CITY OF CHARLOTTESVILLE
BOARD OF ARCHITECTURAL REVIEW
STAFF MEMO
December 21, 2021

Update: Corners and Slip Joints for MSE walls
BAR 17-08-02
Belmont Bridge
City of Charlottesville, Owner/Applicant
Belmont Bridge

Background

The Belmont Bridge, constructed in 1962, is located in the Downton ADC District and provides vehicular and pedestrian crossing over the BBRR/CSX rail lines, Avon Street, and Water Street. Due to deterioration, replacing the bridge has long been one of the city's transportation priorities. Now fully funded, construction is underway with completion expected in 2022/2023.

Prior BAR Actions

September 18, 2018: Approval of the design with the following conditions:

- Approve the horizontal concept of the MSE panels; BAR requests further development of this design, which must come back to the BAR for approval
- Denial of the use of brick [whether faux or actual] on the east side of the bridge [on abutment, north of Water Street]
- Request to see an existing example of the proposed street light [Applicant will advise on location in Northern Virginia where this fixture type is installed.]
- Request that applicant revisit details on the stairs—the south stairs particularly--to create more fluidity and cohesion with the rest of the design concept for the bridge.

http://weblink.charlottesville.org/public/0/edoc/724633/BAR_Belmont%20Bridge_Aug%202017.pdf

August 20, 2019: BAR approved CoA as follows: proposed bridge, lighting and site work satisfy the BAR's criteria and are compatible with this property and other properties in the Downtown ADC District, and that the BAR approves the application with the following additions.

- That the striations will wrap the corners at the abutment, and should appear cut at any obstructions as discussed;*
- That lamping for the pole lights will have a minimum 80 color rendering index (CRI), although 90 is preferred;
- The BAR strongly recommends review of the overhang at the knuckle to reduce the perceived heaviness of the beam, and to visually separate the beam from the parapet;
- The BAR to provide advisory review of the special provision for the concrete panels for the retaining wall system.

* Specifically:
A) At the two corners of the south abutment the striation pattern of the panels on the east and west walls will appear to wrap the corner onto the abutment wall under bridge; and B) where the striated wall panels meet the sloped parapet (above), the ground level (at the base), and an obstruction (a different, non-striated element that has been inserted onto or through the vertical plane of the striated wall--for example, the stairs and the bike/ped tunnels) the

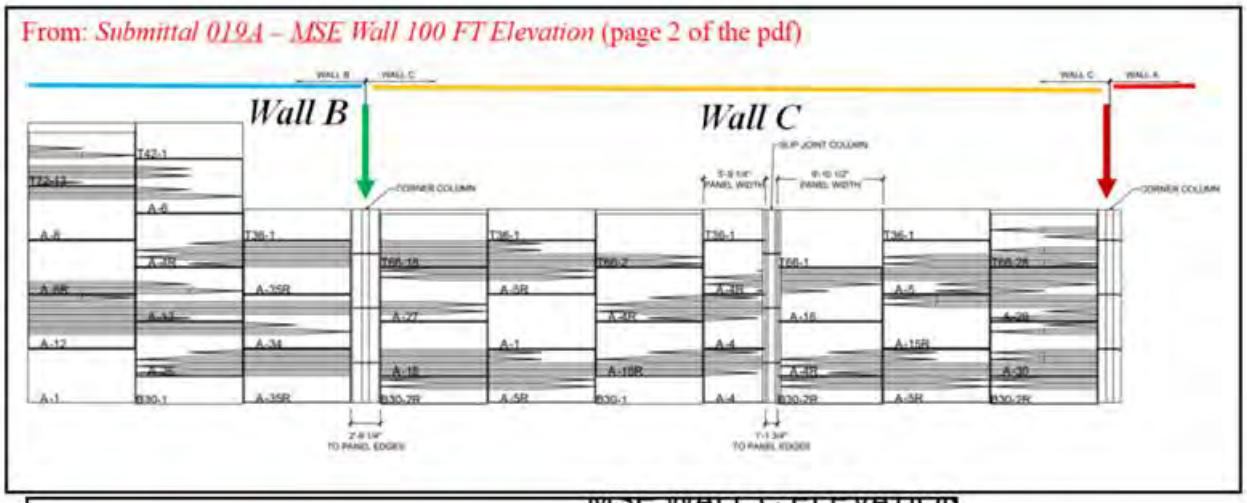
striation pattern will terminate as if cut, similar to a natural, exposed rock outcropping if cut for a road or bored into for an opening. Note: Refer to slides #3 and 19 of the presentation.
http://weblink.charlottesville.org/public/0/edoc/791520/BAR_Belmont%20Bridge_August2019.pdf

Information for Discission
Submittal 019A – MSE Wall 100 FT Elevation.

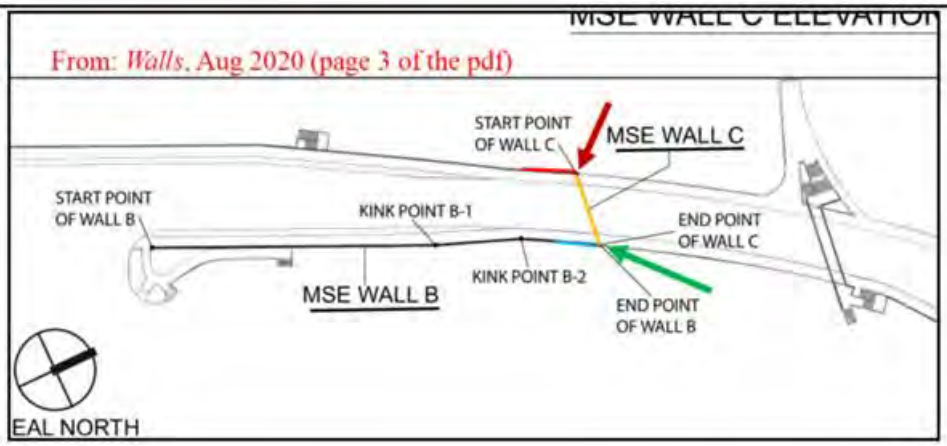
The BAR approved the bridge design with a condition that the striations *wrap the corners at the abutment.* The engineers have determined that this cannot be done with the MSE walls. (A mitered corner piece would undermine the structural integrity of the retaining wall.) The solution requires a separate *corner column*, so the striations will not appear continuous. We have a similar situation along the length of the walls, with the solution being a series of *slip joint columns.*

For reference, see wall elevations from the August 2020 BAR discussion—attached. The *new* elevation shows a section of the new bridge abutment on the east side, south of the RR tracks. (Image below is of the current bridge but helps visualize what is shown in the new elevation.)

From: *Submittal 019A – MSE Wall 100 FT Elevation* (page 2 of the pdf)



From: *Walls*, Aug 2020 (page 3 of the pdf)



CATON CONSTRUCTION GROUP

TRANSMITTAL

To: City of Charlottesville
610 East Market Street P.O Box 911
Charlottesville, VA 22902
Attn: Mr. Jeanette Janiczek

Date: 11/22/2021
Project: Belmont Bridge/20-11
Project No: 0020-104-101, C501
Re: Submittal 019A - MSE Wall 100 FT Elevation

We are sending you:

_____ Shop Drawings _____ Prints _____ Plans X Submittals

_____ Change Order _____ Copy of Letter _____ Samples _____ Specifications

Original Copies	Date	Rev.	Description
1	11/22/2021		RECO's MSE Wall 100 ft Elevation and additional comments.

X For Approval
_____ For Your Use
X As Requested
_____ For Information
_____ For Bids Due on:

X For Review and Comment
_____ Approved As Submitted
_____ Approved As Noted
_____ For Record

_____ Resubmit _____ Copies For Approval
_____ Return _____ Corrected Prints
_____ Returned for Corrections

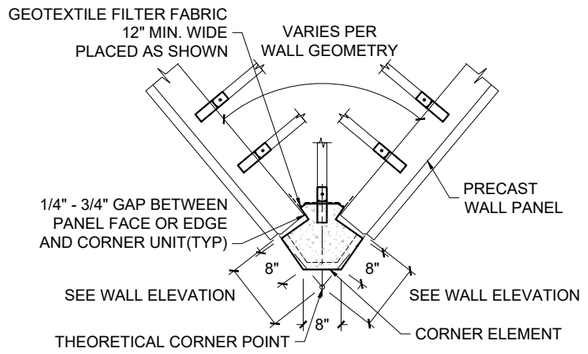
Remarks:

Sincerely,

CC:
Project Team
Grant Walker
Project Manager

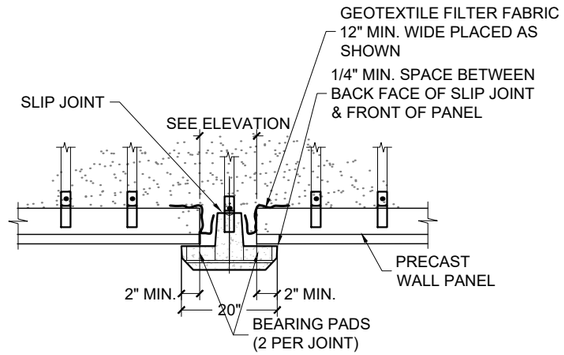
CCG

By: Vikas Gumte
Title: Project Engineer



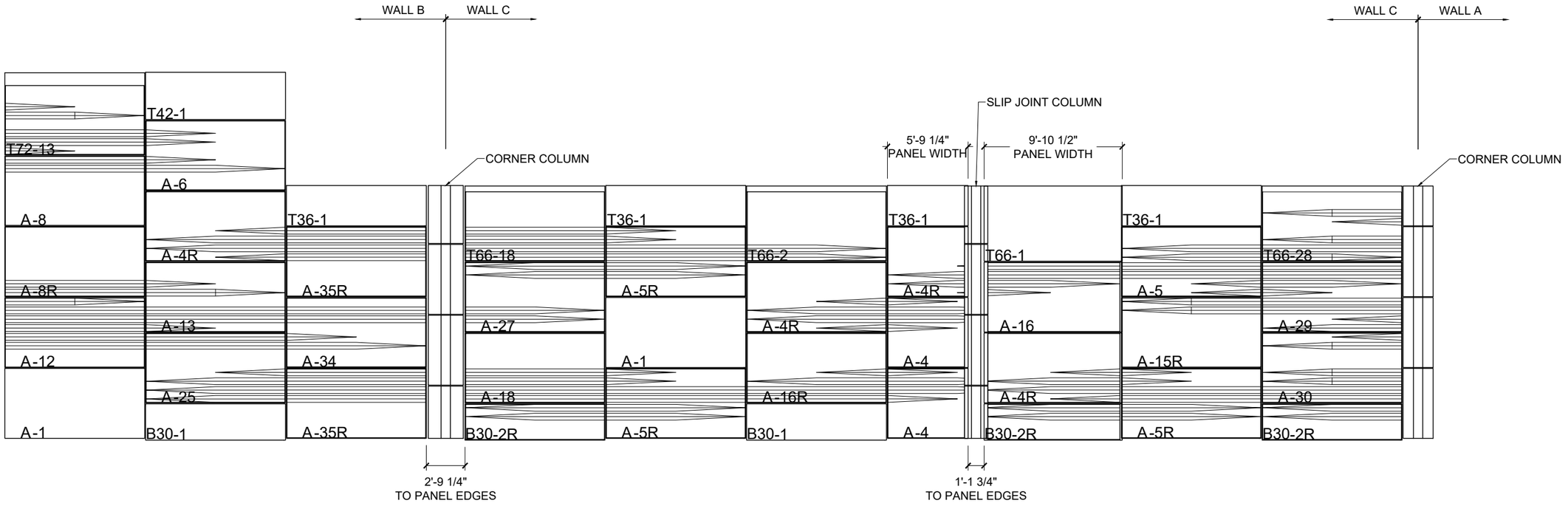
70 DEGREE CORNER ELEMENT DETAIL

NO SCALE



SLIP JOINT DETAIL

NO SCALE



PREPARED BY:
REINFORCED EARTH
9212 Falls of Neuse Rd - Suite 201
Raleigh, NC 27615
Ph.: (919)453-2011 / Fax.: (513)297-7930

DESIGN BY: SM
DRAWN BY: SM
CHECKED BY: JH

PROJECT NAME:
STATE PROJECT #0020-104-101, B601
MSE WALLS
ROUTE 20 (9TH STREET)
CITY OF CHARLOTTESVILLE **VIRGINIA**

THE DESIGN CONTAINED ON THESE DRAWINGS IS BASED ON INFORMATION PROVIDED BY THE OWNER. ON THE BASIS OF THIS INFORMATION, THE REINFORCED EARTH COMPANY HAS DESIGNED, AND IS RESPONSIBLE FOR THE INTERNAL STABILITY OF THE STRUCTURE ONLY. EXTERNAL STABILITY, INCLUDING FOUNDATION (BEARING CAPACITY AND SETTLEMENT) AND GLOBAL STABILITY (INCLUDING SLIDING AND ROTATION), IS THE RESPONSIBILITY OF THE OWNER.

PAGE NAME:
MSE WALL FORMLINER
100-FT ELEVATION

SUBMITTAL DATE: 11/19/2021
PROJECT NO.: 20960
SET: S
PAGE #: 3

Vikas Gumte

From: MASTRONARDI Daniel <DMastronardi@reinforcedearth.com>
Sent: Friday, November 19, 2021 4:43 PM
To: Vikas Gumte
Cc: Grant Walker; HANSBERGER Jonathan; HARRIS Joe; MARKHAM Steven
Subject: RE: Belmont Bridge Replacement (UPC 75878) - Submittal 019 - MSE Wall Mock Up Renderings
Attachments: 20960 PANEL LINER DETAILS_100FT.pdf

Vikas,

Please see attached 100ft elevation as requested. Please note RECo's aesthetic elevation and detail are meant to be schematic by nature and may vary slightly with final design.

Some additional comments for consideration regarding the corner, slip joint and aesthetic patterns:

- With regards to use of corner element pieces, it is strongly recommended to keep these as using mitered/beveled panels will create multiple issues.
    - The multiple degrees of corner angles will make it difficult to either produce or field cut these to precisely fit in the field when placed
    - With these mitered panels, they will be very susceptible to breaking while handling in construction and after installation due to the narrow profile of the corner edges. Along with this narrow corner profile, the architectural features will be prone to breaking after installation as well.
    - For service life of the structure, MSE walls are meant to accommodate slight movements and keeping the corner joint closed will be impossible. It is likely a mitered corner will open up over time with settlement and create continuing maintenance issues as well as be visually unappealing as it opens.
- Another issue that is being brought to light in laying out the pattern on the panels is how the architectural finish will be applied on narrow panels such as at corners.
    - As the contract documents show, the narrow panels have the standard patterns applied but in a modified manner where features are moved/stretched from the standard positions.(example panel type 27 to the right of the corner in the elevation was originally depicted to be less than 10ft wide) This is not going to be possible with a precast formliner as the patterns are going to be fixed and required to be cut either on the left or the right side depending on where the end of the panel will be required.
    - As a proposed solution, RECo is showing a full width panel starting from the corner and moving outward from there. A phase line will be required in the shown wall and that will require a slip joint to be placed in the second phase between the two phases to accommodate any differential settlements between the two phases. This is most likely the ideal location to have a cut panel where the patterns will have that joint to separate them from either side. As shown in the elevation, the slip joint location is approximate and will most likely be adjusted based on phase construction dimensions required.

Please feel free to reach out with any further questions. If another call to discuss is needed, we can be available.

Thank you and have a good weekend.
Dan

Daniel T. Mastronardi III
Project Manager
The Reinforced Earth Company
Office: 703.547.8797 x1123
Mobile: 607.759.0744

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(1)

GENERAL NOTES

1. Specifications
   Construction - Virginia Department of Transportation Road and Bridge Specifications, 2020
   Design - AASHTO LRFD Bridge Design, 8th edition, 2017; and VDOT Modifications
2. These plans are incomplete unless accompanied by the Supplemental Specifications and Special Provisions included in the contract documents.
3. The minimum design life of M.S.E. wall shall be 100-year.
4. The M.S.E. Wall Quantity (s.f.) is based on Limits of Measurement from top of wall to top of leveling pad.
5. ⊗ Denotes items to be paid for on the basis of plan quantities in accordance with current Road and Bridge Specifications.
6. ◓ Denotes Boring Location.
7. ◆ Denotes Settlement Plates
8. Settlement Plates shall be Std. SP-1 and in accordance with VDOT Road and Bridge Specifications, Section 303. Settlement plates shall be provided at the locations indicated in the table.
9. The Contractor shall select an M.S.E. wall system from the Approved Retaining Wall Systems List, Category A, from the VDOT Manual of Structure and Bridge Division; Part 11: Geotechnical Manual for Structures, issued 2/3/2017. The supplier shall be included on approved retaining wall system list dated 2/3/2017.
10. The term M.S.E. Wall shall be considered identical to the pay item Retaining Structure.
11. Complete working drawings/shop plans and design calculations shall be submitted to the Engineer for review and approval prior to beginning wall work.
12. The anticipated M.S.E. Wall total settlement is a maximum of 1½ inches at Abutment A and 3 inches at Abutment B.
13. Geotechnical boring data is available for review in electronic form. These boring logs, although not included in these drawings, shall be considered a part of the bid documents. For further information, please contact the Engineer of Record.
14. Prior to wall construction, the foundation shall be compacted with a smooth wheel vibratory roller. The drums of the roller should be ballasted and each pass of the roller should overlap one half the width of the previous pass. The roller shall make at least ten passes over the proposed wall foundation zone. No density test will be required. Any foundation soils found to be unsuitable shall be removed and replaced with select material Type I minimum CBR of 30.
15. Remove unsuitable or unstable foundation material below the bottom of the wall and replace with select material prior to wall construction. Compact the foundation area according to the VDOT Specifications.
16. The minimum required depth of undercut shall be as denoted in the table on this sheet. Remove unsuitable or unstable foundation material below the bottom of the wall and replace with select material prior to wall construction. Compact the foundation area according to VDOT Specifications. The lateral limits of excavation are generally 3 feet beyond the face of the wall and 0.70H behind the wall face. Additional localized excavation may be required depending on the site conditions at the time of construction.
17. Concrete coating surface shall be a grey as identified CMYK Value (C0.039, M0.0000, Y0.0825, K0.6196). A sample shall be provided to the Engineer prior to fabrication for approval.
18. Vertical slip joints shall be detailed by Contractor's wall designer to accommodate construction phasing corners, abrupt changes in wall height, adjacent structures or walls, and subsurface utilities as required.
19. Joints in the Moment Slab shall be located at a minimum distance of 20 feet from the vertical slip joints.
20. Rustication treatment shall be determined prior to construction beginning. Forms and liners shall be approved by the Engineer of Record.
21. Minimum panel design thickness is 6.0 inches. Thickness of concrete must increase to accommodate any architectural surface finish that may be specified.
22. Reinforcing steel in the rail curb, M.S.E. coping, terminal walls, parapets and the moment slabs shall be CRR (Corrosion Resistant Reinforcement) Class I.
23. All concrete shall be class A4 including face panels, copings and moment slabs.
24. All reinforcing steel not required to be CRR shall be deformed and shall conform to ASTM A615 Grade 60.
25. A geotextile shall be used as a separator between the mechanically stabilized earth mass and the subbase.
26. Provide drainage details such as perforated pipe underdrain and/or drainage blanket based upon field conditions.
27. All panel types and other related elements shall be detailed on shop drawings.
28. Minimum M.S.E. strap length shall be 0.70 x wall height or 8 feet, whichever is greater.
29. During simultaneous construction of drainage structures and M.S.E. walls, care shall be taken during placement of M.S.E. wall fill and straps to avoid drainage structures.
30. All trees located within M.S.E. wall reinforcement must have soil suitable for planting 3 feet in depth above M.S.E. wall fill.
31. Coping shall not be placed until sufficient monitoring data has been reviewed and approved by the Engineer of Record.
32. The M.S.E. Wall as shown is only schematic. Actual details shall be designed by the Contractor and submitted for approval by the Engineer.
33. M.S.E. wall systems shall be designed for parapet, coping and moment slab loads.
34. Lateral pressure arising from surcharge loading shall be added to the earth pressures to determine the total lateral pressures that the walls must resist. In addition, transient loads imposed on the walls by construction equipment during placement and compaction of backfill shall be taken into consideration during design and construction. Heavy construction equipment shall not be allowed within 5 feet of the walls. Compaction within 5 feet of the walls shall be performed with a hand operated tamper or small roller compactor.
35. M.S.E. wall acute corner at Abutments shall be designed as bin structure with at-rest earth pressures from top to bottom. Slip joints shall be added at acute corners.
36. M.S.E. wall supplier shall be responsible for the design of moment slabs. All quantities including concrete and rebar for the moment slab shall be included in the cost per square feet of retaining structure.
37. For light pole anchorage locations, see lighting plans.
38. For limits of overexcavation, see profile sheets.
39. Modify M.S.E. walls, rail curbs, and moment slab at drainage structures and light poles as required to avoid impacting or damaging drainage structures and light poles.
40. The M.S.E. wall designer shall consider the additional load imposed on the M.S.E. structure from the soil-pile interaction during thermal bridge loading. Anticipated thermal movement is 0.90 inches in each direction along the construction baseline of the bridge. The designer shall incorporate into the M.S.E. wall design the additional minimum loads imposed at each pile location as shown. All design calculations and details shall be prepared in accordance with AASHTO Specifications and shall be sealed by an Engineer licensed to practice in the Commonwealth of Virginia. These design details and calculations shall be submitted in accordance with Specification Section 105 for review.
41. The Contractor shall determine all dimensions and details necessary for installation.
42. Settlement is expected to occur during construction of M.S.E. walls and embankment fill. As such, no waiting period prior to placing other structure components of the planned construction is required.
43. For M.S.E. wall typical sections see sheet 13(2K).
44. When the M.S.E. wall reinforcing straps are metallic, they shall be placed with at least 3" clear to the pile and the pile sleeve. Where 3" clear cannot be obtained using a maximum 15 degree splay, the minimum clear can be reduced, but shall not be less than 1". The M.S.E. wall manufacturer shall reduce the tensile resistance of all reinforcement by the cosine of the 15 degree maximum splay angle in the strap design.
45. For locations of undercut refer to the roadway cross sections.

