Request to Amend Order of Conditions

Under Wetlands Program Policy 85-4: Amended Orders

Proposed Self-Storage Facility

Project Location:
State Road
Whately, MA 01085
Assessor's Map 5 Parcel 29

Owner & Applicant:
Todd Cellura
Pioneer Valley Self-Storage
710 Southampton Road
Westfield, MA 01085

January 6, 2023

Pioneer Land Planning LLC
Planning for a better tomorrow
334 Linden Street · Holyoke, MA 01040
(413)588-0985 · info@pioneerlandplanning.com

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SECTION

1. COVER LETTER

Pioneer Land Planning LLC
334 Linden Street · Holyoke, MA 01040
(413)588-0985 · info@pioneerlandplanning.com

January 6, 2023

Scott Jackson, Chair
Town of Whately Conservation Commission
4 Sandy Lane
South Deerfield, MA 01373

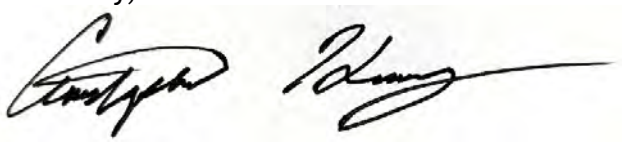
RE: Notice of Intent
Proposed Self-Storage Facility
State Road
Whately, MA 01373
Assessor's Map 5, Parcel 29

Chairman Jackson & Commissioners:

On behalf of the applicant, Todd Cellura of Pioneer Valley Self-Storage, Pioneer Land Planning requests to amend the existing Order of Conditions recorded in the Franklin Country registry of deeds in book 7846 on page 103. The applicant requests to amend the Order to Conditions in order to reduce the area of alteration, include detailed structural requirements for the previously approved crossing and add a dewatering plan. In conjunction with this application, the applicant is submitting a new Notice of Intent in order to alter the route of the previously approved water lines. These filing will work in unison to mitigate the overall impact of the proposed project.

We are hereby requesting to be placed on the Commission's next available agenda. Should you have any questions or comments regarding this Notice of Intent, please do not hesitate to contact this office at your earliest convenience.

Sincerely,

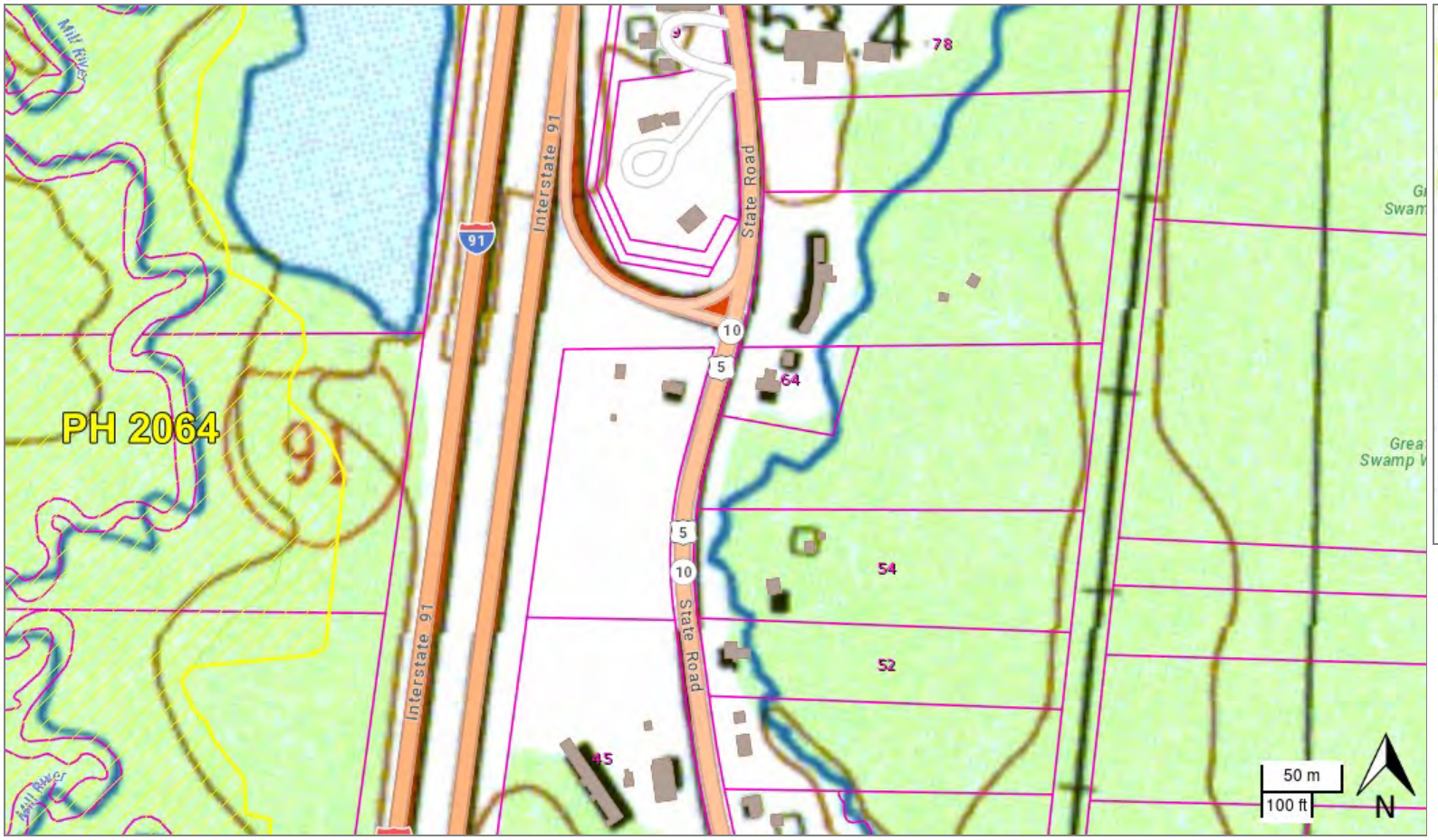


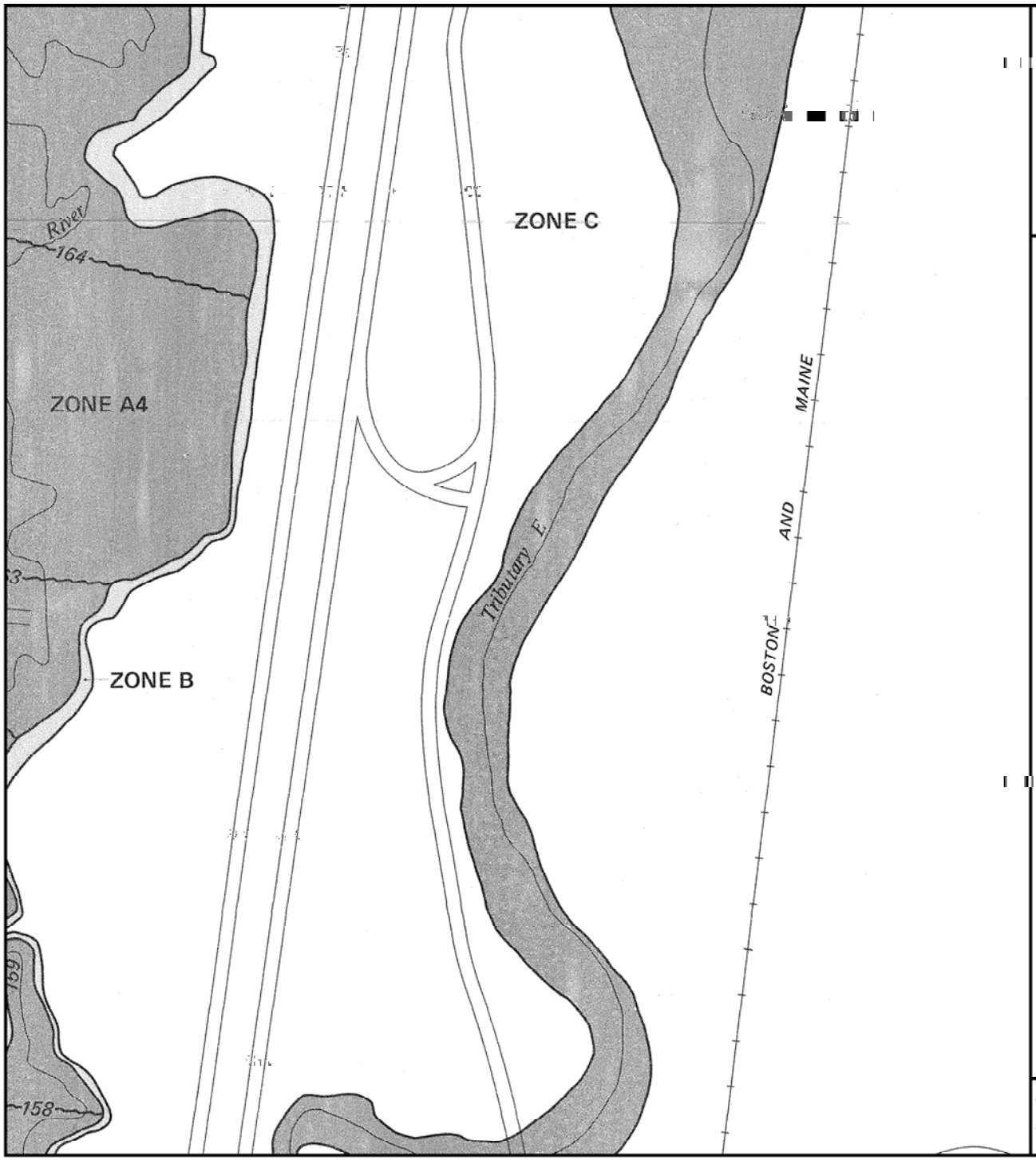
Christopher Karney, PLS, EIT

2. FIGURES

- **USGS MAP WITH NHESP OVERLAY (SOURCE: MASSMAPPER)**
- **FEMA FLOOD INSURANCE RATE MAP (FIRM)**
- **USDA SOIL MAP**

0 State Road


PH 2064
91
Interstate 91
State Road
Interstate 91
State Road
Mill River
Mill River
78
64
54
52
45
10
5
5
10
50 m
100 ft
N
NHESP Priority Habitats of Species
NHESP Estimated Habitats Wildlife
Tax Parcels for Query
Detailed Features
Tax Parcels for Display
Structures
USGS Topographic Maps
MassGIS Statewide Basem
MassGIS Topographic Feat



APPROXIMATE SCALE

400 0 400 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

TOWN OF
WHATELY, MASSACHUSETTS
FRANKLIN COUNTY

PAGE 7 OF 7
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
250132 0007 C

EFFECTIVE DATE:
SEPTEMBER 14, 1979

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

Soil Map—Franklin County, Massachusetts
(0 State Road)

Map Scale: 1:1,440 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
31A	Walpole sandy loam, 0 to 3 percent slopes	0.4	7.1%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	5.1	92.9%
Totals for Area of Interest		**5.5**	**100.0%**

3. APPENDIX

- **STRUCTURAL ANALYSIS REPORT – OPEN BOTTOM BOX CULVET**
  BY CONTECH ENGINEEERED SOLUTIONS LLC
  DATED SEPTEMBER 21, 2022

- **"NOTICE OF INTENT FILING PLAN" SET (3 SHEETS)**
  BY PIONEER LAND PLANNING, LLC
  DATED JANUARY 6, 2023

KOONTZ BRYANT JOHNSON WILLIAMS

FORMERLY CBC ENGINEERS

September 21, 2022

Contech Engineered Solutions LLC
9100 Centre Pointe Drive, Suite 400
West Chester, OH 45069

Attn: Mr. Wesley Brewer
Design Engineer

Re: Review of AASHTO LRFD Structural Calculations and Shop Drawings, Review of Footing Calculations, and Preparation of Aluminum Headwall/Wingwall Calculations for an ALBC #7 (720529); Self Storage Facility, Whately, Massachusetts; KBJW Report No. 25231D-1-0822-05 (Revision No.1)

Ladies and Gentlemen:

Koontz Bryant Johnson Williams, Inc. (KBJW, formerly CBC Engineers and Associates, Ltd.) is pleased to submit our report for the above referenced project. The purpose of this report is to provide a review of AASHTO LRFD structural calculations and shop drawings, review of footing calculations, and preparation of aluminum headwall/wingwall calculations for the proposed ALBC structure. Others are responsible for all other aspects of the structure, including but not limited to hydraulics, backfill, scour/abrasion/corrosion, and the only responsibility of KBJW is the above referenced work. The calculations, specifications, and drawings are included in this report. If you have any questions, please contact us.

Respectfully submitted,

Koontz Bryant Johnson Williams, Inc.

Deepa Nair, M.S., P.E.
Project Engineer

Mitchell T. Harden, P.E.
Chief Engineer

DN/MTH/mt
ec: Client (wesley.brewer@conteches.com)
ec: Darrell Sanders (darrell.sanders@conteches.com)
ec: Melinda Fugate (melinda.fugate@conteches.com)
1-File

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SECTION I

TEXT

1.0 AUTHORIZATION

Authorization to proceed with this evaluation was given by Mr. Wesley Brewer of Contech Engineered Solutions LLC. Work was to proceed in accordance with KBJW Quotation No. 22-375-05, dated August 11, 2022, and the terms and conditions of the Master Agreement for Engineering Services contract between Contech Construction Products, Inc. and CBC Engineers & Associates, Ltd. dated July 30, 2009.

2.0 PROJECT DESCRIPTION

This project consists of an ALBC with a span of 11'-4" and a rise of 7'-2" proposed to be installed in Whately, Massachusetts. The height of cover over the structure is reported to be 2.6 to 5.0 feet at 120 pcf with HL-93 live load.

TABLE 1
STRUCTURE CHARACTERISTICS

Structure Type	ALBC #7
Span (ft.-in.)	11'-4"
Rise (ft.-in.)	7'-2"
Height of Cover (ft.)	2.6' to 5.0' @ 120 pcf
Plate Thickness (in.)	0.125" crown/0.125" haunches
Reinforcing Ribs and Spacing	Type IV @ 18" crown/Type II @ 54" haunches
Length (ft.-in.)	31'-9"
Live Load	HL-93
Type of end treatment	Aluminum HW
Foundation	Concrete Footings (by Contech)

We have been provided with Contech project drawings for the ALBC; their Project No. 720529. The total length of the ALBC structure is 31.75 feet.

3.0 REVIEW OF AASHTO CALCULATIONS AND SHOP DRAWINGS

We have evaluated AASHTO structural calculations and shop drawings for the ALBC and agree that they conform to accepted industry standards for this structure type. We have not made an independent verification of the data used to perform the design calculations, and understand all initial assumptions and data are correct as presented to us. AASHTO structural calculations for the ALBC have been performed for a design minimum and maximum height of cover of 2.6

feet and 5.0 feet respectively over the structure at a unit weight of 120 pcf with HL-93 live load. The select backfill around and over the ALBC structure must be in strict conformance with the project specifications, the manufacturer's requirements and accepted industry standards. Care must be exercised to maintain balanced loading on the structure during any backfilling or construction operations, and the structure must be properly backfilled to maintain this balanced loading. The backfill differential level between sides of the ALBC should not exceed 16 inches. The contractor is responsible for any required bracing/shoring to prevent any distortion of the structure during installation and for knowing and following all applicable safety requirements. The dimensions of the structure should be within 2% of the design dimensions at all locations during and at the completion of installation, and this should be verified by field measuring during construction. The allowable bearing capacity of the non-yielding foundation and embankment material below and beside the ALBC must meet the project requirements, and this must be verified in the field prior to construction. The reviewed AASHTO structural calculations and shop drawings are included in Appendix A and Appendix B of this report, respectively.

4.0 REVIEW OF SPREAD FOOTING CALCULATIONS

We have been provided with spread footing calculations for the ALBC. The spread footing calculations have been performed for the ALBC for the maximum design height of cover of 5.0 feet at 120 pcf considering the design HL-93 live load. The load on a footing consists of the load on top of the structure carried by each leg of the structure, which is equal to the unit weight of the soil times the height of cover over the structure divided into each leg; plus the weight of the soil on the outside edges of the footing outside the structure, plus the weight of the structure and footings, plus live load. The weight of the soil over the footings that is excavated can be deducted from the pressure at the bottom of the footing in the consideration of the net bearing capacity. The footing also must be designed for any horizontal thrust which is created by the angle of entry into the footing. Since the ALBC structure has a span of 11'-4" and a rise of 7'-2", the structure enters the footing at an angle and there is, therefore, a horizontal component to the footing reaction towards the outside of the structure. The maximum loading of the structure footings based on AASHTO LRFD Design Methodology as included in the provided spread footing calculations is R_v = 5,140 plf and R_h =1,416 plf.

The calculations for the spread footings have been performed considering the above-mentioned loads for a net allowable bearing capacity of the foundation soil of 4,000 psf and a friction factor between the footing concrete and foundation soil of 0.45. Based on a net allowable bearing capacity of 4,000 psf and a friction factor of 0.45, the width of the structure footings is to be 2'-6" with a minimum thickness of 20 inches below the keyway. The steel required in the footing is #5 bars at 15" on center at the bottom, #5 bars at 15" on center at the top, and #5 longitudinal reinforcement bars evenly spaced around the perimeter. The footing details as per Contech footing shop drawings; their Project No. 720529 conform to the performed calculations.

The net allowable bearing capacity of the foundation soil must be at least 4,000 psf. This must be verified in the field by a geotechnical engineer before the installation of the ALBC. Note that CBC has not made an independent evaluation of the net allowable bearing capacity and friction factor for this project. We recommend that a geotechnical engineer investigate the site and that borings be performed if this has not already been done. All recommendations in the geotechnical engineer's report should be strictly adhered to during the installation of the proposed ALBC. The design and evaluation of any foundation improvement required to achieve a net allowable bearing capacity of 4,000 psf, a friction factor of 0.45, or to protect against frost and scour and settlement, is the responsibility of others than CBC Engineers & Associates, Ltd. The reviewed footing calculations are attached in Appendix A of this report. The shop drawings are attached in Appendix B of this report.

5.0 EVALUATION OF ALUMINUM HEADWALLS

Contech's standard aluminum structural plate headwall panels have been analyzed for the ends of the structure based on the layout, geometry and wall details provided in the Contech project drawings; Project No. 720529. The headwalls have been analyzed for the loads that will be placed on them by the backfill around the structure and by the surcharge from the design live load with no unbalanced hydrostatic loading. The backfill soil behind the headwalls within 10.0 feet must be granular material meeting the requirements of the select backfill for the ALBC structure having a minimum internal friction angle of 34° (value to be field verified). The following describes the design of the endwalls:

TABLE 2
ALUMINUM HEADWALLS

CHARACTERISTIC	VALUES
Maximum Design Fill Height (ft.)	10.92'
Panel Thickness (in.)	0.150"/0.125"
Spacing of Top Anchors (ft.)	4.5'
Total number of Anchor Rods to shell	3
Headwall width (ft)	13'-6"

Each headwall panel will be anchored at locations shown on the drawings with tie rods to the structure.

The permanent finished groundline at the aluminum walls must be maintained at an elevation of a minimum of 2.25' above the bottom of the walls at all times. The soil in front of the wall providing resistance to the toe of the wall must have a minimum internal friction angle of at least 34° (value to be field verified). The top cap beams will be typical Contech beams made of alloy 6063-T6 material. The calculations for the walls are contained in Appendix A and the shop drawings are attached in Appendix B.

6.0 SCOUR

It is beyond the scope of this report to evaluate scour and it is the responsibility of others than KBJW. The depth of the walls and footings should be evaluated for scour before the walls and footings are constructed, and scour countermeasures (by others) provided as necessary.

7.0 WARRANTY

Our professional services have been performed, our findings obtained and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. No other warranty, expressed or implied, is made.

This report has been prepared for the exclusive use of Contech Engineered Solutions LLC, for specific application to the structure herein described. Specific recommendations have been provided in the various sections of the report. The report shall, therefore, be used in its entirety. This report is not a bidding document and shall not be used for that purpose. Anyone

reviewing this report must interpret and draw their own conclusions regarding specific construction techniques and methods chosen. KBJW is not responsible for the independent conclusions, opinions or recommendations made by others.

SECTION II

SPECIFICATIONS

I - GENERAL

1.0 STANDARDS AND DEFINITIONS

1.1 STANDARDS - All standards refer to latest edition unless otherwise noted.

1.1.1 ASTM D-698-70 (Method C) "Standard Test Methods for Moisture. Density Relations of Soils and Soil Aggregate Mixtures Using 5.5-lb (2.5 kg.) Rammer and 12" (305-mm) Drop".

1.1.2 ASTM D-1557 "Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN · m/m^3]).

1.1.3 ASTM D-2922 "Standard Test Method for Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth)".

1.1.4 ASTM D-1556 "Standard Test Method for Density of Soil in Place by the Sand-Cone Method".

1.1.5 All construction and materials shall be in accordance with the current AASHTO LRFD Specifications.

1.2 DEFINITIONS

1.2.1 Owner - In these specifications the word "Owner" shall mean the project owner.

1.2.2 Engineer - In these specifications the word "Engineer" shall mean the Owner designated engineer.

1.2.3 Design Engineer - In these specifications the words "Design Engineer" shall mean CBC Engineers and Associates, Ltd.

1.2.4 Contractor - In these specifications the word "Contractor" shall mean the firm or corporation undertaking the execution of any work under the terms of these specifications.

1.2.5 Approved - In these specifications the word "approved" shall refer to the approval of the Engineer or his designated representative.

1.2.6 As Directed - In these specifications the words "as directed" shall refer to the directions to the Contractor from the Owner or his designated representative.

2.0 GENERAL CONDITIONS

2.1 The Contractor shall furnish all labor, material and equipment and perform all work and services except those set out and furnished by the Owner, necessary to complete in a satisfactory manner the site preparation, excavation, culvert installation, headwalls, filling, compaction, and grading as shown on the plans and as described therein.

This work is to be accomplished under the observation of the Owner or his designated representative.

2.2 The Contractor shall examine, investigate and inspect the construction site as to the nature and location of the work, and the general and local conditions at the construction site, including, without limitation, the character of surface or subsurface conditions and obstacles to be encountered on and around the construction site; and shall make such additional investigation as he may deem necessary for the planning and proper execution of the work.

If conditions other than those indicated are discovered by the Contractor, the Owner should be notified immediately. The material which the Contractor believes to be a changed condition should not be disturbed so that the owner can investigate the condition.

2.3 The construction shall be performed under the direction of an experienced engineer who is familiar with ALBC culverts.

II - ALUMINUM HEADWALLS

1.0 GENERAL

1.1 The headwalls for the culvert shall be corrugated aluminum structural plates, assembled as shown on the construction drawings and the manufacturer details.

2.0 MATERIAL

2.1 Panels shall be fabricated from aluminum structural plate as specified in ASTM B746 with a minimum panel thickness of 0.150/0.125 inches for the headwalls.

2.2 The material for the rib, and beams shall be Alloy 6061-T6.

2.3 The material for the galvanized anchor rods shall be ¾" nominal steel bars (0.677" actual, ¾-10 UNC threads) – ASTM F 1554 hot-dip galvanized per ASTM A -123 with a minimum yield of 55,000 psi.

2.4 The top cap beam of the walls shall be Alloy 6063-T6.

2.5 The bolts, nuts and anchor rods shall be hot-dipped galvanized, specially heat-treated ¾ inches in diameter steel, meeting ASTM A-307 specifications.

3.0 INSTALLATION

3.1 The top of the headwalls shall be horizontal. The headwall cap shall be field-drilled and bolted to the headwall vertical panels.

3.2 The bottom of the headwall panels shall be attached to the corrugated plates through the reinforcing rib bolted to the ALBC structure and bolted to the headwall.

3.3 Each headwall shall be anchored with anchor rods as shown on the construction drawings. There must be 3 central rods anchored back from the headwall at the tie back reinforcing rib at each headwall.

