VIRGINIA RAILWAY EXPRESS

ADDENDUM OF SOLICITATION

INVITATION FOR BIDS (IFB)

ADDENDUM NO. 1

Issued: July 14, 2025

IFB No.: 025-013	**Title: Construction of the Alexandria Station Improvements and King Street and Commonwealth Avenue Bridge Replacement Project**

Contact: Ramon Paez **Email:** rpaez@vre.org **Telephone:** (703) 838-5447

This addendum is hereby incorporated into the solicitation documents of the above referenced IFB. The following items are clarifications, corrections, additions, deletions and/or revisions to the IFB, which shall take precedence over the original documents. ***Bold and Italics*** indicates additions while deletions are indicated by ~~strikethrough~~. Bidders must acknowledge receipt of this addendum by returning a signed original with your Bid.

DESCRIPTION OF ADDENDUM

The above numbered solicitation is amended as follows:

1. **PART II – PROCUREMENT SCHEDULE**

   A. Note the following revision to Bids Due (Closing Date and Time):

   REVISE:

   August ~~7~~ ***26,*** 2025 at 2:00 P.M. EST

   B. Note the following revision to Bid Opening:

   REVISE:

   August ~~7~~ ***26,*** 2025 at 2:00 P.M. EST

2. PART IV- SPECIAL PROVISIONS

A. Note the following addition to IFB Part IV- Special Provisions:

17. LIMITED NOTICE-TO-PROCEED

A. Virginia Railway Express (VRE) reserves the right, in its sole discretion, to issue a Limited Notice-To-Proceed (LNTP) to the selected Contractor following contract award, but prior to the issuance of the Full Notice-To-Proceed (NTP). The LNTP is intended to authorize commencement of early pre-construction, administrative activities by the Contractor that are critical to maintaining the overall project schedule as set forth in the LNTP.

B. If issued, the LNTP may authorize the Contractor to proceed with specific pre-construction tasks, which may include, but are not limited to, the following:

1. ***Provision of Railroad Protective Liability Insurance***
2. ***Preparation and submittal of various plans, such as:***
    a. ***Project Management Plan***
    b. ***Safety Plan***
    c. ***Quality Control Plan***
    d. ***Baseline Project Schedule***
3. ***Coordination plans with third-party stakeholders***
4. ***Initiation of permit applications***
5. ***Submission of materials for review and approval by CSX Transportation (CSXT), including Railroad Right-of-Entry documentation, which is the paperwork required to gain access to railroad property for project-related activities.***
6. ***Early procurement of approved long-lead time items***
7. ***It is expressly understood that under the LNTP, the Contractor shall not perform any physical construction, permanent fieldwork, or access the CSXT Right-of-Way—which refers to land owned by CSXT used for railroad operations—until the Right of Entry has been approved by CSXT and the NTP issued by VRE. This includes the acceptance of the Contractor's insurance policies and the execution of the Right of Entry Agreement by both the Contractor and CSXT.***

C. Upon receipt of the fully executed Right of Entry Agreement, VRE will issue the NTP, thereby authorizing the Contractor to commence performance of the obligations set forth in the Contract Documents.

D. Issuance of the NTP will be contingent upon the Contractor's timely and satisfactory completion of all CSXT Right-of-Entry requirements, as outlined in the Invitation for Bids (IFB) documents and the CSXT Public Facilities Manual, as well as those identified by CSXT.

E. The Contractor shall be responsible for ensuring that all required documentation is submitted promptly and in a manner that facilitates timely review and approval by VRE and any applicable third parties, including CSX. Any delay in the issuance of the NTP

resulting from the Contractor's failure to provide the required documentation shall be the sole responsibility of the Contractor and shall not be attributable to VRE. Furthermore, the Contractor shall not be entitled to any claims for delay, compensation, or schedule adjustments arising from such delays.

F. All work performed under the LNTP will be subject to the terms and conditions of the Contract and will be undertaken at the Contractor's sole risk until the NTP is issued.

3. **REVISIONS TO PLANS/DRAWINGS (ATTACHMENT B)**

A. PROPOSED TUNNEL SITE PLAN

1. Replace Existing Drawing C-217 with new Drawing C-217 noted Addendum No. 1, dated July 14, 2025.

B. PROPOSED TUNNEL PROFILE

1. Replace Existing Drawing No. C-218 with new Drawing C-218 noted Addendum No. 1, dated July 14, 2025.

C. CASING PROFILES 1 OF 2 AND 2 OF 2

1. Replace Existing Drawing No. C-236 with new Drawing C-236 and C-236A noted Addendum No. 1, dated July 14, 2025.

D. PLATFORM SLAB PLAN 4 OF 5

1. Replace Existing Drawing No. S1-203 with new Drawing S1-203 noted Addendum No. 1, dated July 14, 2025.

E. EAST ELEVATOR PARTIAL PLANS

1. Replace Existing Drawing No. S1-220 with new Drawing S1-220 noted Addendum No. 1, dated July 14, 2025.

F. TEMPORARY PLATFORM AT TRACK 0 AND 1 - PLAN AND SECTIONS

1. Replace Existing Drawing No. S1-302 with new Drawing S1-302 noted Addendum No. 1, dated July 14, 2025.

G. EAST ELEVATOR SECTIONS

1. Replace Existing Drawing No. S1-310 with new Drawing S1-310 noted Addendum No. 1, dated July 14, 2025.

H. TUNNEL PROFILE AND ELEVATION

1. Replace Existing Drawing No. S1-315 with new Drawing S1-315 noted Addendum No. 1, dated July 14, 2025.

I. TUNNEL SECTION

1. Replace Existing Drawing No. S1-520 with new Drawing S1-520 noted Addendum No. 1, dated July 14, 2025.

J. CIP BOX CULVERT REINFORCEMENT DETAILS

1. Replace Existing Drawing No. S1-521 with new Drawing S1-521 noted Addendum No. 1, dated July 14, 2025.

K. PRECAST BOX CULVERT REINFORCEMENT DETAILS

1. Replace Existing Drawing No. S1-523 with new Drawing S1-523 noted Addendum No. 1, dated July 14, 2025.

L. CONCRETE DETAILS 1 OF 2

1. Replace Existing Drawing No. S1-530 with new Drawing S1-530 noted Addendum No. 1, dated July 14, 2025.

4. **REVISIONS TO TECHNICAL SPECIFICATIONS (ATTACHMENT A)**

A. Note the following revisions to the Technical Specifications Table of Contents:

DELETE THE FOLLOWING:

~~31 22 00 - Site Grading~~
~~31 23 16 - Excavation~~
~~31 23 33 - Trenching, Backfilling, and Compacting for Utilities~~
~~31 25 00 - Soil Erosion and Sediment Control~~
~~31 50 00 - Earth Retention Systems~~

RE-ISSUE THE FOLLOWING:

00 01 10 – Table of Contents
31 23 00 – Earthwork
31 40 00 – Shoring and Underpinning

B. Note the following revision to Specification Section 00 01 10 "Table of Contents"

Replace Existing Specification Section 00 01 10, "Table of Contents" with Specification Section 00 01 10 "Table of Contents" noted Addendum No. 1, dated July 14, 2025.

C. Note the following revision to Specification Section 00 73 55, "VSMP General Permit for Construction Activities":

REPLACE REFERENCES TO SPECIFICATION SECTION 31 25 00 with SPECIFICATION SECTION 31 23 00 throughout Specification Section 00 73 55.

D. Note the following revision to Specification Section 26 05 43, "Electrical - Exterior Underground":

REPLACE REFERENCES TO SPECIFICATION SECTION 31 23 33 with SPECIFICATION SECTION 31 23 00 throughout Specification Section 26 05 43.

E. Note the following revision to Specification Section 31 10 00, "Site Clearing":

DELETE REFERENCE TO SPECIFICATION SECTION 31 25 00.

F. Note the following revision to Specification Section 31 20 10, "Excess Material Placement Area":

DELETE REFERENCE TO SPECIFICATION SECTION 31 25 00.

G. Note the following deletion to Specification Section 31 22 00, "Site Grading":

DELETE SPECIFICATION SECTION 31 22 00 in its entirety.

H. Note the following deletion to Specification Section 31 23 16, "Excavation":

DELETE SPECIFICATION SECTION 31 23 16 in its entirety.

I. Note the following revision to Specification Section 31 23 19, "Dewatering":

REPLACE REFERENCES TO SPECIFICATION SECTION 31 23 16 with SPECIFICATION SECTION 31 23 00 throughout Specification Section 31 23 19.

REPLACE REFERENCES TO SPECIFICATION SECTION 31 23 33 with SPECIFICATION SECTION 31 23 00 throughout Specification Section 31 23 19.

J. Note the following revision to Specification Section 31 23 24, "Flowable Fill":

REPLACE REFERENCES TO SPECIFICATION SECTION 31 23 16 with SPECIFICATION SECTION 31 23 00 throughout Specification Section 31 23 24.

REPLACE REFERENCES TO SPECIFICATION SECTION 31 23 33 with SPECIFICATION SECTION 31 23 00 throughout Specification Section 31 23 24.

K. Note the following deletion to Specification Section 31 23 33, "Trenching, Backfilling, and Compacting for Utilities":

DELETE SPECIFICATION SECTION 31 23 33 in its entirety.

L. Note the following deletion to Specification Section 31 25 00, "Soil Erosion and Sediment Control":

DELETE SPECIFICATION SECTION 31 25 00 in its entirety.

M. Note the following deletion to Specification Section 31 50 00, "Earth Retention Systems":

DELETE SPECIFICATION SECTION 31 50 00 in its entirety.

N. Note the following deletion to Specification Section 31 23 00, "Earthwork":

DELETE SPECIFICATION SECTION 31 23 00, "Earthwork" in its entirety and replace with SPECIFICATION 31 23 00, "Earthwork", noted Addendum No. 1, dated July 14, 2025.

O. Note the following deletion to Specification Section 31 40 00, "Shoring and Underpinning":

DELETE SPECIFICATION SECTION 31 40 00, "Shoring and Underpinning" in its entirety and replace with SPECIFICATION SECTION 31 40 00, "Shoring and Underpinning", noted Addendum No. 1, dated July 14, 2025.

P. Note the following revision to Specification Section 32 91 13, "Topsoiling and Finished Grading":

DELETE REFERENCE TO SPECIFICATION SECTION 31 25 00.

Q. Note the following revision to Specification Section 33 40 00, "Storm Drainage System":

REPLACE REFERENCES TO SPECIFICATION SECTION 31 23 33 with SPECIFICATION SECTION 31 23 00 throughout Specification Section 33 40 00.

R. Note the following revision to Specification Section 33 41 00, "Subdrainage":

DELETE REFERENCE TO SPECIFICATION SECTION 31 23 33.

5. **LIST OF ADDENDUM #1 DOCUMENTS (IN PDF)**

A. Add the following new Drawing noted Addendum No. 1, dated 7/14/2025:

1. The following new Drawing is issued with this Addendum:
   C-236A

B. Revision to Drawings: Replace existing sheets below with new sheets noted Addendum No. 1, dated 7/14/2025:

1. The following Drawings are re-issued with this Addendum:
   C-217
   C-218
   C-236
   S1-203
   S1-220
   S1-302
   S1-310

S1-315
S1-520
S1-521
S1-523
S1-530

C. The following Specifications are re-issued noted Addendum No. 1, dated 7/14/2025:

- SECTION 00 01 10 “Table of Contents”
- SECTION 31 23 00 “Earthwork”
- SECTION 31 40 00 “Shoring and Underpinning”

6. Except as specifically amended herein, all other terms and conditions of this solicitation remain unchanged and in full force and effect.

Bidders <u>must</u> acknowledge receipt of this Addendum by returning a signed original with the Bid package prior to the hour and date specified in the solicitation. Failure to acknowledge receipt of this Addendum may be grounds to declare your Bid non-responsive.

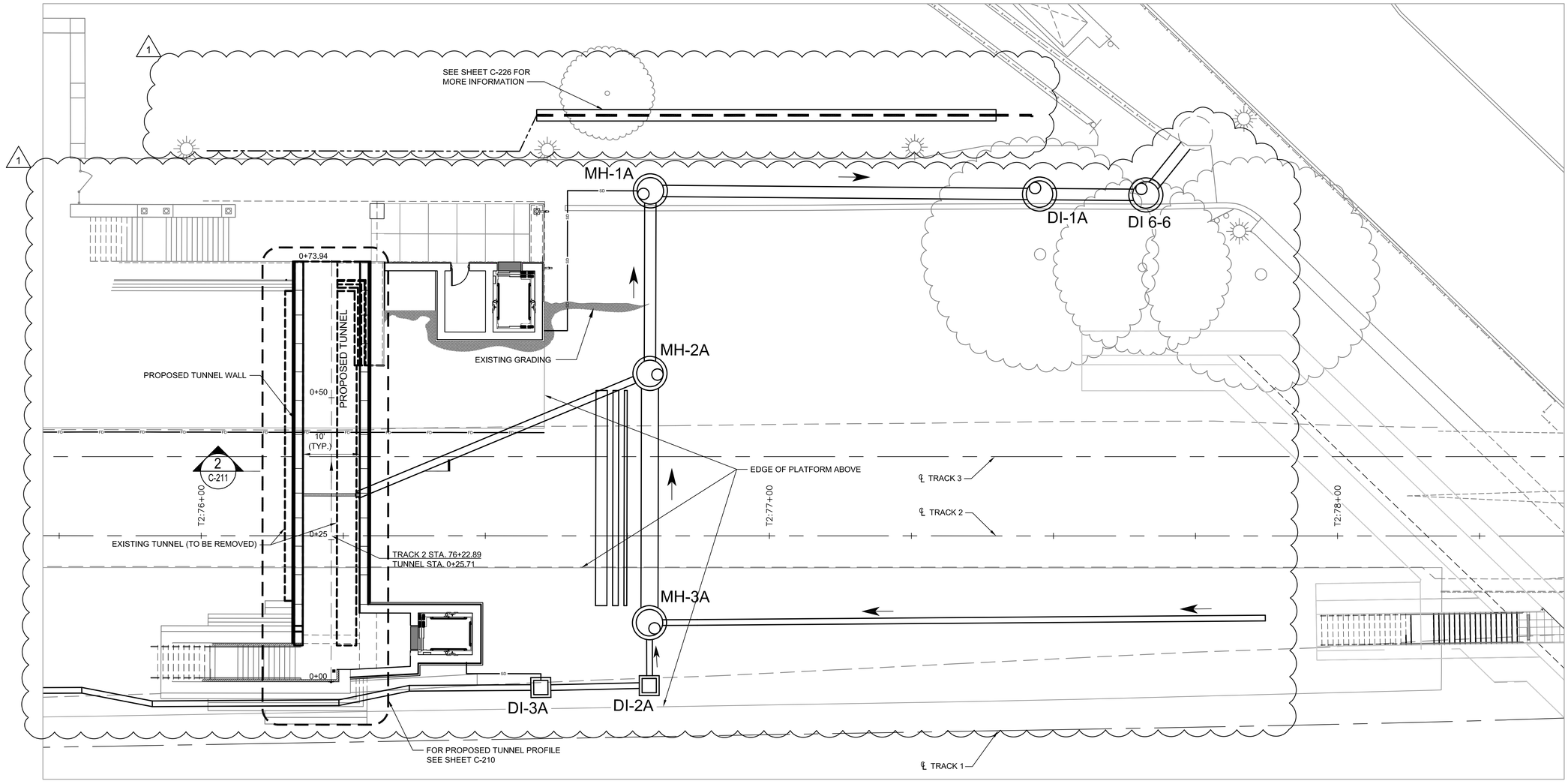
Company_____

Address _____

City _____State_____ Zip Code _____

Name of Person Authorized to Sign _____
Print

Signature_____Date_____



0 5' 10' 20'
HORIZONTAL SCALE 1"=10'

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	07/14/2025	ADDENDUM NO. 1

DESIGNED BY: OM
DRAWN BY: OM
CHECKED BY: WH
DATE: 5/30/2025

COMMONWEALTH OF VIRGINIA
CHARLES WAYNE HYATT, JR.
Lic. No. 0402057665
6/4/2025
PROFESSIONAL ENGINEER

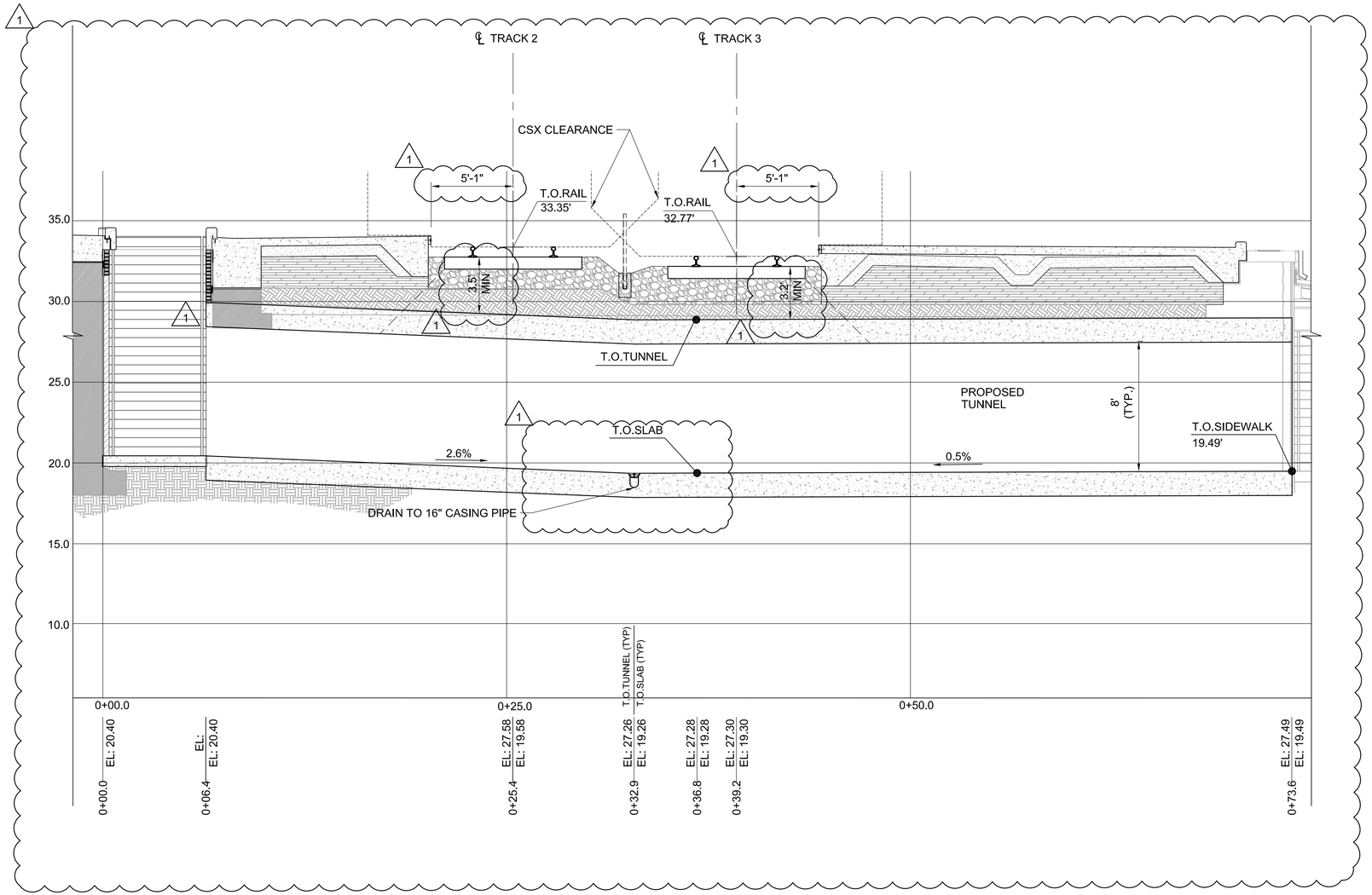
HDR Engineering, Inc.
2650 Park Tower Drive
Suite 400
Vienna, Virginia 22180-7306
(571) 327-5800
www.hdrinc.com

CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

PROPOSED TUNNEL SITE PLAN

IFB NO: 025-013
DRAWING NO: C-217
SCALE: 1" = 10'
SHEET NO: 52 OF 426

C:\pw\working\east01\d0391404\100C_217.dwg



0 2' 4' 8'
SCALE 1"=4'

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	07/14/2025	ADDENDUM NO. 1

DESIGNED BY: OM
DRAWN BY: OM
CHECKED BY: WH
DATE: 5/30/2025

COMMONWEALTH OF VIRGINIA
CHARLES WAYNE HYATT, JR.
Lic. No. 0402057665
6/4/2025
PROFESSIONAL ENGINEER

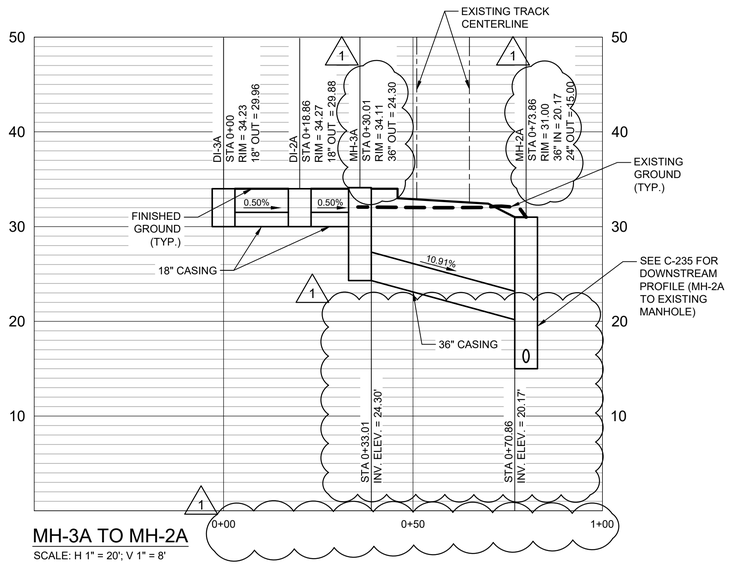
HDR Engineering, Inc.
2650 Park Tower Drive
Suite 400
Vienna, Virginia 22180-7306
(571) 327-5800
www.hdrinc.com

CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

PROPOSED TUNNEL PROFILE

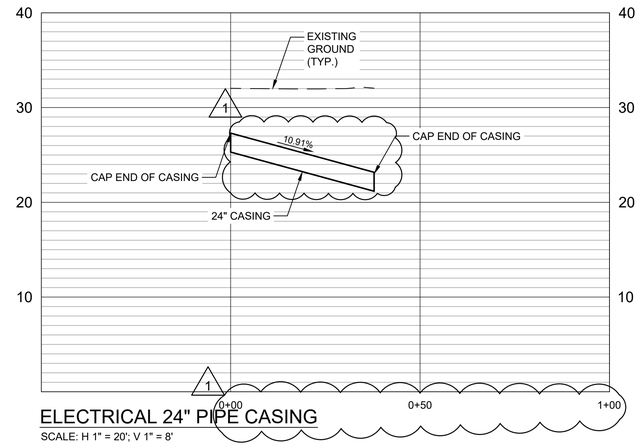
IFB NO: 025-013
DRAWING NO: C-218
SCALE: 1" = 4'
SHEET NO: 53 OF 426

C:\pw\working\east01\d4500929\00C_218.dwg



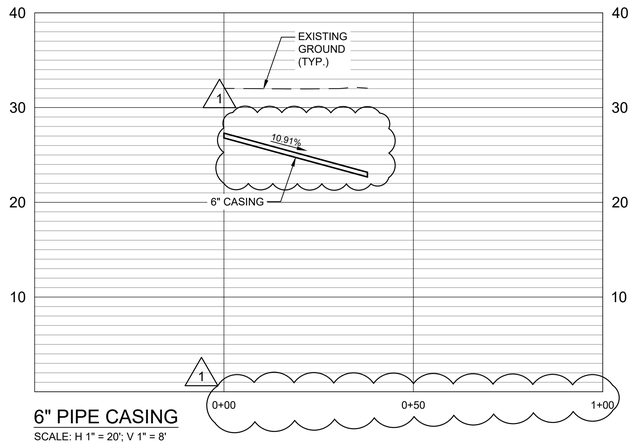
MH-3A TO MH-2A

SCALE: H 1" = 20'; V 1" = 8'



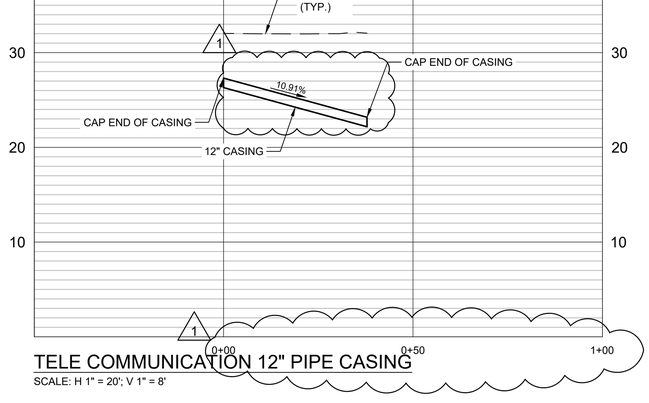
ELECTRICAL 24" PIPE CASING

SCALE: H 1" = 20'; V 1" = 8'



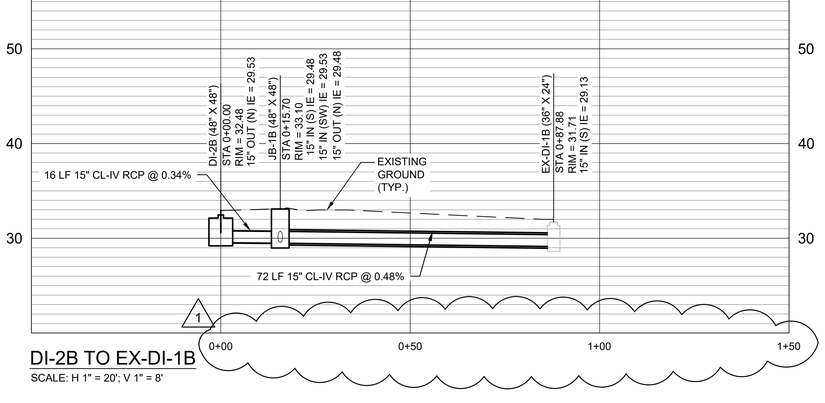
6" PIPE CASING

SCALE: H 1" = 20'; V 1" = 8'



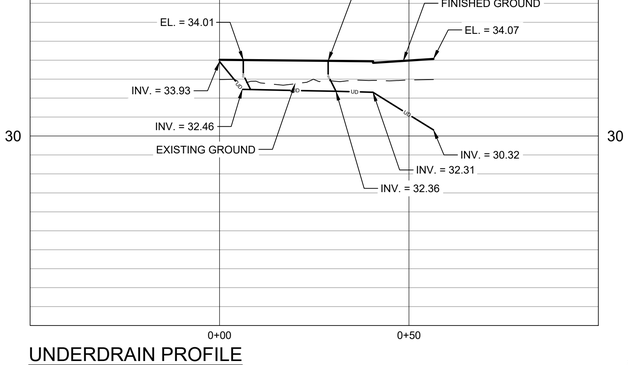
TELE COMMUNICATION 12" PIPE CASING

SCALE: H 1" = 20'; V 1" = 8'



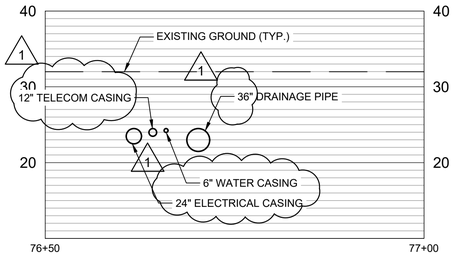
DI-2B TO EX-DI-1B

SCALE: H 1" = 20'; V 1" = 8'



UNDERDRAIN PROFILE

SCALE: H 1" = 20'; V 1" = 4'



CASING PIPES CROSS SECTION

SCALE: 1" = 10'

8' / 4' / 0 VERTICAL SCALE 1"=8'

0 10' 20' 40' HORIZONTAL SCALE 1"=20'

APPROVED
SPECIAL USE PERMIT NO.
DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. DSP 2019-0031

DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED

INSTRUMENT NO. DEED BOOK NO. PAGE NO.

DATUM:
(HZ) NAD 83
(VT) NAVD 88

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	07/14/2025	ADDENDUM NO. 1

DESIGNED BY: RMB
DRAWN BY: JP
CHECKED BY: KK/BM
DATE: 5/30/2025

VRE™

COMMONWEALTH OF VIRGINIA
CHARLES WAYNE HYATT, JR.
Lic. No. 0402057665
6/4/2025
PROFESSIONAL ENGINEER

HDR Engineering, Inc.
2650 Park Tower Drive
Suite 400
Vienna, Virginia 22180-7306
(571) 327-5800
www.hdrinc.com

CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

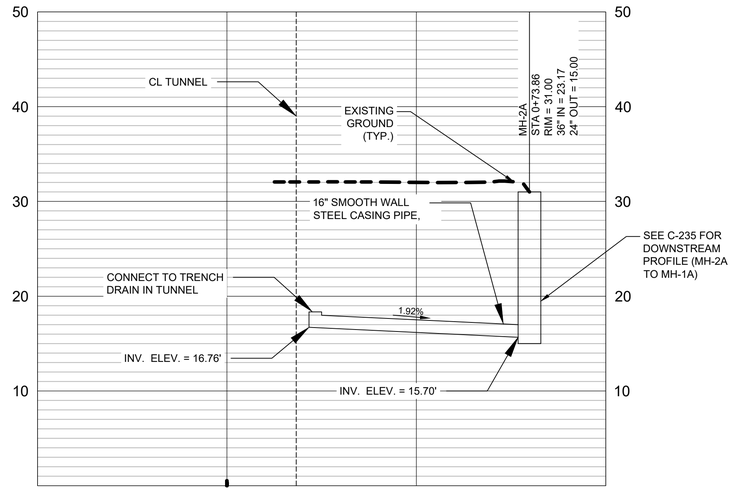
CASING PROFILES

1 OF 2

IFB NO: 025-013
DRAWING NO: C-236
SCALE: AS NOTED
SHEET NO: 71 OF 426

C:\pw\working\east01\d3914041100C_236.dwg

1



TUNNEL TRENCH DRAIN TO MH-2A

SCALE: H 1" = 20'; V 1" = 8'

8' 4' 0 VERTICAL SCALE 1"=8'

0 10' 20' 40'

HORIZONTAL SCALE 1"=20'

APPROVED
SPECIAL USE PERMIT NO.
DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. DSP 2019-0031

DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED

INSTRUMENT NO. DEED BOOK NO. PAGE NO.