ESTIMATED QUANTITIES

Pay Item Code	13815	60621	00200
Location	Mechanically Stabilized Earth (M.S.E.) Wall	NS Railing	Settlement Plate
	s.f.	l.f.	ea.
Wall A	8,820	521	-
Wall B	6,901	406	-
Wall C	1,225	-	-
Wall D	1,121	-	-
Wall E	816	-	-
Wall F	4,058	313	-
Total	22,941	1,240	9

SETTLEMENT PLATE LOCATIONS

Station	Offsets
15+75	30 ft Left, 0 and 30 ft Right
19+15	20 ft Left and 25 ft Right
20+15	28 ft Right and 45 ft Right
20+75	30 ft Right and 50 ft Right

Stations are along 9th Street Construction ℄.

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
Revisions		

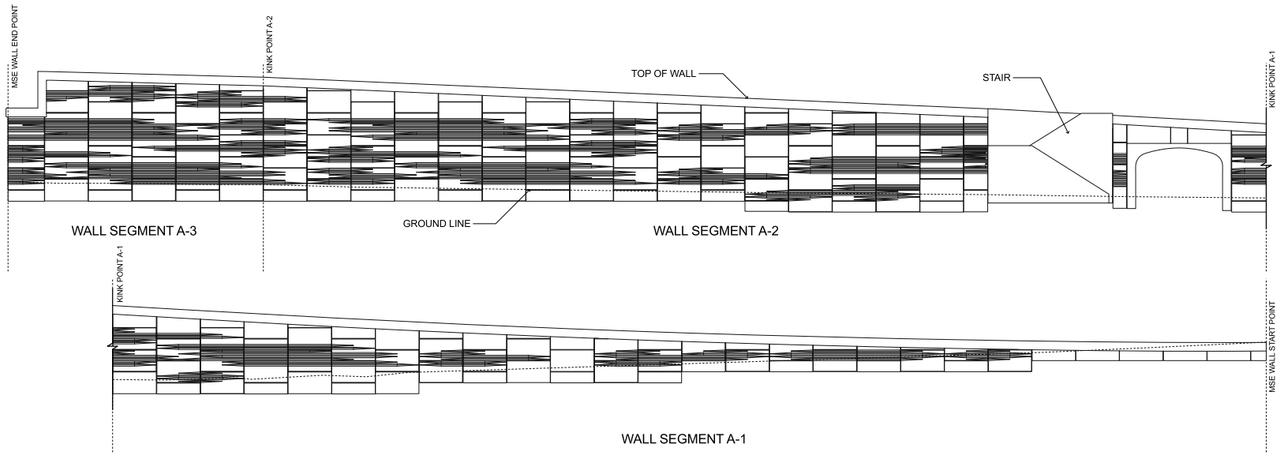
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
STRUCTURE AND BRIDGE DIVISION

M.S.E. RETAINING WALL GENERAL NOTES

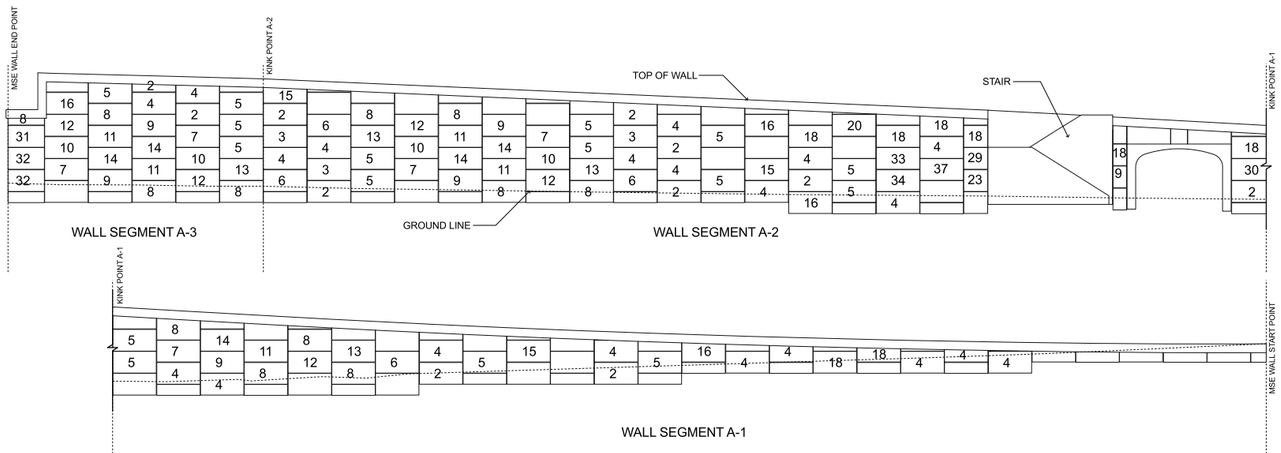
Designed: PDC.....
Drawn: JJK.....
Checked: SAD.....

Date	Plan No.	Sheet No.
May 2020	302-08	13(1)

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.		BR-5104 (159)	20	0020-104-101, B601	13(2A)



MSE WALL A ELEVATION 1/16"=1'-0"



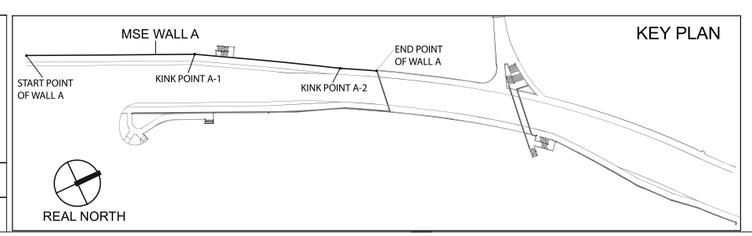
MSE WALL A ELEVATION - PANEL LAYOUT 1/16"=1'-0"

NOTE: MSE PANEL WITHOUT NUMBER IS TYPE 1 (BLANK PANEL)

1/16"= 1'-0"
0 8' 16'

KGP DESIGN STUDIO
WASHINGTON, DC
ARCHITECT

KIMLEY-HORN & ASSOC.
RALEIGH, NC
STRUCTURAL ENGINEER



1. ALL M.S.E. COMPONENT SIZING AND CONNECTIONS TO BE VERIFIED DURING SHOP DRAWING PHASE.
2. SEE STRUCTURAL DRAWINGS FOR MORE INFORMATION
3. ALL DIMENSIONS TO BE VERIFIED IN FIELD
4. SEE M.S.E. WALL SPECIAL PROVISION FOR MORE INFORMATION
5. FINAL LAYOUT TO BE DETERMINED IN COORDINATION BETWEEN FABRICATOR AND ARCHITECT/OWNER REPRESENTATIVE DURING SHOP DRAWINGS AND MOCK-UP REVIEW

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
	Revisions	

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

STRUCTURE AND BRIDGE DIVISION

M. S. E. RETAINING WALL AESTHETIC LAYOUT – WALL A

Designed: KGP	Date	Plan No.	Sheet No.
Drawn: TW&MtN	July 2020		13(2A)
Checked: DP			

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
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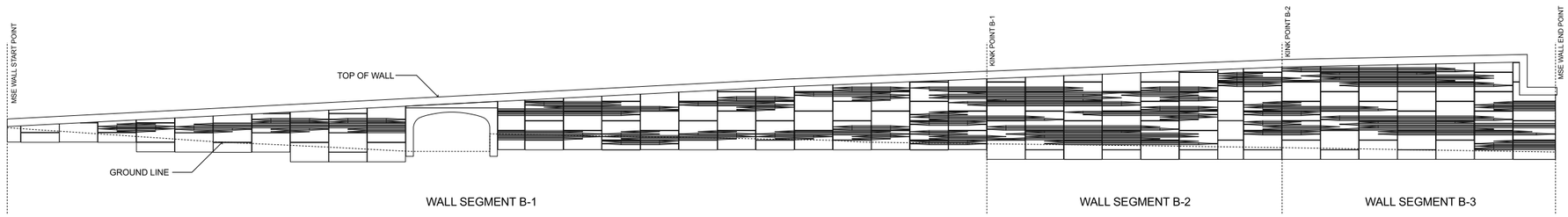

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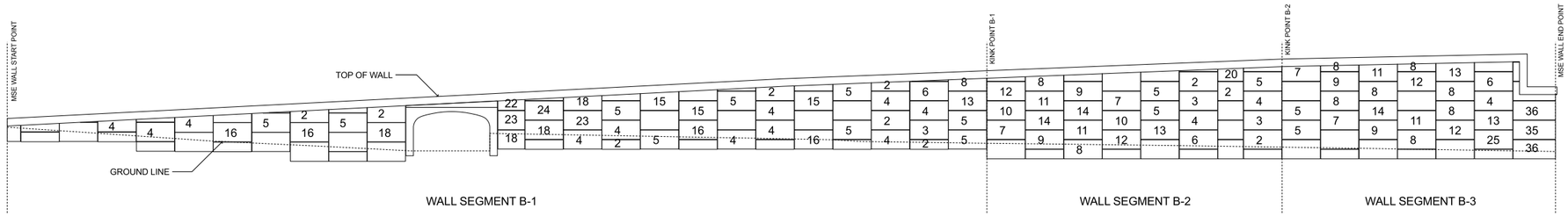
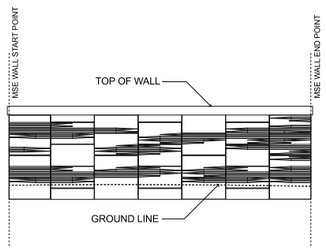
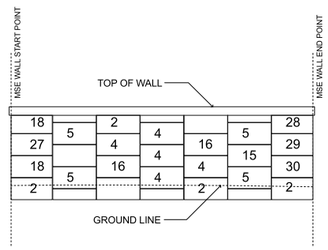


MSE WALL B ELEVATION - PANEL LAYOUT 1/16"=1'-0"



MSE WALL C ELEVATION 1/16"=1'-0"



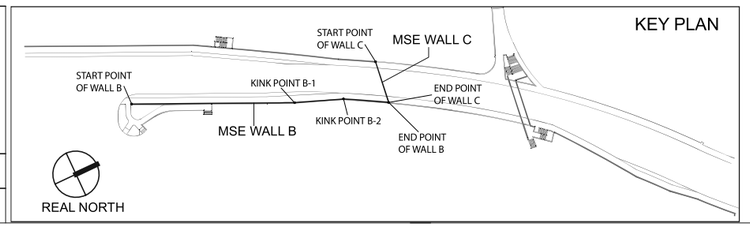
MSE WALL C ELEVATION - PANEL LAYOUT 1/16"=1'-0"

NOTE: MSE PANEL WITHOUT NUMBER IS TYPE 1 (BLANK PANEL)

1/16"= 1'-0"
0 8' 16'

KGP DESIGN STUDIO
WASHINGTON, DC
ARCHITECT

KIMLEY-HORN & ASSOC.
RALEIGH, NC
STRUCTURAL ENGINEER



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PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
STRUCTURE AND BRIDGE DIVISION

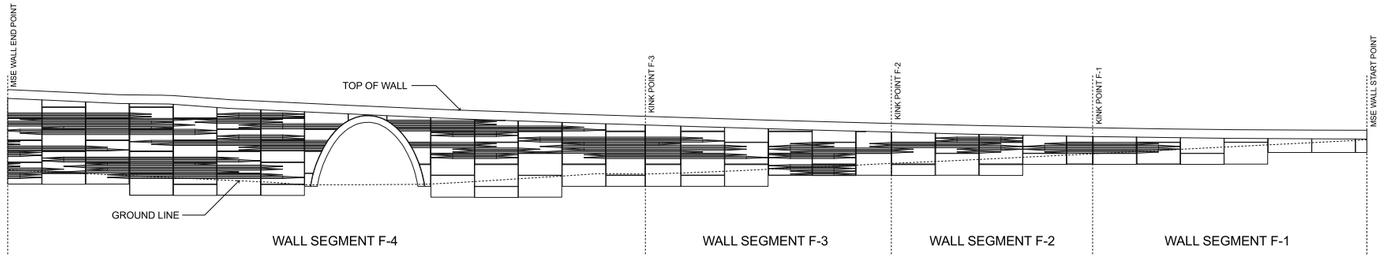
M. S. E. RETAINING WALL AESTHETIC LAYOUT – WALL B & C

No.	Description	Date
	Revisions	

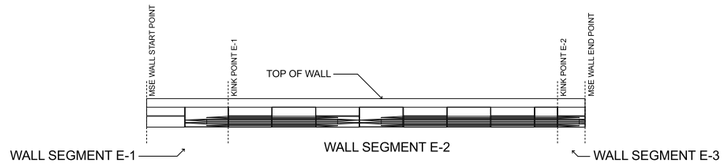
Designed: KGP
Drawn: TW&MIN
Checked: DP

Date: July 2020
Plan No.
Sheet No. 13(2B)

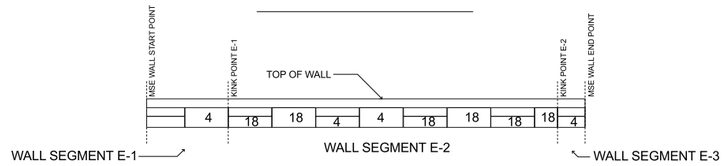
STATE	FEDERAL AID		STATE		SHEET
	ROUTE	PROJECT	ROUTE	PROJECT	NO.
VA.		BR-5104 (159)	20	0020-104-101, B601	13(2C)



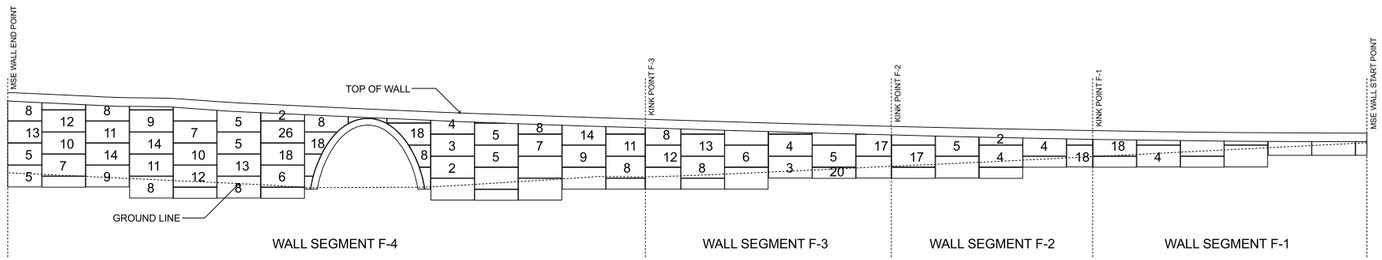
MSE WALL F ELEVATION 1/16"=1'-0"



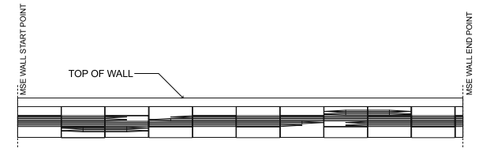
MSE WALL E ELEVATION 1/16"=1'-0"



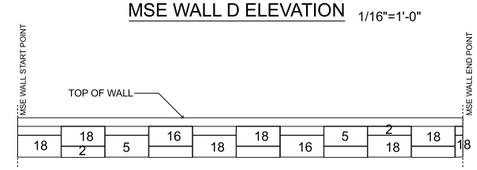
MSE WALL E ELEVATION - PANEL LAYOUT 1/16"=1'-0"



MSE WALL F ELEVATION - PANEL LAYOUT 1/16"=1'-0"



MSE WALL D ELEVATION 1/16"=1'-0"



MSE WALL D ELEVATION - PANEL LAYOUT 1/16"=1'-0"

NOTE: MSE PANEL WITHOUT NUMBER IS TYPE 1 (BLANK PANEL)

1/16"= 1'-0"
0 8" 16'

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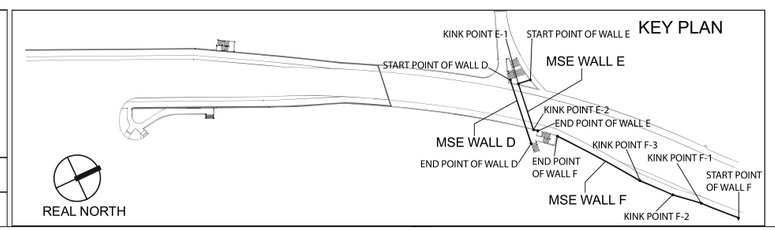

1. ALL M.S.E. COMPONENT SIZING AND CONNECTIONS TO BE VERIFIED DURING SHOP DRAWING PHASE.
2. SEE STRUCTURAL DRAWINGS FOR MORE INFORMATION
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PRELIMINARY PLANS
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No.	Description	Date

Revisions

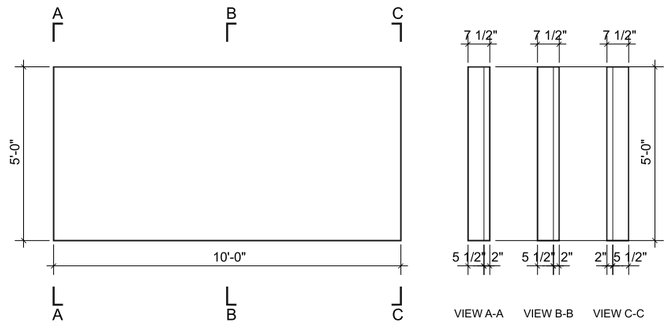
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

STRUCTURE AND BRIDGE DIVISION

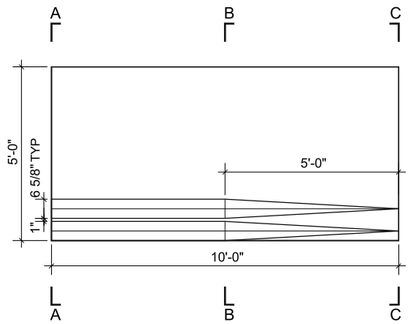
M. S. E. RETAINING WALL AESTHETIC LAYOUT – WALL D, E & F

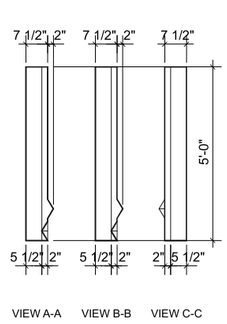
Designed: KGP	Date	Plan No.	Sheet No.
Drawn: TW&MtN	July 2020		13(2C)
Checked: DP			

STATE	FEDERAL AID		STATE		SHEET
	ROUTE	PROJECT	ROUTE	PROJECT	NO.
VA.		BR-5104 (159)	20	0020-104-101, B601	13(2D)



PANEL 1





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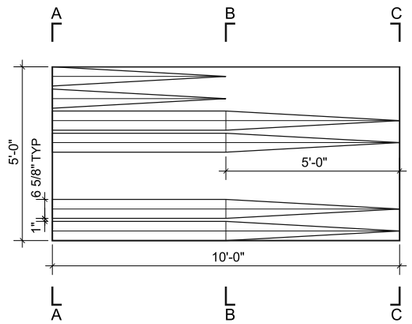
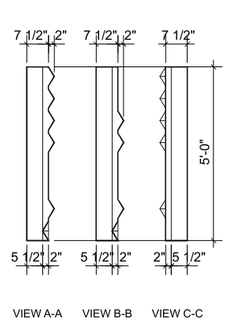
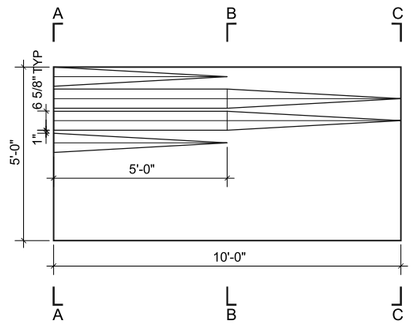
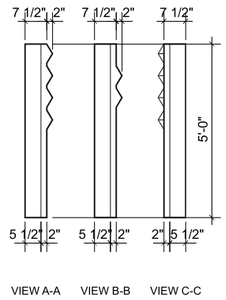