3.4 All headwall panels shall have the top and bottom elevations as shown on the drawings. All panels shall be permanently entrenched a minimum of 2.25' below the final grade elevation as shown on the drawings. The soil in front of the wall providing resistance to the toe of the wall must have a minimum internal friction angle of at least 34° (value to be field verified).

3.5 The backfill against the headwalls, and within 10-feet of the back of the walls, shall meet the gradation of the select backfill for the ALBC and shall have a minimum internal friction angle of 34 degrees (to be field verified). The backfill behind the walls shall be placed and compacted as per the manufacturer's recommendations and accepted industry standards.

3.7 If changes in elevations of fill occur, the designer of the structures and walls shall be notified to check the safety factors.

3.8 Hydrostatic pressure shall be alleviated through one or both of the methods listed below or as approved by the Engineer of Record.

1) Field drill 2" diameter weep holes at the center of every 54" panel. Holes shall be approximately 3-6 inches above the finished grade line near the base of the wall to minimize hydrostatic pressure. A minimum of a 4 ounce filter fabric shall be placed behind the weep holes to maintain a soil-tight system.

2) Underdrains shall be installed per the Engineer of Record's recommendations.

III – FOOTINGS

1.0 EXCAVATION FOR FOOTINGS

1.1 Footing excavation shall consist of the removal of all material, of whatever nature, necessary for the construction of foundations.

1.2 It shall be the responsibility of the Contractor to identify and relocate all existing utilities which conflict with the proposed footing locations shown on the plan. The Contractor must call the appropriate utility company at least 48 hours before any excavation to request exact field location of utilities, and coordinate removal and installation of all utilities with the respective utility company.

1.3 The side of all excavations shall be cut to prevent sliding or caving of the material above the footings.

1.4 Excavated material shall be disposed in accordance with the plan established by the Engineer.

1.5 The footings are designed for a net allowable bearing capacity of 4,000 psf. This value shall be field verified. The evaluation and design of any foundation improvement required to achieve a net allowable bearing capacity of 4,000 psf and a friction factor of 0.45, and to protect against frost and scour and settlement, is the responsibility of others than CBC Engineers.

IV - CONCRETE

1.0 CODES AND STANDARDS

1.1 Reinforced concrete shall conform to the requirements of AASHTO Standard Specifications for Highway Bridges, Division II - Construction, Section 8, "Concrete Structures", for Class A concrete, having a minimum compressive strength of 4,000 psi.

2.0 STANDARDS FOR MATERIALS

2.1 Portland Cement - Conforming to ASTM Specification C-150, Type I or II.

2.2 Water - The water shall be drinkable, clean free from injurious amounts of oils, acids, alkalis, organic materials, or deleterious substances.

2.3 Aggregates - Fine and coarse aggregates shall conform to current ASTM Specification C-33 "Specification for Concrete Aggregates" except that local aggregates which have been shown by tests and by actual service to produce satisfactory qualities may be used when approved by the Engineer.

2.4 Submittals - Test data and/or certifications to the Owner shall be furnished upon request.

3.0 PROPORTIONING OF CONCRETE

3.1 COMPOSITION

3.1.1 The concrete shall be composed of cement, fine aggregate, coarse aggregate and water.

3.1.2 The concrete shall be homogeneous, readily placeable and uniformly workable and shall be proportioned in accordance with ACI-211.1.

3.1.3 Proportions shall be established on the basis of field experience with the materials to be employed. The amount of water used shall not exceed the maximum 0.45 water/cement ratio, and shall be reduced as necessary to produce concrete of the specified consistency at the time of placement.

3.1.4 An air-entraining admixture, conforming to the requirements of ASTM C260, shall be used in all concrete furnished under this contract. The quantity of admixture shall be such as to produce an air content in the freshly mixed concrete of 6 percent plus or minus 1 percent as determined in accordance with ASTM C231 or C173.

3.2 Qualities Required - As indicated in the table below:

TABLE IV-1

QUALITIES REQUIRED

ITEM	QUALITY REQUIRED
AASHTO Class	A
Type of Cement	I or II
Compressive Strength f'c @ 28 days	4,000 psi
Slump, inches	2 - 4 in.

3.3 Maximum Size of Coarse Aggregates - Maximum size of coarse aggregates shall not be larger than 19 mm (3/4 inches).

3.4 Rate of Hardening of Concrete - Concrete mix shall be adjusted to produce the required rate of hardening for varied climatic conditions:

Under 40°F Ambient Temperature – All work to be in accordance with the recommendations of ACI-306R "Cold Weather Concreting."

4.0 MIXING AND PLACING

4.1 Equipment - Ready Mix Concrete shall be used and shall conform to the "Specifications for Ready-Mix Concrete," ASTM C-94. Approval is required prior to using job mixed concrete.

4.2 Preparation - All work shall be in accordance with ACI-304, "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete." All construction debris and extraneous matter shall be removed from within the forms. Concrete shall be placed on clean surfaces, free from water. Concrete that has to be dropped four (4) feet or more shall be placed through a tremie.

4.3 All concrete shall be consolidated by internal mechanical vibration immediately after placement. Vibrators shall be of a size appropriate for the work, capable of transmitting vibration to concrete at frequencies of not less than 4,500 impulses per minute.

5.0 FORM WORK

5.1 Forms shall be of wood, steel or other approved material and shall be set and held true to the dimensions, lines and grades of the structure prior to and during the placement of concrete.

5.2 Forms shall not be removed until the concrete has sufficient strength to prevent concrete drainage and/or damage.

6.0 CURING

6.1 Fresh concrete shall be protected from rains, flowing water and mechanical injury for a period of at least seven (7) days. No load shall be applied to the concrete until it has reached its design strength.

7.0 REINFORCING STEEL

7.1 MATERIAL

7.1.1 All reinforcing bars shall be deformed bars (ASTM-A615) Grade 60.

7.2 BENDING AND SPLICING

7.2.1 Bar reinforcement shall be cut and bent to the shapes shown on the plans. Fabrication tolerances shall be in accordance with ACI 315. All bars shall be bent cold, unless otherwise permitted.

7.2.2 All reinforcement shall be furnished in the full lengths indicated on the plans unless otherwise permitted. Except for splices shown on the plans and splices for No. 5 or smaller bars, splicing of bars will not be permitted without written approval. Splices shall be staggered as far as possible.

7.2.3 In lapped splices, the bars shall be placed and wired in such a manner as to maintain the minimum distance to the surface of the concrete shown on the plans.

7.2.4 Substitution of different size bars will be permitted only when authorized by the engineer. The substituted bars shall have an area equivalent to the design area, or larger.

7.3 PLACING AND FASTENING

7.3.1 Steel reinforcement shall be accurately placed as shown on the plans and firmly held in position during the placing and setting of concrete. Bars shall be tied at all intersections around the perimeter of each mat and at not less than 2 foot centers or at every intersection, whichever is greater, elsewhere. Welding of cross bars (tack welding) will not be permitted for assembly of reinforcement.

7.3.2 Reinforcing steel shall be supported in its proper position by use of mortar blocks, wire bar supports, supplementary bars or other approved devices. Such devices shall be of such height and placed at sufficiently frequent intervals so as to maintain the distance between the reinforcing and the formed surface or the top surface within 1/4 inch of that indicated on the plans.

V – FILTER FABRIC (GEOTEXTILE SCREEN)

1.0 Filter fabric shall be placed at all locations shown on the construction drawings and as necessary to maintain a soil tight system.

2.0 Filter fabric cloth shall conform to Contech specification for C60-NW or equivalent and shall meet the following ASTM tests:

2.1 ASTM D4751 - Apparent opening size equal to #70 U.S. Standard Sieve Size.

2.2 ASTM D4632 (Grab Tensile Test) - Minimum Strength = 160 pounds.

2.3 ASTM D4632 (Grab Elongation) - 30-70%.

2.4 ASTM D4533 (Trapezoidal Tear) - Minimum Strength = 60 pounds.

2.5 ASTM D4355 (Stabilized for Heat and Ultra-Violet Degradation) - 70% strength retained.

3.0 The minimum fabric coefficient of permeability (ASTM D4491) shall be 0.24 cm/sec.

4.0 The fabric shall be non-woven with a minimum thickness (ASTM D5199) of 60 mils.

5.0 Fabric shall not be placed over sharp or angular rocks that could tear or puncture it.

6.0 Care should be exercised to prevent any puncturing or rupture of the filter fabric. Should such rupture occur the damaged area should be covered with a patch of filter fabric using an overlap minimum of one (1) foot.

APPENDIX A

CALCULATIONS

Structural Design Check for Corrugated Aluminum Plate Box Culvert
Per AASHTO LRFD Bridge Design Specifications, Section 12, 9th Edition 2020

CONTECH ENGINEERED SOLUTIONS

Project Name:	Self Storage Facility	**CRM #:**	720,529
Location:	Whately, MA	**Date:**	8/11/2022

H, Height of Cover	2.6	(ft.)	Enter Structure Here:		
Is structure adequate to carry the load?	OK		7	R1	
S, Span			11.33		(ft.)
R, Rise			7.167		(ft.)
Crown Gage			2		
Crown Rib Spacing			18		(in.)
Crown Rib Type			Type IV		
Haunch Gage			2		
Haunch Rib Spacing			54		(in.)
Haunch Rib Type			Type II		
Number of Wheels per Axle	4		Use Above Plate/Rib Values?		
Live Loading Type	HL-93		Yes		

Tandem Controls

A_L, Sum of Axle Loads		50	kip		(12.9.4.2)
C_1, Adjustment Factor		0.727		Typical Wheel/Load Combinations: HS20: 4 wheels Tandem: 4 wheels	(12.9.4.2)
C_2, Adjustment Factor		1.00			(12.9.4.2)
C_{ll}, Adjusted Live Load	$C_{ll}=C_1C_2A_L$	36.33	kip		(12.9.4.2)
C_H, Crown Soil Cover Factor	$C_H=1.15-\left(\frac{H-1.4}{14}\right)>1$	1.064			(12.9.4.4-1)
R_H, Haunch Moment Reduction Factor		0.82			(Table 12.9.4.3-3)
ρ, Density of Cover Material		0.12	(kcf)		(12.9.4.2-1)
η_{EV}, Redundancy Factor		1.05			(1.3.4, 12.5.4)
η_{LL}, Redundancy Factor		1			(1.3.4, 12.5.4)
γ_{EV}, Dead Load Factor		1.5			(Table 3.4.1-2)
γ_{LL}, Live Load Factor		2.00			(12.9.4.2)

K_1, Live Load Moment Calculator	If:	0.107		
	8' < S < 20'	Then: S < 20'	$K_1=\frac{0.08}{\left(\frac{H}{S}\right)^{0.2}}$	(12.9.4.2-4)
	20' < S < 25'-6"	Then:	$K_1=\frac{0.08-0.002(S-20)}{\left(\frac{H}{S}\right)^{0.2}}$	(12.9.4.2-5)
K_2, Live Load Moment Calculator	If:	7.660		(12.9.4.2)
	1.4' < H < 3.0'	Then:	$K_2 = 0.54\,H^2 - 0.4H + 5.05$	(12.9.4.2-6)
	3.0' < H < 5.0'	Then:	$K_2 = 1.90H + 3$	(12.9.4.2-7)

Structural Design Check for Corrugated Aluminum Plate Box Culvert
Per AASHTO LRFD Bridge Design Specifications, Section 12, 9th Edition 2020

CONTECH® ENGINEERED SOLUTIONS

M_{dl}, Dead Load Moments	$M_{dl} = \rho\{S^3[0.0053-0.00024(S-12)]+0.053(H-1.4)S^2\}$	1.934	(kip-ft./ft)	(12.9.4.2-1)
M_{ll}, Live Load Moments	$M_{ll} = C_{ll}K_1 \times S/K_2$	5.773	(kip-ft./ft)	(12.9.4.2-3)
M_{dlu}, Factored DL Moments	$M_{dlu} = \eta_{EV}\gamma_{EV}M_{dl}$	3.046	(kip-ft./ft)	(12.9.4.2)
M_{llu}, Factored LL Moments	$M_{llu} = \eta_{LL}\gamma_{LL}M_{ll}$	11.545	(kip-ft./ft)	(12.9.4.2)
M_{pc}, Crown Plastic Moment Resistance	$M_{pc} = C_H P_c(M_{dlu}+M_{llu})$	See Calcs Below		(12.9.4.3-1)
M_{ph}, Haunch Plastic Moment Resistance	$M_{ph} = C_H(1.0-P_c)(M_{dlu}+R_H M_{llu})$	See Calcs Below		(12.9.4.3-2)
M_{pca}, Allowable Crown Plastic Moment	Provided by Rib Type, Rib Spacing, and	10.42	(kip-ft./ft)	
M_{pha}, Allowable Haunch Plastic Moment	Provided by Rib Type, Rib Spacing, and	4.62	(kip-ft./ft)	
S, Span (ft.)	11.33			

Table 12.9.4.3-1	
Span (ft.)	Allowable Range of P_c
< 10.0	0.55 - 0.70
10.0 - 15.0	0.50 - 0.70
15.0 - 20.0	0.45 - 0.70
20.0 - 25.4	0.45 - 0.60

* calculate P_c using maximum allowable M_{pca} or max P_c

$P_c = M_{pca} / C_H(M_{dlu}+M_{llu})$ (Eq. 3.1)

$P_c =$ 0.6710

* Calculate M_{ph} using the P_c from previous step.

$M_{ph} = C_H(1.0 - P_c)[M_{dlu} + M_{llu}(R_h)]$ (Eq. 3.2)

$M_{ph} =$ 4.374 [redacted]

V, Unfactored Footing Reaction	$V = p\left(\frac{HS}{2.0}+\frac{S^2}{40.0}\right)+\frac{A_L}{8+2(H+R)}$	3.969	(kip/ft.)	(12.9.4.5-1)
Unfactored DL		2.153	(kip/ft.)	
Unfactored LL		1.816	(kip/ft.)	
R_V, Vertical Reaction	$R_V = (V)\cos\Delta$	3.827	(kip/ft.)	downward
R_H, Horizontal Reaction	$R_H = (V)\sin\Delta$	1.054	(kip/ft.)	outward

Structural Design Check for Corrugated Aluminum Plate Box Culvert

Per AASHTO LRFD Bridge Design Specifications, Section 12, 9th Edition 2020

CONTECH® ENGINEERED SOLUTIONS

Project Name:	Self Storage Facility	**CRM #:**	720,529
Location:	Whately, MA	**Date:**	8/11/2022

H, Height of Cover	5	(ft.)	Enter Structure Here:		
Is structure adequate to carry the load?	OK		7	R1	
S, Span			11.33		(ft.)
R, Rise			7.167		(ft.)
Crown Gage			2		
Crown Rib Spacing			18		(in.)
Crown Rib Type			Type IV		
Haunch Gage			2		
Haunch Rib Spacing			54		(in.)
Haunch Rib Type			Type II		
Number of Wheels per Axle	4		Use Above Plate/Rib Values?		
Live Loading Type	HL-93		Yes		

Tandem Controls

A_L, Sum of Axle Loads		50	kip		(12.9.4.2)
C_1, Adjustment Factor		0.727		Typical Wheel/Load Combinations: HS20: 4 wheels Tandem: 4 wheels	(12.9.4.2)
C_2, Adjustment Factor		1.00			(12.9.4.2)
C_{ll}, Adjusted Live Load	$C_{ll} = C_1C_2A_L$	36.33	kip		(12.9.4.2)
C_H, Crown Soil Cover Factor	$C_H = 1.15 - \left(\frac{H-1.4}{14}\right) > 1$	1.000			(12.9.4.4-1)
R_H, Haunch Moment Reduction Factor		1.00			(Table 12.9.4.3-3)
ρ, Density of Cover Material		0.12	(kcf)		(12.9.4.2-1)
η_{EV}, Redundancy Factor		1.05			(1.3.4, 12.5.4)
η_{LL}, Redundancy Factor		1			(1.3.4, 12.5.4)
γ_{EV}, Dead Load Factor		1.5			(Table 3.4.1-2)
γ_{LL}, Live Load Factor		2.00			(12.9.4.2)

K_1, Live Load Moment Calculator	If:	0.094		
	8' < S < 20'	Then: S < 20'	$K_1 = \frac{0.08}{\left(\frac{H}{S}\right)^{0.2}}$	(12.9.4.2-4)
	20' < S < 25'-6"	Then:	$K_1 = \frac{0.08 - 0.002(S-20)}{\left(\frac{H}{S}\right)^{0.2}}$	(12.9.4.2-5)
K_2, Live Load Moment Calculator	If:	12.500		(12.9.4.2)
	1.4' < H < 3.0'	Then:	$K_2 = 0.54H^2 - 0.4H + 5.05$	(12.9.4.2-6)
	3.0' < H < 5.0'	Then:	$K_2 = 1.90H + 3$	(12.9.4.2-7)

Structural Design Check for Corrugated Aluminum Plate Box Culvert
Per AASHTO LRFD Bridge Design Specifications, Section 12, 9th Edition 2020

CONTECH ENGINEERED SOLUTIONS

M_{dl}, Dead Load Moments	$M_{dl} = \rho\{S^3[0.0053-0.00024(S-12)]+0.053(H-1.4)S^2\}$	3.895	(kip-ft./ft)	(12.9.4.2-1)
M_{ll}, Live Load Moments	$M_{ll} = C_{ll}K_1 \times S/K_2$	3.104	(kip-ft./ft)	(12.9.4.2-3)
M_{dlu}, Factored DL Moments	$M_{dlu} = \eta_{EV}\gamma_{EV}M_{dl}$	6.134	(kip-ft./ft)	(12.9.4.2)
M_{llu}, Factored LL Moments	$M_{llu} = \eta_{LL}\gamma_{LL}M_{ll}$	6.208	(kip-ft./ft)	(12.9.4.2)
M_{pc}, Crown Plastic Moment Resistance	$M_{pc} = C_H P_c(M_{dlu}+M_{llu})$	See Calcs Below		(12.9.4.3-1)
M_{ph}, Haunch Plastic Moment Resistance	$M_{ph} = C_H(1.0-P_c)(M_{dlu}+R_H M_{llu})$	See Calcs Below		(12.9.4.3-2)
M_{pca}, Allowable Crown Plastic Moment	Provided by Rib Type, Rib Spacing, and	10.42	(kip-ft./ft)	
M_{pha}, Allowable Haunch Plastic Moment	Provided by Rib Type, Rib Spacing, and	4.62	(kip-ft./ft)	
S, Span (ft.)	11.33			

Table 12.9.4.3-1	
Span (ft.)	Allowable Range of P_c
< 10.0	0.55 - 0.70
10.0 - 15.0	0.50 - 0.70
15.0 - 20.0	0.45 - 0.70
20.0 - 25.4	0.45 - 0.60

* calculate P_c using maximum allowable M_{pca} or max P_c

$P_c = M_{pca} / C_H(M_{dlu}+M_{llu})$ (Eq. 3.1)

$P_c =$ 0.7000

* Calculate M_{ph} using the P_c from previous step.

$M_{ph} = C_H(1.0 - P_c)[M_{dlu} + M_{llu}(R_h)]$ (Eq. 3.2)

$M_{ph} =$ 3.703 [redacted]

V, Unfactored Footing Reaction	$V = \rho\left(\frac{HS}{2.0}+\frac{S^2}{40.0}\right)+\frac{A_L}{8+2(H+R)}$	5.332	(kip/ft.)	(12.9.4.5-1)
Unfactored DL		3.785	(kip/ft.)	
Unfactored LL		1.546	(kip/ft.)	
R_V, Vertical Reaction	$R_V = (V)\cos\Delta$	5.140	(kip/ft.)	downward
R_H, Horizontal Reaction	$R_H = (V)\sin\Delta$	1.416	(kip/ft.)	outward

Client: CONTECH

Title: SELF STORAGE FACILITY, WHATELY, MA

Designer: CBC

Page: 1

Date: 8.29.22

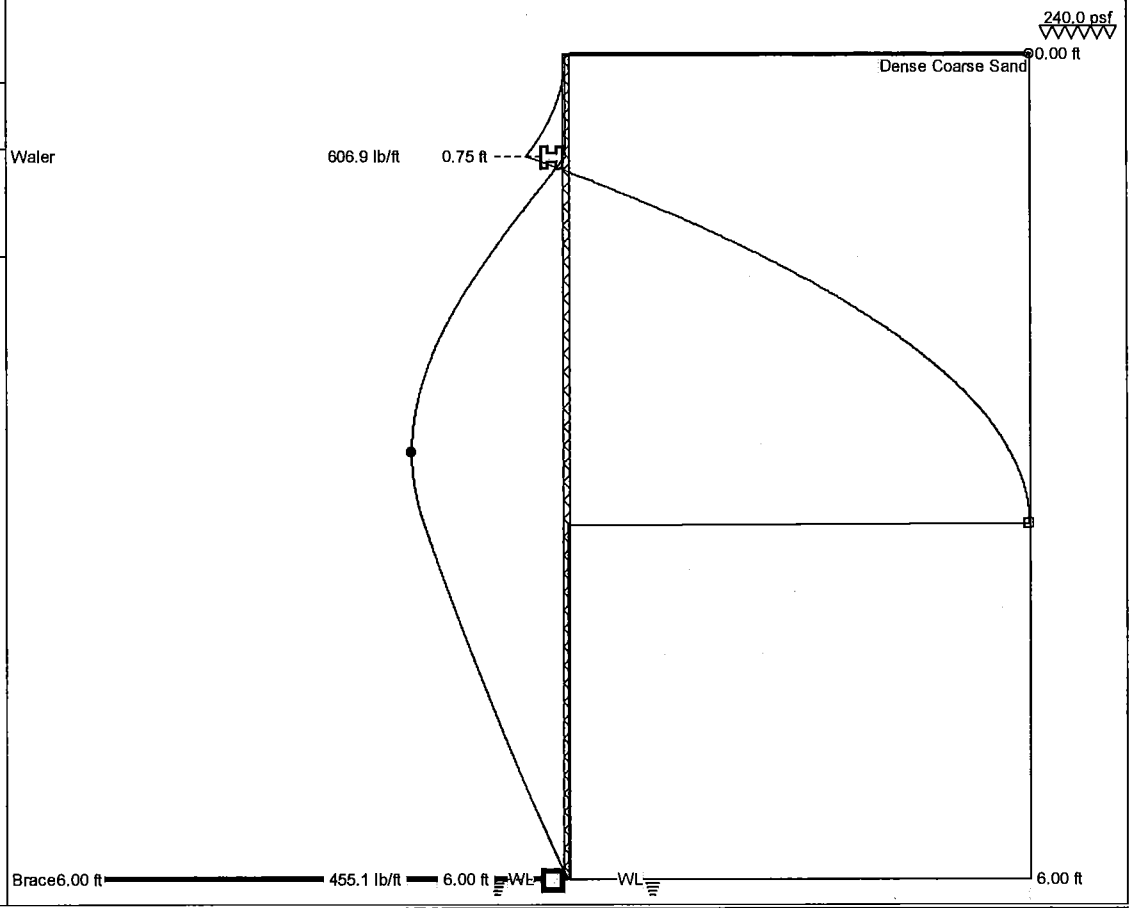
Sheet: AL WALL

Pressure: Terzaghi (m = 1.0; a = 0.4)

Toe: No Earth Support

	Maximum	d (ft)
○	177.0 psf	0.00
□	585.2 ftlb/ft	3.42
●	0.1 in	2.90

Wall (Earth+Live) Load



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Web: www.pilebuck.com

Client: CONTECH

Title: SELF STORAGE FACILITY, WHATELY, MA
Designer: CBC
Page: 2
Date: 8.29.22

Sheet: AL WALL
Pressure: Terzaghi (m = 1.0; a = 0.4)
Toe: No Earth Support

Wall (Earth+Live) Load

Input Data

Depth Of Excavation = 6.00 ft Depth Of Active Water = 6.00 ft Water Density = 62.40 pcf
Surcharge = 240.0 psf Depth Of Passive Water = 6.00 ft Minimum Fluid Density = 31.82 pcf

