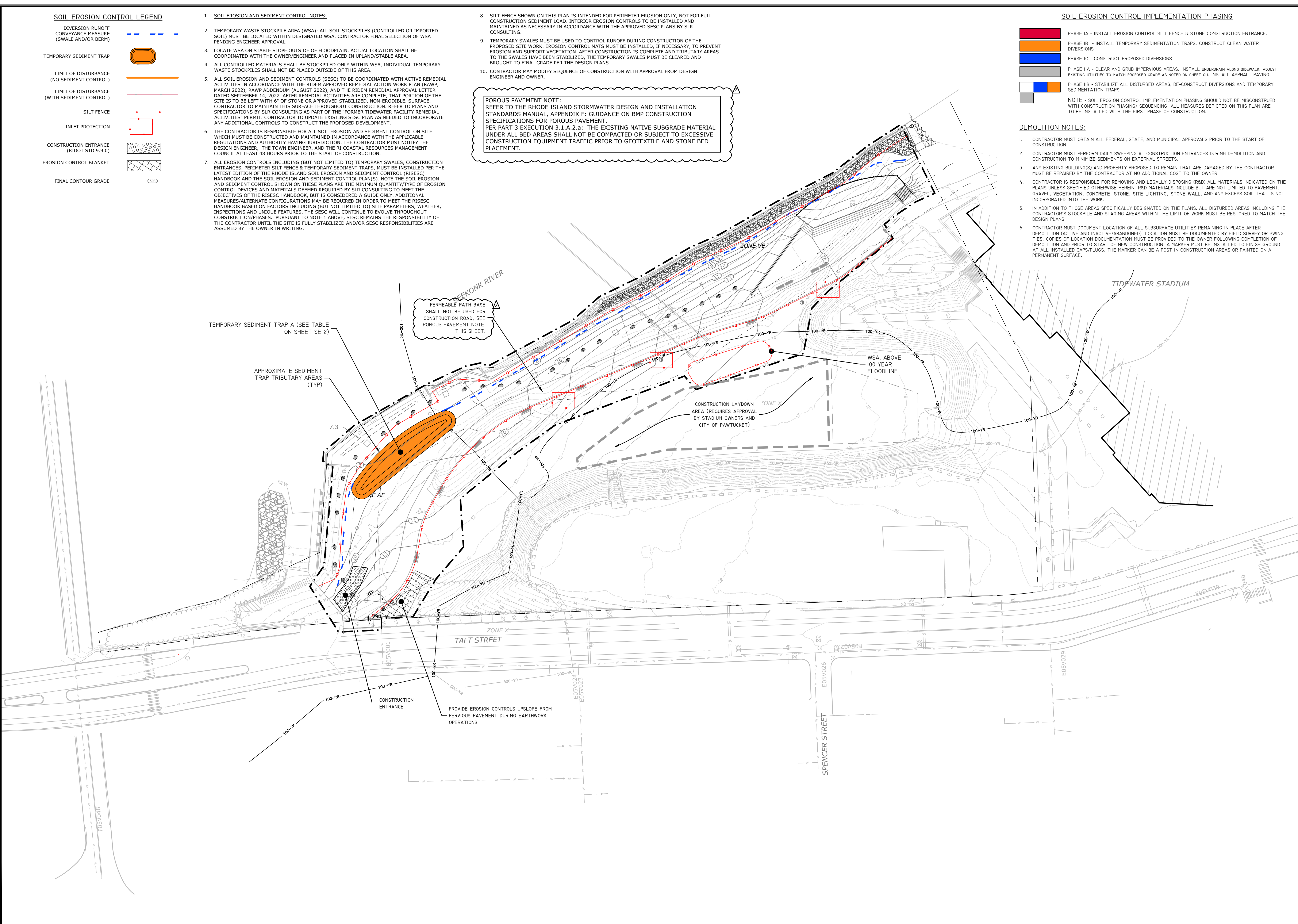
**POROUS PAVEMENT NOTE:**  
 REFER TO THE RHODE ISLAND STORMWATER DESIGN AND INSTALLATION STANDARDS MANUAL, APPENDIX F: GUIDANCE ON BMP CONSTRUCTION SPECIFICATIONS FOR POROUS PAVEMENT.  
 PER PART 3 EXECUTION 3.1.A.2.b: THE EXISTING NATIVE SUBGRADE MATERIAL UNDER ALL BED AREAS SHALL NOT BE COMPACTED OR SUBJECT TO EXCESSIVE CONSTRUCTION EQUIPMENT TRAFFIC PRIOR TO GEOTEXTILE AND STONE BED PLACEMENT.

**SOIL EROSION CONTROL IMPLEMENTATION PHASING**

-  PHASE IA - INSTALL EROSION CONTROL SILT FENCE & STONE CONSTRUCTION ENTRANCE.
  -  PHASE IB - INSTALL TEMPORARY SEDIMENTATION TRAPS. CONSTRUCT CLEAN WATER DIVERSIONS.
  -  PHASE IC - CONSTRUCT PROPOSED DIVERSIONS.
  -  PHASE IIA - CLEAR AND GRUB IMPERVIOUS AREAS. INSTALL UNDERDRAIN ALONG SIDEWALK. ADJUST EXISTING UTILITIES TO MATCH PROPOSED GRADE AS NOTED ON SHEET GJ. INSTALL ASPHALT PAVING.
  -  PHASE IIB - STABILIZE ALL DISTURBED AREAS. DE-CONSTRUCT DIVERSIONS AND TEMPORARY SEDIMENTATION TRAPS.
- NOTE - SOIL EROSION CONTROL IMPLEMENTATION PHASING SHOULD NOT BE MISCONSTRUED WITH CONSTRUCTION PHASING/ SEQUENCING. ALL MEASURES DEPICTED ON THIS PLAN ARE TO BE INSTALLED WITH THE FIRST PHASE OF CONSTRUCTION.

**DEMOLITION NOTES:**

1. CONTRACTOR MUST OBTAIN ALL FEDERAL, STATE, AND MUNICIPAL APPROVALS PRIOR TO THE START OF CONSTRUCTION.
2. CONTRACTOR MUST PERFORM DAILY SWEEPING AT CONSTRUCTION ENTRANCES DURING DEMOLITION AND CONSTRUCTION TO MINIMIZE SEDIMENTS ON EXTERNAL STREETS.
3. ANY EXISTING BUILDING(S) AND PROPERTY PROPOSED TO REMAIN THAT ARE DAMAGED BY THE CONTRACTOR MUST BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
4. CONTRACTOR IS RESPONSIBLE FOR REMOVING AND LEGALLY DISPOSING (R&D) ALL MATERIALS INDICATED ON THE PLANS UNLESS SPECIFIED OTHERWISE HEREIN. R&D MATERIALS INCLUDE BUT ARE NOT LIMITED TO PAVEMENT, GRAVEL, VEGETATION, CONCRETE, STONE, SITE LIGHTING, STONE WALL, AND ANY EXCESS SOIL THAT IS NOT INCORPORATED INTO THE WORK.
5. IN ADDITION TO THOSE AREAS SPECIFICALLY DESIGNATED ON THE PLANS, ALL DISTURBED AREAS INCLUDING THE CONTRACTOR'S STOCKPILE AND STAGING AREAS WITHIN THE LIMIT OF WORK MUST BE RESTORED TO MATCH THE DESIGN PLANS.
6. CONTRACTOR MUST DOCUMENT LOCATION OF ALL SUBSURFACE UTILITIES REMAINING IN PLACE AFTER DEMOLITION (ACTIVE AND INACTIVE/ABANDONED). LOCATION MUST BE DOCUMENTED BY FIELD SURVEY OR SWING TIES. COPIES OF LOCATION DOCUMENTATION MUST BE PROVIDED TO THE OWNER FOLLOWING COMPLETION OF DEMOLITION AND PRIOR TO START OF NEW CONSTRUCTION. A MARKER MUST BE INSTALLED TO FINISH GROUND AT ALL INSTALLED CAPS/PLUGS. THE MARKER CAN BE A POST IN CONSTRUCTION AREAS OR PAINTED ON A PERMANENT SURFACE.



N  
 0' 20' 40'  
 1" = 40'

TODD D. RITCHIE  
 No. 14720  
 REGISTERED PROFESSIONAL ENGINEER  
 CIVIL

**SLR**  
 99 REGENCY DRIVE  
 SUITE 100  
 PAWTUCKET, RI 02861  
 401.283.2717  
 SLRCONSULTING.COM

DESCRIPTION	DATE	BY
CONSTRUCTION DOCUMENTS	2026-02-27	JRH
ADDENDUM 02	MAY 11, 2026	SRS

SITE PLAN - SEDIMENT AND EROSION CONTROL  
 RIVERWALK WEST FINAL PHASE  
 SITE IMPROVEMENTS  
 TAFT STREET  
 PAWTUCKET, RHODE ISLAND  
 CONSTRUCTION DOCUMENTS - ISSUED FOR BID

DESIGNED	DRAWN	CHECKED
SCALE 1"=40'		
DATE APRIL 15, 2026		
PROJECT NO. 15842.00001		
SHEET NO. 11 OF 20		
<b>SE-1</b>		

**GENERAL:**

THESE GUIDELINES SHALL APPLY TO ALL WORK CONSISTING OF ANY AND ALL TEMPORARY AND/OR PERMANENT MEASURES TO CONTROL WATER POLLUTION AND SOIL EROSION, AS MAY BE REQUIRED, DURING THE CONSTRUCTION OF THE PROJECT.

IN GENERAL, ALL CONSTRUCTION ACTIVITIES SHALL PROCEED IN SUCH A MANNER SO AS NOT TO POLLUTE ANY WETLANDS, WATERCOURSE, WATER BODY, AND CONDUIT CARRYING WATER, ETC. THE CONTRACTOR SHALL LIMIT, INsofar AS POSSIBLE, THE SURFACE AREA OF EARTH MATERIALS EXPOSED BY CONSTRUCTION METHODS AND IMMEDIATELY PROVIDE PERMANENT AND TEMPORARY POLLUTION CONTROL MEASURES TO PREVENT CONTAMINATION OF ADJACENT WETLANDS, WATERCOURSES, AND WATER BODIES, AND TO PREVENT, INsofar AS POSSIBLE, EROSION ON THE SITE.

**LAND GRADING:**

THE RESHAPING OF THE GROUND SURFACE BY EXCAVATION AND FILLING OR A COMBINATION OF BOTH, TO OBTAIN PLANNED GRADES, SHALL PROCEED IN ACCORDANCE WITH THE FOLLOWING CRITERIA:

- a. THE CUT FACE OF EARTH EXCAVATION SHALL NOT BE STEEPER THAN TWO HORIZONTAL TO ONE VERTICAL (2:1).
- b. THE PERMANENT EXPOSED FACES OF FILLS SHALL NOT BE STEEPER THAN TWO HORIZONTAL TO ONE VERTICAL (2:1:2).
- c. THE CUT FACE OF ROCK EXCAVATION SHALL NOT BE STEEPER THAN ONE HORIZONTAL TO TWO VERTICAL (1:2).
- d. PROVISION SHOULD BE MADE TO CONDUCT SURFACE WATER SAFELY TO STORM DRAINS TO PREVENT SURFACE RUNOFF FROM DAMAGING CUT FACES AND FILL SLOPES.
- e. NO FILL SHOULD BE PLACED WHERE IT WILL SLIDE OR WASH UPON THE INTO ADJACENT WETLANDS, WATERCOURSES, OR WATER BODIES.
- f. PRIOR TO ANY RE-GRADING, A STABILIZED CONSTRUCTION ENTRANCE SHALL BE PLACED AT THE ENTRANCE TO THE WORK AREA IN ORDER TO REDUCE MUD AND OTHER SEDIMENTS FROM LEAVING THE SITE.

**SOIL PREPARATION:**

EXCAVATED LOAM AND FOREST LOAM FROM THE TRAIL EXCAVATION SHALL BE USED IN PLACE OF IMPORTED TOPSOIL. NO TOPSOIL SHALL BE IMPORTED FOR THE PROJECT. LOAM SHALL BE SPREAD OVER ALL EXPOSED AREAS IN ORDER TO PROVIDE A SOIL MEDIUM HAVING FAVORABLE CHARACTERISTICS FOR THE ESTABLISHMENT, GROWTH, AND MAINTENANCE OF VEGETATION.

UPON ATTAINING FINAL SUBGRADES, SCARIFY SURFACE TO PROVIDE A GOOD BOND WITH LOAM.

REMOVE ALL LARGE STONES, TREE LIMBS, ROOTS AND CONSTRUCTION DEBRIS.

APPLY LIME ACCORDING TO SOIL TEST OR AT THE RATE OF TWO (2) TONS PER ACRE.

**MATERIAL:**

1. LOAM SHOULD HAVE PHYSICAL, CHEMICAL, AND BIOLOGICAL CHARACTERISTICS FAVORABLE TO THE GROWTH OF PLANTS.

2. LOAM SHOULD BE RELATIVELY FREE OF SUBSOIL MATERIAL AND MUST BE FREE OF STONES (OVER 1" IN DIAMETER), LUMPS OF SOIL, ROOTS, TREE LIMBS, TRASH, OR CONSTRUCTION DEBRIS. IT SHOULD BE FREE OF ROOTS OR RHIZOMES SUCH AS THISTLE, NUTGRASS, AND QUACKGRASS.

3. AN ORGANIC MATTER CONTENT OF SIX PERCENT (6%) IS REQUIRED. AVOID LIGHT COLORED SUBSOIL MATERIAL.

4. SOLUBLE SALT CONTENT OF OVER 500 PARTS PER MILLION (PPM) IS LESS SUITABLE. AVOID TIDAL MARSH SOILS BECAUSE OF HIGH SALT CONTENT AND SULFUR ACIDITY.

5. THE pH SHOULD BE MORE THAN 6.0. IF LESS, ADD LIME TO INCREASE pH TO AN ACCEPTABLE LEVEL.

**APPLICATION:**

- 1. AVOID SPREADING WHEN LOAM IS WET OR FROZEN.
- 2. SPREAD LOAM UNIFORMLY TO A DEPTH OF AT LEAST SIX INCHES (6"), OR TO THE DEPTH SHOWN ON THE LANDSCAPING PLANS.

**TEMPORARY VEGETATIVE COVER:**

**TEMPORARY VEGETATIVE COVER SHALL BE ESTABLISHED ON ALL UNPROTECTED AREAS THAT PRODUCE SEDIMENT. AREAS WHERE FINAL GRADING HAS BEEN COMPLETED, AND AREAS WHERE THE ESTIMATED PERIOD OF BARE SOIL EXPOSURE IS LESS THAN 6 MONTHS. TEMPORARY VEGETATIVE COVER SHALL BE APPLIED IF AREAS WILL NOT BE PERMANENTLY SEEDED BY SEPTEMBER 1.**

**ESTABLISHMENT:**

- 1. SELECT APPROPRIATE SPECIES FOR THE SITUATION. NOTE RATES AND SEEDING DATES (SEE VEGETATIVE COVER SELECTION & MULCHING SPECIFICATION BELOW).
- 2. APPLY SEED UNIFORMLY ACCORDING TO THE RATE INDICATED BY BROADCASTING, DRILLING, OR HYDRAULIC APPLICATION.
- 3. UNLESS HYDROSEEDING, COVER RYEGRASS SEEDS WITH NOT MORE THAN 1/4" INCH OF SOIL USING SUITABLE EQUIPMENT.

**EROSION CHECKS**

**GENERAL:**

TEMPORARY PERVIOUS BARRIERS USING COMPOST FILTER TUBES, SHALL BE INSTALLED AND MAINTAINED AS REQUIRED TO CHECK EROSION AND REDUCE SEDIMENTATION.

**CONSTRUCTION:**

COMPOST FILTER TUBES SHALL BE INSTALLED AND MAINTAINED PER THE MANUFACTURER'S SPECIFICATIONS.

**VEGETATIVE COVER SELECTION & MULCHING**

**TEMPORARY VEGETATIVE COVER:**

PERENNIAL RYEGRASS 3 LBS./1,000 SQ.FT. (10LUIUM PERENNE)

**PERMANENT VEGETATIVE COVER:**

- 1. SEE SITE PLAN AND SPECIFICATIONS FOR PERMANENT SEED MIX.
- 2. MULCHING: STRAW AT 70-90 LBS./1,000 SQ.FT. (TEMPORARY VEGETATIVE AREAS) WOOD FIBER IN HYDROMULCH SLURRY 25-50 LBS./1,000 SQ. FT.

**ESTABLISHMENT:**

- 1. SMOOTH AND FIRM SEEDBED WITH CULTIPACKER OR OTHER SIMILAR EQUIPMENT PRIOR TO SEEDING (EXCEPT WHEN HYDROSEEDING).
- 2. SELECT ADAPTED SEED MIXTURE FOR THE SPECIFIC SITUATION. NOTE RATES AND THE SEEDING DATES (SEE VEGETATIVE COVER SELECTION & MULCHING SPEC. BELOW).
- 3. APPLY SEED UNIFORMLY ACCORDING TO RATE INDICATED, BY BROADCASTING, DRILLING, OR HYDRAULIC APPLICATION.
- 4. COVER GRASS AND LEGUME SEED WITH NOT MORE THAN 1/4" INCH OF SOIL WITH SUITABLE EQUIPMENT (EXCEPT WHEN HYDROSEEDING).
- 5. MULCH IMMEDIATELY AFTER SEEDING, IF REQUIRED, ACCORDING TO TEMPORARY MULCHING SPECIFICATIONS. (SEE VEGETATIVE COVER SELECTION & MULCHING SPECIFICATION BELOW).
- 6. USE PROPER INOCULANT ON ALL LEGUME SEEDINGS, USE FOUR (4) TIMES NORMAL RATES WHEN HYDROSEEDING.
- 7. USE SOD WHERE THERE IS A HEAVY CONCENTRATION OF WATER AND IN CRITICAL AREAS WHERE IT IS IMPORTANT TO GET A QUICK VEGETATIVE COVER TO PREVENT EROSION.

**PERMANENT VEGETATIVE COVER**

PERMANENT VEGETATIVE COVER SHALL BE ESTABLISHED AS VARIOUS SECTIONS OF THE PROJECT ARE COMPLETED IN ORDER TO STABILIZE THE SOIL, REDUCE DOWNSTREAM DAMAGE FROM SEDIMENT AND RUNOFF, AND TO ENHANCE THE AESTHETIC NATURE OF THE SITE. IT WILL BE APPLIED TO ALL CONSTRUCTION AREAS SUBJECT TO EROSION WHERE FINAL GRADING HAS BEEN COMPLETED AND A PERMANENT COVER IS NEEDED.

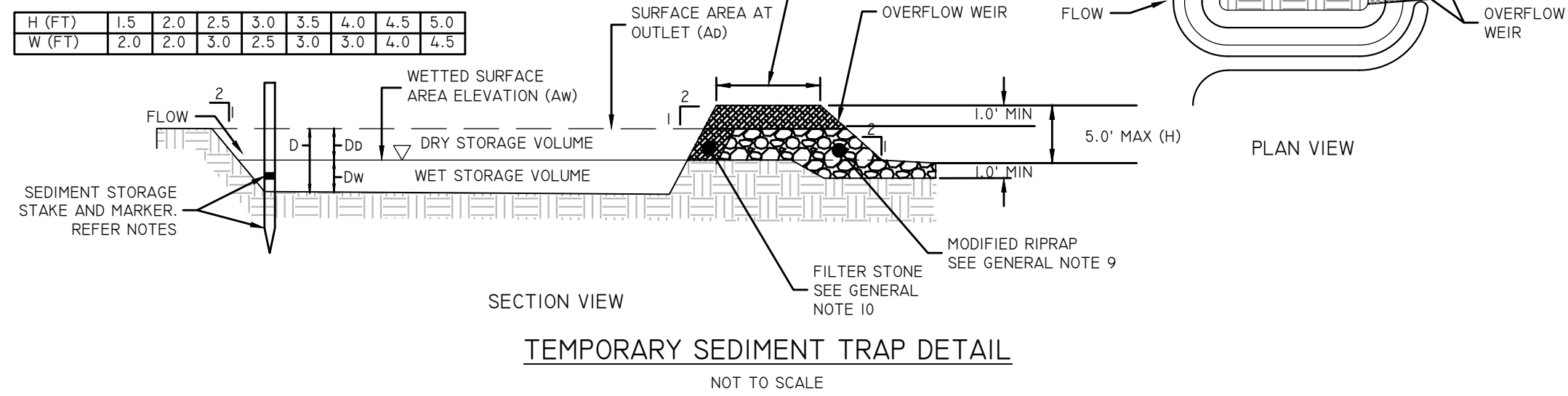
**GENERAL NOTES:**

- 1. THE TEMPORARY SEDIMENT TRAP SHALL MEET ALL REQUIREMENTS FOR TEMPORARY SEDIMENT TRAPS OUTLINED IN THE RHODE ISLAND SOIL EROSION AND SEDIMENT CONTROL HANDBOOK (LATEST REVISION) SECTION SIX: SEDIMENT CONTROL MEASURES
- 2. THE TEMPORARY SEDIMENT TRAP MUST PROVIDE A STORAGE VOLUME FOR ONE INCH OF RUNOFF FROM THE CONTRIBUTING AREA. HALF OF THE STORAGE MUST BE PROVIDED IN THE FORM OF WET STORAGE. SEE DETAIL BELOW SECTION 6 OF THE RISESCH.
- 3. ALL CUT AND FILL SLOPES MUST BE 2:1 OR FLATTER EXCEPT FOR THE EXCAVATED WET STORAGE AREA WHERE SLOPES MUST NOT EXCEED 1.5:1.
- 4. THE OUTLET MUST BE LOCATED AT THE MOST DISTANT HYDRAULIC POINT FROM THE INLET.
- 5. THE OUTLET CONSISTS OF A PERVIOUS STONE DIKE WITH A CORE OF MODIFIED RIPRAP AND FACED ON THE UPSTREAM SIDE WITH STONE.
- 6. TEMPORARY SEDIMENT TRAPS MUST OUTLET ONTO STABILIZED GROUND.
- 7. MAXIMUM HEIGHT OF A TEMPORARY SEDIMENT TRAP EMBANKMENT IS LIMITED TO 5 FEET (BOTTOM OF DRY STORAGE TO TOP OF EMBANKMENT). TOTAL EMBANKMENT HEIGHT MUST NOT EXCEED 6 FEET (BOTTOM OF WET STORAGE TO TOP OF EMBANKMENT).
- 8. SIDE SLOPES OF THE EMBANKMENT MUST BE 2:1 OR FLATTER.
- 9. MODIFIED RIPRAP: SHALL MEET THE REQUIREMENTS OF RIDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION SUBSECTION M.10.03.2.
- 10. FILTER STONE: SHALL MEET THE REQUIREMENTS OF RIDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION SUBSECTION M.01.03 TABLE I, COLUMN V FILTER STONE.

SEDIMENT TRAP DIMENSIONS*	TRAP A
TRIBUTARY DRAINAGE AREA	2.11 AC
WET STORAGE DEPTH (Dw)	2.5 FT
DRY STORAGE DEPTH (Dd)	2.0 FT
TOTAL DEPTH (D)	4.5 FT
BOTTOM OF TRAP AREA (Ab)	790 SQ.FT
WETTED SURFACE AREA (Aw)	1,970 SQ.FT
SURFACE AREA AT OUTLET (Ad)	3,030 SQ.FT

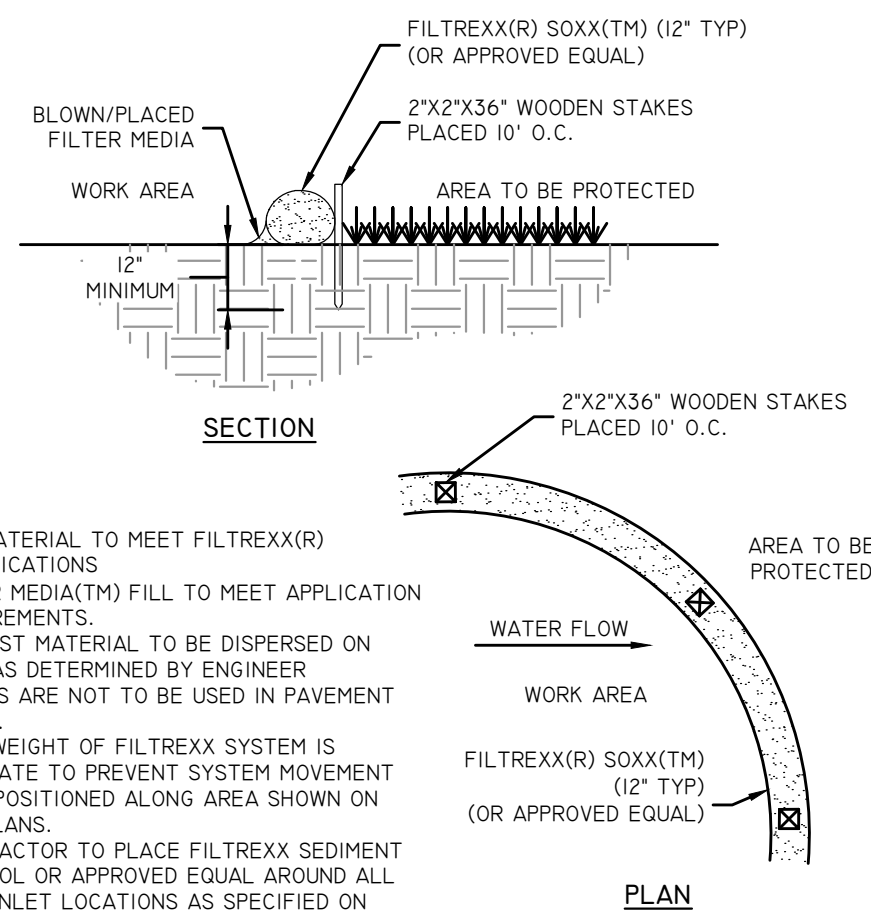
\*TRAP DIMENSIONS REPRESENT MINIMUM REQUIRED SIZING TO MEET THE RISESCH. CONTRACTOR MAY SHAPE TRAP DIFFERENTLY THAN SHOWN ON PLANS AS LONG AS THE MINIMUM SIZING HAS BEEN PROVIDED.

MINIMUM TOP WIDTH VS HEIGHT	
H (FT)	W (FT)
1.5	2.0
2.0	2.0
2.5	3.0
3.0	2.5
3.5	3.0
4.0	3.0
4.5	4.0
5.0	4.5



TEMPORARY SEDIMENT TRAP DETAIL

NOT TO SCALE



**NOTES:**

- 1. ALL MATERIAL TO MEET FILTRREX(R) SPECIFICATIONS
- 2. FILTER MEDIA(TM) FILL TO MEET APPLICATION REQUIREMENTS.
- 3. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER
- 4. STAKES ARE NOT TO BE USED IN PAVEMENT AREAS.
- 5. SELF WEIGHT OF FILTRREX SYSTEM IS ADEQUATE TO PREVENT SYSTEM MOVEMENT ONCE POSITIONED ALONG AREA SHOWN ON THE PLANS.
- 6. CONTRACTOR TO PLACE FILTRREX SEDIMENT CONTROL OR APPROVED EQUAL AROUND ALL CURB INLET LOCATIONS AS SPECIFIED ON PLANS.

FILTRREX SEDIMENT CONTROL (OR APPROVED EQUAL)

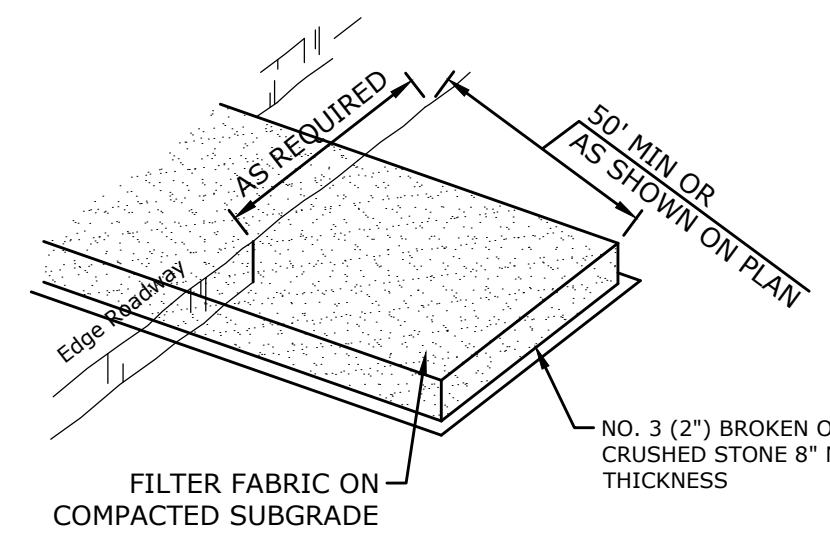
NOT TO SCALE

**INSPECTION, MAINTENANCE, AND REMOVAL REQUIREMENTS:**

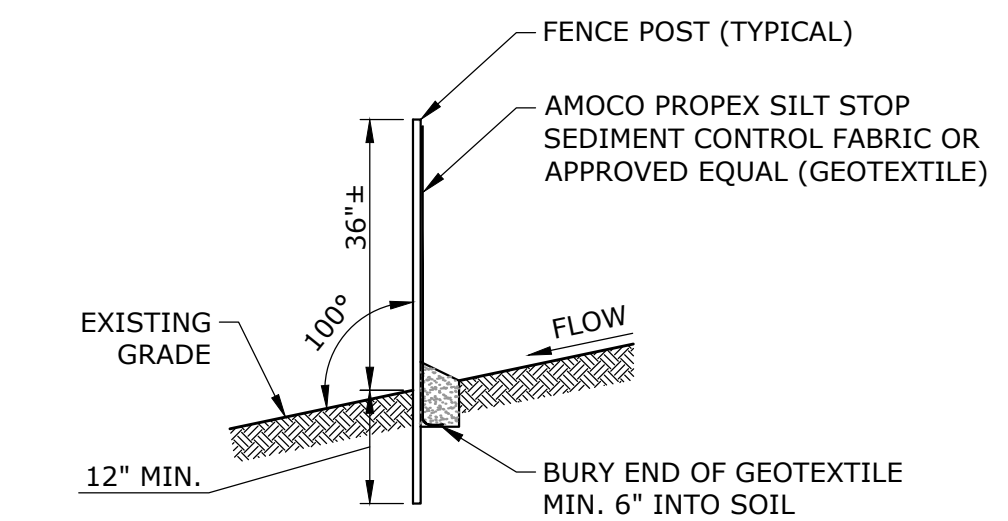
- 1. INSTALL "SEDIMENT STORAGE" STAKE WITH A MARKER AT ONE HALF OF THE WET STORAGE VOLUME.
- 2. INSPECT THE TEMPORARY SEDIMENT TRAP AT LEAST ONCE A WEEK AND WITHIN 24 HOURS OF THE END OF A STORM WITH A RAINFALL AMOUNT OF 0.25 INCH OR GREATER.
- 3. CHECK THE OUTLET TO ENSURE THAT IT IS STRUCTURALLY SOUND AND HAS NOT BEEN DAMAGED BY EROSION OR CONSTRUCTION EQUIPMENT.
- 4. CHECK FOR SEDIMENT ACCUMULATION AND FILTRATION PERFORMANCE.
- 5. WHEN SEDIMENTS HAVE ACCUMULATED TO ONE HALF THE MINIMUM REQUIRED VOLUME OF THE WET STORAGE, DEWATER THE TRAP AS NEEDED, REMOVE SEDIMENTS AND RESTORE THE TRAP TO ITS ORIGINAL DIMENSIONS.
- 6. DISPOSE OF THE SEDIMENT REMOVED FROM THE BASIN IN A SUITABLE AREA AS DESIGNATED BY THE GEOTECHNICAL ENGINEER.
- 7. THE TEMPORARY SEDIMENT TRAP MAY BE REMOVED AFTER THE CONTRIBUTING DRAINAGE AREA IS STABILIZED.

**INSTALLATION NOTES:**

- 1. CLEAR, GRUB AND STRIP ANY VEGETATION AND ROOT MAT FROM ANY PROPOSED EMBANKMENT AND OUTLET AREA.
- 2. REMOVE STONES AND ROCKS WHOSE DIAMETER IS GREATER THAN THREE (3) INCHES AND OTHER DEBRIS.
- 3. EXCAVATE WET STORAGE AND CONSTRUCT THE EMBANKMENT AND/OR OUTLET AS NEEDED TO ATTAIN THE NECESSARY STORAGE REQUIREMENTS.
- 4. USE ONLY FILL MATERIAL FOR THE EMBANKMENT THAT IS FREE FROM EXCESSIVE ORGANICS, DEBRIS, LARGE ROCKS (OVER SIX (6) INCHES) OR OTHER UNSUITABLE MATERIALS. COMPACT THE EMBANKMENT IN 9-INCH LAYERS BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED
- 5. STABILIZE THE EARTHEN EMBANKMENT USING ANY OF THE FOLLOWING MEASURES: SEEDING FOR TEMPORARY VEGETATION COVER; SEEDING FOR PERMANENT VEGETATIVE COVER; OR SLOPE PROTECTION, IMMEDIATELY AFTER INSTALLATION



NOTE: CONSTRUCTION ENTRANCE PAD SHALL BE INSTALLED AND MAINTAINED DURING OPERATIONS WHICH PROMOTE VEHICULAR TRACKING OF MUD

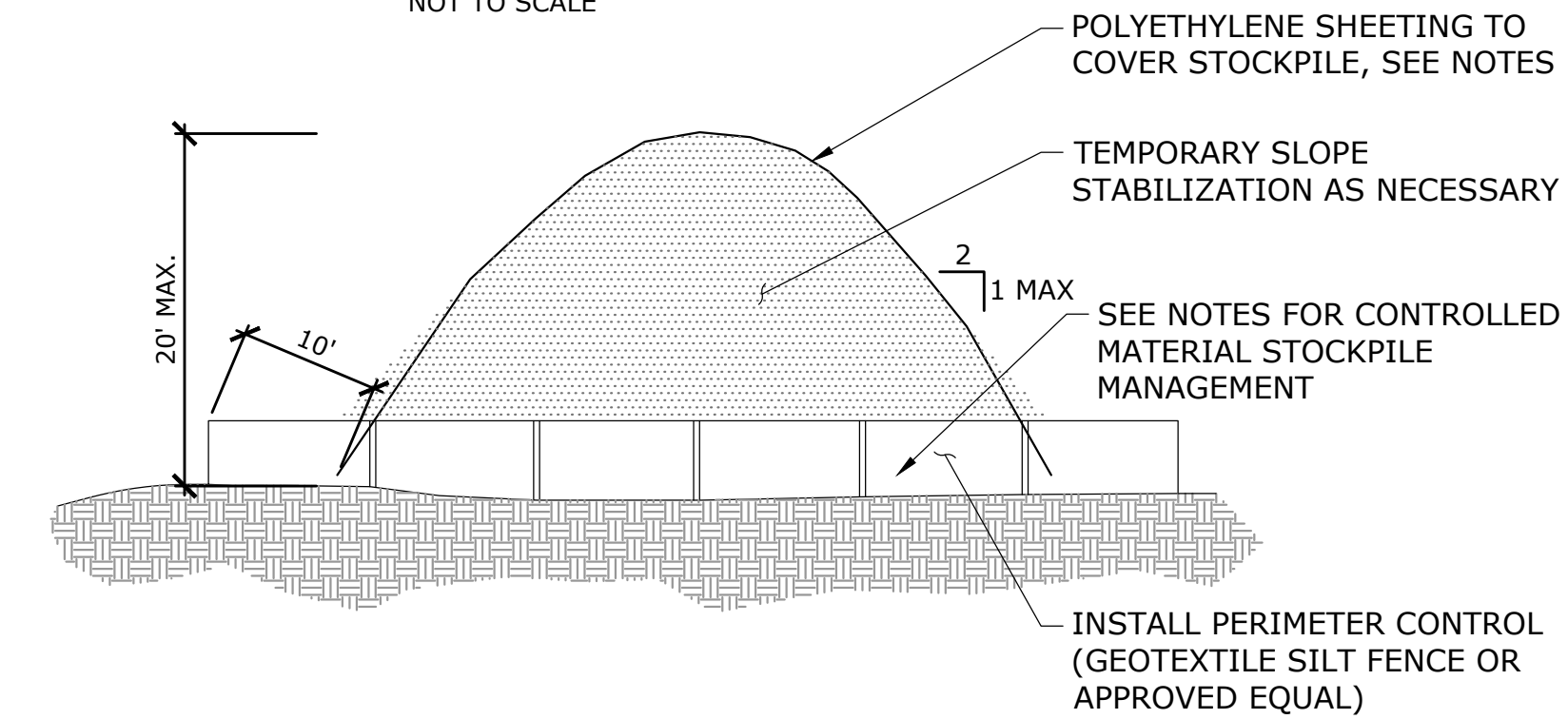


CE CONSTRUCTION ENTRANCE PAD

NOT TO SCALE

SF SEDIMENT FILTER FENCE

NOT TO SCALE

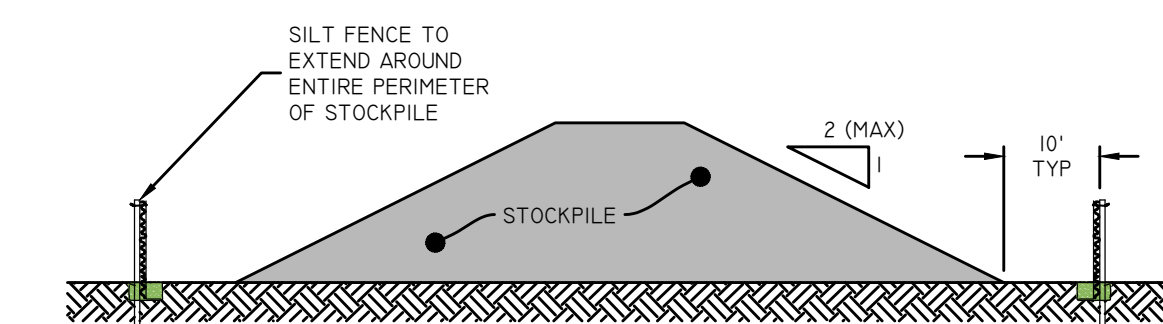


**NOTES:**

- 1. PLACE STOCKPILE ON POLY SHEETING (MIN. 10 MIL), FROM THE RIDEM APPROVAL LETTER (REQUIRES STOCKPILES TO BE UNDERLAIN AND COVERED)
- 2. COVER STOCKPILE WITH POLY SHEETING; SECURE DAILY
- 3. INSTALL APPROPRIATE EROSION & SEDIMENT CONTROLS (IN THE RIDEM APPROVAL, SEE GENERAL S&E NOTES)
- 4. LOCATE STOCKPILES IN A WAY THAT LIMITS UNAUTHORIZED ACCESS
- 5. MAX PILE SIZE: ~100 CY, MAX TOTAL FOR WSA 500 CY; MAX ONSITE STORAGE: 30 DAYS (IN THE SMP WITHIN THE RAWP)
- 6. PROVIDE SECONDARY CONTAINMENT IF LEACHING IS OBSERVED (PER RIDEM APPROVAL LETTER, USE LEAK-PROOF CONTAINER OR SECONDARY CONTAINMENT IF NEEDED)
- 7. CLEAN FILL MUST ALSO BE ON & UNDER POLY (IMPORTED CLEAN FILL MUST BE PLACED ON POLY OR FINISHED IMPERVIOUS SURFACE PER RAWP)
- 8. STOCKPILES MUST BE LOCATED WITHIN THE DESIGNATED WSA AND OUTSIDE THE FLOODPLAIN (PER RIDEM APPROVAL LETTER)
- 9. STOCKPILES MUST STAY WITHIN THE DESIGNATED ONSITE WSA ( ALL STOCKPILES MUST BE LOCATED WITHIN THE DESIGNATED WSA, PER THE RAWP). DAILY STOCKPILING IS ACCEPTABLE ALONG TRENCHES BUT SHALL BE TRANSFERRED BACK IN THE TRENCH AT THE END OF THE DAY OR TRANSPORTED TO THE WSA.)