DATUM:
(HZ) NAD 83
(VT) NAVD 88

REV.NO.	DATE	DESCRIPTION
1	07/14/2025	ADDENDUM NO. 1

DESIGNED BY: OM
DRAWN BY: OM
CHECKED BY: WH
DATE: 7/14/2025

VRE™

COMMONWEALTH OF VIRGINIA
CHARLES WAYNE HYATT, JR.
Lic. No. 0402057665
7/14/2025
PROFESSIONAL ENGINEER

HDR Engineering, Inc.
2650 Park Tower Drive
Suite 400
Vienna, Virginia 22180-7306
(571) 327-5800
www.hdrinc.com

CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

CASING PROFILES
2 OF 2

IFB NO: 025-013
DRAWING NO: C-236A
SCALE: AS NOTED
SHEET NO: 71 OF 426

C:\pw\work\ing\east01\d4500929\00C_236_1.dwg

MATCH LINE SEE S1-202

MATCH LINE SEE S1-204

EXIST. BUILDING

CONCRETE PAD, SEE NOTE 6 (TYP.)

GENERATOR PAD, SEE NOTE 5

EXIST. STAIR

EXIST. CANOPY

RETAINING WALL (BELOW)

EDGE OF GUTTER, SEE ARCH DWGS A1-404 & A1-405

CANOPY EXTENSION, SEE DWG. S1-214

15A 16A 17A 18A 19A 20A 21A 22A 23A 24A

15'-8¼"± 15'-9¼"± 15'-9¾"± 16'1½"± 16'-4"± 16'-4"± 9'-0" 9'-0" 25'-0"

SLOPE DOWN

WEST PLATFORM

EL. #1

COLS. TO MATCH EXIST (TYP.)

CONTROL JOINT (TYP.)

CANOPY FTG. PEDESTAL (TYP.)

16'-0"± (TYP. AT EXIST. COLS.)

EJ

EXIST. CANOPY COLS. AND FTGS. (BELOW) (TYP.)

EXIST. CANOPY COLS. AND FTGS. (BELOW), SEE NOTE 7

CANOPY FTG. BELOW (TYP.)

CSX RIGHT OF WAY

℄ TRACK 3

℄ TRACK 2

℄ TRACK 1

EDGE OF PLATFORM SLAB

PROP. TUNNEL WALL (BELOW) (TYP.)

(TYP. AT COL. 10 AND 11)

(AT COL. 12, COL.13 SIM.)

5'-3" 13'-10⅝" 13'-11" 12'-0¼" 15'-3⅜"

CANOPY FTG. BELOW (TYP.)

CANOPY FTG. PEDESTAL, (TYP.)

EQ. EQ. EQ. EQ. 15'-0" (U.N.O.) (TYP.)

3'-6" (TYP.) 10'-0" (TYP.) 8'-0" (TYP.) 2'-3" (TYP.)

CONTROL JOINT (TYP.)

STAIR NS-1

9'-6" 8'-0" 6'-0" 7'-4"

EL. #2

22'-7"

DI-3A

DI-2A

EAST PLATFORM

MH-3A (SEE CIVIL SHEETS)

LIGHTING POLE, SEE NOTE 3 (TYP.)

EQ. (TYP.) EQ. (TYP.)

25'-0" 25'-0" 25'-0" 20'-0"

9 10 11 12 13

EDGE OF PLATFORM SLAB

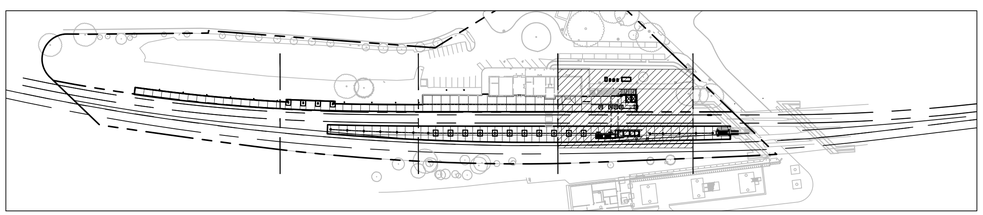
N

YES 83

NOTES:

1. FOR GENERAL NOTES, SEE S1-001 TO S1-004.
2. SEE CIVIL AND ARCHITECTURAL DRAWINGS FOR STATIONING AND ELEVATIONS, TRENCH DRAIN AND FLOOR SLOPE DIRECTION.
3. EXISTING LIGHTING POLE TO BE REPLACED WITH NEW LIGHTING POLE AND USE EXISTING FOUNDATION.
4. FOR LIGHTING POLE LOCATION SEE ELECTRICAL DWGS, FOR FOUNDATION SEE S1-541.
5. FOR GENERATOR PAD LOCATION SEE CIVIL DRAWINGS, FOR DETAILS SEE S1-541.
6. FOR CONCRETE PAD LOCATION, SEE CIVIL DWGS, FOR DETAIL SEE S1-541.
7. EXISTING COLUMNS AND FOOTING TO BE DEMOLISHED AND RESTORED AT ELEVATOR TOWER CANOPY ALIGNMENT LOCATION AFTER THE ELEVATOR TOWER IS COMPLETED.

1 / S1-101 PLATFORM SLAB PLAN - 4
SCALE 1/8" = 1'-0"



KEY PLAN

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	07/14/2025	ADDENDUM NO. 1

DESIGNED BY: RF
DRAWN BY: RF
CHECKED BY: HH
DATE: 5/30/2025

VRE™

COMMONWEALTH OF VIRGINIA
KENNEDY KYEI-MENSAH
Lic. No. 0402051019
5/30/2025
PROFESSIONAL ENGINEER

HDR Engineering, Inc.
2650 Park Tower Drive
Suite 400
Vienna, Virginia 22180-7306
(571) 327-5800
www.hdrinc.com

APPROVED
SPECIAL USE PERMIT NO.
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. DSP 2019-0031
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

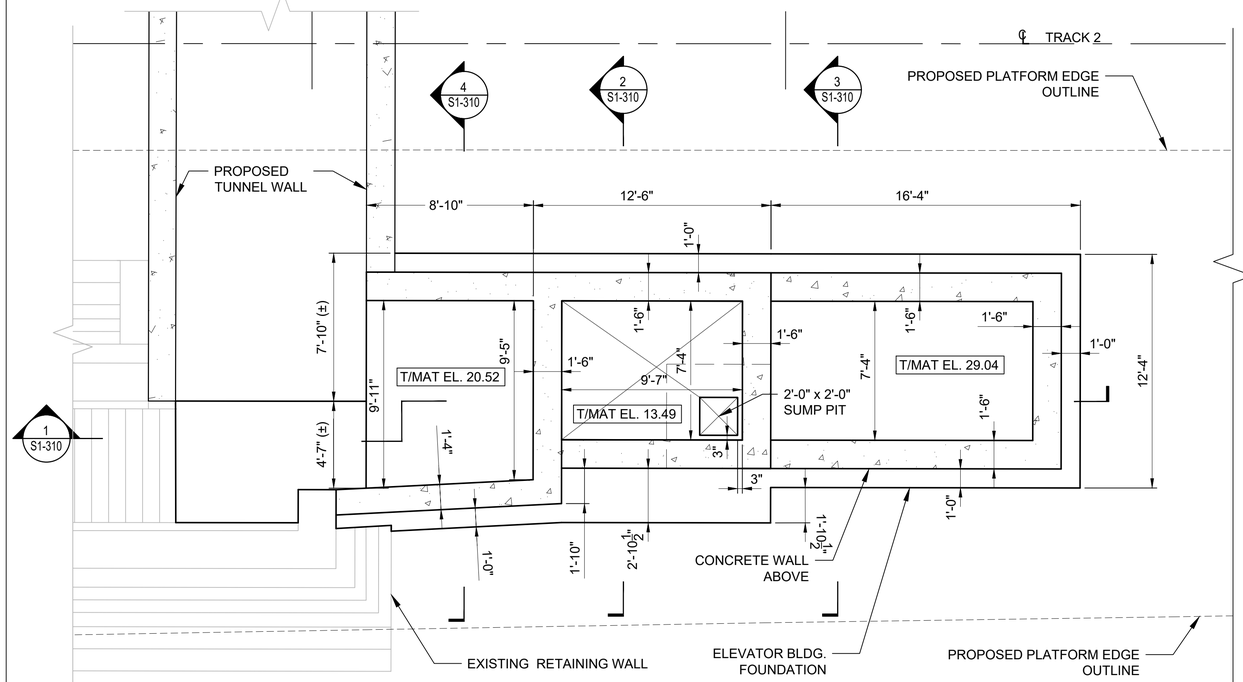
DATUM:
(HZ) NAD 83
(VT) NAVD 88

CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

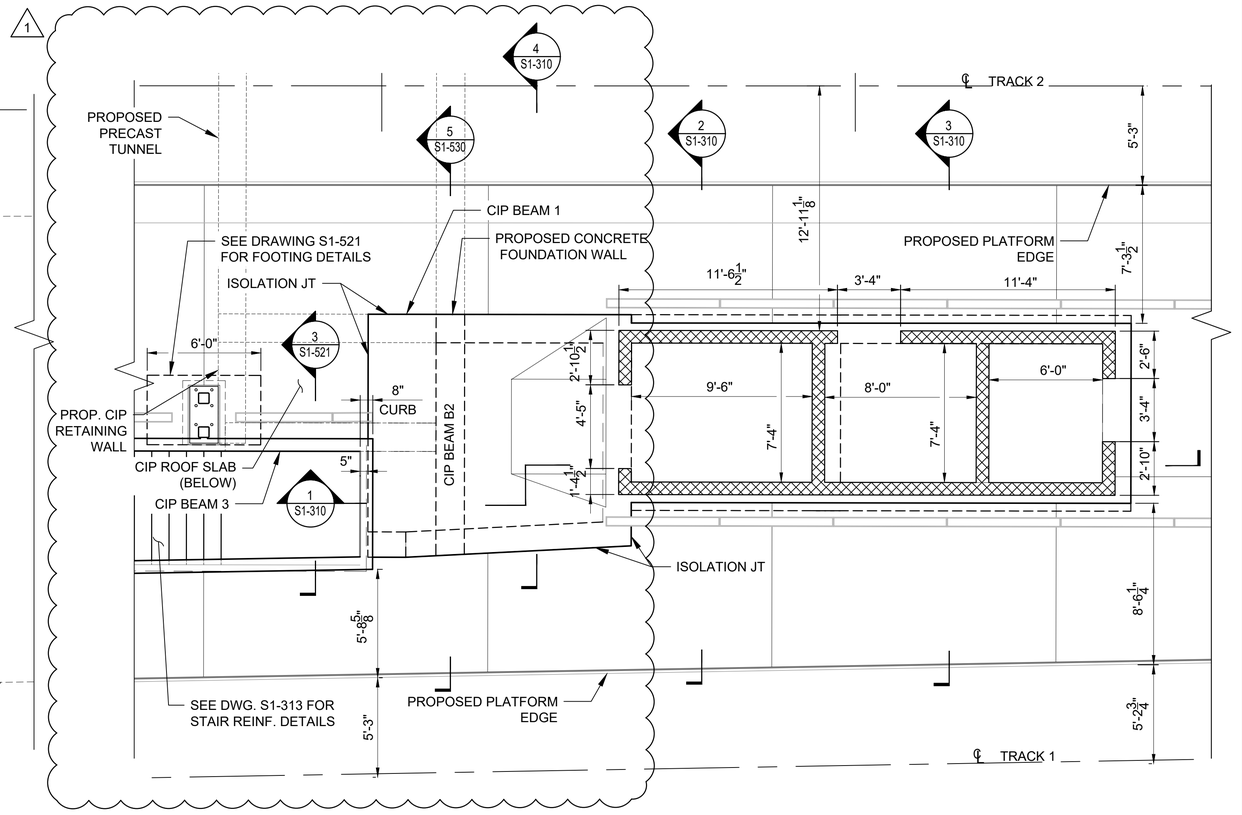
PLATFORM SLAB PLAN
4 OF 5

IFB NO: 025-013
DRAWING NO: S1-203
SCALE: AS NOTED
SHEET NO: 120 OF 426

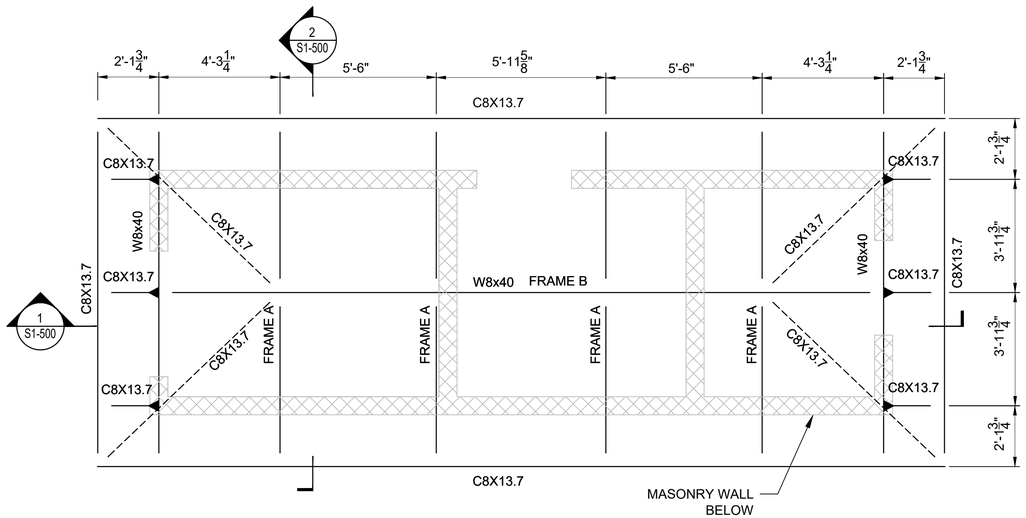
c:\pw\work\ingleast01\d3914055\005203.dwg



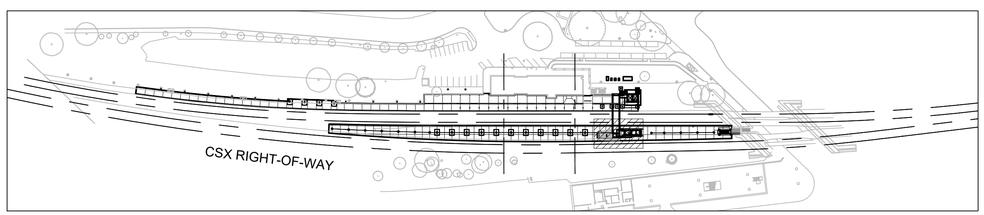
1 S1-100 ELEVATOR BLDG. FOUNDATION PLAN
SCALE 1/4" = 1'-0"



2 S1-203 ELEVATOR BLDG. PLATFORM LEVEL PLAN
SCALE 1/4" = 1'-0"



3 S1-102 ELEVATOR BLDG. ROOF PLAN
SCALE 3/8" = 1'-0"



KEY PLAN

NOTES:

1. FOR GENERAL NOTES, SEE S1-001 TO S1-004.
2. FOR CIP BEAM DETAILS SEE S1-315.

N (VCS 83)

APPROVED
SPECIAL USE PERMIT NO.
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. DSP 2019-0031
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

DATUM:
(HZ) NAD 83
(VT) NAVD 88

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	07/14/2025	ADDENDUM NO. 1

DESIGNED BY: DD
DRAWN BY: DD
CHECKED BY: HH
DATE: 5/30/2025

COMMONWEALTH OF VIRGINIA
Kennedy Mensah
KENNEDY KYEI-MENSAH
Lic. No. 0402051019
5/30/2025
PROFESSIONAL ENGINEER

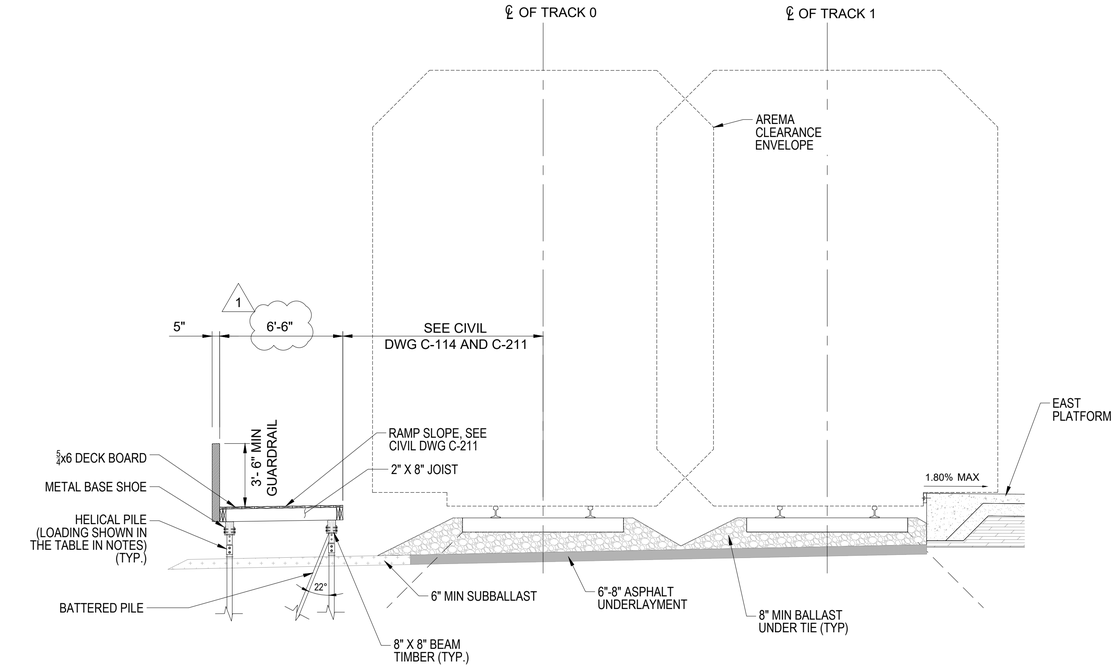
HDR Engineering, Inc.
2650 Park Tower Drive
Suite 400
Vienna, Virginia 22180-7306
(571) 327-5800
www.hdrinc.com

CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

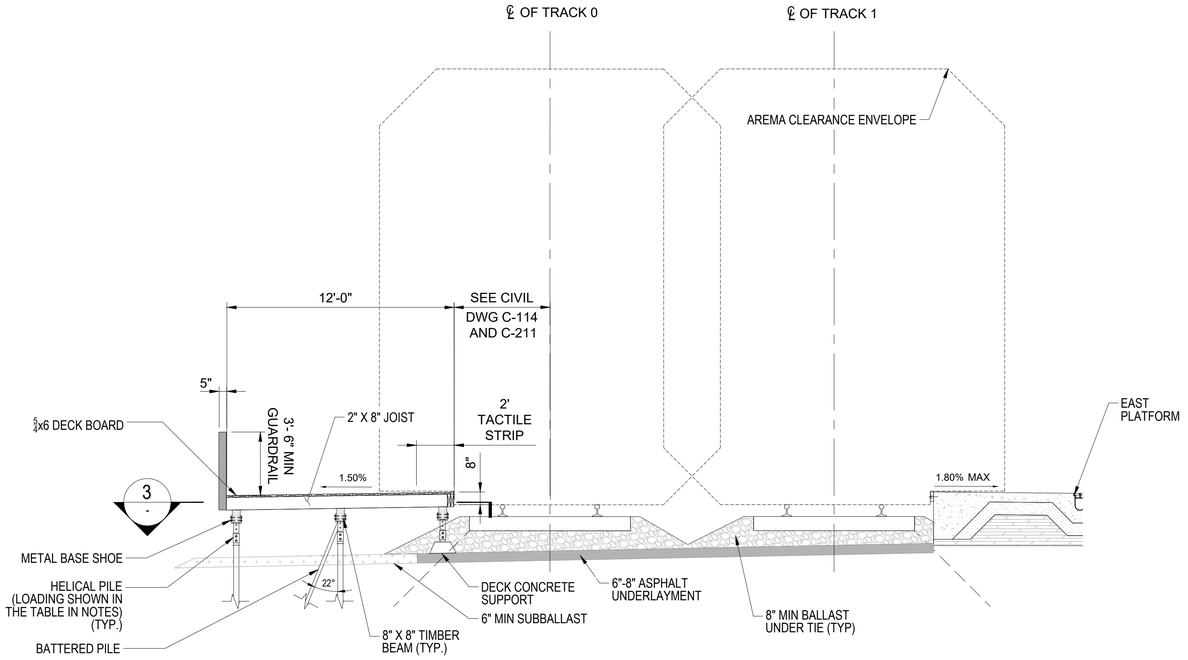
EAST ELEVATOR PARTIAL PLANS

IFB NO: 025-013
DRAWING NO: S1-220
SCALE: AS NOTED
SHEET NO: 127 OF 426

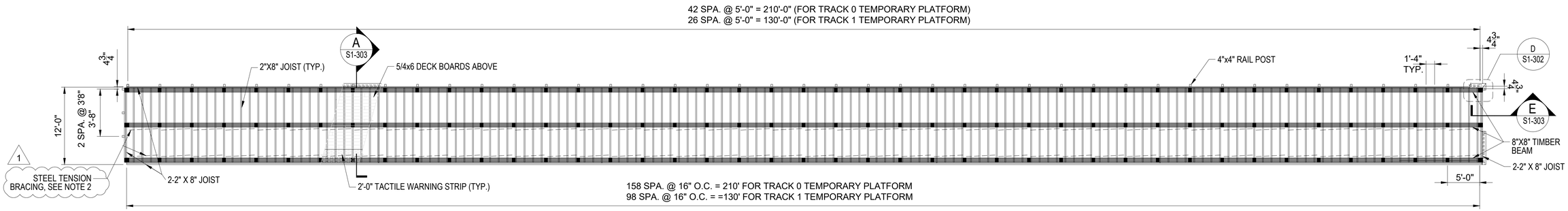
c:\pw\working\east01\d391405\00522O.dwg



1 S1-101 TYPICAL SECTION (A - A)
SCALE 1/4" = 1'-0"
FRAMING PLAN SIMILAR AS 3/S1-302



2 S1-101 TYPICAL SECTION (B - B)
SCALE 1/4" = 1'-0"



3 - TEMPORARY PLATFORM FRAMING PLAN
SCALE 1/8" = 1'-0"

NOTES:

1. SEE CIVIL DWG C-211 FOR TEMPORARY PLATFORM LOCATION, ELEVATION AND ACTUAL SHAPE.

HELICAL PILE DESIGN LOADS	UNFACTORED
DESIGN AXIAL VERTICAL LOAD	10 (KIP) COMPRESSION
	4 (KIP) TENSION
DESIGN LATERAL LOAD	1.0 (KIP)
DESIGN MOMENT	1 (KI-FTP)

1
2. STEEL TENSION BRACING ABOVE GRADE BY HELICAL PILE VENDOR.
3. REMOVE HELICAL PILES TO 3' BELOW BASE OF RAIL AFTER DEMOLITION OF TEMPORARY PLATFORM.

APPROVED
SPECIAL USE PERMIT NO.
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. DSP 2019-0031
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

DATUM:
(HZ) NAD 83
(VT) NAVD 88

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	07/14/2025	ADDENDUM NO.1

DESIGNED BY: RF
DRAWN BY: RF
CHECKED BY: HH
DATE: 5/30/2025

VRE™

COMMONWEALTH OF VIRGINIA
KENNEDY KYEI-MENSAH
Lic. No. 0402051019
5/30/2025
PROFESSIONAL ENGINEER

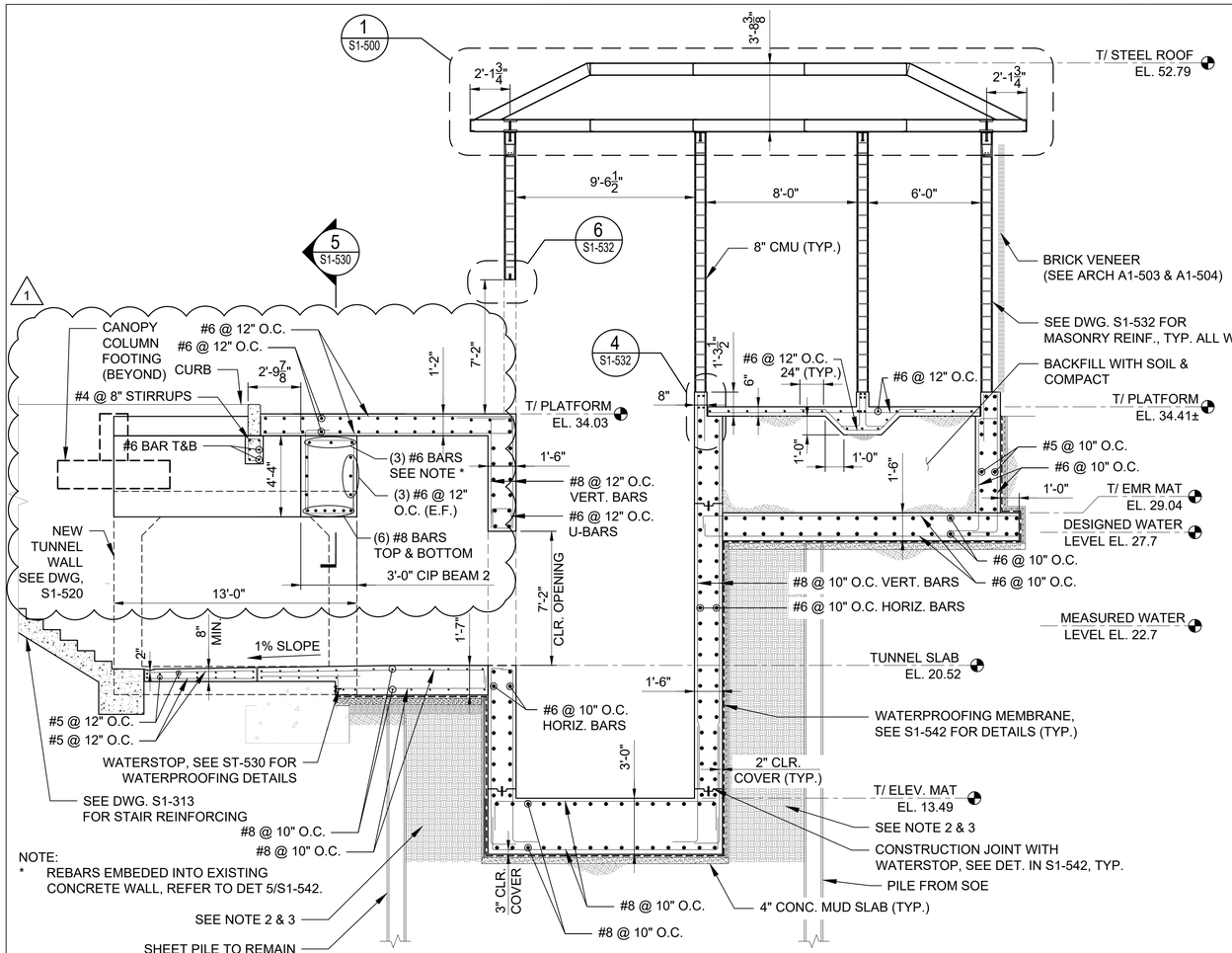
HDR Engineering, Inc.
2650 Park Tower Drive
Suite 400
Vienna, Virginia 22180-7306
(571) 327-5800
www.hdrinc.com

CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

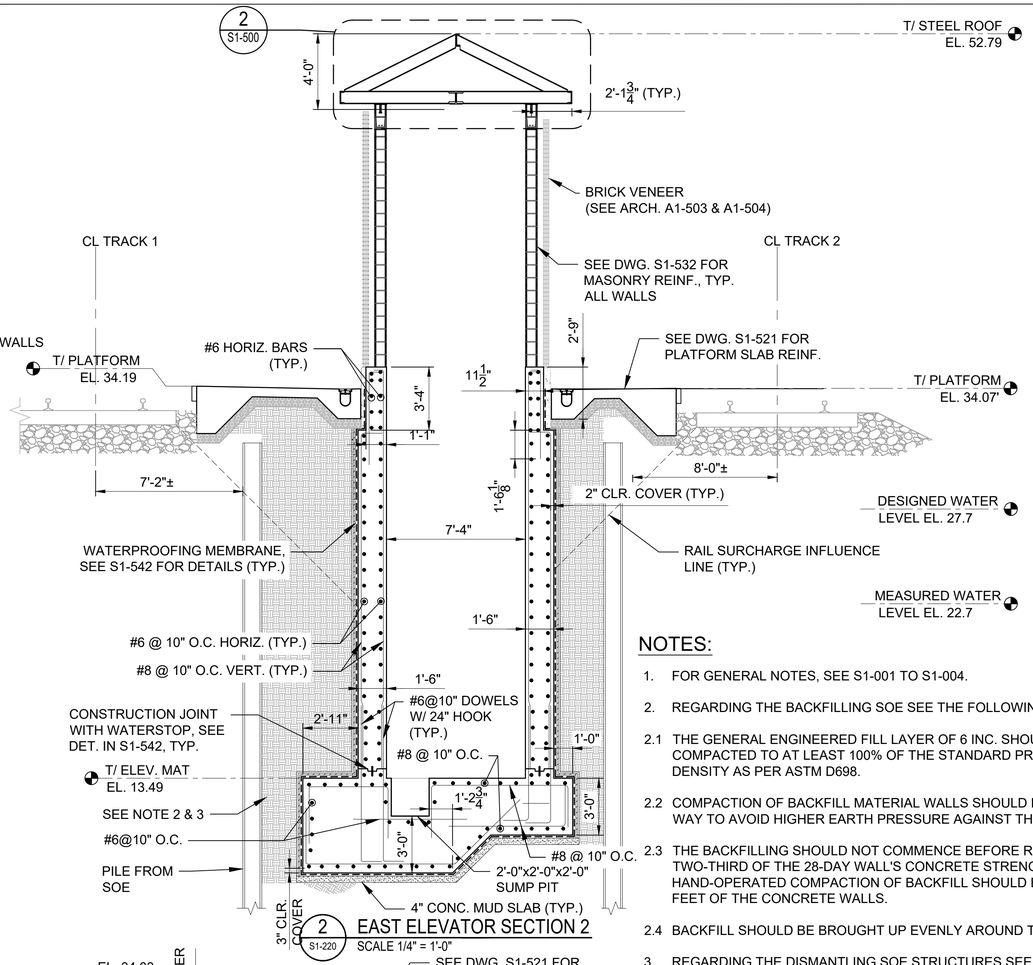
TEMPORARY PLATFORM AT TRACK 0 AND 1 PLAN AND SECTIONS