PANEL 3





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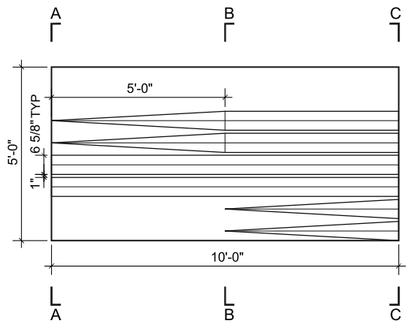

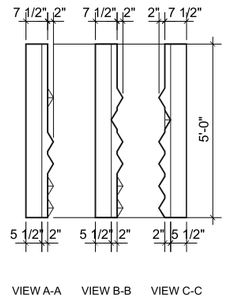

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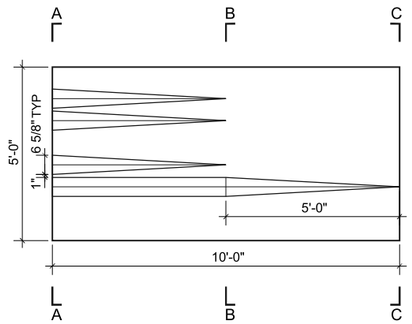

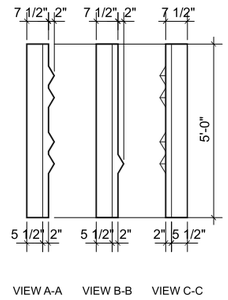

PANEL 6

1/2"= 1'-0"

0 1' 2'

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PRELIMINARY PLANS
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No.	Description	Date
	Revisions	

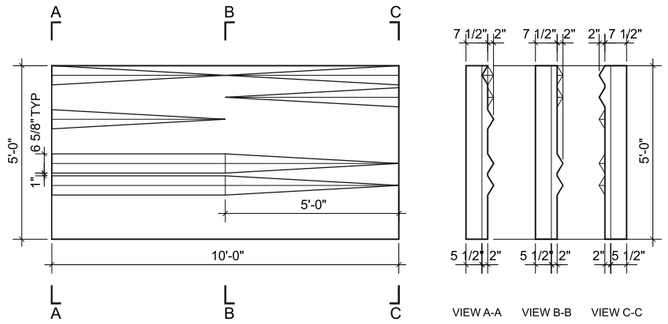
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

STRUCTURE AND BRIDGE DIVISION

M. S. E. RETAINING WALL PANEL DETAILS 1-6

Designed: KGP	Date	Plan No.	Sheet No.
Drawn: TW&MIN	July 2020		13(2D)
Checked: DP			

STATE	FEDERAL AID		STATE		SHEET
	ROUTE	PROJECT	ROUTE	PROJECT	NO.
VA.		BR-5104 (159)	20	0020-104-101, B601	13(2E)



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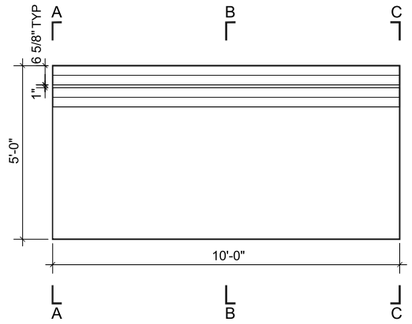

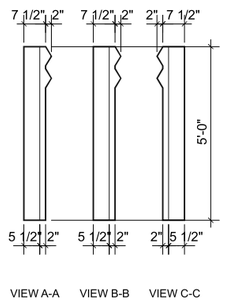

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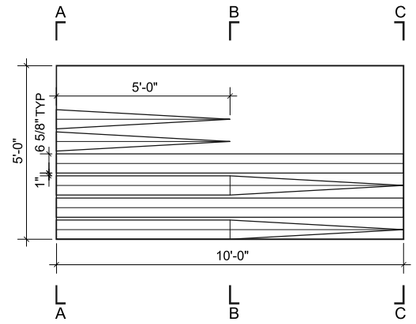

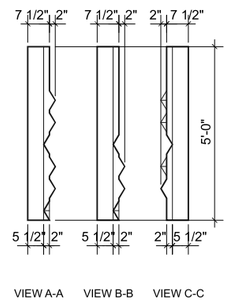

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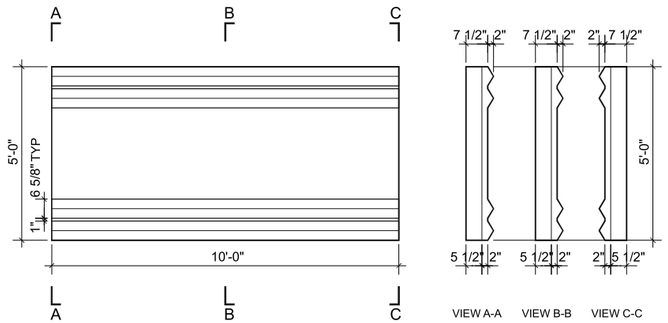
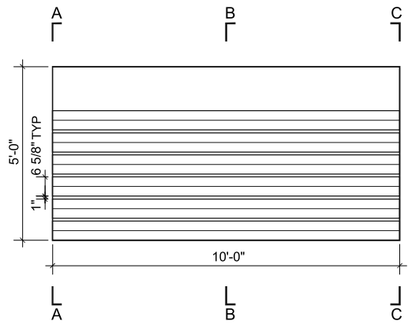
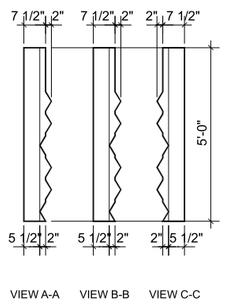


PANEL 10





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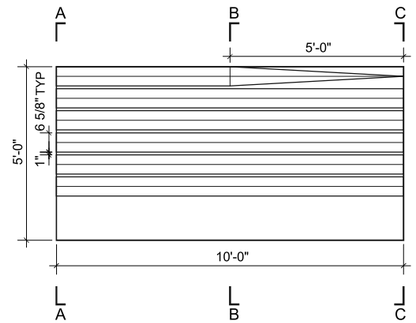

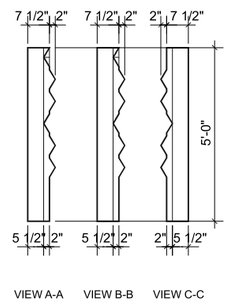

PANEL 12

1/2"= 1'-0"

0 1' 2'

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STRUCTURAL ENGINEER

No.	Description	Date
	Revisions	

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

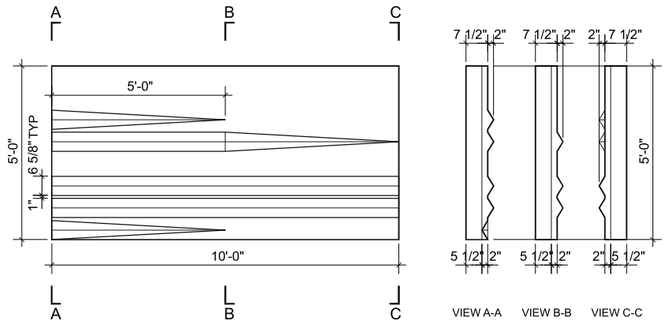
STRUCTURE AND BRIDGE DIVISION

M. S. E. RETAINING WALL PANEL DETAILS 7-12

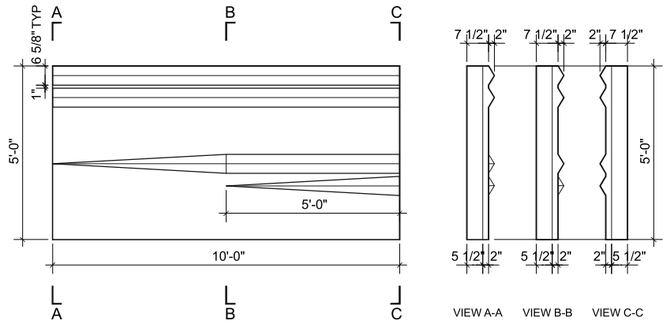
Designed:	KGP
Drawn:	TW&MIN
Checked:	DP

Date	Plan No.	Sheet No.
July 2020		13(2E)

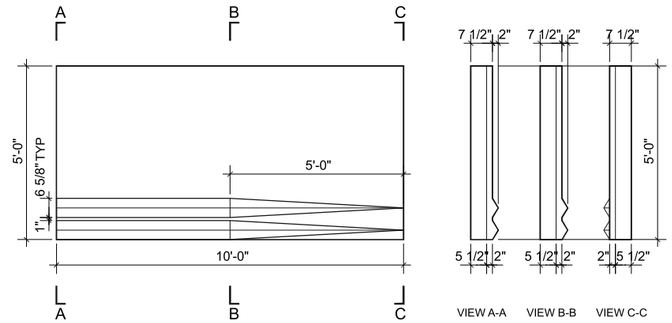
STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.		BR-5104 (159)	20	0020-104-101, B601	13(2F)



PANEL 13



PANEL 14



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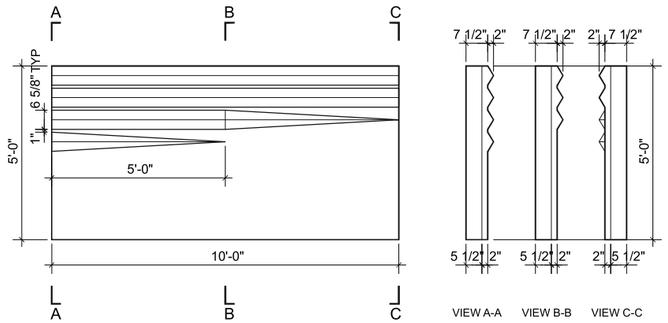

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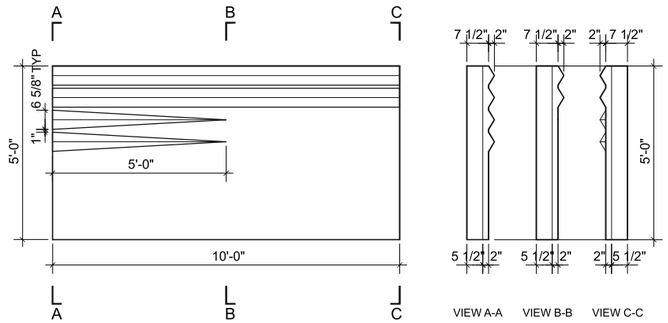

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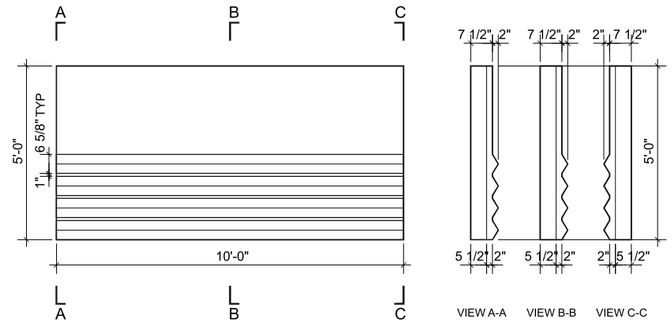

PANEL 18

1/2"= 1'-0"

0 1' 2'

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STRUCTURE AND BRIDGE DIVISION

M. S. E. RETAINING WALL PANEL DETAILS 13-18

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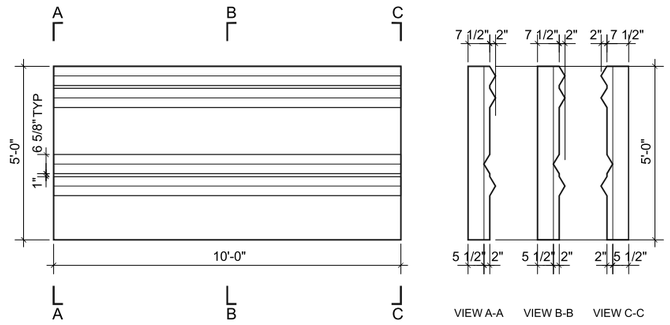
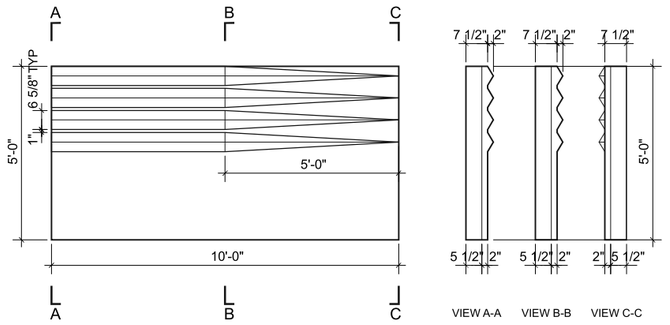
Date	Plan No.	Sheet No.
July 2020		13(2F)

STATE	FEDERAL AID		STATE		SHEET
	ROUTE	PROJECT	ROUTE	PROJECT	NO.
VA.		BR-5104 (159)	20	0020-104-101, B601	13(2G)



PANEL 19



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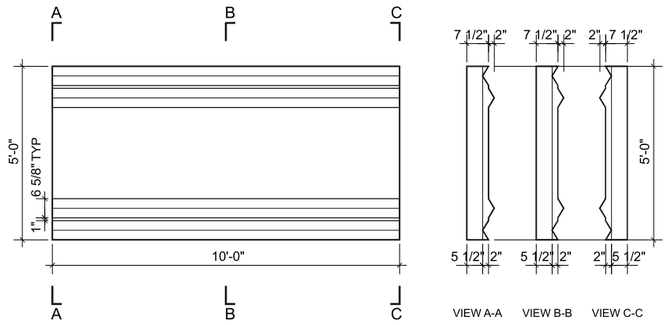

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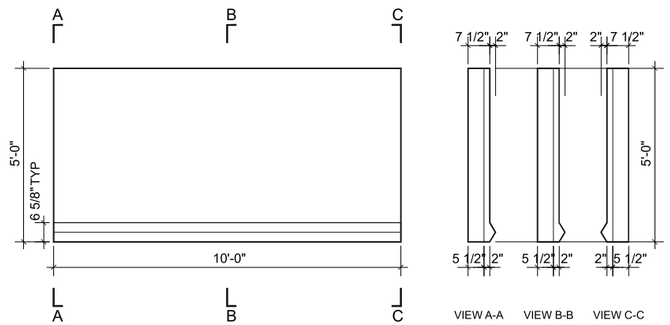

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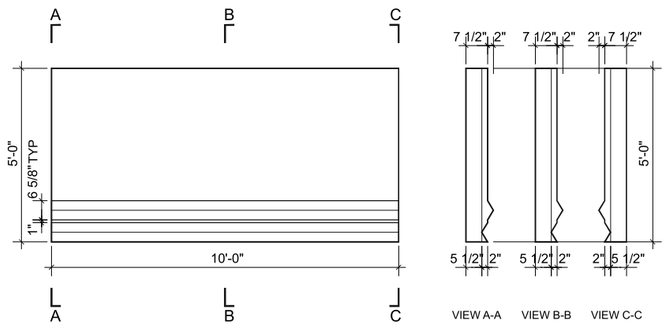

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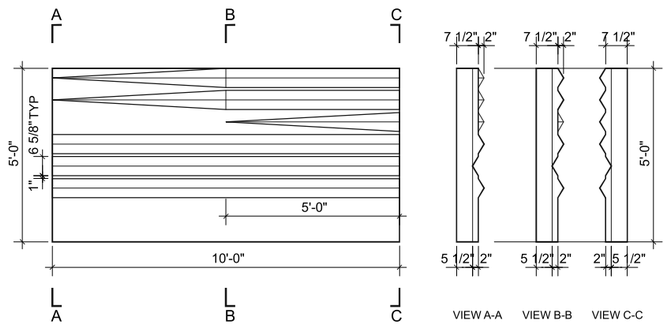

PANEL 24

1/2"= 1'-0"

0 1' 2'

1. ALL M.S.E. COMPONENT SIZING AND CONNECTIONS TO BE VERIFIED DURING SHOP DRAWING PHASE.
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No.	Description	Date

Revisions

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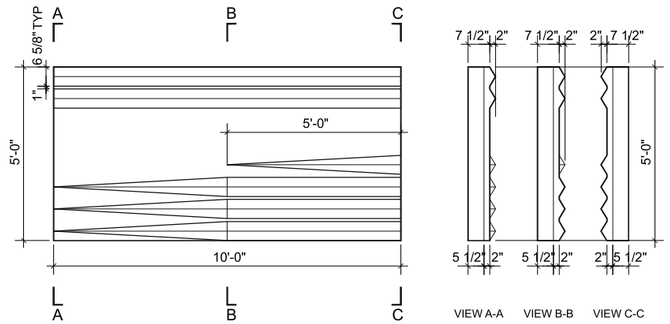
DEPARTMENT OF TRANSPORTATION

STRUCTURE AND BRIDGE DIVISION

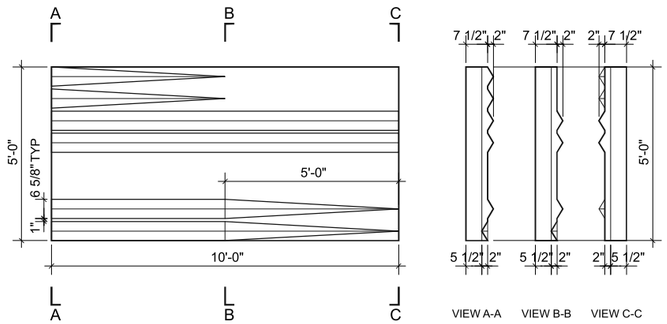
M. S. E. RETAINING WALL PANEL DETAILS 19-24

Designed: KGP	Date	Plan No.	Sheet No.
Drawn: TW&MIN	July 2020		13(2G)
Checked: DP			

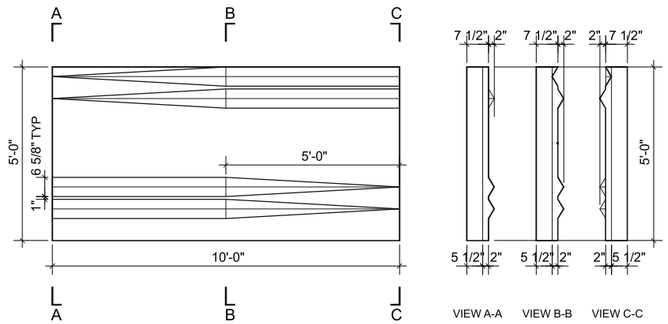
STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.		BR-5104 (159)	20	0020-104-101, B601	13(2H)



PANEL 25



PANEL 26



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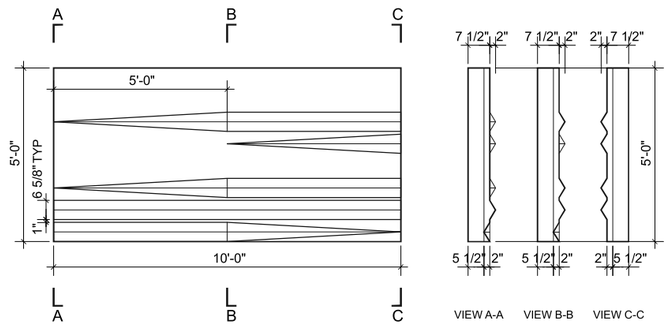

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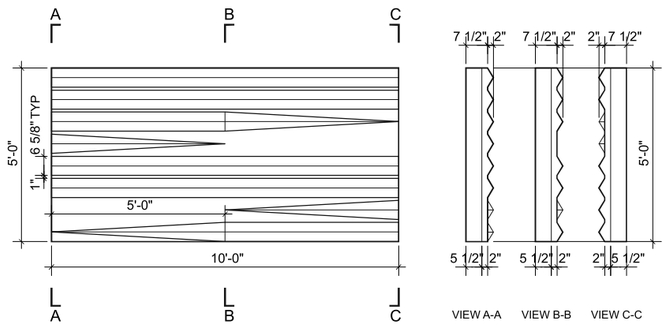

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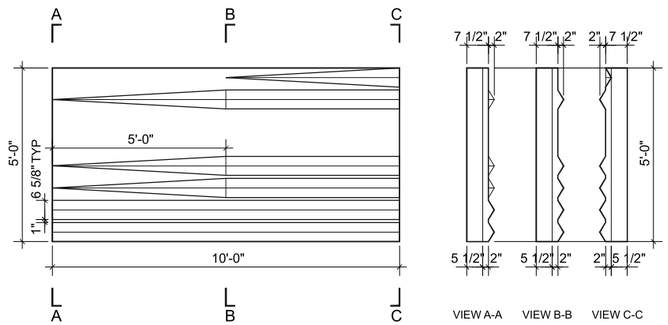