TEMPORARY SOIL STOCKPILE - CONTROLLED SOILS (STK)

NOT TO SCALE

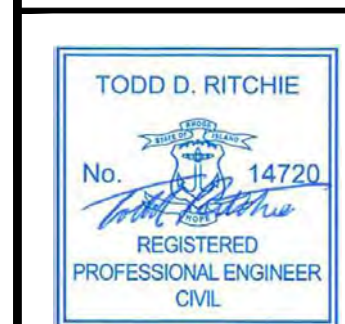


**NOTES:**

- 1. ALL STOCKPILES MUST BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH SECTION 3 "STOCKPILE AND STAGING AREA MANAGEMENT" OF THE RHODE ISLAND SOIL EROSION AND SEDIMENT CONTROL HANDBOOK (CURRENT EDITION).
- 2. DIVERT ALL STORMWATER AWAY FROM STOCKPILES.
- 3. SOIL STOCKPILES THAT ARE NOT TO BE USED WITHIN 30 DAYS MUST BE SEEDED AND MULCHED IMMEDIATELY AFTER FORMATION OF THE STOCKPILE WITH SEED MIX COMPATIBLE WITH THE SOIL TYPE.
- 4. STOCKPILE AND SILT FENCE MUST BE INSPECTED AT LEAST ONCE PER WEEK AND AFTER RAIN EVENTS IN EXCESS OF 4" OF RAINFALL. REPAIR/REPLACE SILT FENCE (AND STOCKPILE COVERS WHERE APPLICABLE) AS NEEDED TO KEEP THEM FUNCTIONING ADEQUATELY.
- 5. SEDIMENT TRAPPED BY SILT FENCES MUST BE REMOVED AND PROPERLY DISPOSED OF WHENEVER SIGNIFICANT ACCUMULATION OCCURS.

STOCKPILE PROTECTION (NON-CONTROLLED)-STK-N

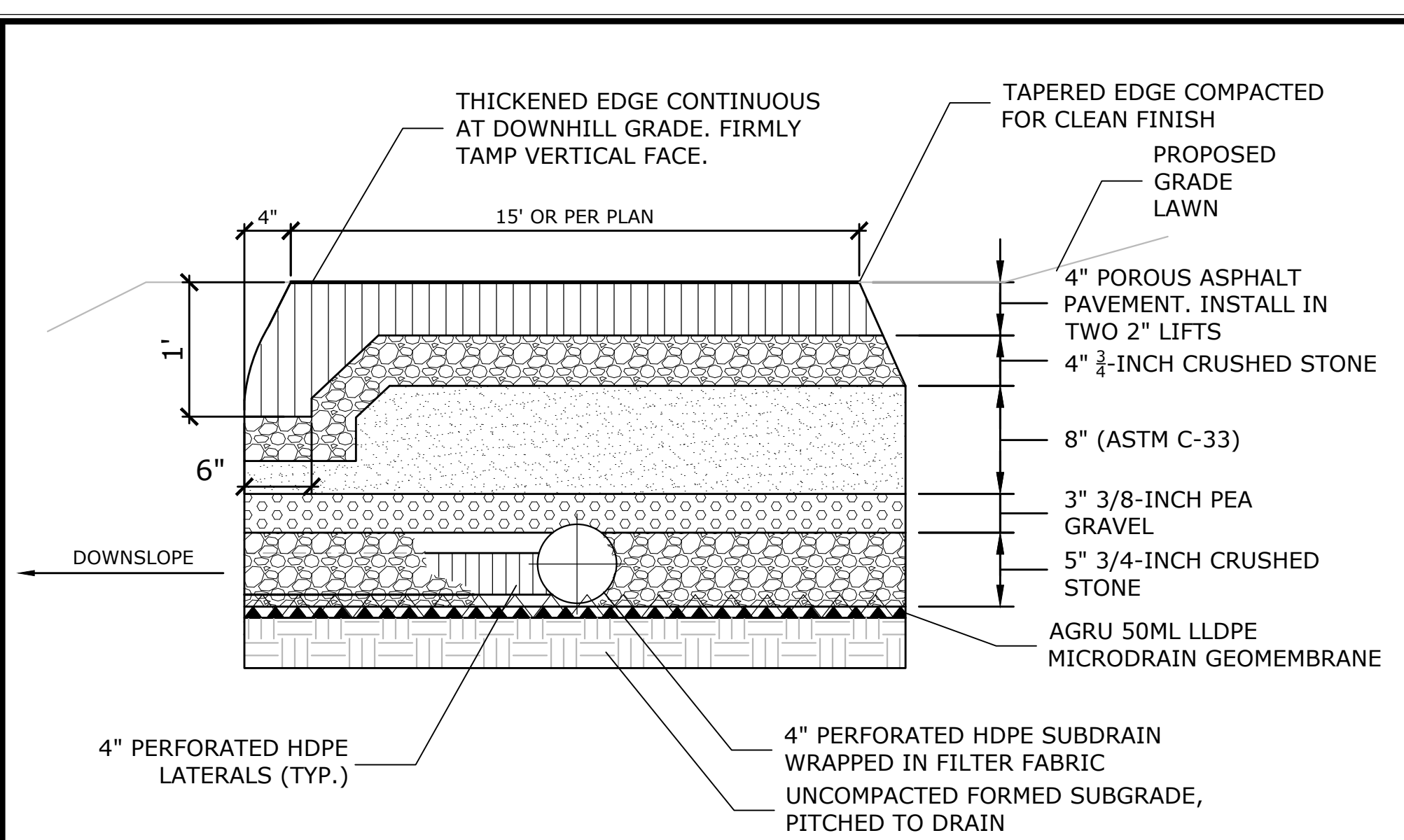
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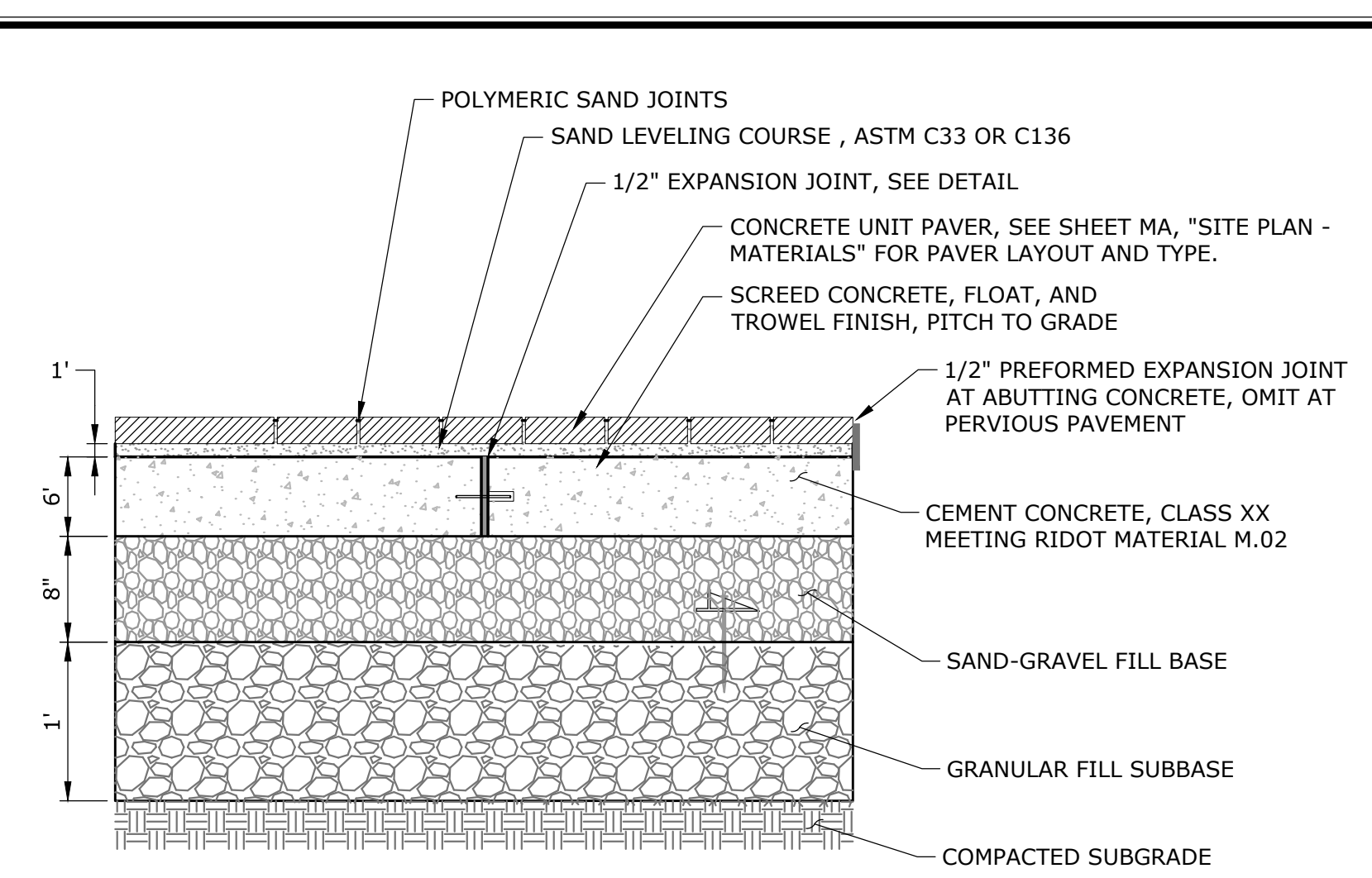
DESCRIPTION	DATE	BY
CONSTRUCTION DOCUMENTS	2026-02-27	JRH
UPDATED REVIEW SET	2026-03-27	JRH
ADDENDUM 02	MAY 11, 2026	SJS

SITE PLAN - SEDIMENT AND EROSION CONTROL  
 RIVERWALK WEST FINAL PHASE  
 SITE IMPROVEMENTS  
 TAFT STREET  
 PAWTUCKET, RHODE ISLAND  
 CONSTRUCTION DOCUMENTS - ISSUED FOR BID

BK	PJP	BK
DESIGNED	DRAWN	CHECKED
SCALE		
AS NOTED		
DATE		
APRIL 15, 2026		
PROJECT NO.		
15842.00001		
SHEET NO.		
12 OF 20		
SHEET NAME		
SE-2		

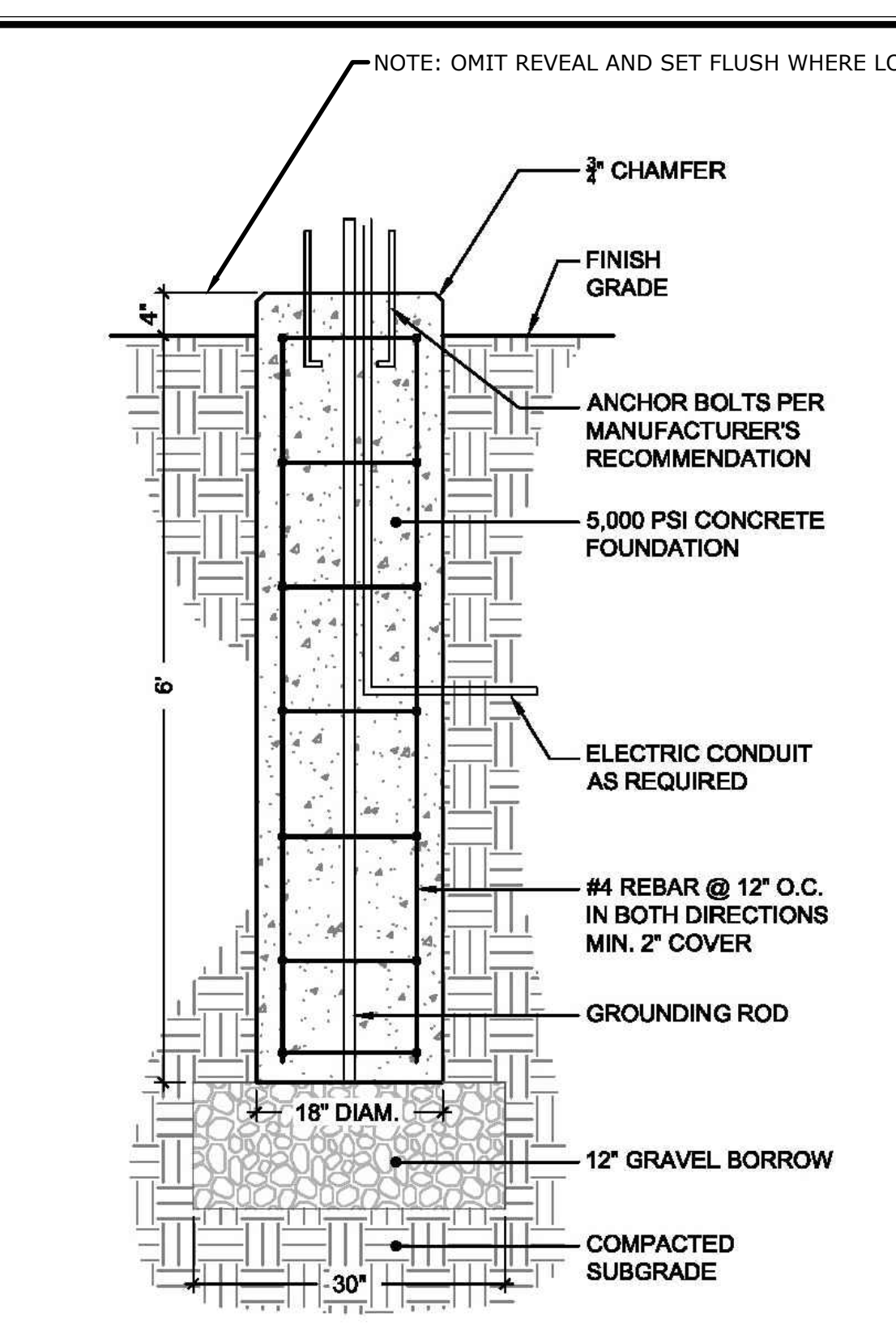


**RIVERWALK DETAIL - POROUS PAVEMENT**  
NOT TO SCALE

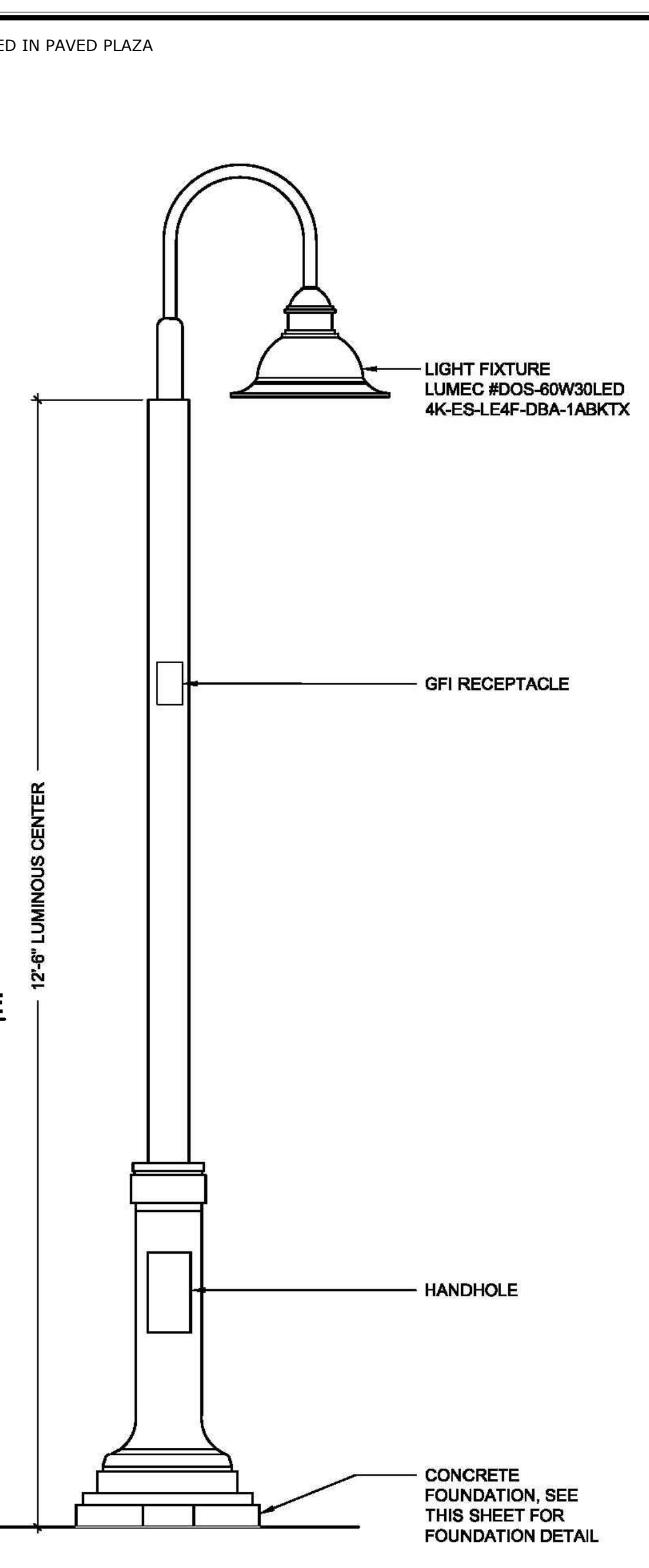


- NOTES:**  
**PLAZA BASE BID SHALL BE FOR CONCRETE SURFACE.**
- EXPANSION JOINTS IN CONCRETE BASE SHALL BE 20' O.C. OR 144 S.F. MAX.
  - CONCRETE BASE SHALL BE SCREEDED WITH A FLOAT FINISH, TROWELED, AND PITCHED TO GRADE.
  - TO BE ACCEPTED, PAVERS SHALL BE INSTALLED IN SUCH A MANNER THAT:
    - THE PAVER WALKING SURFACES ARE WITHIN 1/8" OF EACH OTHER AND ADJACENT FINISHED SURFACES (I.E. GRANITE CURB AND CONC. WALK)
    - THE PAVERS HAVE NO JOINTS GREATER THAN 1/16"
    - SAND SWEEP BETWEEN JOINTS IS VIBRATED AND WITHIN 3/16" OF THE PAVER WALKING SURFACE
    - NO PAVER IS CRACKED OR BROKEN
    - PAVERS ARE VIBRATED IN PLACE, SECURED WITH POLYMERIC SAND IN JOINTS HARDENED.
  - CONTRACTOR SHALL CONSTRUCT A PAVER SAMPLE PATTERN FOR EACH PATTERN AS SPECIFIED AND APPROVED BY THE LANDSCAPE ARCHITECT PRIOR TO AUTHORIZATION TO INSTALL PAVERS.

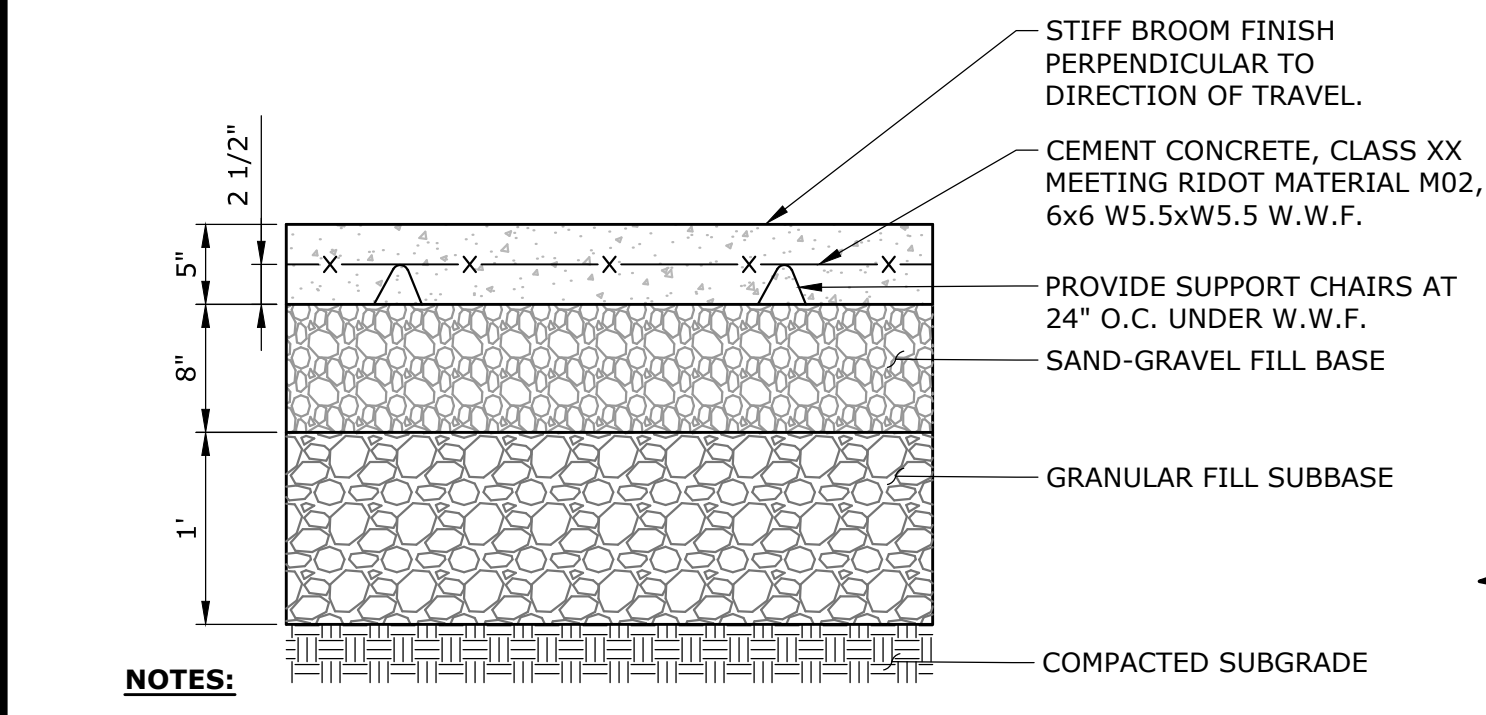
**CONCRETE UNIT PAVERS ON 6" CONCRETE SLAB - BID ALTERNATE**  
NOT TO SCALE



**CONCRETE FOUNDATION FOR LIGHT FIXTURE**  
NOT TO SCALE

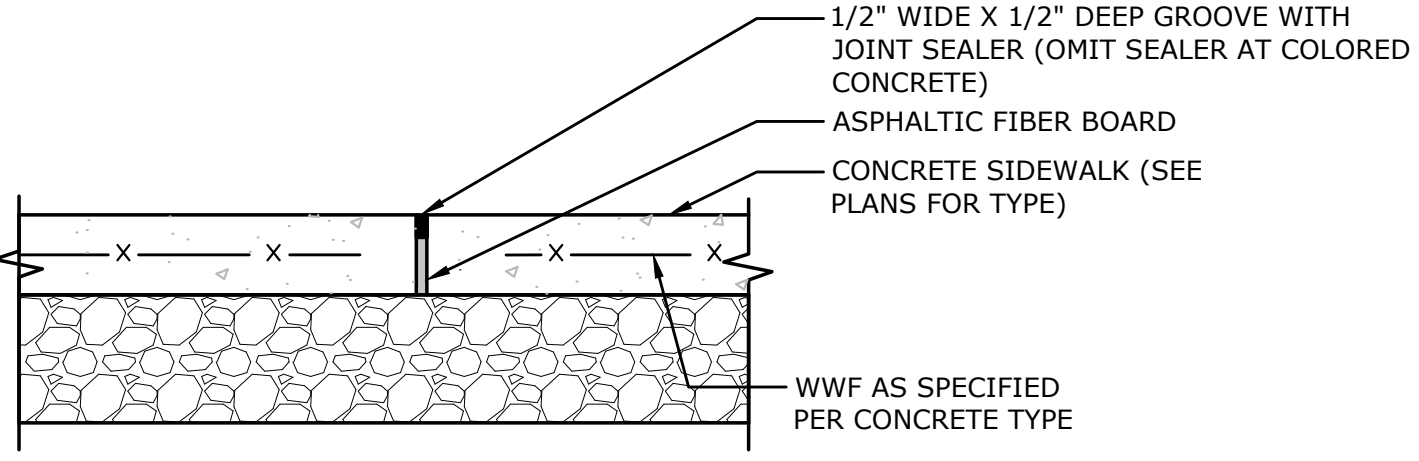


**LIGHT FIXTURE DETAIL**  
NOT TO SCALE



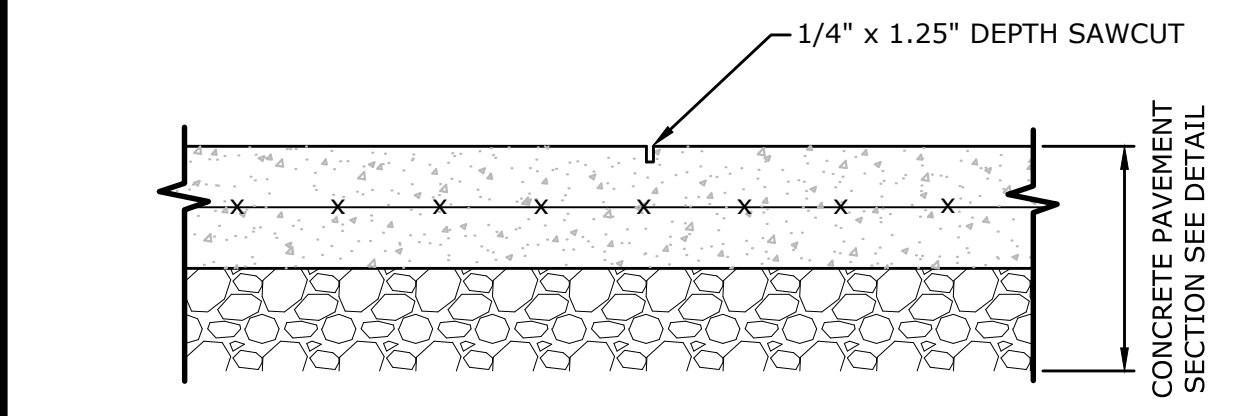
- NOTES:**
- EXPANSION JOINTS 20' O.C. MAXIMUM SCORE JOINTS 5' O.C. TYPICAL.
  - SEE EXPANSION JOINT DETAIL
  - SEE SCORE JOINT DETAIL

**CONCRETE SIDEWALK - 5" THICKNESS**  
NOT TO SCALE



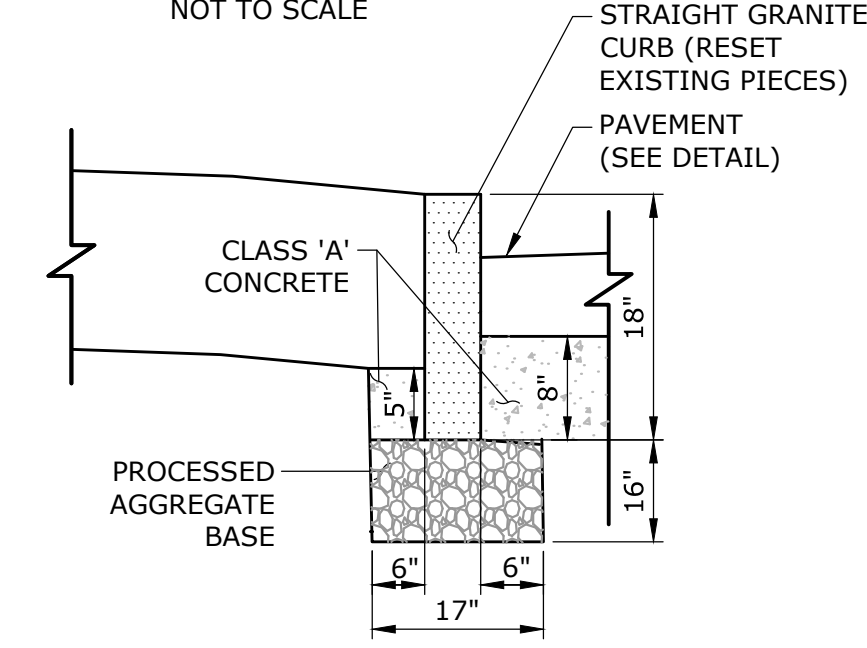
- NOTES:**
- EXPANSION JOINT SHALL BE INSTALLED WHERE NEW CONCRETE ABUTS BUILDING, CURB, WALL, OR EXISTING CONCRETE PAVEMENT

**EXPANSION JOINT**  
NOT TO SCALE



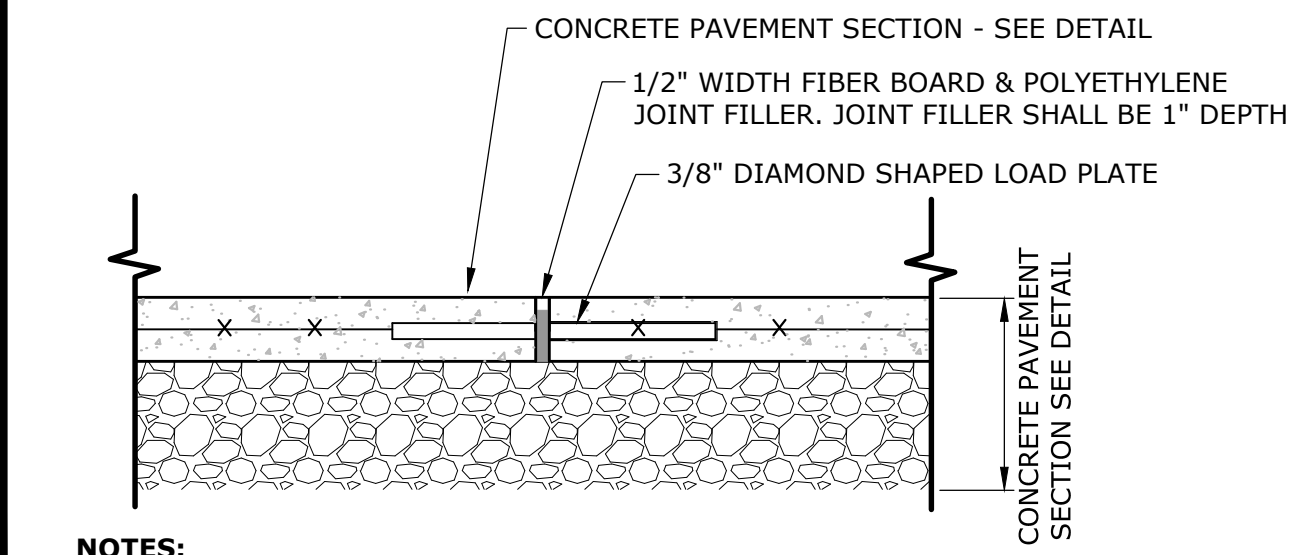
- NOTES:**
- PLACE JOINTS 5' O.C., TYPICAL, OR PER PLAN

**SCORE JOINT - SAWCUT**  
NOT TO SCALE



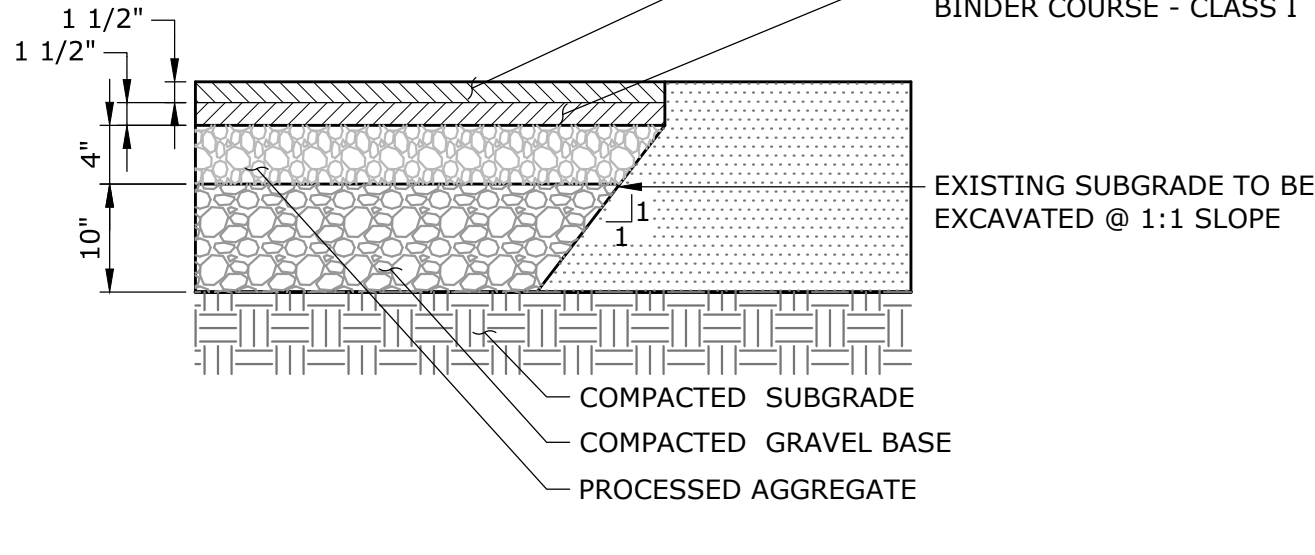
- NOTES:**
- WHERE STRAIGHT CURB ABUTS RADIUS CURB, FEATHER THE 2" RADIUS; SEE RADIUS GRANITE CURB DETAIL THIS SHEET.