IFB NO: 025-013
DRAWING NO: S1-302
SCALE: AS NOTED
SHEET NO: 133 OF 426

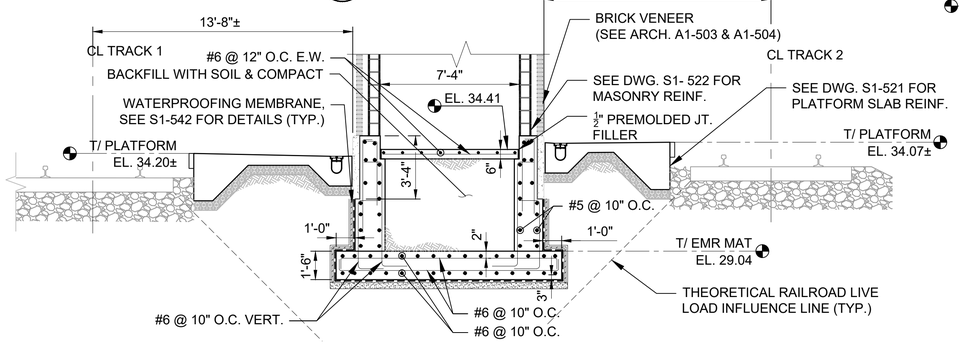
c:\pw\working\eas01\d01914056\05302.dwg



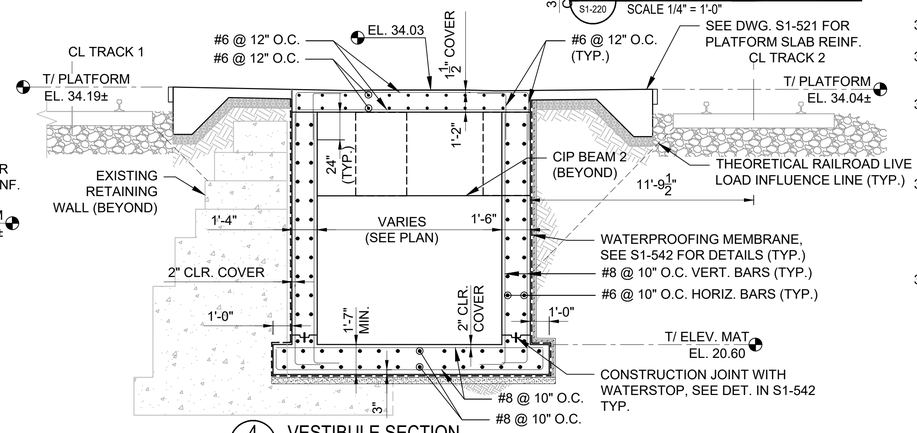
1 EAST ELEVATOR SECTION 1
S1-220 SCALE 1/4" = 1'-0"



2 EAST ELEVATOR SECTION 2
S1-220 SCALE 1/4" = 1'-0"



3 EMR SECTION
S1-220 SCALE 1/4" = 1'-0"



4 VESTIBULE SECTION
S1-220 SCALE 1/4" = 1'-0"

NOTES:

1. FOR GENERAL NOTES, SEE S1-001 TO S1-004.
2. REGARDING THE BACKFILLING SOE SEE THE FOLLOWING NOTES:

2.1 THE GENERAL ENGINEERED FILL LAYER OF 6 INC. SHOULD BE COMPACTED TO AT LEAST 100% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY AS PER ASTM D698.

2.2 COMPACTION OF BACKFILL MATERIAL WALLS SHOULD BE COMPLETED IN A WAY TO AVOID HIGHER EARTH PRESSURE AGAINST THE WALLS.

2.3 THE BACKFILLING SHOULD NOT COMMENCE BEFORE REACHING AT LEAST TWO-THIRD OF THE 28-DAY WALL'S CONCRETE STRENGHT. ONLY HAND-OPERATED COMPACTION OF BACKFILL SHOULD BE EMPLOYED WITHIN 2 FEET OF THE CONCRETE WALLS.

2.4 BACKFILL SHOULD BE BROUGHT UP EVENLY AROUND THE WALLS.

3. REGARDING THE DISMANTLING SOE STRUCTURES SEE THE FOLLOWING NOTES:

3.1 SOE LOADING DISCHARGE PROCESSES SHALL BE WITHOUT ANY ADVERSE IMPACTS OR UNFORSEEN LOADS TO THE PERMANENT WALLS.

3.2 THE CONTRACTOR IS RESPONSIBLE FOR CONDUCTING DEFLECTION CONTROL OF THE WALLS DURING AND AFTER SOE DISMANTLING. A DETAILED WORK PLAN FOR TRACK MONITORING PROGRAM AS PER CSX PUBLIC PROJECT MANUAL MUST BE SUBMITTED.

3.3 CONSTRUCTION SEQUENCE CONSIDERATIONS ARE RESPONSIBILITY OF THE CONTRACTOR. THOSE SHALL ENSURE NO SHORT TERM DEFLECTION AT TOP OF CONCRETE WALLS (AT THE GRADE LEVEL) EXCEED 1" IN EITHER DIRECTION. A THOROUGH MONITORING PLAN (SURVEY, OR INSTRUMENTAL MONITORING) ARE STRONGLY RECOMMENDED BY CSXT.

3.4 IT IS IMPERATIVE THAT THE CONTRACTOR CONDUCTS A THROUGH CONSTRUCTION SEQUENCE TO ENSURE THE SERVICE LOADS AS MAXIMUM PERMITTED LOADING.

APPROVED
SPECIAL USE PERMIT NO.
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. DSP 2019-0031
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

DATUM:
(HZ) NAD 83
(VT) NAVD 88

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	07/14/2025	ADDENDUM NO. 1

DESIGNED BY: DD
DRAWN BY: DD
CHECKED BY: HH
DATE: 5/30/2025

VRE™

COMMONWEALTH OF VIRGINIA
KENNEDY KYEI-MENSAH
Lic. No. 0402051019
5/30/2025
PROFESSIONAL ENGINEER

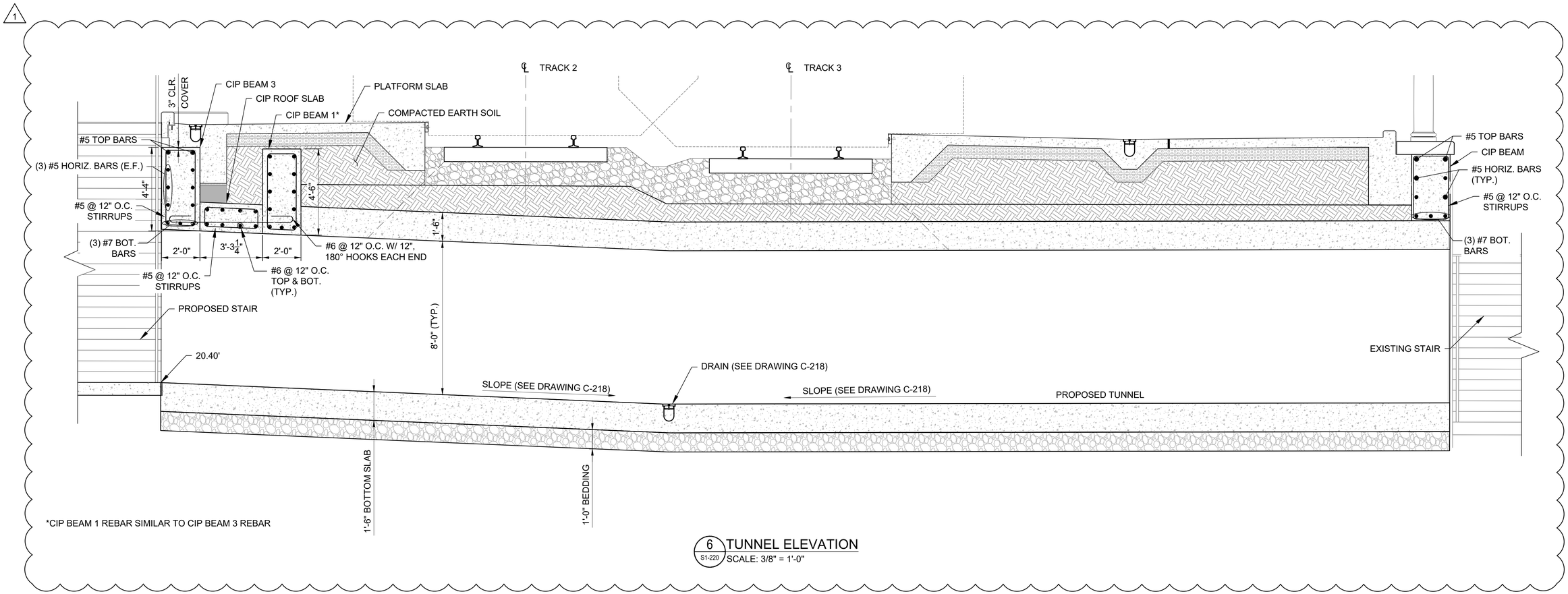
HDR Engineering, Inc.
2650 Park Tower Drive
Suite 400
Vienna, Virginia 22180-7306
(571) 327-5800
www.hdrinc.com

CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

EAST ELEVATOR SECTIONS

IFB NO: 025-013
DRAWING NO: S1-310
SCALE: AS NOTED
SHEET NO: 135 OF 426

c:\pwworking\east01\d391445050\S310.dwg



*CIP BEAM 1 REBAR SIMILAR TO CIP BEAM 3 REBAR

6 / S1-220 TUNNEL ELEVATION
SCALE: 3/8" = 1'-0"

APPROVED
SPECIAL USE PERMIT NO.
DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. DSP 2019-0031

DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED

INSTRUMENT NO. DEED BOOK NO. PAGE NO.

DATUM:
(HZ) NAD 83
(VT) NAVD 88

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	07/14/2025	ADDENDUM NO. 1

DESIGNED BY: RCV
DRAWN BY: NME
CHECKED BY: RD
DATE: 5/30/2025

COMMONWEALTH OF VIRGINIA
Kennedy Mensah
KENNEDY KYEI-MENSAH
Lic. No. 0402051019
5/30/2025
PROFESSIONAL ENGINEER

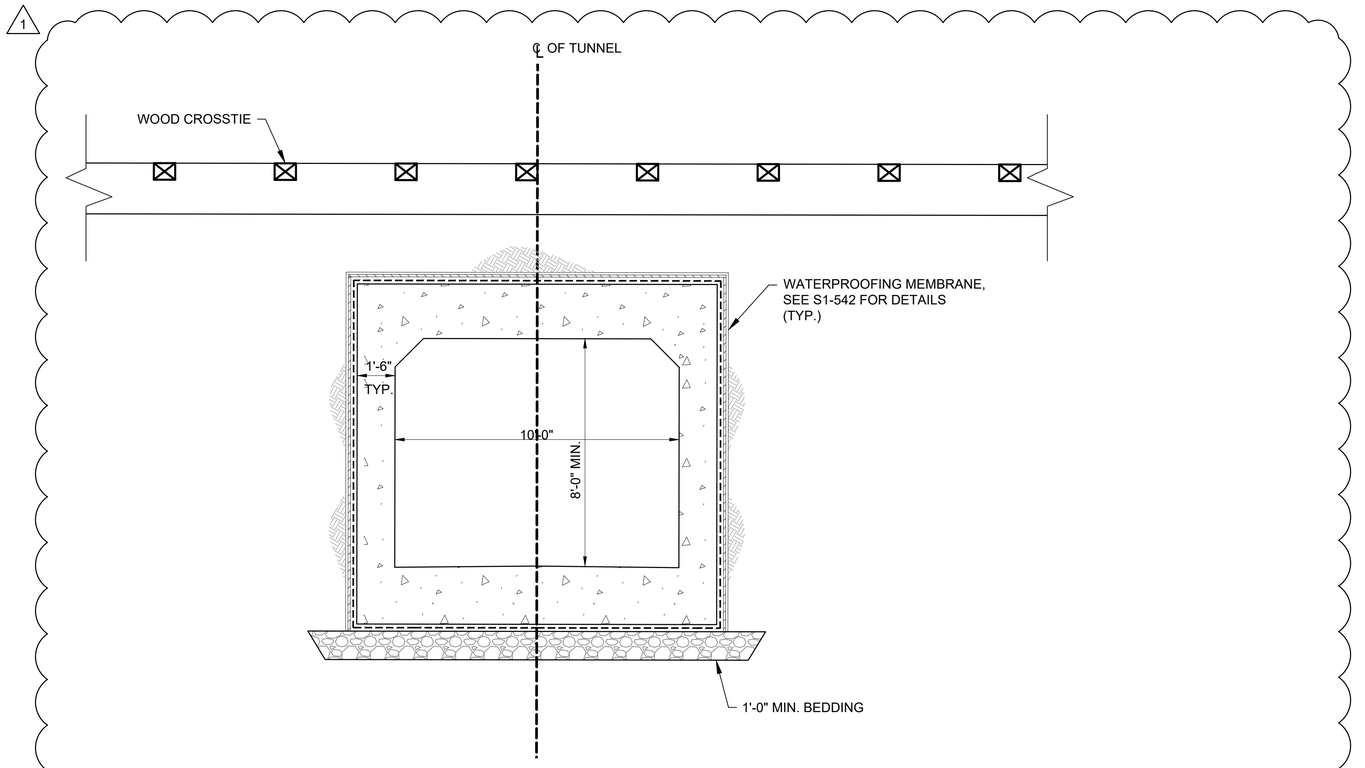
HDR Engineering, Inc.
2650 Park Tower Drive
Suite 400
Vienna, Virginia 22180-7306
(571) 327-5800
www.hdrinc.com

CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

TUNNEL PROFILE AND ELEVATION

IFB NO: 025-013
DRAWING NO: S1-315
SCALE: AS NOTED
SHEET NO: 140 OF 426

c:\pwworking\east01\d0914055\05S315.dwg



1 S1-520 TUNNEL TYPICAL SECTION
SCALE: 3/8" = 1'-0"

NOTES:

1. CUT OFF SUPPORT OF EXCAVATION 3'-0" BELOW BASE OF RAIL AFTER TUNNEL WORK IS COMPLETED.
2. ALL FILL SHALL BE OF STRUCTURAL QUALITY AND SHALL BE AS SPECIFIED AND APPROVED BY THE GEOTECHNICAL ENGINEER.
3. APPLY CONCRETE SURFACE SEALER SUCH AS SIKATOP-144 (POLYMER-MODIFIED, TWO-COMPONENT, CEMENTITIOUS COATING), OR APPROVED EQUAL, TO THE AT-GRADE SURFACE TO PROVIDE FINE TEXTURE AND IMPROVE ABRASION RESISTANCE.

APPROVED
SPECIAL USE PERMIT NO.
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. DSP 2019-0031
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

DATUM:
(HZ) NAD 83
(VT) NAVD 88

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	07/14/2025	ADDENDUM NO. 1

DESIGNED BY: RCV
DRAWN BY: NME
CHECKED BY: RD
DATE: 5/30/2025

VRE™

COMMONWEALTH OF VIRGINIA
KENNEDY KYEI-MENSAH
Lic. No. 0402051019
5/30/2025
PROFESSIONAL ENGINEER

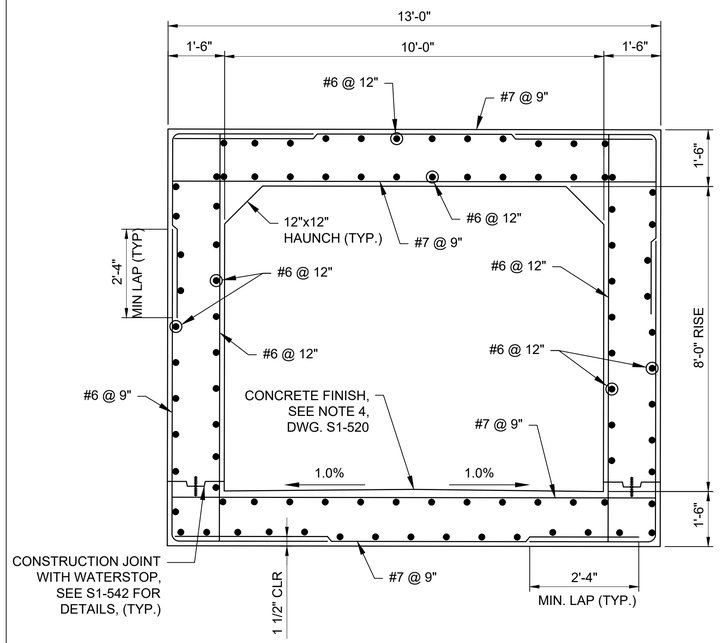
HDR Engineering, Inc.
2650 Park Tower Drive
Suite 400
Vienna, Virginia 22180-7306
(571) 327-5800
www.hdrinc.com

CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

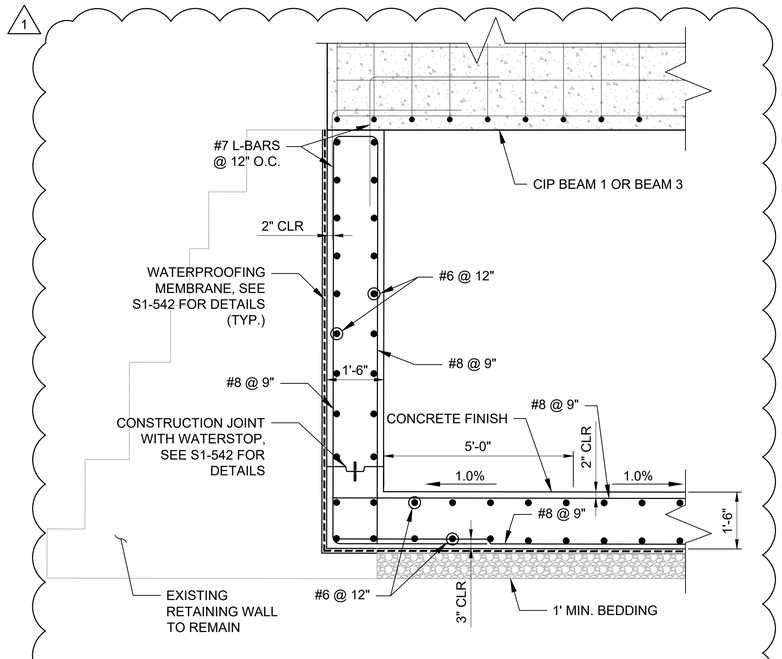
TUNNEL SECTION

IFB NO: 025-013
DRAWING NO: S1-520
SCALE: AS NOTED
SHEET NO: 147 OF 426

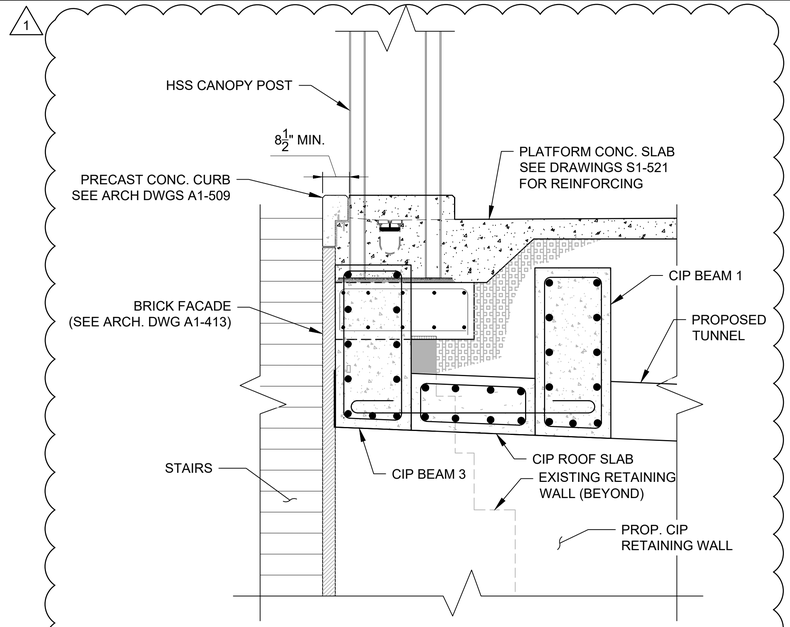
c:\pw\working\east01\d391405\005520.dwg



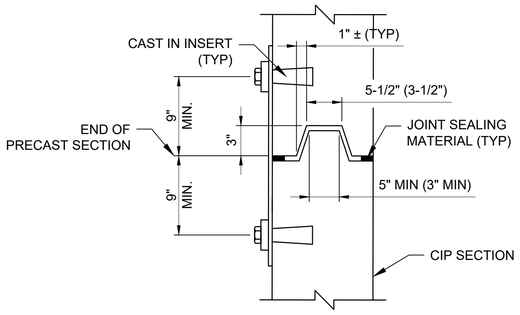
1 S1-521 CAST-IN-PLACE BOX CULVERT TYPICAL SECTION
SCALE: 3/8" = 1'-0"



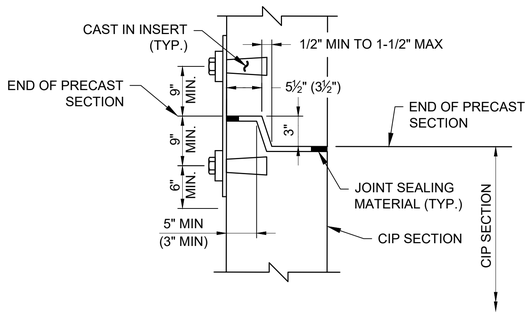
2 S1-521 CIP RETAINING WALL SECTION
SCALE: 1/2" = 1'-0"



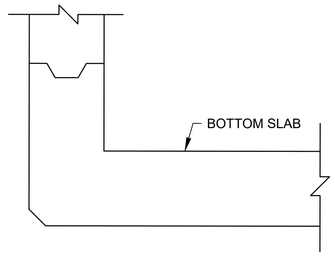
3 S1-203 CANOPY FOUNDATION AT TUNNEL - SECTION
SCALE: 1/2" = 1'-0"



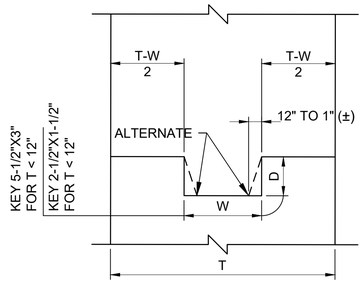
4 S1-521 KEYED JOINT PLAN PRECAST TO CAST-IN-PLACE CONNECTION
NOT TO SCALE



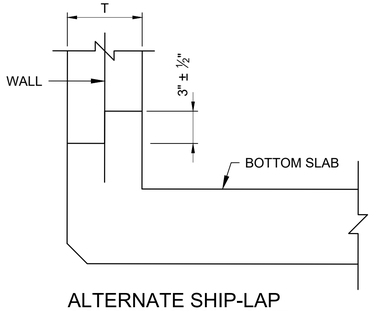
5 S1-521 SHIP LAP JOINT PLAN PRECAST TO CAST-IN-PLACE CONNECTION
NOT TO SCALE



KEYED CONSTRUCTION JOINT
NOT TO SCALE



CONSTRUCTION JOINT DETAIL
NOT TO SCALE



ALTERNATE SHIP-LAP
CONSTRUCTION JOINT
NOT TO SCALE

APPROVED
SPECIAL USE PERMIT NO.
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. DSP 2019-0031
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

DATUM:
(HZ) NAD 83
(VT) NAVD 88

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	07/14/2025	ADDENDUM NO. 1

DESIGNED BY: RCV
DRAWN BY: NME
CHECKED BY: RD
DATE: 5/30/2025

VRE™

COMMONWEALTH OF VIRGINIA
KENNEDY KYEI-MENSAH
Lic. No. 0402051019
5/30/2025
PROFESSIONAL ENGINEER

HDR Engineering, Inc.
2650 Park Tower Drive
Suite 400
Vienna, Virginia 22180-7306
(571) 327-5800
www.hdrinc.com

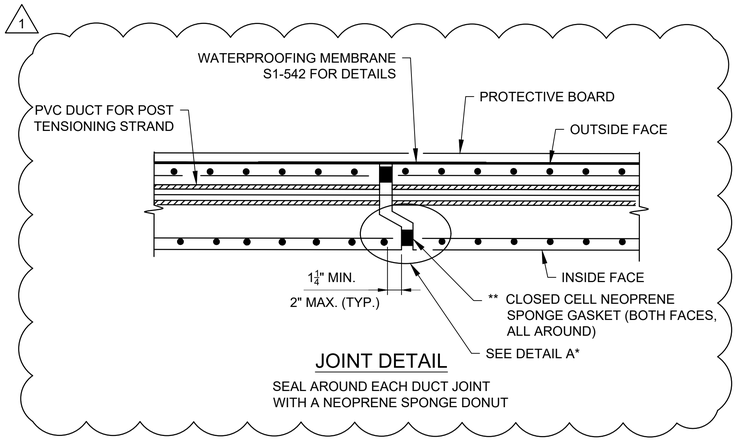
CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

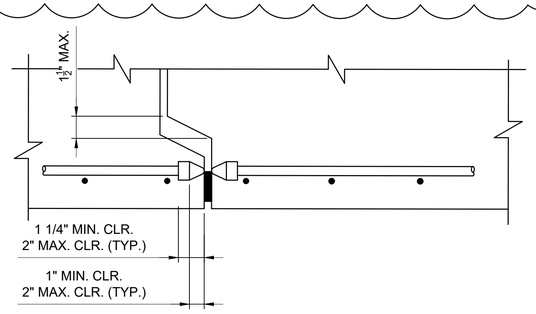
CIP BOX CULVERT REINFORCEMENT DETAILS

IFB NO: 025-013
DRAWING NO: S1-521
SCALE: AS NOTED
SHEET NO: 148 OF 426

c:\pw\working\east01\d391405\05521.dwg

LABEL	SEGMENT LENGTH
A	5'-0"
B	6'-0"
C	4'-4"



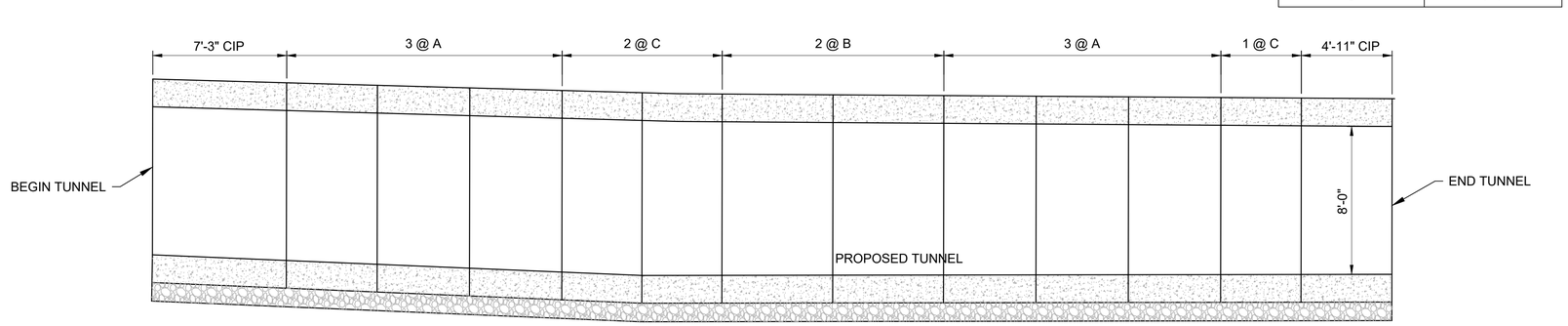


DETAIL A*

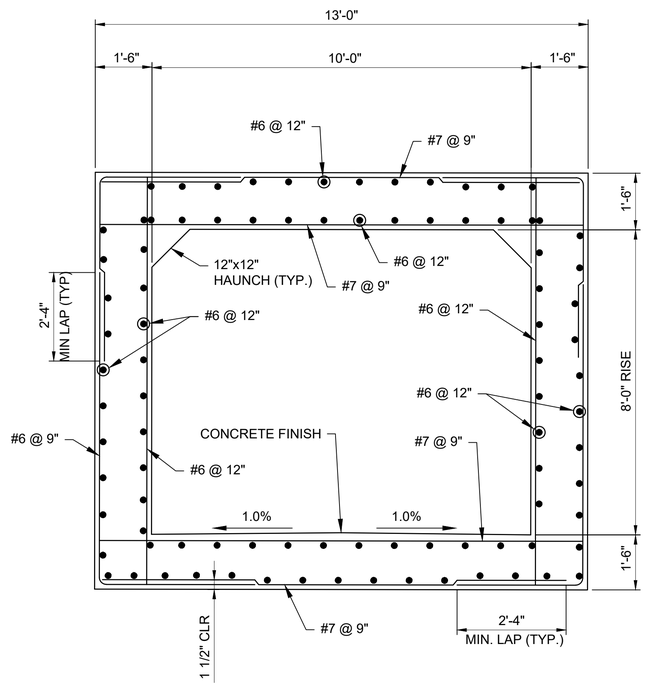
2 S1-523 PRECAST CULVERT JOINT DETAILS
NOT TO SCALE

** TOTAL NEOPRENE WIDTH SHALL BE DESIGNED FOR THE CROSS-SECTION STRESS FROM POST-TENSION FORCES TOTAL NEOPRENE WIDTH SHALL BE DIVIDED BETWEEN THE INSIDE AND OUTSIDE FACES. DIVIDE THE TOTAL WIDTH BY 2 AND ROUND TO THE NEAREST INCH.