PANEL 30

1/2"= 1'-0"

0 1' 2'

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ARCHITECT

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RALEIGH, NC
STRUCTURAL ENGINEER

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COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

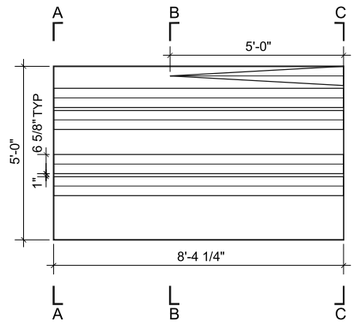
STRUCTURE AND BRIDGE DIVISION

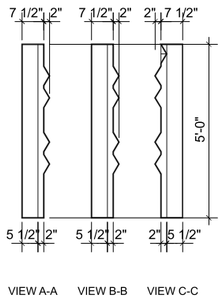
M. S. E. RETAINING WALL PANEL DETAILS 25-30

Designed:	KGP
Drawn:	TW&MIN
Checked:	DP

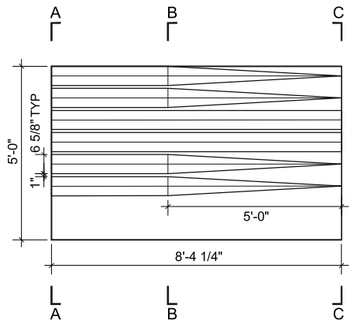
Date	Plan No.	Sheet No.
July 2020		13(2H)

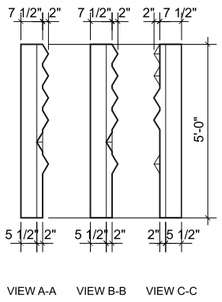
STATE	FEDERAL AID		STATE		SHEET
	ROUTE	PROJECT	ROUTE	PROJECT	NO.
VA.		BR-5104 (159)	20	0020-104-101, B601	13(2I)



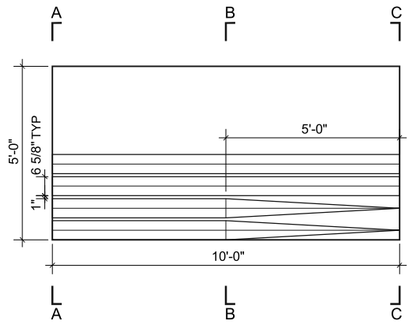


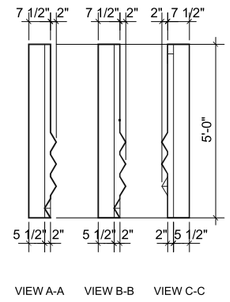
PANEL 31



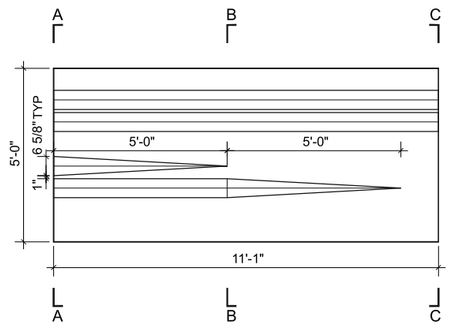


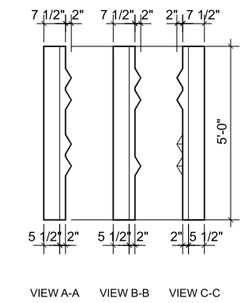
PANEL 32



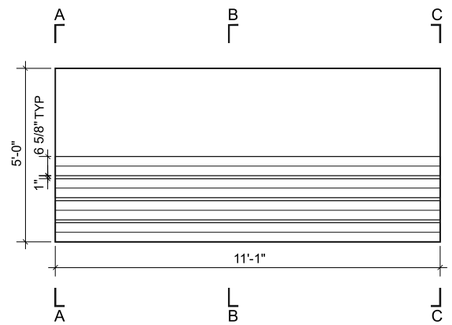


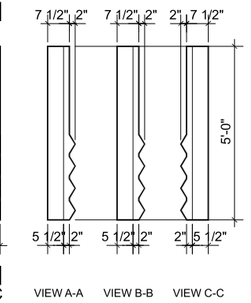
PANEL 33





PANEL 34





PANEL 35

1/2"= 1'-0"

0 1' 2'

KGP DESIGN STUDIO
WASHINGTON, DC
ARCHITECT

KIMLEY-HORN & ASSOC.
RALEIGH, NC
STRUCTURAL ENGINEER

1. ALL M.S.E. COMPONENT SIZING AND CONNECTIONS TO BE VERIFIED DURING SHOP DRAWING PHASE.
2. SEE STRUCTURAL DRAWINGS FOR MORE INFORMATION
3. ALL DIMENSIONS TO BE VERIFIED IN FIELD
4. SEE M.S.E. WALL SPECIAL PROVISION FOR MORE INFORMATION
5. FINAL LAYOUT TO BE DETERMINED IN COORDINATION BETWEEN FABRICATOR AND ARCHITECT/OWNER REPRESENTATIVE DURING SHOP DRAWINGS AND MOCK-UP REVIEW

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
	Revisions	

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

STRUCTURE AND BRIDGE DIVISION

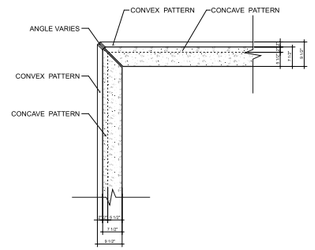
M. S. E. RETAINING WALL PANEL DETAILS 31-35

Designed:	KGP
Drawn:	TW&MIN
Checked:	DP

Date	Plan No.	Sheet No.
July 2020		13(2I)

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.		BR-5104 (159)	20	0020-104-101, B601	13(2J)

MSE PANEL TYPE	NUMBERS
TYPE 1	195
TYPE 2	30
TYPE 3	7
TYPE 4	49
TYPE 5	45
TYPE 6	9
TYPE 7	12
TYPE 8	34
TYPE 9	13
TYPE 10	8
TYPE 11	12
TYPE 12	12
TYPE 13	11
TYPE 14	11
TYPE 15	8
TYPE 16	11
TYPE 17	2
TYPE 18	31
TYPE 19	1
TYPE 20	3
TYPE 21	1
TYPE 22	1
TYPE 23	3
TYPE 24	1
TYPE 25	1
TYPE 26	2
TYPE 27	1
TYPE 28	1
TYPE 29	2
TYPE 30	2
TYPE 31	1
TYPE 32	2
TYPE 33	1
TYPE 34	1
TYPE 35	2
	TOTAL = 536



MSE PANEL TYPICAL CORNER CONDITION

1/2"= 1'-0"

0 1' 2'

1. ALL M.S.E. COMPONENT SIZING AND CONNECTIONS TO BE VERIFIED DURING SHOP DRAWING PHASE.

2. SEE STRUCTURAL DRAWINGS FOR MORE INFORMATION

3. ALL DIMENSIONS TO BE VERIFIED IN FIELD

4. SEE M.S.E. WALL SPECIAL PROVISION FOR MORE INFORMATION

5. FINAL LAYOUT TO BE DETERMINED IN COORDINATION BETWEEN FABRICATOR AND ARCHITECT/OWNER REPRESENTATIVE DURING SHOP DRAWINGS AND MOCK-UP REVIEW

PRELIMINARY PLANS

THESE PLANS NOT TO BE USED FOR CONSTRUCTION

KGP DESIGN STUDIO
WASHINGTON, DC
ARCHITECT

KIMLEY-HORN & ASSOC.
RALEIGH, NC
STRUCTURAL ENGINEER

No.	Description	Date
	Revisions	

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

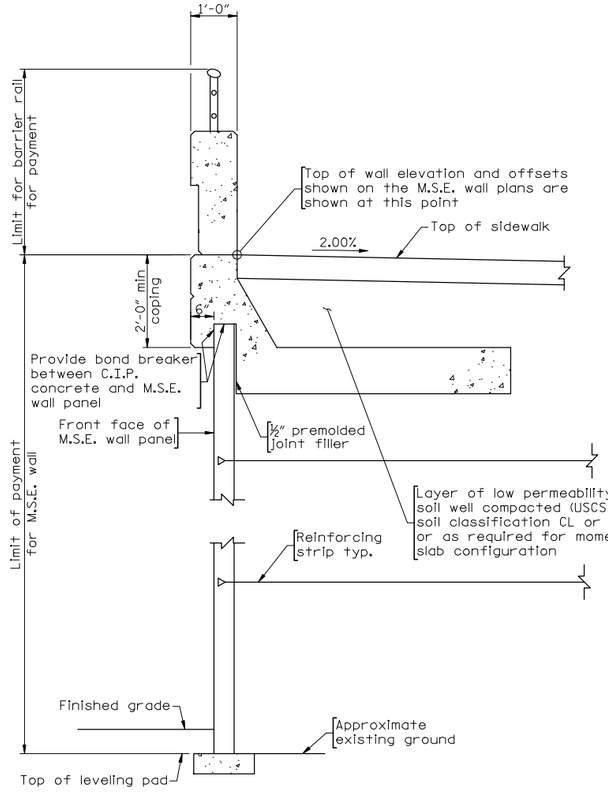
STRUCTURE AND BRIDGE DIVISION

M. S. E. RETAINING WALL PANEL COUNT LEGEND & TYP. CORNER DETAIL

Designed:	KGP
Drawn:	TW&MIN
Checked:	DP

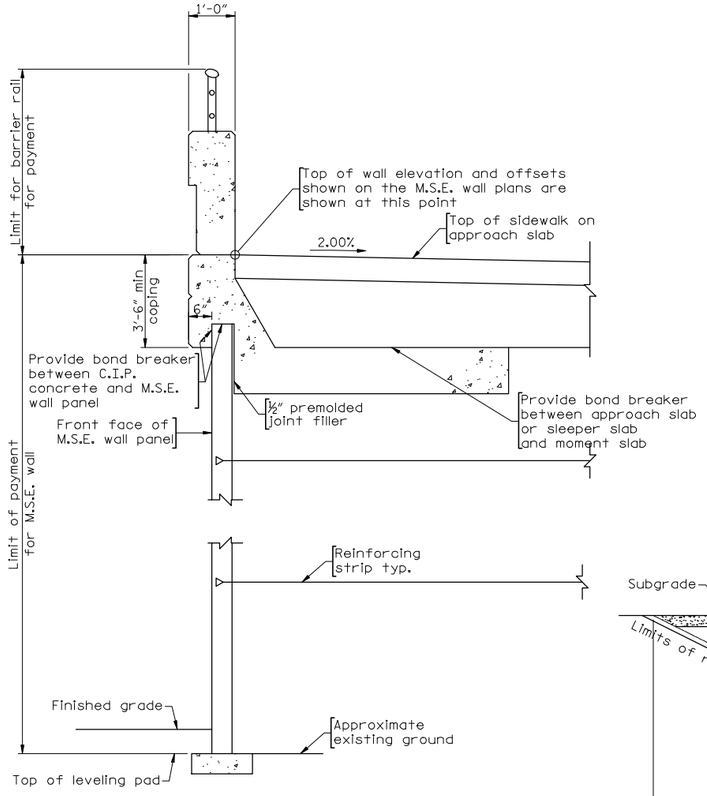
Date	Plan No.	Sheet No.
July 2020		13(2J)

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(2K)



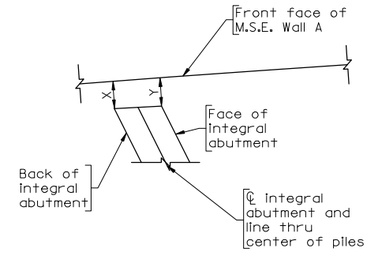
TYPICAL M.S.E. WALL SECTION WITH RAILING AND SIDEWALK

9th Street Station 11+10.43 to 16+49.22 and 19+25.44 to 22+73.64

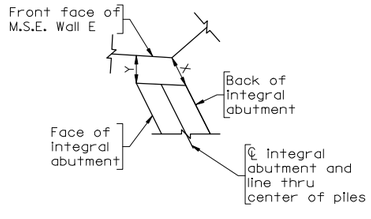


TYPICAL M.S.E. WALL SECTION WITH RAILING AND APPROACH SLAB

9th Street Station 16+49.22 to 16+69.56



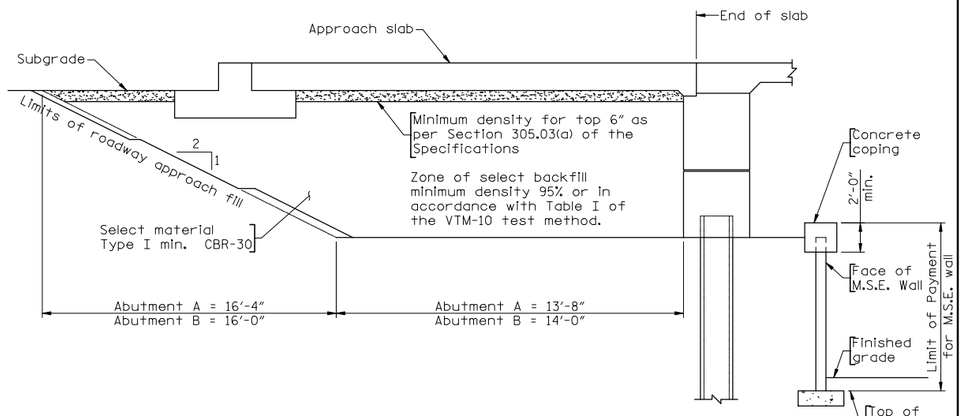
Abutment A (Stage 2) shown
Abutment A (Stage 1) and Abutment B (Stage 1) similar



Abutment B

DISTANCE BETWEEN FRONT FACE M.S.E. WALLS AND ABUTMENTS				
Stage	Abutment	Dimension		Dimension Description
1	A	X	6¼"	Back of Integral abutment to front face of M.S.E Wall B
		Y	6"	Face of Integral abutment to front face of M.S.E Wall B
	B	X	7 13/16"	Back of Integral abutment to front face of M.S.E Wall E
		Y	6 3/16"	Face of Integral abutment to front face of M.S.E Wall E
2	A	X	5 3/16"	Back of Integral abutment to front face of M.S.E Wall A
		Y	6¼"	Face of Integral abutment to front face of M.S.E Wall A
	B	X	1'-2 3/8"	Back of Integral abutment to front face of M.S.E Wall E
		Y	1'-1"	Face of Integral abutment to front face of M.S.E Wall E

DISTANCE BETWEEN FRONT FACE M.S.E. WALLS AND ABUTMENTS



TYPICAL SECTION THRU ABUTMENT

Abutment drainage not shown

RW PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No scale

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RALEIGH, NC
STRUCTURAL ENGINEER

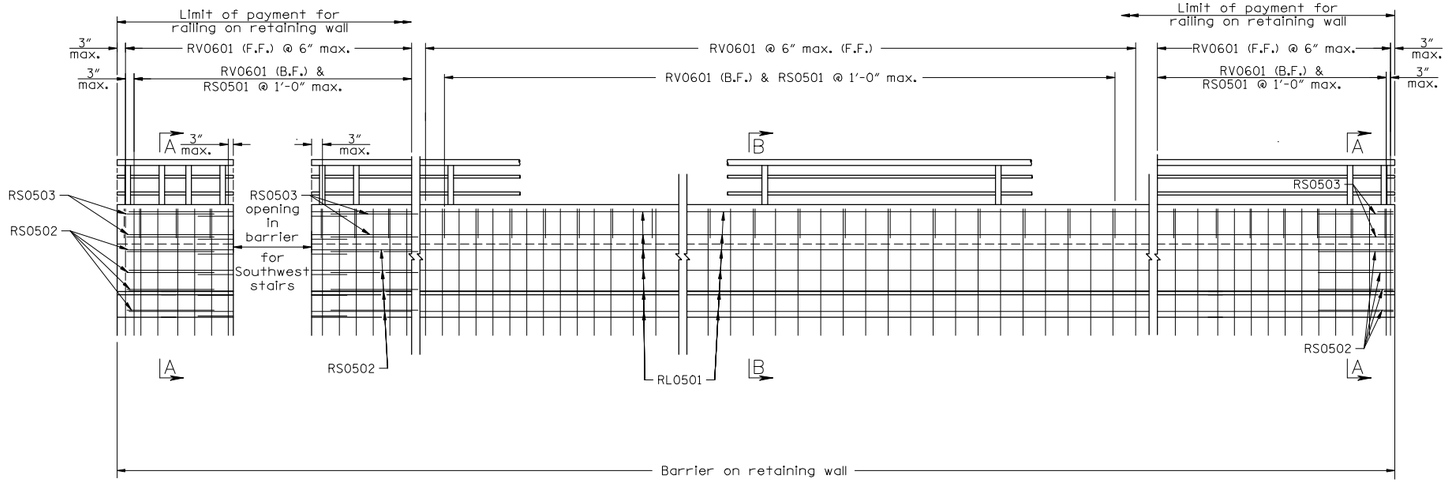
No.	Description	Date
	Revisions	

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
STRUCTURE AND BRIDGE DIVISION

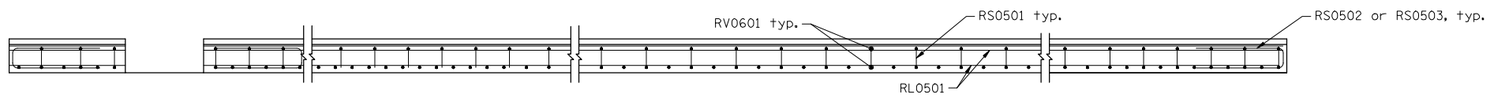
M.S.E. WALL TYPICAL SECTIONS AND DETAILS

Designed: PDC	Date	Plan No.	Sheet No.
Drawn: JJK	May 2020	302-08	13(2K)
Checked: SAG			

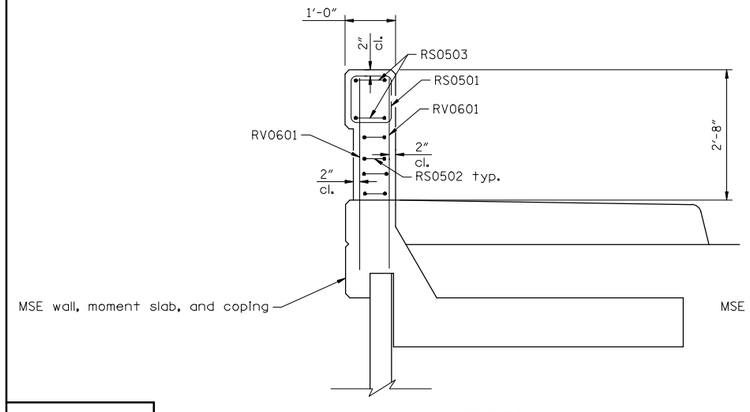
STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(2L)



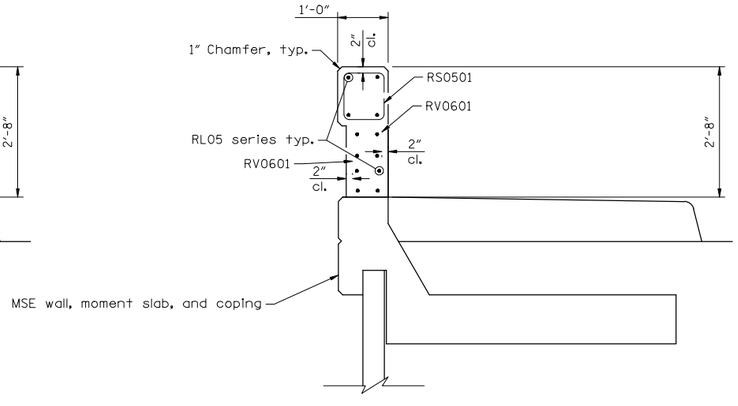
ELEVATION



PLAN



SECTION A–A



SECTION B–B

Notes:

Plan dimensions are measured in the respective horizontal and vertical planes.

The contractor shall determine all dimensions and details necessary for installation.

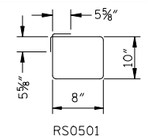
All concrete shall be Low Shrinkage Class A4 Modified.

All reinforcing steel shall be Corrosion Resistant Reinforcing Steel, Class I.