Soil Profile

Depth (ft)	Soil Name	γ (pcf)	γ' (pcf)	C (psf)	C_a (psf)	ϕ(°)	δ(°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Dense Coarse Sand	120.00	57.60	0.0	0.0	34.0	17.0	0.25	0.00	5.48	0.00

Solution

Sheet

Sheet Name	I (in⁴/ft)	E (psi)	Z (in³/ft)	f (psi)	Maximum Bending Moment (ftlb/ft)	Upstand (ft)	Toe (ft)	Pile Length (ft)
AL WALL	1.50	1E+07	1.13	24000.0	2260.0	0.00	0.00	6.00

Load Model: Hinge Method

Supports

Depth (ft)	Type	Linear Load (lb/ft)
0.75	Waler	606.9
6.00	Brace	455.1

Maxima

	Maximum	Depth
Bending Moment	585.2 ftlb/ft	3.42 ft
Deflection	0.1 in	2.90 ft
Pressure	177.0 psf	0.00 ft
Shear Force	473.2 lb/ft	0.75 ft

Client: CONTECH

Title: SELF STORAGE FACILITY, WHATELY, MA

Designer: CBC

Page: 3

Date: 8.29.22

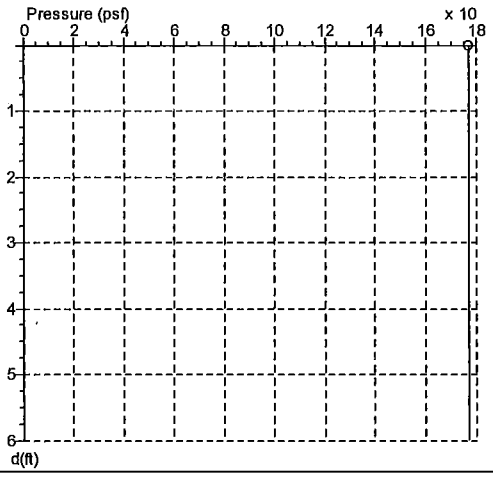
Sheet: AL WALL

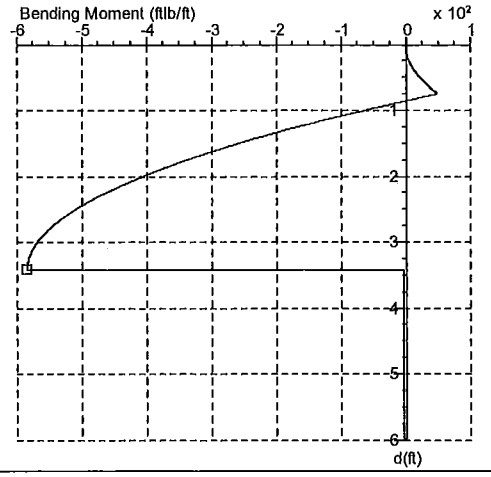
Pressure: Terzaghi (m = 1.0; a = 0.4)

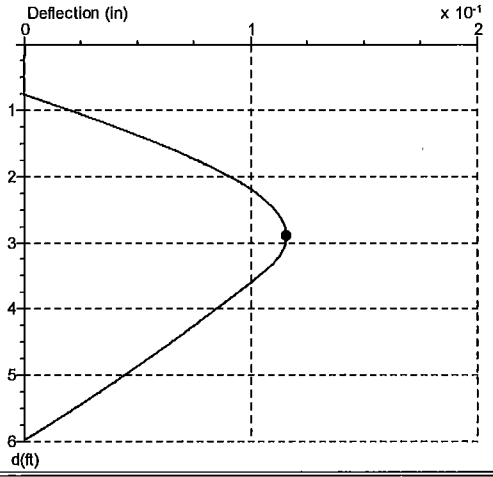
Toe: No Earth Support

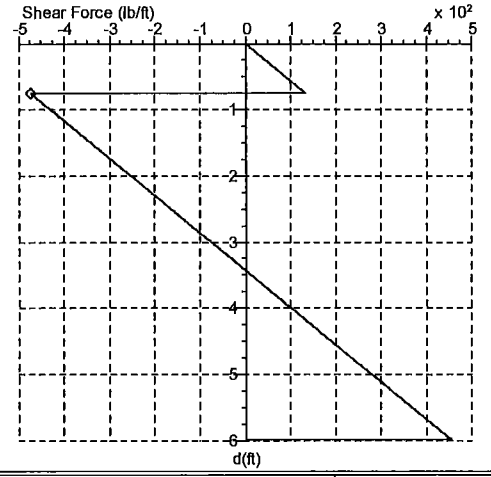
Maximum		d (ft)
○	177.0 psf	0.00
□	585.2 ftlb/ft	3.42
◇	473.2 lb/ft	0.75
●	0.1 in	2.90

Wall (Earth+Live) Load









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Web: www.pilebuck.com

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Page: 4

Date: 8.29.22

Sheet: AL WALL

Pressure: Terzaghi (m = 1.0; a = 0.4)

Toe: No Earth Support

Wall (Earth+Live) Load

depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)
0.00	177.0	0.0	0.0	0.0	2.02	177.0	-410.2	0.1	-248.4	4.04	177.0	-2.3	0.1	108.2
0.05	177.0	0.2	0.0	9.8	2.07	177.0	-422.4	0.1	-239.6	4.09	177.0	-2.3	0.1	118.0
0.11	177.0	0.9	0.0	18.7	2.12	177.0	-435.4	0.1	-229.8	4.14	177.0	-2.3	0.1	126.8
0.16	177.0	2.2	0.0	28.5	2.18	177.0	-446.7	0.1	-221.0	4.19	177.0	-2.3	0.1	136.5
0.21	177.0	3.8	0.0	37.4	2.23	177.0	-458.6	0.1	-211.3	4.25	177.0	-2.3	0.1	146.3
0.27	177.0	6.1	0.0	47.2	2.28	177.0	-470.0	0.1	-201.5	4.30	177.0	-2.3	0.1	155.1
0.32	177.0	9.0	0.0	57.0	2.34	177.0	-479.8	0.1	-192.7	4.35	177.0	-2.3	0.1	164.9
0.37	177.0	12.0	0.0	65.9	2.39	177.0	-490.2	0.1	-182.9	4.41	177.0	-2.3	0.1	173.7
0.42	177.0	15.9	0.0	75.7	2.44	177.0	-499.1	0.1	-174.1	4.46	177.0	-2.3	0.1	183.4
0.48	177.0	20.3	0.0	85.5	2.50	177.0	-508.5	0.1	-164.4	4.51	177.0	-2.3	0.1	193.2
0.53	177.0	24.8	0.0	94.4	2.55	177.0	-517.3	0.1	-154.6	4.57	177.0	-2.3	0.1	202.0
0.58	177.0	30.2	0.0	104.2	2.60	177.0	-524.8	0.1	-145.8	4.62	177.0	-2.3	0.1	211.8
0.64	177.0	35.6	0.0	113.1	2.65	177.0	-532.6	0.1	-136.0	4.67	177.0	-2.3	0.1	221.5
0.69	177.0	42.1	0.0	122.9	2.71	177.0	-539.8	0.1	-126.3	4.73	177.0	-2.3	0.1	230.4
0.74	177.0	47.9	0.0	132.7	2.76	177.0	-545.9	0.1	-117.4	4.78	177.0	-2.3	0.1	240.1
0.80	177.0	27.5	0.0	-465.3	2.81	177.0	-552.1	0.1	-107.7	4.83	177.0	-2.3	0.1	248.9
0.85	177.0	2.1	0.0	-455.5	2.87	177.0	-557.3	0.1	-98.9	4.88	177.0	-2.3	0.0	258.7
0.90	177.0	-22.7	0.0	-445.8	2.92	177.0	-562.5	0.1	-89.1	4.94	177.0	-2.3	0.0	268.4
0.96	177.0	-44.8	0.0	-436.9	2.97	177.0	-567.2	0.1	-79.4	4.99	177.0	-2.3	0.0	277.3
1.01	177.0	-68.6	0.0	-427.2	3.03	177.0	-570.9	0.1	-70.5	5.04	177.0	-2.3	0.0	287.0
1.06	177.0	-89.7	0.0	-418.3	3.08	177.0	-574.6	0.1	-60.8	5.10	177.0	-2.3	0.0	295.8
1.12	177.0	-112.5	0.0	-408.6	3.13	177.0	-577.7	0.1	-51.1	5.15	177.0	-2.3	0.0	305.6
1.17	177.0	-134.7	0.0	-398.9	3.19	177.0	-580.0	0.1	-42.2	5.20	177.0	-2.3	0.0	315.3
1.22	177.0	-154.5	0.0	-390.0	3.24	177.0	-582.1	0.1	-32.5	5.26	177.0	-2.3	0.0	324.2
1.27	177.0	-175.7	0.0	-380.3	3.29	177.0	-583.5	0.1	-23.6	5.31	177.0	-2.3	0.0	333.9
1.33	177.0	-194.5	0.0	-371.4	3.35	177.0	-584.6	0.1	-13.9	5.36	177.0	-2.3	0.0	343.6
1.38	177.0	-214.7	0.1	-361.7	3.40	177.0	-585.1	0.1	-4.2	5.42	177.0	-2.3	0.0	352.5
1.43	177.0	-234.3	0.1	-352.0	3.45	177.0	-2.3	0.1	4.7	5.47	177.0	-2.3	0.0	362.2
1.49	177.0	-251.7	0.1	-343.1	3.50	177.0	-2.3	0.1	14.4	5.52	177.0	-2.3	0.0	371.1
1.54	177.0	-270.4	0.1	-333.4	3.56	177.0	-2.3	0.1	24.1	5.58	177.0	-2.3	0.0	380.8
1.59	177.0	-288.5	0.1	-323.7	3.61	177.0	-2.3	0.1	33.0	5.63	177.0	-2.3	0.0	390.5
1.65	177.0	-304.4	0.1	-314.8	3.66	177.0	-2.3	0.1	42.7	5.68	177.0	-2.3	0.0	399.4
1.70	177.0	-321.5	0.1	-305.1	3.72	177.0	-2.3	0.1	51.6	5.73	177.0	-2.3	0.0	409.1
1.75	177.0	-336.6	0.1	-296.2	3.77	177.0	-2.3	0.1	61.3	5.79	177.0	-2.3	0.0	418.9
1.81	177.0	-352.6	0.1	-286.5	3.82	177.0	-2.3	0.1	71.1	5.84	177.0	-2.3	0.0	427.7
1.86	177.0	-368.1	0.1	-276.7	3.88	177.0	-2.3	0.1	79.9	5.89	177.0	-2.3	0.0	437.4
1.91	177.0	-381.8	0.1	-267.9	3.93	177.0	-2.3	0.1	89.6	5.95	177.0	-2.3	0.0	446.3
1.96	177.0	-396.3	0.1	-258.2	3.98	177.0	-2.3	0.1	98.5	6.00	177.0	0.0	0.0	0.0

Your Company Name

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Client: CONTECH

Title: SELF STORAGE FACILITY, WHATELY, MA

Designer: CBC

Page: 1

Date: 8.29.22

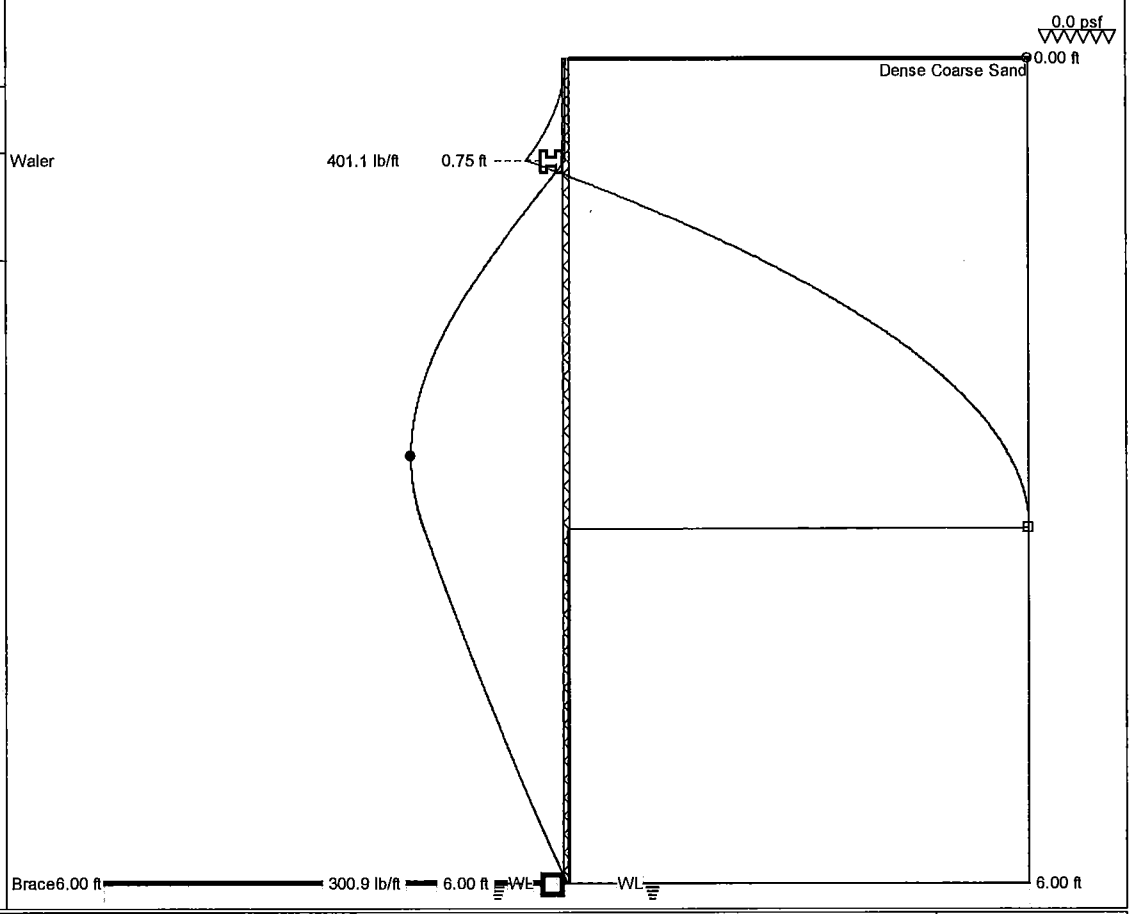
Sheet: AL WALL

Pressure: Terzaghi (m = 1.0; a = 0.4)

Toe: No Earth Support

	Maximum	d (ft)
○	117.0 psf	0.00
□	386.8 ftlb/ft	3.42
●	0.1 in	2.90

Wall (Earth) Load



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Web: www.pilebuck.com

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Designer: CBC

Page: 2

Date: 8.29.22

Sheet: AL WALL

Pressure: Terzaghi (m = 1.0; a = 0.4)

Toe: No Earth Support

Wall (Earth) Load

Input Data

Depth Of Excavation = 6.00 ft Depth Of Active Water = 6.00 ft Water Density = 62.40 pcf

Surcharge = 0.0 psf Depth Of Passive Water = 6.00 ft Minimum Fluid Density = 31.82 pcf

Soil Profile

Depth (ft)	Soil Name	γ (pcf)	γ' (pcf)	C (psf)	C_a (psf)	ϕ(°)	δ(°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Dense Coarse Sand	120.00	57.60	0.0	0.0	34.0	17.0	0.25	0.00	5.48	0.00

Solution

Sheet

Sheet Name	I (in⁴/ft)	E (psi)	Z (in³/ft)	f (psi)	Maximum Bending Moment (ftlb/ft)	Upstand (ft)	Toe (ft)	Pile Length (ft)
AL WALL	1.50	1E+07	1.13	24000.0	2260.0	0.00	0.00	6.00

Load Model: Hinge Method

Supports

Depth (ft)	Type	Linear Load (lb/ft)
0.75	Waler	401.1
6.00	Brace	300.9

Maxima

	Maximum	Depth
Bending Moment	386.8 ftlb/ft	3.42 ft
Deflection	0.1 in	2.90 ft
Pressure	117.0 psf	0.00 ft
Shear Force	312.8 lb/ft	0.75 ft

Client: CONTECH

Title: SELF STORAGE FACILITY, WHATELY, MA

Designer: CBC

Page: 3

Date: 8.29.22

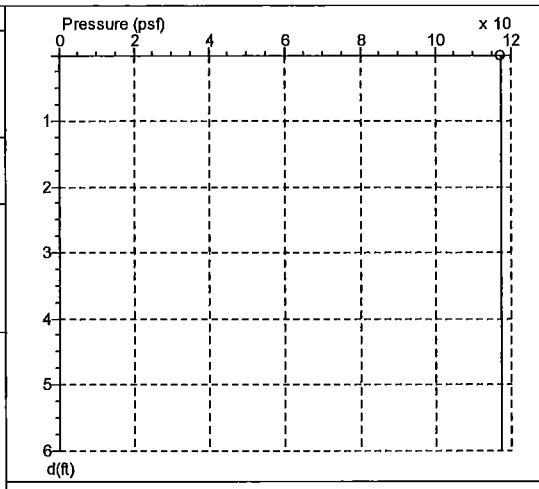
Sheet: AL WALL

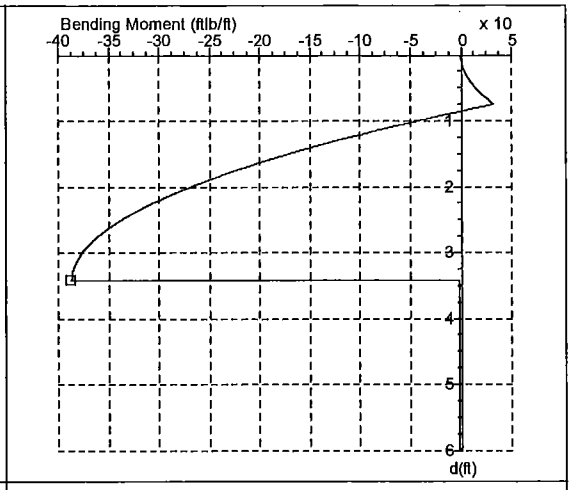
Pressure: Terzaghi (m = 1.0; a = 0.4)

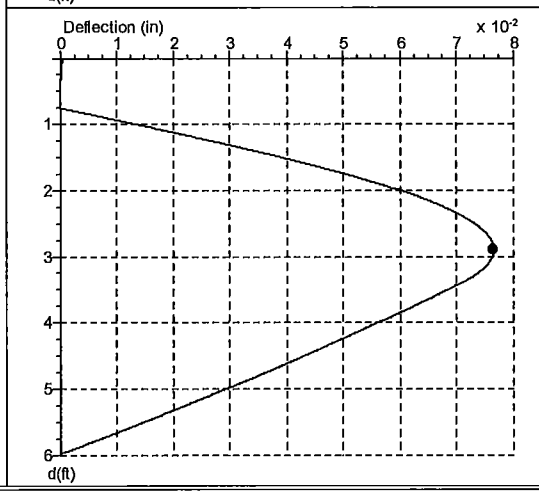
Toe: No Earth Support

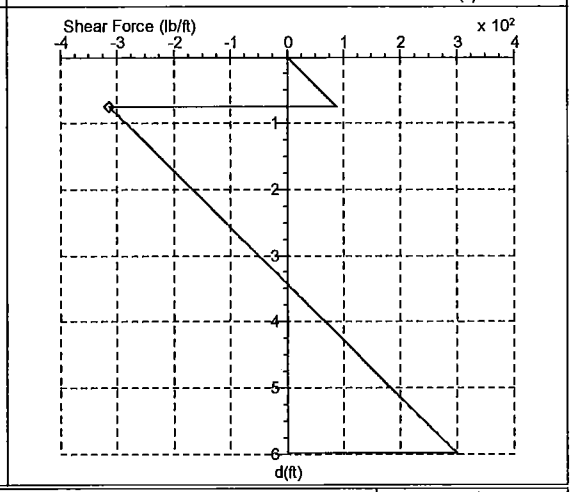
	Maximum	d (ft)
○	117.0 psf	0.00
□	386.8 ftlb/ft	3.42
◇	312.8 lb/ft	0.75
●	0.1 in	2.90

Wall (Earth) Load









Your Company Name

SPW911, v2.40

Email: pilebuck@pilebuck.com
Web: www.pilebuck.com

Client: CONTECH

Title: SELF STORAGE FACILITY, WHATELY, MA

Designer: CBC

Page: 4

Date: 8.29.22

Sheet: AL WALL

Pressure: Terzaghi (m = 1.0; a = 0.4)

Toe: No Earth Support

Wall (Earth) Load

depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)
0.00	117.0	-0.2	0.0	0.6	2.02	117.0	-271.2	0.1	-164.2	4.04	117.0	-1.5	0.1	71.5
0.05	117.0	0.0	0.0	7.0	2.07	117.0	-279.2	0.1	-158.4	4.09	117.0	-1.5	0.1	78.0
0.11	117.0	0.5	0.0	12.9	2.12	117.0	-287.8	0.1	-151.9	4.14	117.0	-1.5	0.1	83.8
0.16	117.0	1.3	0.0	19.3	2.18	117.0	-295.3	0.1	-146.1	4.19	117.0	-1.5	0.1	90.3
0.21	117.0	2.4	0.0	25.2	2.23	117.0	-303.1	0.1	-139.6	4.25	117.0	-1.5	0.0	96.7
0.27	117.0	4.0	0.0	31.6	2.28	117.0	-310.7	0.1	-133.2	4.30	117.0	-1.5	0.0	102.5
0.32	117.0	5.9	0.0	38.0	2.34	117.0	-317.2	0.1	-127.4	4.35	117.0	-1.5	0.0	109.0
0.37	117.0	7.9	0.0	43.9	2.39	117.0	-324.0	0.1	-120.9	4.41	117.0	-1.5	0.0	114.8
0.42	117.0	10.5	0.0	50.3	2.44	117.0	-329.9	0.1	-115.1	4.46	117.0	-1.5	0.0	121.3
0.48	117.0	13.4	0.0	56.7	2.50	117.0	-336.1	0.1	-108.6	4.51	117.0	-1.5	0.0	127.7
0.53	117.0	16.4	0.0	62.6	2.55	117.0	-341.9	0.1	-102.2	4.57	117.0	-1.5	0.0	133.6
0.58	117.0	20.0	0.0	69.0	2.60	117.0	-346.9	0.1	-96.4	4.62	117.0	-1.5	0.0	140.0
0.64	117.0	23.6	0.0	74.9	2.65	117.0	-352.0	0.1	-89.9	4.67	117.0	-1.5	0.0	146.4
0.69	117.0	27.8	0.0	81.3	2.71	117.0	-356.8	0.1	-83.5	4.73	117.0	-1.5	0.0	152.3
0.74	117.0	31.7	0.0	87.7	2.76	117.0	-360.9	0.1	-77.6	4.78	117.0	-1.5	0.0	158.7
0.80	117.0	18.1	0.0	-307.5	2.81	117.0	-365.0	0.1	-71.2	4.83	117.0	-1.5	0.0	164.6
0.85	117.0	1.4	0.0	-301.1	2.87	117.0	-368.4	0.1	-65.3	4.88	117.0	-1.5	0.0	171.0
0.90	117.0	-15.0	0.0	-294.7	2.92	117.0	-371.8	0.1	-58.9	4.94	117.0	-1.5	0.0	177.4
0.96	117.0	-29.6	0.0	-288.8	2.97	117.0	-374.9	0.1	-52.5	4.99	117.0	-1.5	0.0	183.3
1.01	117.0	-45.3	0.0	-282.4	3.03	117.0	-377.4	0.1	-46.6	5.04	117.0	-1.5	0.0	189.7
1.06	117.0	-59.3	0.0	-276.5	3.08	117.0	-379.8	0.1	-40.2	5.10	117.0	-1.5	0.0	195.6
1.12	117.0	-74.4	0.0	-270.1	3.13	117.0	-381.9	0.1	-33.8	5.15	117.0	-1.5	0.0	202.0
1.17	117.0	-89.1	0.0	-263.7	3.19	117.0	-383.4	0.1	-27.9	5.20	117.0	-1.5	0.0	208.4
1.22	117.0	-102.1	0.0	-257.8	3.24	117.0	-384.8	0.1	-21.5	5.26	117.0	-1.5	0.0	214.3
1.27	117.0	-116.1	0.0	-251.4	3.29	117.0	-385.7	0.1	-15.6	5.31	117.0	-1.5	0.0	220.7
1.33	117.0	-128.6	0.0	-245.5	3.35	117.0	-386.4	0.1	-9.2	5.36	117.0	-1.5	0.0	227.2
1.38	117.0	-141.9	0.0	-239.1	3.40	117.0	-386.8	0.1	-2.8	5.42	117.0	-1.5	0.0	233.0
1.43	117.0	-154.9	0.0	-232.7	3.45	117.0	-1.5	0.1	3.1	5.47	117.0	-1.5	0.0	239.4
1.49	117.0	-166.4	0.0	-226.8	3.50	117.0	-1.5	0.1	9.5	5.52	117.0	-1.5	0.0	245.3
1.54	117.0	-178.7	0.0	-220.4	3.56	117.0	-1.5	0.1	16.0	5.58	117.0	-1.5	0.0	251.7
1.59	117.0	-190.7	0.0	-213.9	3.61	117.0	-1.5	0.1	21.8	5.63	117.0	-1.5	0.0	258.2
1.65	117.0	-201.3	0.0	-208.1	3.66	117.0	-1.5	0.1	28.3	5.68	117.0	-1.5	0.0	264.0
1.70	117.0	-212.5	0.0	-201.7	3.72	117.0	-1.5	0.1	34.1	5.73	117.0	-1.5	0.0	270.4
1.75	117.0	-222.5	0.1	-195.8	3.77	117.0	-1.5	0.1	40.5	5.79	117.0	-1.5	0.0	276.9
1.81	117.0	-233.1	0.1	-189.4	3.82	117.0	-1.5	0.1	47.0	5.84	117.0	-1.5	0.0	282.7
1.86	117.0	-243.4	0.1	-182.9	3.88	117.0	-1.5	0.1	52.8	5.89	117.0	-1.5	0.0	289.2
1.91	117.0	-252.4	0.1	-177.1	3.93	117.0	-1.5	0.1	59.3	5.95	117.0	-1.5	0.0	295.0
1.96	117.0	-261.9	0.1	-170.6	3.98	117.0	-1.5	0.1	65.1	6.00	117.0	0.0	0.0	0.0