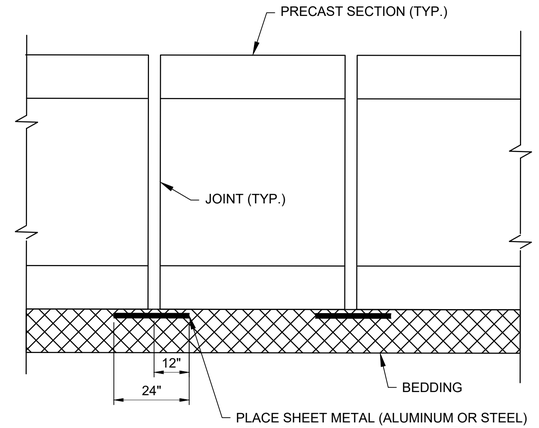
REQUIRED TOTAL NEOPRENE WIDTH		
WALL SIZE IN	POST-TENSIONING CROSS SECTION STRESS PSI	
	10-50	50-100
13" TO 15"	6"	8"
15.5" TO 17.5"	7"	10"
18" TO 20"	8"	1'-0"



1 S1-523 TUNNEL SEGMENT LAYOUT
SCALE: 1/4" = 1'-0"



3 S1-523 PRECAST BOX CULVERT SECTION 4
SCALE: 1/2" = 1'-0"



4 S1-523 ELEVATION VIEW AT PRECAST SEGMENT JOINTS
NOT TO SCALE

APPROVED
SPECIAL USE PERMIT NO.
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. DSP 2019-0031
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

DATUM:
(HZ) NAD 83
(VT) NAVD 88

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	07/14/2025	ADDENDUM NO. 1

DESIGNED BY: RCV
DRAWN BY: NME
CHECKED BY: RD
DATE: 5/30/2025

COMMONWEALTH OF VIRGINIA
KENNEDY KYEI-MENSAH
Lic. No. 0402051019
5/30/2025
PROFESSIONAL ENGINEER

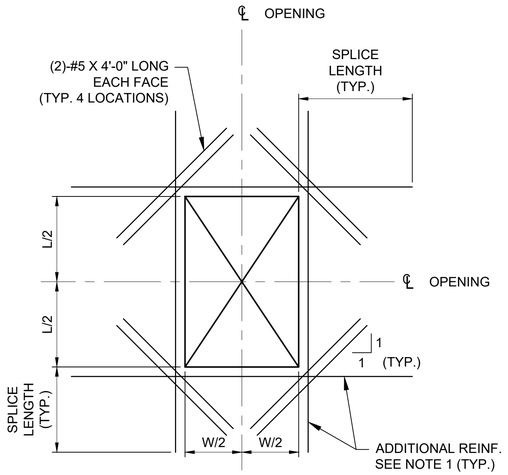
HDR Engineering, Inc.
2650 Park Tower Drive
Suite 400
Vienna, Virginia 22180-7306
(571) 327-5800
www.hdrinc.com

CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

PRECAST BOX CULVERT REINFORCEMENT DETAILS

IFB NO: 025-013
DRAWING NO: S1-523
SCALE: AS NOTED
SHEET NO: 150 OF 426

c:\pw\working\east01\d391405\005523.dwg

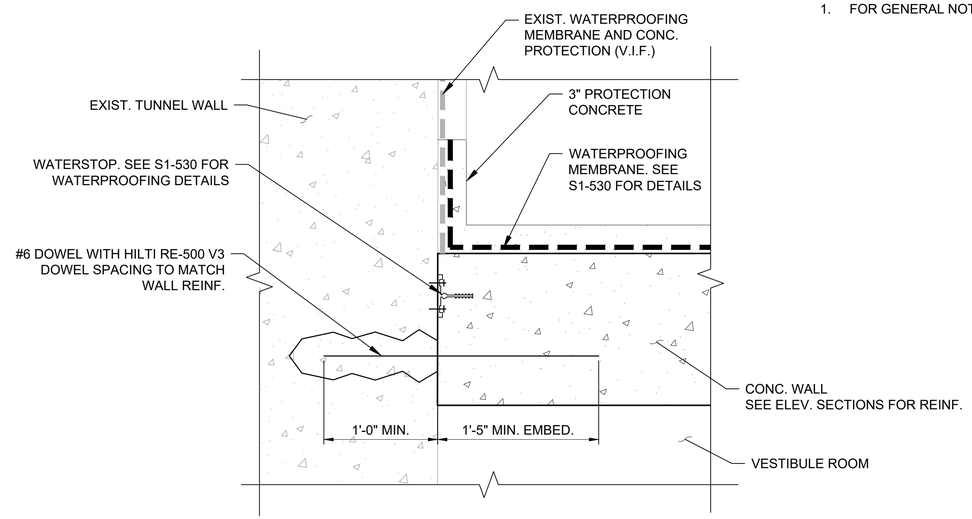


RECTANGULAR OPENING DETAIL

1 TYPICAL REINFORCMENT AT OPENING DETAIL
NOT TO SCALE

NOTES:

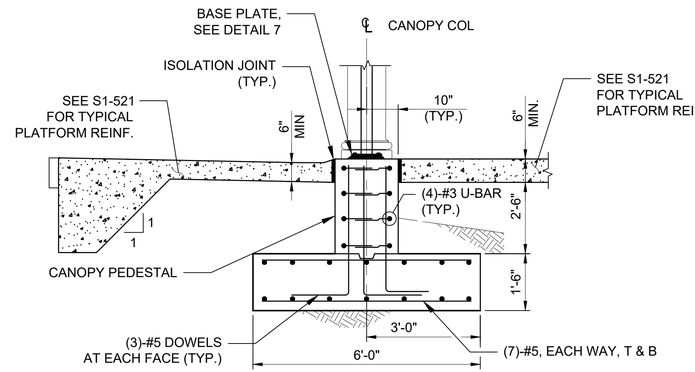
1. PROVIDE ADDITIONAL REINFORCING THE SAME SIZE AS DISCONTINUOUS REINFORCEMENT AT OPENING. QUANTITY OF REINFORCING IN EACH DIRECTION SHALL BE EQUAL TO OR ONE GREATER THAN THE NUMBER OF DISCONTINUOUS BARS. PLACE ONE HALF OF ADDITIONAL REINFORCING BARS AT EACH SIDE OF OPENING. PLACE ADDITIONAL REINFORCEMENT AT 3" O.C. (TYPICAL FOR BOTH DIRECTIONS AND FOR ALL LAYERS). START FIRST BAR 2" CLEAR FROM OPENING.
2. EXTEND ADDITIONAL REINFORCING BEYOND THE EDGE OF OPENING AS SHOWN. ADDITIONAL BARS MAY TERMINATE WITH A STANDARD HOOK AT END OF WALL IF LENGTH DOES NOT PERMIT BARS TO EXTEND AS SHOWN.
3. TYPICAL WALL OR SLAB REINFORCING NOT SHOWN FOR CLARITY. TERMINATE TYPICAL REINFORCING 2" CLEAR FROM OPENING.
4. FOR OPENINGS 12" OR LESS IN SLABS AND OPENINGS 18" OR LESS IN WALLS, NO EXTRA REINFORCING BARS ARE REQUIRED UNLESS NOTED OTHERWISE. TYPICAL REINFORCING SHALL BE RE-SPACED (NOT CUT) TO ALLOW FOR OPENINGS
5. PROVIDE EXTRA REINFORCING AROUND OPENINGS AS SHOWN AND INDICATED UNLESS NOTED OTHERWISE.
6. PROVIDE ADDITIONAL DOWELS PER NOTE 1 ABOVE FOR ALL OPENINGS NEAR FLOOR SLAB, BASE SLAB, OR CORNERS.
7. FOR ALL POST INSTALL DOWELS, MINIMUM EMBEDMENT LENGTH SHALL BE REVIEWED AND CONFIRMED BY THE VENDOR FOR REBAR YIELDING MODE OF FAILURE.



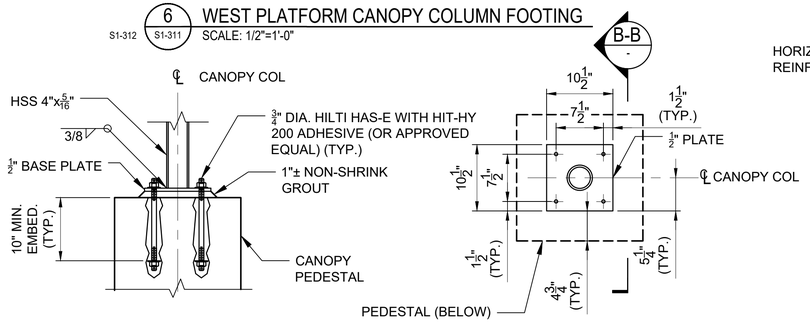
4 TYPICAL WALL CONNECTION PLAN DETAIL
SCALE: 1-1/2"=1'-0"

NOTES:

1. FOR GENERAL NOTES, SEE S1-001 TO S1-004.

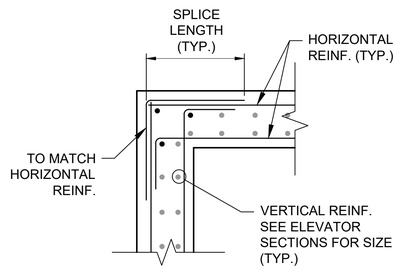


6 WEST PLATFORM CANOPY COLUMN FOOTING
S1-312 | S1-311 SCALE: 1/2"=1'-0"

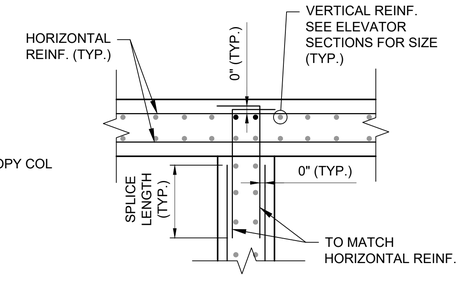


B-B BASE PLATE SECTION
SCALE: 1/2"=1'-0"

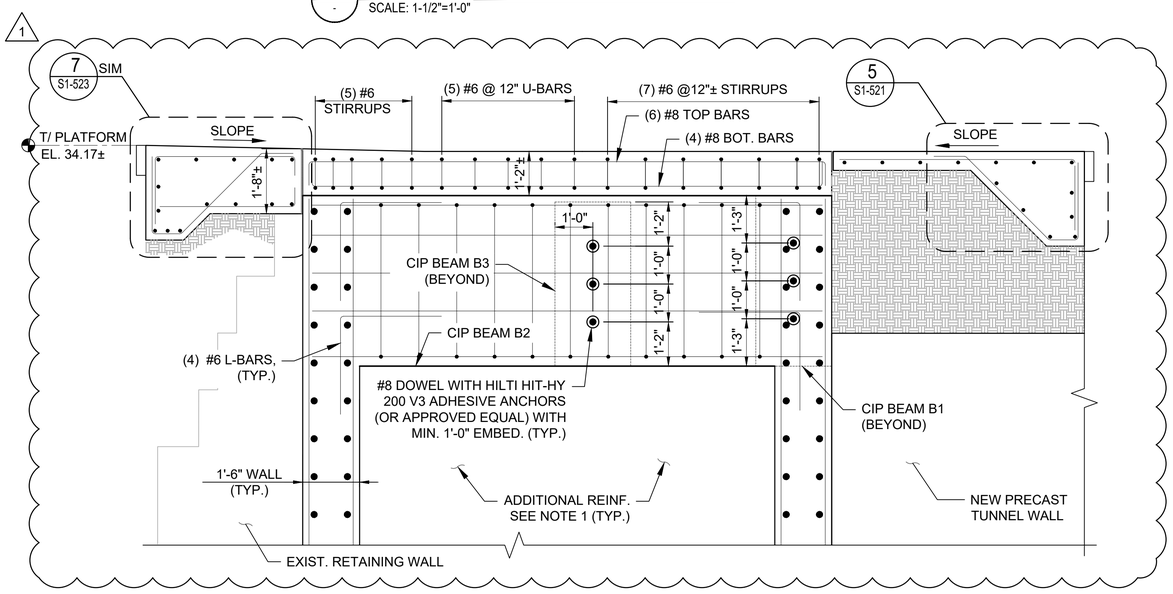
7 BASE PLATE DETAIL
SCALE: 1/2"=1'-0"



2 TYPICAL WALL CORNER DETAIL
NOT TO SCALE



3 TYPICAL WALL INTERSECTION DETAIL
NOT TO SCALE



5 BEAM 2 ANCHORAGE SECTION DETAIL
S1-310 SCALE: 1/2"=1'-0"

APPROVED
SPECIAL USE PERMIT NO.
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. DSP 2019-0031
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

DATUM:
(HZ) NAD 83
(VT) NAVD 88

REV.NO.	DATE	DESCRIPTION
0	05/30/2025	INVITATION FOR BIDS
1	07/14/2025	ADDENDUM NO. 1

DESIGNED BY: RF
DRAWN BY: RF
CHECKED BY: HH
DATE: 5/30/2025

COMMONWEALTH OF VIRGINIA
KENNEDY KYEI-MENSAH
Lic. No. 0402051019
5/30/2025
PROFESSIONAL ENGINEER

HDR Engineering, Inc.
2650 Park Tower Drive
Suite 400
Vienna, Virginia 22180-7306
(571) 327-5800
www.hdrinc.com

CONSTRUCTION OF THE ALEXANDRIA STATION IMPROVEMENTS AND BRIDGE REPLACEMENT

CONCRETE DETAILS 1 OF 2

IFB NO: 025-013
DRAWING NO: S1-530
SCALE: AS NOTED
SHEET NO: 151 OF 426

c:\pwworking\east01\d391405510005S530.dwg

TABLE OF CONTENTS

SECTION 00 73 55

VSMP General Permit for Construction Activities

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section specifies requirements for the individuals that are in control of the site to implement a Storm Water Pollution Prevention Plan (SWPPP). This SWPPP shall be prepared by the Contractor as part of the filings for a Virginia Stormwater Management Program (VSMP) Permit as administered by the City of Alexandria and as authorized by the Virginia Department of Environmental Quality (DEQ) through the National Pollution Discharge Elimination System (NPDES) General Permit for Construction Activities.

B. The storm water pollution prevention measures shown on the site drawings and related specifications are the minimum required by the Virginia Department of Environmental Quality and the City of Alexandria. The Contractor is required to provide additional measures to prevent pollution from storm water discharges in compliance with the VSMP regulations and all other City of Alexandria, state, and federal requirements.

C. VSMP Permit requirements:

1. Operations of construction activities resulting in land disturbance equal to or greater than one acre must apply for Construction General Permit Coverage.

2. Operators of construction activities resulting in land disturbance less than one acre that are part of a larger common plan of development or sale that ultimately disturbs one or more acres must apply for Construction General Permit Coverage. A larger common plan of development or sale is a contiguous area where separate and distinct construction activities may be taking place at different times on different schedules. General permit coverage is required if one or more acres of land will be disturbed, regardless of the size of the individually owned or developed sites.

D. The Contractor shall conduct the storm water management practices in accordance with the City of Alexandria, the VSMP Permit regulations, and any enforcement action taken or imposed by federal, state, or local agencies. The cost of any fines, construction delays, and remedial actions resulting from the Contractor's failure to comply with all provisions of local regulations and VSMP Permit requirements shall be paid for by the Contractor at no additional cost to VRE.

E. As a requirement of the VSMP permitting program, each contractor and subcontractor shall execute a Contractor's Certification Form indicating that they have read and understand the regulations.

F. The respective Contractor(s) who filed a Registration Statement Form shall prepare and file a VSMP General Permit Notice of Termination (NOT) form. A Notice of Termination form may only be submitted after one or more of the following conditions have been met:

1. Final stabilization has been achieved on all portions of the site for which the operation is responsible;

2. Another operator has assumed control over all areas of the site that have not been finally stabilized;

3. Coverage under an alternative VPDES or VSMP permit has been obtained; or

G. The Notice of Termination (NOT) form must be submitted within 30 days of one of the above conditions being met. Authorization to discharge terminates seven (7) days after the Notice of Termination is submitted. For the purposes of this permit, a Notice of Termination that is mailed is considered submitted once it is postmarked.

1.2 RELATED SECTIONS

A. Sections which directly relate to the work of this Section include:

1. Section 31 10 00 – SITE CLEARING.
2. Section 31 23 00 – EARTHWORK
3. Section 32 12 16 – ASPHALTIC CONCRETE VEHICULAR PAVING
4. Section 32 92 00 – SEEDING, SODDING, AND LANDSCAPING.
5. Section 33 41 00 – SUBDRAINAGE.
6. Section 33 42 36 – STORMWATER TRENCH DRAINS

1.3 REFERENCES

A. Virginia Stormwater Management Act – Code of Virginia Stormwater Law (Effective as of July 1, 2006).

B. Virginia Stormwater Management Program (VSMP) Regulations.

C. General Permit for Discharges of Stormwater from Construction Activities – Authorization to Discharge Under the Virginia Stormwater Management Program and the Virginia Stormwater Management Act**.**

D. Guidance Manual – "Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices" (EPA 832-R-005)**.**

E. Summary of Guidance Manual – "Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices" (EPA).

1.4 SUBMITTALS

A. Submit a copy of the VSMP General Permit Registration Statement filed with the City of Alexandria.

B. Submit a copy of the VSMP General Permit Notice of Termination (NOT) filed with the City of Alexandria at completion of project.

1.5 INSPECTIONS

A. Inspections by qualified personnel must be conducted of all areas of the site disturbed by construction activity, and areas used for storage of materials that are exposed to stormwater. "Qualified Personnel" means a licensed professional engineer, responsible land disturber (RLD), or other knowledgeable person who (i) holds a certificate of competence from the board in the area of the project inspection; or (ii) is enrolled in the board's training program for project inspection or combined administrator and successfully completes such program within one year of enrollment.

B. Inspections shall be conducted at least once every 14 calendar days and within 48 hours of the end of any runoff producing storm event. Where areas have been finally or temporarily

stabilized or runoff is unlikely due to winter conditions (e.g., the site is covered with snow or ice, or frozen ground exists) such inspections shall be conducted at least once every month.

C. A report summarizing the scope of the inspection, names and qualifications of personnel making the inspection, the dates of the inspection, major observations relating to the implementation of the SWPPP, and actions taken in accordance with Section II.D4.d of the VSMP Permit shall be made and retained as part of the SWPPP in accordance with Section III.B. of the VSMP Permit. The report shall identify any incidents of noncompliance. Where a report does not identify any incidents of noncompliance, the report shall contain a certification that the facility is in compliance with the SWPPP and the VSMP Permit.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EROSION CONTROL DEVICES

A. Erosion control devices shall be constructed as shown on the SWPPP and as shown on the City of Alexandria approved site plans for the project, specified in ***Section 31 23 00 "Earthwork."*** ~~Section 31 25 00 "Erosion and Sedimentation Controls."~~

3.2 STORM WATER POLLUTION PREVENTION PRINCIPLES

A. The following general principles shall be followed by the Contractor in preparing the SWPPP and during the construction phase:

1. and maintain existing vegetation wherever possible.
2. Minimize the area of disturbance.
3. To the extent possible, route unpolluted flows around disturbed areas.
4. Install mitigation devices as early as possible.
5. Minimize the time disturbed areas are left unstabilized.
6. Maintain erosion and siltation control devices in proper condition.

3.3 CONTRACTOR'S STORM WATER POLLUTION PREVENTION PLAN

A. The Contract Drawings and Specifications identify a portion of the required facilities and temporary erosion and sedimentation control devices. The Contractor shall prepare a SWPPP in accordance with VSMP Permit requirements which identifies the location of construction facilities and proposes additional erosion and sedimentation control measures as required to minimize pollution. The Contractor's SWPPP shall include provisions for, but not be limited to the following:

1. Project construction and sequencing.
2. Construction trailers.
3. Laydown areas.
4. Equipment storage areas.
5. Stockpile areas.
6. Spill response procedures.

B. Reproducible copies of one or more of the Contract Drawings will be provided to the Contractor to serve as a base for the Contractor to develop a SWPPP and modify as necessary as construction proceeds.

STORM WATER POLLUTION PREVENTION PLAN
CONTRACTOR'S CERTIFICATION

PROJECT: _____

ADDRESS _____

DATE: _____

CONTRACTOR/SUBCONTRACTOR:

NAME: _____

ADDRESS: _____

I certify under penalty of law that I understand the terms of conditions of the Virginia Stormwater Management Program (VSMP) General Permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

_____ _____
Signature Date

_____
Title

_____
Company

Registration Statement
General VPDES Permit for Discharges of Stormwater from Construction Activities (VAR10)

(Please Type or Print All Information)

1. **Construction Activity Operator:** *(General permit coverage will be issued to this operator. The Certification in Item #12 must be signed by the appropriate person associated with this operator.)*
   Name:_____
   Contact:_____
   Mailing Address:_____
   City:_____ State:_____ Zip:_____ Phone:_____
   Email address (if available):_____
   Indicate if DEQ may transmit general permit correspondence electronically: Yes ☐ No ☐
2. **Existing General Permit Registration Number (for renewals only):**_____
3. **Name and Location of the Construction Activity:**
   Name:_____
   Address (if available):_____
   City:_____ State:_____ Zip:_____
   County (if not located within a City):_____
   Latitude (decimal degrees):_____ Longitude (decimal degrees):_____
   Name and Location of all Off-site Support Activities to be covered under the general permit:
   Name:_____
   Address (if available):_____
   City:_____ State:_____ Zip:_____
   County (if not located within a City):_____
   Latitude (decimal degrees):_____ Longitude (decimal degrees):_____
4. **Status of the Construction Activity (check only one):** Federal ☐ State ☐ Public ☐ Private ☐
5. **Nature of the Construction Activity (e.g., commercial, industrial, residential, agricultural, oil and gas, etc.):**
   _____
6. **Name of the Receiving Water(s) and Hydrologic Unit Code (HUC):**
   Name:_____ Name:_____
   HUC:_____ HUC:_____
7. **If the discharge is through a Municipal Separate Storm Sewer System (MS4), the name of the MS4 operator:**
   _____
8. **Estimated Project Start and Completion Date:**
   Start Date (mm/dd/yyyy):_____ Completion Date (mm/dd/yyyy):_____
9. **Total Land Area of Development (to the nearest one-hundredth acre):**_____
   Estimated Area to be Disturbed (to the nearest one-hundredth acre):_____
10. **Is the area to be disturbed part of a larger common plan of development or sale?** Yes ☐ No ☐
11. **A stormwater pollution prevention plan (SWPPP) must be prepared in accordance with the requirements of the General VPDES Permit for Discharges of Stormwater from Construction Activities prior to submitting this Registration Statement. By signing this Registration Statement the operator is certifying that the SWPPP has been prepared.**
12. **Certification:** "I certify under penalty of law that I have read and understand this Registration Statement and that this document and all attachments were prepared in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations."
    Printed Name:_____ Title:_____
    Signature:_____ Date:_____
    (Please sign in INK. This Certification must be signed by the appropriate person associated with the operator identified in Item #1.)

07/2014 Page 1 of 1

Notice of Termination
General VPDES Permit for Discharges of Stormwater from Construction Activities (VAR10)

(Please Type or Print All Information)

1. **Construction Activity Operator:**

   Name:_____

   Contact:_____

   Mailing Address:_____

   City:_____ State:_____ Zip:_____ Phone: _____

   Email address (if available):_____

2. **Name and Location of the Construction Activity:** (As listed on the Registration Statement.)

   Name:_____

   Address (if available):_____

   City:_____ State:_____ Zip:_____

   County (if not located within a City):_____

   Latitude (decimal degrees):_____ Longitude (decimal degrees):_____

3. **General Permit Registration Number:**_____

4. **Reason for Terminating Coverage Under the General Permit:** (The operator shall submit a Notice of Termination after one or more of the following conditions have been met.)

   ☐ A. Necessary permanent control measures included in the SWPPP for the site are in place and functioning effectively and final stabilization has been achieved on all portions of the site for which the operator is responsible. When applicable, long-term responsibility and maintenance requirements for permanent control measures shall be recorded in the local land records prior to the submission of a notice of termination;

   ☐ B. Another operator has assumed control over all areas of the site that have not been finally stabilized and obtained coverage for the ongoing discharge;

   ☐ C. Coverage under an alternative VPDES or state permit has been obtained; or

   ☐ D. For residential construction only, temporary soil stabilization has been completed and the residence has been transferred to the homeowner.

   The notice of termination should be submitted no later than 30 days after one of the above conditions being met. Authorization to discharge terminates at midnight on the date that the notice of termination is submitted for the conditions set forth in subsections B through D above, unless otherwise notified by the VSMP authority or the Department. Termination of authorizations to discharge for the conditions set forth in subsection A above shall be effective upon notification from the Department that the provisions of subsection A have been met or 60 days after submittal of the notice of terminations, whichever occurs first.

5. **Permanent Control Measures Installed:** (When applicable, a list of the on-site and off-site permanent control measures (both structural and nonstructural) that were installed to comply with the stormwater management technical criteria. Attach a separate list if additional space is needed.)

   Permanent Control Measure #1

   Type of Permanent Control Measure:_____

   Date Functional:_____

   Address (if available):_____

   City:_____ State:_____ Zip:_____

   County (if not located within a City):_____

   Latitude (decimal degrees):_____ Longitude (decimal degrees):_____

   Receiving Water:_____

   Total Acres Treated:_____ Impervious Acres Treated:_____

01/2014 Page 1 of 2

Permanent Control Measure #2

Type of Permanent Control Measure:_____

Date Functional:_____

Address (if available):_____

City:_____ State:_____ Zip:_____

County (if not located within a City):_____

Latitude (decimal degrees):_____ Longitude (decimal degrees):_____

Receiving Water:_____

Total Acres Treated:_____ Impervious Acres Treated:_____

Permanent Control Measure #3

Type of Permanent Control Measure:_____

Date Functional:_____

Address (if available):_____

City:_____ State:_____ Zip:_____

County (if not located within a City):_____

Latitude (decimal degrees):_____ Longitude (decimal degrees):_____

Receiving Water:_____

Total Acres Treated:_____ Impervious Acres Treated:_____

6. **Participation in a Regional Stormwater Management Plan:** (When applicable, information related to the participation in a regional stormwater management plan. Attach a separate list if additional space is needed.)

Regional Stormwater Management Facility

Type of Regional Stormwater Management Facility:_____

Address (if available):_____

City:_____ State:_____ Zip:_____

County (if not located within a City):_____

Latitude (decimal degrees):_____ Longitude (decimal degrees):_____

Total Site Acres Treated:_____ Impervious Site Acres Treated:_____

7. **Perpetual Nutrient Credits:** (When applicable, information related to perpetual nutrient credits that were acquired in accordance with § 62.1-44.15:35 of the Code of Virginia. Attach a separate list if additional space is needed.)

Nonpoint Nutrient Credit Generating Entity

Name:_____

Perpetual Nutrient Credits Acquired (lbs/acre/year):_____

8. **Certification:** "I certify under penalty of law that I have read and understand this Notice of Termination and that this document and all attachments were prepared in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations."

Printed Name:_____ Title:_____

Signature:_____ Date:_____

(Please sign in INK. This Certification must be signed by the appropriate person associated with the operator identified in Item #1.)

01/2014 Page 2 of 2

END OF SECTION

SECTION 26 05 43

ELECTRICAL - EXTERIOR UNDERGROUND

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Material and installation requirements for:
   a. Manholes.
   b. Handhole.
   c. Underground conduits and ductbanks.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Procurement and Contracting Requirements.
2. Division 01 - General Requirements.
3. Division 03 - Concrete.
4. Section 03 09 00 - Concrete.
5. Section 26 05 26 – Grounding and Bonding.
6. Section 26 05 33 - Raceways and Boxes.
7. ~~Section 31 23 33 - Trenching, Backfilling and Compacting for Utilities.~~
7. ***Section 31 23 00 - Earthwork***

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Association of State Highway and Transportation Officials (AASHTO):
   a. HB-17, Standard Specifications for Highway Bridges.
2. ASTM International (ASTM):
   a. A536, Standard Specification for Ductile Iron Castings.
3. National Fire Protection Association (NFPA):
   a. 70, National Electrical Code (NEC).
4. Society of Cable Telecommunications Engineers (SCTE):
   a. 77, Specification for Underground Enclosure Integrity.

1.3 DEFINITIONS

A. Direct-Buried Conduit(s):

1. Individual (single) underground conduit.
2. Multiple underground conduits, arranged in one or more planes, in a common trench.

B. Concrete Encased Ductbank: An individual (single) or multiple conduit(s), arranged in one or more planes, encased in a common concrete envelope.

1.4 SUBMITTALS

A. Shop Drawings:

1. Product technical data:

a. Provide submittal data for all products specified in PART 2 of this Specification Section.

2. Fabrication and/or layout drawings:

a. Provide dimensional drawings of each manhole indicating all specified accessories and conduit entry locations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Prefabricated composite handholes:

a. Armorcast Products Company.

b. Quazite by Hubbell.

c. Synertech by Oldcastle Enclosure Solutions.

d. Or Approved Equal.

2. Precast manholes and handholes:

a. Lister Industries Ltd.

b. Oldcastle Enclosure Solutions.

c. Jensen Precast and Utility Concrete Products.

d. Or Approved Equal.