**STRAIGHT GRANITE STONE CURBING**  
NOT TO SCALE



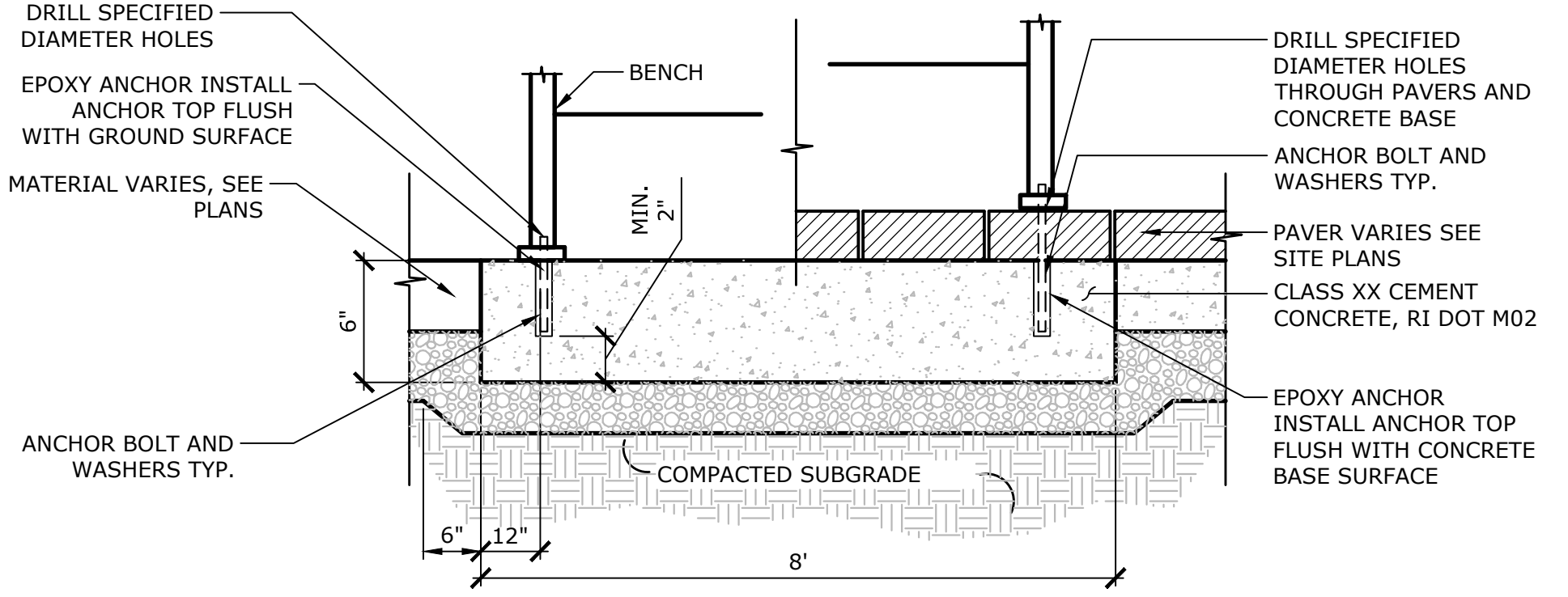
- NOTES:**
- PROVIDE DOWELLED EXPANSION JOINT AT ALL LOCATIONS WHERE SHOWN ON PLANS

**DOWELLED EXPANSION JOINT IN CONCRETE PAVEMENT**  
NOT TO SCALE



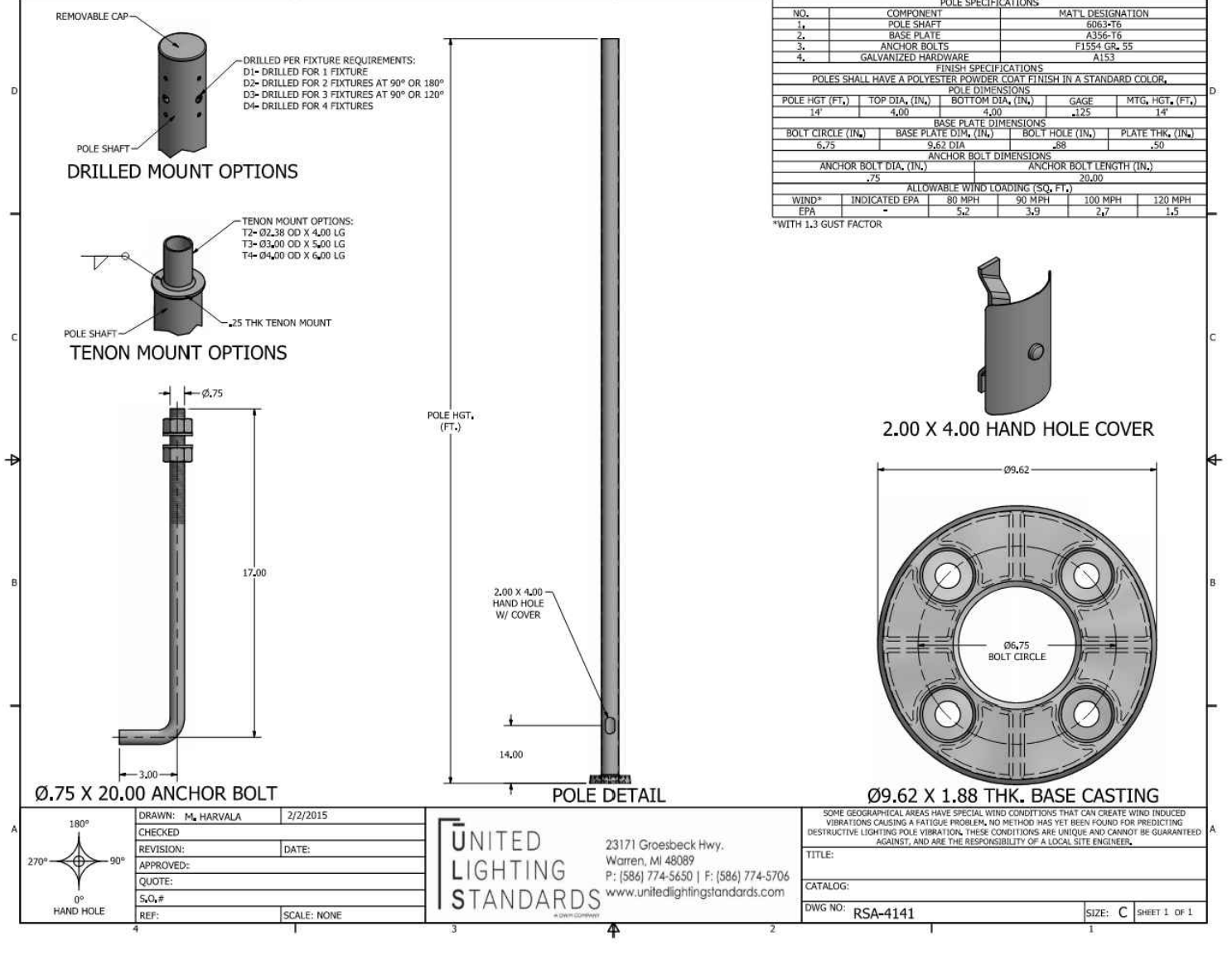
- NOTES:**
- PRIOR TO PAVING, SAWCUT EDGE OF EXIST. PAVEMENT, CLEAN & PAINT WITH LIQUID BITUMEN (TYPICAL) FINAL BITUMINOUS CONCRETE BINDER COURSE TO MEET ELEV. OF EXISTING PAVEMENT.

**PAVEMENT REPAIR**  
NOT TO SCALE



- NOTE:**
- DETAIL SHOWS BENCH MOUNTING FOR CONCRETE, AND BRICK PAVER OR CONCRETE UNIT PAVER SURFACES.
  - CONTRACTOR TO INSTALL BENCHES PER MANUFACTURER'S INSTRUCTIONS.
  - PROVIDE SHOP DRAWINGS FOR APPROVAL.
  - CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL MOUNTING HARDWARE.
  - CLEAN EACH ANCHOR HOLE IN ACCORDANCE WITH EPOXY INSTRUCTIONS.
  - USE EPOXY IN EPOXY GUN TO FILL EACH ANCHOR HOLES
  - INSERT ANCHOR INTO EACH ANCHOR HOLE SO ANCHOR TOP IS FLUSH AS DETAILED. ALLOW PROPER CURING TIME BEFORE INSTALLING BENCH.

**SURFACE MOUNTED BENCH (BID ALTERNATE)**  
NOT TO SCALE



**LIGHT POLE DETAIL**  
NOT TO SCALE

TODD D. RITCHIE  
No. 14720  
REGISTERED PROFESSIONAL ENGINEER  
CIVIL

**SLR**  
90 REALTY DRIVE  
SUITE 100  
280 271 1773  
SLRCONSULTING.COM

DESCRIPTION	DATE	BY
CONSTRUCTION DOCUMENTS	2026-02-27	JRH
UPDATED REVIEW SET	2026-03-27	JRH
ADDENDUM 02	MAY 11, 2026	SRS

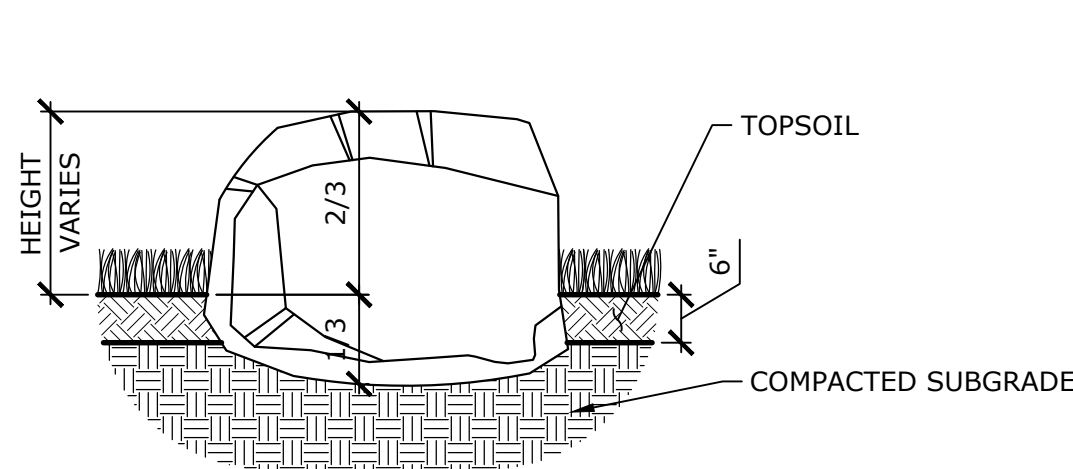
CONSTRUCTION DOCUMENTS - ISSUED FOR BID

**SITE DETAILS**  
RIVERWALK WEST FINAL PHASE  
SITE IMPROVEMENTS  
TAFT STREET  
PAWTUCKET, RHODE ISLAND

BK	PJP	BK
DESIGNED	DRAWN	CHECKED

SCALE: AS NOTED  
DATE: APRIL 15, 2026  
PROJECT NO.: 15842.00001  
SHEET NO.: 13 OF 20

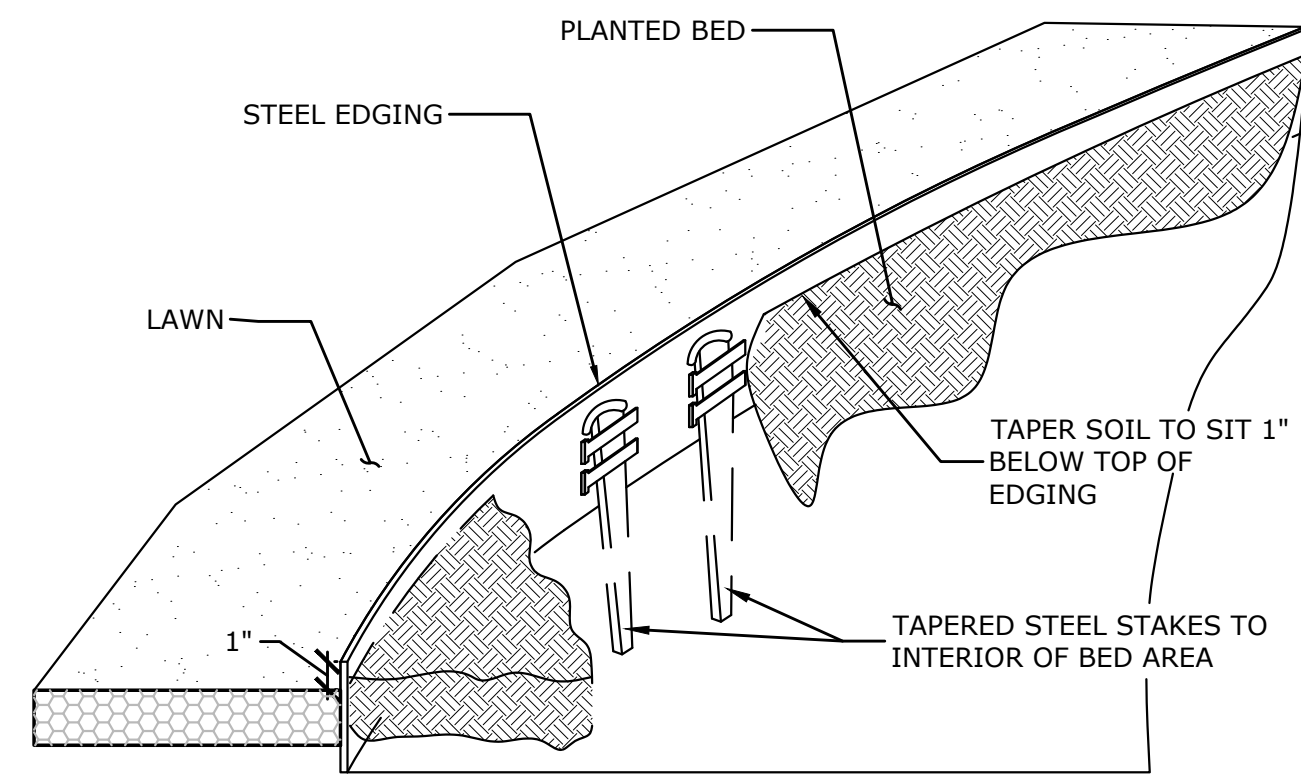
**SD-1**



- NOTES:**
- BOULDERS SHALL BE SOURCED FROM A LOCAL QUARRY OR STONE YARD AND BE OF SIMILAR COLOR AND SIZE TO PLACED BOULDERS ON SITE.
  - PROVIDE A 50-50 MIX OF IRREGULAR STONE AND FLAT-TOPPED STONE SUITABLE FOR INFORMAL SEATING.
  - TYPICAL SIZE RANGE SHALL BE FROM 1.5 TO 2 CUBIC YARDS (MINIMUM 30" IN ANY DIRECTION, MAXIMUM 50" GENERALLY)
  - CONTRACTOR SHALL PROVIDE PHOTOS TO LANDSCAPE ARCHITECT FOR SELECTION AND APPROVAL PRIOR TO PURCHASE.

**PLACED BOULDER IN PLANTED AREA**

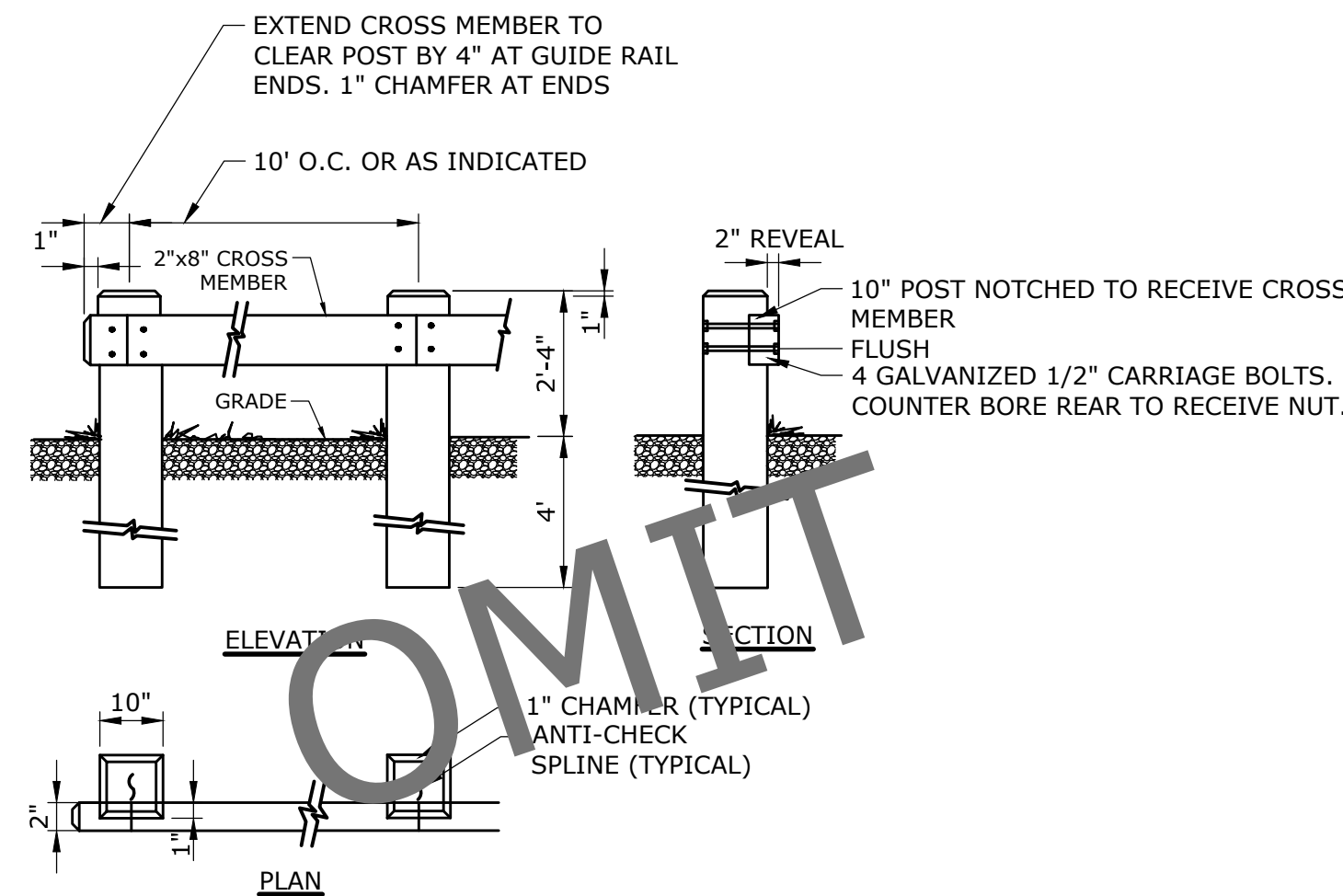
NOT TO SCALE



- NOTE:**
- PROVIDE 3/8" x 5" x 16' STEEL EDGING, INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
  - MANUFACTURED FROM SURE-LOC EDGING CORPORATION OR APPROVED EQUAL. (PH. 1-800-787-3562)
  - COLOR: BLACK

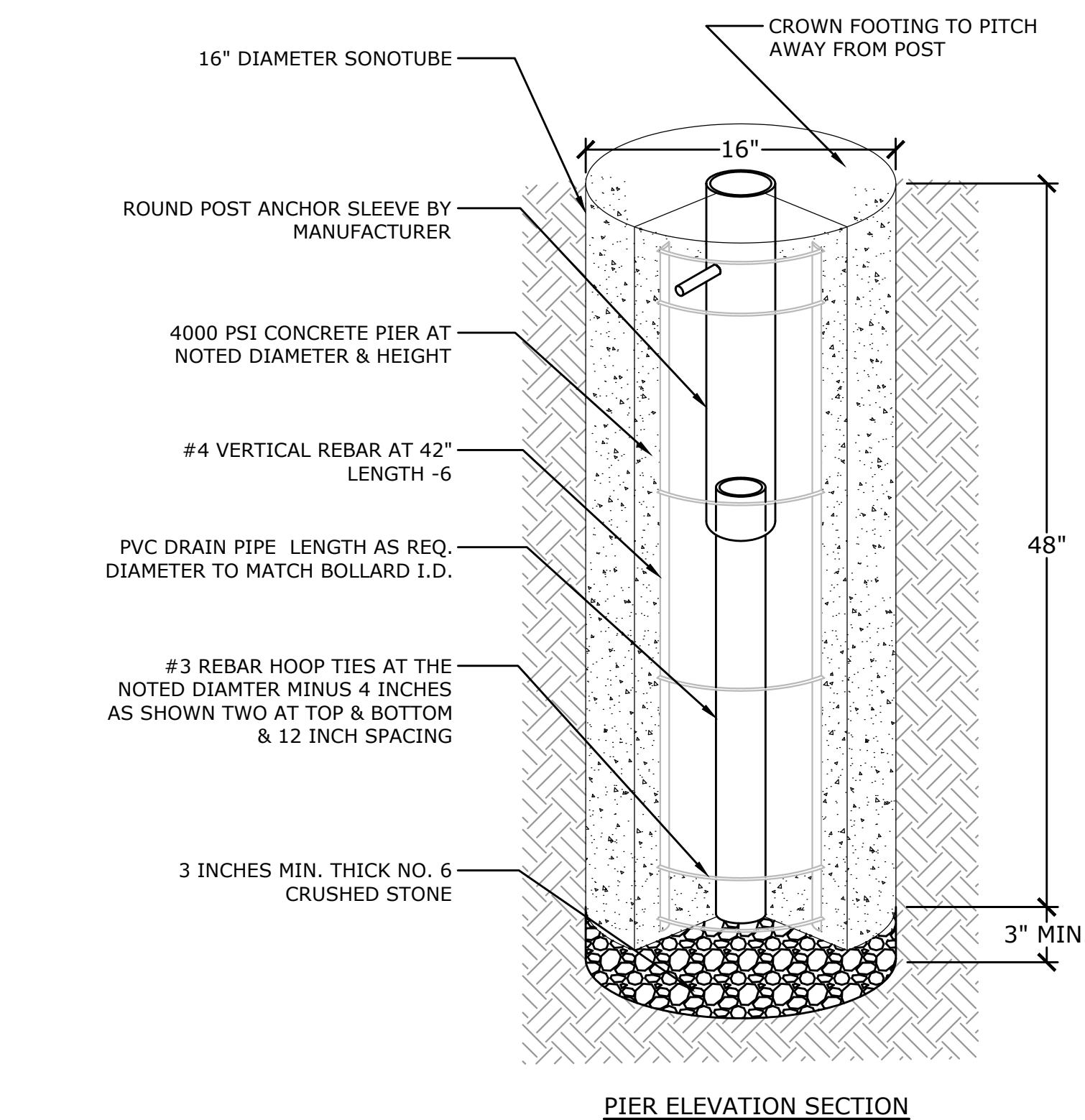
**STEEL LANDSCAPE EDGING**

NOT TO SCALE



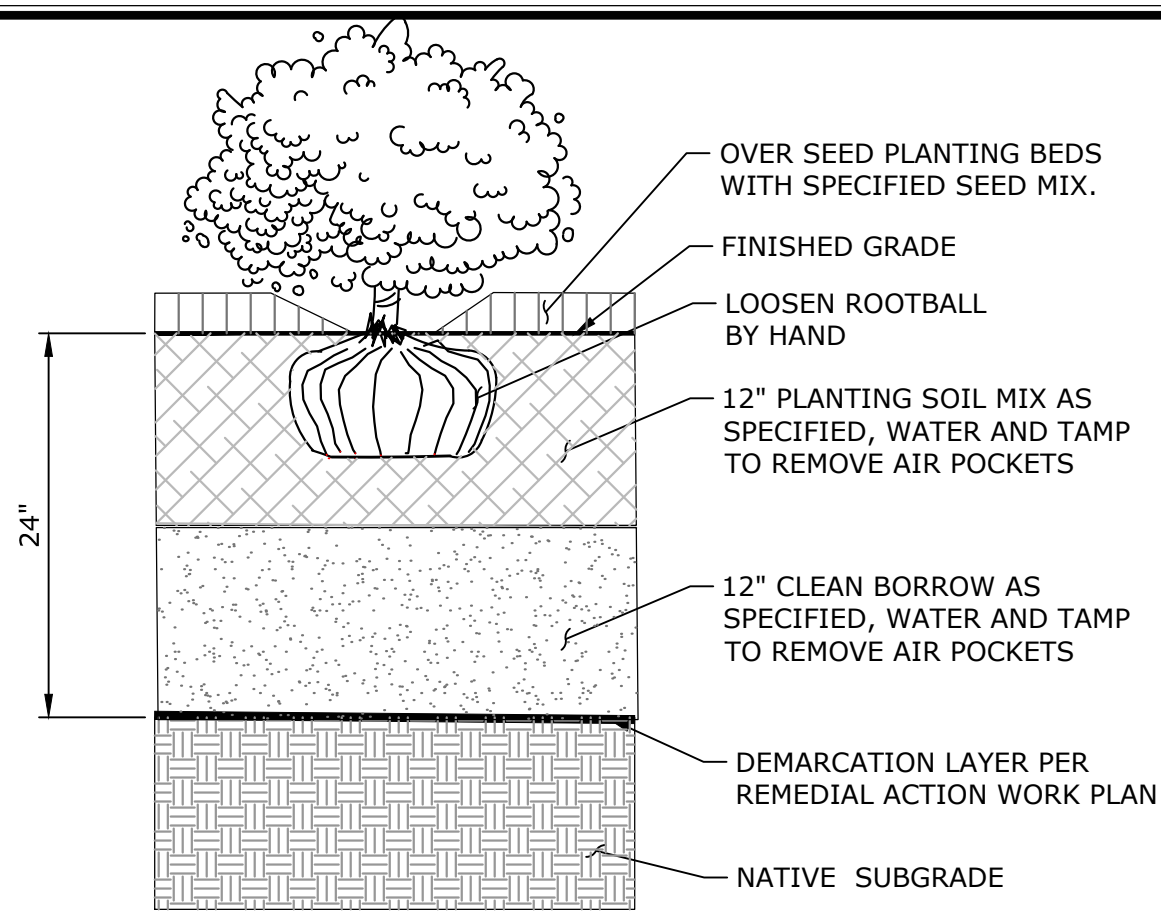
**TIMBER GUIDE RAIL FACEMOUNT 10x10 POSTS**

NOT TO SCALE



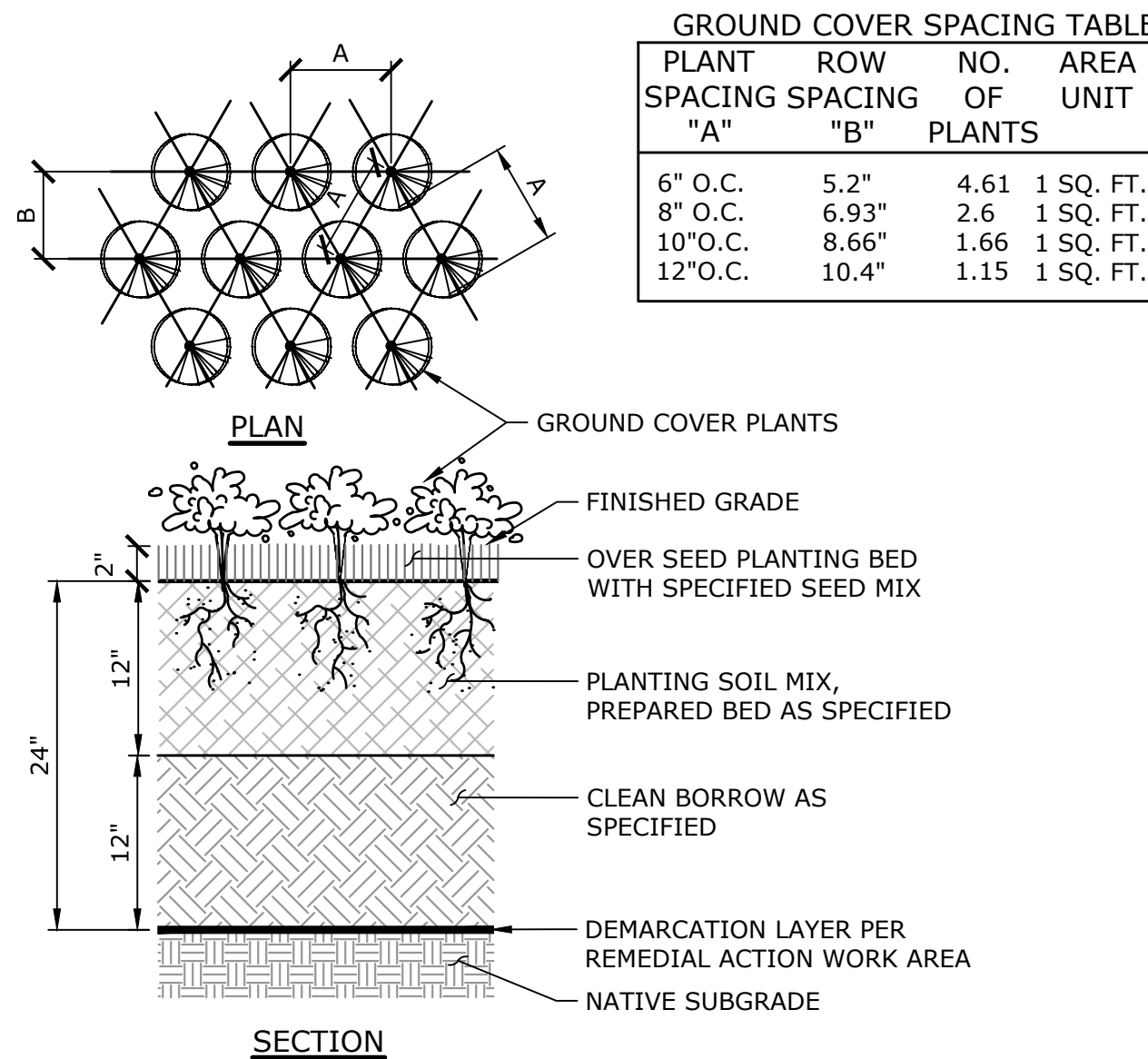
**FOUNDATION FOR REMOVABLE BOLLARD**

NOT TO SCALE



**SHRUB PLANTING**

NOT TO SCALE

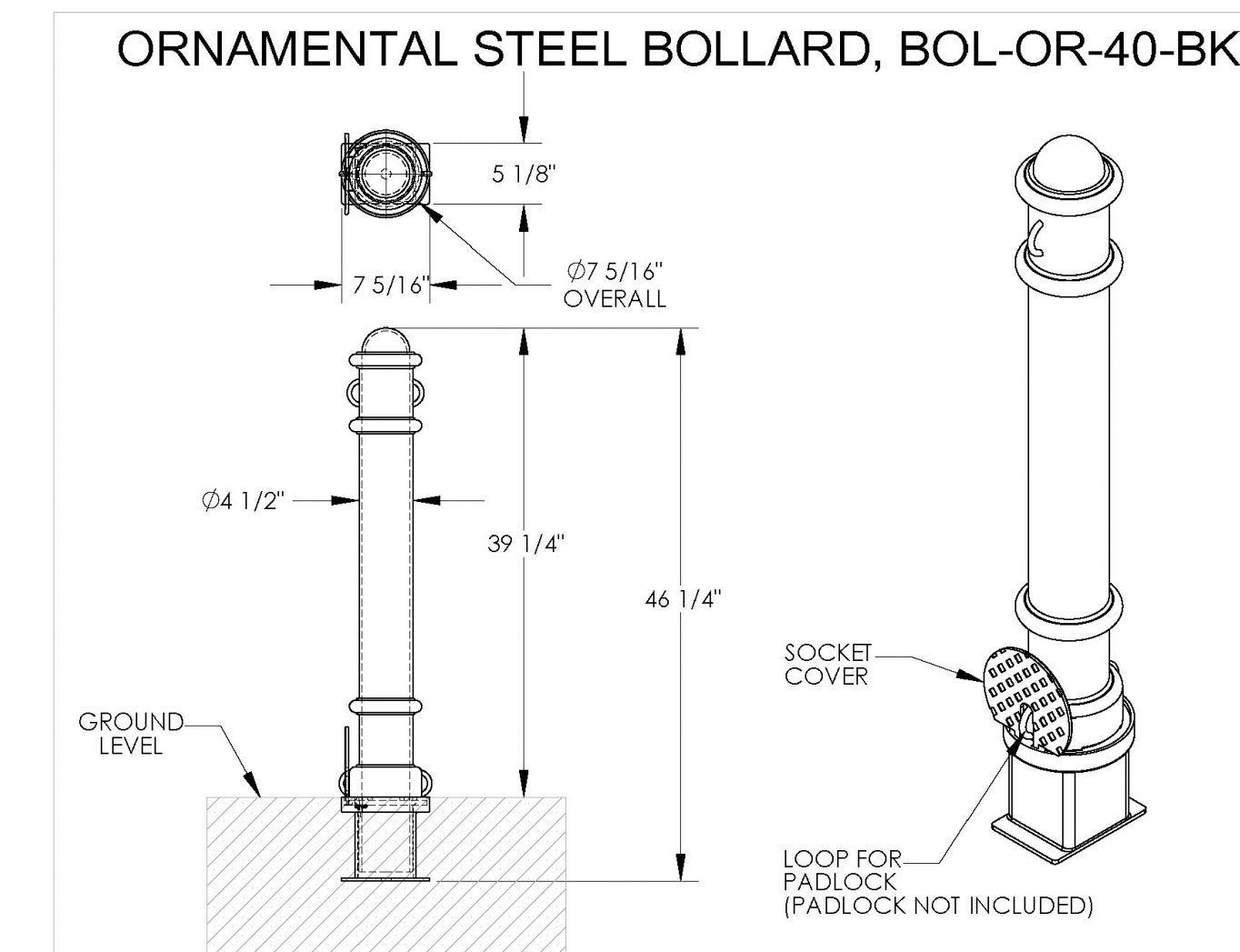


**NOTES:**

- ALL GROUND COVER TO BE PLANTED IN TRIANGULAR PATTERN. SEE DETAIL PLAN AND GROUND COVER SPACING TABLE.

**GROUND COVER/ PERENNIAL PLANTING**

NOT TO SCALE



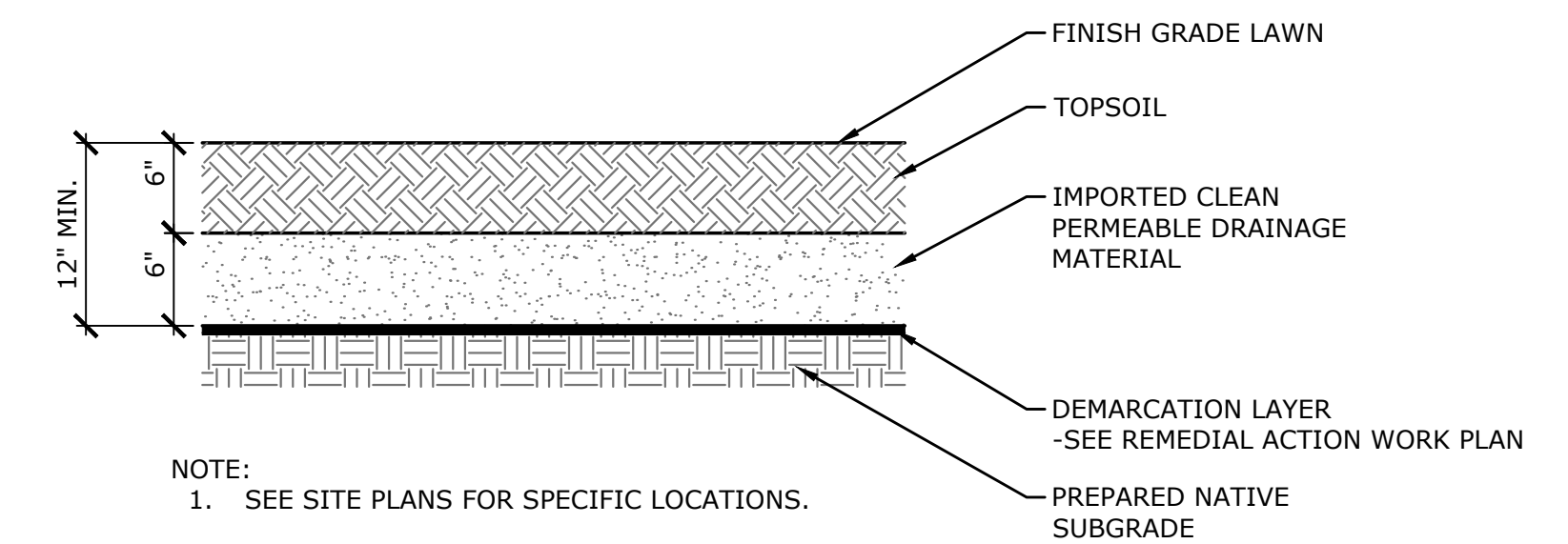
**NOTES:**

- PROVIDE REMOVABLE BOLLARD SUCH AS MODEL BOL-OR-40-BK, HEIGHT SHALL BE MIN. 39 1/4", DIA: 4 1/2", AS MANUFACTURED BY VESTIL MANUFACTURING CORP. 2999 NORTH WAYNE STREET, P.O. BOX 507, ANGOLA IN 46703, (260) 665-7586, OR APPROVED EQUIVALENT.
- COLOR SHALL BE GLOSS BLACK.

**BOLLARD (REMOVABLE)**

NOT TO SCALE

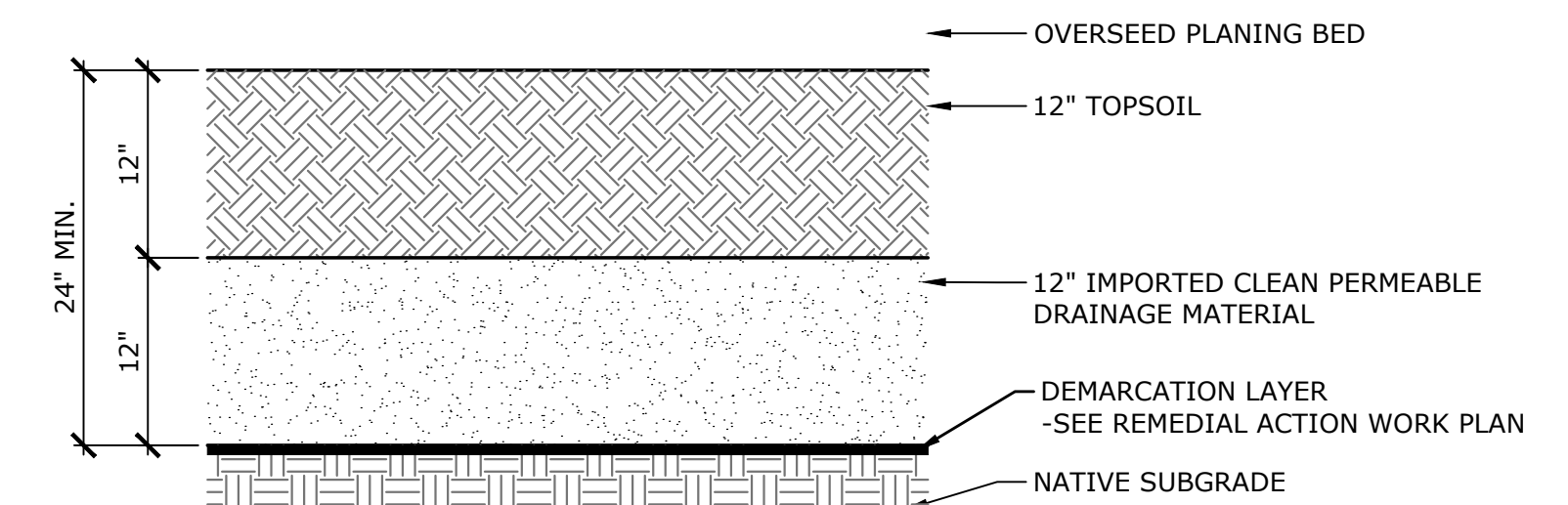
**DEMARICATION LAYER DETAILS PER REMIDIAL ACTION WORK PLAN**



- NOTE:**
- SEE SITE PLANS FOR SPECIFIC LOCATIONS.