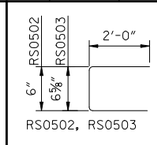
F.F. denotes front face
B.F. denotes back face

REINFORCING STEEL SCHEDULE

Mark	No.	Size	Pin ø	Length	Location
RS0501		#5	2½"	3'-5"	Parapet
RS0502		#5	2½"	4'-3"	Parapet
RS0503		#5	2½"	4'-4"	Parapet
RV0601		#6	–	4'-7"	Parapet
RL05		#5	–		Parapet



RS0501



RS0502, RS0503

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STRUCTURAL ENGINEER

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

Not to scale

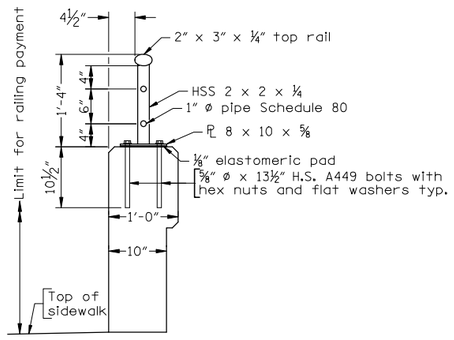
No.	Description	Date
	Revisions	

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
STRUCTURE AND BRIDGE DIVISION

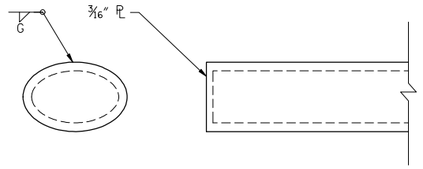
M. S. E. WALL PARAPET DETAILS

Designed: PDC.....
Drawn: JJK.....
Checked: SAR.....

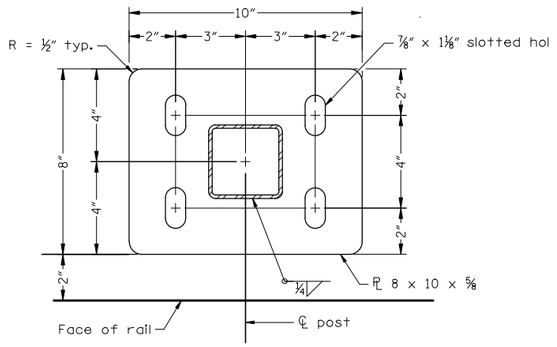
Date	Plan No.	Sheet No.
May 2020	302–08	13(2L)



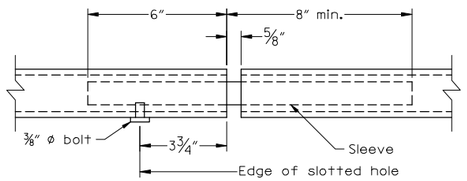
RAIL SECTION



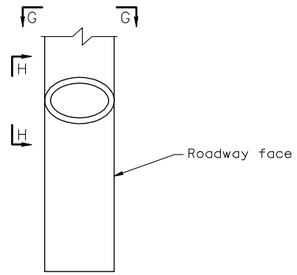
RAIL CAP
1" ø Schedule 80 pipe similar



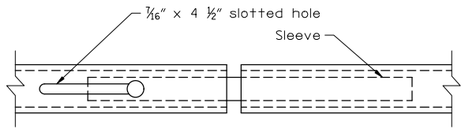
BASE PLATE DETAIL



VIEW G–G

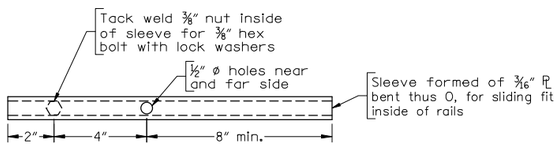


SECTION



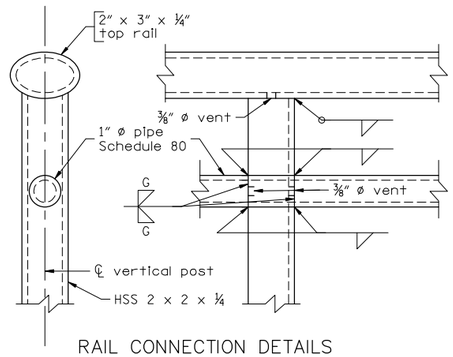
VIEW H–H

Notes:
⅜" nut tack welded to sleeve may be replaced by drilled and tapped hole in sleeve.

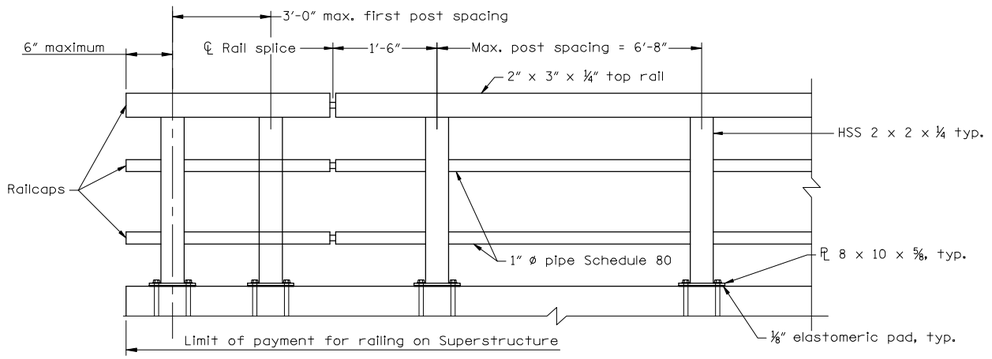


SLEEVE

RAIL SPLICE DETAILS
1" ø Schedule 80 pipe similar



RAIL CONNECTION DETAILS



RAIL ELEVATION

Notes:
Railing shall be powder coated Stormcloud grey. Color to be approved by Owner. A color sample is available and can be provided for color matching.

Drain holes shall be ½" diameter and shall be provided in all rails approximately half-way between posts except at open joints near pier(s). Drain holes shall be provided at each end of rail.

Bid item for railing shall include shall include rails, rail posts, bearing pads, bolts, anchor assemblies, sleeves, barrier delineators, grounding materials and other associated metal parts as shown on the plans. Also included is concrete noted in the plans and reinforcing steel indicated in the reinforcing steel schedule.

Posts and rail members shall be ASTM A500 Grade C steel. Plates shall be ASTM A36 steel. Steel pipe and sleeves shall be ASTM A53.

Bolts for attaching rails to post are ¾" diameter round head (with slot in head), ASTM A449. All other bolts shall be ASTM A325 unless otherwise indicated in the details. Nuts shall be ASTM A563 Grade DH or ASTM A194 Grade 2H. Washers shall be ASTM F436.

All bolts shall be snug tightened.

All steel shall be hot dip galvanized.

Posts shall be equally spaced within a span. Maximum spacing is 6'-8".

Posts shall be seated on neoprene pads ⅛" minimum thickness, having a nominal durometer hardness of 60. Pads shall conform to post base dimensions.

Posts shall be vertical in transverse direction and normal to longitudinal profile grade. Cut bottom of posts to meet these configurations.

Rails to be continuous over a minimum of 3 posts before splicing.

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(2M)

KIMLEY–HORN & ASSOC.
RALEIGH, NC
STRUCTURAL ENGINEER

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

Not to scale

No.	Description	Date
	Revisions	

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
STRUCTURE AND BRIDGE DIVISION

M.S.E. WALL RAILING DETAILS

Designed: PDC	Date	Plan No.	Sheet No.
Drawn: JJK	May 2020	302–08	13(2M)
Checked: SAD			

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(3)

Alignment: WALL-A
Description:

Tangent Data
Description PT Station Northing Easting
Start: 0+00.000 3897492.069 11489325.317
End: 2+65.831 3897733.171 11489437.283
Tangent Data
Parameter Value Parameter Value
Length: 265.831 Course: N 24° 54' 35.1858" E

Tangent Data
Description PT Station Northing Easting
Start: 2+65.831 3897733.171 11489437.283
End: 3+73.897 3897826.400 11489491.931
Tangent Data
Parameter Value Parameter Value
Length: 108.065 Course: N 30° 22' 39.9763" E

Curve Point Data
Description Station Northing Easting
PC: 3+73.897 3897826.400 11489491.931
RP: 3895429.788 11493535.825
PCC: 4+96.505 3897931.049 11489555.810
Circular Curve Data
Parameter Value Parameter Value
Delta: 01° 29' 39.9538" Type: RIGHT
Radius: 4700.726
Length: 122.608 Tangent: 61.307
Mid-Ord: 0.400 External: 0.400
Chord: 122.604 Course: N 31° 24' 01.0903" E

Curve Point Data
Description Station Northing Easting
PCC: 4+96.505 3897931.049 11489555.810
RP: 3896965.901 11491344.588
PT: 5+54.739 3897981.896 11489584.192
Circular Curve Data
Parameter Value Parameter Value
Delta: 01° 38' 29.6482" Type: RIGHT
Radius: 2032.545
Length: 58.234 Tangent: 29.119
Mid-Ord: 0.209 External: 0.209
Chord: 58.232 Course: N 29° 10' 12.6526" E

Alignment: WALL-B
Description:

Tangent Data
Description PT Station Northing Easting
Start: 0+00.000 3897605.972 11489479.649
End: 2+56.594 3897838.696 11489587.724
Tangent Data
Parameter Value Parameter Value
Length: 256.594 Course: N 24° 54' 35.1858" E

Tangent Data
Description PT Station Northing Easting
Start: 2+56.594 3897838.696 11489587.724
End: 3+34.311 3897911.240 11489615.605
Tangent Data
Parameter Value Parameter Value
Length: 77.718 Course: N 21° 01' 25.0252" E

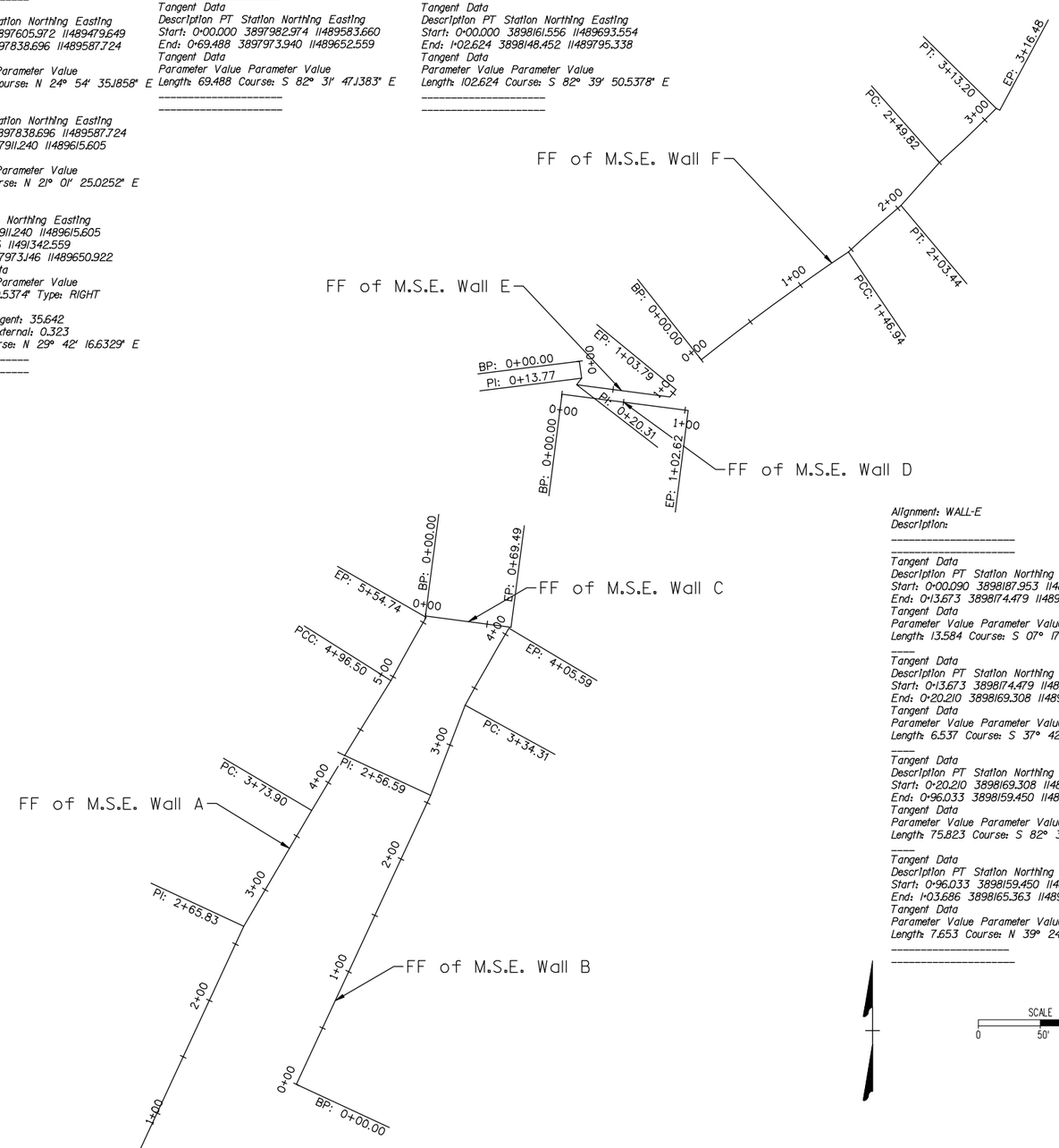
Curve Point Data
Description Station Northing Easting
PC: 3+34.311 3897911.240 11489615.605
RP: 3896967.045 11491342.559
PT: 4+05.587 3897973.146 11489650.922
Circular Curve Data
Parameter Value Parameter Value
Delta: 02° 04' 29.5374" Type: RIGHT
Radius: 1968.216
Length: 71.276 Tangent: 35.642
Mid-Ord: 0.323 External: 0.323
Chord: 71.272 Course: N 29° 42' 16.6329" E

Alignment: WALL-C
Description:

Tangent Data
Description PT Station Northing Easting
Start: 0+00.000 3897982.974 11489583.660
End: 0+69.488 3897973.940 11489652.559
Tangent Data
Parameter Value Parameter Value
Length: 69.488 Course: S 82° 31' 47.1383" E

Alignment: WALL-D
Description:

Tangent Data
Description PT Station Northing Easting
Start: 0+00.000 3898161.556 11489693.554
End: 1+02.624 3898148.452 11489795.338
Tangent Data
Parameter Value Parameter Value
Length: 102.624 Course: S 82° 39' 50.5378" E



Alignment: WALL-E
Description:

Tangent Data
Description PT Station Northing Easting
Start: 0+00.090 3898187.953 11489707.644
End: 0+13.673 3898174.479 11489709.367
Tangent Data
Parameter Value Parameter Value
Length: 13.584 Course: S 07° 17' 08.1502" E

Tangent Data
Description PT Station Northing Easting
Start: 0+13.673 3898174.479 11489709.367
End: 0+20.210 3898169.308 11489705.369
Tangent Data
Parameter Value Parameter Value
Length: 6.537 Course: S 37° 42' 34.2481" W

Tangent Data
Description PT Station Northing Easting
Start: 0+20.210 3898169.308 11489705.369
End: 0+96.033 3898159.450 11489780.548
Tangent Data
Parameter Value Parameter Value
Length: 75.823 Course: S 82° 31' 47.1383" E

Tangent Data
Description PT Station Northing Easting
Start: 0+96.033 3898159.450 11489780.548
End: 1+03.686 3898165.363 11489785.407
Tangent Data
Parameter Value Parameter Value
Length: 7.653 Course: N 39° 24' 48.0395" E

Alignment: WALL-F
Description:

Curve Point Data
Description Station Northing Easting
PC: 0+00.000 3898189.403 11489805.762
RP: 3896662.276 11491015.629
PCC: 1+46.942 3898276.224 11489924.269
Circular Curve Data
Parameter Value Parameter Value
Delta: 04° 19' 16.5602" Type: RIGHT
Radius: 1948.306
Length: 146.942 Tangent: 73.506
Mid-Ord: 1.385 External: 1.386
Chord: 146.907 Course: N 53° 46' 21.3472" E

Curve Point Data
Description Station Northing Easting
PCC: 1+46.942 3898276.224 11489924.269
RP: 3897335.121 11490789.652
PT: 2+03.442 3898313.536 11489966.690
Circular Curve Data
Parameter Value Parameter Value
Delta: 02° 31' 55.3025" Type: RIGHT
Radius: 1278.500
Length: 56.500 Tangent: 28.254
Mid-Ord: 0.312 External: 0.312
Chord: 56.495 Course: N 48° 39' 58.1487" E

Tangent Data
Description PT Station Northing Easting
Start: 2+03.442 3898313.536 11489966.690
End: 2+49.816 3898348.173 11489997.525
Tangent Data
Parameter Value Parameter Value
Length: 46.374 Course: N 41° 40' 35.7635" E

Curve Point Data
Description Station Northing Easting
PC: 2+49.816 3898348.173 11489997.525
RP: 3899022.178 11489401.105
PT: 3+13.201 3898391.814 11490043.476
Circular Curve Data
Parameter Value Parameter Value
Delta: 04° 02' 06.9127" Type: LEFT
Radius: 900.000
Length: 63.386 Tangent: 31.706
Mid-Ord: 0.558 External: 0.558
Chord: 63.373 Course: N 46° 28' 37.4932" E

Tangent Data
Description PT Station Northing Easting
Start: 3+13.201 3898391.814 11490043.476
End: 3+16.480 3898390.264 11490046.365
Tangent Data
Parameter Value Parameter Value
Length: 3.279 Course: S 61° 47' 07.2828" E

SCALE
0 50' 100'

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

KIMLEY-HORN & ASSOC.
RALEIGH, NC
STRUCTURAL ENGINEER

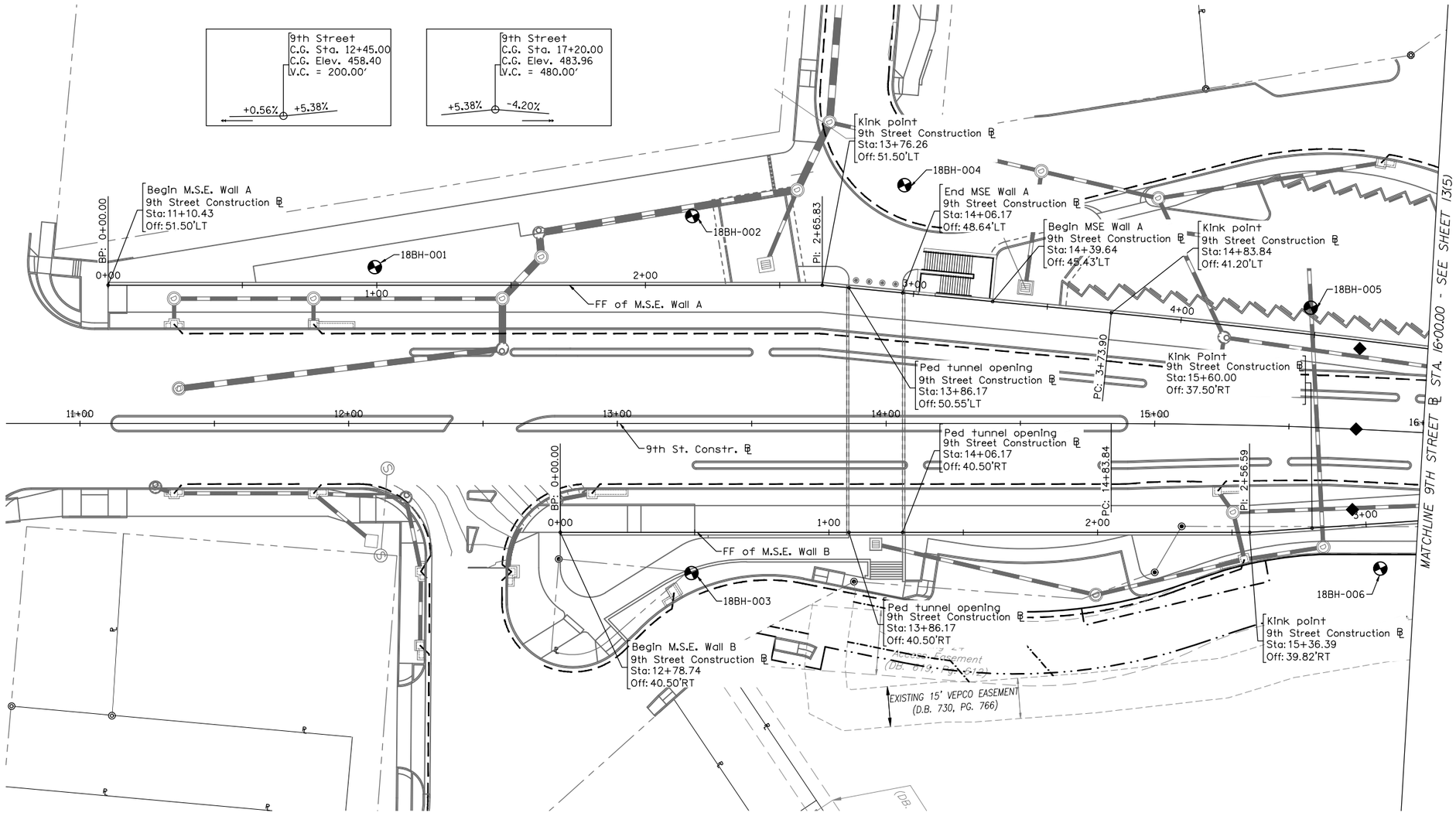
No.	Description	Date
Revisions		

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
STRUCTURE AND BRIDGE DIVISION

RETAINING WALL CONSTRUCTION ALIGNMENT

Designed: PDC	Date	Plan No.	Sheet No.
Drawn: JDL	October 2018		13(3)
Checked: SAD			

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(4)



PLAN

Notes:
1. See sheet 13(1) for additional notes.
2. FF denotes front face. BF denotes back face.