3. Manhole and handhole and ductbank accessories:

a. Cantex, Inc.

b. Condux International, Inc.

c. Neenah Enterprises, Inc.

d. Prime Conduit.

e. Thomas and Betts.

f. Underground Devices, Inc.

g. Unistrut by Atkore International, Inc.

h. Or Approved Equal.

2.2 MANHOLES AND HANDHOLES

A. Prefabricated Composite Material Handholes:

1. Handhole body and cover: shall be fiberglass reinforced polymer concrete conforming to all test provisions of SCTE 77.

2. Minimum load ratings shall comply with SCTE 77 Tier 5.
3. Solid bottom.
4. Stackable design as required for specified depth.
5. Cover:
    a. Engraved legend of "ELECTRIC" or "COMMUNICATIONS".
    b. Non-gasketed bolt down with stainless steel penta head bolts.
    c. Lay-in non-bolt down, when cover is over 100 pounds.
    d. One or multiple sections so the maximum weight of a section is 125 pounds.
6. Cover lifting hook shall be 24 inches minimum in length.

B. Precast Manholes and Handholes:
1. Fiberglass reinforced polymer concrete or steel reinforced cement concrete structures:
2. AASHTO live load rating shall be H-20 for full deliberate vehicle traffic.
3. Mating edges shall be tongue and groove type.
4. Solid bottom with an 18 inch diameter, 18 inch deep sump with aluminum grate in the bottom of each manhole.
5. Cable pulling eyes opposite all conduit entrances.
    a. Coordinate exact location with installation contractor.

2.3 CONCRETE MANHOLE AND HANDHOLE ACCESSORIES

A. Cover and Frame:
1. Cast ductile iron shall comply with ASTM A536.
2. AASHTO live load rating shall be H-20.
3. Diameter shall be 30 inches.
4. Cast the legend "ELECTRICAL" or "COMMUNICATIONS" into manhole and handhole covers.

B. Cable Racks and Hooks:
1. Material shall be heavy-duty nonmetallic (glass reinforced nylon).
2. Hook loading capacity shall be 400 pounds minimum.
3. Rack loading capacity shall be four (4) hooks maximum.
4. Hook deflection shall be 0.25 inch maximum.
5. Hooks shall have a length, as required, with positive locking device to prevent upward movement.
6. Mounding hardware shall be stainless steel.

C. Cable Pulling Irons:
1. 7/8 inch diameter hot-dipped galvanized steel.
2. 6000 pound minimum pulling load.

D. See Specification Section 26 05 26 for ground rods and grounding equipment.

2.4 UNDERGROUND CONDUIT AND ACCESSORIES

A. See Division 03 Specifications for concrete and reinforcing steel.

B. See Specification Section 26 05 33 for conduit.

C. Duct Spacers/Supports:

1. High density polyethylene or high impact polystyrene.
2. Interlocking web or mesh design.
3. Provide 3 inch minimum spacing between conduits.
4. Accessories, as required:
   a. Hold down bars.
   b. Ductbank strapping.

PART 3 - EXECUTION

3.1 GENERAL

A. Drawings indicate the intended location of manholes and handholes and routing of ductbanks and direct buried conduit.

1. Field conditions may affect actual routing.

B. Manhole and Handhole Locations:

1. Approximately where shown on the Drawings.
2. As required for pulling distances.
3. As required to keep pulling tensions under allowable cable tensions.
4. As required for number of bends in ductbank routing.
5. Shall not be installed in a swale or ditch.
6. Determine the exact locations after careful consideration has been given to the location of other utilities, grading and paving.
7. Locations are to be approved by the Engineer prior to excavation and placement or construction of manholes and handholes.

C. Install products in accordance with the manufacturer's instructions.

D. Install manholes and handholes in conduit runs where indicated or as required to facilitate pulling of wires or making connections.

E. Comply with Specification ***Section 31 23 00*** ~~Section 31 23 33~~ for trenching, backfilling and compacting.

3.2 MANHOLES AND HANDHOLES

A. Prefabricated Composite Material Handholes:

1. For use in areas subjected to occasional non-deliberate vehicular traffic.
2. Place handhole on a foundation of compacted 1/4 to 1/2 inch crushed rock or gravel a minimum of 8 inches thick and 6 inches larger than handholes footprint on all sides.

3. Provide concrete encasement ring around handhole per manufacturers installation instructions (minimum of 10 inches wide x 12 inches deep).
4. Install so that the surrounding grade is 1 inch lower than the top of the handhole.
5. Size shall be as indicated on the Drawings or as required for the number and size of conduits.
6. Provide cable rails and pulling eyes as needed.

B. Precast Manholes and Handholes:

1. For use in vehicular and non-vehicular traffic areas.
2. Construction:
   a. Grout or seal all joints, per the manufacturer's instructions.
   b. Support cables on walls by cable racks:
      1) Provide a minimum of two (2) racks, install symmetrically on each wall of manholes and handholes.
         a) Provide additional cable racks, as required, so that both ends of cable splices will be supported horizontally.
      2) Equip cable racks with adjustable hooks and of the quantity of cable hooks as required by the number of conductors to be supported.
   c. In each manhole and handhole, drive 3/4 inch x 10 foot long copper clad ground rod into the earth with approximately 6 inches exposed above finished floor.
      1) Drill opening in floor for ground rod.
      2) Connect all metallic components to ground rod by means of #8 AWG minimum copper wire and approved grounding clamps.
      3) Utilize a ground bar in the manhole or handhole if the quantity of ground wires exceeds three.
         a) Connect ground bar to ground rod with a #2/0 AWG minimum copper wire.
3. Place manhole or handhole on a foundation of compacted 1/4 to 1/2 inch crushed rock or gravel a minimum of 8 inches thick and 6 inches larger than manholes or handholes footprint on all sides.
4. Install so that the top of cover is 1 inch above finished grade.
   a. Where existing grades are higher than finished grades, install sufficient number of courses of curved segmented concrete block between top of handhole and manhole frame to temporarily elevate manhole cover to existing grade level.
5. After installation is complete, backfill and compact soil around manholes and handholes.
6. Handhole size:
   a. As indicated on the Drawings or as required for the number and size of conduits entering or as indicated on the Drawings.
   b. Minimum floor dimension of 4 feet x 4 feet and minimum depth of 4 feet.
7. Manhole size:

a. As indicated on the Drawings or as required for the number and size of conduits entering or as indicated on the Drawings.

b. Minimum floor dimension of 6 feet x 6 feet and a minimum depth of 6 feet.

3.3 UNDERGROUND CONDUITS

A. General Installation Requirements:

1. Ductbank types per location:
   a. Reinforced concrete ductbank:
      1) Under railroads.
   b. Concrete encased ductbank:
      1) Under roads.
   c. Direct-buried conduit(s):
      1) Area/Roadway lighting.
2. Do not place concrete or soil until conduits have been observed by the Engineer.
3. Ductbanks shall be sloped a minimum of 4 inches per 100 feeet or as detailed on the Drawings.
   a. Low points shall be at manholes or handholes.
4. During construction and after conduit installation is complete, plug the ends of all conduits.
5. Provide conduit supports and spacers.
   a. Place supports and spacers for rigid nonmetallic conduit on maximum centers as indicated for the following trade sizes:
      1) 1 inch and less shall be 3 feet.
      2) 1-1/4 to 3 inch shall be 5 feet.
      3) 3-1/2 to 6 inches shall be 7 feet.
   b. Place supports and spacers for rigid steel conduit on maximum centers as indicated for the following trade sizes:
      1) 1 inch and less shall be 10 feet.
      2) 1-1/4 to 2-1/2 inches shall be 14 feet.
      3) 3 inches and larger shall be 20 feet.
   c. Securely anchor conduits to supports and spacers to prevent movement during placement of concrete or soil.
6. Stagger conduit joints at intervals of 6 inches vertically.
7. Make conduit joints watertight and in accordance with manufacturer's recommendations.
8. Accomplish changes in direction of runs exceeding a total of 15 DEG by long sweep bends having a minimum radius of 25 feet.

a. Sweep bends may be made up of one or more curved or straight sections or combinations thereof.

9. Furnish manufactured bends at end of runs.
    a. Minimum radius of 18 inches for conduits less than 3 inch trade size and 36 inches for conduits 3 inch trade size and larger.
10. Field cuts requiring tapers shall be made with the proper tools and shall match factory tapers.
11. After the conduit run has been completed:
    a. Prove joint integrity and test for out-of-round duct by pulling a test mandrel through each conduit.
        1) Test mandrel:
            a) Length shall not be less than 12 inches.
            b) Diameter shall be approximately 1/4 inch less than the inside diameter of the conduit.
    b. Clean the conduit by pulling a heavy duty wire brush mandrel followed by a rubber duct swab through each conduit.
12. Pneumatic rodding may be used to draw in lead wire.
    a. Install a heavy nylon cord free of kinks and splices in all unused new ducts.
    b. Extend cord 3 feet beyond ends of conduit.
13. Transition from rigid nonmetallic conduit to rigid metallic conduit, per Specification Section 26 05 33, prior to entering a structure or going above ground.
    a. Except rigid nonmetallic conduit may be extended directly to manholes, handholes and other exterior pad mounted electrical equipment where the conduit is concealed within the enclosure.
    b. Terminate rigid PVC conduits with end bells.
    c. Terminate steel conduits with insulated bushings.
14. Placement of conduits stubbing into handholes and manholes shall be located to allow for proper bending radiuses of the cables.

B. Concrete Encased Ductbank:

1. Ductbank system consists of conduits completely encased in minimum 2 inches of concrete and with separations between different cabling types as required in Specification Section 26 05 33 or as detailed on the Drawings.
2. Install so that top of concrete encased duct, at any point:
    a. Is not less than 24 inches below grade.
    b. Is below pavement sub-grading.
3. Where identified and for a distance 10 feet either side of the area, the concrete shall be reinforced.

a. The reinforcement shall consist of #4 bars and #4 ties placed 12 inches on center, in accordance with Division 03 Specification Sections or as detailed on the Drawings.

b. Conduit supports to be staggered to minimize weak vertical shear point.

4. Conduit supports shall provide a uniform minimum clearance of 3 inches between the bottom of the trench and the bottom row of conduit.

5. Conduit separators shall provide a uniform minimum clearance of 3 inches between conduits or as required in Specification Section 26 05 33 for different cabling types.

C. Direct-Buried Conduit(s):

1. Install so that the top of the uppermost conduit, at any point:

a. Is not less than 30 inches below grade.

b. Is below pavement sub-grading.

2. Provide a uniform minimum clearance of 3 inches between conduits or as required in Specification Section 26 05 33 for different cabling types.

a. Maintain the separation of multiple planes of conduits by one (1) of the following methods:

1) Install multilevel conduits with the use of conduit supports and separators to maintain the required separations, and backfill with flowable fill (100 PSI) per Specification ***Section 31 23 00*** ~~Section 31 23 33~~ or concrete per Division 03 specifications.

2) Install the multilevel conduits one (1) level at a time.

a) Each level is backfilled with the appropriate amount of soil and compaction, per Specification ***Section 31 23 00*** ~~Section 31 23 33~~, to maintain the required separations.

END OF SECTION

SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Site clearing, tree protection, stripping topsoil and demolition.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Procurement and Contracting Requirements.
2. Division 01 - General Requirements.
3. Section 31 23 00 - Earthwork.
4. ~~*Section 31 25 00 - Soil Erosion and Sediment Control.*~~
4. Section 32 91 13 - Topsoiling and Finished Grading.
5. Section 31 20 10 - Excess Material Placement Area

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect existing trees and other vegetation to remain against damage.

1. Do not smother trees by stockpiling construction materials or excavated materials within drip line.
2. Avoid foot or vehicular traffic or parking of vehicles within drip line.
3. Provide temporary protection as required.

B. Repair or replace trees and vegetation damaged by construction operations.

1. Repair to be performed by a qualified tree surgeon/licensed arborist.
2. Remove trees which cannot be repaired and restored to full-growth status.
3. Replace with new trees of minimum 4 IN caliper or as required by local tree ordinance.

C. Owner will obtain authority for removal and alteration work on adjoining property, as applicable.

3.2 SITE CLEARING

A. Topsoil Removal:

1. Strip topsoil to depths encountered or as specified within the soils report, 4 IN minimum.
    a. Remove heavy growths of grass before stripping.
    b. Stop topsoil stripping sufficient distance from such trees to prevent damage to main root system.
    c. Separate from underlying subsoil or objectionable material.

2. Do not strip topsoil in wooded areas where no change in grade occurs.
3. Borrow topsoil: Reasonably free of subsoil, objects over 2 IN DIA, weeds and roots.

B. Clearing and Grubbing:

1. Clear from within limits of construction all trees not marked to remain.
    a. Include shrubs, brush, downed timber, rotten wood, heavy growth of grass and weeds, vines, rubbish, small structures and debris.
2. Grub (remove) from within limits of construction all stumps, roots, root mats, logs and debris encountered.

C. Disposal of Waste Materials:

1. CONTRACTOR shall remove miscellaneous debris unsuitable for roadbed embankment. ENGINEER will direct CONTRACTOR as to what material constitutes miscellaneous debris.
2. Do not burn combustible materials on site.
3. Remove all waste materials from site.
4. Do not bury organic matter on site.
5. Miscellaneous debris removal shall be placed at an approved disposal site.

END OF SECTION

SECTION 31 20 10

EXCESS MATERIAL PLACEMENT AREA

PART 1 - GENERAL

1.1 SUMMARY

A. Excess material generated onsite will be placed in designated excess material placement areas (EMPA) as shown on the plans or directed by the ENGINEER.

B. Use of this specification does not preclude CONTRACTOR from regulations mandated under Resource Conservation and Recovery Act, or the United States Department of Transportation or other state/federal agencies. CONTRACTOR must obtain and remain in compliance for all required permits during the transport, placement and stabilization of the EMPA. The CONTRACTOR shall arrange for original cross sections to be taken following before embankment is placed with cross sections data being obtained at even 100 ft. stations as shown on the plans. CONTRACTOR shall provide data and plots of these original cross sections to ENGINEER. The plots will compare CONTRACTOR'S cross sections with the sections shown in the plans. Variances found will be reviewed with the ENGINEER. Excavation quantities shall be calculated by the CONTRACTOR using CONTRACTOR's original cross sections and plan design cross sections. These quantities must be approved by ENGINEER prior to beginning any earthwork.

C. The CONTRACTOR shall also arrange for final cross sections to be taken following completion of all earthwork with cross section data being obtained at even 100 ft. stations as above. CONTRACTOR shall provide data and plots of final cross sections to ENGINEER.

D. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Procurement and Contracting Requirements.
2. Division 01 - General Requirements.
3. Section 31 10 00 - Site Clearing
4. Section 31 23 00 - Earthwork.
5. ~~Section 31 25 00 - Soil Erosion and Sediment Control.~~
6. Section 32 91 13 - Topsoiling and Finished Grading.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PLACEMENT

A. Uncontaminated, non-water soluble, non-decomposable, inert, and solid material can be placed in the EMPA. The term includes soil, rock, stone, track bed material, brick, block or concrete for demolition activities that is separate for other waste streams and recognizable as such.

B. No tires, asphalt, rail ties, trees or root balls that have been cleared may be placed in the EMPA. Future decomposition of wood materials may lead to unexpected settlement of the EMPA and make it unstable.

C. If material is determined to be unsuitable for the EMPA it must be managed in accordance with local, state and federal regulation. The excess material may not be handled as clean fill

regardless of the laboratory test results and must be disposed of at a properly permitted facility. This material may not be sold, traded or given to any unauthorized third entities. It must be transported and disposed at a CSXT-approved disposal facility.

D. The EMPA must be on RAILROAD owned property. The selected location must be in close proximity to the source area of the excess material.

E. The EMPA must be constructed in accordance with local, state and federal regulations including final size, height and slope restrictions. These restrictions vary from state to state across the CSXT system. It is the responsibility of the CONTRACTOR to be aware of the requirements for the final EMPA design. Erosion and sediment best management practices (BMPs) must be utilized during construction.

F. During transport of the excess material to the selected/approved EMPA, CONTRACTOR is responsible for proper covering of the material and to ensure that no dirt, mud or other unwanted debris is tracked onto public roadways.

G. Upon final placement of material the EMPA should be covered with appropriate geotextile and soil cap material. The EMPA shall be permanently seeded and stabilized.

3.2 CONSTRUCTION COMPLETION

A. The EMPA shall not be fenced or other barriers put in place unless required by state requirements or directed by the ENGINEER.

B. A brief summary report of the EMPA shall be sent to the ENGINEER to be provided to RAILROAD environmental including photographs, a site location map depicting the EMPA in relation to significant features, latitude and longitude coordinates of at least the four (4) corners decimal degrees to six (6) decimals and a site layout map with an aerial background.

C. Future use of an EMPA, or material contained within, must be approved by RAILROAD Environmental, Law, and Real Property prior to the disturbance or removal of the material.

END OF SECTION

SECTION 31 23 00

EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Earthwork - excavation, ***trenching,*** backfilling, grading, compaction, disposal of waste and surplus materials***, construction of berms***, placing crushed stone, construction of berms, sheeting, bracing, dewatering and other Earthwork related work.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Procurement and Contracting Requirements.
2. Division 01 - General Requirements.
3. ***Division 26 - Electrical.***
4. ***Section 03 31 31 - Concrete Mixing, Placing, Jointing, and Curing.***
5. Section 31 10 00 - Site Clearing
6. Section 31 20 10 - Excess Material Placement Area
7. Section 31 ~~23 33 - Trenching, Backfilling~~ ***40 00 - Shoring*** and ~~Compacting for Utilities~~ ***Underpinning***
8. ***Section 32 92 00 - Seeding, Sodding and Landscape***

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):
   a. C33/C33M, Standard Specification for Concrete Aggregates.
   b. D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 FT-LBF/FT^3).
   c. D1241, Standard Specification for Material for Soil-Aggregate Subbase, Base, and Surface Courses.
   d. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 FT-LBF/FT^3(2,700 kN-M/M^3)).
   e. D2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
   f. D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
   g. D3786, Standard Test Method for Bursting Strength of Textile Fabrics--Diaphragm Bursting Strength Tester Method.
   h. D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

i. D4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

j. D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

2. American Association of State Highway and Transportation Officials (AASHTO)

k. M 43, Standard Specification for Sizes of Aggregate for Road and Bridge Construction.

l. M 57, Standard Specification for Materials for Embankment and Subgrades.

m. M 147, Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base, and Surface Courses.

3. Occupational Safety and Health Administration (OSHA):

n. 29 CFR Part 1926.650, Safety and Health Regulations for Construction - Excavations, referred to herein as OSHA Standards.

4. Virginia Department of Environmental Quality (VDEQ) Erosion And Sediment Control Handbook.

5. VDEQ Esc Technical Bulletins.

6. VDEQ Esc Minimum Standards.

B. Conform to rules and regulations of the Erosion Control Laws of Virginia, specifically the Sediment Pollution Control Act of 1973 (G.S. 113A) as amended, and the local jurisdiction where the project is located.

C. Post a copy of the approved erosion control permit, furnished by Owner, at the site prior to starting work. Maintain a copy of the approved erosion control plan at the site.

D. Provide permanent ground cover as soon as possible, and no later than the number of days after completion of work in accordance with section 32 92 00, Lawns and Grasses.

1.3 DEFINITIONS

A. Excavation:

1. Consists of removal of material encountered to subgrade elevations required or indicated.
2. Includes excavation of soils; pavements and other obstructions visible on surface; underground structures, utilities, and other items indicated to be demolished and removed; boulders; and rock.
3. All excavation will be defined as unclassified.

B. Foundations: Footings, base slabs, foundation walls, mat foundations, grade beams, piers and any other support placed directly on soil or rock.

C. Grading: Moving of earth, rock and all other material from cuts, borrow pits, ditches, and channels for waterways, constructing embankments, protecting slopes paving ditches, gutters and channels for waterways, water pollution, soil erosion, siltation control, and all similar work connected with and appertaining to, or necessary for, the construction of main tracks, yard tracks, side tracks, spur tracks, station grounds and specialized terminals, etc.

Slopes of cuts, ditches, channels and embankments shall be constructed and dressed to the lines prescribed on the Plans or in the Supplement Specifications. Variations may be required

to suit local conditions encountered, but no variation shall be made unless directed or approved by ENGINEER in writing.

Slope construction shall include excavation and dressing all terraces, berms, berm ditches, ditches at top and bottom of slopes, and gutters on terraces.

D. Geotechnical Engineer: Independent geotechnical specialist providing field quality control for the project.

E. Lines, Grade and Cross-sections: All excavations and embankments shall be constructed to the lines, grades, cross-sections, slopes and dimensions called for on contract drawings, or to such modifications or revisions thereof as may be directed in writing by ENGINEER.

F. Finish grade: Layer of soil or other acceptable material immediately below the Site's surfacing material (such as landscaping, pavement, and other surfaces).

G. Rough grade: Layer of soil or other acceptable material immediately below the finish grade.

H. Subgrade: Soil or other suitable material immediately below foundation bearing elevation, subbase material, fill material, backfill material, or topsoil.

I. Non-Structural Fill/Backfill: Soil materials placed and compacted to achieve finish grade elevations that do NOT support foundations, slabs, paving, or other flatwork.

J. Structure: Buildings, foundations, slabs, tanks, curbs, or other man-made stationary features occurring above or below ground surface.

K. Subgrade: The earth or soil layer immediately below foundation bearing elevation, subbase material, fill material, backfill material, or topsoil materials.

L. Sub-surface Conditions: It is the obligation of the CONTRACTOR to make his own investigations of subsoil condition prior to submitting his Proposal. Borings, test excavations and other subsoil investigations, if any, made by ENGINEER prior to the construction of the project, and the records of which are shown on the Plans, are made for design purposes. RAILROAD assumes no responsibility for the correctness of the information nor for the actual subsoil of other conditions which may be found to exist during the progress of construction.

M. Unclassified Excavation:

1. This work shall consist of excavation for all railroad facility subgrades and channels, including the removal of all material encountered not being removed under some other items, disposing of all material excavated whether or not used as fill, and finishing shoulders, slopes and ditches.
2. No classification of the kinds of material encountered in excavation will be made.
3. Disposal of Excavated Material – All suitable materials excavated within the limits of the project shall be used as embankment (fill for roadbed and/or slopes). For detail on suitable material see section F. Where the quantity of excavation exceeds that required to make up embankments to cross-section as shown on the Plans, the suitable surplus material shall be used to widen embankments (roadbed and/or slopes) uniformly along one or both sides, when directed by ENGINEER.
4. Waste areas, for the disposal of excess material unable to use as widen roadbed or unsuitable material, will be disposed of as shown on the Plans. With approval of the

ENGINEER in writing an alternative site whereas such materials deposited in a manner as will not endanger the roadway maybe requested.

5. Over Excavation - The toe of slopes in excavation shall in no case be undercut by power shovels, bulldozers, graders, blasting, or in any manner. Excavation shall not be made in excess of the authorized cross-section, and such excess excavation will not be included in the measurements for payment. Where slides occur and extend beyond the slope lines, CONTRACTOR will not be paid for the removal of such material unless in the judgment of ENGINEER they are due to causes which are not the fault of CONTRACTOR. In all cases the surplus material shall be removed by CONTRACTOR and the slopes formed to the satisfaction of ENGINEER.
6. Removal of Miscellaneous Materials - The excavation, removal and disposal of minor pavements, timber or concrete foundations, not apparent on the surface or subsurface, rock, boulders, encompassing a volume of less than one cubic yard and all other subsurface materials encountered shall be considered as UNCLASSIFIED EXCAVATION, except as covered under other sections in the specification. Such materials shall be removed to an elevation six inches below final sub-grade as designated on the cross sections within ten (10) feet of the centerline of any proposed track or within five (5) feet of the edge of any roadway. In other areas, all such materials shall be removed to the elevation of final grade.
7. Roadbed Excavation - Roadbed Excavation shall include the excavation to the prescribed lines, grades, and cross-sections, and the removal and satisfactory disposal of all earth, rock, boulders, masonry and all other materials encountered, of whatsoever nature, required for the construction of main tracks, yard tracks, side tracks, spur tracks, station grounds, specialized terminals and similar appurtenant work, construction of embankments of the excavated material in accordance with provisions as specified herein and ditching and channel excavation when these items are not scheduled in the Proposal.
8. Channel Excavation - Channel Excavation shall include the excavation to the prescribed lines, grades and cross-section, and the removal and satisfactory disposal of all materials encountered of whatsoever nature, required for deepening, widening and relocating water channels.
9. Ditch Excavation - Ditch Excavation shall include the excavation to the prescribed lines, grades and cross section, and the removal and satisfactory disposal of all materials encountered of whatsoever nature, required for constructing ditches.
10. Where wet cuts are encountered, the roadbed will be constructed extra wide with ditches of extra depth and width as shown on “Section At Wet Cuts” on current RAILROAD standard drawing 2601, latest revision.
11. Intercepting and berm ditches shall be provided at the top of the cut slopes and the toe of the embankment slopes to divert storm water, which flows toward the roadbed. Roadbed ditches shall be provided as indicated with the outfall ends diverging sufficiently to prevent erosion of the adjoining embankments. All ditches shall be in accordance with RAILROAD Standard Roadbed Section or as approved by the ENGINEER.
12. Should unsuitable material be encountered such as muck, highly plastic clays or silty unstable material, it shall be removed at the direction of the ENGINEER.

N. Unauthorized Excavation:

1. Consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Engineer.
    a. Unauthorized excavation, as well as associated remedial work as directed by Engineer or Geotechnical Engineer, shall be at CONTRACTOR's expense.

O. Unsuitable Soil Materials: Soil materials encountered at or below subgrade elevation of insufficient strength and stiffness to support construction as determined by the Geotechnical Engineer.

1.4 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
2. Product technical data including:
    a. Acknowledgement that products submitted meet the requirements of standards referenced.
    b. Manufacturer's installation instructions.
3. Certifications.
4. ***Submit respective pipe or conduit manufacturer's data regarding bedding methods of installation and general recommendations.***
5. ***Submit sieve analysis reports on all granular materials.***

B. Product Data:

1. ***Written indication of each source of materials to be used for site grading Work. Where materials from the Site will be used, so indicate in the Submittal.***
2. ***Where materials not native to the Site will be used, indicate borrow source, location, and sufficient information to indicate to Engineer's satisfaction that proposed materials are appropriate and comply with the Contract Documents and are do not constitute a Hazardous Environmental Condition Where borrow materials contain one or more Constituents of Concern, submit acceptable laboratory analysis results of representative samples sufficient to demonstrate such materials will not constitute a Hazardous Environmental Conditions when installed at the Site.***
3. ***Regardless of source, submit:***
    a. ***Results and certification of gradation and material of aggregate fill.***
    b. ***Results of representative sampling and testing of material for gradation (as applicable) and material content.***
    c. ***CONTRACTOR's written certification that materials proposed comply with the Contract Documents, including applicable reference standards.***

C. Samples:

1. Coordinate samples and testing for approval of off-site materials with the Geotechnical Engineer.

2. Test reports.

D. Informational Submittals:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

2. Supplier's Installation instructions: Written instructions on handling, storing, and installing materials from offsite sources.

3. Field Quality Control Results:

a. Results of required field quality control activities, including installed material density and moisture tests.

b. One optimum moisture-maximum density curve for each type of material encountered.

c. Report of actual unconfined compressive strength or results of bearing tests of each strata tested.

4. Trench shield (trench box) certification if employed:

a. Specific to Project conditions.

b. Re-certified if members become distressed.

c. Certification by registered professional structural engineer, registered in the state where the Project is located.

d. Engineer is not responsible to, and will not, review and approve.

5. Trench Safety Plan and/or trench shoring drawing:

a. Trench Safety Plan and/or trench shoring drawings submittal is required only as evidence that plans and drawings have been prepared if required by Authorities Having Jurisdiction.

1) Engineer is not responsible to, and will not, review and approve.

6. Submit test reports and fully document each with specific location or stationing information, date, and other pertinent information.

1.5 WARRANTY

A. CONTRACTOR is liable for damages to public and private property and fines as may be placed on the Project by the governing agencies due to failure to provide erosion control devices in accordance with approved erosion control plan.

1.6 PROJECT CONDITIONS

A. Salvageable Items: Carefully remove items to be salvaged, and store on Owner's premises unless otherwise directed.

B. Dispose of waste materials, legally, off site.

7. Burning, as a means of waste disposal, is not permitted.

C. CONTRACTOR shall follow all local and state "Call Before You Dig" laws.

D. CONTRACTOR shall visit the site and become acquainted with the existing conditions. CONTRACTOR shall accept the site as found prior to submitting the bid to do all excavation as indicated on the plans or as necessary due to existing conditions.

E. CONTRACTOR shall verify the grades and dimensions shown as existing on the plans. If there are discrepancies between the actual field conditions and those shown on the plans, then CONTRACTOR shall notify ENGINEER and request clarification before continuing with the work.

F. Avoid overloading or surcharge a sufficient distance back from edge of excavation to prevent slides or caving.

8. Maintain and trim excavated materials in such manner to be as little inconvenience as possible to public and adjoining property owners.

G. Provide full access to public and private premises and fire hydrants, at street crossings, sidewalks and other points as designated by Owner to prevent serious interruption of travel.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Erosion and Sediment Control

1. See plans for materials and standard details with material designations.

B. Fill and Backfill:

1. Selected material approved by Geotechnical Engineer from site excavation or from ***suitable*** off-site borrow.
2. Structural Fill:
   a. May be low volume change cohesive or granular soil at CONTRACTOR's option.
   b. Free of organic matter, frozen material and debris.
   c. Low volume change cohesive soil:
      1) ASTM D2487 classification: CL-ML, ML or CL.
      2) Liquid limit: Less than 35.
      3) Maximum plasticity index: 15.
   d. Site excavation material that is approved by the Geotechnical Engineer.
   e. Granular soil:
      1) ASTM D2487 classification: GW, GP, GM, GC, SW, SP, SM or SC.
3. Non-Structural Fill:
   a. ASTM D2487 classification: GW, GP, GM, GC, SC, SW, SP, SM, CL-ML or CL.
   b. Liquid limit: Less than 35.
   c. Maximum plasticity index: 15.