ALUMINUM WINGWALL CALCULATIONS:
PROJECT NAMNE: SELF STORAGE FACILITY, WHATELY, MA
DESIGN SECTION AT THE END OF THE PANEL BASED ON AASHTO LRFD DESIGN:

BACKFILL PROPERTIES

Unit weight of backfill (pcf)		120
Friction angle		34

WALL GEOMETRY:

Height of wall (ft) (design) 6

WALL SECTION PROPERTIES:

Type		Corrugated Aluminum Plate
Thickness (in)		0.15
I (in^4/ft)		1.5
S(in^3/ft)		1.131
E (psi)		10000000
Allowable stress (psi)		24000

Notes:

Wingall has been analysed using SPW911 V 2.4 two dimensional analysis and the results superimposed (See the attached SPW 911 Output)
Both service and strength case analyzed using the appropriate load factors.
HORIZONTAL EARTH Load from lateral earth pressure for anchored walls AASHTO LRFD C3.11.S.7
LIVE LOAD SURCHARGE 240 psf live load surcharge considered

LOAD FACTORS AND COMBINATION ANALYSIS: BASED ON AASHTO LRFD 2012 BRIDGE DESIGN SPECIFICATIONS TABLE 3.4.1-1 AND 3

STRENGTH CASE II
HORIZONTAL EARTH LOAD(ES-AEP) 1
LIVE LOAD SURCHARGE (LS) 1.3

STRENGTH CASE ANALYSIS (CRITICAL) LOAD FACTORS
STRENGTH CASE I
HORIZONTAL EARTH LOAD (ES-AEP) 1.35
LIVE LOAD SURCHARGE (LS) 1.75
OUTPUT RESULTS FROM SPW911V2.4 ANALYSIS

WALE LOAD (lbs/ft)

DEPTHS (ft)	ES	LS
0.75	401.1	205.8

Moment (lbs-ft/ft)		
DEPTHS (ft)	ES	LS
3.42	386.8	198.4

Maximum Wall Deflections(in)

TYPE	DEAD LOAD	LIVE LOAD	TOTAL
SERVICE CASE 1	0.1	0	0.1

STRENGTH CASE ANALYSIS:
DESIGN OF WALES (Standard Contech Wale Beam Alloy 6061-T6)

Moment Capacity (lbs-ft/ft)				
	12851.6	Φu.Mn		
		ϕu=	0.8	(AASHTO LRFD DESIGN TABLE 7.5.4.1)
		Sxx (in^3)	5.073	(CONTECH STANDARD)
		Ftu(psi)	38000	(AASHTO LRFD DESIGN TABLE 7.4.2.1)
		Mn	192774	

1) FACTORED WALE LOADS AND MOMENTS IN THE WALES (lbs-ft/ft)

DEPTHS (ft)	STRENGTH CASE 1	MAX MOMENTS (lbs-ft/ft)	
0.75	901.6	2282.3	o.k

METHODOLOGY

2) DESIGN OF ALSP WALL (CORRUGATED ALUMINUM STRUCTURAL PLATE)

MOMENT CAPACITY (lbs-ft/ft)					
	2260.0	Φu.Mn			
		ϕu=	0.8	(AASHTO LRFD DESIGN TABLE 7.5.4.1)	
		Sxx (in^3)	1.13	(CONTECH STANDARD)	
PLASTIC MOMENT CAPACITY (lbs-ft/ft)		Ftu(psi)	30000	(AASHTO LRFD DESIGN TABLE 7.4.2.1)	
		Mn	33900	Plastic section modulus (in^3)	1.59
	3180			Design yield strength =0.9*30000	

FACTORED MOMENTS IN THE WALES (lbs-ft/ft

DEPTHS (ft)		STRENGTH CASE 1	
3.42		869.38	o.k

4) ANCHOR ROD TENSILE STRENGTH:

ANCHOR ROD TENSILE STRENGTH (psi)		ϕTn		
Fy=	55 ksi			
ϕ=	0.9	ϕTn (ksi)	49.5	
		Anet(in^2)	0.36	(3/4" dia threads)

DEPTHS d2(ft)	STRENGTH CASE 1	Max Tensile Stress (psi)
0.75	4057.4	11270.4

Structural Plate Footing Reactions

Per AASHTO Standard Specifications for Highway Bridges, Section 12

CONTECH ENGINEERED SOLUTIONS

Project Name: Self Storage Facility **Merlin #:** 720,529

Location: Whately, MA **Date:** 9/20/2022

Tandem (HL93) Live Load

Corrugation =	ALBC	
Shape =	ALBC 11'-4" Span x 7'-2" Rise	ALBC
Span (S) =	11.33	ft.
Rise (R) =	7.17	ft.
	5.67	
Bottom Span =	11.33	ft.
Area (A) =	65.0	sq. ft.
Footing contact angle (fca) =	15.40	degrees
Height of cover (H) =	5.00	ft.
Axle Load =	Tandem (HL93)	lbs.
Number of Lanes =	1	
Axle Load (AL) =	50,000	lbs.
Soil Density =	120	lbs./cu. ft.

LOAD ON STRUCTURE

Total Load, V = Live Load + Dead Load

Live Load, LL =	AL/(8 + 2(H + R))	
Live Load =	1,546	lbs./foot/footing
		lbs./foot/footing

Aluminum Box Culvert

Soil weight = Soil density x (HS/2,000 + S2/40,000)*1000 lbs/kip

Dead Load per foot	3,785	lbs/ft/footing
Dead Load =	3,785	lbs./foot/footing
Total Load, V =	5,332	lbs./foot/footing

FOOTING REACTIONS

Vertical

R_V =	V x cos(fca)	
$R_{V,LL}$ =	1,491	
$R_{V,DL}$ =	3,649	
R_V Total =	5,140	lbs./foot/footing

Horizontal

R_H =	V x sin(fca)		
$R_{H,LL}$ =	411		
$R_{H,DL}$ =	1,005		
R_H Total =	1,416	lbs./foot/footing	outward

Use these Unfactored Reactions for preliminary footing design unless it is known that Factored Reactions are required.

Manual Unfactored Reactions	No

Loads:		
Vertical Load (Dead Load) per leg, $R_{V,DL}$	3.65	kips/ft
Vertical Load (Dead + Live Load) per leg, $R_{V,DL+LL}$	5.14	kips/ft
Horizontal Load (Dead Load) per leg, $R_{H,DL}$	1.01	kips/ft
Horizontal Load (Dead + Live Load) per leg, $R_{H,DL+LL}$	1.42	kips/ft

Footing Design:		
Overburden Depth, d_F	0.00	ft
Net allowable bearing pressure, q_a	4000	lbs/ft^2
Gross allowable bearing pressure	4000	lbs/ft^2
Include Soil over Heel	Yes	
Trial footing width, b	1.91	ft
Footing width, B	2.50	ft
Footing offset, o	5.50	in
Toe width, W_t	0.79	ft
Heel width, W_h	1.71	ft
Footing depth, D	2.00	ft
Footing Type	Keyway	
Keyway depth, k_d	4.00	in

Bearing Pressures and Eccentricity:			
Total vertical Load, F_V	8.38	kip/ft	
Total moment, M	10.54	kip-ft/ft	
Moment Arm, L	1.26	ft	
Eccentricity, e	0.01	ft	
Gross bearing pressure at toe, q_{toe}	3294	lbs/ft^2	< gross allowable, OK
Gross bearing pressure at heel, q_{heel}	3414	lbs/ft^2	< gross allowable, OK

Vertical Forces:		
CANDE Dead Load R_V	3649.42	lbs
R_V', soil above structure	3649.42	lbs
$\Delta R_V = R_V - R_V'$	0.00	lbs
y	12.167	ft
x	0.000	ft
θ	0.00	degrees
$x' = W_h =$	1.71	ft
Additional Soil	2494	lbs
Centroid	1.646	ft (from toe)
Description	**Force**	
Culvert vertical reaction, R_V	5.14	kip/ft
Footing weight, P_f	0.750	kip/ft
Weight of soil over heel, P_h	2.49	kip/ft
Sum of vertical forces, F_V	8.38	kip/ft
Description	**Moment Arm**	
Culvert vertical reaction, R_V	0.79	ft
Footing weight, P_f	1.25	ft
Weight of soil over heel, P_h	1.646	ft
Description	**Moment**	
Culvert vertical reaction, R_V	4.07	kip-ft/ft
Footing weight, P_f	0.94	kip-ft/ft
Weight of soil over heel, P_h	4.10	kip-ft/ft
Sum of vertical forces, F_V	9.11	kip-ft/ft

CONTECH®
ENGINEERED SOLUTIONS

Horizontal Forces:		
Determine Active or Passive condition behind footing:		
Z_t	12.17	ft
Z_f	14.17	ft
Active Pressures:		
$p_1 = K\,\gamma_s\,Z_t$	481.8	lbs/ft^2
$p_3 = K\,\gamma_s\,Z_f$	561.0	lbs/ft^2
Culvert horizontal Reaction, R_H	-1.42	kip/ft
Active Pressure Force (Po)	0.953	kip/ft
Calculated friction coefficient, f_s	0.055	
Actual friction force, F_f	0.463	kip/ft
$F_{f,max}$	3.773	kip/ft
Sum of horizontal forces, F_H	0.000	kip/ft
Po + Ff,max >= Rh	Active	
Passive pressure behind footing: (Used for FS SLIDING calculation)		
Passive pressure coefficient, K_p	0.30	
Passive Pressures:		
$p_1 = K_p\,\gamma_s\,Z_t$	440.1	lbs/ft^2
$p_3 = K_p\,\gamma_s\,Z_f$	512.5	lbs/ft^2
$P_p = 1/2(p_1+p_3)(D)/1000 =$	0.953	kips
Moment arm = $1/3(D)(p_3+2*p_1)/(p_1+p_3) =$	0.975	ft
$p_{1,max} = K_{p,max}\,\gamma_s\,Z_t =$	3650	lbs/ft^2
$p_{3,max} = K_{p,max}\,\gamma_s\,Z_f =$	4250	lbs/ft^2
$P_{p,max} = 1/2(p_{1,max}+p_{3,max})(D)/1000 =$	7.90	kips
Active pressure inside:		
Description	**Force**	
Culvert horizontal Reaction, R_H	-1.42	kip/ft
Passive pressure behind wall, P_p	0.953	kip/ft
Description	**Moment Arm**	
Culvert horizontal Reaction, R_H	1.67	ft
Passive pressure behind wall, P_p	0.97	ft
Description	**Moment**	
Culvert horizontal Reaction, R_H	2.36	kip-ft/ft
Passive pressure behind wall, P_p	-0.93	kip-ft/ft
Sum of horizontal forces, F_H	1.43	kip-ft/ft

Check Stability:			
ΣM_R	11.47	kip-ft/ft	
ΣM_D	0.93	kip-ft/ft	
FS Overturning = ΣM_R / ΣM_D	12.4		**> 1.5 O.K.**
ΣF_R	11.67	kip/ft	
ΣF_D	1.42	kip/ft	
FS Sliding = ΣF_R / ΣF_D	8.2		**> 1.5 O.K.**

Footing Unreinforced Bending Check:			
q at inside footing	3331.76	lbs/ft^2	
F_S Toe	2.623	kip/ft	
F_S Heel	5.762	kip/ft	
x toe	0.396	ft	
x heel	0.854	ft	
$M_{S,Toe}$	1.04	kip-ft/ft	
$M_{S,Heel}$	2.79	kip-ft/ft	heel bending controls
y	10.00	in	
I	8000	in^4	
$\sigma_{t,allow}$	99.61	lbs/in^2	
$\sigma_{t,actual}$	41.87	lbs/in^2	OK unreinforced

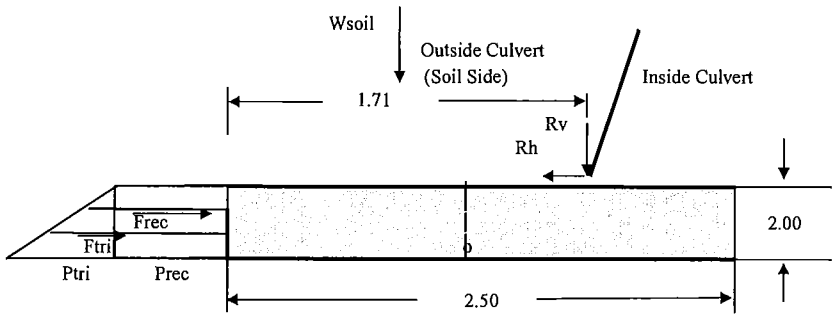
Footing Reinforcement: (Bending, Factored Loads)			
Live Load Percentage of R_V	19.53%		
Weighted load factor for ultimate bearing pressures	1.404		
$q_{u,toe}$	4625	lbs/ft^2	
$q_{u,heel}$	4794	lbs/ft^2	
q_u at inside footing	4678.72	lbs/ft^2	
F_u Toe	3.68	kip/ft	
F_u Heel	8.09	kip/ft	
x toe	0.396	ft	
x heel	0.854	ft	
$M_{u,Toe}$	1.46	kip-ft/ft	
$M_{u,Heel}$	4.14	kip-ft/ft	heel bending controls
Design reinforcement:			
M_u	4.14	kip-ft/ft	
$1.2M_{cr}$	37.95	kip-ft/ft	
$(4/3)M_u$	5.52	kip-ft/ft	
Design Moment	5.522	kip-ft/ft	
Rebar clear cover	3	in	
d	16.69	in	
m	17.6471		
R_u	22	lbs/in^4	
ρ	0.0004		
ρ_{min}	0.0004		
ρ_{max}	0.0214		
$A_{s,req'd}$	0.0738	in^2/ft	
$A_{s,actual}$	0.2045	in^2/ft	
φM_n	15.221	kip-ft/ft	OK
Horizontal bars:	#5 @	18 in	
Longitudinal bars:	#5 @	18 in	

Check Shear in Footing:			
q_u @ d from inside of arch leg	4584.9	lbs/ft^2	
q_u @ d from outside of arch leg	4772.6	lbs/ft^2	
φV_c	16.15	kip/ft	
V_u toe	Toe width < d	kip/ft	Critical section outside of toe
V_u heel	1.06	kip/ft	Heel shear OK

Reinforced Concrete Properties:		
Concrete unit weight, γ_c	150	lbs/ft^3
Concrete strength, f'_c	4000	lbs/in^2
Reinforcing steel strength, f_y	60000	lbs/in^2

Soil Properties:		
Soil unit weight, γ_s	120	lbs/ft^3
Internal friction angle, φ	32	degrees
Angle of wall friction, δ	24	degrees
Earth pressure	Active	
Active pressure coefficient, Ko	0.33	
Maximum passive pressure coefficient, $K_{p,max}$	2.5	
Maximum friction coefficient, f_{max}	0.45	

Footing Reinforcement:				
$A_{s,req'd}$	Bar size and spacing		$A_{s,actual}$	
Horizontal Bar - 0.074	#5 @	18 in	0.205	**OK**
Longitudinal Bar - 0.144	#5 @	18 in	0.205	**OK**
Summary of Stability After Construction				
FS Overturning	12.4	> 1.5 O.K.		
FS Sliding	8.2	> 1.5 O.K.		
Footing Shear				
Toe	Critical section outside of toe			
Heel	Heel shear OK			



APPENDIX B

CONTECH SHOP DRAWINGS

IMPORTANT:
ASSEMBLY INSTRUCTIONS WILL BE SHIPPED WITH THE STRUCTURE. THEY ARE LOCATED IN THE BRIGHTLY COLORED BOLT KEG.

NOTES:
1. INVERT END OF HAUNCH PLATES PAINTED RED.
2. WHEN A FULL CORRUGATED INVERT IS USED, SCALLOPED CLOSURE PLATES ARE TO BE CLIPPED TO THE OUTSIDE OF THE RECEIVING CHANNEL TO MINIMIZE BACKFILL INFILTRATION IN THE VALLEYS OF THE CORRUGATED INVERT PLATE BELOW THE RECEIVING CHANNEL.
   NOTE: THIS DOES NOT MAKE A JOINT TIGHT ENOUGH TO PREVENT INFILTRATION OF FINE SILTS OR SANDS. THE USE OF A GEOTEXTILE PREVENTS THE INFILTRATION OF THE BACKFILL THROUGH THE UNFILLED BOLT HOLES AND THE SPACE BETWEEN THE INVERT PLATE AND THE SCALLOP PLATE. A ROLL OF GEOTEXTILE IS PROVIDED FOR THIS PURPOSE. WHEN SHORT FOOTING PADS ARE USED, THE SCALLOPED CLOSURE PLATES ARE NOT PROVIDED UNLESS ORDERED AS AN EXTRA, SINCE IT IS ANTICIPATED THESE FOOTING PLATES WILL BE BURIED.
3. INVERT END OF HAUNCH RIBS PAINTED RED.

GENERAL NOTES:
1. CONFIRMATION OF COVER - THIS STRUCTURE IS WITHIN THE MINIMUM AND MAXIMUM ALLOWABLE HEIGHT OF COVER, FOR THE DESIGNATED LOADING, AS FOLLOWS:

   LOADING: HL-93
   MINIMUM COVER (FT): 2.6
   MAXIMUM COVER (FT): 5.0

2. FOR PROPER BOLT SIZE USAGE, REFER TO THE FOLLOWING:

PLATE ONLY

	1 PLATE	2 PLATE	3 PLATE
0.100" - 0.125" THK. PLATE		1 1/4"	1 1/4"
0.150" - 0.175" THK PLATE		1 1/4"	1 1/2"
0.200" - 0.250" THK. PLATE		1 1/2"	2"

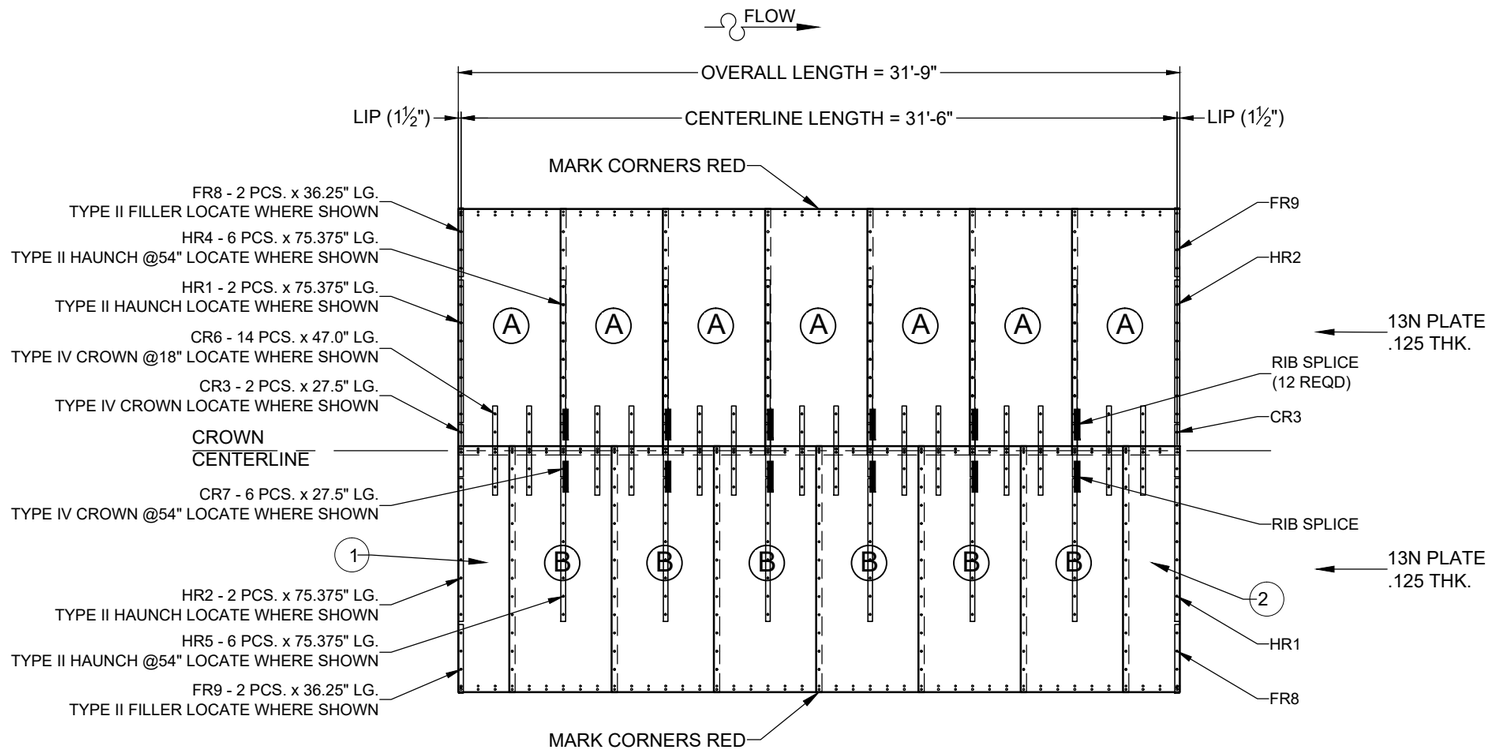
PLATE W/ TYPE - II OR TYPE - IV REINFORCING RIB OR RECEIVING CHANNEL

	1 PLATE	2 PLATE	3 PLATE
0.100" - 0.125" THK. PLATE	1 1/4"	1 1/2"	1 1/2"
0.150" - 0.175" THK PLATE	1 1/4"	1-1/2"	2"
0.200" - 0.225" THK. PLATE	1 1/2"	2"	2"
0.250" THK. PLATE	1 1/2"	2"	2"

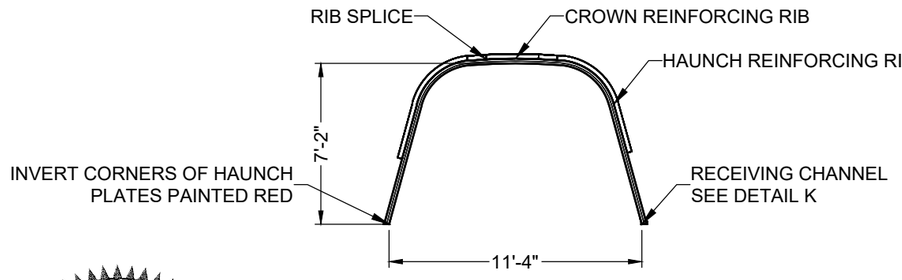
PLATE W/ TYPE - VI REINFORCING RIB

	1 PLATE	2 PLATE	3 PLATE
0.100" - 0.125" THK. PLATE	1 1/2"	2"	2"
0.150" - 0.175" THK PLATE	2"	2"	2"
0.200" - 0.225" THK. PLATE	2"	2"	2 1/2"
0.250" THK. PLATE	2"	2"	2 1/2"

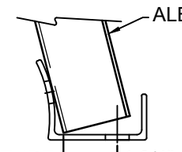
3. NUTS MAY BE LOCATED ON STRUCTURE'S INTERIOR OR EXTERIOR TO ALLOW CONVENTIONAL ACCESS DURING ASSEMBLY AND TORQUING. ONLY ONE SIDE OF NUT HAS A CURVED SURFACE AND IT SHOULD BE IN DIRECT CONTACT WITH PLATE VALLEY.
4. ALL PLATE LAPS AND REINFORCING RIBS MUST BE PROPERLY MATED IN A TANGENT FASHION USING PROPER ALIGNMENT TECHNIQUES AND HELD IN ALIGNMENT BY FASTENERS (FINGER TIGHTENED ONLY). BEFORE BACKFILLING COMMENCES, ALL FASTENERS MUST BE TORQUED FOR ADEQUATE COMPONENT CONTACT. GOOD COMPONENT FIT IS BETTER THAN HIGH TORQUE.
5. FASTENER TORQUE REQUIREMENTS: TORQUE AT 100-150 FOOT-POUNDS. TORQUE LEVELS ARE FOR INSTALLATION, NOT RESIDUAL, IN-SERVICE REQUIREMENTS. SINCE TORQUEING MAY LOOSEN PREVIOUSLY TIGHTENED FASTENERS, MULTIPLE PASSES MAY BE NECESSARY. WHEN SEAM SEALANT TAPE IS USED, FASTENERS SHOULD BE TORQUED AGAIN AFTER 24 HOURS.
6. ALL ALUMINUM STRUCTURAL PLATE MATERIAL IS MANUFACTURED IN ACCORDANCE WITH AASHTO M219, ASTM B746 AND ASTM B864 SPECIFICATIONS. SEE ASSEMBLY INSTRUCTIONS SHIPPED WITH MATERIAL IN FASTENER CONTAINER. ALSO REFER TO SPECIFIC PRODUCT CATALOG FOR ADDITIONAL PRODUCT INFORMATION.
7. THE ASSEMBLY BOLTS AND NUTS ARE SPECIALLY DESIGNED WITH ROUNDED OR SPHERICAL THROATS FOR FITTING EITHER THE CREST OR VALLEY OF THE CORRUGATIONS, PROVIDING MAXIMUM BEARING CONTACT AREA WITH THE PLATES WITHOUT THE USE OF WASHERS. NOTE THAT THE BOLTS AND NUTS SHOULD BE INSTALLED SUCH THAT THE ROUNDED PORTION IS IN CONTACT WITH THE PLATES.