**ONE FOOT DEPTH SOIL CAP - LAWN AREAS**

N.T.S.

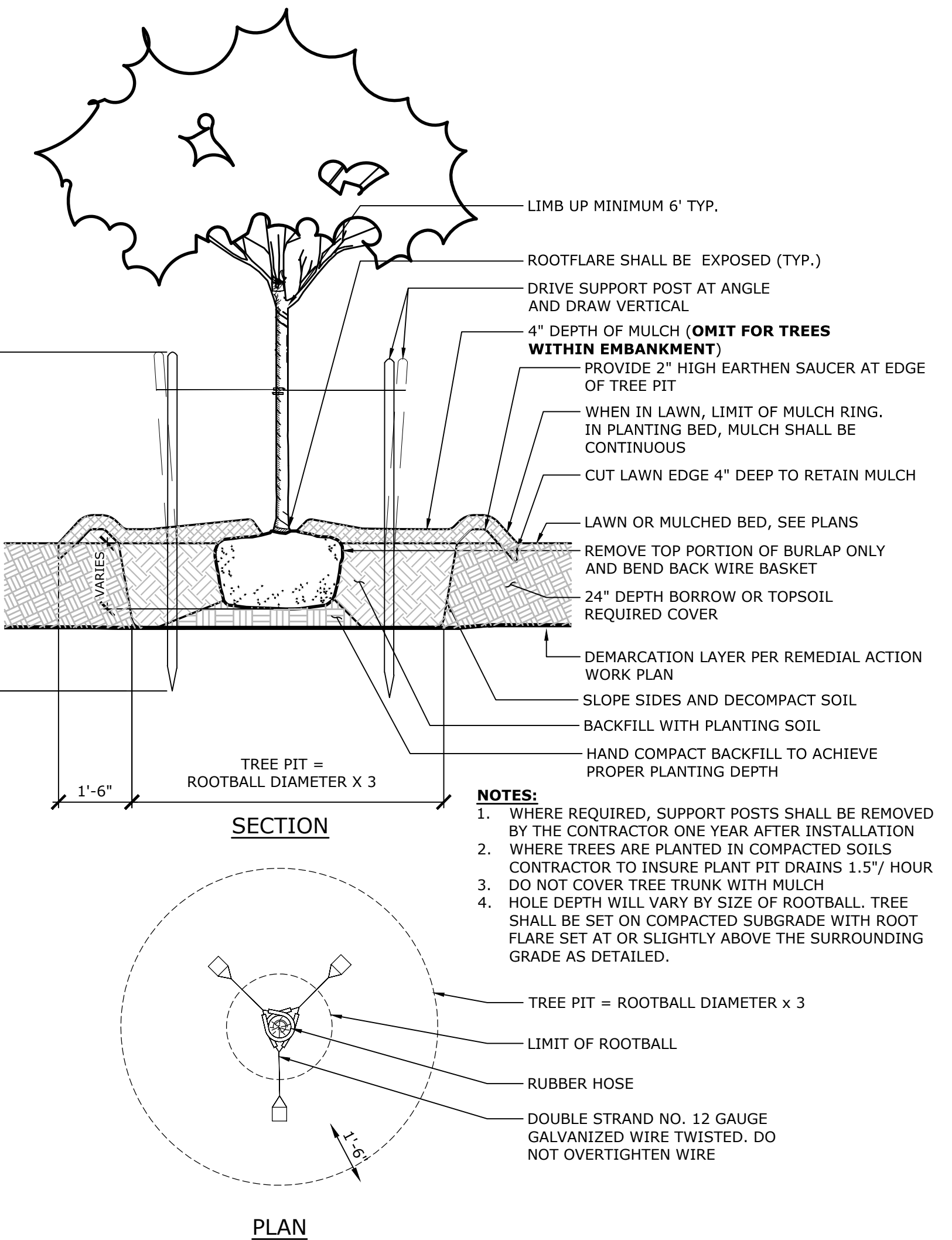


- NOTE:**
- SEE SITE PLANS FOR SPECIFIC LOCATIONS.

**TWO FOOT DEPTH SOIL CAP - PLANT BED AREAS**

N.T.S.

- NOTES:**
- NO MULCH TO BE INSTALLED ON EMBANKMENT AREA



**NOTES:**

- WHERE REQUIRED, SUPPORT POSTS SHALL BE REMOVED BY THE CONTRACTOR ONE YEAR AFTER INSTALLATION
- WHERE TREES ARE PLANTED IN COMPACTED SOILS CONTRACTOR TO INSURE PLANT PIT DRAINS 1.5"/HOUR DO NOT COVER TREE TRUNK WITH MULCH
- HOLE DEPTH WILL VARY BY SIZE OF ROOTBALL. TREE SHALL BE SET ON COMPACTED SUBGRADE WITH ROOT FLARE SET AT OR SLIGHTLY ABOVE THE SURROUNDING GRADE AS DETAILED.

**SECTION**

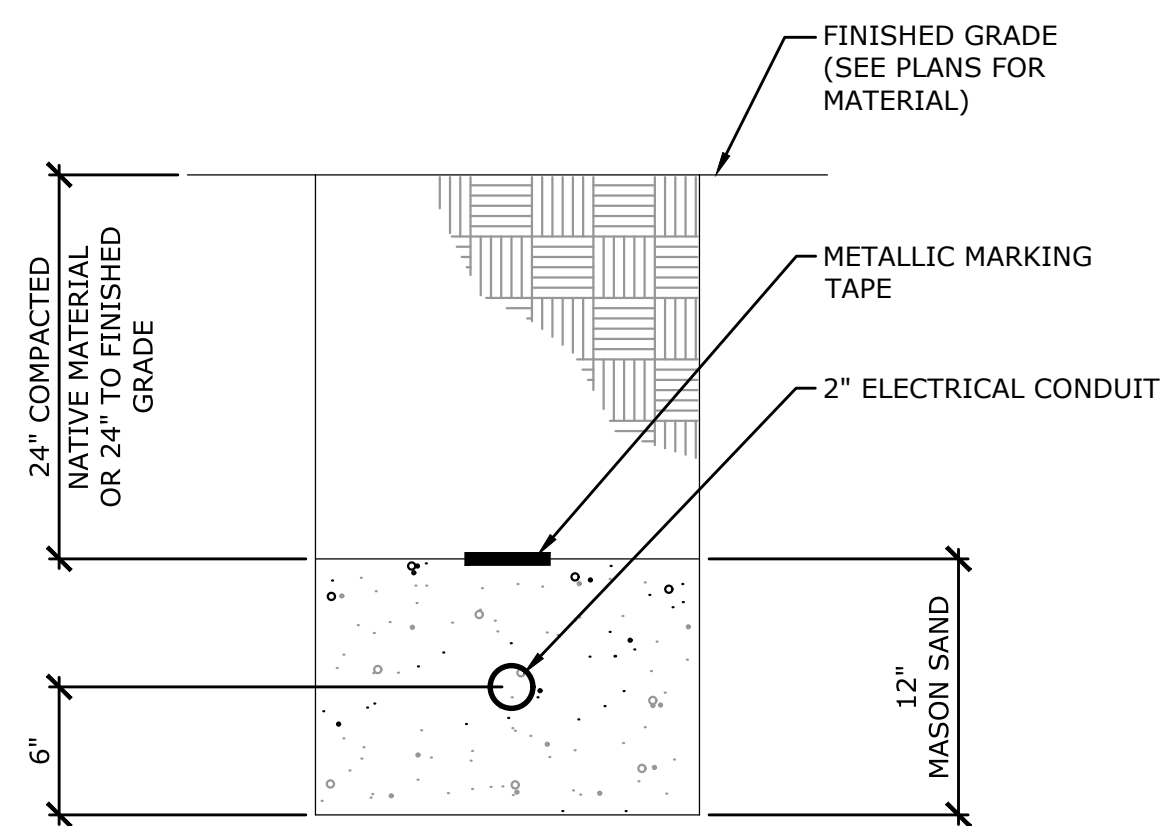
**PLAN**

**TREE PLANTING**

NOT TO SCALE

**ELECTRIC TRENCH DETAIL**

NOT TO SCALE

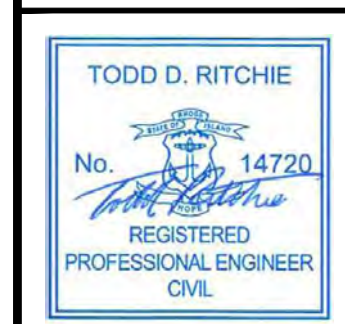


**NOTES:**

- EXISTING SIGN SHALL BE REINSTALLED WITH EXISTING HARDWARE IF REMOVAL IS NECESSARY TO COMPLETE THE WORK
- CONTRACTOR TO VERIFY CONDITION IN THE FIELD AND ADVISE OWNER OF CONDITION

**FOOTING FOR SQUARE TUBE SIGN POST**

NOT TO SCALE



DESCRIPTION	DATE	BY
CONSTRUCTION DOCUMENTS	2026-02-27	JRH
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ADDENDUM 02	MAY 11, 2026	SFS

CONSTRUCTION DOCUMENTS - ISSUED FOR BID

**SITE DETAILS**  
RIVERWALK WEST FINAL PHASE  
SITE IMPROVEMENTS  
TAFT STREET  
PANTUCKET, RHODE ISLAND

BK	PJP	BK
DESIGNED	DRAWN	CHECKED
SCALE: AS NOTED		
DATE: APRIL 15, 2026		
PROJECT NO: 15842.00001		
SHEET NO: 14 OF 20		
SHEET NAME: SD-2		

**FASTENING NOTES**

1. JOISTS TO POSTS - 1/2"Ø LAG BOLTS & 3/4"Ø THRU BOLTS AS SHOWN ON DETAILS.
2. DECKING TO JOISTS - 3" GALVANIZED SCREWS.
3. RAILINGS TO POSTS - 3" GALVANIZED SCREWS.
4. RAILING CABLES TO POSTS PER MANUFACTURER'S RECOMMENDATIONS.

**BOARDWALK**

**PART 1 - GENERAL**

**DESCRIPTION OF WORK:**

- BOARDWALK CONSTRUCTION INCLUDES THE FOLLOWING TYPES OF WORK:
- STAINLESS STEEL CABLE RAILING
  - CONCRETE ABUTMENTS
  - CONCRETE PIERS
  - WOOD FRAMING
  - TIMBER DECKING

**REFERENCES**

LUMBER STANDARDS: COMPLY WITH PS 20 AND WITH APPLICABLE RULES OF THE RESPECTIVE GRADING AND INSPECTING AGENCIES FOR SPECIES AND PRODUCTS INDICATED.

**SUBMITTALS**

**PRODUCT DATA:** SUBMIT MANUFACTURER'S SPECIFICATIONS AND INSTALLATION INSTRUCTIONS FOR MATERIALS LISTED BELOW:

**WOOD TREATMENT DATA:** SUBMIT TREATMENT MANUFACTURER'S INSTRUCTIONS FOR PROPER USE OF EACH TYPE OF TREATED MATERIAL.

**PRESSURE TREATMENT:** FOR EACH TYPE SPECIFIED, INCLUDE CERTIFICATION BY TREATING PLANT STATING CHEMICALS AND PROCESS USED, NET AMOUNT OF PRESERVATIVE RETAINED AND CONFORMANCE WITH APPLICABLE STANDARDS.

**PRODUCT HANDLING**

**DELIVERY AND STORAGE:** KEEP MATERIALS DRY AT ALL TIMES. PROTECT AGAINST EXPOSURE TO WEATHER AND CONTACT WITH DAMP OR WET SURFACES. STACK LUMBER AND PLYWOOD, AND PROVIDE AIR CIRCULATION WITHIN STACKS.

**PART 2 - PRODUCTS**

**MATERIALS**

**LUMBER, GENERAL**

FACTORY MARK EACH PIECE OF LUMBER WITH TYPE, GRADE, MILL AND GRADING AGENCY, EXCEPT OMIT MARKING FROM SURFACES TO BE EXPOSED WITH TRANSPARENT FINISH OR WITHOUT FINISH.

NOMINAL SIZES ARE INDICATED, EXCEPT AS SHOWN BY DETAIL DIMENSIONS. PROVIDE ACTUAL SIZES AS REQUIRED BY PS 20, FOR MOISTURE CONTENT SPECIFIED FOR EACH USE.

PROVIDE DRESSED LUMBER, S4S, UNLESS OTHERWISE INDICATED.

PROVIDE SEASONED LUMBER WITH 19% MAXIMUM MOISTURE CONTENT AT THE TIME OF DRESSING.

PROVIDE SOUTHERN PINE LUMBER, FOR FRAMING.

TIMBER PLANKS, PER DETAIL

ALL PRESSURE TREATED LUMBER SHALL BE GRADE 2. CEDAR POSTS SHALL BE CLEAR OR ARCHITECT KNOTTY POSTS SHALL RUN FULL HEIGHT AND NO SPLICING ALLOWED.

**MISCELLANEOUS MATERIALS**

**FASTENERS AND ANCHORAGES:** PROVIDE SIZE, TYPE, MATERIAL AND FINISH AS INDICATED AND AS RECOMMENDED BY APPLICABLE STANDARDS, COMPLYING WITH APPLICABLE FEDERAL SPECIFICATIONS FOR NAILS, STAPLES, SCREWS, BOLTS, NUTS, WASHERS AND ANCHORING DEVICES. PROVIDE METAL HANGERS AND FRAMING ANCHORS OF THE SIZE AND TYPE RECOMMENDED BY THE MANUFACTURER FOR EACH USE INCLUDING RECOMMENDED NAILS. PROVIDE FASTENERS AND ANCHORAGES WITH A HOT-DIP ZINC COATING (ASTM A 153).

WOOD PRESERVATIVE TREATMENT SHALL BE UCSB

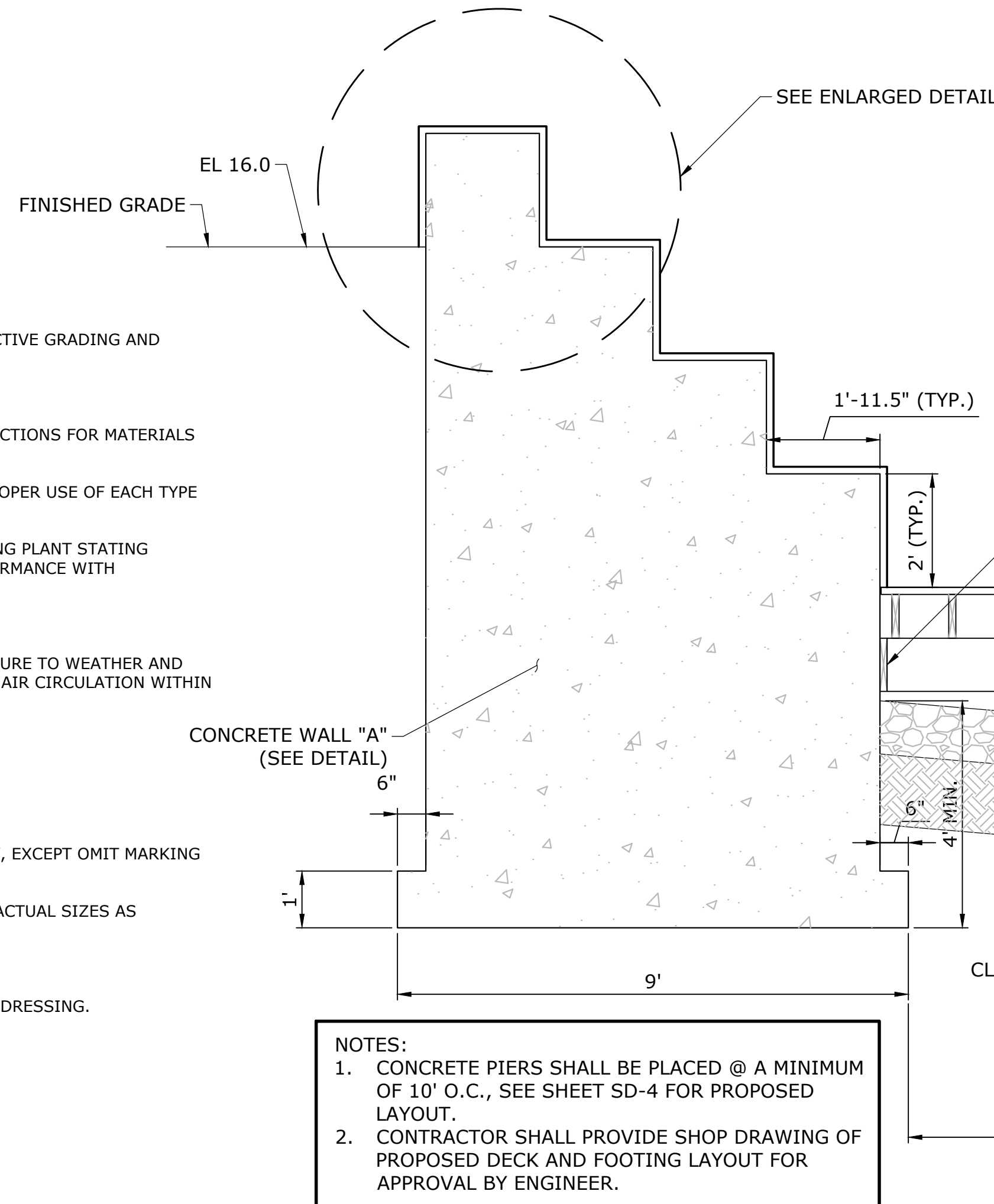
**PART 3 - EXECUTION**

**MATERIALS, GENERAL**

DISCARD UNITS OF MATERIAL WITH DEFECTS WHICH MIGHT IMPAIR QUALITY OF WORK, AND UNITS WHICH ARE TOO SMALL TO USE IN FABRICATING WORK WITH MINIMUM JOINTS OR OPTIMUM JOINT ARRANGEMENTS.

SET CARPENTRY WORK ACCURATELY TO REQUIRED LEVELS AND LINES, WITH MEMBERS PLUMB AND TRUE AND ACCURATELY CUT AND FITTED.

SECURELY ATTACH CARPENTRY WORK TO SUBSTRATE BY ANCHORING AND FASTENING AS SHOWN AND AS REQUIRED BY RECOGNIZED STANDARDS. COUNTERSINK SCREW AND NAIL HEADS ON EXPOSED CARPENTRY WORK AND RILL HOLES. SELECT FASTENERS OF SIZE THAT WILL NOT PENETRATE MEMBERS WHERE OPPOSITE SIDE WILL BE EXPOSED TO VIEW. MAKE TIGHT CONNECTIONS BETWEEN MEMBERS. INSTALL FASTENERS WITHOUT SPLITTING OF WOOD; PRE-DRILL AS REQUIRED.

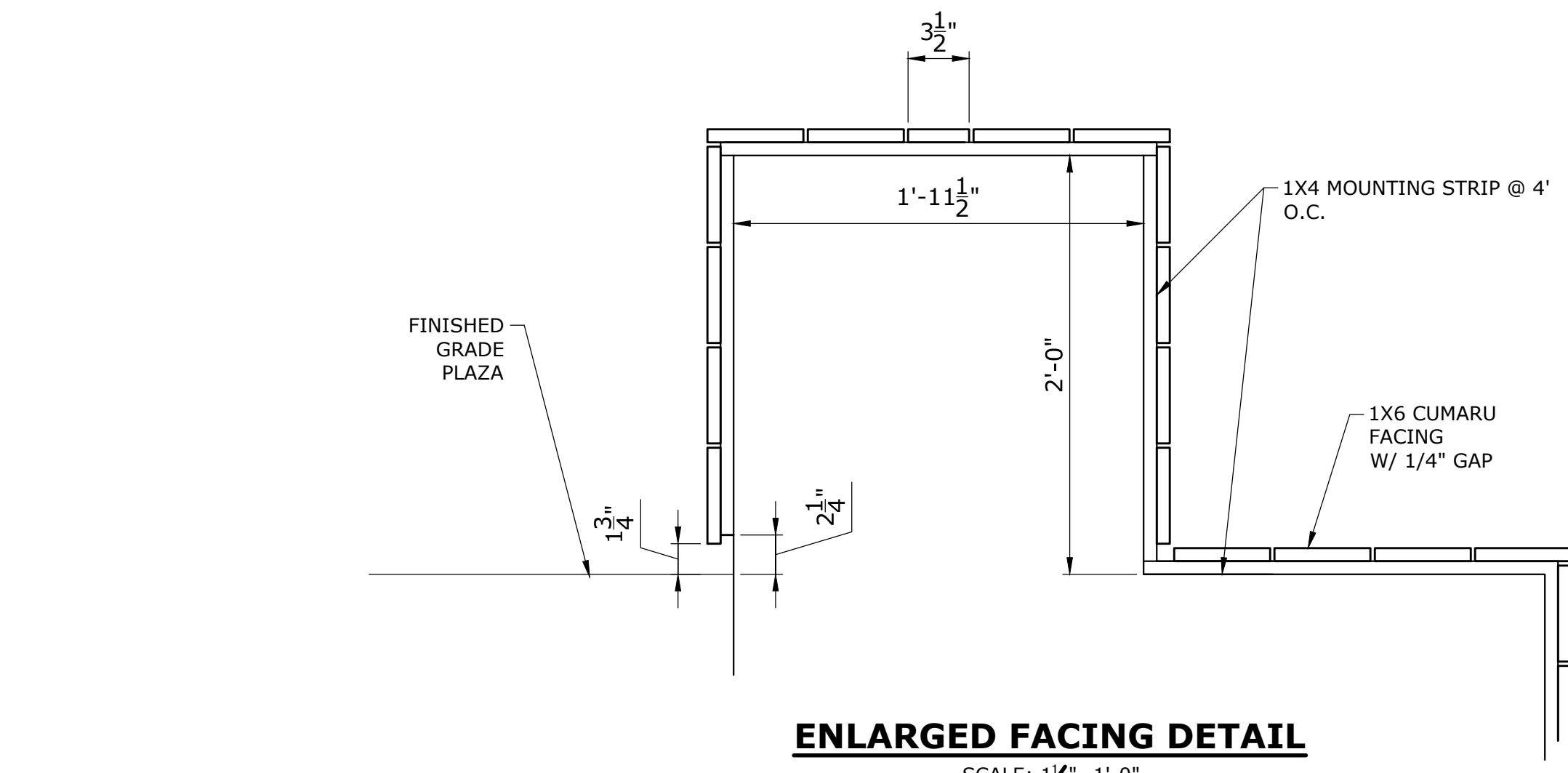


**WOOD AMPITHEATER OVERLOOK - WOOD VENEERED CONCRETE STEPS**  
NOT TO SCALE

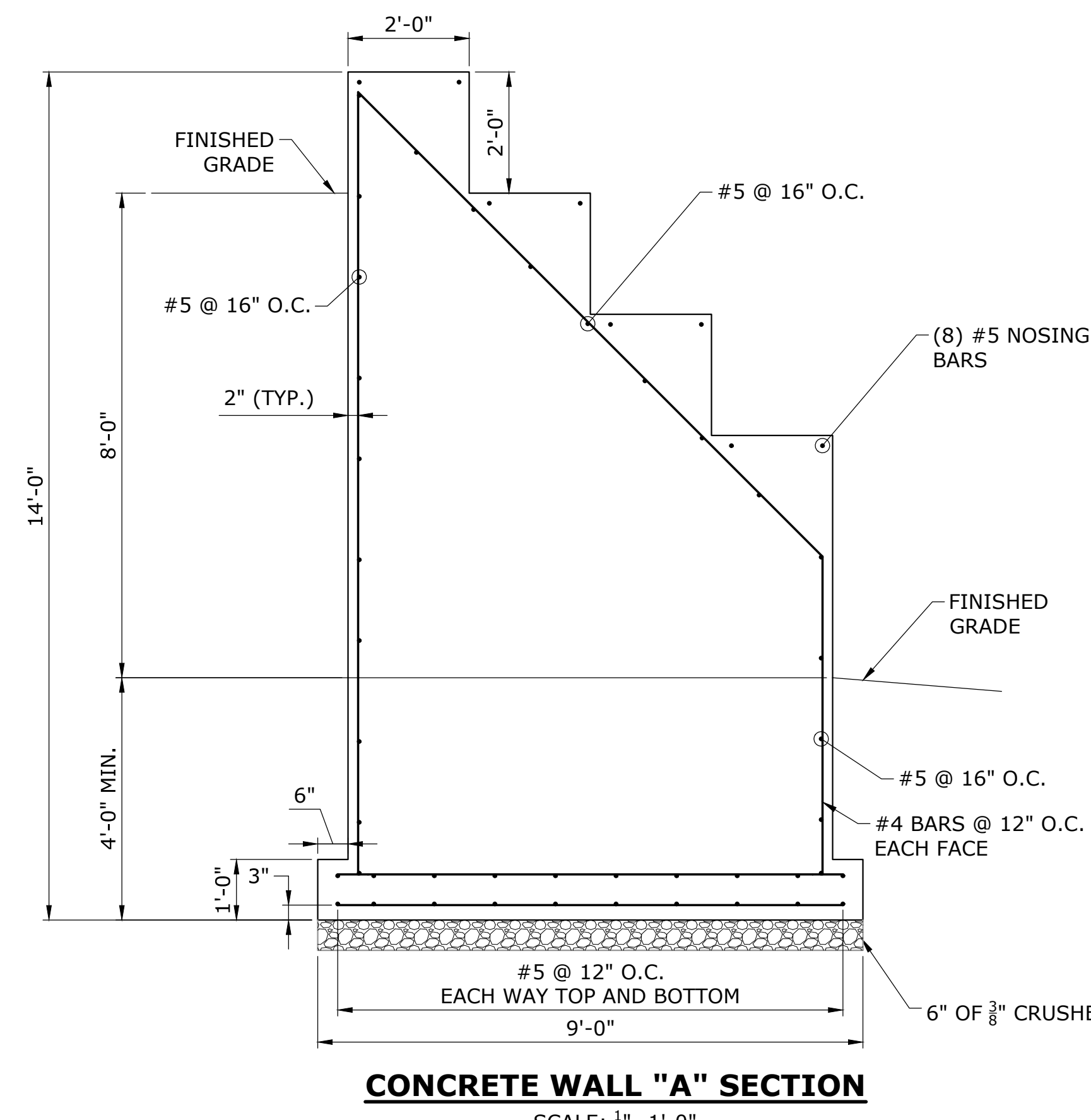


**WOOD DECKING - CUMARU WOOD SURFACE**  
NOT TO SCALE

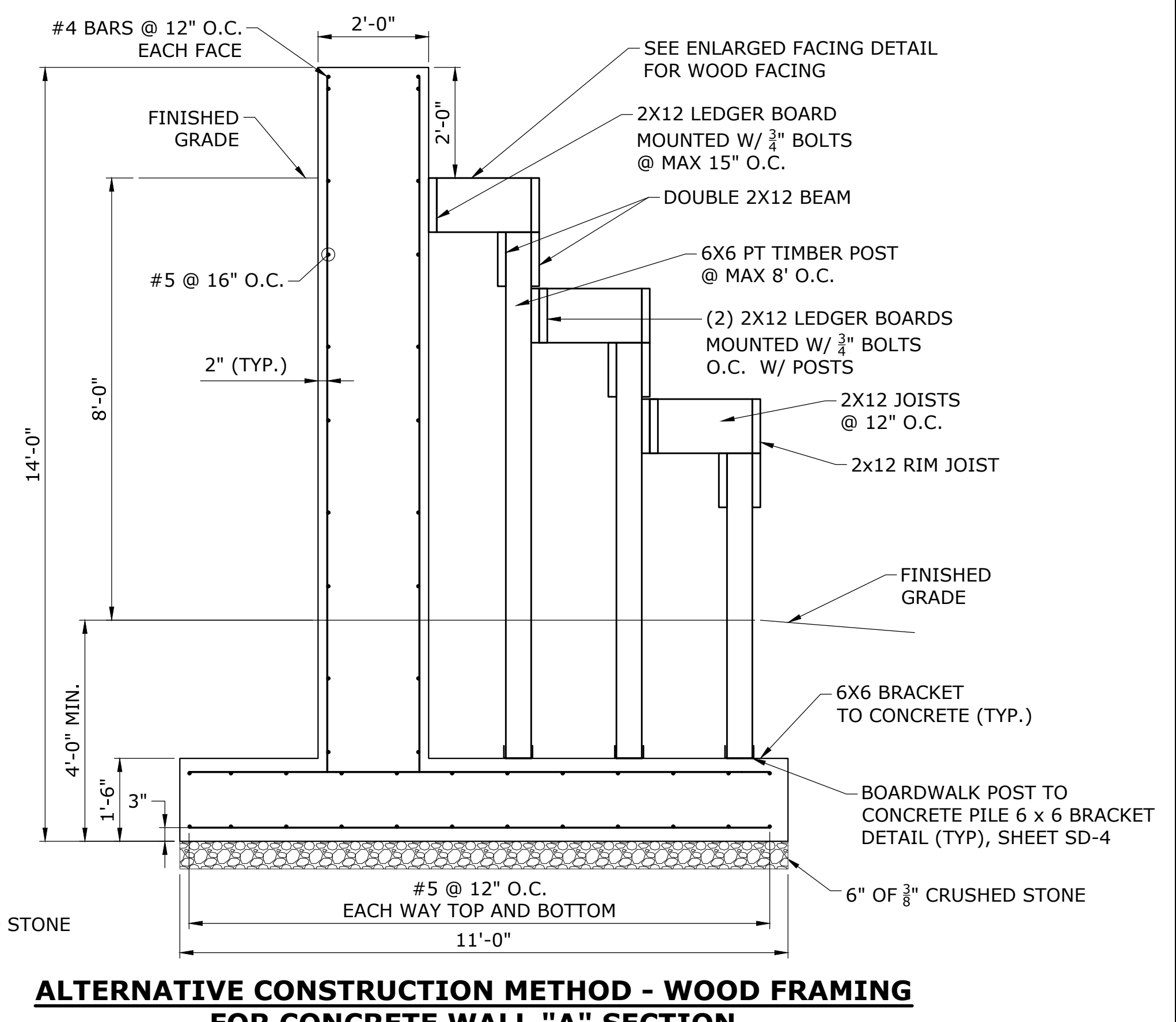
- NOTES:
1. WOOD VENEER TO BE CUMARU HARDWOOD.
  2. INTERNAL COMPONENTS TO BE PRESSURE TREATED LUMBER
  3. ALL FASTENERS AND HARDWARE TO BE 316 STAINLESS
  4. SUBMIT SHOP DRAWING FOR FABRICATION FOR APPROVAL BY LANDSCAPE ARCHITECT AND STRUCTURAL ENGINEER.



**ENLARGED FACING DETAIL**  
SCALE: 1/2"=1'-0"



**CONCRETE WALL "A" SECTION**  
SCALE: 1/2"=1'-0"



**ALTERNATIVE CONSTRUCTION METHOD - WOOD FRAMING FOR CONCRETE WALL "A" SECTION**  
SCALE: 1/2"=1'-0"



DESCRIPTION	DATE	BY
CONSTRUCTION DOCUMENTS	2026-02-27	JRH
UPDATED REVIEW SET	2026-03-27	JRH
ADDENDUM 02	MAY 11, 2026	SRS

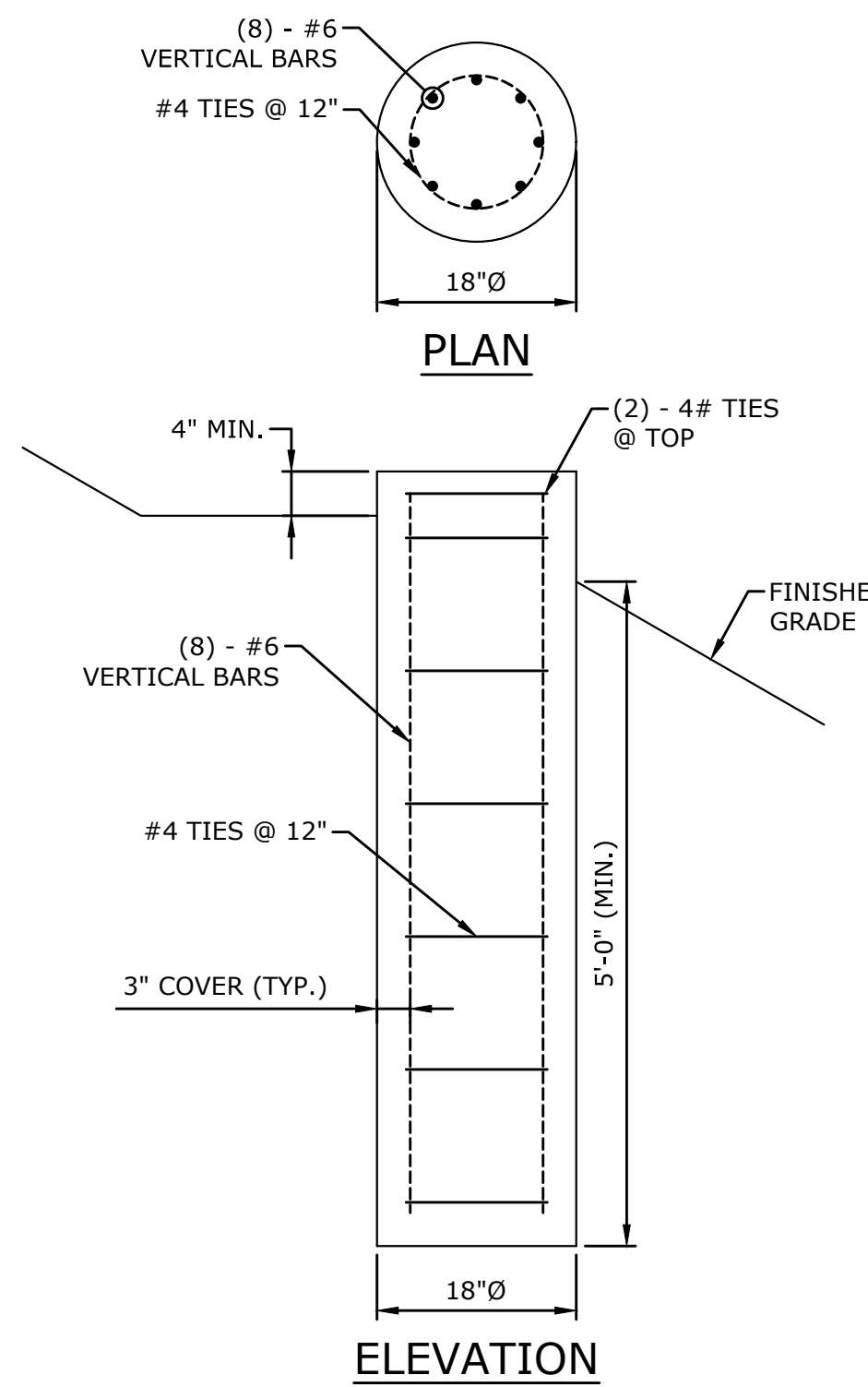
**SITE DETAILS - BID ALTERNATE 3 - WOOD DECK AND AMPITHEATER**  
RIVERWALK WEST FINAL PHASE  
SITE IMPROVEMENTS  
TAFT STREET  
PAWBUCKET, RHODE ISLAND