4. Trench Backfill:

a. Free of rock cobbles, roots, sod or other organic matter, and frozen material.

b. Moisture content at time of placement: ±3 PCT of optimum moisture content as specified in accordance with ASTM D698.

c. Gravel:

1) ASTM C33/C33M gradation size No. 67, 3/4 IN to No. 4 or other material acceptable to Geotechnical Engineer.

C. Working Surface:

1. Crushed aggregate approved by Geotechnical Engineer.

D. Base Course Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand.

E. Granular Fill Under Slabs-On-Grade, Electrical Equipment Pads, Manholes and Handholes:

1. Clean, granular material.
2. Less than 5 PCT fines passing the No. 200 sieve.
3. ASTM C33/C33M gradation size No. 67, 3/4 IN to No. 4 or other material acceptable to Geotechnical Engineer.

F. Granular Fill Under Base Slabs with Pressure Relief Valves:

1. Drainage material: Conform to ASTM C33/C33M, Size No. 67.
2. Filter material: Conform to ASTM C33/C33M requirements for fine aggregate.

G. Drainage Course: Free draining stone such as #57 stone or #67 stone meeting the requirements of ASTM C33/C33M specifications.

H. Granular Fill Under Electrical Equipment Pads, Manholes and Handholes: Clean, crushed, nonporous rock, crushed or uncrushed gravel complying with ASTM C33/C33M gradation size No. 67, 3/4 IN to No. 4.

I. Geotextile Filter Fabric:

1. Nonwoven type.
2. Equivalent opening size: 50 - 100 (U.S. Standard Sieve).
3. Permeability coefficient (cm/second): 0.07 minimum, 0.30 maximum.
4. Grab strength: 90 LBS minimum in either direction in accordance with ASTM D4632 requirements.
5. Mullen burst strength: 125 PSI minimum in accordance with ASTM D3786 requirements.

6. For Placement with Subgrade Drains: The filter fabric shall be non-woven needle punched polyester or polypropylene material conforming to the following minimum average requirements:

ITEM	***MINIMUM AVERAGE REQUIREMENTS***	***TEST***
Weight	***5.3 ounces per square yard***	***ASTM D 1910***
Apparent opening size	***70 Standard sieve***	***ASTM D 4751***
Grab tensile Strength	***150 pounds***	***ASTM D 4632***

ITEM	*MINIMUM AVERAGE REQUIREMENTS*	*TEST*
Burst strength	*300 pounds per square inch*	*ASTM D 3786*
Max. elongation @ failure	*40% - 60%*	*ASTM D 4632*
Permeability	*0.2 cm / second*	*ASTM D 4410*
Trapezoidal tear	*65 pounds*	*ASTM D 4533*
Puncture strength	*80 pounds*	*ASTM D 4833*

J. Bedding Materials:

1. As approved by the Geotechnical Engineer.

2. Granular bedding materials:

a. ASTM D2321 Class 1B.

1) Well-graded crushed stone.

b. The QUALITY ASSURANCE and SUBMITTALS Articles are used to address factory tests, inspections, and certifications required to be performed at the shop prior to shipment to site.

K. Embankments

1. Embankment construction shall consist of placing and compacting suitable materials in embankment at the required locations to the prescribed lines, grades, cross-sections, and dimensions shown on Plans and as directed or approved for wasting of surplus acceptable material to widen embankments. The CONTRACTOR shall construct embankments to such heights above subgrade and to such increased widths as are necessary to provide for shrinkage, subsidence, and erosion. As the embankments become consolidated, their sides shall be trimmed to the proper dimensions and shapes until the completion and acceptance of the work.

2. Materials used for embankment shall be suitable inorganic soil, granular material, rock or random materials and shall be free from stumps, wood, brush, leaves, roots, sod, rubbish, debris, garbage, frozen material, inflammable material, or any perishable matter. Any materials subject to degradation by weathering, or cinders, will not be acceptable. Suitable material will be as defined herein.

3. The materials used in embankment shall be those available from the various items of Earthwork, or other suitable material delivered by RAILROAD in cars or RAILROAD approved materials brought to the project by CONTRACTOR.

4. Before placing embankment material, the underlying ground surfaces shall be prepared between bottom of slope stakes as provided in CLEARING & GRUBBING AND TOPSOIL STRIPPING, as specified herein, and shall be free of snow and ice. Embankment material shall not be placed on frozen material of either the embankment or foundation.

   Where the embankment is placed on sloping ground or existing embankments, the existing ground shall be plowed, scarified or benched. Benching shall be required where slopes are steeper than 8:1 in any direction. The roadbed will be continuously benched over those areas where it is required as the work is brought up in layers. Benching shall be of sufficient width to permit operation of placing and compacting equipment. Each

horizontal cut shall begin at the intersection of the original ground and the vertical sides of the previous cut. Suitable materials thus cut out, except for topsoil, shall be reused along with the new embankment material.

Where benching is not required, embankment foundation areas, stripped of topsoil, shall be plowed or scarified to a depth of at least eight inches and then compacted as specified herein or by ENGINEER in the field. This requirement can be waived by ENGINEER in inundated, swampy areas or areas where field conditions warrant. The use of filter fabric may be permitted by ENGINEER to permit the operation of construction equipment over the subgrade.

5. Except as hereinafter provided, embankments shall be formed in horizontal layers, with loose lifts placed no deeper than eight inches, extending across the entire fill.

6. The material shall be leveled to a uniform cross-section and shall be thoroughly compacted to the specified density and moisture content before the next layer is started. When necessary to achieve proper compaction, the moisture content of the material shall be altered to bring its moisture content sufficiently close to optimum, as specified herein. The material may be uniformly wetted by the controlled application of water to in place embankment material; or dried by plowing, discing and aerating, which drying process may be carried out either on the embankment or at the source of the material. Other methods shall be proposed by the CONTRACTOR and reviewed by the ENGINEER.

7. When the amount of embankment material required exceeds the amount of suitable material to be excavated within the limits of the grading section, sufficient suitable material, approved by ENGINEER, shall be obtained by CONTRACTOR from borrow pits furnished by CONTRACTOR located outside of RAILROAD property, except when permission is given, in writing, by ENGINEER to use a borrow pit which may be available on RAILROAD property or permission is given by ENGINEER to widen the roadway excavation to obtain additional material.

8. All topsoil, sod, brush, weeds, roots, and other unsuitable material shall be removed from the surface of borrow pit prior to the removal of any materials.

9. Trucks, cars or other equipment used for transporting material from borrow pits shall have tight bodies and shall be loaded and covered so that no material will be lost while in transit.

10. The source and quality of borrow material shall be approved by ENGINEER and comply with section 31 20 10 - Excess Material Placement Area (EMPA) before excavation of such borrow is made. The CONTRACTOR may be required to obtain at his sole expense, property for borrow from sites other than RAILROAD owned property. Prior to the use of the property, the CONTRACTOR will secure from the owner a written permit or agreement satisfactory to the ENGINEER, for the use of the property.

    Borrow pits will be seeded and mulched as required by permit and unless otherwise specified.

11. If directed by ENGINEER, borrow pits on RAILROAD property shall be connected with ditches and drained to the nearest water course and no material shall be borrowed from a depth that will not permit proper drainage without the approval of ENGINEER. CONTRACTOR shall provide immediate, permanent, or temporary control measures to prevent contamination of adjacent streams or other water courses, lakes, ponds, or other areas of water impoundment. Such work may involve the construction of temporary

benches, dikes, dams, sediment basins, slope drains, and the use of temporary mulches, mats, seeding or other control devices or methods necessary to control erosion, as required by Federal, State or local authorities. All borrow pits shall be left in a neat condition. Side slopes on borrow pits on RAILROAD property or adjacent thereto shall be the same as used in the cross-sections of embankments of roadbed. Final condition of all borrow pits must be approved by ENGINEER.

12. A berm of the original unbroken ground not less than ten feet (10) in width shall be left between slope stakes of embankment and edge of borrow pits and a similar berm between outside slope of borrow pits and RAILROAD right-of-way unless otherwise shown on the Plans or approved in writing by ENGINEER.

L. Soil or Granular Material for Embankments:

1. Soil shall include all durable inorganic earth materials having a maximum particle size of three inches (as determined by current ASTM Designation D 422); a plasticity index between 0 and 35 (as determined by current ASTM Designation D 422); and that can be readily placed and compacted to the required density in loose 8-inch layers. Organic soils will not be permitted for use in embankment construction. Fine grained soils which are moisture sensitive may be placed and compacted only during periods of dry weather. Where such soils are used and become wetted, due to natural causes or by fault of CONTRACTOR or by accident, to the extent they exhibit rutting and/or weaving characteristics, when subject to construction traffic, they shall either be removed and replaced with suitable materials or dried as approved by ENGINEER. Any such materials removed may be stockpiled and dried to the required moisture content for later placement and compaction. All soil which is placed on embankment foundation to a plane three feet below the subgrade plane, and to the Plan slope limits shall be compacted to at least 95% of its maximum density and within 2% of its optimum moisture content as determined by current ASTM Designation D 1557, Modified Proctor. All soil placed from subgrade plane and to a plane three feet below the subgrade plane, shall have less than 20% passing a #200 sieve (as determined by current ASTM Designation D 1140) and shall be compacted to at least 100% of its maximum density or to a relative density of 75% of its maximum, whichever is higher, as determined respectively by current ASTM Designation D 1557 or current ASTM Designation D 2049. The in-place density of compacted embankment soils will be determined either by current ASTM Designation D 1556 (Sand Cone Method) or D 2167 (Balloon Method) or D-2922 (Nuclear Method). Any soil layer placed in the embankment and found deficient in required density shall either be brought to specification requirements or removed, as directed by ENGINEER, prior to placing and compacting any subsequent layers.

2. Shale shall include all rock-like materials formed by the natural consolidation of mud, clay, silt and fine sand. Useable shale shall be thinly laminated, comparatively soft and easily split, having a maximum size that can be readily placed and compacted in loose 8-inch layers. Shale, which consists predominately of fine particles which can be readily tested for compaction in the laboratory and field, shall be placed and compacted in accordance with requirements for soil. Shale containing sufficient amounts of large particles to make checking of the compaction impractical shall not be used within design embankment slope limits. When approved by ENGINEER, such materials may be used to flatten embankment slopes under ten feet in height, if approved by ENGINEER. No embankment flattening shall be done with this material until such time as approval is granted. Shale that is or becomes unstable in the presence of air and water shall not be used for embankment construction.

3. Rock, other than shale, shall include all igneous, metamorphic, and sedimentary rock which cannot be excavated without blasting or by the use of rippers and all boulders and detached stones having a maximum size that cannot be readily placed and compacted in loose 8-inch layers. The use of any micaceous rock or rock containing degradable sulfur minerals or asbestos will not be permitted. Rock shall be placed in uniform loose layers not exceeding in thickness the approximate average size of the larger rock but limited to a maximum thickness of two feet. Oversize rock shall be reduced in size until it can readily be incorporated into a 2-foot layer. All voids shall be filled by brooming in with spalls and other acceptable filling material and thoroughly wetted and compacted until an unyielding layer is formed. Rock shall not be placed against the backslope of side hill fills nor shall an existing embankment be benched for the placement of a rock embankment or rock slope. The top three feet of an embankment must not be made up of rock fill. The compaction program for rock shall be submitted to ENGINEER for approval. No embankment shall be built until such time as approval is granted.

   When rock or other embankment materials are excavated at approximately the same time, the rock shall be incorporated into the other slopes of the embankment to a 1 on 1 plane extending from the intersection of the design slope and subgrade plane from natural ground to a line three feet below the subgrade plane. The inner portion of the embankment adjacent to the rock fill shall be held at substantially the same elevation as the rock fill, but always above the rock fill at a height sufficient to avoid incorporating water used to wet the rock fill in such quantities as to cause rutting or weaving of the inner embankment fill under the operations of construction equipment.

4. The top three feet of all embankments shall be formed of granular material or soil, as required herein. Provisions should be made to reserve this material from excavation where available. Should such materials be available and not reserved, it shall be furnished and placed by the CONTRACTOR at his expense.

5. Embankment material placed in areas inaccessible to compaction equipment used to form the main body of the embankment shall be placed in uniform loose layers not exceeding four inches and be compacted by means of approved mechanical or vibrating compacting equipment to the density requirements specified herein.

6. Where embankment is to be constructed across low swampy ground, open water, or other areas which will not support the weight of trucks or other hauling equipment, dumping of suitable materials, as approved by ENGINEER, shall be used to such an elevation only that will permit the use of compacting equipment and the remainder shall be constructed in layers to conformity with these Specifications or as shown on the Plans. In no case shall end dumping be started until ENGINEER has approved the surface on which embankment is to be constructed.

7. Where end dumping is necessary, the material shall be deposited so that the soft underlying material will be forced to the sides and not to the front of the areas filled. End dumped material shall be properly compacted in a manner satisfactory to ENGINEER.

8. Embankment, other than rock embankment, in areas back of bridge abutments and in areas adjacent to structures under embankments, other than pipe structures, shall be formed of free-draining soil having a maximum size of three inches, and shall be constructed in advance of other embankment sections. Back of bridge abutments, this area shall extend longitudinally for a distance of twice the height of the embankment above the top of the footing or above the natural ground line, if such ground line is above the top of the footing.

Adjacent to structures under embankment, the soil shall be placed to the height of the structure and in the adjacent area longitudinally for a distance of twice the height of the structure. Shale, rock or plastic soils shall not be used in bridge abutment backfill construction. When filling behind abutments and similar structures, all material shall be placed so that fill height on one side of a wall is never greater than two feet above the material on the other side or as shown on the Plans. The materials shall be deposited in layers of not more than six inches in thickness, carefully tamped and sloped away from the structure.

Filling over arches, boxes and large pipes shall be deposited uniformly on both sides. Large stones shall not be placed within two (2) feet of the exterior surface of any arch, top and sides of boxes, or outside of large pipes. Any damage to waterproofing shall be repaired by the CONTRACTOR at his sole cost and expense.

In forming embankments from or about trestles, the material shall be spread uniformly, without depressions between slopes and shall be thoroughly compacted between the trestle bents and around and under all parts of the structure. No part of the trestle shall be left in the embankment with three (3) feet of the sub-grade. Construction trestles for the formation of embankment will not be permitted unless approved by the ENGINEER.

9. CONTRACTOR shall be responsible, until acceptance by RAILROAD, for stability of all existing and new embankments constructed and shall replace all sections which, in the opinion of ENGINEER, have been damaged or displaced due to carelessness or neglect on the part of CONTRACTOR, or due to natural causes, such as storms, etc.
10. At the beginning of each day's work, the embankment should be restored to such a condition that the specifications as herein stated are met. Any changes in moisture content, shape, and density due to natural causes shall be repaired at CONTRACTOR's expense prior to the start of the work of the day. Any frozen soil materials shall be completely removed and wasted on embankment side slopes or as directed by ENGINEER.
11. Fill or backfill material at structures, culverts, pipes, conduit, and direct burial cable shall conform to the quality requirements herein unless otherwise stated herein, or as shown on the Plans. All such material shall be placed in uniform horizontal loose lifts not exceeding six inches and be compacted to 95% of its maximum density and not to exceed 2% of its optimum moisture as determined by current ASTM Designation D1557 (Modified Proctor) or as shown on the Plans. Compaction shall be by means of approved mechanical or vibratory compacting equipment.
12. CONTRACTOR shall be responsible for proper placement and compaction of all materials in the railroad embankment, and for correcting any deficiencies resulting from insufficient or improper compaction and moisture control of such materials throughout the contract period. CONTRACTOR shall provide the type size and weight of compactor best suited to the work at hand; exert proper control over the moisture content of the material, and other details necessary to obtain satisfactory results.
13. Rutting or weaving of a compacted layer under the section of construction equipment shall not necessarily be interpreted as due to faulty compaction or moisture control during compaction but shall be considered as constituting damage to a compacted lift requiring full repair prior to placing any overlying materials. ENGINEER will prohibit placement of an overlying lift until CONTRACTOR takes effective corrective action.

14. The selection of compaction equipment needed to meet the requirements specified herein is CONTRACTOR's responsibility but shall be subject to approval by ENGINEER. Any equipment not principally manufactured for compaction purposes and equipment which is not in proper working order shall not be approved or used. ENGINEER will also withhold approval of any compactor for which CONTRACTOR cannot furnish manufacturer's specifications covering data not obvious from a visual inspection and necessary to determine its classification. The use of tractors, trucks, scrapers or other equipment designed for purposes other than solely compaction will not be considered as compaction equipment.
15. Sufficient leveling and compacting equipment shall be provided to do the work of spreading and compacting the material promptly after it has been deposited. When, solely in ENGINEER's judgment, such equipment is inadequate to spread and compact the material properly, CONTRACTOR shall reduce the rate of excavation placing of fill to a rate not to exceed the capacity of leveling and compacting equipment or employ additional equipment.
16. CONTRACTOR shall make sufficient passes of the compacting equipment over each loose lift of material to obtain the specified densities. The compacting equipment shall be operated in a systematic manner so that the number of coverage's over all areas can be readily determined and recorded. One pass shall be defined as the complete application of the compaction equipment's rated energy over the entire area to be compacted.

M. Offsite Borrow Material

1. Off Site Borrow Material shall include excavation, removal and satisfactory disposal of all material from borrow pits, construction of embankments of the excavated material and preparing subgrade.
2. When the total amount of embankment material required exceeds the amount of suitable material to be excavated within the limits of the grading section, sufficient suitable material, approved by ENGINEER, shall be obtained by CONTRACTOR from borrow pits furnished by CONTRACTOR located outside of RAILROAD property, except when permission is given, in writing, by ENGINEER to use a borrow pit which may be available on CSXT property or permission is given by ENGINEER to widen the roadway excavation to obtain additional material.
3. CONTRACTOR shall be required to obtain a release from borrow site owner upon completion. A copy of the release shall be provided to the ENGINEER.
4. All topsoil, sod, brush, weeds, roots and other unsuitable material shall be removed from the surface of borrow pit prior to the removal of any materials.
5. Trucks, cars or other equipment used for transporting material from borrow pits shall have tight bodies and shall be loaded and covered so that no material will be lost while in transit.
6. The source and quality of borrow material shall be approved by ENGINEER before excavation of such borrow is made.
7. A berm of the original unbroken ground not less than ten feet (10) in width shall be left between slope stakes of the embankment and edge of borrow pits and a similar berm between outside slope of borrow pits and CSXT right-of-way unless otherwise shown on the Plans or approved in writing by ENGINEER.

N. Unsuitable Material

1. Should unsuitable material be encountered it shall be removed at the direction of the ENGINEER. In cut sections, plastic material as defined by the American Association of State Transportation Officials Soil Classification as A-2-6, A-2-7, A-4, A-5, A-6 and A-7 shall be removed to a depth of at least 2 feet below subgrade from ditch line to ditch line. Additional depth may be required at the direction of the ENGINEER. Where organic muck, Classification A-8, is encountered in the fill section, it shall be removed within the limits of the toes of slope of the road bed. Where fill exceeds 10 feet in height, width of the section to be mucked shall be three times the height of the fill or as directed by the ENGINEER.
2. CONTRACTOR shall excavate unstable materials encountered below the line and grade indicated on the plans, which are of such a nature that the use of ordinary dry excavation methods and equipment is impractical.
3. Unsuitable excavated material shall be disposed following Section 31 20 10, Excess Material Placement Area (EMPA) as designated by plans or directed by the ENGINEER. When wasting of unsuitable material is ordered, the material shall, if possible, be deposited in low areas of the property but under no circumstances shall the nearest edge of waste bank be within 10 feet of the berm ditch along a cut section. Waste areas shall be leveled or drained as directed by ENGINEER. CONTRACTOR's proposals will be considered for approval by ENGINEER.
4. If areas of any unsuitable soils are encountered, they shall be excavated to a firm bedding stratum acceptable to ENGINEER or treated in other manner as described on the plans or as directed by ENGINEER. If any wet excavation is required, it shall be treated similarly. After the excavation, the area shall be backfilled with a suitable material and in a manner as described by ENGINEER, to the lines and grades shown on the plans.

PART 3 - EXECUTION

3.1 PROTECTION

A. Erosion Control:

~~1. See Specification Section 31 25 00.~~

1. Clean paved roadways daily of any spillage of dirt, rocks or debris from vehicles and equipment entering or leaving site.

2. Clean railroad crossings immediately upon spillage of dirt, rocks or debris from vehicles and equipment entering or leaving site.

3. Conduct work to minimize erosion of site. Remove eroded material washed off site.

a. If necessary or requested by Engineer, construct stilling areas to settle and detain eroded material.

B. Protect existing surface and subsurface features on-site and adjacent to site as follows:

1. Provide barricades, coverings, or other types of protection necessary to prevent damage to existing items indicated to remain in place.

2. Protect and maintain benchmarks, monuments or other established reference points and property corners.
    a. If disturbed or destroyed, replace at ***CONTRACTOR's*** expense to full satisfaction of Owner and controlling agency.
3. Verify location of utilities.
    a. Omission or inclusion of utility items does not constitute nonexistence or definite location.
    b. Secure and examine local utility records for location data.
    c. Take necessary precautions to protect existing utilities from damage due to any construction activity.
        1) If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.
        2) Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by Owner and then only after acceptable temporary utility services have been provided.
        3) Obtain Owner's approval prior to disconnecting any utility service.
    d. Repair damages to utility items at own expense.
    e. In case of damage, notify Engineer at once so required protective measures may be taken.
4. Maintain free of damage, existing sidewalks, structures, and pavement, not indicated to be removed.
    a. Protect new and existing structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
    b. Any item known or unknown or not properly located that is inadvertently damaged shall be repaired to original condition.
    c. All repairs to be made and paid for by CONTRACTOR.
5. Provide full access to public and private premises, fire hydrants, street crossings, sidewalks and other points as designated by Owner to prevent serious interruption of travel.
6. Maintain stockpiles and excavations in such a manner to prevent inconvenience or damage to structures on-site or on adjoining property.
7. Avoid surcharge or excavation procedures which can result in heaving, caving, or slides.

C. Protection of trees to remain:

8. Perform excavation by hand within dripline of large trees designated on Drawings to remain. Protect root systems from damage or dryout to the greatest extent possible.
    a. Maintain moist condition for root system and cover exposed roots with moistened burlap.

3.2 SUBGRADE PREPARATION

A. The bottom of sub ballast for railroad roadbed shall be known as the subgrade and shall be prepared in conformity with the lines as shown on the Plans. Refer to section 34 11 00, Railroad Track Construction.

B. CONTRACTOR shall prepare the subgrade by proof-rolling to ascertain the uniformity of compaction beneath the subgrade surface, to locate deficiencies requiring correction, and to establish that corrective work has been effective, all immediately prior to final trimming of the subgrade surface and to the placement of sub ballast.

C. Proof-rolling of subgrade surface will not be required where the subgrade surface is rock cut; where, in the opinion of ENGINEER, proof-rolling would be detrimental to the work; where the proof-roller will approach a culvert, pipe or other conduit closer than five feet in any direction; or where the proof-roller may damage adjacent work due to restrictions in available access and for maneuvering space.

D. The proof-roller shall consist of a loaded off-road dump truck weighing approximately 20 tons or similar. Any deviations to equipment must be supported by geotechnical recommendations and must be approved by ENGINEER.

E. Within the ranges set forth herein before, the load and tire inflation pressure shall be adjusted as required. It is the intent of these Specifications to use a contact pressure as nearly practical to the maximum supporting value of the subgrade. The subgrade shall then be rolled with one or more coverage's of the heavy pneumatic-tired roller, as directed by ENGINEER. One coverage shall be considered to represent two trips of the roller, each trip offset from the other by the width of one tire, to obtain complete area coverage. The equipment shall be operated at the speed directed by ENGINEER but in no case shall the speed exceed five miles per hour, and the normal operating speed shall not be less than 2-1/2 miles per hour.

F. When the railroad embankment thickness provides less than three feet of cover over the embankment foundation, the initial stress level shall be based upon the embankment foundation soil and will be set as directed by ENGINEER.

G. Where the operation of the heavy pneumatic-tired roller shows the subgrade to be unstable or to have non- uniform stability, CONTRACTOR shall correct the unstable areas in accordance with the provisions specified herein.

H. Observe the following requirements when unstable trench bottom materials are encountered.

1. Notify Owner when unstable materials are encountered.

a. Define by drawing station locations and limits.

2. Remove unstable trench bottom caused by CONTRACTOR failure to dewater, rainfall, or CONTRACTOR operations.

a. Replace with subgrade stabilization with no additional compensation.

3.3 SITE EXCAVATION AND GRADING

A. The site excavation and grading work includes the offsite disposition of all material:

1. That exceed quantities required for earthwork on the project.
2. That the Geotechnical engineer classifies as unclassified excavation.
3. That the Geotechnical engineer classifies as unacceptable.

4. That the Geotechnical engineer classifies as potentially contaminated.

B. Unclassified Excavation: Remove rock excavation, clay, silt, gravel, hard pan, loose shale, and loose stone as directed by Geotechnical Engineer.

C. Excavation and Grading:

1. Perform as required by the Contract Drawings.
2. Contract Drawings may indicate both existing grade and finished grade required for construction of Project.
    a. Stake all units, structures, piping, roads, parking areas and walks and establish their elevations.
    b. Perform other layout work required.
    c. Replace property corner markers to original location if disturbed or destroyed.
3. Preparation of ground surface for embankments or fills:
    a. Before fill is started, scarify to a minimum depth of 6 IN in all proposed embankment and fill areas.
    b. Where ground surface is steeper than one vertical to four horizontal, plow surface in a manner to bench and break up surface so that fill material will bind with existing surface.
4. Protection of finish grade:
    a. During construction, shape and drain embankment and excavations.
    b. Maintain ditches and drains to provide drainage at all times.
    c. Protect graded areas against action of elements prior to acceptance of work.
    d. Reestablish grade where settlement or erosion occurs.

D. Borrow:

1. Provide necessary amount of approved fill compacted to density equal to that indicated in this Specification.
2. Include cost of all borrow material in original proposal.
3. Fill material to be approved by Geotechnical Engineer prior to placement.

E. Construct embankments and fills as required by the Contract Drawings:

1. Construct embankments and fills at locations and to lines of grade indicated.
    a. Completed fill shall correspond to shape of typical cross section or contour indicated regardless of method used to show shape, size, and extent of line and grade of completed work.
    b. The tolerance for embankment construction shall be plus or minus 0.1 feet of the dimension indicated on the plans.
2. Provide approved fill material which is free from roots, organic matter, trash, frozen material, and stones having maximum dimension greater than 6 IN.
    a. Ensure that stones larger than 4 IN are not placed in upper 6 IN of fill or embankment.

b. Do not place material in layers greater than 8 IN loose thickness.

c. Place layers horizontally and compact each layer prior to placing additional fill.

3. Compact soils as required to obtain specified density. Selection of appropriate equipment is the CONTRACTOR's responsibility.

a. In general, compact cohesive soils by sheepsfoot, and granular soils by pneumatic rollers, vibrators, or by other equipment as required to obtain specified density.

b. Control moisture for each layer necessary to meet requirements of compaction.

F. Trench Excavation:

1. Excavate trenches by open cut method to depth shown on Drawings and necessary to accommodate work.

a. Support existing utility lines where proposed work crosses at a lower elevation.

1) Stabilize excavation to prevent undermining of existing utility.

b. The trenches shall be excavated to a tolerance of plus or minus 0.1 feet of the invert elevation shown on the plans.

2. Open trench outside buildings, units, and structures:

a. No more than the distance between two manholes, structures, units, or 300 LF, whichever is less.

b. Field adjust limitations as weather conditions dictate.

3. Trenching within buildings, units, or structures:

a. No more than 100 LF at any one time.

4. Any trench or portion of trench, which is opened and remains idle for seven calendar days, or longer, as determined by the Owner, may be directed to be immediately refilled, without completion of work, at no additional cost to Owner.

a. Said trench may not be reopened until Owner is satisfied that work associated with trench will be prosecuted with dispatch.

5. Observe following trenching criteria:

a. Trench size:

1) Excavate width to accommodate free working space.

2) Maximum trench width at top of pipe or conduit may not exceed outside diameter of utility service by more than the following dimensions:

OVERALL DIAMETER OF UTILITY SERVICE	*EXCESS DIMENSION*
33 IN and less	*18 IN*
more than 33 IN	*24 IN*

3) Cut trench walls vertically from bottom of trench to 1 FT above top of pipe, conduit, or utility service.

4) Keep trenches free of surface water runoff.

a) Include cost in Bid.

b) No separate payment for surface water runoff pumping will be made.

G. Trenching for Electrical Installations:

1. Observe the preceding Trench Excavation paragraph in PART 3 of this Specification Section.

2. Modify for electrical installations as follows:

a. Open no more than 600 LF of trench in exterior locations for trenches more than 12 IN but not more than 30 IN wide.

b. Any length of trench may be opened in exterior locations for trenches which are 12 IN wide or less.

c. Do not over excavate trench.

d. Cut trenches for electrical runs with minimum 30 IN cover, unless otherwise specified or shown on Drawings.

e. See Division 26 for additional requirements.

H. Grading Tolerances: As shown on Drawings.

3.4 PREPARATION OF FOUNDATION FOR PIPE LAYING

A. Over-Excavation:

1. Backfill and compact to 95 PCT of maximum dry density per ASTM D698.

2. Backfill with granular bedding material as option.

3. Bedding material shall be granular backfill identical to subballast, or a well graded crushed stone or gravel. If crushed stone or gravel is to be used, it shall conform to ASTM designation C-33, Gradation 67, or approved by Geotechnical Engineer.

a. This material shall be placed according to the typical section and compacted in layers not exceeding six (6) inches.

b. The layers are to be alternately placed to keep the same elevation on both sides of the culvert at all times.

c. Compaction under the haunches shall be accomplished by utilizing a pole or 2" x 4" timber in the small areas.

d. Hand tampers shall weigh not less than 20 pounds and have a tamping face not larger than 6" x 6". Mechanical tampers and rollers shall be used in bringing the backfill up to at least 3 feet above the culvert. They shall not strike the culverts while tamping. Smooth rollers will not be allowed in compacting fills around or over culverts.