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RALEIGH, NC
STRUCTURAL ENGINEER

PAC PLANS

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PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
	Revisions	

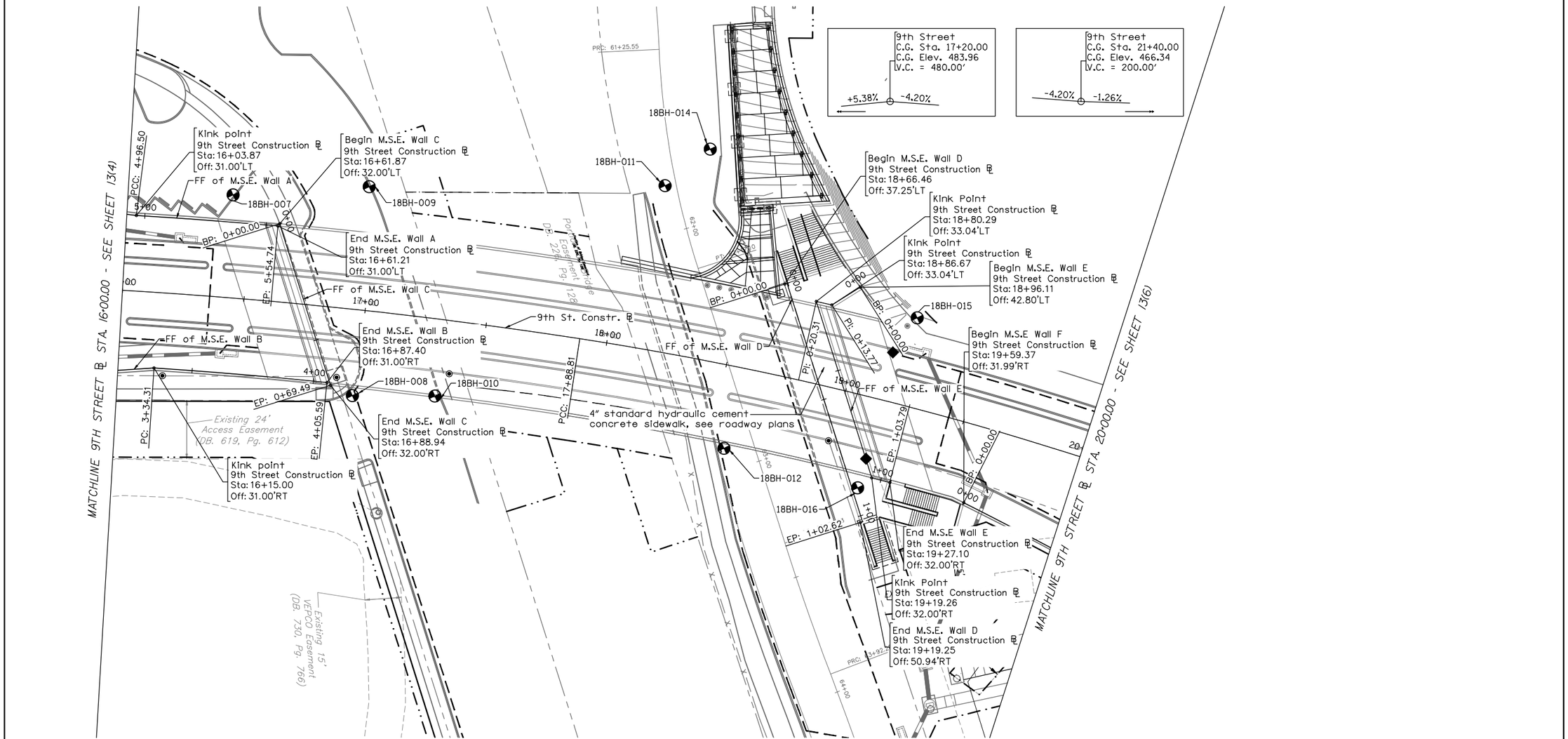
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
STRUCTURE AND BRIDGE DIVISION

M.S.E. & RETAINING WALL GENERAL PLAN 9TH STREET

Designed: PDC.....
Drawn: JDL.....
Checked: SAD.....

Date	Plan No.	Sheet No.
October 2018		13(4)

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(5)



PLAN

Notes:
1. See sheet 13(1) for additional notes.
2. FF denotes front face. BF denotes back face.

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

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RALEIGH, NC
STRUCTURAL ENGINEER

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
	Revisions	

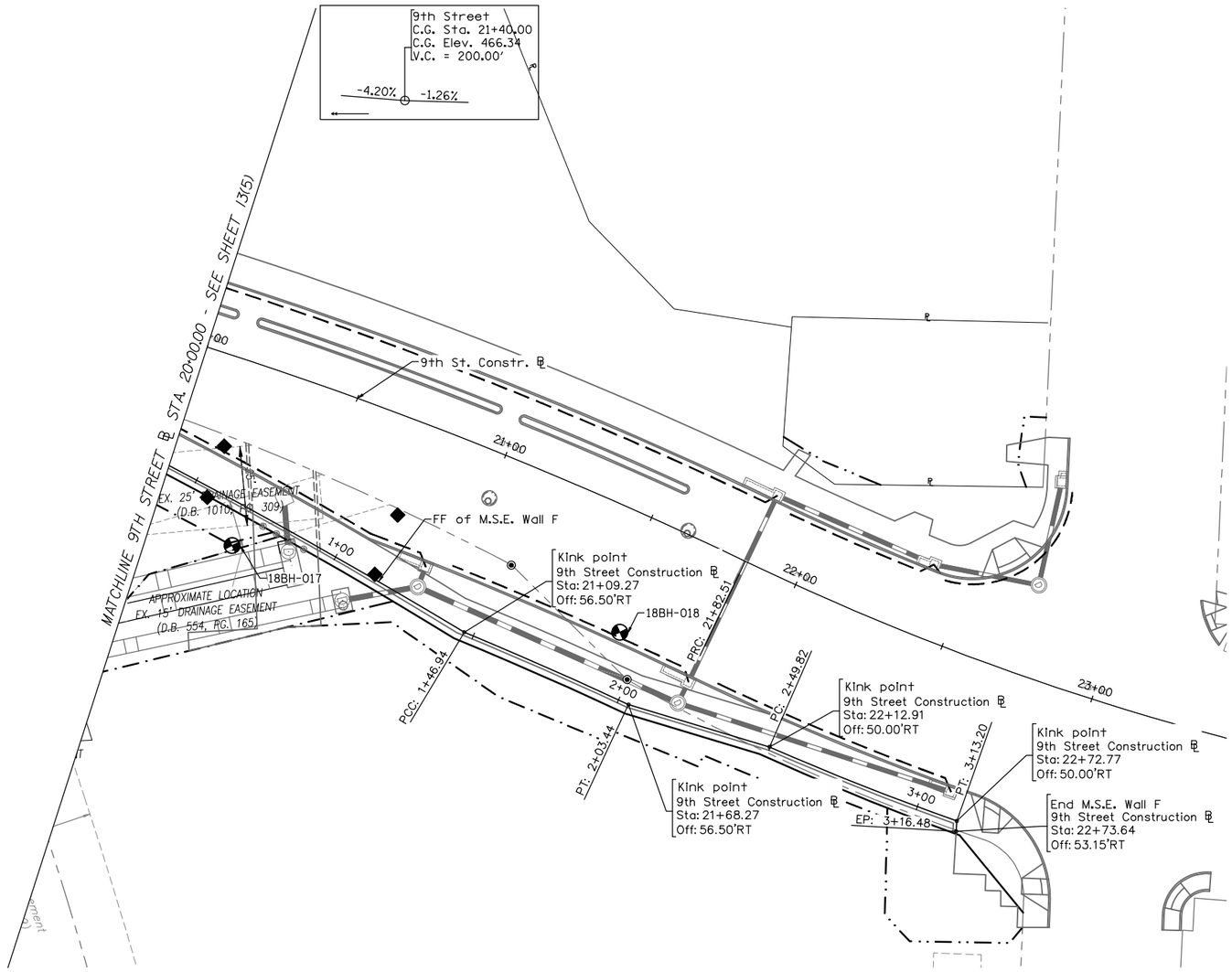
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

STRUCTURE AND BRIDGE DIVISION

M.S.E. & RETAINING WALL GENERAL PLAN 9TH STREET

Designed: PDC	Date	Plan No.	Sheet No.
Drawn: JDL	October 2018		13(5)
Checked: SAD			

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(6)



PLAN

Notes:
1. See sheet 13(1) for additional notes.
2. FF denotes front face. BF denotes back face.

KIMLEY-HORN & ASSOC.
RALEIGH, NC
STRUCTURAL ENGINEER

PAC PLANS

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PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
	Revisions	

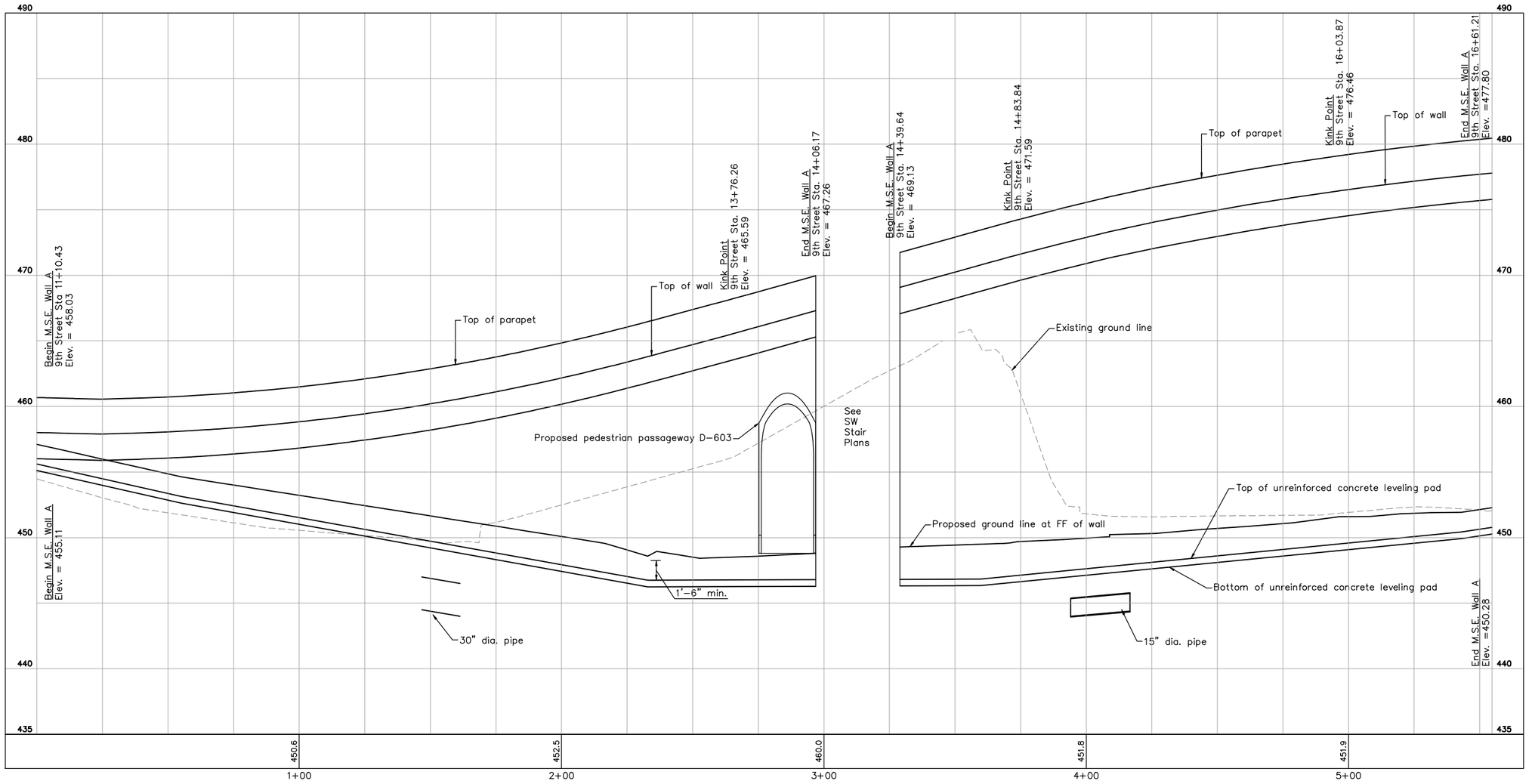
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
STRUCTURE AND BRIDGE DIVISION

M.S.E. & RETAINING WALL GENERAL PLAN 9TH STREET

Designed: PDC.....
Drawn: JDL.....
Checked: SAD.....

Date	Plan No.	Sheet No.
October 2018		13(6)

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(7)



PROFILE - WALL A

Notes:
1. See drainage descriptions for storm sewer information.

KIMLEY-HORN & ASSOC.
RALEIGH, NC
STRUCTURAL ENGINEER

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
	Revisions	

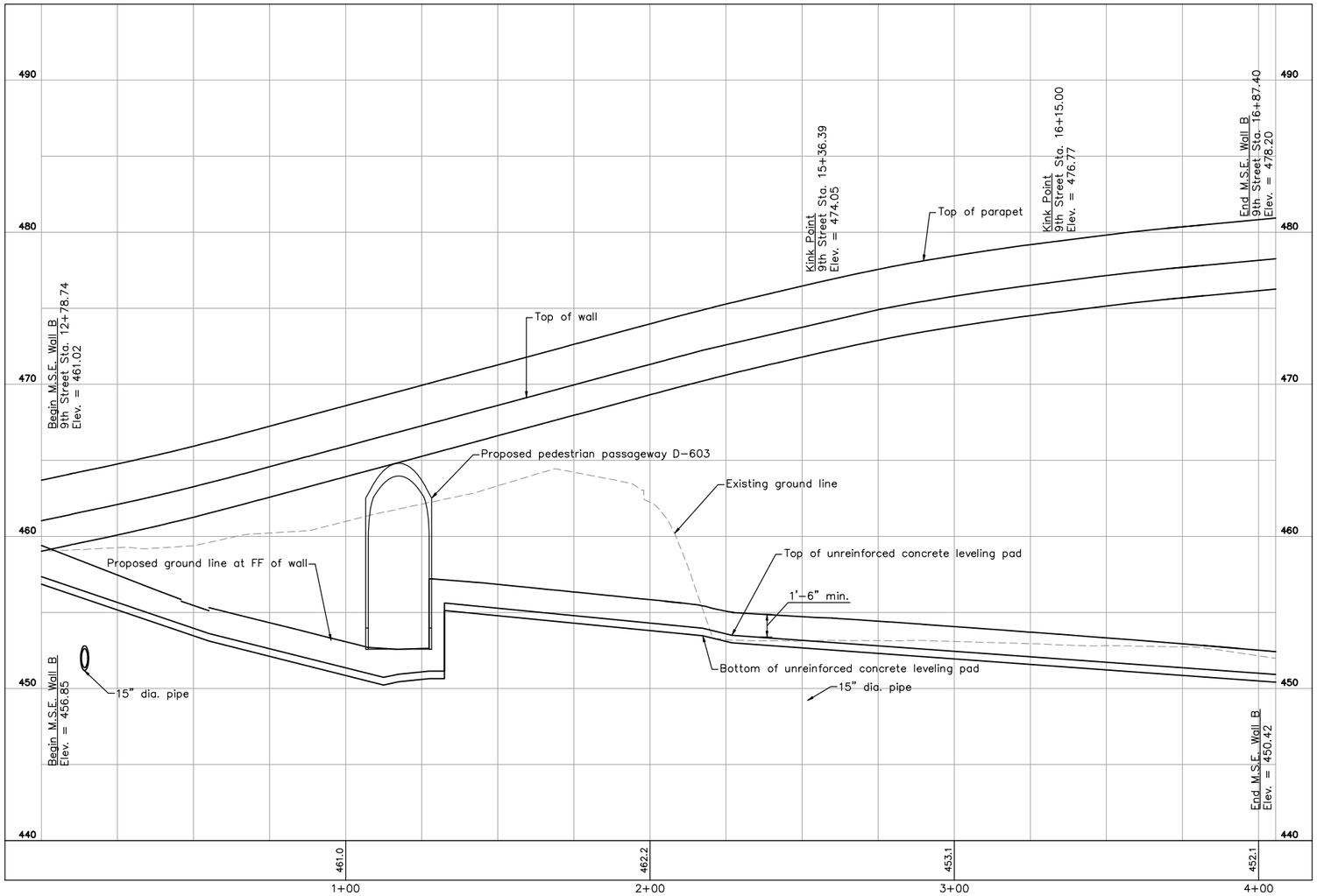
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
STRUCTURE AND BRIDGE DIVISION

M.S.E. RETAINING WALL A PROFILE 9TH STREET

Designed: PDC.....
Drawn: JJK.....
Checked: SAP.....

Date	Plan No.	Sheet No.
March 2020	302-08	13(7)

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(8)



PROFILE - WALL B

Notes:
1. See drainage descriptions for storm sewer information.

KIMLEY-HORN & ASSOC.
RALEIGH, NC
STRUCTURAL ENGINEER

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
	Revisions	

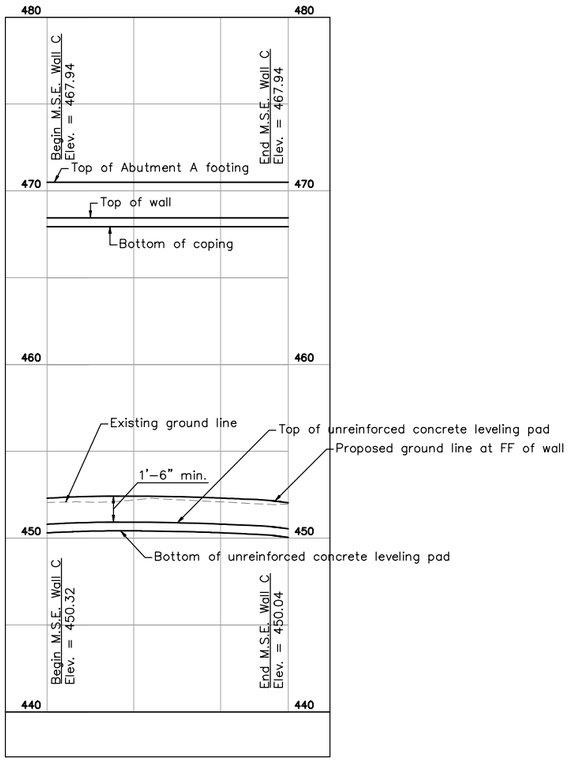
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
STRUCTURE AND BRIDGE DIVISION

M.S.E. RETAINING WALL B PROFILE 9TH STREET

Designed: PDC.....
Drawn: MK.....
Checked: SAD.....

Date	Plan No.	Sheet No.
March 2020	302-08	13(8)

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(9)



PROFILE - WALL C

Notes:
1. See drainage descriptions for storm sewer information.

KIMLEY-HORN & ASSOC.
RALEIGH, NC
STRUCTURAL ENGINEER

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
	Revisions	

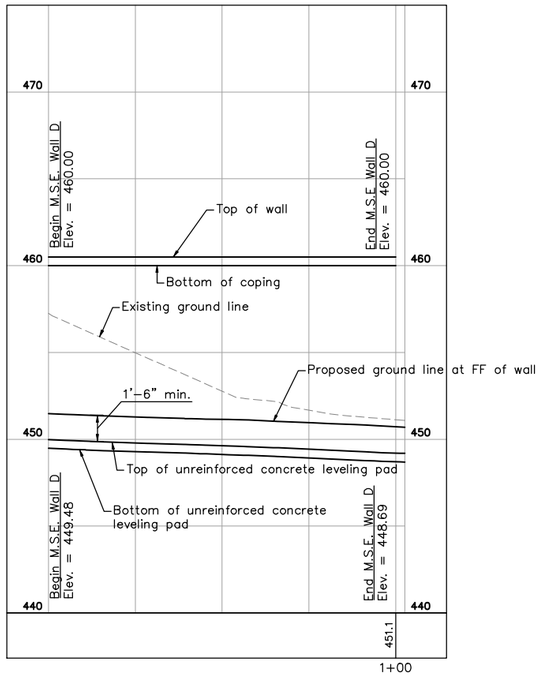
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

STRUCTURE AND BRIDGE DIVISION

M.S.E. RETAINING WALL C PROFILE 9TH STREET

Designed: PDC	Date	Plan No.	Sheet No.
Drawn: JJK	March 2020	302-08	13(9)
Checked: SAR			

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(10)



PROFILE - WALL D

Notes:
1. See drainage descriptions for storm sewer information.