BK	PJP	BK
DESIGNED	DRAWN	CHECKED

SCALE: AS NOTED  
DATE: APRIL 15, 2026  
PROJECT NO.: 15842.00001  
SHEET NO.: 15 OF 20

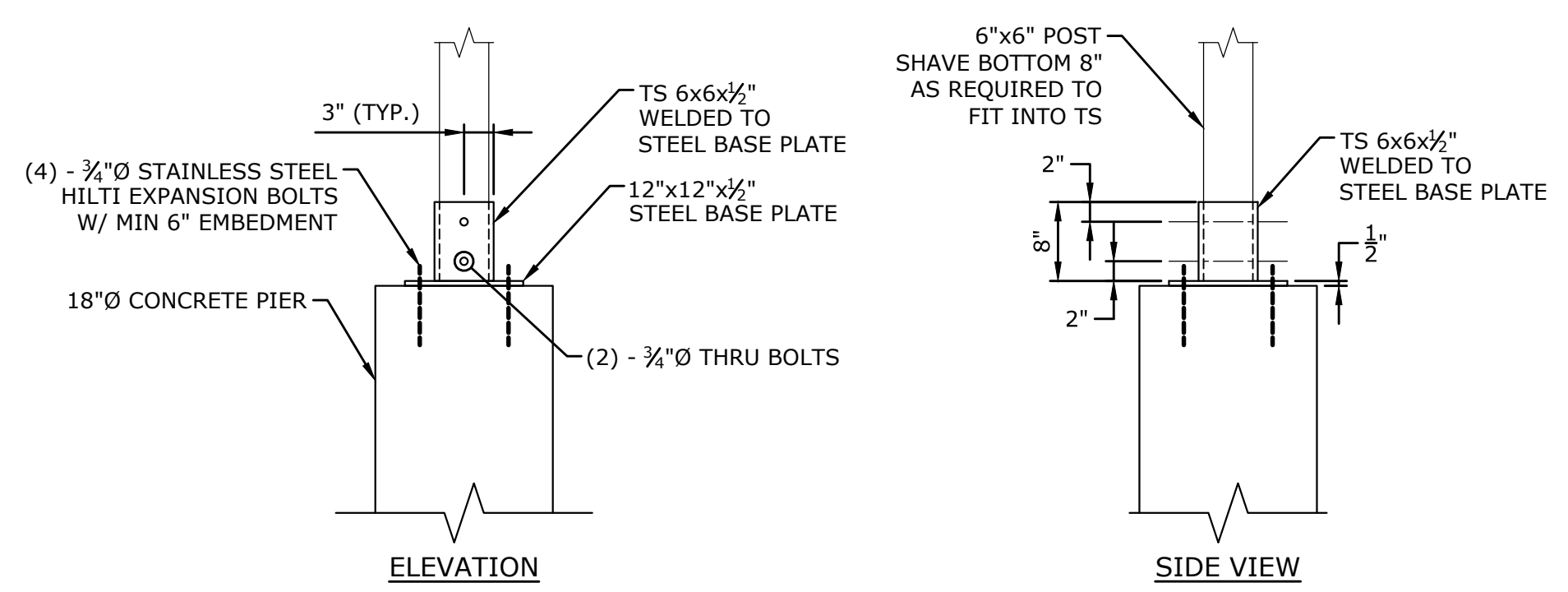
**SD-3**

SHEET NAME



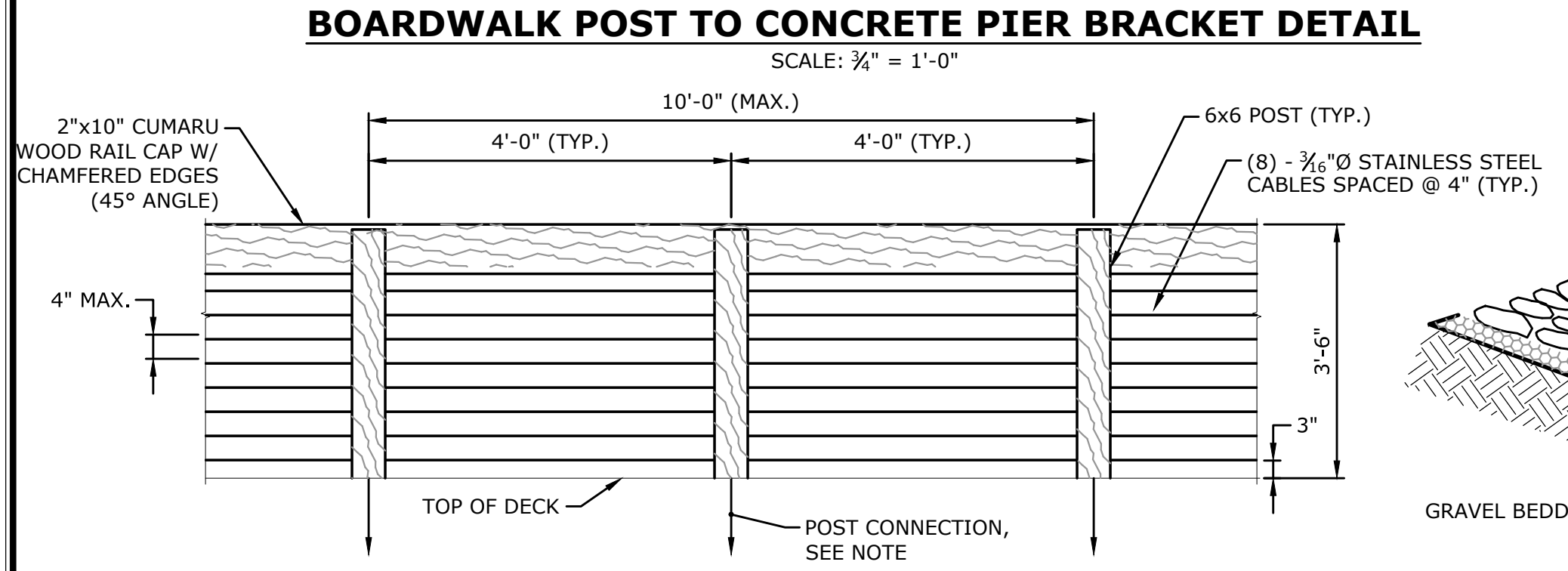
**CONCRETE PIER DETAIL**  
SCALE: 3/4" = 1'-0"

**NOTE:**  
FOR CONCRETE PIERS, REFER TO BORING DATA LOGS AND GEOTECHNICAL REPORT FOR OVER EXCAVATION REQUIREMENTS.



**BOARDWALK POST TO CONCRETE PIER BRACKET DETAIL**  
SCALE: 3/4" = 1'-0"

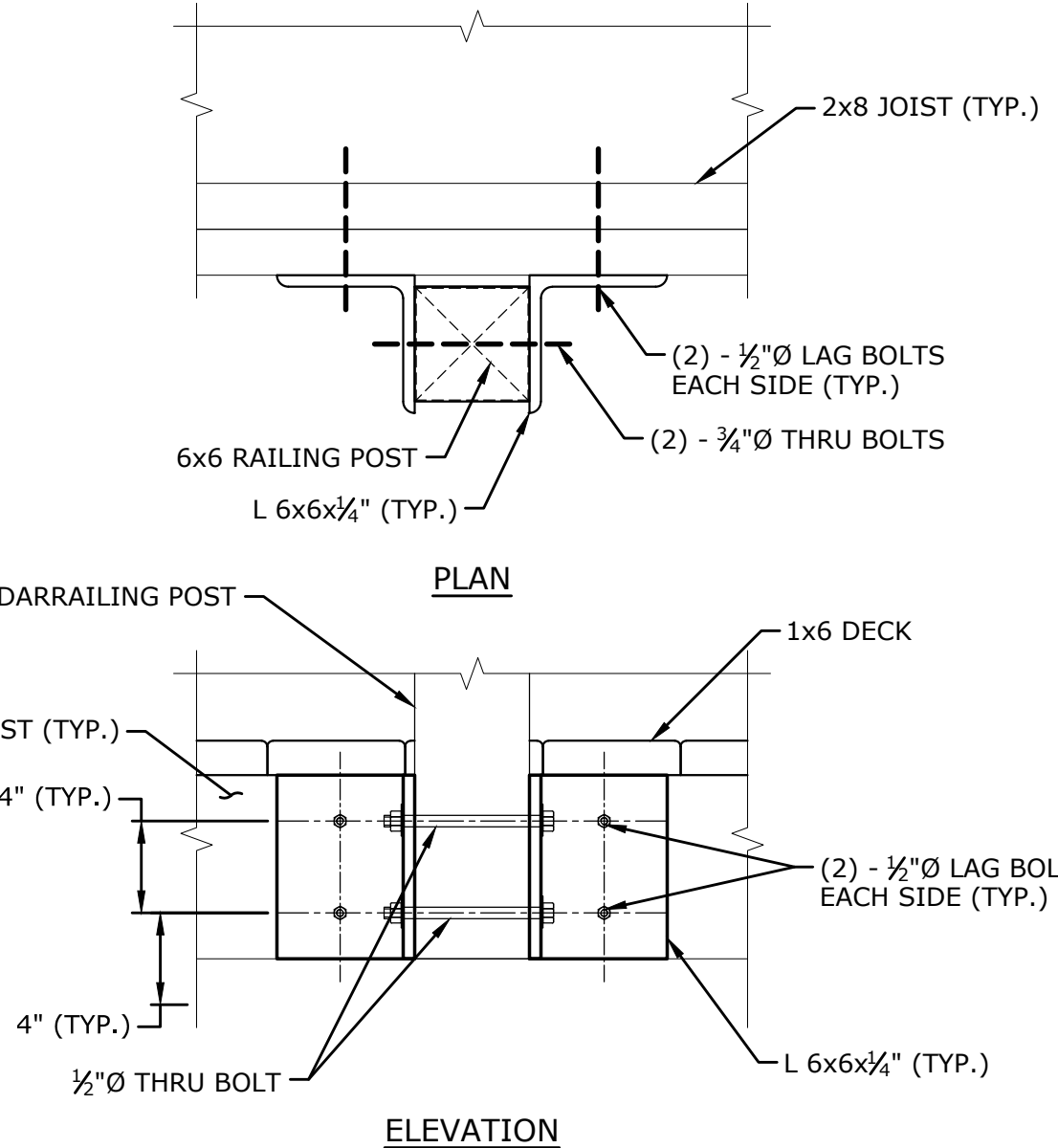
**NOTES**  
1. AFTER THE TS SECTION IS WELDED TO THE BASE PLATE, THE ENTIRE BRACKET IS TO BE HOT-DIPPED GALVANIZED.  
2. PROVIDE SHOP DRAWINGS FOR TRIM BOARD AND STEEL BRACKET FOR APPROVAL.



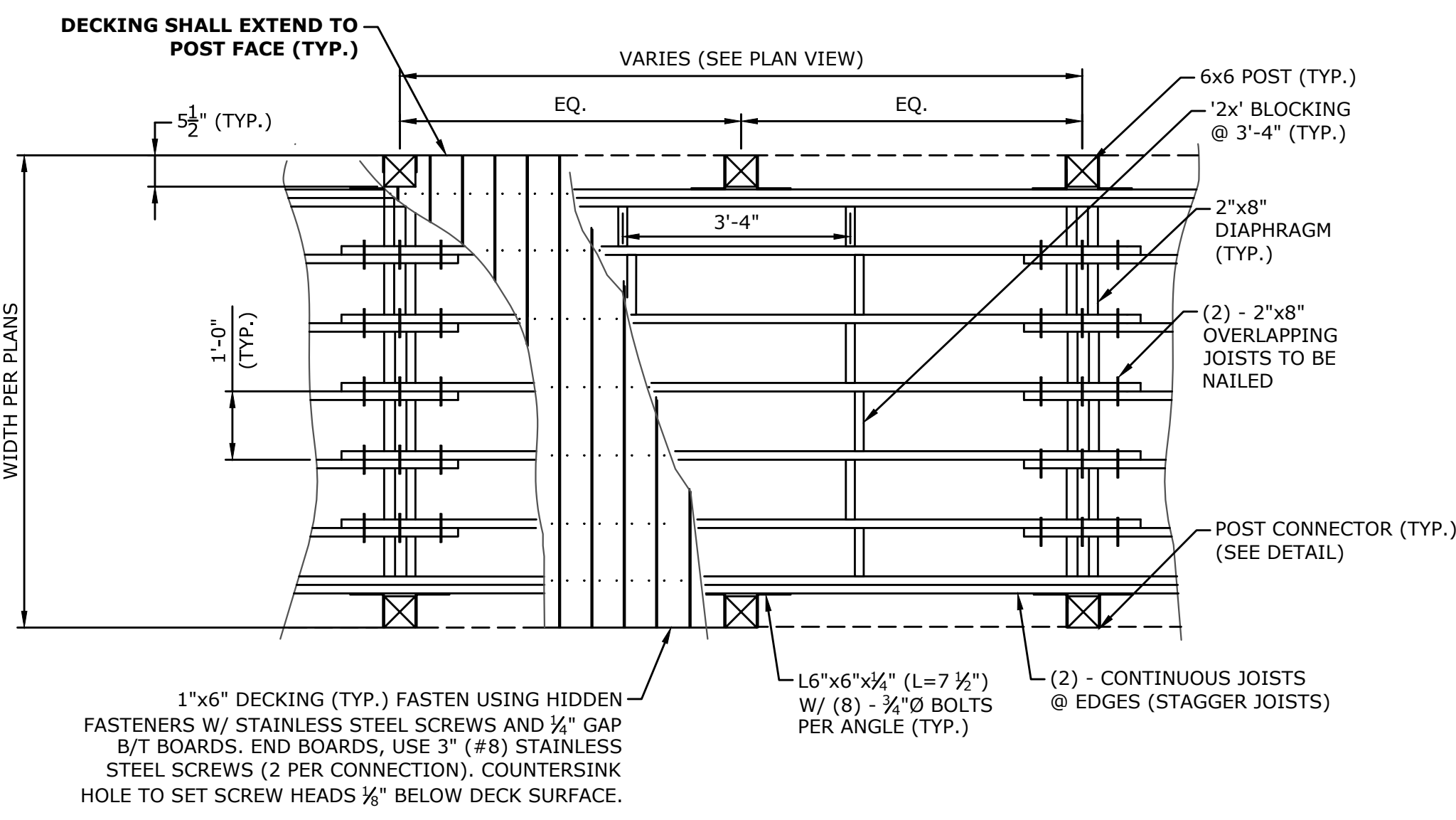
**TYPICAL RAILING ELEVATION**  
SCALE: 1/2" = 1'-0"

**TYPICAL AMPHTEATER OVERLOOK SECTION**

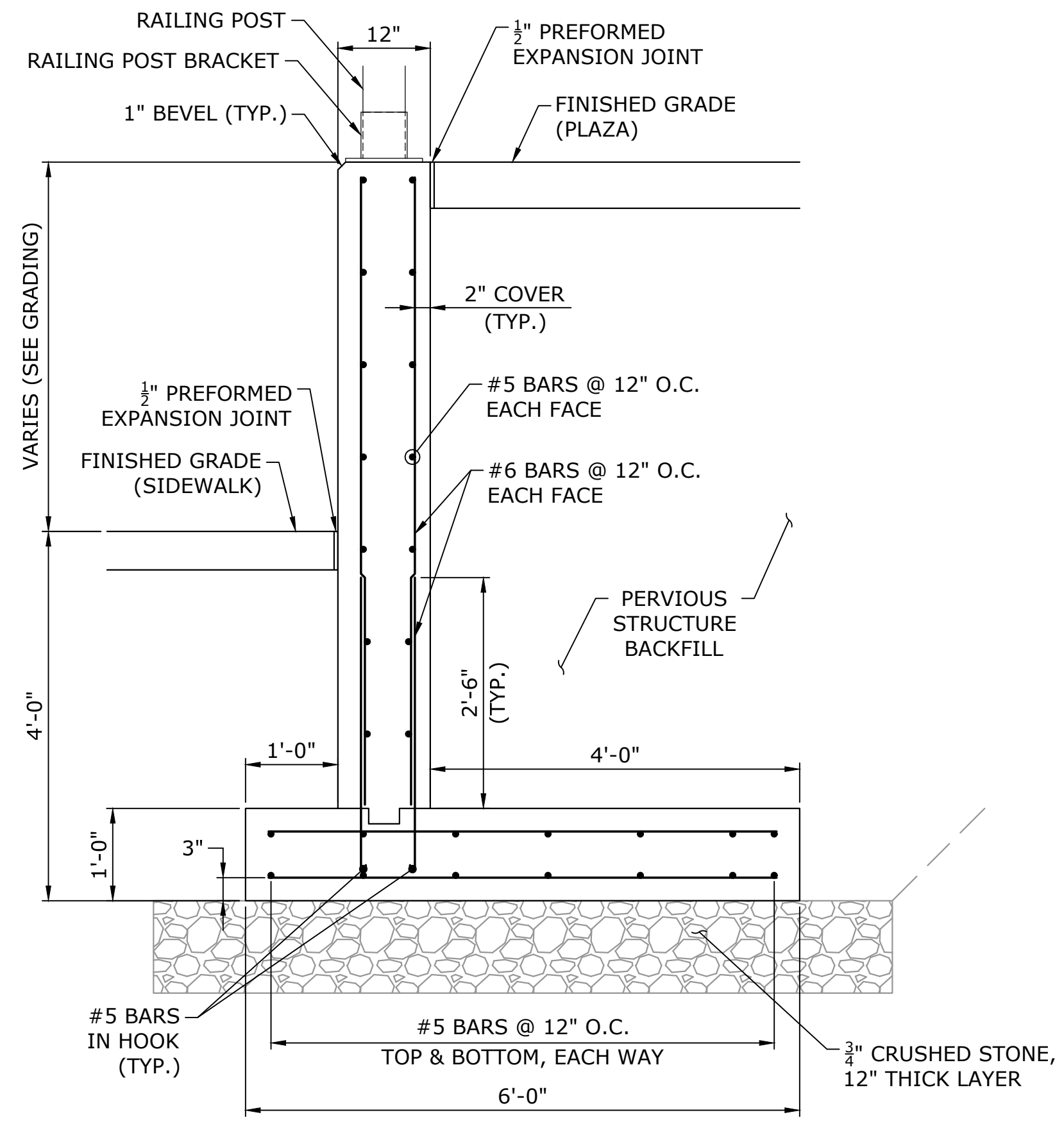
**NOTES**  
1. ALL POSTS AND TOP RAIL SHALL BE ACTUAL SIZE.  
2. ALL MEMBERS SHALL BE PRESSURE TREATED TIMBER, COLOR TO BE DETERMINED.  
3. ALL PRESSURE TREATED TIMBER SHALL BE NOMINAL SIZE.  
4. CROSS BRACE TIMBER PILE AS REQUIRED.  
5. ALL EXPOSED END OF POSTS AND RAILS SHALL BE 1" CHAMFERED (45°) EDGES.  
6. CABLES SHALL HAVE A CONNECTOR AT EVERY POST, AND CABLES SHALL NOT RUN THRU CENTER POSTS.  
7. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR APPROVAL.



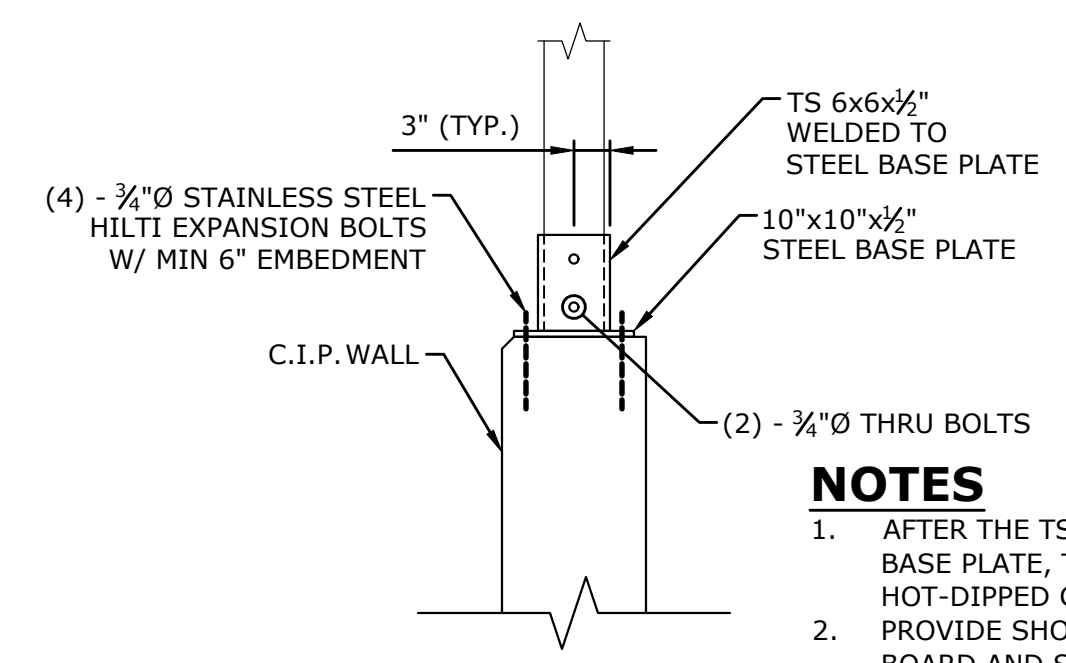
**INTERMEDIATE POST CONNECTION**  
SCALE: 1 1/2" = 1'-0"



**BOARDWALK DECK OVERLOOK FRAMING PLAN**  
SCALE: 1/2" = 1'-0"

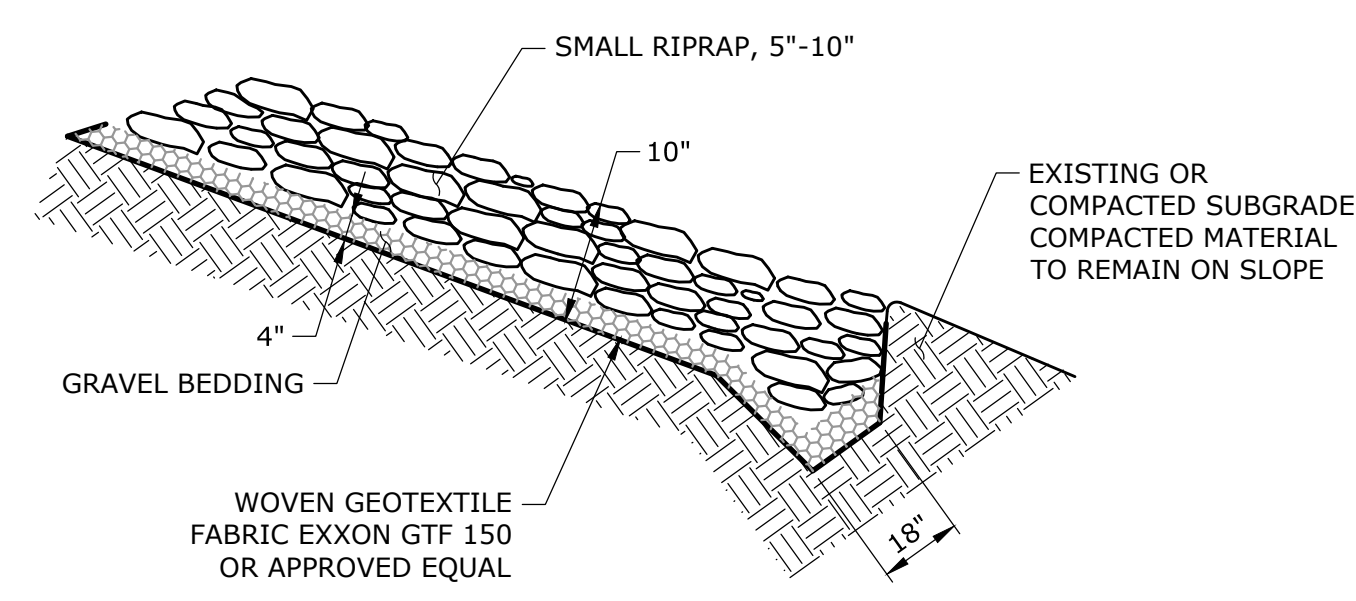


**TYPICAL C.I.P. WALL SECTION**  
SCALE: 3/4" = 1'-0"

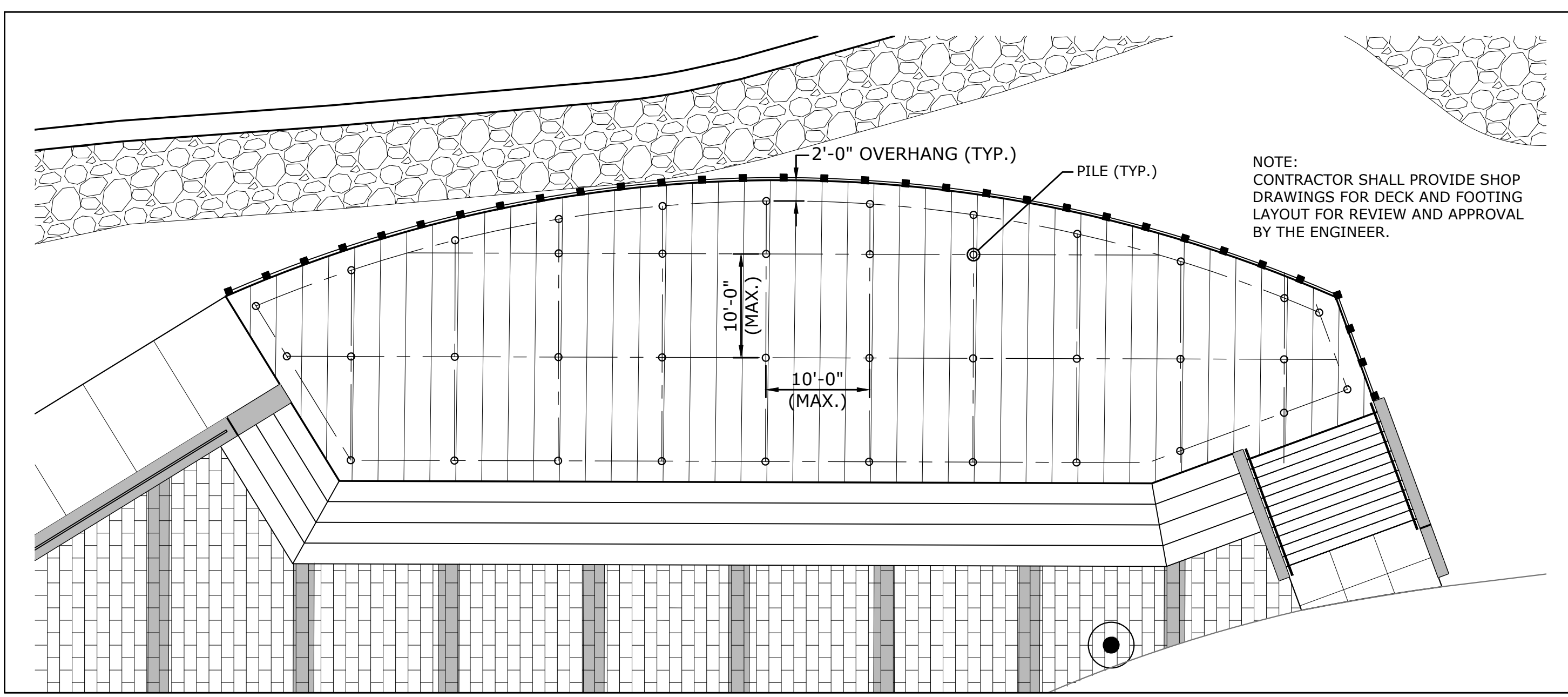


**RAILING POST BRACKET DETAIL**  
SCALE: 3/4" = 1'-0"

**NOTES**  
1. AFTER THE TS SECTION IS WELDED TO THE BASE PLATE, THE ENTIRE BRACKET IS TO BE HOT-DIPPED GALVANIZED.  
2. PROVIDE SHOP DRAWINGS FOR TRIM BOARD AND STEEL BRACKET FOR APPROVAL.



**RIPRAP AT BOARDWALK PLATFORM**  
NOT TO SCALE



**WOOD DECKING - FOOTING LAYOUT PLAN**  
NOT TO SCALE

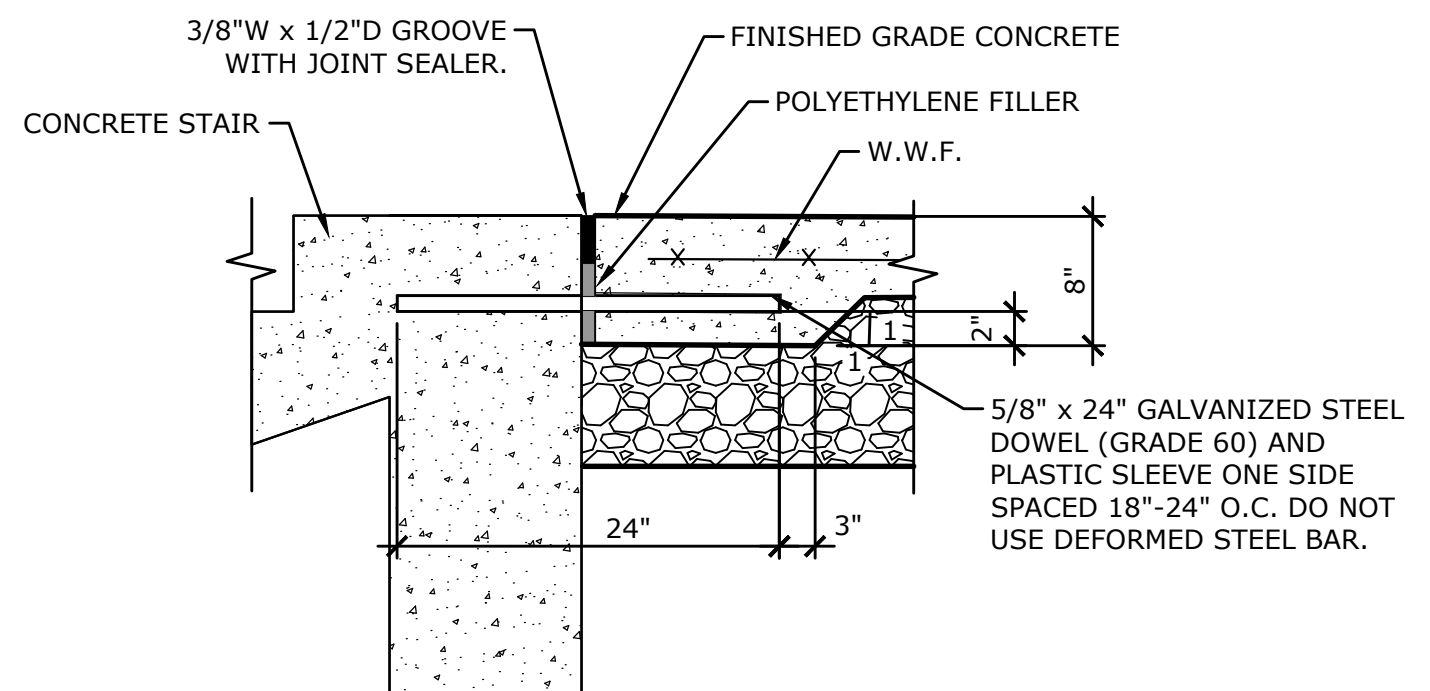


DESCRIPTION	DATE	BY
CONSTRUCTION DOCUMENTS	2026-02-27	JRH
UPDATED REVIEW SET	2026-03-27	JRH
ADDENDUM 02	MAY 11, 2026	SJS

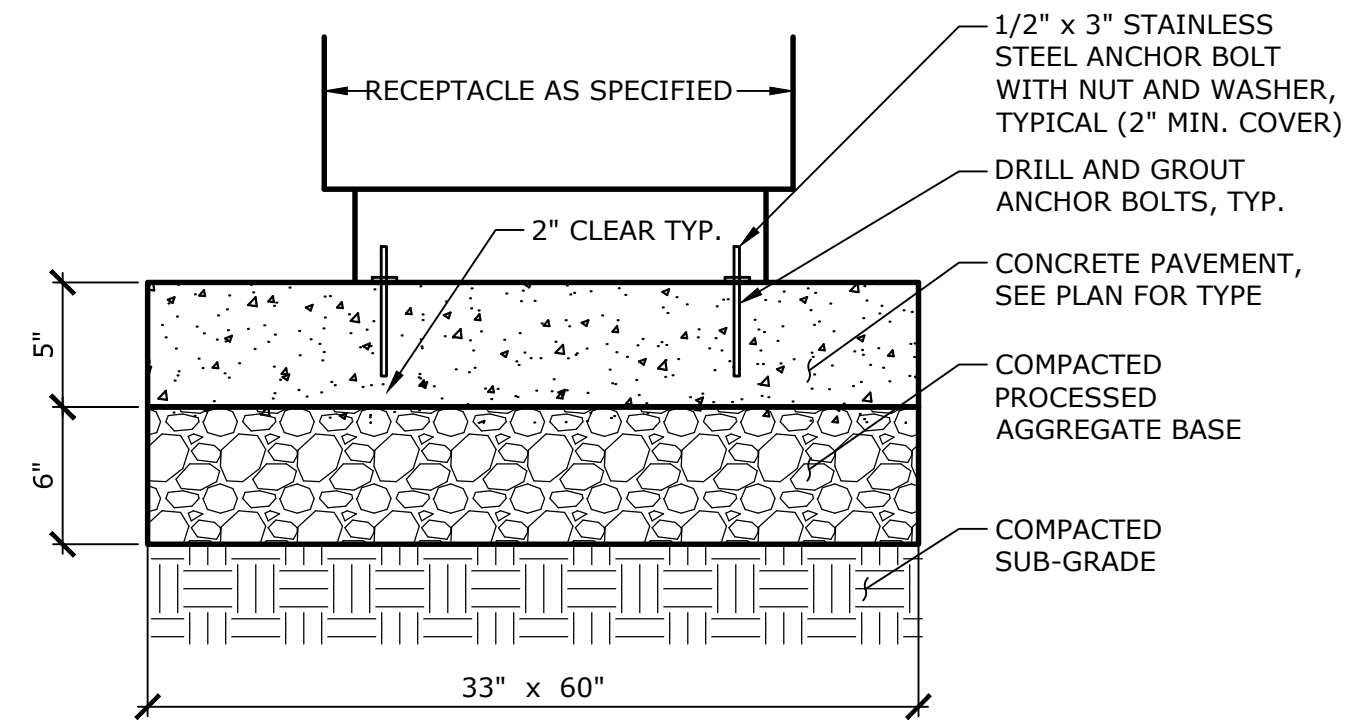
**SITE DETAILS - BID ALTERNATE 3 - WOOD DECK AND AMPITHEATER**  
RIVERWALK WEST FINAL PHASE  
SITE IMPROVEMENTS  
TAFT STREET  
PAWTUCKET, RHODE ISLAND

CONSTRUCTION DOCUMENTS - ISSUED FOR BID

BK	NP	NP
DESIGNED	DRAWN	CHECKED
AS NOTED		
DATE: APRIL 15, 2026		
PROJECT NO: 15842.00001		
SHEET NO: 16 OF 20		
<b>SD-4</b>		

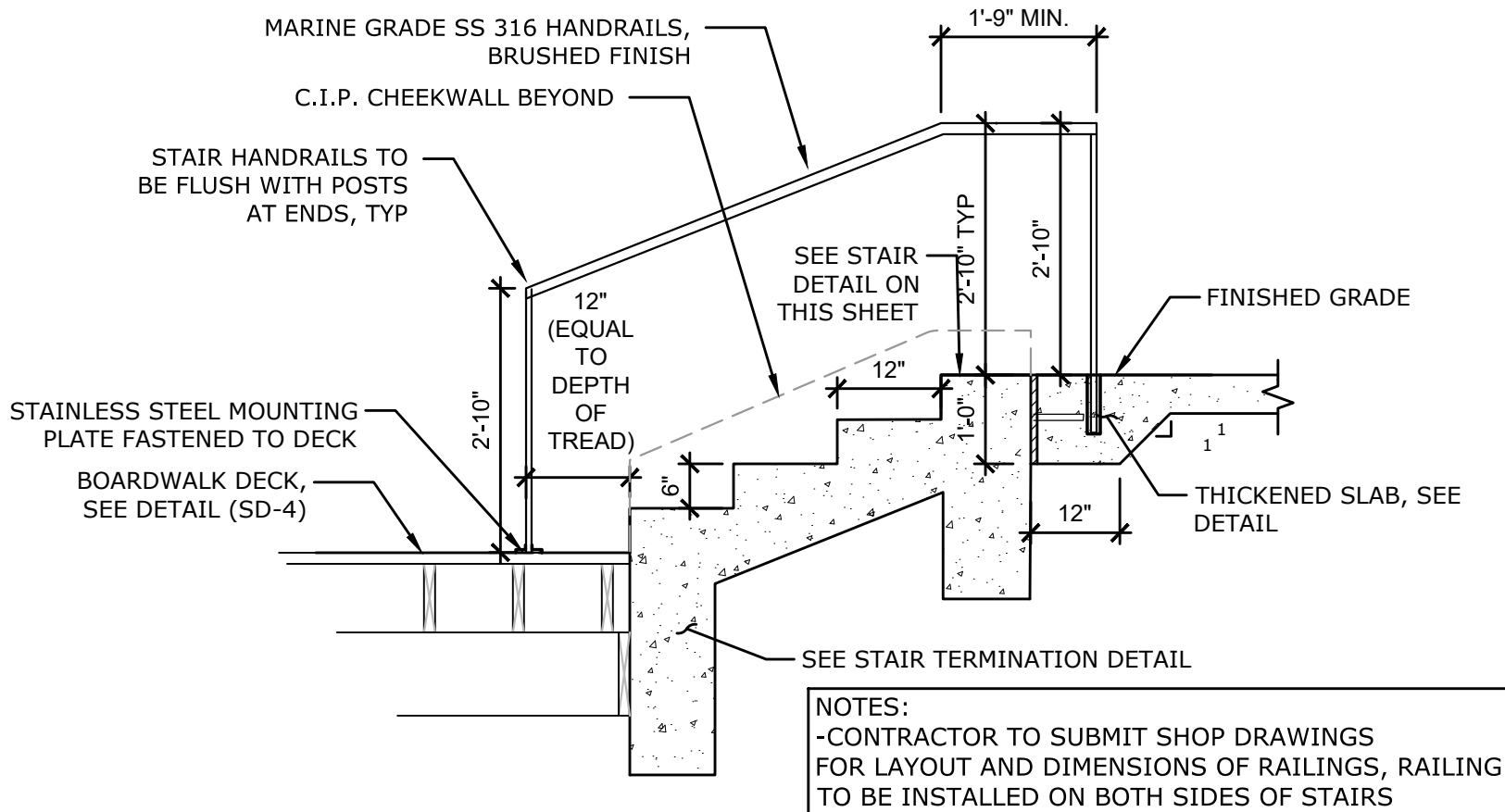


**THICKENED SLAB WITH DOWELLED EXPANSION JOINT**



- NOTE:**
1. INSTALL PER MANUFACTURER'S INSTRUCTIONS.
  2. PROVIDE PRODUCT DATA SHEET FOR RECEPTACLE AND COVER FOR APPROVAL.
  3. CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL MOUNTING HARDWARE.
  4. CLEAN EACH ANCHOR HOLE IN ACCORDANCE WITH EPOXY INSTRUCTIONS.
  5. USE EPOXY IN EPOXY GUN TO FILL EACH ANCHOR HOLES.
  6. INSERT ANCHOR INTO EACH ANCHOR HOLE SO ANCHOR TOP IS FLUSH AS DETAILED. ALLOW PROPER CURING TIME BEFORE INSTALLING TRASH RECEPTACLE.
  7. INSTALL EXPANSION JOINT WHERE PAD ABUTS EXISTING CONCRETE PAVEMENT.
  8. PITCH PAD TO DRAIN TOWARDS LAWN, AWAY FROM ADJACENT SIDEWALK

**CONCRETE PAD AND MOUNTING FOR TRASH AND RECYCLING RECEPTACLE**  
NOT TO SCALE



**HANDRAIL AT CONCRETE STAIR**  
NOT TO SCALE

**NYLOPLAST 12" DRAIN BASIN: 2812AG \_ \_ X**

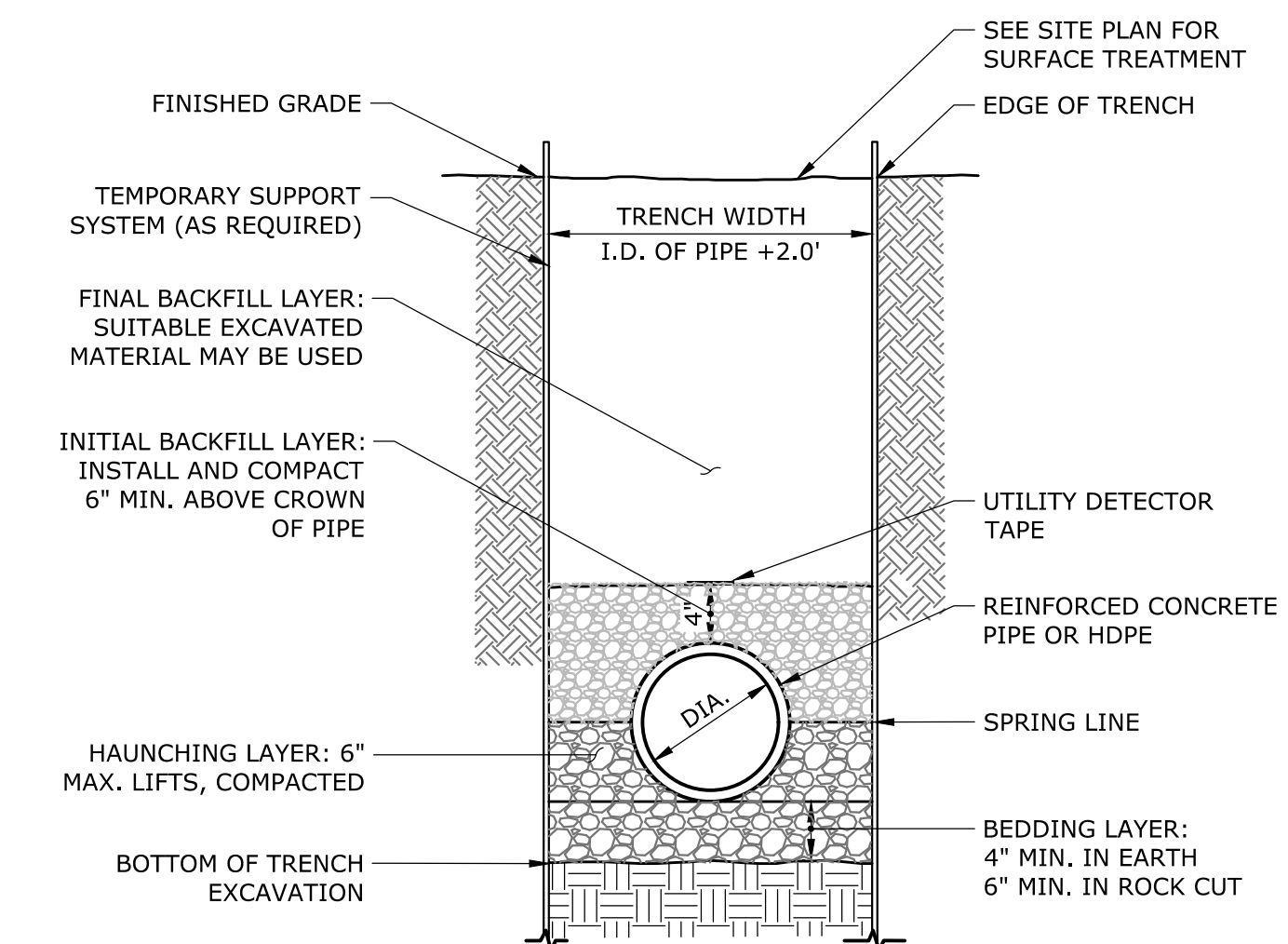
**TRAFFIC LOADS:** CONCRETE SLAB DIMENSIONS ARE FOR GUIDELINE PURPOSES ONLY. ACTUAL CONCRETE SLAB MUST BE DESIGNED TAKING INTO CONSIDERATION LOCAL SOIL CONDITIONS, TRAFFIC LOADINGS, & OTHER APPLICABLE DESIGN FACTORS. SEE DRAWING NO. 7001-110-111 FOR NON TRAFFIC INSTALLATION.