3.5 COMPACTION DENSITY REQUIREMENTS

A. Obtain approval from Geotechnical Engineer with regard to suitability of soils and acceptable subgrade prior to subsequent operations.

B. Provide dewatering system necessary to successfully complete compaction and construction requirements.

C. Remove frozen, loose, wet, or soft material and replace with approved material as directed by Geotechnical Engineer.

D. Stabilize subgrade with well graded granular materials as directed by Geotechnical Engineer.

E. Place and assure bedding, backfill, and fill materials achieve an equal or higher degree of compaction than undisturbed materials adjacent to the work.

F. In no case shall degree of compaction below minimum compactions specified be accepted.

G. Assure by results of testing that compaction densities comply with the following requirements:

1. Sitework:

LOCATION	COMPACTION DENSITY	MOISTURE CONTENT
Under Paved Areas, Sidewalks and Piping:		
Cohesive soils	95~~PCT~~**%** per ASTM D698	-2**%** to +3~~PCT~~**%** of optimum
Cohesionless soils	95~~PCT~~**%** per ASTM ~~D4698~~***D698***	-2**%** to +3~~PCT~~**%** of optimum
Unpaved Areas:		
Cohesive soils	95~~PCT~~**%** of ASTM D698	-2**%** to +3~~PCT~~**%** of optimum
Cohesionless soils	95~~PCT~~**%** of ASTM D698	-2**%** to +3~~PCT~~**%** of optimum

2. Structures:

LOCATION	COMPACTION DENSITY	MOISTURE CONTENT
Inside of structures under foundations, under equipment support pads, under slabs-on-grade and scarified existing subgrade under fill material	95~~PCT~~**%** per ASTM D698	-2**%** to +3~~PCT~~**%** of optimum
Outside structures next to walls, piers, columns and any other structure exterior member	95~~PCT~~**%** per ASTM D698	-2**%** to +3~~PCT~~**%** of optimum

3. Specific areas:

LOCATION	COMPACTION DENSITY	MOISTURE CONTENT
Outside structures under equipment support foundations	95~~PCT~~**%** per ASTM D698	-2**%** to +3~~PCT~~**%** of optimum
Trench backfill	***95% per ASTM D698***	***-2% to +3% of optimum***

3.6 EXCAVATION, FILLING, AND BACKFILLING FOR STRUCTURES

A. General:

1. In general, work includes, but is not necessarily limited to, excavation for structures and retaining walls, removal of underground obstructions and undesirable material, backfilling, filling, ~~and fill,~~ backfill, and subgrade compaction.

2. Obtain fill and backfill material necessary to produce grades required.
    a. Materials and source to be approved by Geotechnical Engineer.
    b. Excavated material approved by Geotechnical Engineer may also be used for fill and backfill.
3. In the paragraphs of this Specification Section, the word "soil" also includes any type of rock subgrade that may be present at or below existing subgrade levels.

B. Excavation Requirements for Structures:
1. General:
    a. Do not commence excavation for foundations for structures until Geotechnical Engineer approves:
        1) The removal of topsoil and other unsuitable and undesirable material from existing subgrade.
        2) Density and moisture content of site area compacted fill material meets requirements of specifications.
        3) Site surcharge or mass fill material can be removed from entire construction site or portion thereof.
        4) Surcharge or mass fill material has been removed from construction area or portions thereof.
    b. Engineer grants approval to begin excavations.
2. Dimensions:
    a. Excavate to elevations and dimensions indicated or specified.
    b. Allow additional space as required for construction operations and inspection of foundations.
    c. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction.
    d. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
3. Removal of obstructions and undesirable materials in excavation includes, but is not necessarily limited to, removal of old foundations, existing construction, unsuitable subgrade soils, expansive type soils, and any other materials which may be concealed beneath present grade, as required to execute work indicated on Contract Drawings.
    a. If undesirable material and obstructions are encountered during excavation, remove material and replace as directed by Geotechnical Engineer.
    b. Remove unsuitable subgrade soils located below foundations. The bottom of the over excavation shall be located outside the exterior limits of foundations around the perimeter of structure the following horizontal distance:
        1) As directed by Geotechnical Engineer.

c. When excavation has reached required subgrade elevations, notify Geotechnical Engineer, who will make an inspection of conditions.

1) If Geotechnical Engineer determines that bearing materials at required subgrade elevations are unsuitable, provide Subgrade Stabilization as specified herein.

d. After the excavation, the area shall be backfilled with a suitable material and in a manner as described by ENGINEER, to the lines and grades shown on the plans.

e. After the excavation of any area, all material that enters the excavated area by sloughage, or from any other cause, shall be removed prior to backfilling. Removal of any such sloughage not caused by the operations will be included in this item.

4. Construction traffic:

a. Use backhoe and/or other low contact pressure equipment to remove the existing fill and excavate into the native soils.

b. Minimize construction traffic on native soils and saturated soils to avoid soil disturbance.

c. Repair disturbed subgrade soils prior to placing fill or construction work as directed by Geotechnical Engineer

d. Allow only minimal foot traffic on bearing soils prepared for fill or foundations.

5. Proof-roll all subgrades to receive fill or concrete placement after subgrade has been scarified and compacted.

a. Proof-roll in the presence of Geotechnical Engineer with a fully loaded tandem axle dump truck or other equipment with a minimum gross weight of 25 tons.

6. Level off bottoms of excavations to receive foundations, slabs-on-grade, ***paving, site structures,*** equipment support pads, or compacted fill.

a. Remove loose materials and bring excavations into approved condition to receive concrete or fill material.

b. Where compacted fill material must be placed to bring subgrade elevation up to underside of construction, scarify existing subgrade upon which fill material is to be placed to a depth of 6 IN and then compact to density stated in this Specification Section before fill material can be placed thereon.

c. Do not carry excavations lower than shown for foundations except as directed by Geotechnical Engineer or Engineer.

d. If any part of excavations is carried below required depth without authorization, notify Engineer and correct unauthorized excavation as directed. Corrections may include:

1) Under soil supported footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation.

a) Concrete fill may be used to bring elevations to proper position.

2) In locations other than those above, including slabs on grade and pile supported foundations, backfill and compact unauthorized excavations as specified for

authorized excavations of same classification, unless otherwise directed by Geotechnical Engineer.

3) No extra compensation will be made to CONTRACTOR for correcting unauthorized excavations.

7. Make excavations large enough for working space, forms, damp proofing, waterproofing, and inspection.

8. Notify Geotechnical Engineer and Engineer as soon as excavation is completed in order that subgrades may be inspected.

   a. Do not commence further construction until subgrade under compacted fill material, under foundations, under slabs-on-grade, under equipment support pads, and under retaining wall footings has been inspected and approved by the Geotechnical Engineer as being free of undesirable material, being of compaction density required by this specification, and being capable of supporting the allowable foundation design bearing pressures and superimposed foundation, fill, and building loads to be placed thereon.

   b. Geotechnical Engineer shall be given the opportunity to inspect subgrade below fill material both prior to and after subgrade compaction.

   c. Place fill material, foundations, retaining wall footings, slabs-on-grade, and equipment support pads as soon as weather conditions permit after excavation is completed, inspected, and approved and after forms and reinforcing are inspected and approved.

   d. Before concrete or fill material is placed, protect approved subgrade from becoming loose, wet, frozen, or soft due to weather, construction operations, or other reasons.

~~9. Dewatering:~~

~~a. Where groundwater is or is expected to be encountered during excavation, install a dewatering system to prevent softening and disturbance of subgrade below foundations and fill material, to allow foundations and fill material to be placed in the dry, and to maintain a stable excavation side slope.~~

~~b. Groundwater shall be maintained at least 3 FT below the bottom of any excavation.~~

~~c. Review Geotechnical investigation before beginning excavation and determine where groundwater is likely to be encountered during excavation.~~

~~d. Employ dewatering specialist for selecting and operating dewatering system.~~

~~e. Keep dewatering system in operation until dead load of structure exceeds possible buoyant uplift force on structure.~~

~~f. Dispose of groundwater to an area which will not interfere with construction operations or damage existing construction.~~

~~1) Install groundwater monitoring wells as necessary.~~

~~g. Shut off dewatering system at such a rate to prevent a quick upsurge of water that might weaken the subgrade.~~

9. Subgrade stabilization:

a. If subgrade under foundations, fill material, slabs-on-grade, or equipment support pads is in a frozen, loose, wet, or soft condition before construction is placed thereon, remove frozen, loose, wet, or soft material and replace with approved compacted material as directed by Geotechnical Engineer.

b. Provide compaction density of replacement material as stated in this Specification Section.

c. Loose, wet, or soft materials, when approved by Geotechnical Engineer, may be stabilized by a compacted working mat of well graded crushed stone.

d. Compact stone mat thoroughly into subgrade to avoid future migration of fines into the stone voids.

e. Remove and replace frozen materials as directed by Geotechnical Engineer.

f. Method of stabilization shall be performed as directed by Geotechnical Engineer.

g. Do not place further construction on the repaired subgrades, until the subgrades have been approved by the Geotechnical Engineer.

10. Do not place slabs-on-grade including equipment support pads until subgrade below has been approved, piping has been tested and approved, reinforcement placement has been approved, and CONTRACTOR receives approval to commence slab construction.

a. Do not place building slabs-on-grade including equipment support pads when temperature of air surrounding the slab and pads is or is expected to be below 40 DEGF before structure is completed and heated to a temperature of at least 50 DEGF.

11. Protection of structures:

a. Prevent new and existing structures from becoming damaged due to construction operations or other reasons.

b. Prevent subgrade under new and existing foundations from becoming wet and undermined during construction due to presence of surface or subsurface water or due to construction operations.

12. Shoring:

~~a. Shore, slope, or brace excavations as required to prevent them from collapsing.~~

~~b. Remove shoring as backfilling progresses but only when banks are stable and safe from caving or collapse.~~

~~c. Construct shoring that is required to retain water as part of the dewatering system, using non-permeable details such as interlock sealant for sheet piles.~~

a. See Section 31 40 00.

13. Drainage:

a. Control grading around structures so that ground is pitched to prevent water from running into excavated areas or damaging structures.

b. Maintain excavations where foundations, slabs-on-grade, equipment support pads or fill material are to be placed free of water.

c. Provide pumping required to keep excavated spaces clear of water during construction.

d. Should any water be encountered in the excavation, notify Engineer and Geotechnical Engineer.

e. Provide free discharge of water by trenches, pumps, wells, well points, or other means as necessary and drain to point of disposal that will not damage existing or new construction or interfere with construction operations.

14. Frost protection:

a. Do not place foundations, slabs-on-grade, equipment support pads, or fill material on frozen ground.

b. When freezing temperatures may be expected, do not excavate to full depth indicated, unless foundations, slabs-on-grade, equipment support pads, or fill material can be placed immediately after excavation has been completed and approved.

c. Protect excavation from frost if placing of concrete or fill is delayed.

d. Where a concrete slab is a base slab-on-grade located under and within a structure that will not be heated, protect subgrade under the slab from becoming frozen until final acceptance of the Project by the Owner.

e. Protect subgrade under foundations of a structure from becoming frozen until structure is completed and heated to a temperature of at least 50 DEGF.

C. Fill and Backfill Inside of Structure and Below Foundations, Base Slabs, Slabs-on-grade, Equipment Support Pads, and Piping:

1. General:

a. Subgrade to receive fill or backfill shall be free of undesirable material as determined by Geotechnical Engineer and scarified to a depth of 6 IN and compacted to density specified herein.

b. Surface may be stepped by at not more than 12 IN per step or may be sloped at not more than 2 PCT.

c. Do not place any fill or backfill material until subgrade under fill or backfill has been inspected and approved by Geotechnical Engineer as being free of undesirable material and compacted to specified density.

2. Obtain approval of fill and backfill material and source from Geotechnical Engineer prior to placing the material.

3. Granular fill under slabs-on-grade: Place all slabs-on-grade on a minimum of 6 IN of granular fill unless otherwise indicated.

4. Geotextile filter fabric:

a. Lap filter fabric 12 IN at splices.

b. Cover punctures and tears with an additional layer of fabric lapped 12 IN all around.

c. Do not puncture fabric with grade stakes or other items.

d. Spread the drainage material over the filter fabric in the direction of the lap splices.

5. Filter Fabric Placement for Subgrade Drains:

a. The filter fabric shall be placed at the locations shown on the plans or as directed by the ENGINEER. The surface to receive the fabric shall be prepared to a relatively smooth condition, free of obstructions, depressions, debris and soft or low density pockets of material. All holes, rips, or flaws made in the fabric shall be repaired by placing a piece of fabric, which is 1.5 feet larger than the hole in the fabric in all directions, directly over the hole before stone is placed on the fabric. The fabric shall be laid smooth and free of wrinkles, folds, or creases. The use of securing pins will not be permitted. The fabric shall be secured, if necessary, by placing large stones or bags of soil on the fabric section. All damage to the fabric during its installation or during placement of the backfill shall be replaced or repaired by the CONTRACTOR at no cost to the railroad. The fabric shall be protected from sunlight, ultra-violet light, high temperatures, dirt and debris at all times prior to installation. The filter material shall be placed on the fabric, as specified herein or as shown on the plans, immediately after fabric placement.

b. Initial placement of the fabric shall be at lowest trench grade with the succeeding strips being placed at successively higher grades. Longitudinal overlaps shall be a minimum of 12 inches.

c. Trenches to be lined with fabric shall be graded to obtain smooth side and bottom surfaces so that the fabric will not bridge cavities in the soil or be damaged by projecting rock. The fabric shall be laid flat, but not stretched on the soil, with sides folded back and secured large stones to allow for the placement of stone backfill. The backfill shall be placed and compacted to the depth shown on the plans. The filter fabric sides shall be folded across the top of the backfill with a minimum of 12 inches of overlap.

d. The fabric shall be placed, lining the drain trenches, in accordance with the lines and grades shown on the plans.

6. Fill and backfill placement:

a. Do not backfill until tests to be performed on system show system is in full compliance with specified requirements.

b. Prior to placing fill and backfill material, optimum moisture and maximum density properties for proposed material shall be obtained from Geotechnical Engineer.

c. Place fill and backfill material in maximum ~~***eight***~~***six***-inch-thick lifts or as necessary to obtain required compaction density.

d. The layers are to be alternately placed to keep the same elevation on both sides of the culvert at all times and densely compacted.

e. Compaction under the haunches shall be accomplished by utilizing a pole or 2" x 4" timber in the small areas.

f. Compact material by means of equipment of sufficient size and proper type to obtain specified density.

g. Hand place, shovel slice, and pneumatically tamp all carefully compacted backfill.

1) Hand tampers shall weigh not less than 20 pounds and have a tamping face not larger than 6" x 6".

2) Mechanical tampers and rollers shall be used in bringing the backfill up to at least 3 feet above the culvert. They shall not strike the culverts while tamping.

3) Smooth rollers will not be allowed in compacting fills around or over culverts.

h. Use light hand operated equipment for filling and backfilling within 5 FT of walls and less than 3 FT above pipes.

1) CONTRACTOR is responsible for method of compaction so as not to damage wall.

i. Do not place fill and backfill when the temperature is less than 40 DEGF and when subgrade to receive fill and backfill material is frozen, wet, loose, or soft.

j. Observe specific manufacturer's recommendations regarding backfilling and compaction.

k. Use vibratory equipment to compact granular material; do not use water.

7. Where fill material is required below foundations, place fill material, conforming to the required density and moisture content as required to fill the specified overexcavation to bottom of foundation.

D. Filling and Backfilling Outside of Structures:

1. This paragraph of this Specification applies to fill and backfill placed outside of structures above bottom level of both foundations and piping but not under paving.
2. Provide material as approved by Geotechnical Engineer for filling and backfilling outside of structures.
3. Fill and backfill placement:
   a. Prior to placing fill and backfill material, obtain optimum moisture and maximum density properties for proposed material from Geotechnical Engineer.
   b. Place fill and backfill material in thin lifts as necessary to obtain required compaction density.
   c. Compact material with equipment of proper type and size to obtain density specified.
   d. Use light hand operated equipment for filling and backfilling within 5 FT of walls and less than 3 FT above pipes.
      1) CONTRACTOR is responsible for method of compaction so as not to damage wall.
   e. Do not place fill or backfill material when temperature is less than 40 DEGF and when subgrade to receive material is frozen, wet, loose, or soft.
   f. Use vibratory equipment for compacting granular material; do not use water.
4. Backfilling against walls:
   a. Do not backfill around any part of structures until each part has reached specified 28-day compressive strength and backfill material has been approved.
   b. Do not start backfilling until concrete forms have been removed, trash removed from excavations, pointing of masonry work, concrete finishing, damp proofing and waterproofing have been completed.

c. Do not place fills against walls until slabs-on-grade at top, bottom, and at intermediate levels of walls are in place and have reached 28-day required compressive strength to prevent wall movement.

d. Bring backfill and fill up uniformly around the structures and individual walls, piers, or columns.

E. Backfilling Outside of Structures Under Piping or Paving:

1. When backfilling outside of structures requires placing backfill material under piping or paving, the material shall be placed from bottom of excavation to underside of piping or paving at the density required for fill under piping or paving as indicated in this Specification Section.

2. This compacted material shall extend transversely to the centerline of piping or paving a horizontal distance each side of the exterior edges of piping or paving equal to the depth of backfill measured from bottom of excavation to underside of piping or paving.

3. Provide special compacted bedding or compacted subgrade material under piping or paving as required by other Specification Sections for the Project.

F. Common Trench Backfill:

1. Perform in accordance with the following:

a. Place backfill in lift thicknesses capable of being compacted to densities specified.

b. Observe specific manufacturer's recommendations regarding backfilling and compaction.

c. Avoid displacing joints and appurtenances or causing any horizontal or vertical misalignment, separation, or distortion.

G. Water flushing for consolidation is not permitted.

H. Backfilling for Electrical Installations:

1. Observe the preceding Carefully Compacted Backfill paragraph or Common Trench Backfill paragraph in PART 3 of this Specification Section or when approved by the Engineer.

2. Modify for electrical installation as follows:

a. Observe notes and details on electrical drawings for fill in immediate vicinity of direct burial cables.

3.7 FIELD QUALITY CONTROL

A. All excavation, trenching, and related sheeting, bracing, etc. shall comply with the requirements of OSHA Standards, and state requirements. Where conflict between OSHA and state regulations exists, the more stringent requirements shall apply.

B. A Special Inspector shall inspect and test piles for compliance with the Specification Section.

1. Special Inspector shall be an independent geotechnical testing agency, acceptable to the Owner.

C. CONTRACTOR provides sufficient notification and access so inspection and testing can be accomplished.

D. CONTRACTOR pays for retesting of failed tests and for additional testing required when defects are discovered.

E. Responsibilities of Special Inspector:

1. Review proposed materials for fill and backfill around structures.
2. All testing, observation and work indicated as being performed by the Geotechnical Engineer in this Specification Section.
3. Services will include verification and documentation of satisfactory soil materials, subgrade quality, sampling, placement, moisture conditioning, compaction and testing of proposed soil materials, and field testing for quality control.
4. Moisture density relations, to be established by the Geotechnical Engineer required for all materials to be compacted.
5. Extent of compaction testing will be as necessary to assure compliance with specifications.
6. Make at least one field density test on subgrade and each compacted fill layer for every 2000 SQFT.
7. Prepare and submit inspection and test reports to Engineer.
    a. Coordinate such work with other Special Inspectors.
8. Test reports to include the following:
    a. Report and certification of aggregate fill and drainage fill.
    b. Test reports on borrow material.
    c. Verification of suitability of each footing subgrade material, in accordance with specified requirements.
    d. Field reports; in-place soil density and moisture tests.
    e. One optimum moisture-maximum density curve for each type of soil encountered.
    f. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.
    g. Other documentation necessary for Geotechnical Engineer to approve earthwork.
    h. Assist Engineer to determine corrective measures necessary for defective work.

F. Give minimum of 24 HR advance notice to Geotechnical Engineer when ready for compaction or subgrade testing and inspection.

G. Should any compaction density test or subgrade inspection fail to meet specification requirements, perform corrective work as necessary, at no additional expense to Owner.

H. Pay for all costs associated with corrective work and retesting resulting from failing compaction density tests.

I. Responsibilities of Testing Agency for Site Excavation and Grading:

1. All testing, observation and work indicated as being performed by the Geotechnical Engineer in other than Article 3.5 of this Specification Section.

2. Services will include verification and documentation of satisfactory soil materials, subgrade quality, sampling, placement, moisture conditioning, compaction and testing of proposed soil materials, and field testing for quality control.
3. Moisture density relations, to be established by the Geotechnical Engineer required for all materials to be compacted.
4. Extent of compaction testing will be as necessary to assure compliance with specifications.

END OF SECTION

SECTION 31 23 19

DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Dewatering system.
2. Surface water control system.
3. Water disposal.

B. Related Specification Sections include but are not necessarily limited to:

~~1. Site Grading.~~

~~2. ***Section 31 23 16- Excavation***~~

~~3. ***Section 31 23 33 - Trenching, Backfilling, and Compacting for Utilities.***~~

1. Section 31 10 00 Site Clearing.

2. Section 31 23 00 Earthwork.

1.2 PRECONSTRUCTION MEETINGS

A. Preinstallation Conference:

1. Conduct conference at the location and time determined by the County Inspector.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Installer:
   a. An experienced installer that has specialized in dewatering work.
2. Delegated Design Engineer:
   a. A professional engineer who is legally qualified to practice in the Commonwealth of Virginia where Project is located and who is experienced in providing engineering services of the type indicated.
3. Land Surveyor:
   a. A professional land surveyor who is legally qualified to practice in Commonwealth of Virginia where Project is located.

B. Permits:

1. Obtain and pay respective fees for all local, state, and federal permits required for the withdrawal, treatment, and disposal/discharge of water from the dewatering operation, prior to start of work.

1.4 DEFINITIONS

A. Dewatering:

1. Lowering of groundwater table and intercepting horizontal water seepage to prevent groundwater from entering excavations, trenches, and shafts.

2. Disposing of removed water.

B. Surface Water Control:

1. Removal of surface water within open excavations.

C. Foundations:

1. Footings, base slabs, foundation walls, mat foundations, grade beams, piers and any other support placed directly on soil or rock.

1.5 SUBMITTALS

A. Shop Drawings:

1. Dewatering plan design data and Drawings including the following:

a. Proposed type of dewatering system with complete description of equipment and instrumentation to be used.

b. Arrangement, locations, and depths of system components.

c. Pipe sizes and capacities.

d. Filter types and sizes.

e. Water disposal method and location.

f. Surface water control devices.

g. System operation, monitoring, and maintenance procedures.

h. Method of monitoring water quality.

i. Analysis data.

j. Prepared by or under the supervision of a qualified professional engineer.

k. Signed and sealed by the qualified professional engineer.

2. Product technical data including:

a. Dewatering pump data including the following:

1) Size, capacity, and means of operation of engine and motor.

b. Pumping equipment for control of surface water within excavation.

B. Field Quality-Control Submittals:

1. Field quality-control reports.

1.6 PROJECT CONDITIONS

A. Survey Work:

1. Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements.

2. Establish exact elevations at fixed points to act as benchmarks.

3. Clearly identify benchmarks and record existing elevations.

B. Site Information:

1. Data in subsurface investigation reports was used for the basis of the design.

a. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings.

b. The Owner or Engineer will not be responsible for interpretations or conclusions drawn from this data by Contractor.

2. Additional test borings and other exploratory operations may be performed by Contractor, at the Contractor's option.

a. However, no change in the Contract Sum will be authorized for such additional exploration.

3. Site data provided is not contractual and shall be considered "for information only".

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design:

1. Engage a qualified professional engineer, to design dewatering system.

B. Dewatering Performance:

1. Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of groundwater and permit excavation and construction to proceed on dry, stable subgrades.

C. Regulatory Requirements:

1. Comply with governing EPA notification regulations before beginning dewatering.

2. Comply with water- and debris-disposal regulations of authorities having jurisdiction.

3. Comply with Virginia DEQ Construction General Permit dewatering requirements and monitoring.

2.2 DEWATERING EQUIPMENT

A. Select dewatering equipment to meet specified performance requirements.

PART 3 - EXECUTION

3.1 PROTECTION

A. Erosion Control:

1. See Specification Section 31 10 00 - Site Clearing.

2. Clean paved roadways daily of any spillage of dirt, rocks or debris from vehicles and equipment entering or leaving site.

3. Conduct work to minimize erosion of site. Remove eroded material washed off site.

a. If necessary or requested by Engineer, construct stilling areas to settle and detain eroded material.

4. Protect and maintain temporary erosion and sedimentation controls, which are specified in Section 31 10 00 - Site Clearing, during dewatering operations.

B. Protect existing surface and subsurface features on-site and adjacent to site as follows:

1. Provide barricades, coverings, or other types of protection necessary to prevent damage to existing items indicated to remain in place.
2. Protect and maintain bench marks, monuments or other established reference points and property corners.
    a. If disturbed or destroyed, replace at own expense to full satisfaction of Owner and controlling agency.
3. Maintain free of damage, existing sidewalks, structures, and pavement, not indicated to be removed.
    a. Protect new and existing structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
    b. Any item known or unknown or not properly located that is inadvertently damaged shall be repaired to original condition.
    c. All repairs to be made and paid for by Contractor.
4. Provide full access to public and private premises, fire hydrants, street crossings, sidewalks and other points as designated by Owner to prevent serious interruption of travel.
5. Provide temporary grading to facilitate dewatering and control of surface water.

3.2 DEWATERING

A. Review Geotechnical investigation before beginning excavation and determine where groundwater is likely to be encountered during excavation.

B. Where groundwater is or is expected to be encountered during excavation, install a dewatering system to prevent softening and disturbance of subgrade below foundations and fill material, to allow foundations and fill material to be placed in the dry, and to maintain a stable excavation side slope.
    1. Employ dewatering specialist for selecting and operating dewatering system.
    2. Groundwater shall be maintained at least 3 feet below the bottom of any excavation.
    3. Install groundwater monitoring wells as necessary.
    4. Keep dewatering system in operation until dead load of structure exceeds possible buoyant uplift force on structure.
    5. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.

C. Place dewatering system into operation to lower water to specified levels before excavating below groundwater level.

D. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.

E. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails.

F. Operation:
    1. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.

2. Operate system to lower and control groundwater to permit excavation, construction of structures, and placement of fill materials on dry subgrades.
3. Drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
    a. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
    b. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
    c. Maintain piezometric water level a minimum of 24 inches below bottom of excavation.

G. Dispose of groundwater to an area which will not interfere with construction operations or damage existing construction.
1. Shut off dewatering system at such a rate to prevent a quick upsurge of water that might weaken the subgrade.
2. Discharge water into settling basins.

H. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

3.3 SURFACE WATER CONTROL SYSTEMS

A. Provide ditches, berms, and other devices to divert and drain surface water from excavation area as specified in Specification Section 31 10 00.

B. Divert surface water and seepage water within excavation areas into sumps and pump water in accordance with requirements of the agencies having jurisdiction.

C. Control and remove unanticipated water seepage into excavation.

END OF SECTION

NO TEXT ON THIS PAGE.

SECTION 31 23 24
FLOWABLE FILL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Flowable fill for:
    a. Structure backfill.
    b. Utility bedding.
    c. Utility backfill.
    d. Filling abandoned utilities.

B. Related Sections include but are not necessarily limited to:

1. Division 00 - Procurement and Contracting Requirements.
2. Division 01 - General Requirements.
3. ~~***Section 31 23 16 - Excavation: General building excavation.***~~
4. ~~***Section 31 23 33- Trenching: Soil and aggregate backfill for utility trenches.***~~
3. Section 31 23 00 – Earthwork.~~***: Soil back filling and compacting for earthworks.***~~

C. General conditions for this work are in accordance with Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. Reference Standards:

1. ASTM International (ASTM):
    a. C33, Standard Specification for Concrete Aggregates.
    b. C94/C94M, Standard Specification for Ready-Mixed Concrete.
    c. C150, Standard Specification for Portland Cement.
    d. C260, Standard Specification for Air-Entraining Admixtures for Concrete.
    e. C403/C403M, Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance.
    f. C494/C494M, Standard Specification for Chemical Admixtures for Concrete.
    g. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
    h. C1017/C1017M, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
    i. C1040, Standard Test Methods for Density of Unhardened and Hardened Concrete in Place By Nuclear Methods.
    j. D4832, Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.

B. Maintain a copy of each standard affecting the Work of this Section on Site.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Flowable Fill:

1. Basis of Measurement: By CU YD
2. Basis of Payment: Includes furnishing flowable fill and installing where required.

1.4 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, manhole, tank, or cable.

B. Excavatable Flowable Fill: Lean cement concrete fill used where future excavation may be required, such as fill for utility trenches, bridge abutments, and culverts.

C. Non-excavatable Flowable Fill: Lean cement concrete fill used where future excavation is not anticipated, such as fill below structure foundations and filling abandoned utilities.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Material specifications for admixtures used.

C. Aggregates: Aggregates shall be sourced from a supplier currently approved by the DOT of the State in which the project is located. The CONTRACTOR shall submit documentation for approval by the ENGINEER indicating such approval.

D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

E. Field Quality-Control Submittals:

1. Mix Design:
   a. Furnish flowable fill mix design for each specified strength.
   b. Furnish separate mix designs when admixtures are require for the following:
      1) Flowable fill Work during hot and cold weather.
      2) Air entrained flowable fill Work.
   c. Identify design mix ingredients, proportions, properties, admixtures, and tests.
2. Furnish test results to certify flowable fill mix design properties meet or exceed specified requirements.

F. Delivery Tickets:

1. Furnish duplicate delivery tickets indicating actual materials delivered to Project Site.

G. Qualifications Statements:

1. Submit qualifications for supplier.

1.6 QUALIFICATIONS

A. Supplier:

1. Company specializing in supplying products specified in this Section with minimum three years' documented experience.
2. Product source approved by VRE.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 50 00 - Temporary Facilities and Controls specifies ambient condition control facilities for product storage and installation.

