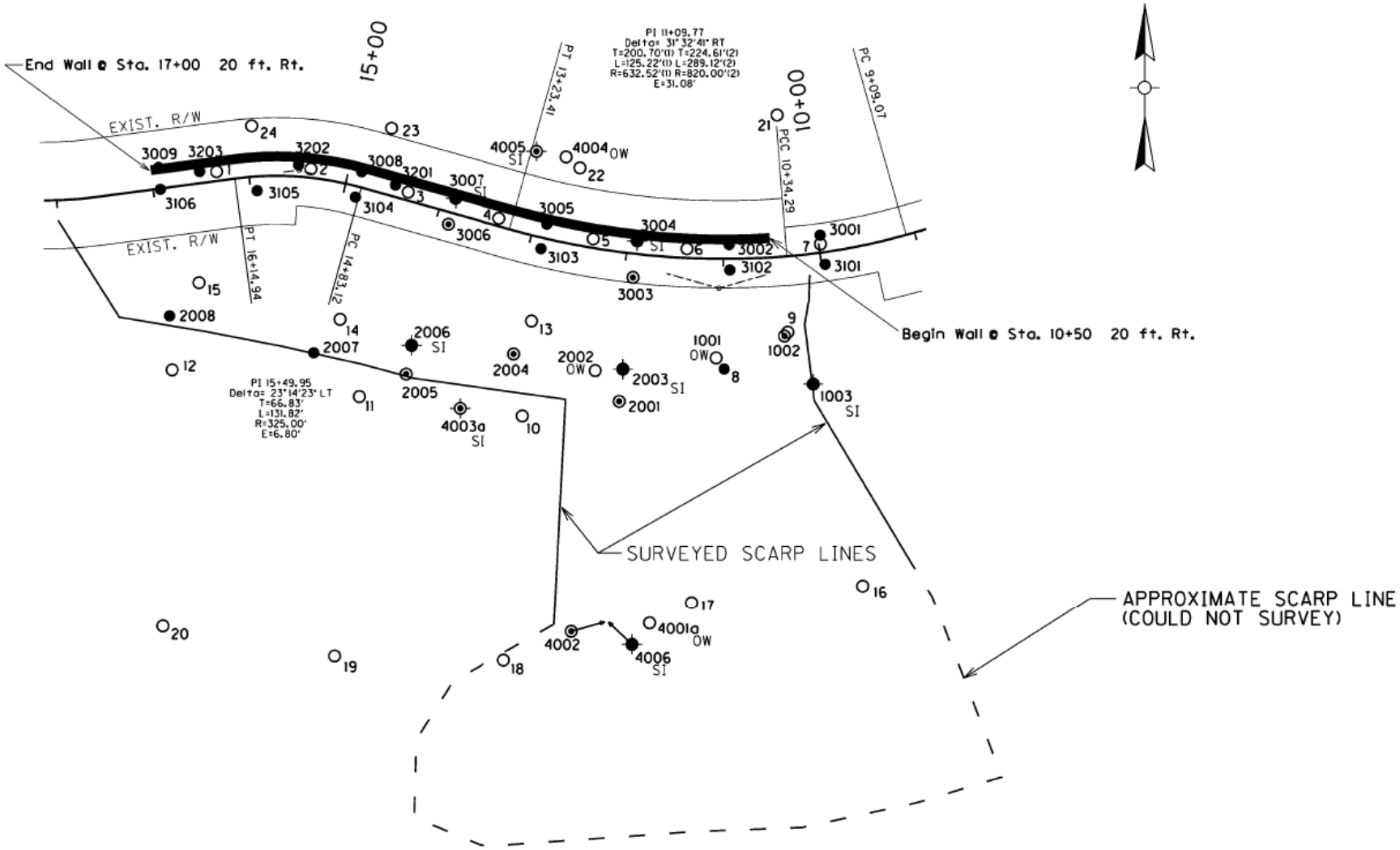
Harlan Co. US 421 Slope Stabilization
Contract ID 212264

Site Map


Bledsoe
Project Site
N
Green Hill Community Church
Martin Marietta Harlan Quarry
Harlan Co.
US 421, MP 22.8
Slope Stabilization
Google