GRATE OPTIONS	LOAD RATING	PART #	DRAWING #
PEELER BRUSH	MEETS H-20	129902SP	7001-110-200
STANDARD	MEETS H-20	129902SS	7001-110-200
SOLID COVER	MEETS H-20	129902OC	7001-110-204
PEELER STRAIN BRONZE	N/A	129902PB	7001-110-205
STONE	129902SD	7001-110-206	
DROP IN GRATE	LIGHT DUTY	129901	7001-110-201

**13 IN DRAIN BASIN QUICK SPEC INSTALLATION DETAIL.**

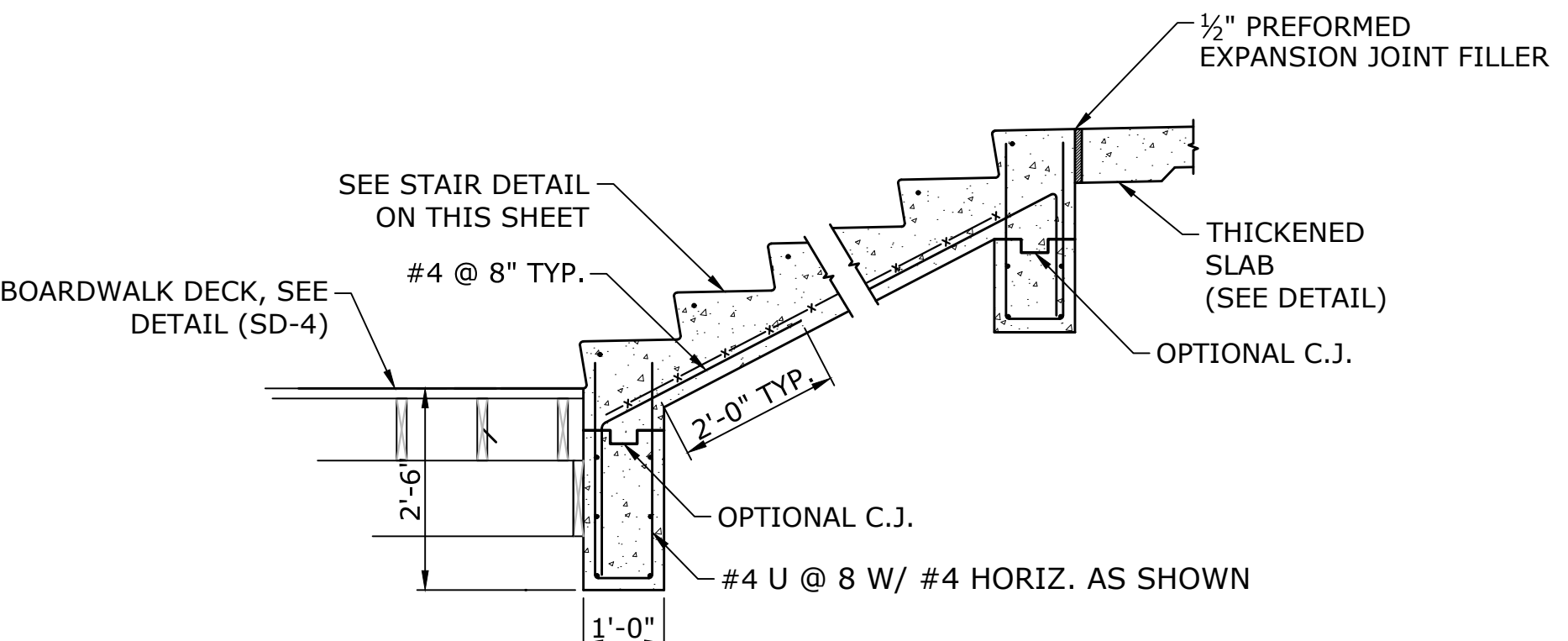
**NYloplast**  
3130 HERNDON AVE  
BURLINGTON, VA 22616  
PH (703) 832-2442  
FAX (703) 832-2499  
www.nyloplast.com

**TYPICAL AREA DRAIN (AD)**  
NOT TO SCALE

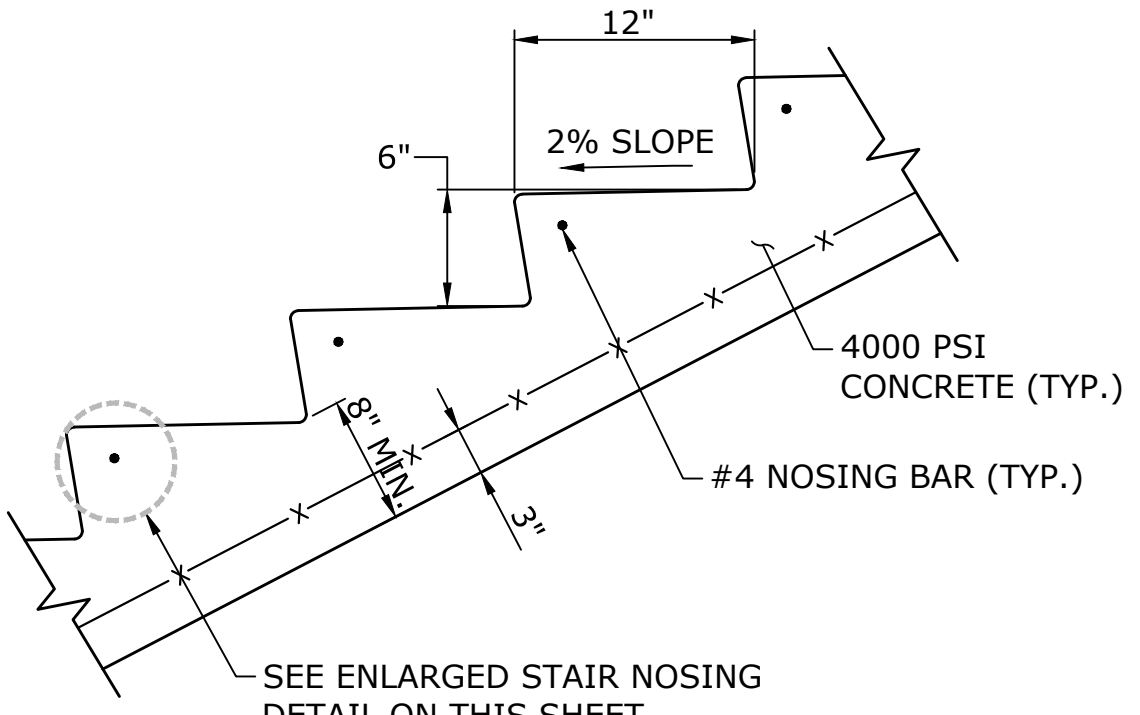


- NOTES:**
1. BACKFILL MATERIAL USED IN BEDDING, HAUNCHING, AND INITIAL BACKFILL LAYERS SHALL BE 3/4\"/>
  - 2. PAYMENT LIMIT FOR ROCK IN TRENCH TO BE PIPE DIAMETER + 3.0'

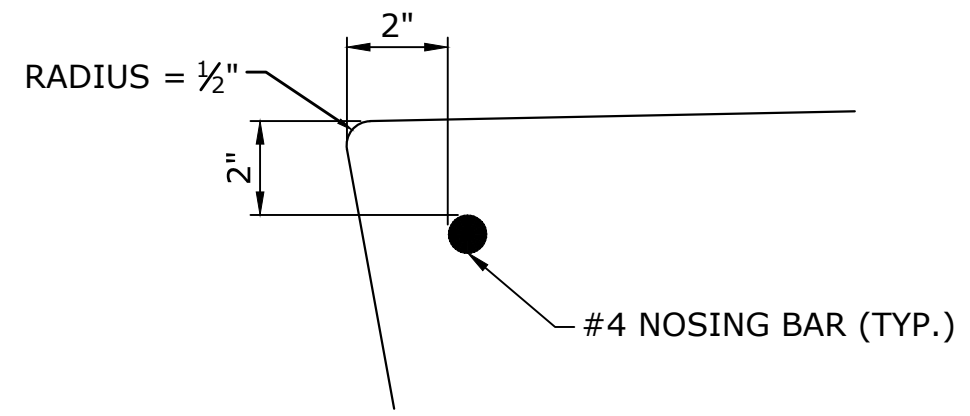
**STORM DRAINAGE TRENCH**  
NOT TO SCALE



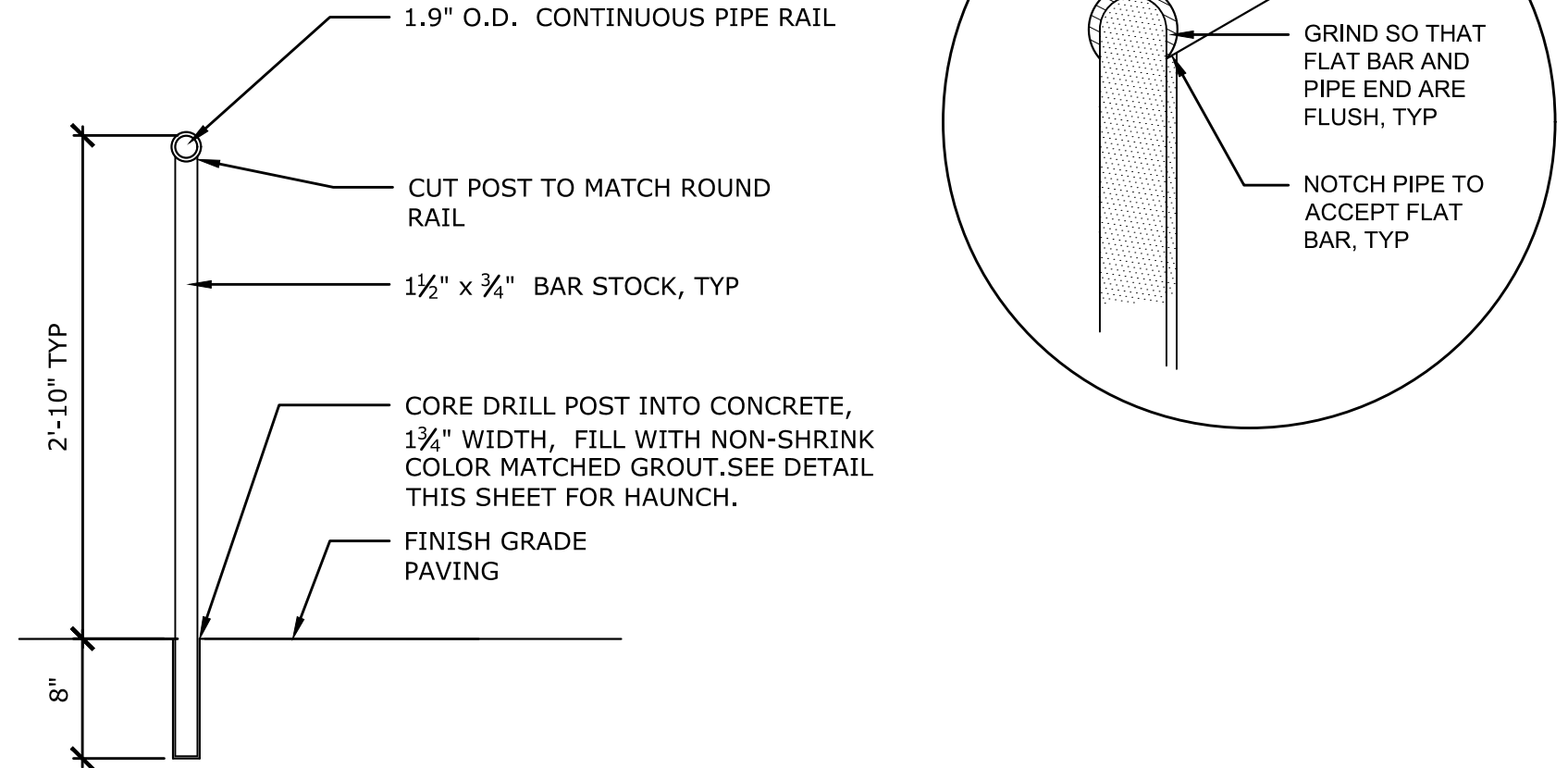
**STAIR TERMINATION DETAIL**  
SCALE: 1/2\"/>



**TYPICAL CONCRETE STAIR DETAIL**  
SCALE: 1\"/>

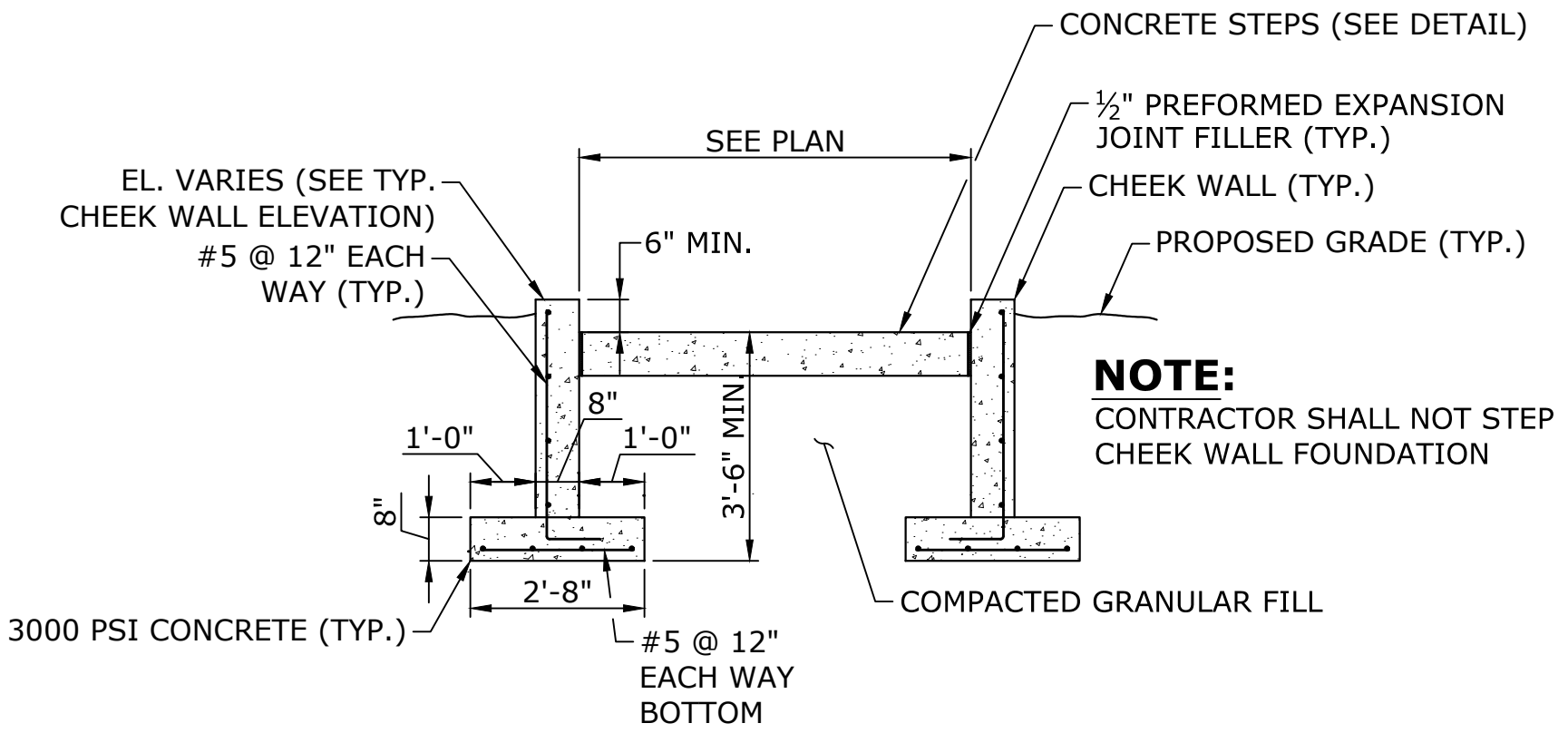


**TYPICAL STAIR NOSING DETAIL**  
SCALE: 3\"/>



- NOTES:**
1. FURNISH AND INSTALL 1.9\"/>
  - 2. ALL WELDS TO BE GRIND SMOOTH
  - 3. HANDRAIL TYPICAL BOTH SIDES OF STAIRS
  - 4. SUBMIT SHOP DRAWINGS FOR APPROVAL

**HANDRAIL AT STAIR-ELEVATION**  
NOT TO SCALE



**TYPICAL STAIR CHEEK WALL SECTION**  
SCALE: 3/8\"/>

- NOTE:**
1. ALL CHEEK WALLS TO HAVE STONE VENEER ON ALL EXPOSED SURFACES. STONE TO MATCH SITE WALLS. PROVIDE SAMPLES FOR APPROVAL.



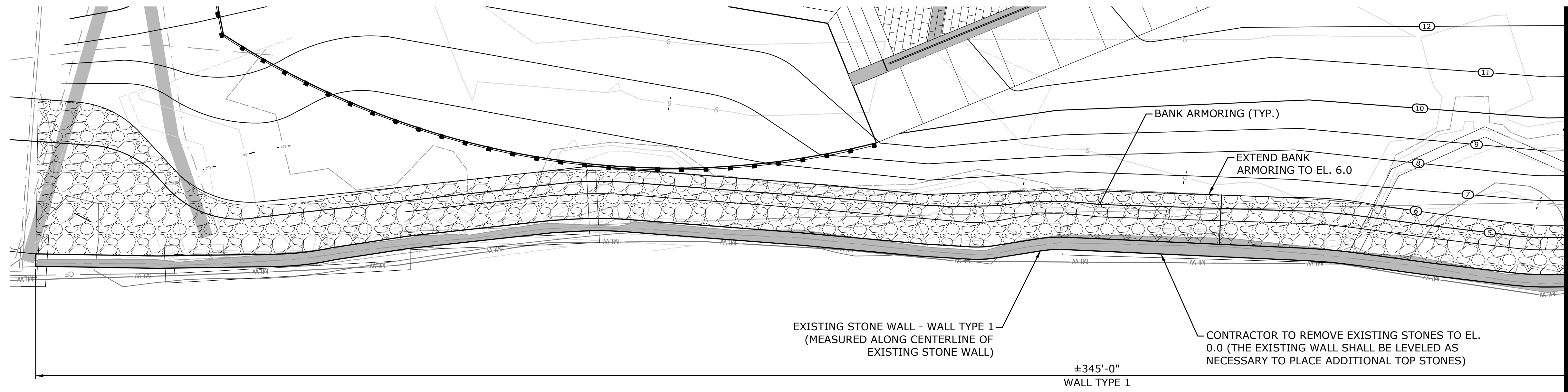
DESCRIPTION	DATE	BY
CONSTRUCTION DOCUMENTS	2026-02-27	JRH
UPDATED REVIEW SET	2026-03-27	JRH
ADDENDUM 02	MAY 11, 2026	JRH

**SITE DETAILS - BID ALTERNATE 3 - WOOD DECK AND AMPITHEATER**  
**RIVERWALK WEST FINAL PHASE**  
**SITE IMPROVEMENTS**  
TAFT STREET  
PANTUCKET, RHODE ISLAND

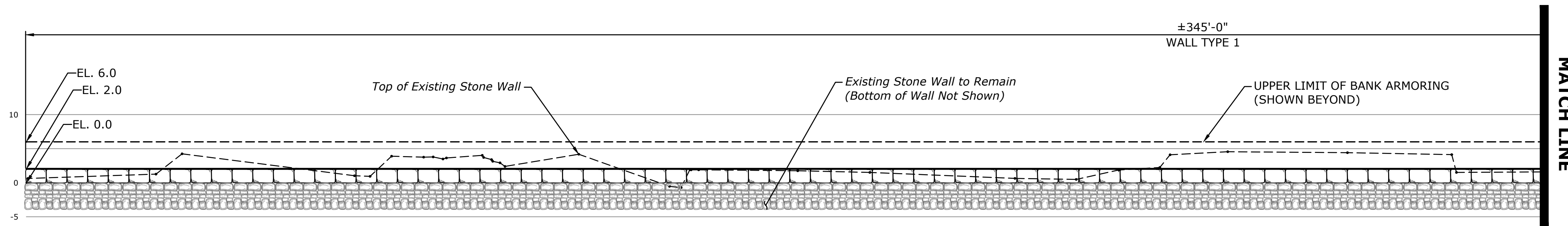
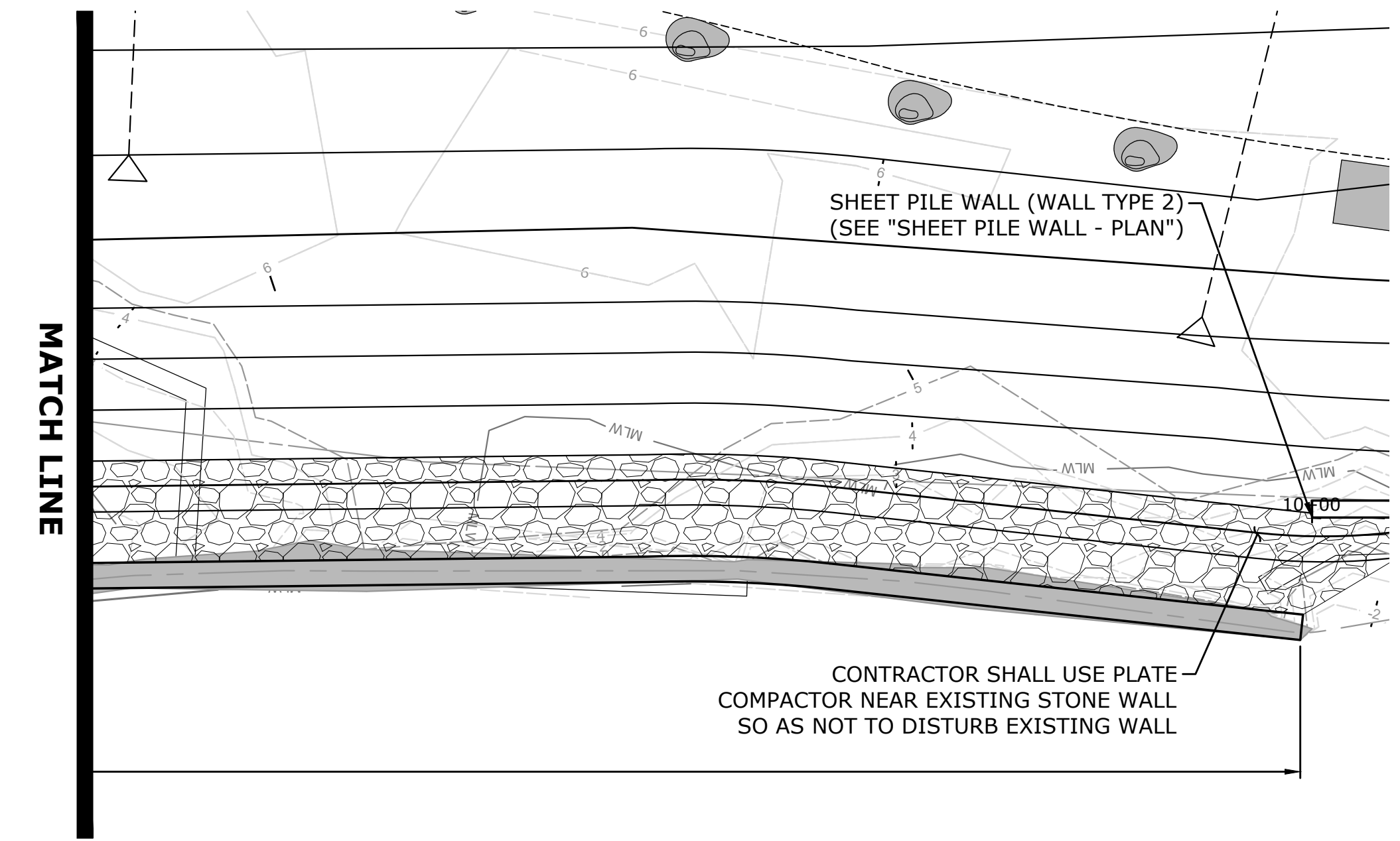
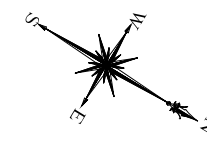
BK	PJP	BK
DESIGNED	DRAWN	CHECKED

SCALE: AS NOTED  
DATE: APRIL 15, 2026  
PROJECT NO.: 15842.00001  
SHEET NO.: 17 OF 20

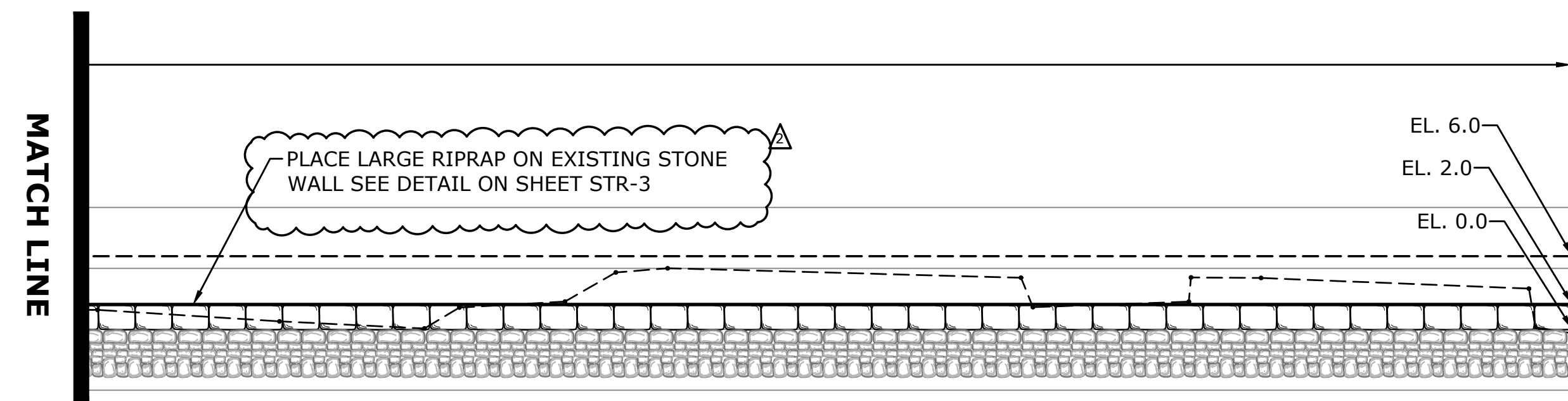
**SD-5**



**STONE WALL - PLAN  
(WALL TYPE 1)**  
SCALE: 1"=10'



**STONE WALL - ELEVATION  
(WALL TYPE 1)**  
SCALE: 1"=10'



DESCRIPTION	DATE	BY
CONSTRUCTION DOCUMENTS	2026-02-27	JRH
ADDENDUM 02	MAY 11, 2026	SFS

CONSTRUCTION DOCUMENTS - ISSUED FOR BID

**SITE STRUCTURAL DETAILS**  
RIVERWALK WEST FINAL PHASE  
SITE IMPROVEMENTS  
TAFT STREET  
PAWTUCKET, RHODE ISLAND

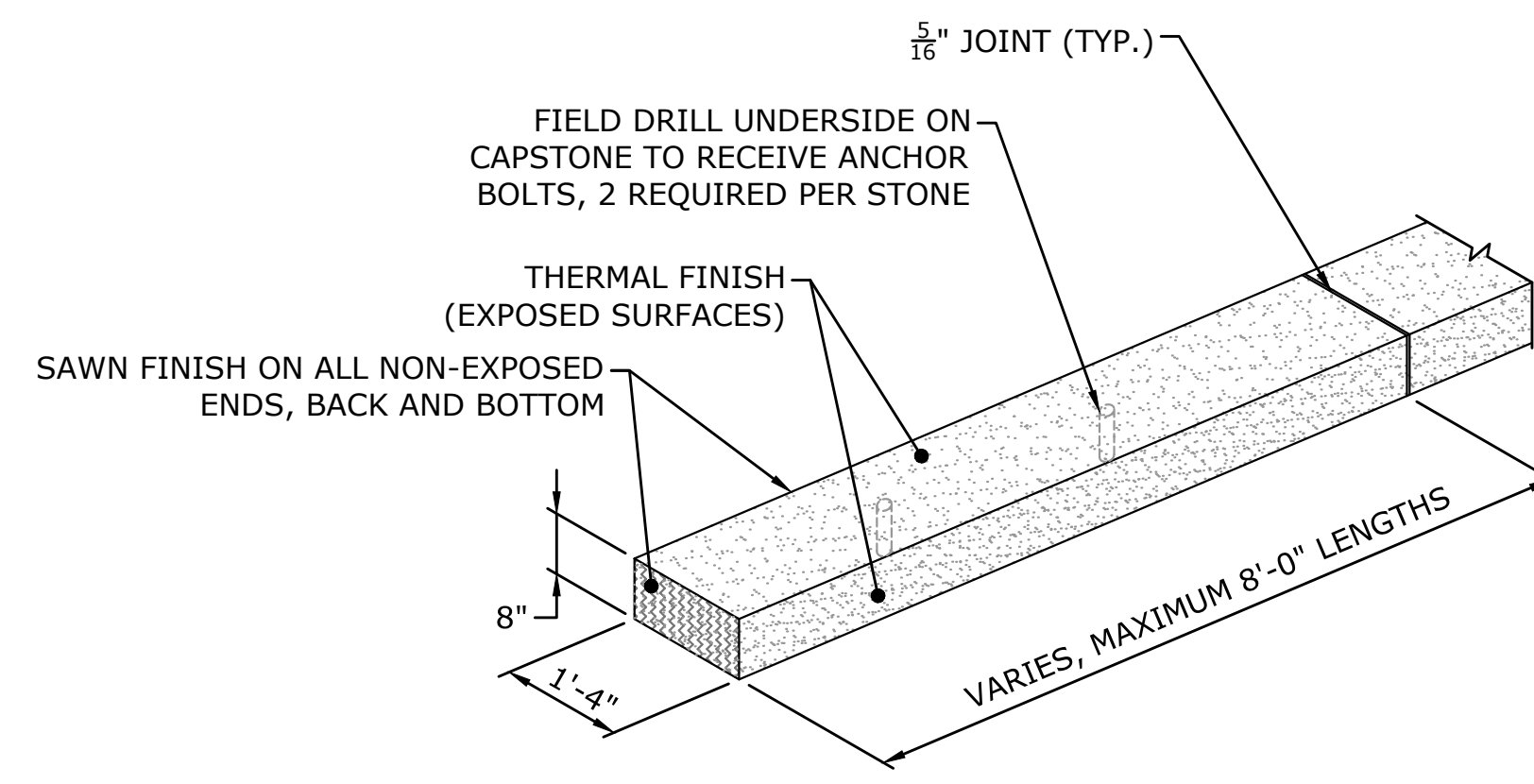
KP	PJP	BK
DESIGNED	DRAWN	CHECKED
AS SHOWN		
DATE: APRIL 15, 2026		
PROJECT NO.: 15842.00001		
SHEET NO.: 18 OF 20		