ALBC - DEVELOPED PLAN (OUTSIDE VIEW)
11'-4" SPAN x 7'-2" RISE

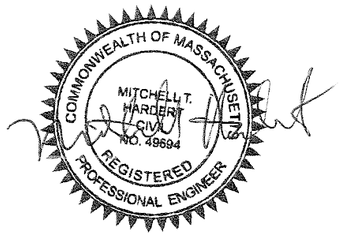


ALBC - END VIEW



11'-4" INSIDE SPAN OF STRUCTURE | 1 3/4"
11'-7 1/2" CENTER OF RECEIVING CHANNEL SLOTS

DETAIL "K"



FOR APPROVAL

TYPE: BOX		INLET	OUTLET	PLATE THICKNESS: .125 (H)/.125(C)
SIZE: 7R1				REINFORCING RIB SPACING: AS SHOWN
SPAN: 11'-4"	SKEW	0	0	REINFORCING RIB TYPE: AS SHOWN
RISE: 7'-2"				
LENGTH @ ℄: 31'-6"	BEVEL	0	0	NUMBER OF STRUCTURES: 1

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Project No.	Rev.
KBJW-25231	1

KOONTZ BRYANT JOHNSON WILLIAMS
Formerly CBC Engineers

Rev.	Date	By	Description
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CONTECH STRUCTURAL PLATE
CONTECH CONTRACT DRAWING

SELF STORAGE FACILITY

WHATELY, MA

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720529	010	8/24/2022
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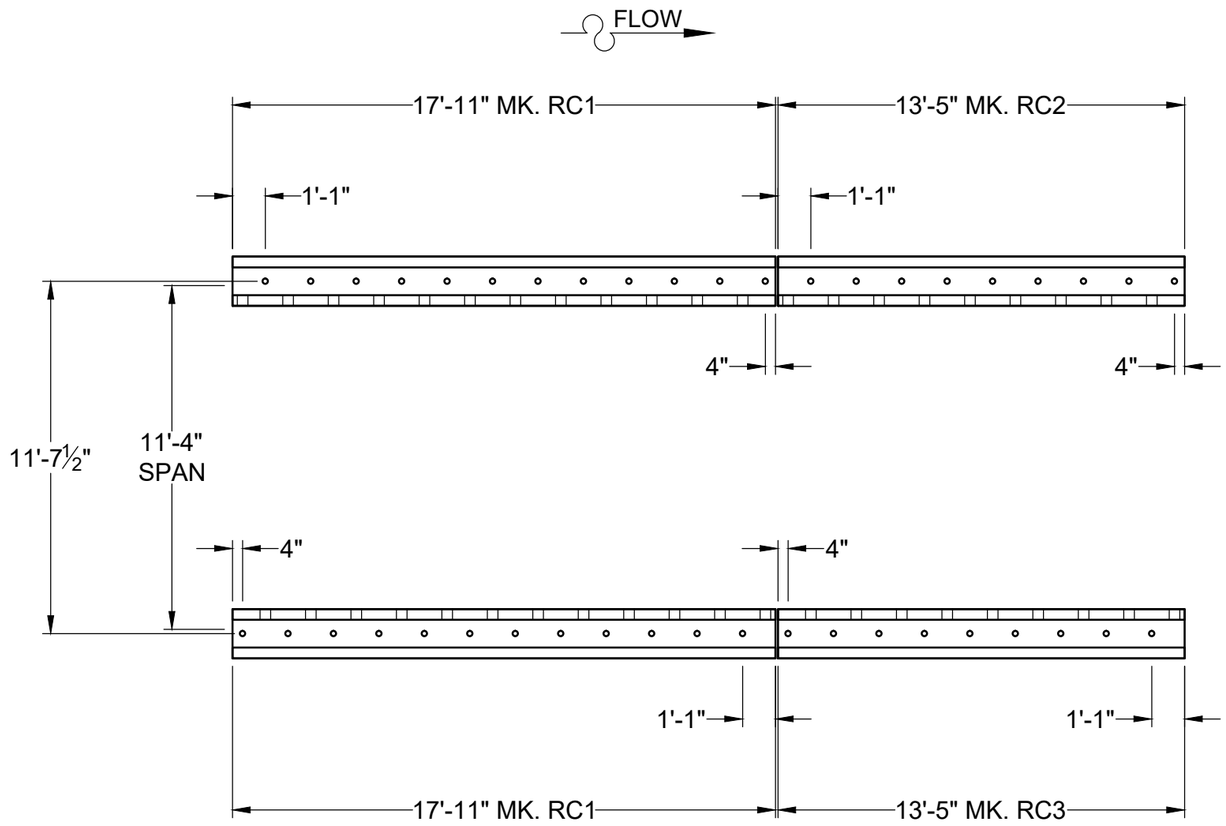
SHEET NO.: 1 OF 7		



ALBC - RECEIVING CHANNEL PLAN VIEW

NOTE: 1" GAP BETWEEN ADJACENT RECEIVING CHANNELS

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MITCHELL T. HARBERT
CIVIL
NO. 49694
REGISTERED PROFESSIONAL ENGINEER

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TYPE: BOX SIZE: 7R1 SPAN: 11'-4" RISE: 7'-2" LENGTH @ ℄: 31'-6"		INLET	OUTLET	PLATE THICKNESS: .125 (H)/.125(C) REINFORCING RIB SPACING: AS SHOWN REINFORCING RIB TYPE: AS SHOWN NUMBER OF STRUCTURES: 1
	SKEW	0	0	
	BEVEL	0	0	

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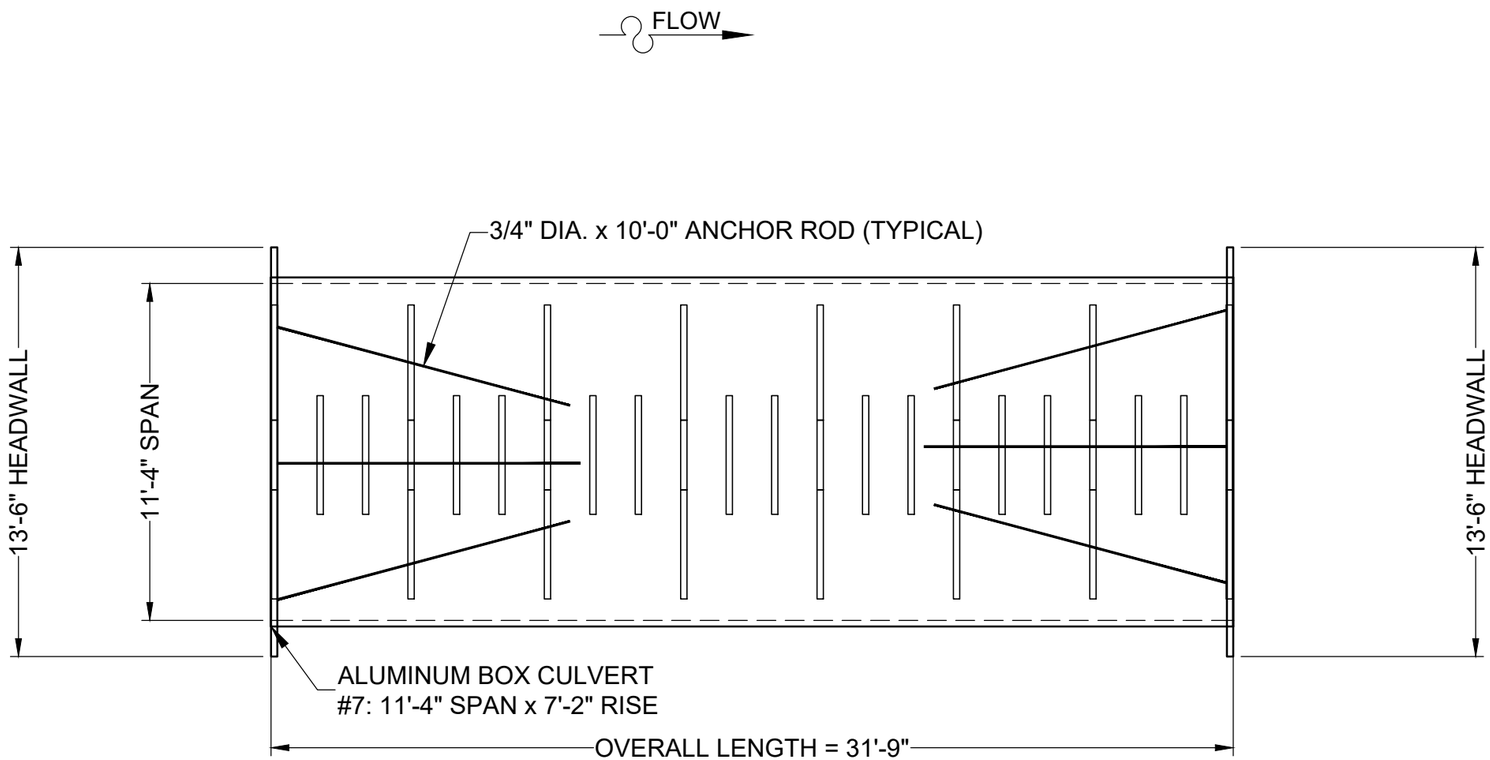

COMMONWEALTH OF MASSACHUSETTS
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CIVIL
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REGISTERED PROFESSIONAL ENGINEER

PLAN VIEW

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TYPE: BOX SIZE: 7R1 SPAN: 11'-4" RISE: 7'-2" LENGTH @ ℄: 31'-6"		INLET	OUTLET
	SKEW	0	0
	BEVEL	0	0

PLATE THICKNESS: .125 (H)/.125(C)
REINFORCING RIB SPACING: AS SHOWN
REINFORCING RIB TYPE: AS SHOWN

NUMBER OF STRUCTURES: 1

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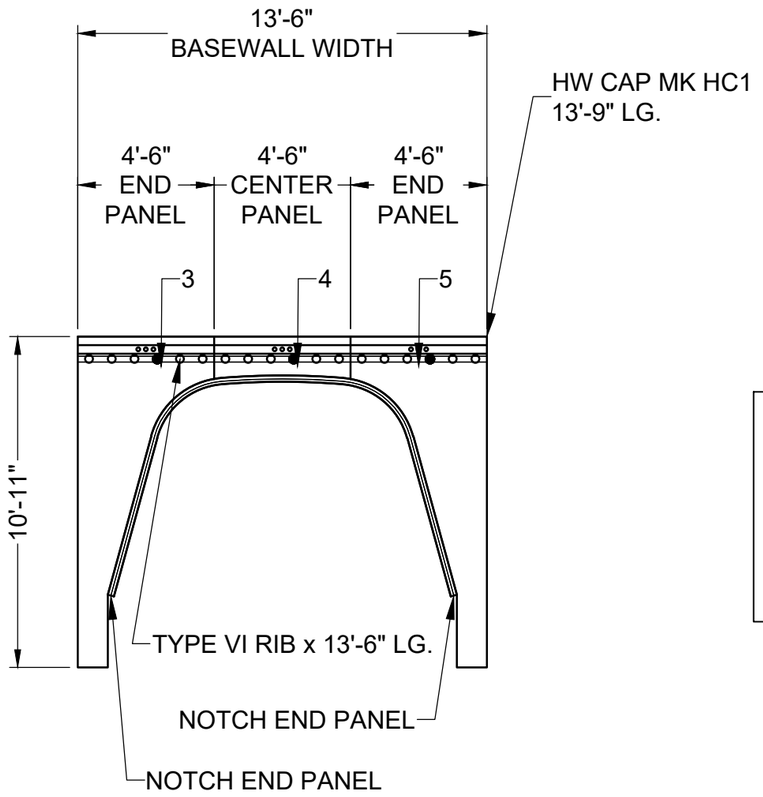
NOTES:
1. ALL MARK IDENTIFICATIONS TO BE ON SOIL SIDE.
2. BOLT HEADWALL TO REINFORCING RIB AT END OF STRUCTURE.
3. SEE SHEET 5 FOR SECTION AND ASSEMBLY DETAILS.
4. ALL 2'-3" DIMENSIONS ARE RELATIVE TO SECTION B-B.
5. ALL 4 1/2" DIMENSIONS ARE RELATIVE TO SECTION E-E.
6. ○ DENOTES BOLTS
7. ● DENOTES RODS



NOTE:
THE BOTTOM OF ALL WINGWALL PANELS MUST BE PERMANENTLY EMBEDDED AT LEAST 2.25 FEET BELOW THE FINISHED GROUNDLINE AT THE FACE OF THE WALL. THE SOIL IN FRONT OF THE WALL PROVIDING RESISTANCE TO THE TOE OF THE WALL MUST HAVE A MINIMUM INTERNAL FRICTION ANGLE OF AT LEAST 34° (TO BE FIELD VERIFIED). LEVEL BACKFILL SLOPE BEHIND WALLS.

COMMONWEALTH OF MASSACHUSETTS
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CIVIL
NO. 49694
REGISTERED PROFESSIONAL ENGINEER

ALBC - INLET AND OUTLET EXPANDED END VIEW

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TYPE: BOX		INLET	OUTLET
SIZE: 7R1			
SPAN: 11'-4"	SKEW	0	0
RISE: 7'-2"			
LENGTH @ ℄: 31'-6"	BEVEL	0	0

PLATE THICKNESS: .125 (H)/.125(C)
REINFORCING RIB SPACING: AS SHOWN
REINFORCING RIB TYPE: AS SHOWN
NUMBER OF STRUCTURES: 1

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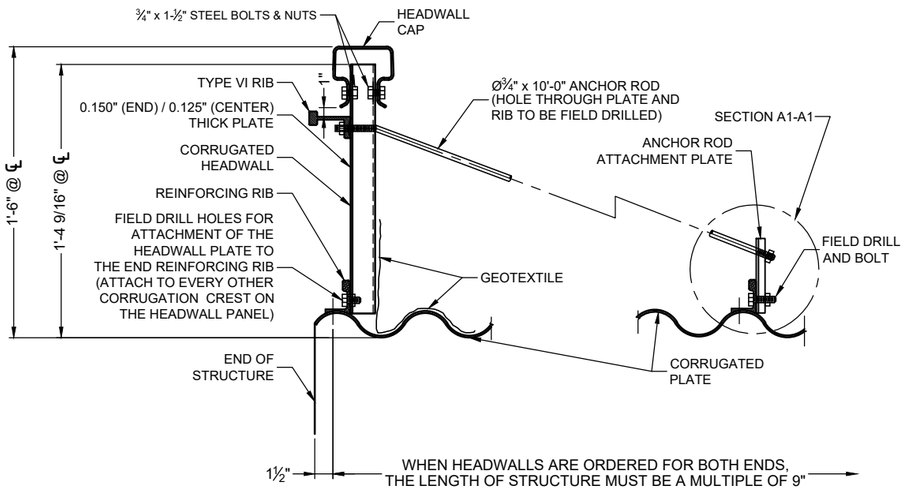


SECTION A-A

HEADWALL ATTACHMENT TO CROWN OF STRUCTURE

NOTES:

1) REVERSE CROWN RIB FOR PROPER ANCHOR ROD ATTACHMENT PLATE ORIENTATION.

2) NO SPLICE PLATES ARE USED FOR THE TYPE IV REINFORCING RIBS ATTACHED TO THE CORRUGATED HEADWALL.

3) REINFORCING RIBS AT EACH END OF STRUCTURE MUST BE ORIENTED SUCH THAT THE HEADWALL CAN BE PLACED BEHIND THEM AS SHOWN.

TYPE II RIB (CONTECH) TYPE 1 RIB (ASTM)

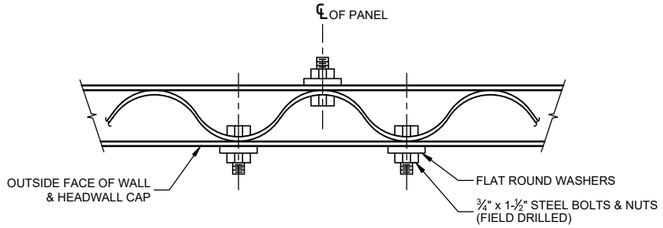
ALLOY	6061-T6
YIELD STRENGTH	35 KSI [241.3 MPa]
TENSILE STRENGTH	38 KSI [262.0 MPa]
AREA	1.71IN.² [1103 mm²]
CENTER OF AREA	Yc = 1.02 IN. [26.0mm]
PLASTIC MODULUS	1.70 IN.³ [27,858mm³]
PLASTIC MOMENT	Mp = 4.97 [6.72 KN-M]

TYPE IV RIB (CONTECH) TYPE 2 RIB (ASTM)

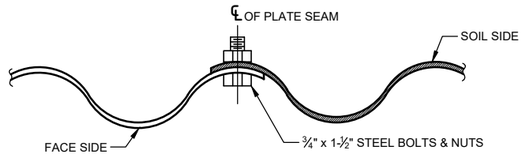
ALLOY	6061-T6
YIELD STRENGTH	35 KSI [241.3 MPa]
TENSILE STRENGTH	38 KSI [262.0 MPa]
AREA	2.27IN.² [1465 mm²]
CENTER OF AREA	Yc = 1.76 IN. [44.8mm]
PLASTIC MODULUS	2.68 IN.³ [43,917mm³]
PLASTIC MOMENT	Mp = 7.81 [10.60 KN-M]

TYPE VI RIB (CONTECH) TYPE 3 RIB (ASTM)

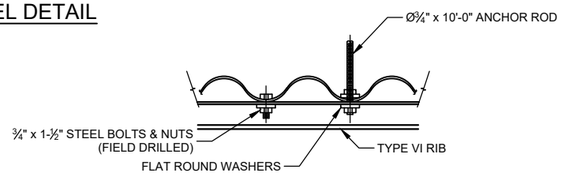
ALLOY	6061-T6
YIELD STRENGTH	35 KSI [241.3 MPa]
TENSILE STRENGTH	38 KSI [262.0 MPa]
AREA	3.62IN.² [2335 mm²]
CENTER OF MASS Y	Yc = 2.27 IN. [57.6mm]
SECTION MODULUS	4.38 IN³ [71,775mm³]
PLASTIC MODULUS	5.66 IN.³ [92,750mm³]
PLASTIC MOMENT	Mp = 16.52 [22.41 KN-M]



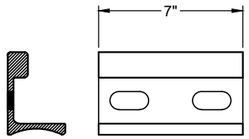
HEADWALL CAP AT ATTACHMENT TO PANEL DETAIL



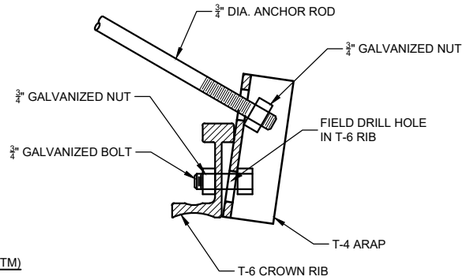
TYPICAL PANEL LAP DETAIL



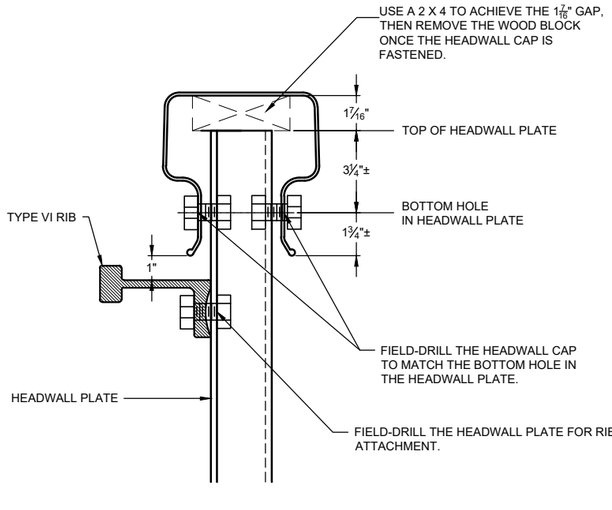
TYPICAL ANCHOR ROD ATTACHMENT AT HEADWALL



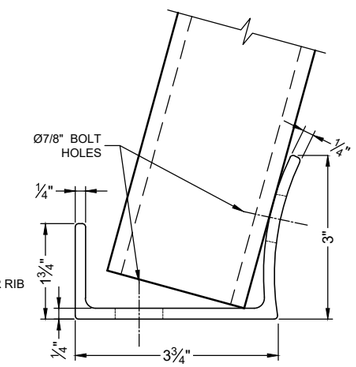
TYPE 4 ANCHOR ROD ATTACHMENT PLATE



SECTION A1-A1



HEADWALL CAP AND RIB ATTACHMENT



ALUMINUM RECEIVING CHANNEL

COMMONWEALTH OF MASSACHUSETTS
MITCHELL T. HARDERT
CIVIL
NO. 49694
REGISTERED PROFESSIONAL ENGINEER

FOR APPROVAL

Approved By	Date
MTH	8/25/22
Project No.	Rev.
KBJW-25231	1

KOONTZ BRYANT JOHNSON JULLIANS
Formerly CBC Engineers

Rev.	Date	By	Description
1	9/21/22	DH	REV.1

		INLET	OUTLET
TYPE: BOX SIZE: 7R1 SPAN: 11'-4" RISE: 7'-2" LENGTH @ ℄: 31'-6"	SKEW	0	0
	BEVEL	0	0

PLATE THICKNESS: .125 (H)/.125(C)
REINFORCING RIB SPACING: AS SHOWN
REINFORCING RIB TYPE: AS SHOWN

NUMBER OF STRUCTURES: 1

MARK	DATE	REVISION DESCRIPTION	BY

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PROJECT No.:	SEQ. No.:	DATE:
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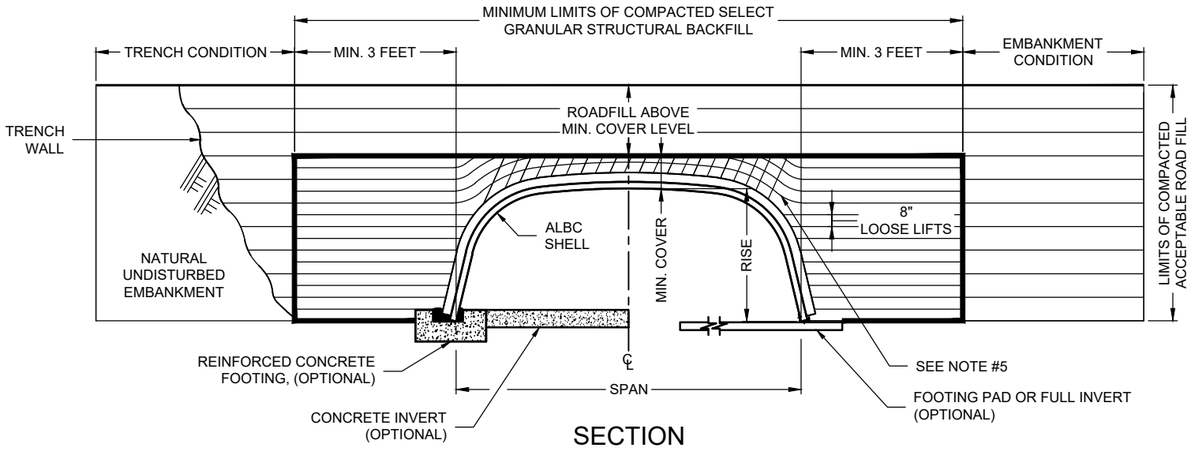


SECTION

SELECT GRANULAR STRUCTURAL BACKFILL LIMITS.