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

KIMLEY-HORN & ASSOC.
RALEIGH, NC
STRUCTURAL ENGINEER

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
	Revisions	

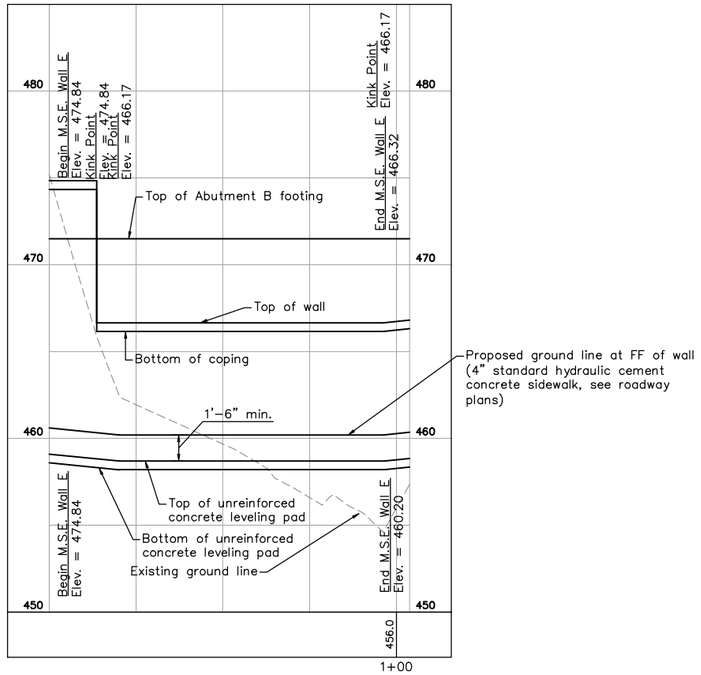
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

STRUCTURE AND BRIDGE DIVISION

M.S.E. RETAINING WALL D PROFILE 9TH STREET

Designed: PDC	Date	Plan No.	Sheet No.
Drawn: JJK	March 2020	302-08	13(10)
Checked: SAD			

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(11)



PROFILE - WALL E

Notes:
1. See drainage descriptions for storm sewer information.

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

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RALEIGH, NC
STRUCTURAL ENGINEER

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
	Revisions	

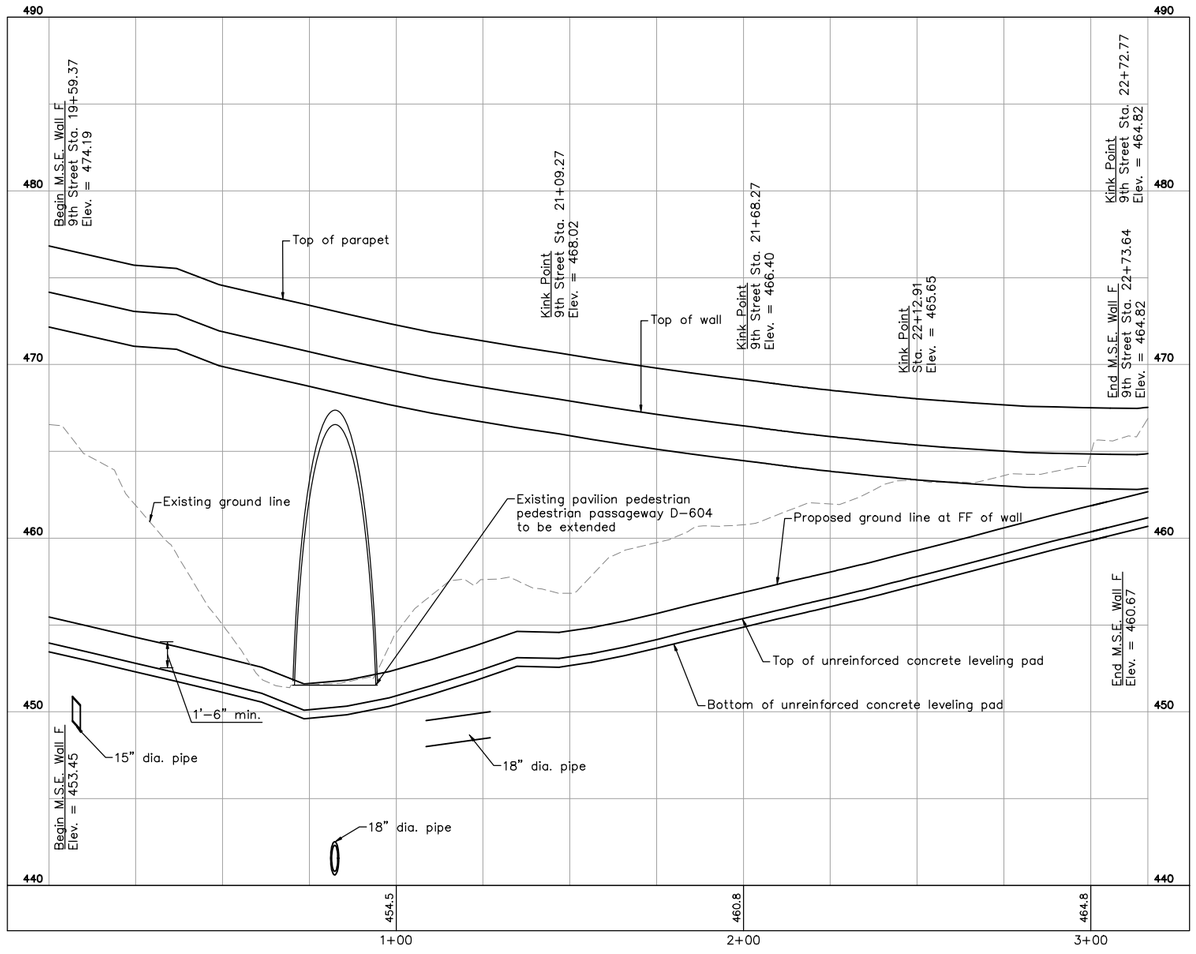
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

STRUCTURE AND BRIDGE DIVISION

M.S.E. RETAINING
WALL E PROFILE
9TH STREET

Designed: PDC	Date	Plan No.	Sheet No.
Drawn: JJK	March 2020	302-08	13(11)
Checked: SAP			

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(12)



PROFILE - WALL F

Notes:
1. See drainage descriptions for storm sewer information.

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

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RALEIGH, NC
STRUCTURAL ENGINEER

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
	Revisions	

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

STRUCTURE AND BRIDGE DIVISION

M.S.E. RETAINING WALL F PROFILE 9TH STREET

Designed: PDC	Date	Plan No.	Sheet No.
Drawn: JJK	March 2020	302-08	13(12)
Checked: SAD			

PROJECT MANAGER _____
SURVEYED BY, DATE _____
DESIGN SUPERVISED BY _____
DESIGNED BY _____
SUBSURFACE UTILITY BY, DATE _____

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(13)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT.

VDOT Virginia Department of Transportation

PROJECT #: 0020-104-101, UPC 75878
LOCATION: Belmont Bridge Replacement
STRUCTURE: 9TH STREET MSE WALL

18BH-001 PAGE 1 OF 1

STATION: 12+00 OFFSET: 55 L
LATITUDE: 38.027213° N LONGITUDE: 78.477628° W
SURFACE ELEVATION: 450.36 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/14/2018 – 06/14/2018
Drilling Method(s): 3-1/4" I.D. Hollow Stem Auger
SPT Method: Auto Hammer (140 lb)
Other Test(s): Not Applicable
Driller: Shenandoah Drilling Services, Inc
Logger: A. Nezelek, Schnabel Engineering

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
											0.0 / 450.36 6-INCHES ASPHALT				
											0.67 / 449.69 6-INCHES CRUSHED STONE				
											1.17 / 449.19 Fill, dark brown, fine to coarse, SILTY SAND FILL, contains gravel, very loose, moist (SM)	46	14	23.0	41.0
											3.0 / 447.36 Residuum, orange-brown, fine to coarse, SILTY SAND WITH GRAVEL, medium dense, moist (SM) SAME, dense below 5 ft			21.5 18.7	
											7.5 / 442.86 IGM, light green-gray, SILT WITH GRAVEL, very hard, moist (ML)			5.2 7.9 5.0	
											Auger refusal at 11 ft. Bottom of Boring at 11 ft.				

REMARKS: Rig Type: Diedrich D-50 (ATV).

PAGE 1 OF 1
18BH-001

VDOT Virginia Department of Transportation

PROJECT #: 0020-104-101, UPC 75878
LOCATION: Belmont Bridge Replacement
STRUCTURE: 9TH STREET MSE WALL

18BH-002 PAGE 1 OF 1

STATION: 13+25 OFFSET: 80 L
LATITUDE: 38.027529° N LONGITUDE: 78.477515° W
SURFACE ELEVATION: 447.84 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/14/2018 – 06/14/2018
Drilling Method(s): 3-1/4" I.D. Hollow Stem Auger
SPT Method: Auto Hammer (140 lb)
Other Test(s): Not Applicable
Driller: Shenandoah Drilling Services, Inc
Logger: A. Nezelek, Schnabel Engineering

GROUND WATER
▽ FIRST ENCOUNTERED AT 18.5 ft DEPTH
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
												0.0 / 447.84 6-INCHES ASPHALT			
												0.5 / 447.34 6-INCHES CRUSHED STONE			
												1.0 / 446.84 Fill, red-brown with speckles of black, ELASTIC SILT WITH SAND FILL, soft, moist (MH)			27.1
												3.5 / 444.34 Residuum, brown with speckles of black, fine to coarse, SILTY SAND, medium dense, moist (SM)			16.6
												8.0 / 439.84 IGM, brown-gray, fine to coarse, SANDY SILT WITH GRAVEL, very hard, moist (ML)			28.9 6.8 3.1 3.3
												Auger refusal at 19 ft. Bottom of Boring at 19 ft.			

REMARKS: Rig Type: Diedrich D-50 (ATV).
Water observed on spoon at 18.5 ft.

PAGE 1 OF 1
18BH-002

VDOT Virginia Department of Transportation

PROJECT #: 0020-104-101, UPC 75878
LOCATION: Belmont Bridge Replacement
STRUCTURE: 9TH STREET MSE WALL

18BH-003 PAGE 1 OF 1

STATION: 13+25 OFFSET: 55 R
LATITUDE: 38.027375° N LONGITUDE: 78.477097° W
SURFACE ELEVATION: 457.31 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/14/2018 – 06/14/2018
Drilling Method(s): 3-1/4" I.D. Hollow Stem Auger
SPT Method: Auto Hammer (140 lb)
Other Test(s): Not Applicable
Driller: Shenandoah Drilling Services, Inc
Logger: A. Nezelek, Schnabel Engineering

GROUND WATER
▽ FIRST ENCOUNTERED AT 8.0 ft DEPTH
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
												0.0 / 457.31 1-INCHES ROOTMAT AND TOPSOIL				
												0.08 / 457.23 Fill, red-brown, fine to coarse, SANDY FAT CLAY WITH GRAVEL FILL, contains root fragments, stiff, moist (CH) SAME, soft below 2 ft SAME, soft below 4 ft			15.5 48.0	
												6.0 / 451.31 Gray-brown, fine to coarse, SILTY SAND FILL, contains rock fragments, loose, moist (SM)	62	34	34.8	53.8
												7.5 / 449.81 Residuum, brown, fine to coarse, SILTY SAND WITH GRAVEL, very dense, wet (SM)	30	6	19.7 6.6	23.6
												9.5 / 447.81 IGM, brown, fine to coarse, SILTY SAND WITH GRAVEL, very dense, moist (SM)			5.4	
												Auger refusal at 18 ft. Bottom of Boring at 18 ft.				

REMARKS: Rig Type: Diedrich D-50 (ATV).

PAGE 1 OF 1
18BH-003

THE SUBSURFACE INFORMATION SHOWN ON THE BORING LOGS IN THESE PLANS WAS OBTAINED WITH REASONABLE CARE AND RECORDED IN GOOD FAITH SOLELY FOR USE BY THE DEPARTMENT IN ESTABLISHING DESIGN CONTROLS FOR THE PROJECT. THE DEPARTMENT HAS NO REASON TO SUSPECT THAT SUCH INFORMATION IS NOT REASONABLY ACCURATE AS AN APPROXIMATE INDICATION OF THE SUBSURFACE CONDITIONS AT THE SITES WHERE THE BORINGS WERE TAKEN. THE DEPARTMENT DOES NOT IN ANY WAY WARRANT OR GUARANTEE THAT SUCH DATA CAN BE PROJECTED AS INDICATIVE OF CONDITIONS BEYOND THE LIMITS OF THE BORINGS SHOWN; AND ANY SUCH PROJECTIONS BY BIDDERS ARE PURELY INTERPRETIVE AND ALTOGETHER SPECULATIVE. FURTHER, THE DEPARTMENT DOES NOT IN ANY WAY GUARANTEE, EITHER EXPRESSLY OR BY IMPLICATION. THE SUFFICIENCY OF THE INFORMATION FOR BID PURPOSES.

THE BORING LOGS ARE MADE AVAILABLE TO BIDDERS IN ORDER THAT THEY MAY HAVE ACCESS TO SUBSURFACE DATA IDENTICAL TO THAT WHICH IS POSSESSED BY THE DEPARTMENT, AND ARE NOT INTENDED AS A SUBSTITUTE FOR PERSONAL INVESTIGATION, INTERPRETATION AND JUDGEMENT BY THE BIDDERS.

KIMLEY-HORN & ASSOC.
RALEIGH, NC
STRUCTURAL ENGINEER

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
	Revisions	

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
STRUCTURE AND BRIDGE DIVISION

M.S.E. RETAINING WALL SOIL BORINGS

Designed: PDC	Date	Plan No.	Sheet No.
Drawn: JJK	May 2020	302-08	13(13)
Checked: SAD			

PROJECT MANAGER _____
SURVEYED BY, DATE _____
DESIGN SUPERVISED BY _____
DESIGNED BY _____
SUBSURFACE UTILITY BY, DATE _____

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(14)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT.

VDOT Virginia Department of Transportation

PROJECT #: 0020-104-101, UPC 75878
LOCATION: Belmont Bridge Replacement
STRUCTURE: 9TH STREET MSE WALL

18BH-004 PAGE 1 OF 1

STATION: 14+00 OFFSET: 90 L
LATITUDE: 38.027739° N LONGITUDE: 78.477436° W
SURFACE ELEVATION: 447.61 ft COORD. DATUM: NAD 83

Date(s) Drilled: 06/14/2018 – 06/14/2018
Drilling Method(s): 3-1/4" I.D. Hollow Stem Auger
SPT Method: Auto Hammer (140 lb)
Other Test(s): Not Applicable
Driller: Shenandoah Drilling Services, Inc
Logger: A. Nezelek, Schnabel Engineering

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP ° STRATA	DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
												0.0 / 447.61 7-INCHES ASPHALT			
												0.58 / 447.03 6-INCHES CRUSHED STONE			
4	2	445	5 3 3	65		1						1.08 / 446.53 Fill, red-brown, ELASTIC SILT WITH SAND FILL, contains gravel, firm, moist (MH)			21.3
1	4		2 2 2	65		3						3.0 / 444.61 Brown, fine to coarse, SANDY SILT FILL, contains gravel, firm, moist (ML)			17.5
2.5	6		1 1 4	60		5						6.0 / 441.61 Residuum, tan-brown, SILT WITH SAND, firm, moist (ML)			34.3
	8	440	50/5	75		7 7.4						7.0 / 440.61 IGM, gray-green, fine to coarse, SILTY SAND, very dense, moist (SM)			26.7
	10		50/1	100		9 9.1									3.8
	12	435													
	14		50/0			14						Auger refusal at 14 ft. Bottom of Boring at 14 ft.			

REMARKS: Rig Type: Diedrich D-50 (ATV).

PAGE 1 OF 1
18BH-004

SPT_LOGS-12CAD03 VDOT LOGS.GPJ SPT7.GDT.pdT_version 10.0.0005.1/12/18/Schnabel Engineering, Inc.

VDOT Virginia Department of Transportation

PROJECT #: 0020-104-101, UPC 75878
LOCATION: Belmont Bridge Replacement
STRUCTURE: 9TH STREET MSE WALL

18BH-005 PAGE 1 OF 1

STATION: 15+50 OFFSET: 50 L
LATITUDE: 38.028063° N LONGITUDE: 78.477071° W
SURFACE ELEVATION: 451.73 ft COORD. DATUM: NAD 83

Date(s) Drilled: 06/14/2018 – 06/14/2018
Drilling Method(s): 3-1/4" I.D. Hollow Stem Auger
SPT Method: Auto Hammer (140 lb)
Other Test(s): Not Applicable
Driller: Shenandoah Drilling Services, Inc
Logger: A. Nezelek, Schnabel Engineering

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

DEPTH (ft)	ELEVATION (ft)	STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP ° STRATA	DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
											0.0 / 451.73 2-INCHES ASPHALT				
											0.17 / 451.56 6-INCHES CRUSHED STONE				
2	450	5 7 7	90		1						0.67 / 451.06 Fill, dark brown, fine to coarse, SILTY SAND FILL, medium dense, moist (SM) SAME, loose below 3 ft			15.9	
4		4 3 4	75		3									26.4	
6		3 2 3	100		5						5.0 / 446.73 Residuum, brown, fine to coarse, SILTY SAND, few rock fragments, loose, moist (SM)	47	14	30.1	47.2
8	445	9 44 50/5	100		7									4.5	
10		50/6	80		8.4 9 9.5						8.0 / 443.73 IGM, brown-gray, fine to coarse, SANDY SILT WITH GRAVEL, very hard, moist (ML)			4.9	
12	440										Auger refusal at 12.5 ft. Bottom of Boring at 12.5 ft.				

REMARKS: Rig Type: Diedrich D-50 (ATV).

PAGE 1 OF 1
18BH-005

SPT_LOGS-12CAD03 VDOT LOGS.GPJ SPT7.GDT.pdT_version 10.0.0005.1/12/18/Schnabel Engineering, Inc.

VDOT Virginia Department of Transportation

PROJECT #: 0020-104-101, UPC 75878
LOCATION: Belmont Bridge Replacement
STRUCTURE: 9TH STREET MSE WALL

18BH-006 PAGE 1 OF 1

STATION: 15+75 OFFSET: 50 R
LATITUDE: 38.028015° N LONGITUDE: 78.476728° W
SURFACE ELEVATION: 453.49 ft COORD. DATUM: NAD 83

Date(s) Drilled: 06/14/2018 – 06/14/2018
Drilling Method(s): 3-1/4" I.D. Hollow Stem Auger
SPT Method: Auto Hammer (140 lb)
Other Test(s): Not Applicable
Driller: Shenandoah Drilling Services, Inc
Logger: A. Nezelek, Schnabel Engineering

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

DEPTH (ft)	ELEVATION (ft)	STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP ° STRATA	DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
											0.0 / 453.49 4-INCHES ASPHALT				
											0.33 / 453.16 4-INCHES CRUSHED STONE				
2	450	2 2 3	80		1						0.67 / 452.82 Fill, red-brown, fine to coarse, SILTY SAND WITH GRAVEL FILL, loose, moist (SM) SAME, very loose below 3 ft			18.8	
4		1 1 1	75		3							24	1	15.3	32.7
6		2 4 10	85		5						5.5 / 447.99 Residuum, brown, fine to coarse, SILTY SAND, medium dense, moist (SM)			13.3	
8	445	23 50/4	100		7							32	8	5.9	41.0
10		50/1	100		9 9.1						7.5 / 445.99 IGM, brown, fine to coarse, SILTY SAND WITH GRAVEL, very dense, moist (SM)			4.5	
12											Auger refusal at 13 ft. Bottom of Boring at 13 ft.				

REMARKS: Rig Type: Diedrich D-50 (ATV).

PAGE 1 OF 1
18BH-006

SPT_LOGS-12CAD03 VDOT LOGS.GPJ SPT7.GDT.pdT_version 10.0.0005.1/12/18/Schnabel Engineering, Inc.

THE SUBSURFACE INFORMATION SHOWN ON THE BORING LOGS IN THESE PLANS WAS OBTAINED WITH REASONABLE CARE AND RECORDED IN GOOD FAITH SOLELY FOR USE BY THE DEPARTMENT IN ESTABLISHING DESIGN CONTROLS FOR THE PROJECT. THE DEPARTMENT HAS NO REASON TO SUSPECT THAT SUCH INFORMATION IS NOT REASONABLY ACCURATE AS AN APPROXIMATE INDICATION OF THE SUBSURFACE CONDITIONS AT THE SITES WHERE THE BORINGS WERE TAKEN. THE DEPARTMENT DOES NOT IN ANY WAY WARRANT OR GUARANTEE THAT SUCH DATA CAN BE PROJECTED AS INDICATIVE OF CONDITIONS BEYOND THE LIMITS OF THE BORINGS SHOWN; AND ANY SUCH PROJECTIONS BY BIDDERS ARE PURELY INTERPRETIVE AND ALTOGETHER SPECULATIVE. FURTHER, THE DEPARTMENT DOES NOT IN ANY WAY GUARANTEE, EITHER EXPRESSLY OR BY IMPLICATION. THE SUFFICIENCY OF THE INFORMATION FOR BID PURPOSES.