**STR-1**

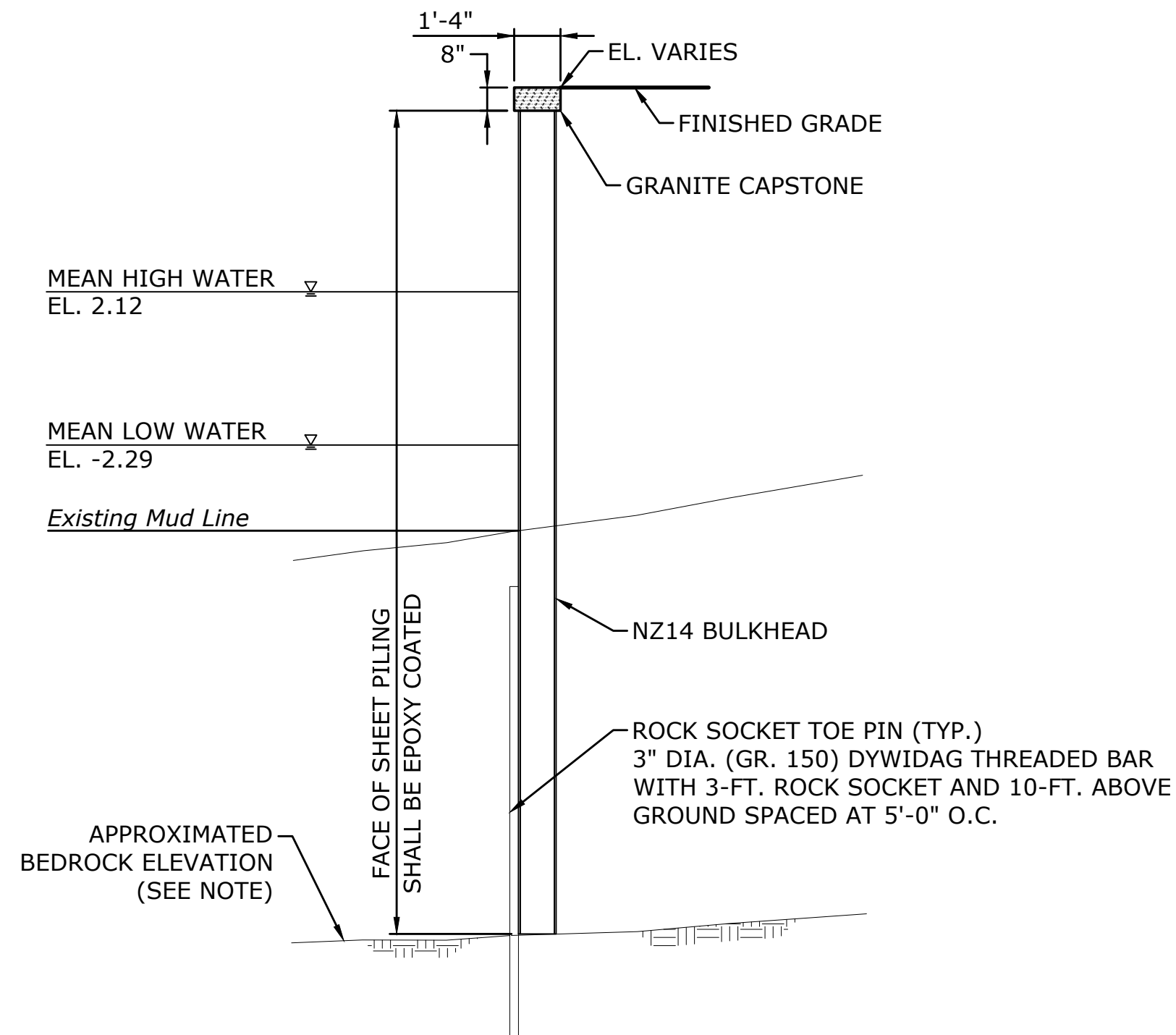


**SHEET PILING BULKHEAD NOTES:**

- SHEET PILING SHALL BE HOT-ROLLED STEEL SECTIONS CONFORMING TO ASTM A572 (OR EQUIVALENT). MINIMUM YIELD STRENGTH SHALL BE 50,000 PSI. INTERLOCKS SHALL BE FREE SLIDING, PROVIDE A SWING ANGLE SUITABLE FOR THE INTENDED INSTALLATION, AND MAINTAIN CONTINUOUS INTERLOCKING WHEN INSTALLED. SHEET PILING SHALL BE FULL-LENGTH SECTIONS OF THE DIMENSIONS SHOWN ON THE DRAWINGS. SPECIAL FABRICATED SECTION SHALL CONFORM TO THE REQUIREMENTS HEREIN AND THE PILING MANUFACTURER'S RECOMMENDATIONS.
- SHEET PILING SECTION PROPERTIES: PROVIDE INDICATED PILING MAKE AND SECTION OF EQUIVALENT. EQUIVALENT SECTIONS SHALL PROVIDE SAME OR GREATER OVERALL WALL SECTION AND MOMENT OF INERTIA ON A PER FOOT BASIS AND WILL HAVE A MINIMUM THICKNESS OF ALL ELEMENTS NO LESS THAN 0.48 INCHES.
- SHEET PILING SHALL BE DRIVEN TO A DEPTH INDICATED ON THE DRAWINGS TO WITHIN AN ALLOWABLE TOLERANCE OF 2". TOP OF PILE SHALL BE CUT WITH PLASMA CUTTER WITH A TOLERANCE OF ±1" FROM THE ELEVATION INDICATED ON THE DRAWINGS.
- BEFORE PROCEEDING WITH ANY WORK ON SITE, CONTRACTOR SHALL SUBMIT FOR ENGINEER REVIEW WRITTEN PROCEDURES/DRAWINGS INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
  - PILE HANDLING/DRIVING EQUIPMENT AND METHOD OF INSTALLATION.
  - MANUFACTURER'S MILL CERTIFICATION THAT MEETS OR EXCEEDS SPECIFIED STEEL REQUIREMENTS.
  - SHOP DRAWINGS THAT SHALL IDENTIFY PILE SECTION PROPERTIES AND WALL THICKNESS, PILE LENGTH PRIOR TO DRIVING, LOCATIONS AND TYPES OF WELDS, CORNER DETAILS, CLOSURE/TIE-IN DETAILS AT EXISTING SHEET PILE WALLS AND CUT-OFF ELEVATIONS.
- THE CONTRACTOR SHALL LOG EACH SHEET PILE AND MAINTAIN A RECORD WITH THE FOLLOWING INFORMATION:
  - DATE OF INSTALLATION.
  - LOCATION OF IDENTIFICATION MARKS.
  - HAMMER EQUIPMENT AND OPERATION.
  - LENGTH FROM TIP TO CUT-OFF.
  - CUT-OFF ELEVATION.
  - PLUMB (DEVIATION FROM VERTICAL, INCHES PER FOOT).
  - IF SHEET PILING ARE IMPACT DRIVING TO INDICATED TIP ELEVATION, RECORD BLOW COUNTS PER FOOT FOR THE LENGTH OF PILE DRIVEN.
  - COMPLETE LOGS AT THE END OF EACH DAY'S WORK AND IMMEDIATELY SUBMIT (3) LEGIBLE COPIES SIGNED BY THE CONTRACTOR'S REPRESENTATIVE TO THE PORT'S REPRESENTATIVE.
- PILE DRIVING HAMMERS: HAMMERS SHALL BE STEAM, AIR OR DIESEL DROP, SINGLE ACTING, OR VIBRATORY TYPES. THE HAMMER SHALL HAVE A DELIVERED ENERGY SUITABLE FOR THE TOTAL WEIGHT OF THE PILE AND THE CHARACTER OF SUBSURFACE MATERIAL TO BE ENCOUNTERED. IF UNABLE TO REACH PILE TIP ELEVATIONS, NOTIFY THE ENGINEER BEFORE PROCEEDING WITH PILE OPERATIONS.
  - SHEET PILING SHALL BE DRIVEN WITH THE PROPER SIZE HAMMER AND BY APPROVED METHODS SO AS NOT TO SUBJECT THE PILINGS TO DAMAGE AND TO ENSURE PROPER INTERLOCKING THROUGHOUT THEIR LENGTHS. DRIVING HAMMERS SHALL BE MAINTAINED IN PROPER ALIGNMENT DURING DRIVING OPERATIONS BY USE OF LEADS OR GUIDES ATTACHED TO THE HAMMER. A PROTECTIVE CAP SHALL BE EMPLOYED IN DRIVING WHEN USING IMPACT HAMMERS TO PREVENT DAMAGE TO THE TOPS OF THE PILINGS.
  - PILINGS DAMAGED DURING DRIVING OR DRIVEN OUT OF INTERLOCK SHALL BE REMOVED AND REPLACED AT NO ADDITIONAL COST TO OWNER. PILINGS SHALL BE DRIVEN WITHOUT THE AID OF A WATER JET.
- SHEET PILING SHALL BE PROVIDED AS ONE PIECE. NO SPLICES WILL BE ALLOWED.
- SHEET PILES SHALL BE CAREFULLY LOCATED AS SHOWN ON THE DRAWINGS. TEMPORARY WALES, TEMPLATES, OR GUIDE STRUCTURES SHALL BE PROVIDED TO ENSURE THAT THE PILINGS ARE PLACE AND DRIVEN TO THE CORRECT ALIGNMENT.
- WHERE DRIVEN SHEET PILES HAVE EXCEEDED SPECIFIED TOLERANCES, THE CONTRACTOR SHALL REMOVE SUCH PILES AND DRIVE SUBSTITUTE PILES AT NO ADDITIONAL COST TO OWNER. DETAILS OF SUBSTITUTE PILES SHALL BE APPROVED BY THE ENGINEER OF RECORD PRIOR TO INSTALLATION.
- ALL SHEET PILES SHALL BE ADVANCED TO THE MINIMUM TIP PENETRATION INDICATED IN THE CONTRACT DRAWINGS. ANY OBSTRUCTIONS ENCOUNTERED (EXISTING PILES, DEBRIS, BOULDERS) SHALL BE PRE-FORMED BY SPUDDING OR DRILLED THROUGH.
- THE CONTRACTOR SHALL REMOVE ALL SHEET PILE CUT-OFFS AND OTHER DEBRIS FROM THE JOB SITE.
- FRONT FACE OF SHEET PILING RIVER SHALL BE EPOXY COATED.
- ANY EPOXY COATED AREAS DAMAGED DURING STORAGE, HANDLING AND INSTALLATION SHALL RECEIVE A TOUCH-UP EPOXY COATING.
- WELDING SHALL CONFORM TO THE "STRUCTURAL WELDING CODE FOR STEEL", LATEST EDITION, AS ADOPTED BY THE AMERICAN WELDING SOCIETY (AWS). WELDING SHALL BE PERFORMED BY A WELDER CERTIFIED IN ACCORDANCE WITH AWS STANDARDS.

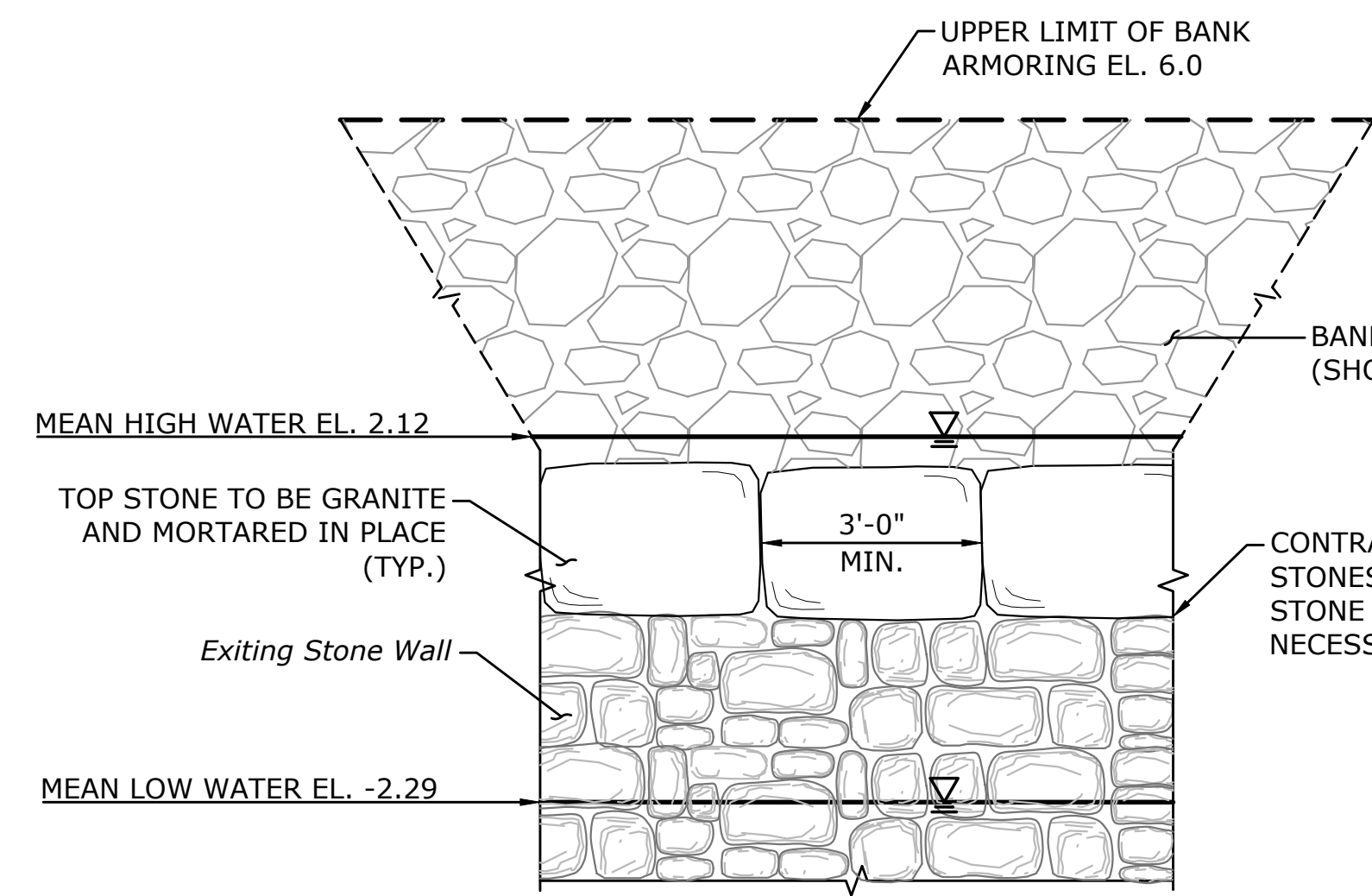


**GRANITE CAPSTONE DETAIL (WALL TYPE 2)**  
SCALE: 1/2" = 1'-0"

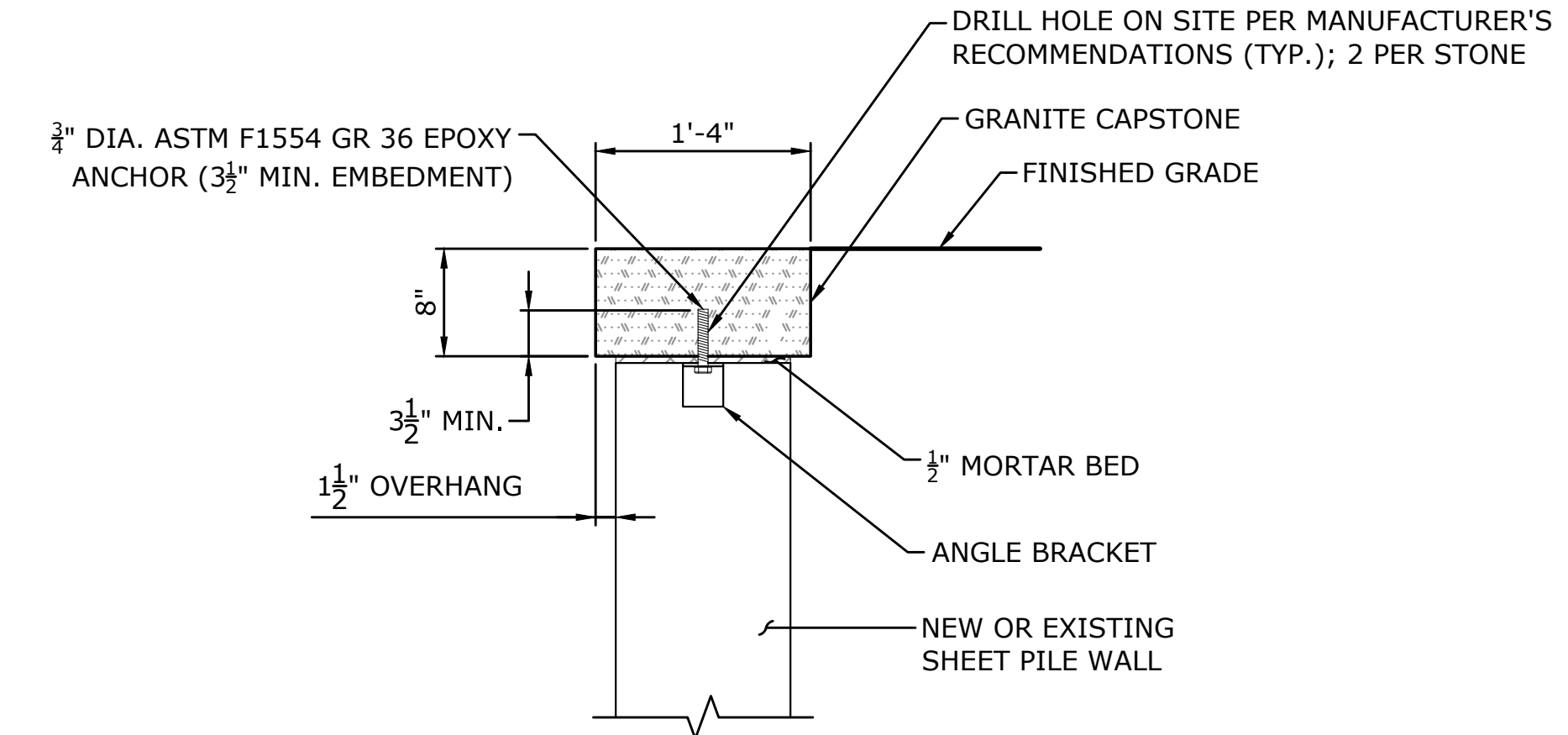


**TYPICAL SHEET PILE WALL - SECTION (WALL TYPE 2)**  
SCALE: 1/4" = 1'-0"

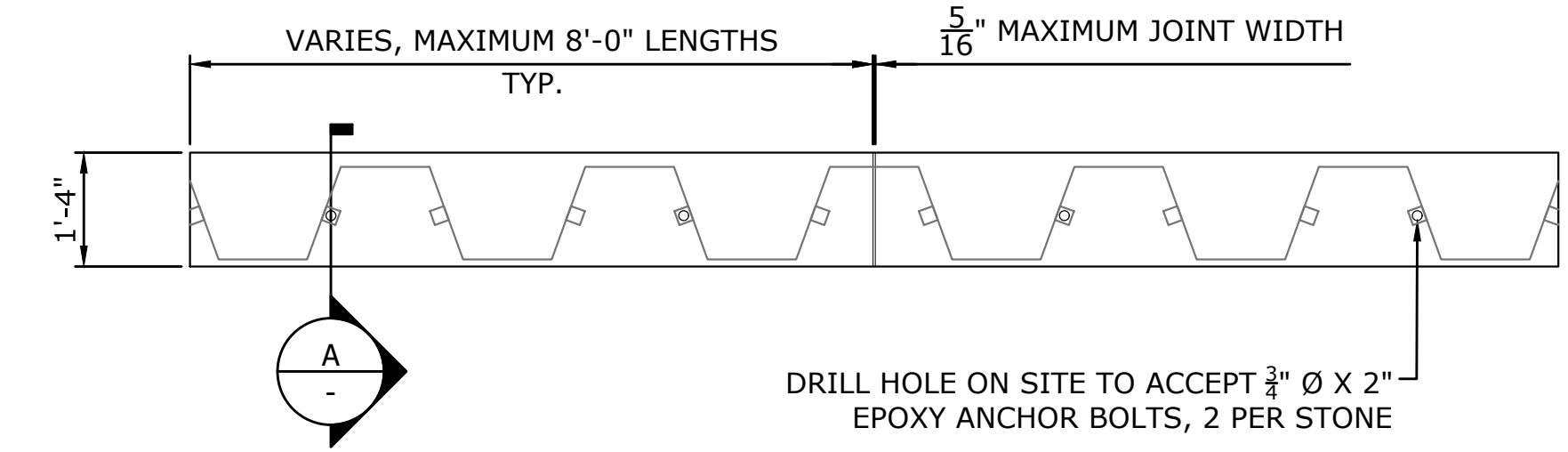
**NOTE:**  
IF BEDROCK IS ENCOUNTERED PRIOR TO TIP ELEVATION DURING INSTALLATION OF SHEET PILE WALL, THE CONTRACTOR SHALL INSTALL ROCK SOCKET TOE PIN AS SHOWN. IF NO BEDROCK IS ENCOUNTERED, THE SHEET PILE WALL SHALL BE DRIVEN TO THE ELEVATION SHOWN ON "SHEET PILE WALL - ELEVATION".



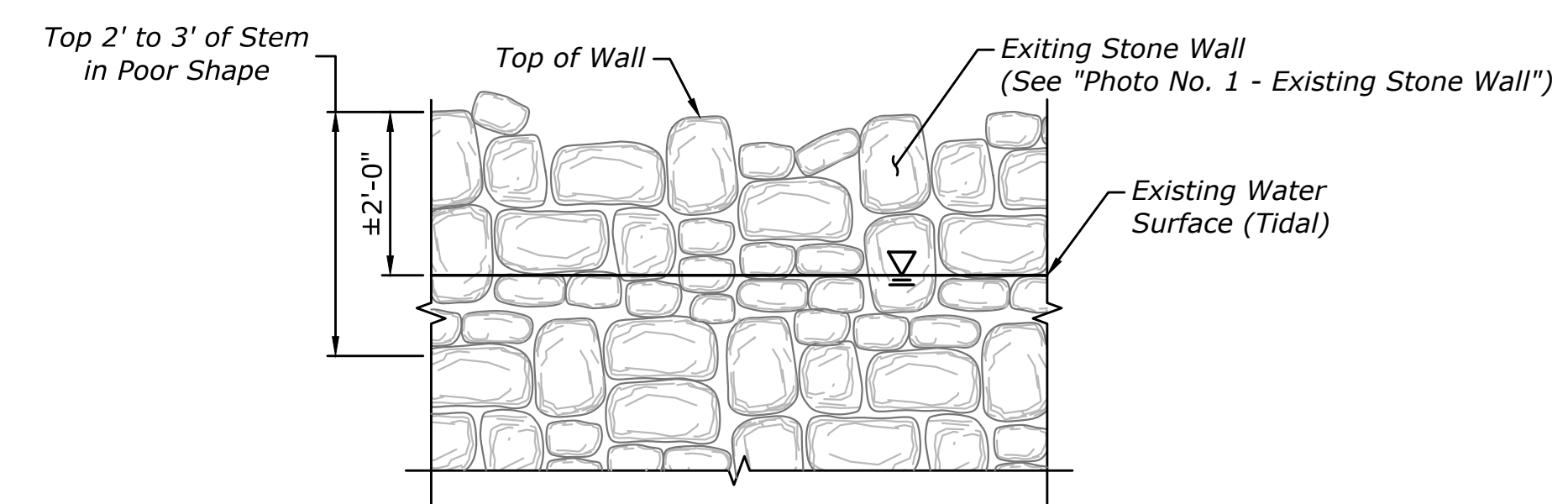
**STONE WALL - ELEVATION (WALL TYPE 1)**  
SCALE: 1/2" = 1'-0"



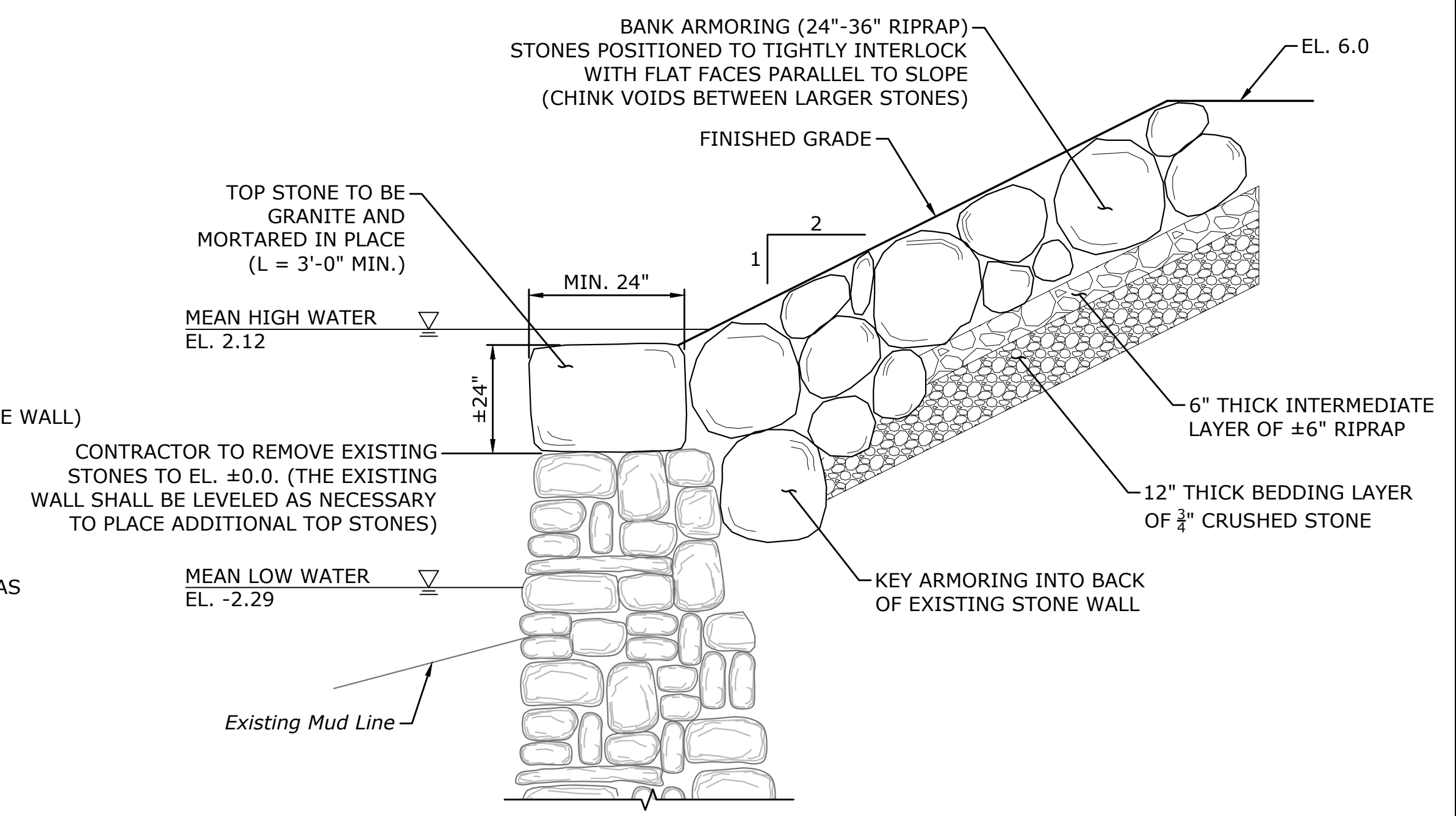
**SECTION A**  
SCALE: 1/2" = 1'-0"



**GRANITE CAPSTONE ON SHEET PILE WALL (WALL TYPE 2)**  
SCALE: 1/2" = 1'-0"



**EXISTING STONE WALL - ELEVATION**  
SCALE: 1/2" = 1'-0"



**STONE WALL - SECTION (WALL TYPE 1)**  
SCALE: 1/2" = 1'-0"



DESCRIPTION	DATE	BY
CONSTRUCTION DOCUMENTS	2026-02-27	JRH
ADDENDUM 02	MAY 11, 2026	SFS

CONSTRUCTION DOCUMENTS - ISSUED FOR BID

**SITE STRUCTURAL DETAILS**  
RIVERWALK WEST FINAL PHASE  
SITE IMPROVEMENTS  
TAFT STREET  
PAWTUCKET, RHODE ISLAND

KP	PJP	PJP
DESIGNED	DRAWN	CHECKED

AS SHOWN  
DATE: APRIL 15, 2026  
PROJECT NO.: 15842.00001  
SHEET NO.: 20 OF 20

**STR-3**

**Attachment C: Section 31 30 00, Earthwork (revised p. 3)**

**PART 1 - GENERAL**

## 1.1 SUMMARY

- A. The proposed redevelopment activities addressed under this Section pertain to the City of Pawtucket parcel (Town Landing/Riverwalk area), which is a portion of the overall Tidewater Landing project included in the Remedial Action Work Plan (RAWP) Steps 4. Work within this parcel includes site preparation and earthwork required to support Step 4 described in the RAWP as Construction of the Riverwalk portion of the Subject Site, including grading, landscaping areas, and pedestrian connection from Town Landing northward toward the stadium riverwalk system. These activities occur within an area identified on the Project Plans and identified by the RAWP as containing widespread historic fill, requiring implementation of engineered controls during earthwork and development.
- B. The overall Tidewater Landing project includes the completed Stadium on the southern portion of the development which was the former NGRID Site, and the Subject Parcel owned by the City of Pawtucket subject to the RAWP that includes this phase of work with the Riverwalk improvements and preparation for the final mixed use development.
- C. Work under the Section includes all materials, labor, equipment, and services necessary to complete earthwork associated with the Riverwalk construction and preparation of the future mixed-use development, including excavation, on-site soil management, grading, backfilling, placement of engineered controls, and all related activities. All such work shall be performed in accordance with the RIDEM approved RAWP, and the RIDEM Remedial Approval Letter.
- D. The Contractor shall perform the work of this section as shown on the Project Plans, as specified, and as required by job conditions, subject to the environmental requirements of the RAWP and RIDEM RAL, including, but not limited to the following:
1. Stripping, clearing, grubbing and removal of all organic material, topsoil, and subsoil within the portions of the site to be developed. Stripped topsoil shall be stockpiled onsite at locations designated by the Engineer and managed as Controlled Material unless demonstrated otherwise, in accordance with the RAWP. Off-site disposal or reuse is not permitted without RIDEM approval.
  2. Soil and rock excavation, rock and boulder removal, trench excavation, subgrade preparation, proof compaction, backfill placement, grading, and compaction required for Riverwalk improvements. All excavation involving Controlled Materials shall be performed under Environmental Professional (EP) oversight to be provided by the City, following the RAWP for excavation, handling, and dust control requirements. Dewatering is not anticipated per RAWP findings; if encountered, work shall stop and the EP or City shall be notified immediately.
  3. Soil Management:
    - a. All existing soils on the parcel are considered Controlled Materials and shall be managed in accordance with the RAWP.
    - b. All Controlled Materials shall remain onsite and be reused below approve engineered controls (impervious caps, Type 1 or 2 soil caps).

- c. No relocation or disposal of Controlled Materials offsite is permitted unless approved RIDEM and supported by waste characterization.
4. Crushing and processing of existing boulders, concrete, and other on-site materials to meet gradation criteria for on-site re-use provided such material is not mixed with Controlled Materials and is allowable by RAWP.
5. Import of Common Borrow and other backfill materials, if required, shall comply with RAWP clean fill acceptance criteria. Imported fill shall meet RIDEM Method 1 RDEC and testing frequency requirements.
6. Placement and spreading of loam or topsoil required for final Type 1 or Type 2 engineered soil caps in accordance with RAWP Section 4.2.
7. Removal and legal off-site disposal shall be limited to non-soil solid waste debris only (e.g., concrete, timber, metal, glass, asphalt) in accordance with the RAWP and RAL. Controlled Materials (soil) shall not be removed from the Site except under RIDEM approved conditions.
8. Preparation of as-built subgrade surveys as specified in Section 1.9, including documentation required to confirm engineered control elevations for RAWP compliance.

## 1.2 RELATED WORK

- A. The General Provisions of the Contract, including General and Supplementary Conditions, apply to the work specified in this Section.
- B. Examine all Specifications for requirements affecting work under this Section, including all RAWP driven environmental controls integrated into Sitework, Earthwork, and Riverwalk components.
- C. Coordinate work with trades affecting or affected by this Section to maintain consistent progress and prevent disturbance of engineered controls and temporary caps required under the RAWP.
- D. Related work specified in other Sections:
  1. Section 31 23 00 – Temporary Sediment and Erosion Control
  2. Section 32 90 00 – Topsoil, Seeding, and Sodding
  3. Section 02 61 15 – Controlled Material Handling
  4. Section 02 61 16 – Waste Stockpile Area (WSA)
  5. Section 02 61 17 – Demarcation Layer

## 1.3 DEFINITIONS

- A. Owner: City of Pawtucket
- B. Property Owner:
  1. City of Pawtucket

- C. Site/Civil Engineer and Landscape Architecture: SLR Consulting Limited, 45 Glastonbury Boulevard, Glastonbury, CT 06033, (860) 400-5860
- D. Excavation: removal of material encountered to subgrade elevations indicated on subsequent placement, management, and reuse of such materials onsite, consistent with the requirements of the RAWP, and RIDEM RAL. All excavated soil shall be treated as Controlled Materials unless otherwise demonstrated.
- E. Unauthorized excavation: removal of materials beyond indicated subgrade elevations or dimensions without explicit direction of the Engineer. Unauthorized excavation shall be at the Contractor's expense. Corrective actions must comply with RAWP requirements where Controlled Materials are present.
- F. Subgrade: The undisturbed soil or properly compacted soil layer at footing bearing elevations or immediately below subbase of slabs, walks, pavement, lawn areas, or landscaped beds.
- G. Structure: buildings, foundations, slabs, tanks, curbs, or other manmade stationary features occurring above or below ground surface.
- H. Structure Area (Building Area) is the area below structures defined by a line extending downward and outward at a 1 vertical to 1 horizontal from 5 feet outside the edge of exterior footings.
- I. Unsuitable material: on-site materials that are improper gradation, contain excessive fines, organic matter, debris, or otherwise fail to meet the requirements for reuse. Unsuitable Controlled Materials shall not be disposed of offsite except as permitted by RIDEM. Such materials must be managed and reused beneath approved engineered caps in accordance with the RAWP Sections 4.2.3 to 4.2.5.
- J. Area of Environmental Concern (AOEC): The entire Site identified by RIDEM as containing widespread urban fill with contaminant concentrations requiring risk-based controls. All earthwork activities occur within an AOEC and must follow RAWP requirements.
- K. Controlled Materials: Soil or fill that contains contaminants (including PAHs, TPH, arsenic and lead) above RIDEM Method 1 RDEC, as documented throughout the RAWP and supplemental investigations. All earthwork activities occur within an AOEC and must follow RIDEM RAL requirements.
- L. Engineer Control: A physical barrier (impervious cap, Type 1 soil cap, Type 2 soil cap, or building foundation) installed to prevent direct contact with underlying Controlled Material, as defined in RAWP Section 4.2.3 to 4.2.5.
- M. Environmental Professional (EP): A qualified individual designated in the RAWP responsible for oversight of excavation, stockpiling, reuse, and compliance with RAWP and RIDEM requirements during earthwork activities.
- 1.4 SUBMITTALS
- A. Earthwork Plan:
1. Provide a Method of Construction (MOC) submittal for all earthwork activities involving Controlled Materials, including temporary stockpiling, excavation, grading, handling, reuse, and placement beneath engineered caps. Include a schedule and a detailed written

description of proposed sequence of earthwork operations, excavation limits and depths, proposed stockpile locations, dust suppression methods, air monitoring equipment, and procedures for encountering groundwater or unexpected materials. Submit the MOC two (2) weeks prior to start of excavation.

2. The earthwork plan shall identify compaction equipment, procedures, and lift thicknesses, and shall also confirm compliance with the RAWP requirements for engineered cap installation (impervious cap, Type 1 and Type 2 soil caps). Submit two (2) weeks prior to compaction work.

B. Fill / Backfill Material Samples:

1. The Contractor shall submit bag samples (40 lbs minimum) of each type of material to be used as fill or backfill two (2) weeks prior to use for geotechnical review and RAWP compliance conformation.
2. For on-site materials intended for reuse, submit representative sample for geotechnical visual inspection and environmental suitability determination. On-site soils shall be reused only below engineered control caps per RAWP Sections 4.2.3 to 4.2.5.
3. For off-site materials, submit the name of each material supplier with specific name, source location, material description, and all required environmental analytical results (see 1.4D), at least two (2) weeks prior to delivery. All imported materials must be approved by the City and Engineer prior to delivery.
4. No off-site materials may be delivered or used until written approval is received confirming compliance with gradation, geotechnical suitability, and RIDEM RDEC criteria as required in the RAL.

C. Test reports: submit the following directly to Owner, with copy to Contractor:

1. Gradation test reports for off-site imported material.
2. One (1) gallon sample for each material type proposed for use or reuse.
3. Optimum moisture-maximum density curve for each type of soil compacted.
4. All testing and material costs shall be included in the Contract Sum.

D. Analytical Testing of Off-Site Fill Materials:

1. All imported fill materials shall be sampled and analyzed for acceptance. Testing shall include:
  - a. Arsenic and Lead in accordance with USEPA SW-846 Method 6010/6010 & 7471A.
  - b. Priority Pollutant 13 Metals (PP-13) in accordance with USEPA SW-846 Method 6010 and Method 7471A.

- c. Total Petroleum Hydrocarbons (TPH) in accordance with USEPA SW-846 Method 8100M.
  - d. Volatile Organic Compounds (VOC) in accordance with USEPA SW-846 Method 8260.
  - e. Semi-Volatile Organic Compounds (SVOCs) in accordance with USEPA SW-846 Method 8270.
2. All imported materials must meet RIDEM's Method 1 Residential Direct Exposure Criteria (RDEC).
  3. Sampling frequency for imported materials shall be:
    - a. 1 sample per 1,000 CY for VOC, SVOC, TPH, and PP-13 metals.
    - b. 1 sample per 500 CY for arsenic and lead, consistent with RAL guidance.
    - c. Analytical results shall be submitted to the EP, Engineer, Construction Manager, and Property Owner two (2) weeks prior to import of the material to the Site.
  4. Imported fill shall not be delivered to the Site until the EP and Owner confirms that analytical results meet the above RAWP/RAL criteria.

E. Certificates

1. Certify that materials are new and meet or exceed specification requirements by submitting a notarized copy of Manufacturer's certificates for all products.

1.5 QUALITY ASSURANCE

- A. Codes and Standards: Earthwork shall comply with all local, State, and Federal requirements and with RIDEM approved RAWP, RAWP addendum, and RIDEM RAL, including all requirements for handling, stockpiling, air monitoring, reuse, and capping of Controlled Materials.
- B. Earthwork Performance: Earthwork shall be performed to meet the placement and compaction requirements of these specifications and the engineered control requirements defined in RAWP Sections 4.2.3-4.2.5 (impervious caps, Type I and Type II soil caps).
- C. Material Quality: Materials provided shall meet gradation and structural requirements of this Section and the clean fill requirements of the RAWP and RAL where applicable. Imported fill shall meet RIDEM Method 1 RDEC criteria.
- D. Rhode Island Department of Transportation (RIDOT) Standard Specifications: RIDOT specifications and supplements unless superseded by the RAWP or environmental requirements.
- E. Environmental Oversight: All excavation, handling, placement, and reuse of Controlled Materials shall be performed under the oversight of the Environmental Professional (EP), provided by the City, as required by the RAWP.

## 1.6 OWNER'S RESPONSIBILITIES

## A. Soil Testing and Inspection Service:

1. Soil acceptance testing and inspection service for quality control testing during earthwork operations will be supplied by the Owner.
2. The Contractor will bear the cost of retesting or corrective action when materials or compaction fail to meet the requirements of this Section or RAWP requirements.