INITIAL LIFTS OVER THE CROWN OF STRUCTURE AS INDICATED BY SHADED AREA TO BE COMPACTED TO REQUIRED DENSITY WITH HAND OPERATED EQUIPMENT OR WITH LIGHTWEIGHT(D-4 OR LIGHTER) EQUIPMENT.

NOTES:

1. ALL SELECT GRANULAR BACKFILL TO BE PLACED IN A BALANCED FASHION IN THIN LIFTS (8" LOOSE TYPICALLY) AND COMPACTED TO 90 PERCENT DENSITY PER AASHTO T-180.
2. COMPLETE AND REGULAR MONITORING OF THE ALUMINUM BOX CULVERT SHAPE IS NECESSARY DURING ALL BACKFILLING OF THE STRUCTURE.
3. PREVENT DISTORTION OF SHAPE AS NECESSARY BY VARYING COMPACTION METHODS AND EQUIPMENT.
4. TRENCH WIDTH OTHER THAN 3 FEET SHALL BE BY DIRECTION OF THE ENGINEER OF RECORD.
5. SWITCH TO PLACING SELECT GRANULAR BACKFILL NEAR IN RADIAL LIFTS THE MIDDLE OF THE HAUNCH CURVE.

ADDITIONAL SELECT GRANULAR STRUCTURAL BACKFILL NOTES:

SATISFACTORY BACKFILL MATERIAL, PROPER PLACEMENT, AND COMPACTION ARE KEY FACTORS IN OBTAINING MAXIMUM STRENGTH AND STABILITY.

THE BACKFILL MATERIAL SHOULD BE FREE OF ROCKS, FROZEN LUMPS, AND FOREIGN MATERIAL THAT COULD CAUSE HARD SPOTS OR DECOMPOSE TO CREATE VOIDS. BACKFILL MATERIAL SHOULD BE WELL GRADED GRANULAR MATERIAL THAT MEETS THE REQUIREMENTS OF AASHTO M-145 FOR SOIL CLASSIFICATIONS A-1, A-2-4, A-2-5, OR A-3 MODIFIED.

SEE THE STRUCTURAL PLATE BACKFILL GROUP CLASSIFICATION TABLE ON THIS SHEET. BACKFILL MUST BE PLACED SYMMETRICALLY ON EACH SIDE OF THE STRUCTURE IN 8" LOOSE LIFTS. EACH LIFT IS TO BE COMPACTED TO A MINIMUM OF 90% DENSITY PER AASHTO T-180.

A HIGH PERCENTAGE OF SILT OR FINE SAND IN THE NATIVE SOILS SUGGESTS THE NEED FOR A WELL GRADED GRANULAR BACKFILL MATERIAL TO PREVENT SOIL MIGRATION. IF THE PROPOSED BACKFILL IS NOT A WELL-GRADED MATERIAL, A NON-WOVEN GEOTEXTILE FILTER FABRIC SHALL BE PLACED BETWEEN THE SELECT BACKFILL AND THE IN SITU MATERIAL.

DURING BACKFILL, ONLY LIGHTWEIGHT TRACKED VEHICLES (D-4 OR LIGHTER) SHOULD BE NEAR THE STRUCTURE AS FILL PROGRESSES ABOVE THE CROWN AND TO THE FINISHED GRADE. THE ENGINEER AND CONTRACTOR ARE CAUTIONED THAT THE MINIMUM COVER MAY NEED TO BE INCREASED TO HANDLE TEMPORARY CONSTRUCTION VEHICLE LOADS (HEAVIER THAN D-4).

STRUCTURAL PLATE BACKFILL GROUP CLASSIFICATION, REFERENCE AASHTO M-145					
GROUP CLASSIFICATION	**A-1-a**	**A-1-b**	**A-2-4**	**A-2-5**	**A-3**
Sieve Analysis Percent Passing					
No. 10 (2.000 mm)	**50 max.**	----	----	----	----
No. 40 (0.425 mm)	**30 max.**	**50 max.**	----	----	**51 max.***
No. 200 (0.075 mm)	**15 max.**	**25 max.**	**35 max.**	**35 max.**	**10 max.**
Atterberg Limits for Fraction Passing No. 40 (0.425 mm)					
Liquid Limits	----	----	**40 max.**	**41 min.**	----
Plasticity Index	**6 max.**	**6 max.**	**10 max.**	**10 max.**	**Non Plastic**
Usual Materials	**Stone Fragment, Gravel and Sand**		**Silty or Clayey Gravel and Sand**		**Coarse Sand**

*Modified from M-145.

Fine beach sands, windblown sands, stream deposited sands, etc., exhibiting fine, rounded particles and typically Classified by AASHTO M-145 as A-3 materials should not be used.

Reference the most current version of ASTM D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System), for comparable soil groups.

1.0 STANDARDS AND DEFINITIONS

1.1 STANDARDS - All standards refer to the current ASTM/AASHTO edition unless otherwise noted.

1.1.1 ASTM B-864 "Standard Specification for Corrugated Aluminum Box Culverts" (AASHTO Designation M-219).

1.1.2 AASHTO Standard Specification for Highway Bridges - Section 12 Division I - Design, AASHTO LRFD Bridge Design Specifications Section 12.

1.1.3 AASHTO Standard Specification for Highway Bridges - Section 26 Division II - Construction, AASHTO LRFD Bridge Construction Specifications - Section 26. ASTM B789, Standard Practice for Installing Corrugated Aluminum Structural Plate Pipe.

1.2 DEFINITIONS

1.2.1 Engineer - In these specifications the word "Engineer" shall mean the Engineer of Record or Owner's designated engineering representative.

1.2.2 Manufacturer - In these specifications the word "Manufacturer" shall mean CONTECH ENGINEERED SOLUTIONS.

1.2.3 Contractor - In these specifications the word "Contractor" shall mean the firm or corporation undertaking the execution of any installation work under the terms of these specifications.

2.0 GENERAL CONDITIONS

2.1 Any installation guidance provided herein shall be endorsed by the engineer; discrepancies herein are governed by the Engineer's plans and specifications.

2.2 The Contractor shall furnish all labor, material and equipment and perform all work and services except those set out and furnished by the Owner, necessary to complete in a satisfactory manner the site preparation, excavation, filling, compaction, grading as shown on the plans and as described therein. This work shall consist of all mobilization clearing and grading, grubbing, stripping, removal of existing material unless otherwise stated, preparation of the land to be filled, filling of the land, spreading and compaction of the fill, and all subsidiary work necessary to complete the grading of the cut and fill areas to conform with the lines, grades, slopes, and specifications. This work is to be accomplished under the observation of the Owner or his designated representative.

2.3 Prior to bidding the work, the Contractor shall examine, investigate and inspect the construction site as to the nature and location of the work, and the general and local conditions at the construction site, including without limitation, the character of surface or subsurface conditions and obstacles to be encountered on and around the construction site and shall make such additional investigation as he may deem necessary for the planning and proper execution of the work.

If conditions other than those indicated are discovered by the Contractor, the Owner shall be notified immediately. The material which the Contractor believes to be a changed condition shall not be disturbed so that the owner can investigate the condition.

2.4 The construction shall be performed under the direction of the Engineer.

2.5 All aspects of the structure design and site layout including foundations, backfill, end treatments and necessary scour consideration shall be performed by the Engineer.

3.0 ASSEMBLY AND INSTALLATION

3.1 Bolts and nuts shall conform to the requirements of ASTM A-307 and/or ASTM A-449. The box culvert shall be assembled in accordance with the plate layout drawings provided by the manufacturer and per the manufacturer's recommendations.

Bolts shall be tightened using an applied torque of between 100 and 150 ft.-lbs.

3.2 The box culvert shall be installed in accordance with the plans and specifications, the manufacturer's recommendations, and AASHTO Standard Specification for Highway Bridges - Section 26 Division II - Construction/AASHTO LRFD Bridge Construction Specifications - Section 26.

3.3 Trench excavation shall be made in embankment material that is structurally adequate. The trench width shall be shown on the plans. Poor quality in situ embankment material must be removed and replaced with suitable backfill as directed by the Engineer.

3.4 Aluminum Box Culvert designs require a minimum allowable soil-bearing pressure of 4,000 psf. Lower bearing capacities may be accommodated with a site specific design for an aluminum foundation or a concrete footing.

If the engineer determines the natural foundation is inadequate to support the structure's backfill, the poor material shall be excavated, removed and replaced to a suitable depth with competent material. The specific depth of excavation required may be reduced by utilizing a geosynthetic reinforced foundation as designed by a qualified geotechnical engineer. For additional information contact your local Contech representative.

3.5 When a metal foundation is used, the soil bedding requires a minimum of 6 inches of loose granular material with a maximum particle size of one half the corrugation depth. The proper width of the bedding material required shall conform to the project plans and specifications.

Bedding preparation is critical to both structure performance and service life. The bedding should be constructed to uniform line and grade to avoid distortions that may create undesirable stresses in the structure and/or rapid deterioration of the roadway. The bed should be free of rock formations, protruding stones, frozen lumps, roots, and other foreign matter that may cause unequal settlement.

3.6 The structure shall be assembled in accordance with the Manufacturer's instructions. All plates shall be unloaded and handled with reasonable care. Plates shall not be rolled or dragged over gravel rock and shall be prevented from striking rock or other hard objects during placement in trench or on bedding.

When installed on a full invert or on flexible footing pads, assembly of the invert or footing pads shall start at the downstream end. Circumferential seam laps shall shingle over the top of the downstream plates as assembly progresses upstream. Whether the box culvert is installed on a concrete footing, full metal invert, or flexible footing pad, assembly of the structure shell shall start at the upstream end. Downstream rings of plates shall be assembled outside of the upstream rings (Circumferential seams are shingled downstream when viewed from the inside of the shell).

3.7 The structure shall be backfilled using clean well graded granular material that meets the requirements for soil classifications A-1, A-2-4, A-2-5, or A-3 modified per AASHTO M-145. See the structural plate backfill group classification table on this sheet.

Backfill must be placed symmetrically on each side of the structure in 8 inch loose lifts. Each lift shall be compacted to a minimum of 90 percent density per AASHTO T-180.

3.8 Standard highway loads that meet the permissible design load limits for an Aluminum Box Culvert are not allowed on the structure until it is backfilled completely and pavement is in place.

The addition of temporary soil for heavy construction loads is not feasible or permissible for Aluminum Box Culverts. By design, these structures are limited in the range of permissible fill heights and live loads.

Heavy construction loads that exceed that of the particular highway live load design limits are not allowed on Aluminum Box Culverts without approval from the Engineer.

3.9 If an aluminum headwall and/or wingwall system is specified, the select granular structural backfill limits shall extend past the deadman anchor system. Contact the Engineer if stiff material or rock is encountered where the wingwalls and deadmen are to be installed.

COMMONWEALTH OF MASSACHUSETTS
MITCHELL T. HARDERT
CIVIL
NO. 49694
REGISTERED
PROFESSIONAL ENGINEER

FOR APPROVAL

TYPE: BOX SIZE: 7R1 SPAN: 11'-4" RISE: 7'-2" LENGTH @ ℄: 31'-6"		INLET	OUTLET	PLATE THICKNESS: .125 (H)/.125(C) REINFORCING RIB SPACING: AS SHOWN REINFORCING RIB TYPE: AS SHOWN	
	SKEW	0	0		
	BEVEL	0	0	NUMBER OF STRUCTURES: 1	

Approved By	Date
MTH	8/25/22
Project No.	Rev.
KBJW-25231	1

KOONTZ BRYANT JOHNSON WILLIAMS
Formerly CBC Engineers

Rev.	Date	By	Description
1	9/21/22	DH	REV.1

MARK	DATE	REVISION DESCRIPTION	BY

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
700 Tech Drive, Winchester, KY 40391
859-744-3339 859-744-9665 FAX

CONTECH STRUCTURAL PLATE
CONTECH CONTRACT DRAWING

SELF STORAGE FACILITY

WHATELY, MA

PROJECT No.:	SEQ. No.:	DATE:
720529	010	8/24/2022
DESIGNED:	DRAWN: JEM	
CHECKED:	APPROVED:	
SHEET NO.: 6 OF 7		

FOUNDATION NOTES:

THE ENGINEER SHALL VERIFY THAT THE PROPOSED FOUNDATION IS APPROPRIATE FOR THE SITE CONDITIONS AND THE DESIGN PARAMETERS ARE CONSISTENT WITH THE PROJECT REQUIREMENTS. THE FOUNDATION DESIGN CONSIDERS STRUCTURAL REQUIREMENTS OF THE FOUNDATION ONLY. HYDRAULIC ANALYSIS AND SCOUR ANALYSIS, AS REQUIRED, SHALL BE PERFORMED OR COORDINATED BY THE ENGINEER.

PRIOR TO CONSTRUCTION, CONTRACTOR MUST VERIFY ALL ELEVATIONS SHOWN WITH THE ENGINEER.

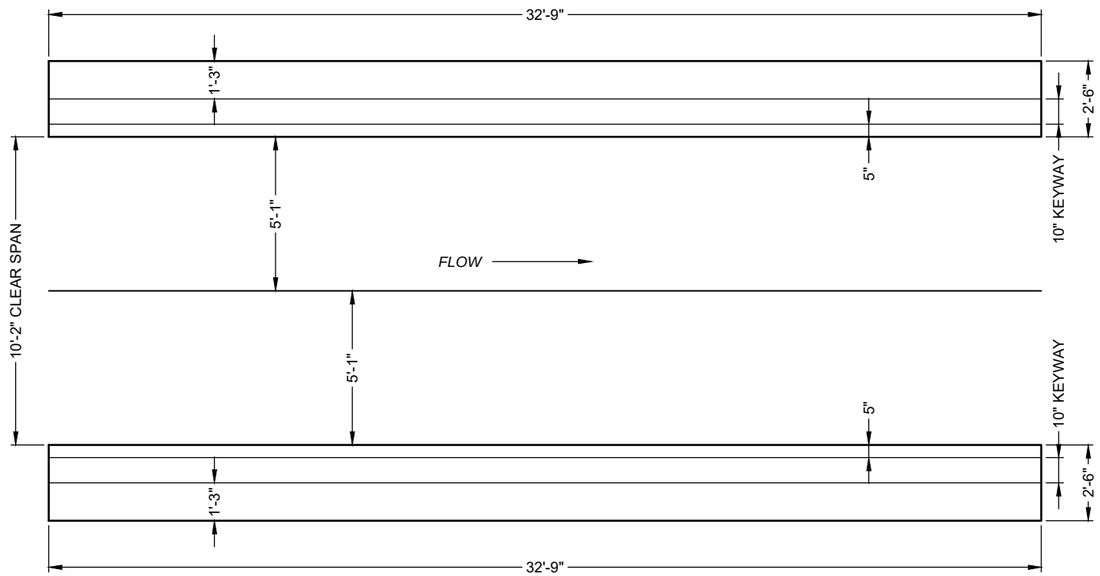
FOUNDATION DESIGN IS BASED ON SITE SOIL INFORMATION PROVIDED TO CONTECH AND DESCRIBED IN THE DESIGN PARAMETERS BELOW. FOUNDATION BEARING SOILS, INCLUDING ANY SOIL IMPROVEMENTS REQUIRED, SHALL BE EVALUATED AND APPROVED BY OTHERS PRIOR TO FOUNDATION CONSTRUCTION. IF UNEXPECTED SOIL CONDITIONS ARE ENCOUNTERED, OR THE BEARING REQUIREMENTS CANNOT BE ACHIEVED, CONTECH MUST BE NOTIFIED TO DETERMINE IF FOOTING DESIGN CHANGES ARE NEEDED.

REINFORCED CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE CONSTRUCTION SPECIFICATIONS, SECTION 8, REINFORCED CONCRETE, FOR CLASS A CONCRETE HAVING A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.

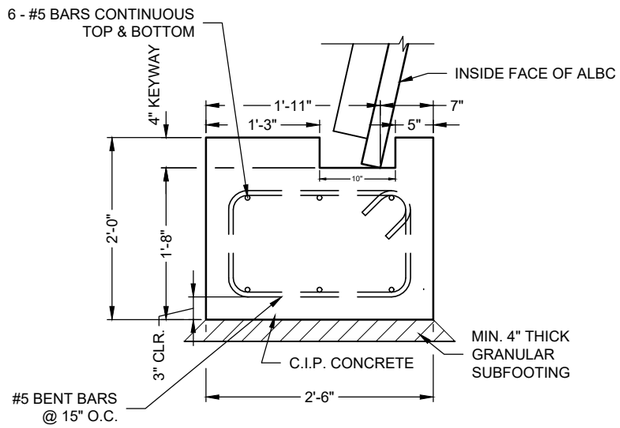
REINFORCING STEEL FOR FOUNDATIONS SHALL CONFORM TO ASTM A615, GRADE 60 (Fy=60 ksi).

KEYWAY TO BE FILLED WITH NON-METALLIC, NON-SHRINK GROUT, WITH A MINIMUM 4,000 PSI COMPRESSIVE STRENGTH (ASTM C1107). GROUT AND SHIMMING MATERIAL SHOULD NOT CONTAIN ANY CORROSION-PROMOTING AGENTS.

DESIGN PARAMETERS:
DESIGN LIVE LOAD: HL-93
DESIGN MAXIMUM FILL HEIGHT: 2.6' (MIN.) 5.0' (MAX.)
DESIGN METHOD: LOAD FACTOR DESIGN PER AASHTO SPECIFICATION
DESIGN MINIMUM NET ALLOWABLE BEARING CAPACITY: 4,000 PSF



FOUNDATION PLAN



FOOTING CROSS SECTION

COMMONWEALTH OF MASSACHUSETTS
MITCHELL T. HARDERT
CIVIL
NO. 49694
REGISTERED PROFESSIONAL ENGINEER

FOR APPROVAL

Approved By	Date
MTH	8/25/22
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KBJW-25231	1

KOONTZ BRYANT JOHNSON WILLIAMS
Formerly CBC Engineers

Rev.	Date	By	Description
1	9/21/22	DH	REV.1

MARK	DATE	REVISION DESCRIPTION	BY

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH STRUCTURAL PLATE
CONTECH CONTRACT DRAWING

SELF STORAGE FACILITY

WHATELY, MA

PROJECT No.:	SEQ. No.:	DATE:
720529	010	8/24/2022
DESIGNED:	DRAWN:	
	JEM	
CHECKED:	APPROVED:	
SHEET NO.:	7 OF 7	

NOTES

1. *THE RECORD OWNER OF THE SUBJECT PARCEL IS PIONEER VALLEY SELF-STORAGE LLC. SEE FRANKLIN COUNTY REGISTRY OF DEEDS BOOK 7940 PAGE 103.*
2. *THIS SITE HAS A PREVIOUSLY APPROVED NOTICE OF INTENT DATED AUGUST 5, 2021. SEE FRANKLIN COUNTY REGISTRY OF DEEDS BOOK 7846 PAGE 61.*
3. *THIS PLAN HAS BEEN CREATED TO AMEND THE AFOREMENTIONED EXISTING NOTICE OF INTENT AND FOR THE APPLICATION OF A NEW SUPPLEMENTAL NOTICE OF INTENT.*
4. *THE APPLICANT PROPOSES TO AMEND THE EXISTING NOTICE OF INTENT BY REDUCING THE AREA OF ALTERATION, DETAILING THE STRUCTURAL REQUIREMENTS FOR THE PROPOSED CROSSING AND ADDING A DEWATERING PLAN .*
5. *THE APPLICANT PROPOSES A NEW NOTICE OF INTENT IN ORDER TO ADD AN ADDITIONAL ALTERATION AREA AND ADD/IMPROVE EROSION CONTROL MEASURES FOR THE INSTALLATION OF TWO SUBSURFACE WATER LINES.*
6. *THIS PLAN IS TO BE USED FOR CONSERVATION COMMISSION PERMITTING ONLY. PLEASE SEE THE PLAN SET PREVIOUSLY APPROVED BY THE WHATELY PLANNING BOARD FOR ADDITIONAL PROJECT DETAILS.*