THE BORING LOGS ARE MADE AVAILABLE TO BIDDERS IN ORDER THAT THEY MAY HAVE ACCESS TO SUBSURFACE DATA IDENTICAL TO THAT WHICH IS POSSESSED BY THE DEPARTMENT, AND ARE NOT INTENDED AS A SUBSTITUTE FOR PERSONAL INVESTIGATION, INTERPRETATION AND JUDGEMENT BY THE BIDDERS.

KIMLEY-HORN & ASSOC.
RALEIGH, NC
STRUCTURAL ENGINEER

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
	Revisions	

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
STRUCTURE AND BRIDGE DIVISION

M.S.E. RETAINING WALL SOIL BORINGS

Designed: PDC	Date	Plan No.	Sheet No.
Drawn: JJK	May 2020	302-08	13(14)
Checked: SAD			

PROJECT MANAGER _____
SURVEYED BY, DATE _____
DESIGN SUPERVISED BY _____
DESIGNED BY _____
SUBSURFACE UTILITY BY, DATE _____

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(15)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT.

VDOT Virginia Department of Transportation

PROJECT #: 0020-104-101, UPC 75878
LOCATION: Belmont Bridge Replacement
STRUCTURE: 9TH STREET ABUT A & MSE

18BH-007 PAGE 1 OF 1

STATION: 16+50 OFFSET: 40 L
LATITUDE: 38.028271° N LONGITUDE: 78.476920° W
SURFACE ELEVATION: 452.17 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/18/2018 – 06/18/2018
Drilling Method(s): 3-1/4" I.D. Hollow Stem Auger
SPT Method: Auto Hammer (140 lb)
Other Test(s): Not Applicable
Driller: Shenandoah Drilling Services, Inc
Logger: A. Nezelek, Schnabel Engineering
GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP ° STRATA	DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
											0.0 / 452.17 2-INCHES ASPHALT				
											0.17 / 452.0 4-INCHES CRUSHED STONE			17.5	
2	450	5 11 21 25	60		1						0.5 / 451.67 Fill, black, fine to coarse, SILTY SAND FILL, contains gravel, dense, moist (SM)				
4		7 24 20 11	65		3						3.0 / 449.17 Light brown and dark brown, fine to coarse, POORLY GRADED SAND WITH SILT FILL, very dense, moist (SP-SM)			14.1	
6		8 11 11 16	65		5						5.0 / 447.17 Residuum, tan-brown, fine to coarse, SILTY SAND, few rock fragments, medium dense, moist (SM)	23	3	8.4	
8	445	10 50/6	90		7						7.5 / 444.67 IGM, tan-brown, fine to coarse, SILTY SAND, few rock fragments, very dense, moist (SM)			7.7	35.4
		50/3	100		9 9.3						10.5 / 441.67 Highly to moderately weathered, soft to moderately hard, gray-green, METABASALT, intensely fractured (< 2 in) to highly fractured (2 – 12 in), moderately dipping joints with manganese infill and iron oxide staining			3.6	
12	440				10.5	92	27								
14					15.5										
16															
18	435					68	32								
20					20.5						Auger refusal at 10.5 ft. Bottom of Boring at 20.5 ft.				

REMARKS: Rig Type: Diedrich D-50 (ATV).

PAGE 1 OF 1
18BH-007

SFT_LOGS:17X30X3 VDOT LOGS.GPJ SFT7.GDT.gdt_metric 10.0.005\11/12/19\Schnabel Engineering, Inc.

VDOT Virginia Department of Transportation

PROJECT #: 0020-104-101, UPC 75878
LOCATION: Belmont Bridge Replacement
STRUCTURE: 9TH STREET ABUT A & MSE

18BH-008 PAGE 1 OF 1

STATION: 17+00 OFFSET: 30 R
LATITUDE: 38.028298° N LONGITUDE: 78.476590° W
SURFACE ELEVATION: 451.72 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/19/2018 – 06/19/2018
Drilling Method(s): 3-1/4" I.D. Hollow Stem Auger
SPT Method: Auto Hammer (140 lb)
Other Test(s): Not Applicable
Driller: Shenandoah Drilling Services, Inc
Logger: A. Nezelek, Schnabel Engineering
GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP ° STRATA	DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
												0.0 / 451.72 4-INCHES ASPHALT				
												0.33 / 451.39 44-INCHES CRUSHED STONE			4.3	
	2	450	11 6 6 5	50		1						4.0 / 447.72 Fill, orange-brown, fine to coarse, POORLY GRADED SAND FILL, contains gravel, loose, moist (SP)			5.8	
	4		4 3 3 3	70		3						5.0 / 446.72 Brown with mottles of black, ELASTIC SILT WITH SAND FILL, stiff, moist (MH)	62	27	27.5	76.2
	6		3 3 4 4	75		5						7.0 / 444.72 Residuum, green-brown, fine to coarse, SILTY SAND WITH GRAVEL, dense, moist (SM)	38	11	8.7	35.2
2		445	6 13 21 24	85		7						10.5 / 441.22 IGM, green-brown, fine to coarse, SANDY SILT WITH GRAVEL, very hard, moist (ML)			16.7	
	8		6 12 18 50/5	80		9						14.0 / 437.72 Decomposed to moderately weathered, soft to moderately hard, gray-green, METABASALT, intensely fractured (< 2 in) to highly fractured (2 – 12 in), moderately dipping joints with manganese infill and iron oxide staining				
	10	440				10.9										
	12		50/0			14										
	14															
	16	435					30	17								
	18					19										
	20						43	7								
	22	430														
	24					24						Auger refusal at 14 ft. Bottom of Boring at 24 ft.				

REMARKS: Rig Type: Diedrich D-50 (ATV).

PAGE 1 OF 1
18BH-008

SFT_LOGS:17X30X3 VDOT LOGS.GPJ SFT7.GDT.gdt_metric 10.0.005\11/12/19\Schnabel Engineering, Inc.

VDOT Virginia Department of Transportation

PROJECT #: 0020-104-101, UPC 75878
LOCATION: Belmont Bridge Replacement
STRUCTURE: 9TH STREET ABUT B & MSE

18BH-015 PAGE 1 OF 2

STATION: 19+25 OFFSET: 35 L
LATITUDE: 38.028912° N LONGITUDE: 78.476351° W
SURFACE ELEVATION: 474.68 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/13/2018 – 06/13/2018
Drilling Method(s): 3-1/4" I.D. Hollow Stem Auger
SPT Method: Auto Hammer (140 lb)
Other Test(s): Not Applicable
Driller: Shenandoah Drilling Services, Inc
Logger: A. Nezelek, Schnabel Engineering
GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP ° STRATA	DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
												0.0 / 474.68 6-INCHES ASPHALT				
												0.5 / 474.18 12-INCHES CRUSHED STONE			3.7	
	2		9 3 3 5	65		1						1.5 / 473.18 Fill, red-brown, fine to coarse, SILTY SAND FILL, contains crushed stone, mica, and brick fragments, loose, moist (SM)	45	11	19.4	46.0
	4	470	1 3 4 5	65		3						SAME, medium dense below 5 ft			20.1	
	6		5 5 4 3	75		5						SAME, loose below 7 ft			19.3	
	8		3 4 3 4	85		7										
1	10	465	1 2 3 5	80		9						9.0 / 465.68 Red-brown, ELASTIC SILT WITH SAND FILL, firm, moist (MH)	66	30	32.1	72.2
	12					11										
	14	460	5 3 4 5	90		14						SAME, stiff below 15 ft			39.0	
2.5	16															
	18					19										
3.5	20	455	1 3 4 7	95		21									32.3	
	22															
	24	450	2 3 6 9	95		24						22.5 / 452.18 Dark gray-brown, SILT WITH SAND FILL, stiff, moist (ML)				
	26					26									25.7	
	28											27.5 / 447.18 Residuum, tan-brown, SILT, hard, moist (ML)				
	30	445	5 10			29										

REMARKS: Rig Type: Diedrich D-50 (ATV).

PAGE 1 OF 2
18BH-015

SFT_LOGS:17X30X3 VDOT LOGS.GPJ SFT7.GDT.gdt_metric 10.0.005\11/12/19\Schnabel Engineering, Inc.

KIMLEY-HORN & ASSOC.
RALEIGH, NC
STRUCTURAL ENGINEER

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PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
	Revisions	

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
STRUCTURE AND BRIDGE DIVISION

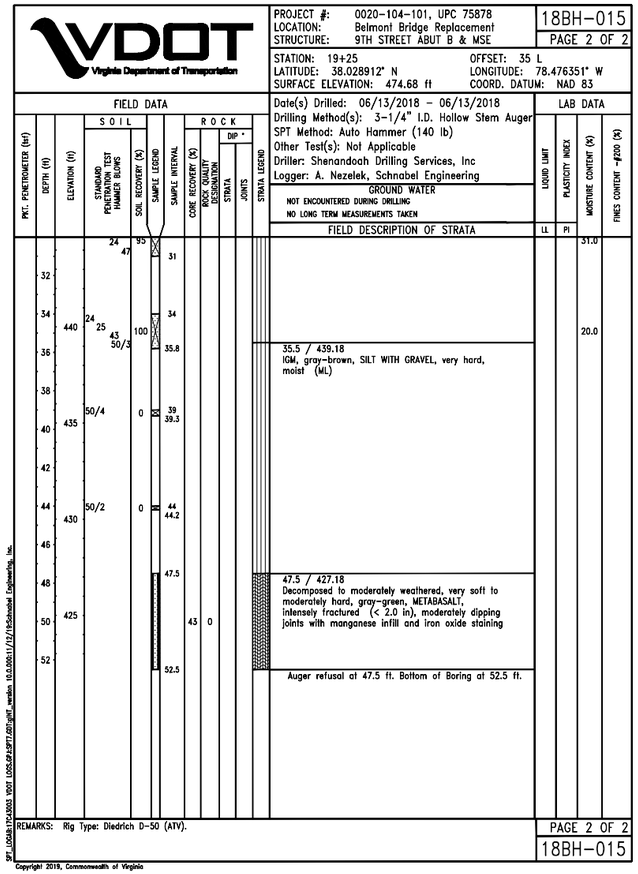
M.S.E. RETAINING WALL SOIL BORINGS

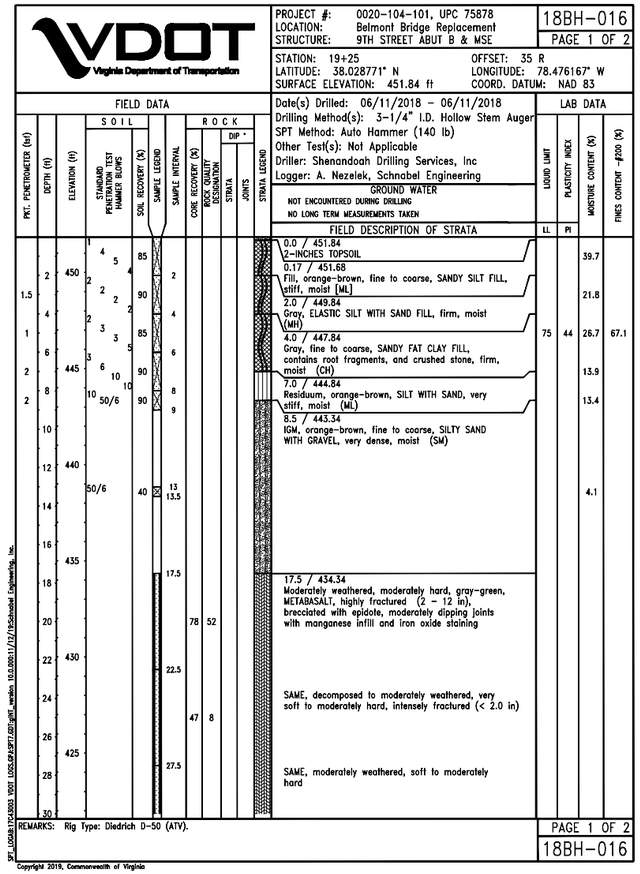
Designed: PDC.....	Date	Plan No.	Sheet No.
Drawn: MK.....			
Checked: SAP.....	May 2020	302-08	13(15)

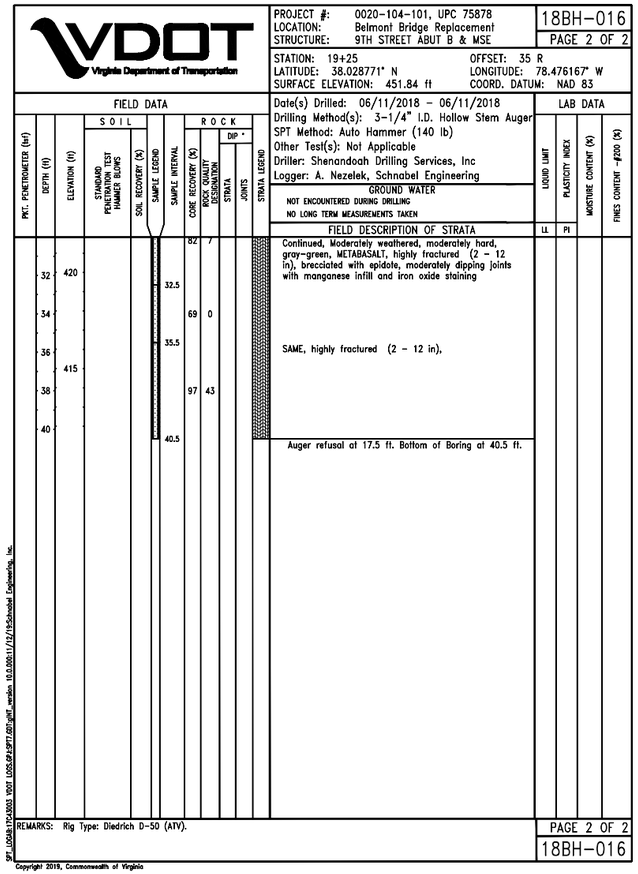
PROJECT MANAGER _____
SURVEYED BY, DATE _____
DESIGN SUPERVISED BY _____
DESIGNED BY _____
SUBSURFACE UTILITY BY, DATE _____

STATE	FEDERAL AID		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(16)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT.







THE SUBSURFACE INFORMATION SHOWN ON THE BORING LOGS IN THESE PLANS WAS OBTAINED WITH REASONABLE CARE AND RECORDED IN GOOD FAITH SOLELY FOR USE BY THE DEPARTMENT IN ESTABLISHING DESIGN CONTROLS FOR THE PROJECT. THE DEPARTMENT HAS NO REASON TO SUSPECT THAT SUCH INFORMATION IS NOT REASONABLY ACCURATE AS AN APPROXIMATE INDICATION OF THE SUBSURFACE CONDITIONS AT THE SITES WHERE THE BORINGS WERE TAKEN. THE DEPARTMENT DOES NOT IN ANY WAY WARRANT OR GUARANTEE THAT SUCH DATA CAN BE PROJECTED AS INDICATIVE OF CONDITIONS BEYOND THE LIMITS OF THE BORINGS SHOWN; AND ANY SUCH PROJECTIONS BY BIDDERS ARE PURELY INTERPRETIVE AND ALTOGETHER SPECULATIVE. FURTHER, THE DEPARTMENT DOES NOT IN ANY WAY GUARANTEE, EITHER EXPRESSLY OR BY IMPLICATION. THE SUFFICIENCY OF THE INFORMATION FOR BID PURPOSES.

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KIMLEY-HORN & ASSOC.
RALEIGH, NC
STRUCTURAL ENGINEER

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
	Revisions	

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
STRUCTURE AND BRIDGE DIVISION

M.S.E. RETAINING WALL SOIL BORINGS

Designed: PDC	Date	Plan No.	Sheet No.
Drawn: JJK	May 2020	302-08	13(16)
Checked: SAD			

PROJECT MANAGER ______________________
SURVEYED BY, DATE ____________________
DESIGN SUPERVISED BY __________________
DESIGNED BY __________________________
SUBSURFACE UTILITY BY, DATE ____________

STATE	FEDERAL AID ROUTE	FEDERAL AID PROJECT	STATE ROUTE	STATE PROJECT	SHEET NO.
VA.	—	BR-5104 (159)	20	0020-104-101, B601	13(17)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT.

VDOT Virginia Department of Transportation

PROJECT #: 0020-104-101, UPC 75878
LOCATION: Belmont Bridge Replacement
STRUCTURE: 9TH STREET MSE WALL

18BH-017
PAGE 1 OF 1

STATION: 20+25 OFFSET: 55 R
LATITUDE: 38.028960° N LONGITUDE: 78.475866° W
SURFACE ELEVATION: 452.64 ft COORD. DATUM: NAD 83

Date(s) Drilled: 06/12/2018 – 06/12/2018
Drilling Method(s): 3-1/4" I.D. Hollow Stem Auger
SPT Method: Auto Hammer (140 lb)
Other Test(s): Not Applicable
Driller: Shenandoah Drilling Services, Inc
Logger: A. Nezelek, Schnabel Engineering

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

FIELD DATA (SOIL / ROCK) and LAB DATA

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA (DIP °)	JOINTS (DIP °)	LIQUID LIMIT (LL)	PLASTICITY INDEX (PI)	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
	0–2		1, 3, 3, 4	80	2							24.7	
1.75	2–4	450	1, 3, 6, 7	60	4							27.2	
2.25	4–6		3, 6, 12, 37	95	6					37	15	16.3	67.2
2.75	6–6.8		23, 50/4	100	6.8							23.1	
	8–8.8	445	18, 50/4	100	8.8							6.8	
	13–13.3	440	50/4	100	13.3							4.2	

FIELD DESCRIPTION OF STRATA

0.0 / 452.64
1-INCHES ROOTMAT AND TOPSOIL

0.08 / 452.56
Fill, brown, fine to coarse, SILTY SAND FILL, contains root fragments, loose, moist (SM)

2.0 / 450.64
Residuum, orange-brown, fine to coarse, SANDY LEAN CLAY, contains root fragments, stiff, moist (CL)
SAME, very stiff below 4 ft

6.5 / 446.14
IGM, gray-brown, fine to coarse, SILTY SAND WITH GRAVEL, very hard, moist (SM)

SAME, gray below 11.5 ft

Auger refusal at 17 ft. Bottom of Boring at 17 ft.

REMARKS: Rig Type: Diedrich D-50 (ATV).

PAGE 1 OF 1
18BH-017

SPT_LOGAB:17C43003 VDOT LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/12/19:Schnabel Engineering, Inc.

THE SUBSURFACE INFORMATION SHOWN ON THE BORING LOGS IN THESE PLANS WAS OBTAINED WITH REASONABLE CARE AND RECORDED IN GOOD FAITH SOLELY FOR USE BY THE DEPARTMENT IN ESTABLISHING DESIGN CONTROLS FOR THE PROJECT. THE DEPARTMENT HAS NO REASON TO SUSPECT THAT SUCH INFORMATION IS NOT REASONABLY ACCURATE AS AN APPROXIMATE INDICATION OF THE SUBSURFACE CONDITIONS AT THE SITES WHERE THE BORINGS WERE TAKEN. THE DEPARTMENT DOES NOT IN ANY WAY WARRANT OR GUARANTEE THAT SUCH DATA CAN BE PROJECTED AS INDICATIVE OF CONDITIONS BEYOND THE LIMITS OF THE BORINGS SHOWN; AND ANY SUCH PROJECTIONS BY BIDDERS ARE PURELY INTERPRETIVE AND ALTOGETHER SPECULATIVE. FURTHER, THE DEPARTMENT DOES NOT IN ANY WAY GUARANTEE, EITHER EXPRESSLY OR BY IMPLICATION. THE SUFFICIENCY OF THE INFORMATION FOR BID PURPOSES.

THE BORING LOGS ARE MADE AVAILABLE TO BIDDERS IN ORDER THAT THEY MAY HAVE ACCESS TO SUBSURFACE DATA IDENTICAL TO THAT WHICH IS POSSESSED BY THE DEPARTMENT, AND ARE NOT INTENDED AS A SUBSTITUTE FOR PERSONAL INVESTIGATION, INTERPRETATION AND JUDGEMENT BY THE BIDDERS.

KIMLEY-HORN & ASSOC.
RALEIGH, NC
STRUCTURAL ENGINEER

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
	Revisions	

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

STRUCTURE AND BRIDGE DIVISION

M.S.E. RETAINING WALL SOIL BORINGS

Designed / Drawn / Checked	Date	Plan No.	Sheet No.
Designed: PDC; Drawn: JIK; Checked: SAD	May 2020	302-08	13(17)