B. Minimum Conditions: Do not install flowable fill during inclement weather or when ambient temperature is less than 40 degrees F.

1.8 FIELD MEASUREMENTS

A. Verify field measurements before installing flowable fill to establish quantities required to complete the Work.

PART 2 - PRODUCTS

2.1 FLOWABLE FILL

A. Flowable Fill: Excavatable type and non-excavatable type as indicated on Drawings.

2.2 MATERIALS

A. Cement, aggregate, water and admixtures shall meet the requirements of Section 03 09 00 – Concrete.

1. For fine aggregates, any clean fine aggregate with 100% passing a ⅜ inch mesh sieve and not more than 15% passing a No. 200 sieve may be used for flowable fill, other gradation requirements are waived.

2. High air generators or foaming agents may be used in lieu of conventional air entraining admixtures and shall be added at the jobsite and mixed in accordance with the manufacturer's recommendations.

B. Pozzolan shall be fly ash, silica fume or slag meeting the following requirements:

a. Fly ash shall meet the requirements of ASTM C618 (Class C or Class F). Sampling and testing of fly ash shall follow the requirements of ASTM C311.

b. Silica fume shall meet the requirements of ASTM C1240 using the referenced test methods and frequencies.

c. Slag shall meet the requirements of ASTM C989, only ground granulated blast-furnace slag Grade 100 or 120 will be permitted.

d. Fly ash and slag shall not be used in conjunction with Type IP or Type IS cements.

C. Preformed Foam to be used for cellular concrete flowable fill shall meet the requirements of ASTM C869.

D. Aggregates: Aggregates shall be sourced from a supplier currently approved by the DOT of the State in which the project is located. The CONTRACTOR shall submit documentation for approval by the ENGINEER indicating such approval.

2.3 ADMIXTURES

A. Manufacturers:

1. Substitutions: Section 01 61 00 - Common Product Requirements Acceptable Manufacturers and Products.

B. Air Entrainment: ASTM C260.

C. Chemical Admixture: ASTM C494/C494M.

D. Fly Ash: ASTM C618 Class C or F obtained from residue of electric generating plant using ground or powdered coal.

E. Plasticizing: ASTM C1017/C1017M Type I, plasticizing.

2.4 MIXES

A. Mix and deliver flowable fill according to ASTM C94/C94M, Option C.

B. Flowable Fill Design Mix:

ITEM	EXCAVATABLE	NON-EXCAVATABLE
Cement Content	75 to 100 pound/CUYD	75 to 100 pound/CUYD
Fly Ash Content	None	150-600 pcf
Water Content	As specified	As specified
Air Entrainment	5 to 35%	5 to 15%
28-Day Compressive Strength	Maximum 100 psi.	Minimum 125 psi
Unit Mass (Wet)	90 to 110 pcf	100 to 125 pcf
Temperature, Minimum at Point of Delivery	50 degrees F	50 degrees F

C. Provide water content in design mix to produce self-leveling, flowable fill material at time of placement.

D. Design mix air entrainment and unit mass are for laboratory design mix and source quality control only.

2.5 SOURCE QUALITY CONTROL

A. Test and analyze properties of flowable fill design mix and certify results for the following:

1. Design mix proportions by weight of each material.
2. Aggregate: ASTM C33 for material properties and gradation.
3. Properties of plastic flowable fill design mix including:
    a. Temperature.
    b. Slump.
    c. Air entrainment.
    d. Wet unit mass.
    e. Yield.
    f. Cement factor.
4. Properties of hardened flowable fill design mix including:
    a. Compressive strength at one day, seven days, and 28 days. Report compressive strength of each specimen and average specimen compressive strength.
    b. Unit mass for each specimen and average specimen unit mass at time of compressive strength testing.

B. Prepare delivery tickets containing the following information:

1. Project designation.
2. Date.
3. Time.
4. Class and quantity of flowable fill.
5. Actual batch proportions.
6. Free moisture content of aggregate.
7. Quantity of water withheld.

2.6 HANDLING AND STORING MATERIAL

A. Material shall be handled and stored per manufacturer's recommendations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify excavation specified in ***Section 31 23 00*** ~~Section 31 23 16~~ or trenching specified in ***Section 31 23 00*** ~~Section 31 23 33~~ is complete.

B. Verify utility installation is complete and tested before placing flowable fill.

C. Verify excavation is dry and dewatering system is operating.

3.2 PREPARATION

A. Support and restrain utilities to prevent movement and flotation during installation of flowable fill.

B. Protect structures and utilities from damage caused by hydraulic pressure of flowable fill before fill hardens.

C. Protect utilities and foundation drains to prevent intrusion of flowable fill.

3.3 INSTALLATION

A. Delivery: Deliver flowable fill using concrete construction equipment.

B. Fill, Bedding, and Backfill:

1. Place flowable fill by chute, pumping or other methods approved by ENGINEER.
   a. When required, place flowable fill under water using tremie procedure.
   b. Do not place flowable fill through flowing water.
2. Place flowable fill in lifts to prevent lateral pressures from exceeding structural capacity of structures and utilities.
3. Place flowable fill evenly on both sides of utilities to maintain alignment.
4. Place flowable fill to elevations indicated on Drawings without vibration or other means of compaction.
5. Protect flowable fill from freezing for a period of 36 hours after placement.

6. Use straps, soil anchors, or other approved means of restraint to ensure correct alignment when flowable fill is used as backfill for pipe or where flotation or misalignment may occur.
7. Leave the fill undisturbed until the material obtains sufficient strength. Sufficient strength is 35 psi penetration resistance as measured using a hand held penetrometer in accordance with ASTM C403. Provide a hand held penetrometer to measure the penetration resistance of the hardened flowable fill.

C. Filling Abandoned Utilities:

1. Verify pipes and conduits are not clogged and are sufficiently empty to permit gravity installation of flowable fill for entire length indicated to be filled.
2. Seal lower end of pipes and conduits by method to contain flowable fill and to vent trapped air caused by filling operations.
3. Place flowable fill using method to ensure there are no voids.
   a. Fill pipes and conduits from high end.
   b. Fill manholes, tanks, and other structures from grade level access points.
4. After filling pipes and conduits seal both ends.

3.4 FIELD QUALITY CONTROL

A. Perform inspection and testing according to ASTM C94/C94M.

1. Take samples for tests for every 150 cubic yards of flowable fill, or fraction thereof, installed each day.
2. Sample, prepare and test four compressive strength test cylinders according to ASTM D4832. Test one specimen at three days, one at seven days, and two at 28 days.
3. Measure temperature at point of delivery when samples are prepared.

B. Perform in place penetration (density) tests using hand held penetrometer to measure penetration resistance of hardened flowable fill according to ASTM C403.

1. Perform tests at locations as directed by the ENGINEER.
2. Perform in-place density tests using nuclear test device according to ASTM C1040.
3. Perform tests at locations as directed by the ENGINEER.

C. Defective Flowable Fill: Fill failing to meet the following test requirements or fill delivered without the following documentation.

1. Test Requirements:
   a. Minimum temperature at point of delivery.
   b. Compressive strength requirements for each type of fill.
2. Documentation: Duplicate delivery tickets.

3.5 ACCEPTANCE

A. Acceptance will be based on the following documentation and a minimum temperature of flowable fill at the point of delivery of 50° F. For each load of flowable fill delivered to the worksite, furnish a delivery ticket to the ENGINEER containing the following information:

1. Project designation, including prefix and milepost
2. Date
3. Time
4. Class and quantity of flowable fill
5. Actual batch proportions
6. Free moisture content of aggregates
7. Quantity of water withheld

3.6 CLEANING

A. Remove spilled and excess flowable fill from Project Site.

B. Restore facilities and Site areas damaged or contaminated by flowable fill installation to existing condition before installation.

END OF SECTION

NO TEXT ON THIS PAGE.

SECTION 31 40 00
SHORING AND UNDERPINNING

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers design, construction, maintenance and removal of cofferdams for marine construction and/or for structure excavation, along with other types of braced excavation.

B. General conditions for this work are in accordance with Division 1 of these Specifications.

1.2 RELATED SECTIONS

A. Sections which directly relate to the work of this Section include:

1. Section 03 05 05 – CONCRETE TESTING AND INSPECTION
2. Section 03 09 00 – CONCRETE
3. Section 03 31 30 – CONCRETE, MATERIALS AND PROPORTIONING
4. Section 03 21 00 – REINFORCEMENT
5. Section 05 12 00 – STRUCTURAL STEEL

1.3 QUALITY ASSURANCE

A. CONTRACTOR Qualifications:

1. CONTRACTOR who specializes in installation of earth retention systems such as that proposed.

2. Minimum five years of experience in earth retention system installation.

3. Employ or retain services of a Specialty Structural Engineer with knowledge in earth retention system design and a minimum of five years of experience in systems as proposed for this project.

B. Assume complete responsibility for design, installation, and maintenance in addition to damage resulting from installation or performance of earth retention system.

C. Engineer Qualifications:

1. Comply with Section 01 33 00, Submittal Procedure requirements.

D. Carefully examine site and verify elevations of existing footings of adjacent buildings and invert elevations of underground utility lines.

E. Standards:

1. Post Tensioning Institute (PTI):

a. Guide specification for post tensioning materials.

b. Recommendation for prestressed rock and soil anchors.

2. American Institute of Steel Construction (AISC):

a. Specifications for design, fabrication and erection of structural steel for buildings.

b. Code of standard practice for steel buildings.

3. ***American Welding Society (AWS):***
   a. ***AWS D1.1, structural welding code - steel.***
4. ***ASTM International (ASTM): Standards indicated.***
5. ***Structural Steel Painting Council (SSPC): Standards indicated.***
6. ***American Wood Preservers Association (AWPA).***

F. Design Criteria:

1. ***Provide earth retention system which will safely withstand earth pressures and limit settlement of surrounding structures to maximum 1/4 inches vertically and laterally.***
2. ***Earth retention systems shall utilize effectively prestressed tie backs or earth anchors to minimize lateral earth deflection.***
3. ***Earth pressures used for the design of the earth retention system shall be determined by recognized principles of soils mechanics and shall be acceptable to the Owner's Geotechnical Engineer.***
4. ***Design, installation and grouting of earth retention system to follow recommendations of Post Tensioning Institute's "Recommendations for Prestressed Rock and Soil Anchors".***
5. ***Consider long term effects, including creep and relaxation in anchor design such that lateral movement of finished wall is less than 1/4 inches during service life of structure.***
6. ***Global Earth Stability:***
   a. ***The earth retention design engineer shall evaluate the excavation for global slope stability.***
   b. ***Demonstrate by calculation that an appropriate factor of safety will exist or be provided by the earth retention system for all conditions or imposed loads.***
   c. ***Appropriate soil properties to be used for the analysis shall be determined by the project Geotechnical Engineer.***
   d. ***Analysis shall conform to the US Army Corps of Engineers Engineer Manual 1110-2-1902***

G. Testing:

1. ***Proof test tie-back anchors in accordance with Post Tensioning Institute's "Recommendations for Prestressed Rock and Soil Anchors" to verify their load carrying capabilities.***
2. ***Ten percent of permanent anchors shall be performance tested to at least 1.5 times design working load; and 10% of temporary anchors to at least 1.35 times design working load in accordance with referenced PTI standard.***

H. Monitoring:

1. ***CONTRACTOR shall employ a qualified geotechnical consultant familiar with soil conditions at the site who shall install three-dimensional survey monitoring instrumentation as required to observe movement of earth retention system and adjacent structures.***
   a. ***CSX track shall be continuously monitored. If track movement occurs, work must stop, and the ENGINEER shall be notified immediately. The CONTRACTOR must propose an alternate procedure for ENGINEER approval before proceeding.***

2. Geotechnical consultant shall report measured movements of earth retention system, CSX track, and adjacent structures to CONTRACTOR, Owner, and CM on a weekly basis until monitoring systems are no longer necessary as deemed acceptable by Geotechnical consultant.

3. If movements are recorded that are larger than anticipated or projected, provide necessary support to reduce movements to acceptable level.

I. Inspection:

1. Specialty Structural Engineer shall observe work in progress to see that design is being followed and design criteria are being met.

2. After construction of earth retention system is complete, Specialty Structural Engineer shall verify correctness of installation and inform Architect.

1.4 SUBMITTALS

A. The CONTRACTOR shall prepare and deliver technical submittals for review and approval of the ENGINEER. All submittals must be approved before related work may begin. Listed below are submittals required for this item of work, additional submittals may be required due to site conditions or the nature of the work. In order to maintain correspondence records each submittal shall be assigned a submittal number and transmittal number for use by the CONTRACTOR and the ENGINEER.

1. Temporary Waterway Diversion Structure, if applicable;
2. Design calculations for the cofferdam and or other braced excavation, and any temporary waterway diversion structure required for the work, signed and sealed by a Professional Engineer licensed in the Commonwealth, District, State or Province where work is to be performed. Shoring for railway Live Load shall be designed to resist a vertical live load surcharge of 1800 lbs. per square foot, in addition to active earth pressure. The surcharge shall be assumed to act on a continuous strip, 8'-6" wide. Lateral pressures due to surcharge shall be computed using the strip load formula shown in the AREMA MRE. Allowable stresses in materials shall be in accordance with AREMA recommendations.
3. Erection drawings and construction procedure detailing the proposed method of cofferdam and/or braced excavation construction and other details not fully shown in the Contract Drawings. Such drawings shall be signed and sealed by a Professional Engineer licensed in the Commonwealth, District, State or Province where work is to be performed, and approved by the ENGINEER before construction is started.

PART 2 - PRODUCTS

2.1 GENERAL

A. All materials shall be new materials meeting the requirements of the related sections listed above.

B. Any used material proposed shall be in good condition, free of section loss, or other defects and approved by the ENGINEER.

2.2 HANDLING AND STORING MATERIALS

A. All materials shall be handled and stored according to manufacturer's recommendation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Preferred protection is the cofferdam type that completely encloses the excavation. Where dictated by conditions, partial cofferdams with open sides away from the track may be used. Cofferdams shall be constructed using steel sheet piling or steel soldier beams with timber lagging. Wales and struts shall be provided as needed.

B. Safety railing meeting the requirements of 29 CFR 1910.23 shall be installed when temporary shoring is within 12 feet of track, or depth is greater than 6 feet.

C. A minimum distance of 10 feet from centerline of the track to face of nearest point of shoring shall be maintained.

D. Cofferdams shall be constructed to keep the excavations free from earth, water, ice, or snow, and to permit excavations to be carried to the depths indicated on the plans. Additional bracing may be required to satisfactorily perform excavation, dewatering, and other required construction operations. Permanent sheeting system shall be returned to its intended condition after all cofferdam equipment and material, including any additional bracing, has been removed.

E. Cofferdams shall be designed, inspected daily, and maintained in compliance with the applicable requirements of 29 CFR 1926.651, 1926.652, and 1926.802.

F. Shoring protection shall be provided when excavating adjacent to an active railroad track, except as noted below. Shoring will not be required if both the following conditions are satisfied:

1. Excavation does not encroach upon a 1 horizontal: 1 vertical theoretical slope line starting at the bottom of the near end of the tie (approximately 4’-3” from centerline of the track).

2. Track is on level ground or in a cut section and on stable soil.

G. Dewatering equipment and any additional bracing shall be of adequate quality and capacity and shall be so arranged as to permit their proper functioning in connection with the cofferdam. Dewatering equipment and bracing shall be so located to permit construction of the structure in accordance with the plans.

H. All damage caused by the failure of a cofferdam to perform its proper functions shall be the responsibility of the CONTRACTOR. It shall also be the CONTRACTOR’s responsibility to protect all stream banks from erosion by reason of restriction of the channel caused by the erection of the cofferdam to limits greater than that shown on the plans for the CONTRACTOR’s own convenience. In that situation, bank restoration shall be at the CONTRACTOR’ own expense. The ENGINEER shall approve all repair methods proposed by the CONTRACTOR prior to the CONTRACTOR beginning any remedial activities for which they are liable.

I. It shall be the CONTRACTOR’s responsibility to place the cofferdam so that it will not interfere with any substructure components.

J. CONTRACTOR shall provide and maintain COFFERDAM access.

K. The CONTRACTOR shall establish and maintain a sediment removal area(s) to retain the discharge for a sufficient period of time using equivalent best management practices as approved by the ENGINEER, in order that any discharge entering the stream will be as clear as the flowing stream.

L. The CONTRACTOR shall fully remove cofferdam installation or the waterway diversion structure, including anchor spuds if used, after such time that it is determined by the ENGINEER to be no longer necessary. The removal shall be sequenced to minimize turbidity and the discharge of materials into the waterway. Additional temporary erosion control measures, as determined by the ENGINEER, may need to be employed to facilitate removal.

END OF SECTION

SECTION 32 91 13

TOPSOILING AND FINISHED GRADING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. This section covers work necessary to prepare soils for foundation bearing pressures. It includes preparation of the excavated soil strata to receive spread footings, cast-in-place culverts, precast culverts and pipes and other soil areas for which bearing capacity must be evaluated to determine potential settlement under proposed man-made loading conditions.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Procurement and Contracting Requirements.
2. Division 01 - General Requirements.
3. Section 31 10 00 - Site Clearing.
4. Section 31 23 00 - Earthwork.
5. ~~*Section 31 25 00 - Soil Erosion and Sediment Control.*~~
5. Section 32 92 00 - Seeding, Sodding and Landscaping.

C. Location of Work: All areas within limits of grading and all areas outside limits of grading which are disturbed in the course of the work.

1.2 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

B. Submittals: The CONTRACTOR shall prepare and deliver technical submittals for review and approval of the ENGINEER. All submittals must be approved before related work may begin. Listed below are submittals required for this item of work, additional submittals may be required due to site conditions or the nature of the work. In order to maintain correspondence records each submittal shall be assigned a submittal number and transmittal number for use by the CONTRACTOR and the ENGINEER.

1. Material specifications and or certifications
2. Installation plan

C. Alternate Plans: CONTRACTOR shall furnish one (1) complete electronic copy of detailed alternate plans including construction sequence prepared by a geotechnical engineer, licensed in the state where the Project is located, for approval prior to starting installation. By approving and submitting alternate plans, the CONTRACTOR thereby represents that all field measurements, field construction criteria, materials, catalog numbers and similar data have been determined and verified, and that the alternate plans have been checked and coordinated with the requirements of the work and of the contract documents. After approval of alternate plans, the CONTRACTOR shall supply the RAILROAD with one (1) complete electronic set of reproducible approved drawings.

1.3 SITE CONDITIONS

A. Verify amount of topsoil stockpiled and determine amount of additional topsoil, if necessary to complete work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil:

1. Original surface soil typical of the area.
2. Existing topsoil stockpiled under Specification Section 31 10 00.
3. Friable, loamy soil capable of supporting native plant growth.
4. Reasonably free of subsoil, clay lumps, brush, roots, weeds or other objectionable vegetation, stones or similar objects larger than one inch in any dimension, litter, or other materials unsuitable or harmful to plant growth, and shall not contain less than 5% nor more than 20% organic matter, as determined by current AASHTO Designation T-194.

B. Foundation conditioning materials may include but are not limited to fine aggregates, large aggregates, injectable grouts, pozzolans and other cementitious materials and geotextiles. The Project Geotechnical Engineer will provide a detailed list of recommended materials to accomplish the required increase in soil bearing capacity.

2.2 TOLERANCES

A. Finish Grading Tolerance: ±0.1 FT from required elevations.

PART 3 - EXECUTION

3.1 GENERAL

A. The CONTRACTOR shall install the foundation soil conditioning materials in accordance with the plans and sequence of construction provided with the Contract Documents or the approved alternate plans.

B. The CONTRACTOR shall employ a geotechnical Professional Engineer licensed in the Commonwealth, District, State, or Province where the work is to be performed to monitor the installation and provide certified As-Built plans indicating the installation was performed in accordance with the approved construction plans. The cost of such monitoring shall be incidental to the work.

3.2 PREPARATION

A. Correct, adjust and/or repair rough graded areas.

1. Cut off mounds and ridges.
2. Fill gullies and depressions.
3. Perform other necessary repairs.
4. Bring all sub-grades to specified contours, even and properly compacted.

B. Loosen surface to depth of 2 IN, minimum.

C. Remove all stones and debris over 2 IN in any dimension.

3.3 ROUGH GRADE REVIEW

A. Reviewed by Engineer in Specification Section 31 10 00.

3.4 PLACING TOPSOIL

A. Do not place when subgrade is wet or frozen enough to cause clodding.

B. Spread and lightly compact to a depth of 4 IN for all disturbed earth areas.

C. If topsoil stockpiled is less than amount required for work, furnish additional topsoil at no cost to Owner.

D. Provide finished surface free of stones, sticks, or other material 1 IN 3/8 IN or more in any dimension.

E. Provide finished surface smooth and true to required grades.

F. It shall then be compacted by means of a roller weighing not more than 120 pounds per foot width. Immediately prior to placing of the topsoil, the area shall be wetted thoroughly.

G. Restore stockpile area to condition of rest of finished work.

3.5 ACCEPTANCE

A. Upon completion of topsoiling, obtain Engineer's acceptance of grade and surface.

B. Make test holes where directed to verify proper placement and thickness of topsoil.

END OF SECTION

NO TEXT ON THIS PAGE.

SECTION 33 40 00

STORM DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Storm drainage systems.
2. Storm drainage pipe.
3. Inlets, headwalls, flumes and flared end sections.

B. Related Specification Sections include but are not necessarily limited to:

1. Section ***31 23 00 - Earthwork*** ~~***31 23 33 - Trenching, Backfilling, and Compacting for Utilities***~~***.***

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Association of State Highway and Transportation Officials (AASHTO):
   a. M36, Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains (Equivalent ASTM A760/A760M).
   b. M190, Standard Specification for Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches.
2. ASTM International (ASTM):
   a. A760/A760M, Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains.
   b. C14, Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.
   c. C76, Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
   d. C361, Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
   e. F2510/F2510M, Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures and Corrugated Dual- and Triple-Wall Polyethylene and Polypropylene Pipes.
   f. F2648/F2648M, Standard Specification for 2 to 60 IN (50 to 1500 MM) Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications.
3. Standard Specifications for Road and Bridge Construction for the State of Virginia:
   a. Standard Details.

1.3 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

2. Product technical data including:
    a. Acknowledgement that products submitted meet requirements of standards referenced.
3. Certifications.
4. Test reports.
5. Submit all tests and certification in a single coordinated submittal.
    a. Partial submittals will not be accepted.

B. Submit schedules and details for structures and joints.

1.4 WARRANTY

A. Warrant that the infiltration will not exceed the amount specified in the Exfiltration Test paragraph in the FIELD QUALITY CONTROL Article in PART 3 of this Specification Section during the one year correction period.

PART 2 - PRODUCTS

2.1 MATERIALS

A. RCP Joint Sealer:
    1. Rubber gasket: ASTM C361.

B. Flared End Sections:
    1. Conform to State of Virginia Specifications.
    2. Bituminous coated: AASHTO M190, Type A.
    3. Jointing: Same as pipe.

C. High Density Polyethylene Pipe (HDPE):
    1. ASTM F2648/F2648M.
    2. ASTM F2510/F2510M.

D. CMP Joint Sealer:
    1. Cold applied asphalt joint compound.
    2. Preformed flexible pipe joint sealing compound.

E. Concrete and Reinforcement for Inlets, Manholes, Junction Boxes, Headwalls, and Flumes:
    1. Conform to Drawings and Details.

F. Concrete and Reinforcement for Concrete Flared End Sections:
    1. Conform to Drawings and Details.

PART 3 - EXECUTION

3.1 PREPARATION

A. Comply with Specification ***Section 31 23 00***. ~~***Section 31 23 33.***~~

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Pipe shall be placed in accordance with AREMA recommendations Installation of Pipe Chapter 1, Part 4, latest version.

C. Comply with Specification ***Section 31 23 00***. ~~***Section 31 23 33.***~~

3.3 FIELD QUALITY CONTROL

A. Verify and coordinate installation.

B. Exfiltration Test:

1. Perform an exfiltration test on each reach of sewer between manholes.
    a. Test the first reach after backfilling and prior to installing any of the remaining pipe, or any additional reach.
    b. Single or multiple reaches may be tested thereafter, at Contractor's option.
    c. Subject each manhole to at least one test.
    d. Provide all necessary piping between the reach to be tested and the water supply, and other necessary materials and equipment.
    e. Air testing may be allowed.
        1) Submit complete information to Engineer for review describing the proposed test method, scheduling, and duration, including the method of testing manholes before beginning testing.
2. Procedure:
    a. Block off all manhole openings, except those connecting with the reach being tested.
    b. Fill the line.
        1) Average depth: 10 FT above invert, except as required by manhole depth.
        2) Depth at lower end: 25 FT maximum above crown.
        3) Depth at upper end: 5 FT minimum above crown.
    c. Add and measure water as required to maintain a constant level.
        1) Exfiltration: 100 GAL maximum per inch of nominal diameter per mile per day.
        2) Manholes are considered section of 48 IN pipe.
    d. Maintain test for at least 2 HRS, or as long as necessary in Engineer's opinion, to locate all leaks.
3. Repair and retest any reach that exceeds the allowable exfiltration.
4. Pipes, culverts and sealants shall be inspected and approved by the Engineer before any backfill is placed.
5. Any culvert found to be vertically or horizontally out of alignment, deformed, or structurally damaged shall be taken up and re-laid at no extra cost.

C. Infiltration Test:

1. If at any time prior to expiration of the correction or warranty period infiltration exceeds 200 GAL/IN of nominal diameter/mile/day, locate the leaks and make repairs.

D. In case of conflict, do not relocate piping without prior approval from the Engineer.

END OF SECTION

SECTION 33 41 00

SUBDRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Foundation drain systems.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 31 23 00 - Earthwork.

~~2. ***Section 31 23 33 - Trenching, Backfilling, and Compacting for Utilities.***~~

2. Section 33 40 00 - Storm Drainage System.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Association of State Highway and Transportation Officials (AASHTO):
   a. M278, Standard Specification for Class PS46 Polyvinyl Chloride (PVC) Pipe.
2. ASTM International (ASTM):
   a. C14, Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.
   b. C444, Standard Specification for Perforated Concrete Pipe.
   c. D3034, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

1.3 SYSTEM DESCRIPTION

A. Foundation Drainage System:

1. System which drains by gravity, connects to and drains into storm drain system as shown on Drawings.

1.4 SUBMITTALS

A. Shop Drawings:

1. Fabrication and/or layout drawings:
   a. Layout diagram of drainage system(s).
2. Product technical data including:
   a. Acknowledgement that products submitted meet requirements of standards referenced.
   b. Manufacturer's installation instructions.
   c. Type, size and manufacturer of drain pipe.
   d. Type, size and gradation of filter material.
   e. Type and manufacturer of filter fabric.

3. Certifications.
4. Test reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Filter fabric:
   a. Mirafi 140N by Mirafi Inc.
   b. US 120NW by US Fabrics, Inc.

2.2 DRAIN PIPE

A. Drain Pipe:

1. Inside diameter: 4, 6, 8, 12 inches.
2. Provide fittings so that thickness, weight, material and quality correspond to that of the drain pipe approved for use.
   a. Perforated concrete pipe:
      1) ASTM C444, Type I or II, and all applicable requirements of ASTM C14, Class 1.
   b. PVC pipe:
      1) ASTM D3034, SDR 35.
      2) Perforations in accordance with AASHTO M278, except perforations not to be greater than 5/16 inches diameter.

B. Filter Material: Graded gravel or crushed stone meeting the following sieve analysis:

SIEVE SIZE	PERCENT PASSING
1 inches	95 - 100
3/8 inches	20 - 85
No.10	0 - 10
No.200	0 - 3

C. Filter Fabric:

1. Nonwoven polypropylene fabric.
2. Not less than 4 oz/SY.
3. Resistant to the chemical actions of the soil and water and nonbiodegradable.
4. Fabric to prevent the migration of soil particles into the filter material while allowing the free flow of water from the subsoil to the drain pipe.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lay filter fabric with 12 inches minimum laps at splices.

1. Spread filter material in same direction as fabric overlap.
2. Patch tears and holes in fabric with piece of same fabric material large enough to cover the tear or hole plus a 12 inches overlap.
3. The fabric shall be protected from sunlight, ultra-violet light, high temperatures, dirt and debris at all times prior to installation. The filter material shall be placed on the fabric immediately after fabric placement.
4. Initial placement of the fabric shall be at lowest trench grade with the succeeding strips being placed at successively higher grades. Longitudinal overlaps shall be a minimum of 12 inches.
5. Trenches to be lined with fabric shall be graded to obtain smooth side and bottom surfaces so that the fabric will not bridge cavities in the soil or be damaged by projecting rock. The fabric shall be laid flat, but not stretched on the soil, with sides folded back and secured large stones to allow for the placement of stone backfill. The backfill shall be placed and compacted to the depth shown on the plans. The filter fabric sides shall be folded across the top of the backfill with a minimum of 12 inches of overlap.
6. The fabric shall be placed, lining the drain trenches, in accordance with the lines and grades shown on the plans.

B. Lay drain pipe lines firmly bedded in filter material to true grades and alignment with invert elevation shown on Drawings.

1. Unless indicated otherwise on Drawings, install pipes level to point of discharge with perforations down and joints closed.
2. Make joints with sleeve type couplings or tapered couplings.
3. Provide couplings suitable for holding pipe firmly in alignment without use of sealing compounds or gaskets.
4. Face bells upgrade away from point of discharge.
5. Use 1/8 bends for change in direction; use Y fittings at intersections.

C. Test drain lines with water to assure free flow before covering.

1. Remove obstructions and retest until satisfactory.

D. Provide filter material around drain pipes of depths and thicknesses shown on Drawings.

1. Compact filter material with vibrator tamper to density required to preclude settlement and to avoid damage to drain pipe and to filter fabric.
2. Avoid damage to foundation.

E. Install standard pipe (nonperforated) to catch basin in accordance with requirements of Specification Section 33 40 00.

END OF SECTION