ALTERATION AREA CALCULATIONS

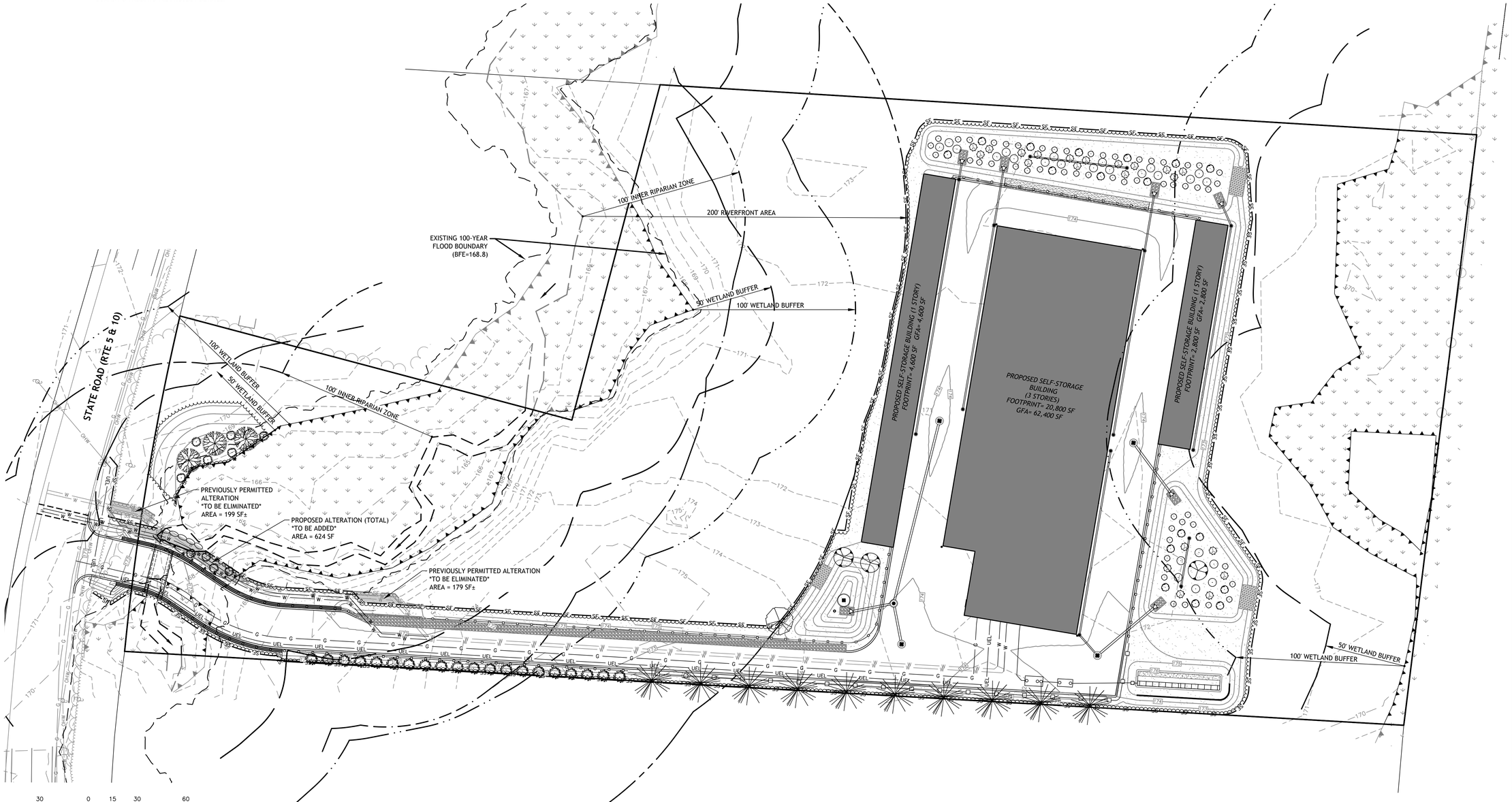
PROPOSED REDUCTION TO AREA OF ALTERATION	*378 SF ±*
PROPOSED ADDITION TO AREA OF ALTERATION	*624 SF ±*
NET CHANGE TO AREA OF ALTERATION	*246 SF ±*

RIVERFRONT AREA CALCULATIONS

	EXISTING	*PROPOSED*
RIVERFRONT AREA ON SITE	*104,890 SF ±*	*104,890 SF ±*
ALLOWABLE 10% DISTURBANCE OF RA	*10,489 SF ±*	*10,489 SF ±*
PROPOSED INNER RIPARIAN DISTURBANCE (0-100)	*10,094 SF ±*	*10,340 SF ±*
PROPOSED RIVERFRONT AREA DISTURBANCE (100-200)	*6,414 SF ± **	*6,414 SF ± **
TOTAL PROPOSED RA DISTURBANCE (0-200)	*16,508 SF ± **	*16,754 SF ± **

** EXCLUDES EXEMPTED ACTIVITY (STRUCTURAL STORMWATER MANAGEMENT MEASURES - 310 CMR 10.58 AND COMPENSATORY STORAGE - 310 CMR 10.57)*

NOTE: RA DISTURBANCE OVER 10% PERMISSIBLE PER 310 CMR 10.53(3)(E)



prepared by:

PIONEER LAND PLANNING

CIVIL ENGINEERS & LAND SURVEYORS
for
SITE DESIGN & PROPERTY MAPPING

phone: (413) 588-8765
334 Linden Street
Holyoke, MA 01060
web: pioneerlandplanning.com
email:info@pioneerlandplanning.com

PROFESSIONAL SEAL
(not without seal)

COMMONWEALTH OF MASSACHUSETTS
CHRISTOPHER V KARNEY
No. 54626
PROFESSIONAL LAND SURVEYOR

prepared for:

Todd Cellura
Pioneer Valley Self-Storage

710 Southampton Road
Westfield, MA 01085

NOTICE OF INTENT FILING PLAN

STATE ROAD
WHATELY, MASSACHUSETTS
ASSESSOR'S MAP 5 PARCEL 29

Issued: January 6, 2023	
Revision:	Date:

Scale: 1" = 30'

Project: 010623

Sheet	*Revision*
NOI-1	-

STREAM BED CONSTRUCTION SEQUENCE

1. CREATE AN ARMORED LOW FLOW CHANNEL WITHIN THE NEW CULVERT
2. BURY 3–6-INCH ROUNDED NATURAL STONE 14 INCHES DOWN (BELOW THE ELEVATION OF THE CULVERT)
3. USE MIRAFI/ GEOTEXTILE FABRIC BELOW THE NATURAL STONE
4. COVER THE STONE WITH SILT FROM BELOW THE EXISTING CULVERT TO MATCH THE SUBSTRATE OF THE EXISTING STREAM
5. SET ASIDE THE EXISTING STREAM SEDIMENT, AFTER THE REMOVAL OF THE EXISTING CULVERT, AND COVER WITH A TARP BEFORE RE-USING WITHIN THE NEW CULVERT
6. MATCH THE CHANNEL ELEVATION ABOVE AND BELOW THE CULVERT
7. THE PLACEMENT OF THE FABRIC, STONE, AND SEDIMENT WILL BE DONE BEFORE PLACING THE NEW CULVERT OVER THE CHANNEL.

DEWATERING NOTES

1. INSTALL SUMP AS PER DETAIL (SHOW PROPOSED LOCATION ON DRAWING).
2. DEWATER USING SUBMERSIBLE PUMP(S) AS NEEDED, 3" DISCHARGE HOSE AND SEDIMENTATION FILTER BAG.
3. IF PUMPING CLEAR WATER, IT CAN BE PUMPED AROUND THE WORK AREA AND BACK INTO STREAM CHANNEL AND NOT INTO A SEDIMENT BAG.
4. IF TURBID WATER NEEDS TO BE REMOVED FROM WORK AREA, IT SHALL BE PUMPED INTO A SEDIMENTATION FILTER BAG WHICH WILL BE LOCATED IN AN UPLAND AREA AND SURROUNDED BY STRAWBALES.
5. NOTE ANY DISCHARGE AREAS ON THE DRAWINGS

WETLAND CROSSING CONSTRUCTION SPECIFICATIONS

1. PLEASE SEE THE STRUCTURAL ENGINEERING REPORT SUBMITTED AS PART OF THE AMENDED ORDER OF CONDITIONS FOR CROSSING DETAILS. THIS REPORT IS PREPARED BY CONTECH ENGINEERED SOLUTIONS LLC, DATE SEPTEMBER 21, 2022 AND IS SUBMITTED AS PART OF THE PROPOSED AMENDMENTS TO THE EXISTING ORDER OF CONDITIONS.
2. IN THE EVENT OF DISCREPANCIES BETWEEN THE STRUCTURAL REPORT AND THE PREVIOUSLY APPROVED PLAN SET, THE STRUCTURAL REPORT WILL GOVERN ALL STRUCTURAL ELEMENTS AND THE ORDER OF CONDITION(S) WILL GOVERN ALL EROSION CONTROL MEASURES.

WETLAND REPLICATION NOTES:

SCHEDULE:

1. WETLAND REPLICATION WORK SHALL TAKE PLACE DURING THE GROWING SEASON. ONCE BEGUN, WORK WILL BE COMPLETED WITHIN APPROXIMATELY THREE WEEKS. WETLAND REPLICATION WORK SHALL BE DONE CONCURRENT WITH SITE WORK.
2. THE WHATELY CONSERVATION COMMISSION (WCC) SHALL BE CONTACTED 48 HOURS IN ADVANCE OF THE START OF WORK AND A PRECONSTRUCTION SITE MEETING SHALL BE HELD WITH THE WCC, PIONEER LAND PLANNING OR WETLAND SCIENTIST, AND THE APPLICANT.
3. THE WETLAND SCIENTIST, OR THEIR REPRESENTATIVE, SHALL BE ON SITE AT THE START OF WORK AND CHECK ON THE PROGRESS OF THE PROJECT REGULARLY DURING WORK IN WETLANDS AND AT OTHER CRITICAL POINTS DURING CONSTRUCTION. AT A MINIMUM, THE WETLAND SCIENTIST SHALL BE PRESENT: AT THE START OF WORK; TO VERIFY SUBGRADES; AT THE BEGINNING OF PLANTING; AND TO VERIFY THAT WORK IS COMPLETE.
4. AN INSPECTION REPORT SHALL BE SUBMITTED TO THE WCC BY THE APPLICANT DURING THE WETLAND CONSTRUCTION PERIOD.

CONSTRUCTION SEQUENCE:

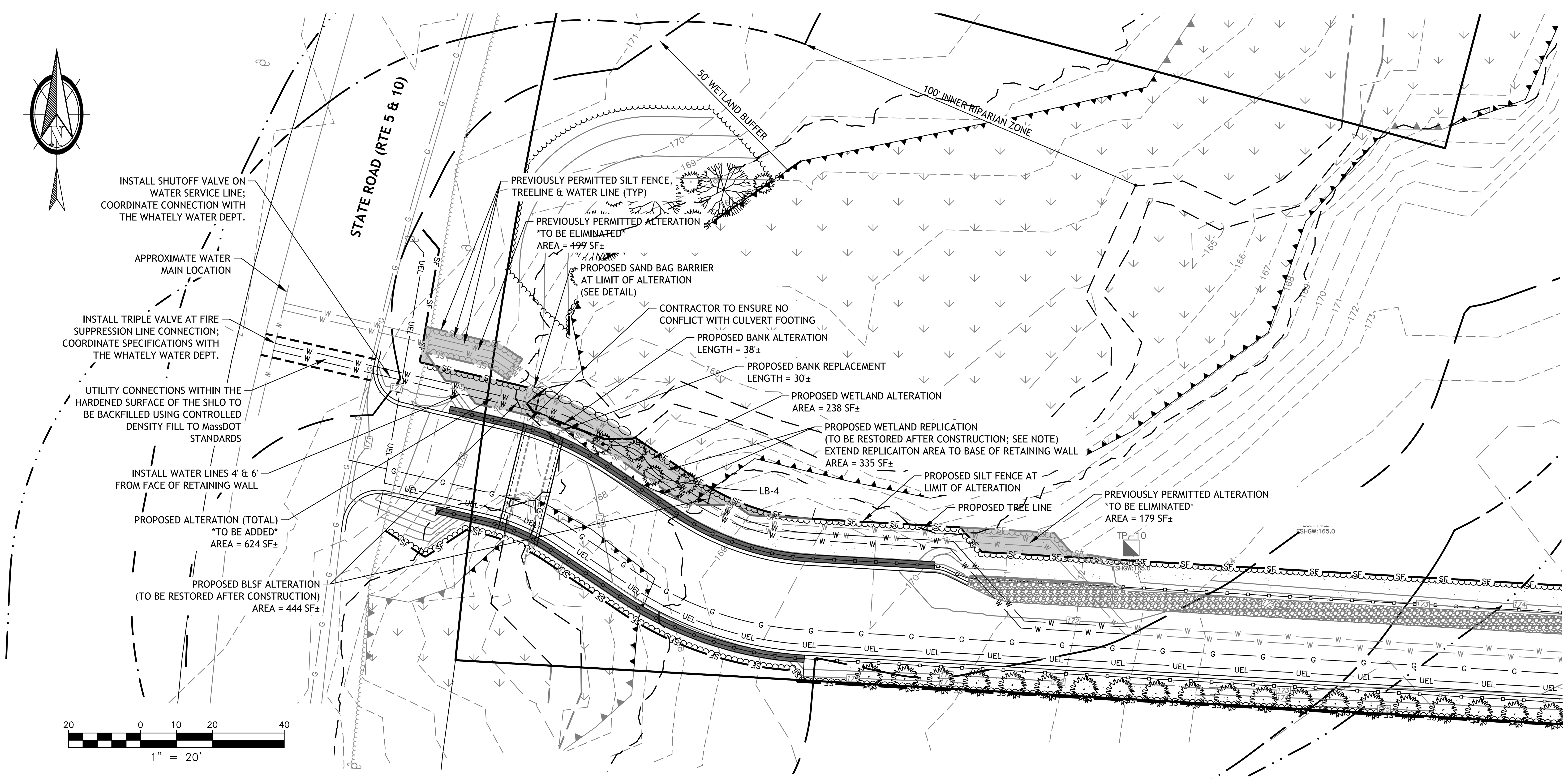
1. THE WETLAND SCIENTIST, OR THEIR REPRESENTATIVE, SHALL STAKE OUT THE LIMITS OF THE WETLAND REPLICATION AREA BEFORE CONSTRUCTION COMMENCES AND MARK GRADE STAKES FOR CUT TO PROPER DEPTH BELOW PROPOSED FINISH GRADE FOR REPLICATION AREA.
2. INSTALL EROSION CONTROL AND SILT BARRIERS AT LOCATIONS SHOWN ON PLAN, PRIOR TO CONSTRUCTION. NO EQUIPMENT TRAFFIC OR OTHER ALTERATION IS PERMITTED BEYOND SEDIMENT BARRIERS OR IN WETLAND AREAS, EXCEPT FOR GRADING AS SHOWN ON THE PLAN. BARRIERS WITHIN THE WETLAND SHALL BE INSTALLED SO AS TO MINIMIZE DISTURBANCE OF THE WETLAND. SILT FENCING SHALL BE TRENCHED IN BY HAND IN WETLAND AREAS. STRAW BALES MAY BE SET DIRECTLY ON THE WETLAND SURFACE WITHOUT TRENCHING, BUT MUST BE WELL STAKED, TIGHTLY BUTTED, AND JOINTS CHINKED WITH LOOSE HAY.
3. CLEAR AND GRUB THE REPLICATION AREA AND REMOVE TOPSOIL FOR STOCKPILING ON ADJACENT LAND AS PER THESE PLANS. EXCAVATE SUBSOIL TO THE DEPTH BELOW THE FINAL GRADE SHOWN ON PLANS TO ALLOW FOR INLAY OF ORGANIC SOIL. DO NOT STOCKPILE TOPSOIL, SUBSOIL, STUMPS OR DEBRIS WITHIN RESOURCE AREAS.
4. EXCAVATION WORK SHALL BE DONE FROM OUTSIDE THE EXISTING WETLAND AND SHALL PROGRESS FROM THE WETLAND EDGE INTO THE UPLAND.
5. THE GROUNDWATER ELEVATION SHALL BE VERIFIED IN THE WETLAND REPLICATION AREA BY THE THE WETLAND SCIENTIST, OR THEIR REPRESENTATIVE, ONCE THE REPLICATION AREA HAS BEEN EXCAVATED TO SUB-GRADE. IF SEASONAL HIGH GROUNDWATER IS NOT PRESENT AT OR WITHIN SUFFICIENT DEPTH TO SUPPORT WETLAND VEGETATION, MODIFICATIONS TO THE PROPOSED REPLICATION AREA TOPOGRAPHY SHALL BE MADE IN THE FIELD UNDER THE SUPERVISION OF THE THE WETLAND SCIENTIST, OR THEIR REPRESENTATIVE.
6. REPLACE 12 INCHES OF ORGANIC SOIL INLAY TO THE REPLICATION AREA TO ACHIEVE FINAL GRADE. ORGANIC SOIL SHALL BE AN ORGANIC FINE SANDY LOAM APPROVED BY THE WETLAND SCIENTIST, OR THEIR REPRESENTATIVE. IT IS ANTICIPATED THAT THE TOPSOIL EXCAVATED FROM THE REPLICATION SITE WILL BE AMENDED FOR THE WETLAND SOIL INLAY.
7. AVOID COMPACTION OF SUBSOILS AND PLACED WETLAND SOILS. EQUIPMENT TRAFFIC IN THE REPLICATION AREA IS TO BE MINIMIZED BY USING TRACK INSTEAD OF WHEEL MACHINES. THERE SHALL BE NO TRAFFIC ON WETLAND SOILS ALREADY PLACED.
8. WETLAND PLANT MIX, AS SPECIFIED ON THE PLANS, SHALL BE OBTAINED FROM A NURSERY IN THE NEW ENGLAND STATES. SEE NOTICE OF INTENT FILING FOR PLANTING REPLICATION AREA PLANTING SCHEDULE.
9. ALL EXPOSED SOIL WITHIN THE RESOURCE AREA(S) SHALL BE SEEDED WITH A WETLAND MIXTURE (SEE SPECIFICATION) AND MULCHED WITH WET MEADOW HAY, SALT HAY OR STRAW TO PREVENT EROSION UNTIL VEGETATION IS ESTABLISHED AND A CERTIFICATE OF COMPLIANCE IS RECEIVED FROM THE LOCAL CONSERVATION COMMISSION.
10. FINAL WETLAND REPLICATION AREA ELEVATIONS SHALL BE CERTIFIED BY THE WETLAND SCIENTIST, OR THEIR REPRESENTATIVE.
11. IMPACT TO ADJACENT WETLAND AREAS SHALL BE AT A MINIMUM. STORAGE OF ANY CONSTRUCTION MATERIALS OR MACHINERY IN ADJACENT WETLAND AREAS IS PROHIBITED. USE OF HEAVY MACHINERY IN ADJACENT WETLAND AREAS IS PERMITTED FOR CONSTRUCTION OF THE REPLICATION AREA ONLY WITHIN THE LIMITS OF THE EROSION CONTROL BARRIERS. ANY ADJACENT WETLAND DISTURBED DURING CONSTRUCTION WILL BE REESTABLISHED TO ITS PRE-CONSTRUCTION CONDITION AT THE CONTRACTOR'S EXPENSE.
12. ALL SLOPES AND FILL AREAS IN BUFFER ZONE SHALL BE SEEDED AND MULCHED UPON COMPLETION OF CONSTRUCTION TO PREVENT ANY POSSIBLE IMPACT TO ADJACENT WETLAND.
13. UPON COMPLETION OF THE CONSTRUCTION PHASE OF THE WETLAND REPLICATION, THE CONTRACTOR SHALL CONTACT THE THE WETLAND SCIENTIST, OR THEIR REPRESENTATIVE, FOR AN INSPECTION. THE WETLAND SCIENTIST, OR THEIR REPRESENTATIVE, SHALL NOTIFY THE LOCAL CONSERVATION COMMISSION AS TO THE COMPLETION DATE.

ESTABLISHMENT & MONITORING:

1. AT THE END OF EACH GROWING SEASON, AND UNTIL COMPLIANCE WITH THE PERFORMANCE STANDARDS SET FORTH IN 310 CMR 10.55(4)(B)1-7 IS ACHIEVED , A PROGRESS REPORT SHALL BE SUBMITTED BY A REGISTERED LANDSCAPE ARCHITECT OR WETLAND SCIENTIST, TO THE LOCAL ISSUING AUTHORITY.
2. ALL WORK SHALL COMPLY WITH 310 CMR 10.55 (4)(B)1-7: WITHIN TWO GROWING SEASONS AFTER COMPLETION, AT LEAST 75% OF THE REPLICATION AREA SHALL BE ESTABLISHED WITH INDIGENOUS WETLAND PLANT SPECIES. IF AT THE END OF THE FIRST OR THE SECOND GROWING SEASON (OR BOTH), THE SUCCESS RATE IS NOT EXPECTED TO BE 75%, PLANTING AND/OR RE-SEEDING OF THE REPLICATION AREA SHALL BE UNDERTAKEN. VEGETATION MAY BE CUT OR REMOVED SELECTIVELY TO ELIMINATE NUISANCE OR INVASIVE PLANTS AND ENCOURAGE WETLAND SPECIES.

MAINTENANCE:

1. AFTER SUCCESSFUL ESTABLISHMENT OF WETLAND VEGETATION AND RECEIPT OF A CERTIFICATE OF COMPLIANCE, THE AREA SHALL BE PERMITTED TO GROW WITHOUT DISTURBANCE. NO CONTINUING MAINTENANCE IS REQUIRED, EXCEPT FOR THE POSSIBLE SELECTIVE PRUNING OR REMOVAL OF NUISANCE AND/OR INVASIVE SPECIES THAT MAY HAVE INVADED THE REPLICATION AREA.

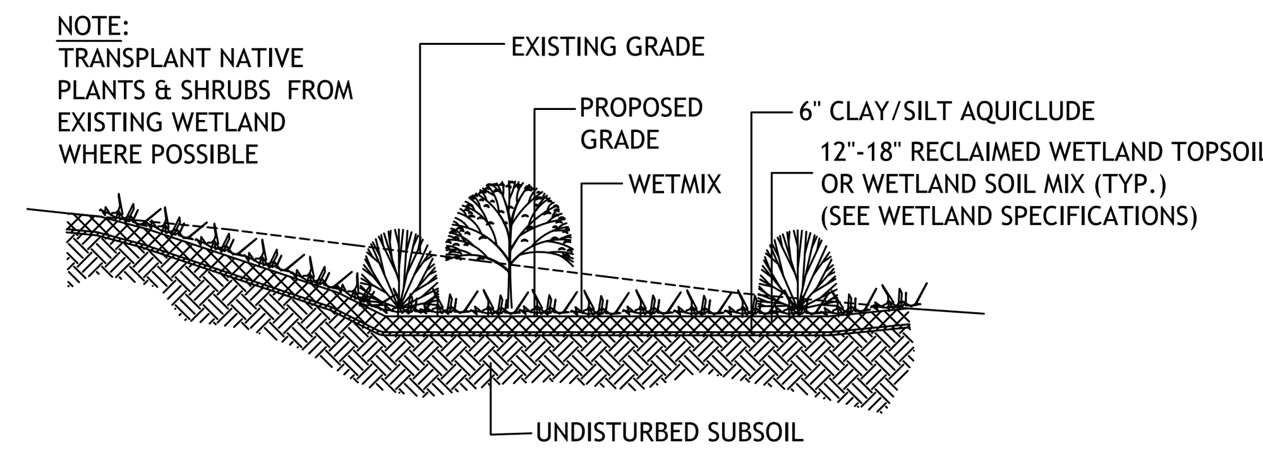

STATE ROAD (RTE 5 & 10)
50' WETLAND BUFFER
100' INNER RIPARIAN ZONE
INSTALL SHUTOFF VALVE ON WATER SERVICE LINE; COORDINATE CONNECTION WITH THE WHATELY WATER DEPT.
APPROXIMATE WATER MAIN LOCATION
INSTALL TRIPLE VALVE AT FIRE SUPPRESSION LINE CONNECTION; COORDINATE SPECIFICATIONS WITH THE WHATELY WATER DEPT.
UTILITY CONNECTIONS WITHIN THE HARDENED SURFACE OF THE SHLO TO BE BACKFILLED USING CONTROLLED DENSITY FILL TO MassDOT STANDARDS
INSTALL WATER LINES 4' & 6' FROM FACE OF RETAINING WALL
PROPOSED ALTERATION (TOTAL) *TO BE ADDED* AREA = 624 SF±
PROPOSED BLSF ALTERATION (TO BE RESTORED AFTER CONSTRUCTION) AREA = 444 SF±
PREVIOUSLY PERMITTED SILT FENCE, TREELINE & WATER LINE (TYP)
PREVIOUSLY PERMITTED ALTERATION *TO BE ELIMINATED* AREA = 199 SF±
PROPOSED SAND BAG BARRIER AT LIMIT OF ALTERATION (SEE DETAIL)
CONTRACTOR TO ENSURE NO CONFLICT WITH CULVERT FOOTING
PROPOSED BANK ALTERATION LENGTH = 38'±
PROPOSED BANK REPLACEMENT LENGTH = 30'±
PROPOSED WETLAND ALTERATION AREA = 238 SF±
PROPOSED WETLAND REPLICATION (TO BE RESTORED AFTER CONSTRUCTION; SEE NOTE) EXTEND REPLICAITON AREA TO BASE OF RETAINING WALL AREA = 335 SF±
PROPOSED SILT FENCE AT LIMIT OF ALTERATION
PROPOSED TREE LINE
LB-4
PREVIOUSLY PERMITTED ALTERATION *TO BE ELIMINATED* AREA = 179 SF±
TP-10
20 0 10 20 40
1" = 20'

PLANT LIST

LANDSCAPE PLANTING LIST

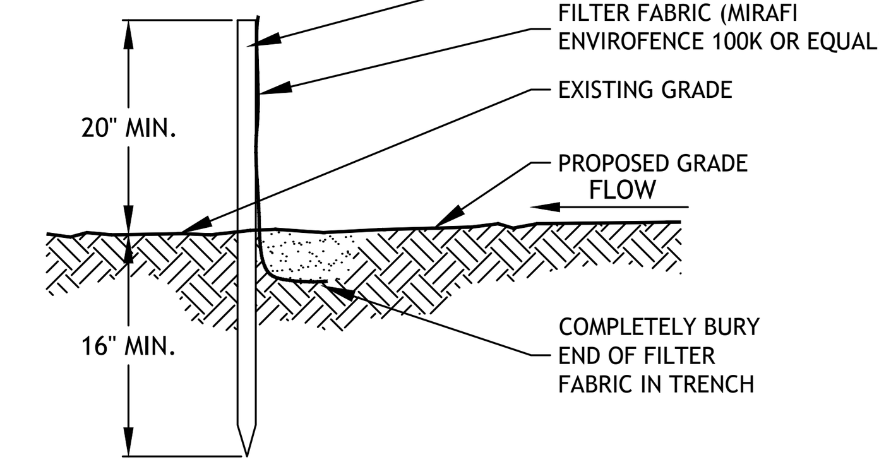
KEY	QTY.	BOTANICAL NAME	COMMON NAME	SIZE/SPACING
LB	4	LINDERA BENZOIN	NORTHERN SPICEBUSH	2'-3' HT. (>5 GAL CONTAINER)

SEED WETLAND REPLICATION AREA WITH "NEW ENGLAND WETMIX" BY NEW ENGLAND WETLAND PLANTS, INC., OR EQUAL APPROVED BY LANDSCAPE ARCHITECT/WETLAND SCIENTIST.
SEED MIXTURE TO BE APPLIED AT A RATE OF 1.0 LB/2,500 S.F.