## B. Environmental Oversight: an Environmental Professional (EP) retained by the Owner will observe excavation, stockpiling, and engineered control placement, and will verify compliance with RAWP, SMP, and RAL requirements.

## 1.7 REFERENCES

## A. RIDEM Decision documents including:

1. Remedial Action Work Plan prepared by SLR dated March 2022, defines the Controlled Material handling, engineered controls, and reuse requirements.
2. RAWP Addendum, August 2022, addresses the polysheeting, demarcation, stockpiling, and clean fill confirmation.
3. Construction Soil Management Plan (SMP), October 2021, governs dust control, excavation notifications, EP oversight, stockpile controls, and worker protection protocols, included in the RAWP.
4. RIDEM Remedial Approval Letter, September 14, 2022, approval conditions for soils storage, engineered controls, capping requirements, and 30-day stockpile limitations.

## B. All Drawings and all other Sections of the Specifications.

## C. The Rhode Island Building Code, latest edition.

## D. American Society for Testing and Materials (ASTM) D1586-18 Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils.

## E. ASTM D1557 Modified Proctor Density.

## F. ASTM D422 Particle Size Analysis of Soil.

## G. ASTM D2922 Density of Soil and Soil Aggregate In-place by Nuclear Methods.

## H. Occupational Safety and Health Administration (OSHA) Regulation 29 CFR Part 1926 - Occupational Safety and Health.

## 1.8 PERMITS CODES AND SAFETY REGULATIONS

## A. All work performed under this contract shall comply with applicable Federal, State, and local laws, including RIDEM requirements contained in the RAWP and RAL.

- B. Comply with all rules, regulations, laws and ordinances of all authorities having jurisdiction including but not limited to the City of Pawtucket and the State of Rhode Island. All labor, materials, equipment, and services necessary to make the work comply with such requirements shall be provided without additional cost to the Owner.
- C. Comply with the provisions of the Manual of Accident Prevention in Construction of the Associated General Contractors of America, Inc., and the requirements of the Occupational Safety and Health Administration, United States Department of Labor.
- D. The Contractor shall obtain all required permits and licenses for the work and shall comply with any RIDEM notifications or approvals required for activities affecting Controlled Materials, including any future changes to the approved RAWP.

#### 1.9 SUBGRADE CONFIRMATION OF GRADE AND ADJUSTMENT:

- A. As-built topographic survey shall be by a Land Surveyor licensed in the State of Rhode Island.
- B. Engineer's review of grades will be singular. Each subsequent review after the first will be at the contractor's cost.
- C. Deliverable:
  - 1. As-built topography shall be provided to the Engineer as an Autodesk Civil 3D CADD file:
    - a. Drawing format 2013
    - b. Containing all the content required to compile triangulated irregular network surfaces (TIN Surface)
    - c. In the same horizontal and vertical datum as the construction documents
    - d. Be provided with the surface styles showing contours and triangles
  - 2. Adobe portable document file (PDF) representing the content from 1.9.C.1
    - a. With a title block, legend, north arrow, scale, date, supplier of topography
    - b. At the scale equivalent to the construction documents
- D. Adjustments: Contractor shall adjust grades meeting tolerances per 1.10 below at no additional cost to the contract.

#### 1.10 TOLERANCES FOR GRADES

- A. General: the Drawings indicate finished elevations. The grading to be performed under this Section consist of establishing finished grade elevations as shown on the Project Plans and in accordance with the RAWP requirements for Engineered Controls (impervious cap, Type 1 and Type 2 soil caps). Grading activities shall ensure that minimum thicknesses are achieved everywhere and are not reduced by construction tolerances.
- B. Uniformly grade areas within limits of grading under this Section, including adjacent transition areas. Smooth finished surfaces within specified tolerances, compact with uniform levels or

slopes between points where elevations are indicated, or between such points and existing grades. Finished grades shall ensure that no ponding or erosion occurs that could compromise the effectiveness of the Engineered Controls.

- C. Subgrade shall be free from irregular surface changes, and as follows:
1. Topsoil shall be placed to a minimum depth of 6 inches and maximum depth of 8 inches, unless otherwise shown on the Drawings. A maximum of 6 inches will be paid for; placement above 6 inches is at no cost to the Contract. Where topsoil forms part of the Type 1 or Type 2 soil cap, the combined cap thickness shall not be reduced below the RAWP required minimum (1 foot for Type 1, 2 feet for Type 2).
  2. Grades shall be within the construction document grades as follows:
    - a. Lawn areas/landscaped areas:
      - 1) Equal to or 0.5% steeper than the grades shown
      - 2) Without depressions or high spots which trap water or prevent drainage to structures or natural pathways. Depressions may be corrected in topsoil layer up to the maximum topsoil depth of 8 inches; additional material required above 6 inches is at the Contractor's cost.
- D. Grading in areas receiving Type 1 or Type 2 engineered soil caps shall be performed such that the minimum clean material thickness above the Demarcation Layer is achieved after compaction. Under no circumstances shall grading tolerances result in cap thicknesses falling below:
1. 12 inches of clean soil for Type 1 caps, or
  2. 24 inches of clean soil for Type 2 caps.
- E. Where grading activities are exposed the Demarcation Layer or underlying Controlled Materials, the Contractor shall immediately notify the EP and restore the cap thickness using approved clean material.

#### 1.11 PROJECT CONDITIONS

- A. Site Information:
1. Data on indicated subsurface conditions are not intended as representations or warranties of continuity between borings. Such information is provided for the Contractor's convenience. The Contractor shall understand that all soil at the Site is classified as Controlled Material within a designated AOEC, per the RAWP and SMP, and shall be handled accordingly regardless of geotechnical descriptions.
    - a. Boring logs and locations are included in the RAWP.
    - b. Additional test borings and other explorations may be made by the Contractor at no cost to Owner.
  2. If unexpected subsurface conditions or unanticipated environmental conditions are encountered, including, but not limited to, odors, staining, free product, debris, or

groundwater, Contractor shall immediately notify the Engineer, EP, and Owner and discontinue work in the affected area until directed to resume.

- B. The Contractor shall examine the substrate within the work areas to ascertain existing site conditions before beginning earthwork. Work shall not proceed until unsatisfactory or unstable conditions are corrected to the satisfaction of the Owner and in compliance with the RAWP requirements for excavation, handling, and Engineered Controls.
- C. The Contractor shall notify DIG SAFE and procure a Dig Safe Number for each location prior to disturbing existing ground in any way. Work shall not proceed until clearance is received.
- D. Existing utilities:
  - 1. Locate existing underground utilities in areas of excavation work. Provide adequate means of support and protection during earthwork operations.
  - 2. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
  - 3. Do not interrupt existing utilities serving facilities occupied by Owner or others during occupied hours except when permitted and then only after acceptable temporary utility services have been provided.
  - 4. Provide adequate notice to the Owner and receive written notice to proceed before interrupting utility.
  - 5. Demolish and completely remove from site existing underground utilities indicated for removal. Abandoned utilities not indicated shall be evaluated with the EP prior to disturbance to confirm proper handling of any Controlled Materials encountered.
- E. Protection of persons and property:
  - 1. Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights during hours from dusk to dawn each day and as otherwise recommended by authorities having jurisdiction.
  - 2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
  - 3. Protect benchmarks and existing structures, roads, sidewalks, paving, and curbs against damage from equipment and vehicular or foot traffic.
  - 4. Underpin adjacent structures, which may be damaged by excavation work, including service lines and pipe chases.
  - 5. Provide necessary safeguards to prevent accidents, to avoid all necessary hazards, and to protect the public, the work, and the property at all times, including Saturdays, Sundays, and holidays. Dust suppression and monitoring shall be performed in accordance with RAWP requirements, including real-time particulate monitoring during work hours.

6. The Contractor is responsible for all damages arising from failure to provide adequate lights, guards, barriers, dust control, monitoring, or other protective measures required by law and by the RAWP/SMP.

#### 1.12 PERMITS CODES AND SAFETY REGULATIONS

- A. All work performed under this Contract shall be accomplished in accordance with all regulations and laws of local, State, and Federal agencies and utility companies. Work shall also comply with the RIDEM approved RAWP, and RAL, which govern all excavation, soil handling, stockpiling, reuse, dust control, and engineered control installation at the Site.
- B. Comply with all rules, regulations, laws and ordinances of all authorities having jurisdiction including but not limited to the City of Pawtucket and the State of Rhode Island. All labor, materials, equipment, and services necessary to make the work comply with such requirements, including those in the RAWP, and RAL, shall be provided without additional cost to the Owner.
- C. Comply with the provisions of the Manual of Accident Prevention in Construction of the Associated General Contractors of America, Inc., and the requirements of the Occupational Safety and Health Administration, United States Department of Labor. Because all earthwork occurs within a designated Area of Environmental Concern (AOEC) and involves Controlled Materials, the Contractor shall implement a site-specific Health and Safety Plan compliant with OSHA 29 CFR 1910.120 (HAZWOPER), consistent with RAWP requirements for intrusive work, dust monitoring, PPE, and decontamination.
- D. The Contractor shall procure and pay for all permits and licenses required for the complete work specified herein and shown on the Drawings. This includes any notifications or approvals required to comply with the RAWP, and RAL, including but not limited to:
  1. Excavation of Controlled Materials,
  2. Temporary stockpile establishment,
  3. Importation of clean fill meeting RIDEM Method 1 RDEC criteria, and
  4. Any dewatering activities if groundwater is encountered unexpectedly.

### **PART 2 - PRODUCTS**

#### 2.1 SOIL MATERIALS

- A. Sand-Gravel Fill
  1. Sand-gravel fill generated on-site shall only be reused below final engineered control cap systems in accordance with the RAWP. Off-site sand-gravel fill must meet RIDEM Method 1 RDEC criteria before import.
  2. "Sand-Gravel Fill", "Sand-Gravel", "Gravel Borrow Subbase", "Compacted Gravel", and "Compact Gravel Borrow", shall consist of hard, durable sand and gravel, and shall be free from ice and snow, roots, sod, rubbish, and other deleterious or organic matter. It shall conform to the following gradation requirements:

SIEVE SIZE	PERCENT FINER BY WEIGHT
*	100
1/2-inch	50 - 85
No. 4	40 - 75
No. 10	30 - 60
No. 40	10 - 35
No. 50	8 - 28
No. 100	5 - 20**
No. 200	0 - 10

\* Four inches (4") where placed as base course; elsewhere, two-thirds (2/3) of the loose lift thickness; Two inches (2") where placed as bedding and backfill around utilities.

\*\* The amount passing the No. 100 sieve should be between forty percent (40%) and seventy percent (70%) of that amount passing the No. 40 sieve.

B. Granular Fill:

- Granular fill generated on-site shall only be reused below final engineered control cap systems in accordance with the RAWP. Off-site fill must meet RIDEM Method 1 RDEC criteria before import.
- "Granular Fill", "Free Draining Gravel", "Free Draining Granular Fill" and "Clean Granular Fill" shall be free from ice and snow, roots, sod, rubbish, and other deleterious or organic matter. It shall conform to the following gradation requirements:

SIEVE SIZE	PERCENT FINER BY WEIGHT
*	<b>100</b>
<b>No. 10</b>	<b>30 - 95</b>
<b>No. 40</b>	<b>10 - 70</b>
<b>No. 200</b>	<b>0 - 10**</b>

\* Two-thirds (2/3) of the loose lift thickness.

\*\* "Free Draining Granular Fill" and "Clean Granular Fill" shall have less than eight percent passing the number 200 sieve.

C. Gravel Borrow

"Gravel Borrow" shall consist of bank run sand and gravel or plant-processed, crushed or uncrushed gravel with fine aggregate added as filler. Alternatively, Gravel Borrow may consist of selected materials which have been reclaimed from within project limits, are proportioned and processed to produce granular material for reuse as Gravel Borrow within the source project limits. Gravel Borrow, whether consisting of bank run or plant processed sand and gravel, or reclaimed and processed granular material, shall consist of sound, durable particles free from loam, clay, organic soil, vegetative matter, soft and elongate particles.

- Fill generated on-site shall only be reused below final engineered control cap systems in accordance with the RAWP. Off-site fill must meet RIDEM Method 1 RDEC criteria before import.
- Bank Run or Plant-Processed Sand and Gravel.

Bank run or plant-processed sand and gravel proposed for Gravel Borrow shall be well-graded and meet the gradation requirements specified in RIDOT Standard Specifications, Column Ia, Table I in Subsection M.01.09. In addition, the maximum particle size shall not exceed 9 inches or three-fourths of the loose lift thickness, whichever is smaller. It shall conform to the following gradation requirements:

SIEVE SIZE	PERCENT FINER BY WEIGHT
3-inch	60 - 100
1/2-inch	50 - 85
3/8-inch	45 - 80
No. 4	40 - 75
No. 40	5 - 45
No. 200	0 - 10

\* Four inches (4") where placed as base course; elsewhere, two-thirds (2/3) of the loose lift thickness; Two inches (2") where placed as bedding and backfill around utilities.

\*\* The amount passing the No. 100 sieve should be between forty percent (40%) and seventy percent (70%) of that amount passing the No. 40 sieve.

D. Dense-Grade Aggregate Base:

1. "Processed Aggregate", "Dense Grade Aggregate", "Dense Grade Aggregate Base", "Aggregate Basecourse", and "Engineered Fill" for use as slab-on-grade base material and access road pavement base material, shall be in accordance with ASTM D2940 Dense-Grade Aggregate Base\*, and shall be free from ice and snow, roots, sod, rubbish, and other deleterious or organic matter. It shall conform to the following gradation requirements:

SIEVE SIZE	PERCENT FINER BY WEIGHT
1½-inch	100
1-inch	85-100
½-inch	50-85
No. 4	40-75
No. 40	8-35
No. 200	2-10

E. Ordinary Fill

1. "Ordinary Fill" shall consist of well-graded mineral soil substantially free of organic materials, loam, wood, trash and other objectionable material which may be compressible or which cannot be compacted properly. Ordinary fill shall be unfrozen and shall not contain snow, ice, or frozen materials. Ordinary fill shall not contain stones larger than eight (8) inches in largest diameter. It shall have physical properties such that it can be readily spread and compacted during filling.
2. Ordinary fill obtained onsite shall be treated as Controlled Material and may only be reused below the demarcation layer beneath the Engineered Controls.

F. Crushed Stone

1. "Crushed Stone" shall consist of one or the other of the following materials:
  - a. Durable crushed rock consisting of the granular fragments obtained by breaking and crushing solid or shattered natural rock, and free from a detrimental quantity of thin, flat, elongated, or other objectionable pieces. Thin or elongated pieces are defined as follows: Thin stones shall be considered to be such stones whose average width exceeds four (4) times their average thickness. Elongated stones shall be considered to be such stones whose average length exceeds four (4) times their average width.
  - b. Durable crushed gravel stone obtained by artificial crushing of cobbles, boulders, or field stone with a minimum diameter before crushing of 8 inches.
2. The crushed stone shall be reasonably free from clay, loam, or deleterious material and not more than 1.0% of satisfactory material passing a No. 200 sieve will be allowed to adhere to the crushed stone.

Crushed stone shall be uniformly blended according to the grading requirements in the following table:

PERCENT FINER BY WEIGHT				
SIEVE SIZE	3/8" CRUSHED STONE*	3/4" CRUSHED STONE**	1-1/2" CRUSHED STONE	2" CRUSHED STONE***
6-Inch	---	---	---	---
3-Inch	---	---	---	---
2-1/4-Inch	---	---	---	100
2-Inch	---	---	---	90 - 100
1 1/2-Inch	---	---	100	30 - 55
1 1/4-Inch	---	---	85 - 100	0 - 25
1-Inch	---	100	---	0 - 5
3/4-Inch	---	90 - 100	10 - 40	---
1/2-Inch	---	20 - 50	0 - 8	---
3/8-Inch	90 - 100	0 - 20	---	---
No. 4	0 - 10	0 - 5	---	---
No. 10	---	---	---	---
No. 100	---	---	---	---
No. 200	<1	<1	<1	<1

\* Also called out on drawings as "No. 8 Crushed Stone"

\*\* Also called out on drawings as "No. 57 Crushed Stone"

\*\*\* Also called out on drawings as "3/4" – 2" Clean, Washed, Crushed, Angular Stone"

3. "Crushed Stone", installed adjacent or above Controlled Materials shall not compromise the minimum required cap thickness. Stone used as part of the engineered cap layering must comply with the RAWP grading and demarcation requirements.

G. Pea Stone Gravel

1. Pea stone shall not be used surface cover or top dressing above Controlled Materials unless it is placed above the demarcation layer and beneath clean cap soils.
2. Pea stone gravel shall consist of durable crushed rock or durable crushed gravel stone free from ice and snow, sand, clay, loam, or other deleterious or organic material. The pea gravel shall be double washed and shall be 1/2 to 3/8 inch in size. The pea stone shall be uniformly blended and shall conform to the following requirements:

SIEVE SIZE	PERCENT FINER BY WEIGHT
1/2-inch	100
3/8-inch	85 - 100
No. 4	10 - 30
No. 8	0 - 10
No. 16	0 - 5

\* Also called out on drawings as "3/8-Inch Pea Gravel"

H. Topsoil/Loam:

1. Topsoil (stripped from site) or Loam (supplied from off-site) shall be a sandy loam or loam soil classification as defined by the USDA Soil Conservation Service, Soil Classification System consisting of a fertile, friable, natural topsoil/loam typical of locality, without admixture of subsoil, refuse or other foreign materials, shall be obtained from a well-drained arable site, and shall meet ASTM D5268. It shall be such a mixture of sand, silt and clay particles as to exhibit sandy and clayey properties in about equal proportions. It shall be free of stumps, roots, heavy or stiff clay, stones larger than 3/4-inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other litter, and shall have the following mechanical analysis:

Textural Class	% of Total Weight	Average %
Sand 0.05 - 2.0mm dia. Range	45 to 75	60
Silt 0.002 - 0.05mm dia. Range	15 to 35	25
Clay less than 0.002mm dia. Range	5 to 25	25

- a. 95 percent of Topsoil shall pass a 2.0 mm sieve.
- b. Topsoil/Loam shall have a pH value range of 6.0 to 7.0. If Topsoil/Loam material does not fall within the required pH range, limestone or aluminum sulfate shall be added to bring the pH within the specified limit.
2. Loam and topsoil shall contain not less than 4 percent or more than 20 percent organic matter as determined by the loss on ignition of oven-dried samples. Test sample shall be oven-dried to a constant weight at a temperature of 230°F ±9°.
3. All imported loam/topsoil must meet RIDEM Method 1 RDEC requirements and shall be placed only above the demarcation layer as part of the engineered soil cap.

## 2.2 FILTER FABRIC

- A. Non-Woven Filter Fabric: shall be a geotextile such as ADS 601T, Mirafi 160N, or approved equivalent, and as specified on the drawings. Joints shall be continuously sewn or overlapped by a minimum of 18 inches.
- B. Woven Filter Fabric: shall be a geotextile such as Mirafi FW700 or approved equal, as specified on the drawings. Joints shall be overlapped by a minimum of 18 inches.
- C. Filter fabric used above Controlled Materials shall be compatible with the placement of the demarcation layer and shall not be used as a substitute for the visual barrier.

## 2.3 EROSION CONTROL BLANKET

- A. North American Green S75 or approved equal.
- B. Erosion control blankets placed over areas of Controlled Materials shall be installed in conjunction with SMP required erosion and sedimentation controls to prevent exposure or migration of impacted soils.

## **PART 3 - EXECUTION**

### 3.1 EXCAVATION

- A. General:
  - 1. Earth excavation of all materials other than rock excavation. All excavated soils shall be treated as Controlled Material and handled in accordance with the RAWP, and RAL.
  - 2. Earth excavation includes the removal, temporary stockpiling, and onsite reuse of materials encountered while establishing required grades, except where materials are debris unsuitable for reuse. Controlled Materials shall not be disposed of off-site except as explicitly allowed by RIDEM under the RAWP.
  - 3. Perform all excavations to the depths and extents indicated, under Environmental Professional (EP) oversight, as required by the RAWP.
  - 4. Excavate to the minimum depths required for foundations, walls, structures, and utility systems. Where rock is encountered, over-excavate 12 inches unless otherwise directed.
  - 5. Earth excavation includes removal of pavement, foundations, and underground structures indicated for removal. Debris (concrete, wood, metal, plastic) may be removed offsite as solid waste, soils may not.
- B. Unauthorized Excavation:
  - 1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Engineer. Unauthorized excavation shall be at the Contractor's expense.

2. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Clean concrete fill may be used to bring elevations to proper position, when acceptable to the Engineer.

In locations other than those above, backfill with "Granular Fill" and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by the Engineer.

C. Rock Excavation:

1. Rock Excavation shall include the excavation of hard and solid ledge, boulders in excess of one cubic yard in volume and hard cementitious deposits, the removal of which requires the use of drilling, barring, and wedging. Blasting will not be permitted.
2. For the purposes of payment, rock shall be defined as material, which cannot be excavated with equipment rated at less than 120 HP flywheel power developing at least 40,000 pounds breakout force measured in accordance with SAE S732C. Hard and compact materials such as cemented-gravel, glacial till, and relatively soft or disintegrated rock that can be removed without continuous and systematic drilling, barring, wedging, or other mechanical or pneumatic equipment will not be considered as mass rock even though intermittent use of these methods may be performed to increase production.

D. Excavation for Structures:

1. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', and extending a sufficient distance from foundations to permit placing and removal of concrete formwork, other construction required, and for inspection.
2. In excavating for foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete is placed. Trim bottoms to required lines and grades to leave a solid base to receive concrete.

E. Disturbed Subgrade:

1. If subgrade becomes disturbed or saturated, stabilize as directed by the Engineer. If disturbance involves Controlled Materials, stabilization must comply with RAWP cap requirements to maintain minimum cover thickness.

F. Excavation for Pavement and Hardscape Areas:

1. Cut to the subgrade under pavements to comply with cross-sections, elevations, grades as shown on the Drawings and requirements presented herein.

G. Excavation and Installation of Utilities:

1. Trench for pipes shall be excavated to the required line and grade and of sufficient width to permit thorough tamping of the fill material under the haunches and around the pipe.
2. In general, utility trenches shall be excavated to a minimum 6 inches below the bottom of the utility line to accommodate bedding material as specified hereinafter or as specified by the manufacturer.

3. Soft or unsuitable material encountered below the normal bedding of the pipe shall be removed as directed, replaced with selected sand or manufacturer-recommended bedding material, and thoroughly compacted.
4. The bottom of the trench shall be shaped to conform to the curvature of the pipe. This bed shall also be excavated to accommodate the bells of pipes.
5. All utilities shall be installed as recommended by the manufacturer or as specified herein or as directed by the Geotechnical Engineer.
6. All utility trench excavation within Controlled Materials must follow the RAWP dust control, stockpile containment, and EP oversight requirement

H. Demolition:

1. Remove existing slabs, foundations, debris, and utilities to required limits. Soils disturbed during demolition must be treated as Controlled Material and cannot be exported. Debris may be removed off-site as solid waste, but no impacted soil may leave the site without RIDEM approval.

I. Re-Use of Material:

1. Excavated materials meeting gradation requirements may be reused onsite only below the engineered controls in accordance with the RAWP. Controlled Materials may not be reused near the finished grades or above the demarcation layer.

### 3.2 EARTHWORK FOR SOD AND SEEDED AREAS

A. Compaction control during earthwork

1. Topsoil for sod and seeded areas must be placed above the demarcation layer and clean soil cap, ensuring minimum cover thickness are met for Type 1 and Type 2 soil caps.
2. Utilize track machines to move the soils on site during construction keeping rubber tire vehicles except for landscape machinery off the soils. Use low ground pressure machines to move and spread soil materials.
3. Use a subsoiler to loosen the subsoil compaction to 6" depth after it is in place and graded if it does not meet the density specifications. Stones if present at the surface from using the subsoiler will need to be raked and removed from the surface before placing topsoil.

### 3.3 ROCK PAYMENT LINES

A. Rock payment lines are limited to the following:

1. In pipe trenches, one foot below the invert elevation of the pipe and two foot wider than the inside diameter of the pipe, but not less than a three-foot minimum trench width.
2. 12" below top of subgrade elevations.

B. No payment will be made for rock removal beyond specified rock payment lines.

### 3.4 UNSUITABLE MATERIAL

- A. Unsuitable materials are materials that consist of Controlled Material (soil) shall NOT be removed from the Site. Such materials shall be reworked, moisture-conditioned, blended, or placed beneath Engineered Controls per the RAWP.
- B. Debris or solid waste that is not soil (asphalt, metal, wood, concrete) may be removed offsite as construction waste.

### 3.5 STABILITY OF EXCAVATIONS

- A. General: comply with local, state, and federal codes, ordinances, and requirements of agencies having jurisdiction.
- B. Slope sides of excavations to comply with OSHA requirements and local, state, and federal codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- C. Slope the sides of excavations over 5' deep to the angle of repose of the material excavated, but not steeper than 1½ horizontal to 1 vertical. Where sloping is not possible, due to space restrictions or stability of material excavated, shore and brace in accordance with requirements of authorities having jurisdiction. In addition, provide 5' high snow fence around these areas as protection. Temporary slopes should be covered with plastic sheeting or other suitable cover where necessary to prevent the surface from drying or eroding.
- D. Maintain sides and slopes of excavation in a safe condition until completion of backfilling, by scaling, benching, shelving, or bracing.
- E. Take precautions to prevent slides or cave-ins when excavations are made in locations adjacent to backfilled excavations, and when sides or excavations are subject to vibrations from vehicular traffic or the operation of machinery, or from any other source.
- F. Maintain dust suppression and air monitoring during excavation per RAWP.

### 3.6 SHORING AND BRACING:

- A. Where required, provide adequate shoring and bracing, such as soldier piles and lagging, or steel or timber sheeting, in good serviceable condition.
- B. Trench shoring and bracing shall comply with OSHA requirements and local codes and authorities having jurisdiction.
- C. Coordinate shoring and bracing with the construction to be performed.
- D. Construct shoring and bracing system in accordance with the approved plans.
- E. Maintain shoring and bracing in excavations during all time periods when excavations are to be open. Extend shoring and bracing downward as excavation progresses.

- F. Provide minimum requirements for trench shoring and bracing to comply with ANSI A10.1 "Safety for Building Construction", and with local codes and authorities having jurisdiction.

### 3.7 DEWATERING

- A. If groundwater is encountered unexpectedly, the Contractor shall immediately notify the EP and Owner and suspend work in that area. The RAWP indicates groundwater is not anticipated, encountering groundwater requires corrective action.
- B. No groundwater may be discharged without evaluating RAWP requirements and any required RIDEM permitting.

### 3.8 EXCAVATION OF TRENCHES FOR PIPES AND CONDUIT

- A. Where trenching penetrates areas containing Controlled Materials, bedding, backfill, and trench spoils must be handled according to the RAWP and must be reused only below engineered controls.
- B. Excavate trenches to uniform width, sufficiently wide to provide ample working room and a minimum of six- to nine-inch clearance on both sides of pipe or conduit, unless otherwise indicated on drawings.
- C. Excavate trenches and conduit to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
  - 1. If rock is encountered, carry excavation 12" below required elevation and backfill a six-inch layer of fine aggregate fill prior to installation of pipe.
  - 2. For pipes or conduit less than six inches in nominal size, and for flat-bottomed, multiple-duct conduit units, do not excavate beyond indicated depths. Hand-excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.
  - 3. For pipes and equipment six inches or larger in nominal size, shape bottom of trench to fit of pipe for 90 degrees (bottom 1/4 of the circumference). Fill depressions with tamped fine aggregate backfill. At each pipe joint, dig bell holes to relieve pipe bell of loads and ensure continuous bearing of pipe barrel on bearing surface.

### 3.9 COLD WEATHER PROTECTION

- A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35°F.
- B. Protect bottom of excavations and soil around and beneath foundations from frost.

### 3.10 BACKFILL AND FILL

- A. General: Place acceptable soil materials in layers to required elevations. On-site soils (Controlled Materials) shall only be reused beneath approved Engineered Controls (impervious cap, Type 1 and Type 2 soil cap). They shall not be used as backfill near finished grades or surface soils.

- B. Backfill operations shall follow all RAWP requirements, including:
  - 1. EP oversight
  - 2. Dust suppression
  - 3. Stockpile management
  - 4. Maintaining minimum cap thicknesses
  - 5. Protecting the demarcation layer from exposure.
- C. Backfill of utility trenches below groundwater is unexpected. If trenches encounter groundwater notify the EP and Owner immediately prior to backfilling.

### 3.11 PLACING AND COMPACTION

- A. General
  - 1. All compacted fill shall be placed in layers. Each layer shall be systemically compacted by approved compaction equipment to the density specified herein.
  - 2. Place backfill and fill materials in layers not more than twelve (12) inches in loose depth for material compacted by heavy compaction equipment, and not more than six (6) inches in loose depth for material compacted by hand-operated equipment and tampers.
  - 3. Compaction equipment in open areas shall consist of a vibratory roller having a minimum drum weight of 10,000 pounds and a dynamic force of at least 20,000 pounds.
  - 4. Compaction in confined areas (in trenches and adjacent to walls) shall be accomplished by hand-operated vibratory equipment or mechanical tampers as approved by the Engineer.
  - 5. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
  - 6. Place backfill and fill materials evenly adjacent to structures to required elevations. Prevent wedging action of backfill against structures by carrying material uniformly around structures to approximately same elevation in each lift.
  - 7. The work area shall be graded, shaped and otherwise drained in such a manner as to minimize soil erosion, siltation of drainage channels, damage to existing vegetation and damage to property outside the limits of the work area.
  - 8. The Contractor shall use extra care when compacting adjacent to walls. Where walls are buried on both sides, backfill and compaction shall proceed on both sides of the wall so that the difference in top of fill level on either side of the wall shall not exceed two feet (2 ft.) at any stage of construction. Where buried walls are backfilled on only one side, only hand-operated rollers or plate compactors shall be used within a lateral distance of five feet (5 ft.) of back of wall.

9. In freezing weather, a layer of fill shall not be left in an uncompacted state at the close of a day's operations. Prior to terminating operations for the day, the final layer of fill, after compaction, shall be rolled with a smooth-wheeled roller to eliminate ridges of soil left by tractors, trucks and compaction equipment.
  10. The Contractor shall not place a layer of compacted fill on snow, ice or frozen soil. Removal of these unsatisfactory materials will be required as directed by the Owner.
  11. All on-site soils placed as fill shall be treated as Controlled Materials and may be reused only below approved engineered controls. Fill placement shall not reduce required clean soil cap thicknesses.
  12. EP oversight (Owner representative) is required during placement of any Controlled Materials to ensure proper separation from clean imported fill, maintenance of demarcation layer integrity, confirmed cap thickness after compaction, and no placement of Controlled Materials above the demarcation layer.
- B. Ground surface preparation: remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break up sloped surfaces steeper than one vertical to four horizontal so that fill material will bond with existing surface.
1. Proof-roll proposed pavement and foundation subgrades as described herein.
  2. Prior to placing new fill, surface compact the subgrade in areas where existing foundations, slabs, and pavements have been demolished.
  3. When existing ground surface has a density less than that specified in this section for particular area classification, break up ground surface and pulverize, moisture condition as required to achieve optimum moisture content, and compact to required depth and percentage of density.
  4. Ground surfaces serving as a base for Engineered Controls shall be inspected by the EP prior to placing the demarcation layer or clean cap soils. No Controlled Materials shall be left exposed at completion of daily earthwork operations.
- C. Backfilling of Utilities:
1. After pieces and joints have been inspected and approved by the Owner, sand shall be carefully placed and tamped in 6-inch layers under, around, and one foot over the pipe to ensure a uniform bearing surface and to prevent lateral movement of the pipe.
  2. The remainder of the backfill may, if it meets fill specifications listed above, be material removed from the utility excavation and shall be placed in approximately 8-inch layers and compacted to the required density.
  3. Where trench spoils consist of Controlled Materials, they may only be reused beneath the engineered controls and not be used as final cover or near finished grades. Spoils must be stockpiled on polyethylene sheeting and covered in accordance with the RAWP.
- D. Backfill below Pavement Subbase:

1. Backfill below pavement subbase shall be placed in layers having a maximum loose lift thickness of 12 inches, if compaction is with a large vibratory drum roller or in maximum loose lift thickness of 8 inches, if compaction is with hand-operated compaction equipment.

E. Subbase and Base Course:

1. Pavement and slab subbase and base courses shall be placed in layers having a maximum loose lift thickness of 12 inches, except in confined areas or within 3 feet of new or existing structures where maximum loose lift thickness shall be 8 inches or less as determined by the Geotechnical Engineer.

3.12 COMPACTION REQUIREMENTS

A. General

1. Backfill shall be compacted to the minimum percentage of density specified for each area classification.

B. Percentage of Maximum Density Requirements:

1. In areas where Controlled Materials are placed, compaction shall not cause displacement, damage, or exposure of the demarcation layer, nor reduce the minimum clean soil cap thickness.
2. Provide not less than the following percentages of the maximum density of soil material compacted at optimum moisture content, as determined by ASTM D-1557, (Modified Proctor Test). Correct improperly compacted areas or lifts as directed by Engineer if soil density tests indicate inadequate compaction.
  - a. Pavement base course: Compact "Dense Grade Aggregate" base course below bituminous concrete pavement to 95% of the maximum dry density.
  - b. Pavement subbase: Compact "Sand-Gravel" subbase below base course to 95% of the maximum dry density.
  - c. All materials below the pavement subbase, with the exception of crushed stone, shall be compacted to 95% of the maximum dry density for heavy-duty areas (access roads), and to 92% of the maximum dry density in all standard duty areas.
  - d. All soil materials placed below foundations and within "Structure Areas" with the exception of crushed stone shall be compacted to 95% of the maximum dry density.
  - e. All materials placed behind retaining walls shall be compacted to 95% of the maximum dry density except for the area within 5 feet of the stem, which shall be compacted to between 90% and 93% of the maximum dry density.
  - f. All soil materials placed on the sides of and above site utilities and duct banks, with the exception of crushed stone, shall be compacted to 92% of the maximum dry density. Where utilities are placed below "Structure Areas" backfill shall be compacted to 95% of the maximum dry density. All pavement and exterior concrete slab base and subbase courses located above utilities and duct banks shall also be compacted to 95% of the maximum dry density.

- g. Fill under Landscaped Areas: Ordinary Fill within the top 3 feet of finished grade shall be compacted to at least 90% of the maximum dry density. Ordinary Fill below 3 feet of finished grade shall be compacted to 85% of the maximum dry density.

C. Moisture Control:

1. Where the subgrade or a layer of soil material must be moisture-conditioned before compaction, uniformly apply water to the surface of subgrade or layer of soil material as needed to obtain optimum moisture content. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.
2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to the specified density.
3. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

### 3.13 GRADING

A. General:

1. Final grading shall ensure minimum clean soil cap thickness are met after compaction. Type 1 cap with minimum of 12-inches of clean soil above the demarcation layer, and Type 2 cap with minimum of 24 inches of clean soil above the demarcation layer.
2. At no time shall grading operations exposure the demarcation layer or Controlled Material. If exposure occurs, notify the EP immediately and restore cover thickness with clean soil.

B. Compaction:

1. After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.
2. Final cap surfaces shall be inspected by the EP to confirm that grading maintains long-term cap slope stability, positive drainage, and prevents erosion of clean cap soil.

### 3.14 FIELD QUALITY CONTROL

A. Quality control testing during construction will be provided by the Owner. The Geotechnical Engineer shall be notified 48 hours prior to any fill, backfill, or compaction operations. Emailed notification is satisfactory.

1. Permit the Engineer to observe all subgrades for each layer of fill or backfill. Additional fill or backfill shall not be placed unless the Geotechnical Engineer has approved the subgrade and/or previous layer of fill.
2. When required or requested by the Engineer, the Contractor shall provide field elevations of the compacted subgrade or fill layer.

3. All excavation, stockpile handling, fill placement, and engineered control construction shall occur under EP oversight, consistent with the RAWP. The EP will be representative of the Owner.

B. Compacted materials which are below specified density shall be re-compacted at no additional expense to the Owner.

### 3.15 MAINTENANCE

A. Protection of Graded Areas:

1. Protect newly graded areas from erosion and keep free of trash and debris.
2. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas:

1. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

### 3.16 ON-SITE SOIL MANAGEMENT

A. Dust Control:

1. The Contractor shall implement dust suppression including watering. Stabilized construction entrances/exits shall be constructed using 6 inches of 2-inch crushed stone, maintained throughout the project.
2. Dust control must comply with the RAWP including air monitoring during excavation activities, and action levels. Any visible dust migration offsite shall trigger immediate work suspension and corrected. Dust suppression must include daily wetting of working faces, speed control of work vehicles, and covering of haul loads when transporting.

B. Stormwater Runoff Control:

1. The contractor shall ring storm drains with haybales and silt capture devices and maintain the conditions throughout the project to control entrainment of surficial sediments in stormwater runoff.
2. Erosion controls must be placed and maintained around all Controlled Material stockpile areas, including silt fence and inlet protection, as required by the RAL.
3. No uncontrolled stormwater may erode or contact Controlled Material.

### 3.17 OFF-SITE SOIL MANAGEMENT

A. Disposal of excess asphalt, debris, and solid waste shall be in accordance with the Contract Documents. Controlled Materials (soil) shall NOT be disposed offsite unless explicitly approved by RIDEM in writing following waste characterization.

- B. All existing soils shall remain onsite. Removal of Controlled Materials offsite may occur only with prior written approval from the RIDEM, in accordance with the RAWP and RAL. Owner or Contractor authorization is not sufficient.

**END OF SECTION 31 30 00**