NOTE:
TRANSPLANT NATIVE PLANTS & SHRUBS FROM EXISTING WETLAND WHERE POSSIBLE
EXISTING GRADE
PROPOSED GRADE
WETMIX
6" CLAY/SILT AQUICLUDE
12"-18" RECLAIMED WETLAND TOPSOIL OR WETLAND SOIL MIX (TYP.) (SEE WETLAND SPECIFICATIONS)
UNDISTURBED SUBSOIL

TYPICAL WETLAND REPLICATION AREA - CROSS SECTION

NO SCALE

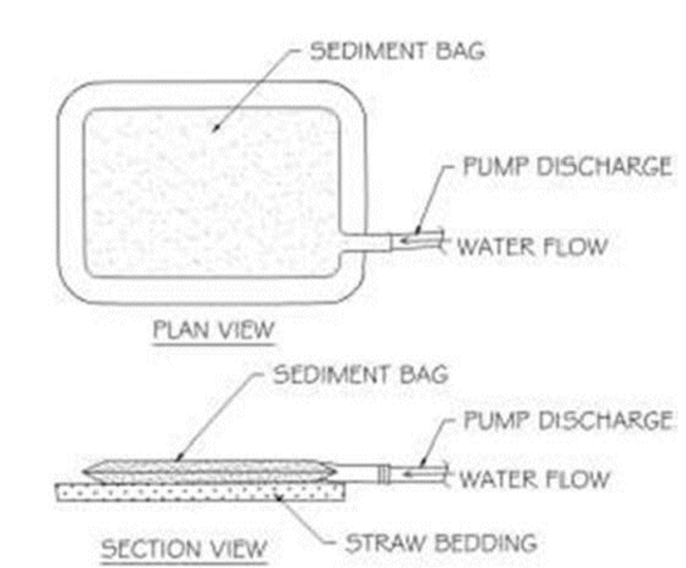


SILT FENCE DETAIL

NO SCALE

CRUSHED STONE SUMP DETAIL

NO SCALE



SEDIMENT FILTER BAG DETAIL

NO SCALE

SAND BAG DETAIL (37"x37"x60")

NO SCALE

prepared by:

PIONEER LAND PLANNING

CIVIL ENGINEERS & LAND SURVEYORS
for
SITE DESIGN & PROPERTY MAPPING

phone: (413) 588-8765
334 Linden Street
Holyoke, MA 01060
web: pioneerlandplanning.com
email:info@pioneerlandplanning.com

PROFESSIONAL SEAL
(null without seal)
COMMONWEALTH OF MASSACHUSETTS
CHRISTOPHER V. KARNEY
No. 54626
PROFESSIONAL LAND SURVEYOR

prepared for:

Todd Cellura
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710 Southampton Road
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NOTICE OF INTENT FILING PLAN

STATE ROAD
WHATELY, MASSACHUSETTS
ASSESSOR'S MAP 5 PARCEL 29

Issued: January 6, 2023

Revision:	Date:

Scale: 1" = 20'

Project: 010623

Sheet	Revision
NOI-2	-

WETLAND REPLICATION NOTES:

SCHEDULE:

1. WETLAND REPLICATION WORK SHALL TAKE PLACE DURING THE GROWING SEASON. ONCE BEGUN, WORK WILL BE COMPLETED WITHIN APPROXIMATELY THREE WEEKS. WETLAND REPLICATION WORK SHALL BE DONE CONCURRENT WITH SITE WORK.
2. THE WHATELY CONSERVATION COMMISSION (WCC) SHALL BE CONTACTED 48 HOURS IN ADVANCE OF THE START OF WORK AND A PRECONSTRUCTION SITE MEETING SHALL BE HELD WITH THE WCC, PIONEER LAND PLANNING OR WETLAND SCIENTIST, AND THE APPLICANT.
3. THE WETLAND SCIENTIST, OR THEIR REPRESENTATIVE, SHALL BE ON SITE AT THE START OF WORK AND CHECK ON THE PROGRESS OF THE PROJECT REGULARLY DURING WORK IN WETLANDS AND AT OTHER CRITICAL POINTS DURING CONSTRUCTION. AT A MINIMUM, THE WETLAND SCIENTIST SHALL BE PRESENT: AT THE START OF WORK; TO VERIFY SUBGRADES; AT THE BEGINNING OF PLANTING; AND TO VERIFY THAT WORK IS COMPLETE.
4. AN INSPECTION REPORT SHALL BE SUBMITTED TO THE WCC BY THE APPLICANT DURING THE WETLAND CONSTRUCTION PERIOD.

CONSTRUCTION SEQUENCE:

1. THE WETLAND SCIENTIST , OR THEIR REPRESENTATIVE, SHALL STAKE OUT THE LIMITS OF THE WETLAND REPLICATION AREA BEFORE CONSTRUCTION COMMENCES AND MARK GRADE STAKES FOR CUT TO PROPER DEPTH BELOW PROPOSED FINISH GRADE FOR REPLICATION AREA.
2. INSTALL EROSION CONTROL AND SILT BARRIERS AT LOCATIONS SHOWN ON PLAN, PRIOR TO CONSTRUCTION. NO EQUIPMENT TRAFFIC OR OTHER ALTERATION IS PERMITTED BEYOND SEDIMENT BARRIERS OR IN WETLAND AREAS, EXCEPT FOR GRADING AS SHOWN ON THE PLAN. BARRIERS WITHIN THE WETLAND SHALL BE INSTALLED SO AS TO MINIMIZE DISTURBANCE OF THE WETLAND. SILT FENCING SHALL BE TRENCHED IN BY HAND IN WETLAND AREAS. STRAW BALES MAY BE SET DIRECTLY ON THE WETLAND SURFACE WITHOUT TRENCHING, BUT MUST BE WELL STAKED, TIGHTLY BUTTED, AND JOINTS CHINKED WITH LOOSE HAY.
3. CLEAR AND GRUB THE REPLICATION AREA AND REMOVE TOPSOIL FOR STOCKPILING ON ADJACENT LAND AS PER THESE PLANS. EXCAVATE SUBSOIL TO THE DEPTH BELOW THE FINAL GRADE SHOWN ON PLANS TO ALLOW FOR INLAY OF ORGANIC SOIL. DO NOT STOCKPILE TOPSOIL, SUBSOIL, STUMPS OR DEBRIS WITHIN RESOURCE AREAS.
4. EXCAVATION WORK SHALL BE DONE FROM OUTSIDE THE EXISTING WETLAND AND SHALL PROGRESS FROM THE WETLAND EDGE INTO THE UPLAND.
5. THE GROUNDWATER ELEVATION SHALL BE VERIFIED IN THE WETLAND REPLICATION AREA BY THE THE WETLAND SCIENTIST, OR THEIR REPRESENTATIVE, ONCE THE REPLICATION AREA HAS BEEN EXCAVATED TO SUB-GRADE. IF SEASONAL HIGH GROUNDWATER IS NOT PRESENT AT OR WITHIN SUFFICIENT DEPTH TO SUPPORT WETLAND VEGETATION, MODIFICATIONS TO THE PROPOSED REPLICATION AREA TOPOGRAPHY SHALL BE MADE IN THE FIELD UNDER THE SUPERVISION OF THE THE WETLAND SCIENTIST, OR THEIR REPRESENTATIVE.
6. REPLACE 12 INCHES OF ORGANIC SOIL INLAY TO THE REPLICATION AREA TO ACHIEVE FINAL GRADE. ORGANIC SOIL SHALL BE AN ORGANIC FINE SANDY LOAM APPROVED BY THE WETLAND SCIENTIST, OR THEIR REPRESENTATIVE. IT IS ANTICIPATED THAT THE TOPSOIL EXCAVATED FROM THE REPLICATION SITE WILL BE AMENDED FOR THE WETLAND SOIL INLAY.
7. AVOID COMPACTION OF SUBSOILS AND PLACED WETLAND SOILS. EQUIPMENT TRAFFIC IN THE REPLICATION AREA IS TO BE MINIMIZED BY USING TRACK INSTEAD OF WHEEL MACHINES. THERE SHALL BE NO TRAFFIC ON WETLAND SOILS ALREADY PLACED.
8. WETLAND PLANT MIX, AS SPECIFIED ON THE PLANS, SHALL BE OBTAINED FROM A NURSERY IN THE NEW ENGLAND STATES. SEE NOTICE OF INTENT FILING FOR PLANTING REPLICATION AREA PLANTING SCHEDULE.
9. ALL EXPOSED SOIL WITHIN THE RESOURCE AREA(S) SHALL BE SEEDED WITH A WETLAND MIXTURE (SEE SPECIFICATION) AND MULCHED WITH WET MEADOW HAY, SALT HAY OR STRAW TO PREVENT EROSION UNTIL VEGETATION IS ESTABLISHED AND A CERTIFICATE OF COMPLIANCE IS RECEIVED FROM THE LOCAL CONSERVATION COMMISSION.
10. FINAL WETLAND REPLICATION AREA ELEVATIONS SHALL BE CERTIFIED BY THE WETLAND SCIENTIST, OR THEIR REPRESENTATIVE.
11. IMPACT TO ADJACENT WETLAND AREAS SHALL BE AT A MINIMUM. STORAGE OF ANY CONSTRUCTION MATERIALS OR MACHINERY IN ADJACENT WETLAND AREAS IS PROHIBITED. USE OF HEAVY MACHINERY IN ADJACENT WETLAND AREAS IS PERMITTED FOR CONSTRUCTION OF THE REPLICATION AREA ONLY WITHIN THE LIMITS OF THE EROSION CONTROL BARRIERS. ANY ADJACENT WETLAND DISTURBED DURING CONSTRUCTION WILL BE REESTABLISHED TO ITS PRE-CONSTRUCTION CONDITION AT THE CONTRACTOR'S EXPENSE.
12. ALL SLOPES AND FILL AREAS IN BUFFER ZONE SHALL BE SEEDED AND MULCHED UPON COMPLETION OF CONSTRUCTION TO PREVENT ANY POSSIBLE IMPACT TO ADJACENT WETLAND.
13. UPON COMPLETION OF THE CONSTRUCTION PHASE OF THE WETLAND REPLICATION, THE CONTRACTOR SHALL CONTACT THE THE WETLAND SCIENTIST, OR THEIR REPRESENTATIVE, FOR AN INSPECTION. THE WETLAND SCIENTIST, OR THEIR REPRESENTATIVE, SHALL NOTIFY THE LOCAL CONSERVATION COMMISSION AS TO THE COMPLETION DATE.

ESTABLISHMENT & MONITORING:

1. AT THE END OF EACH GROWING SEASON, AND UNTIL COMPLIANCE WITH THE PERFORMANCE STANDARDS SET FORTH IN 310 CMR 10.55(4)(B)1-7 IS ACHIEVED , A PROGRESS REPORT SHALL BE SUBMITTED BY A REGISTERED LANDSCAPE ARCHITECT OR WETLAND SCIENTIST, TO THE LOCAL ISSUING AUTHORITY.
2. ALL WORK SHALL COMPLY WITH 310 CMR 10.55 (4)(B)1-7: WITHIN TWO GROWING SEASONS AFTER COMPLETION, AT LEAST 75% OF THE REPLICATION AREA SHALL BE ESTABLISHED WITH INDIGENOUS WETLAND PLANT SPECIES. IF AT THE END OF THE FIRST OR THE SECOND GROWING SEASON (OR BOTH), THE SUCCESS RATE IS NOT EXPECTED TO BE 75%, PLANTING AND/OR RE-SEEDING OF THE REPLICATION AREA SHALL BE UNDERTAKEN. VEGETATION MAY BE CUT OR REMOVED SELECTIVELY TO ELIMINATE NUISANCE OR INVASIVE PLANTS AND ENCOURAGE WETLAND SPECIES.

MAINTENANCE:

1. AFTER SUCCESSFUL ESTABLISHMENT OF WETLAND VEGETATION AND RECEIPT OF A CERTIFICATE OF COMPLIANCE, THE AREA SHALL BE PERMITTED TO GROW WITHOUT DISTURBANCE. NO CONTINUING MAINTENANCE IS REQUIRED, EXCEPT FOR THE POSSIBLE SELECTIVE PRUNING OR REMOVAL OF NUISANCE AND/OR INVASIVE SPECIES THAT MAY HAVE INVADED THE REPLICATION AREA.

STREAM BED CONSTRUCTION SEQUENCE

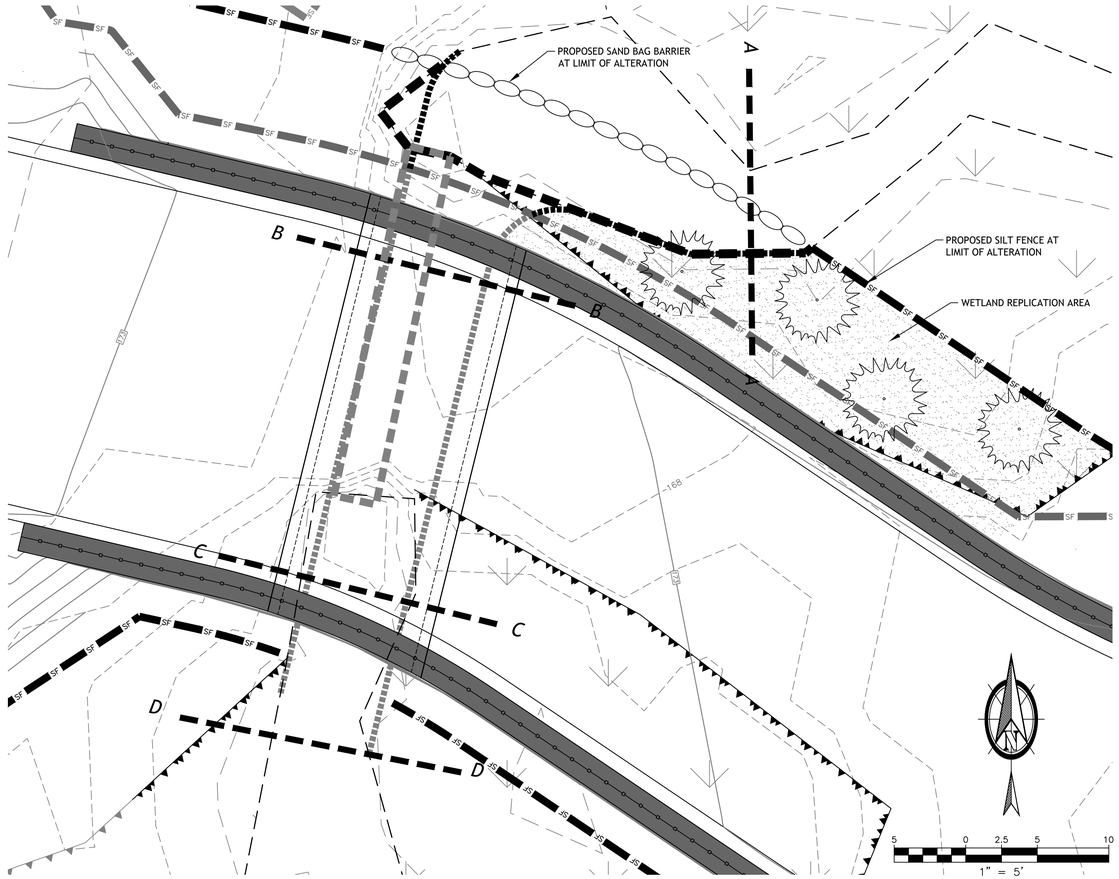
1. CREATE AN ARMORED LOW FLOW CHANNEL WITHIN THE NEW CULVERT
2. BURY 3-6-INCH ROUNDED NATURAL STONE 14 INCHES DOWN (BELOW THE ELEVATION OF THE CULVERT)
3. USE MIRAFI/ GEOTEXTILE FABRIC BELOW THE NATURAL STONE
4. COVER THE STONE WITH SILT FROM BELOW THE EXISTING CULVERT TO MATCH THE SUBSTRATE OF THE EXISTING STREAM
5. SET ASIDE THE EXISTING STREAM SEDIMENT, AFTER THE REMOVAL OF THE EXISTING CULVERT, AND COVER WITH A TARP BEFORE RE-USING WITHIN THE NEW CULVERT
6. MATCH THE CHANNEL ELEVATION ABOVE AND BELOW THE CULVERT
7. THE PLACEMENT OF THE FABRIC, STONE, AND SEDIMENT WILL BE DONE BEFORE PLACING THE NEW CULVERT OVER THE CHANNEL.

DEWATERING NOTES

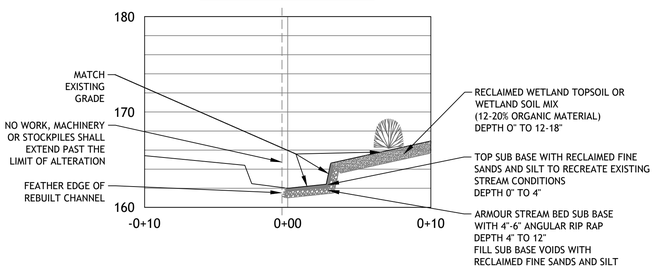
1. INSTALL SUMP AS PER DETAIL (SHOW PROPOSED LOCATION ON DRAWING).
2. DEWATER USING SUBMERSIBLE PUMP(S) AS NEEDED, 3" DISCHARGE HOSE AND SEDIMENTATION FILTER BAG.
3. IF PUMPING CLEAR WATER, IT CAN BE PUMPED AROUND THE WORK AREA AND BACK INTO STREAM CHANNEL AND NOT INTO A SEDIMENT BAG.
4. IF TURBID WATER NEEDS TO BE REMOVED FROM WORK AREA, IT SHALL BE PUMPED INTO A SEDIMENTATION FILTER BAG WHICH WILL BE LOCATED IN AN UPLAND AREA AND SURROUNDED BY STRAWBALES.
5. NOTE ANY DISCHARGE AREAS ON THE DRAWINGS

WETLAND CROSSING CONSTRUCTION SPECIFICATIONS

1. PLEASE SEE THE STRUCTURAL ENGINEERING REPORT SUBMITTED AS PART OF THE AMENDED ORDER OF CONDITIONS FOR CROSSING DETAILS. THIS REPORT IS PREPARED BY CONTECH ENGINEERED SOLUTIONS LLC, DATE SEPTEMBER 21, 2022 AND IS SUBMITTED AS PART OF THE PROPOSED AMENDMENTS TO THE EXISTING ORDER OF CONDITIONS.
2. IN THE EVENT OF DISCREPANCIES BETWEEN THE STRUCTURAL REPORT AND THE PREVIOUSLY APPROVED PLAN SET, THE STRUCTURAL REPORT WILL GOVERN ALL STRUCTURAL ELEMENTS AND THE ORDER OF CONDITION(S) WILL GOVERN ALL EROSION CONTROL MEASURES.



CROSS-SECTION A-A



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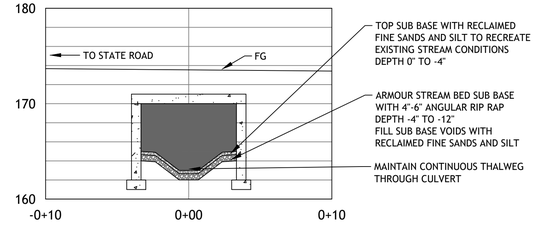

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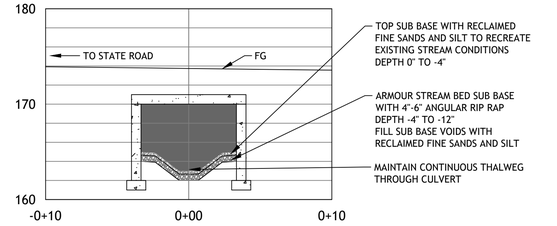

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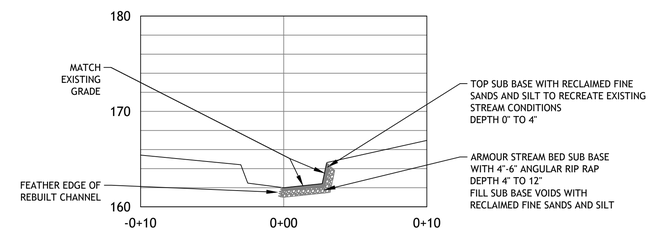

prepared by:

PIONEER LAND PLANNING

CIVIL ENGINEERS & LAND SURVEYORS
for
SITE DESIGN & PROPERTY MAPPING

phone: (413) 588-8765
334 Linden Street
Holyoke, MA 01060
web: pioneerlandplanning.com
email:info@pioneerlandplanning.com

PROFESSIONAL SEAL
(null without seal)

COMMONWEALTH OF MASSACHUSETTS
CHRISTOPHER V. KARNEY
No. 54626
PROFESSIONAL LAND SURVEYOR

prepared for:

Todd Cellura
Pioneer Valley Self-Storage

710 Southampton Road
Westfield, MA 01085

NOTICE OF INTENT FILING PLAN

STATE ROAD
WHATELY, MASSACHUSETTS
ASSESSOR'S MAP 5 PARCEL 29

Issued: January 6, 2023	
Revision:	Date:

Scale: 1" = 5'

Project: 010623

Sheet	Revision
NOI-3	-