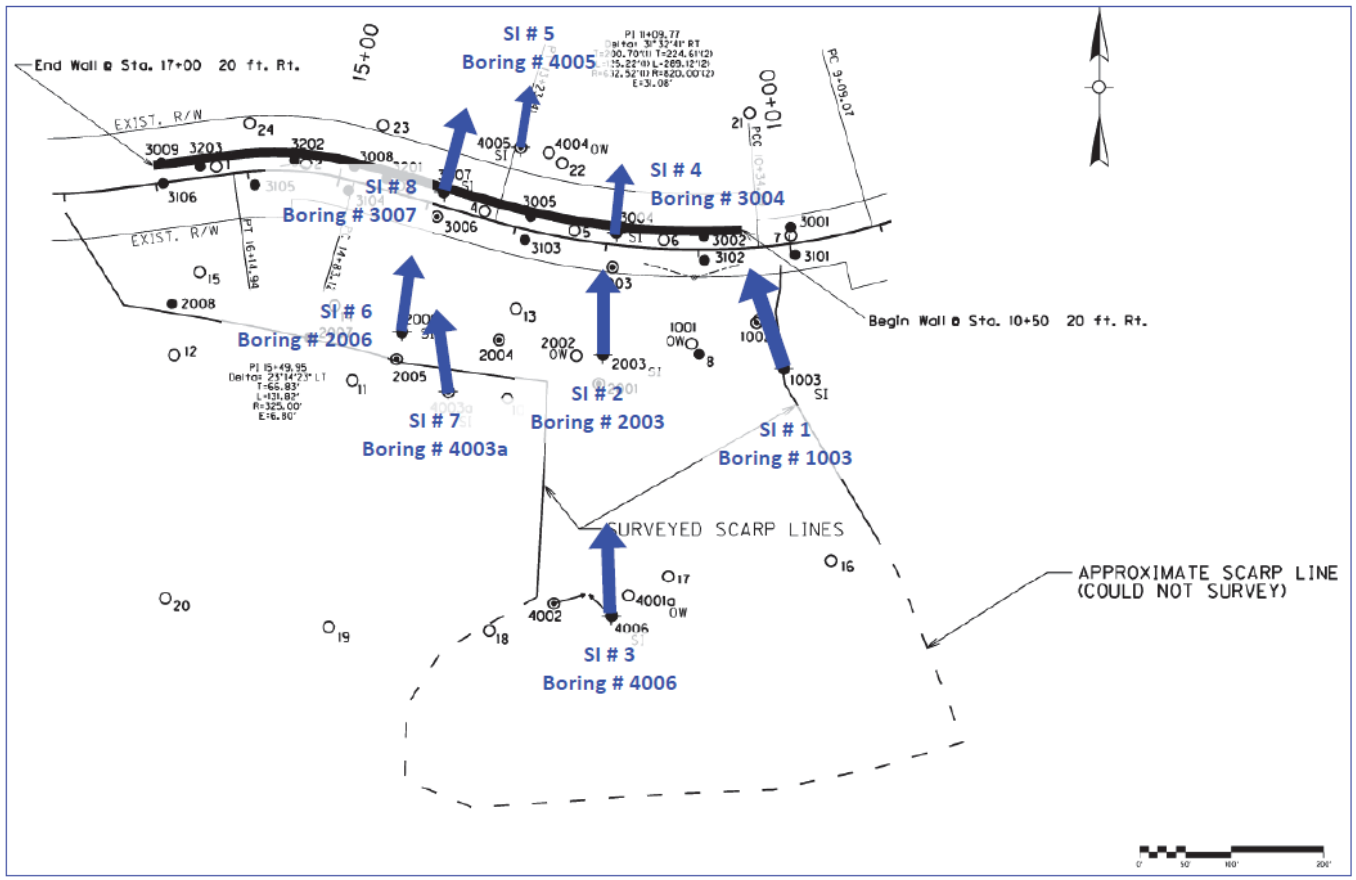
Plan View Layout



Measured Slope Displacements

Displacements Approximately 2 to 4 inches

Ranging from about 4 to 15 ft. above Rock Line



Geotechnical Report

Posted in Project-Related Information

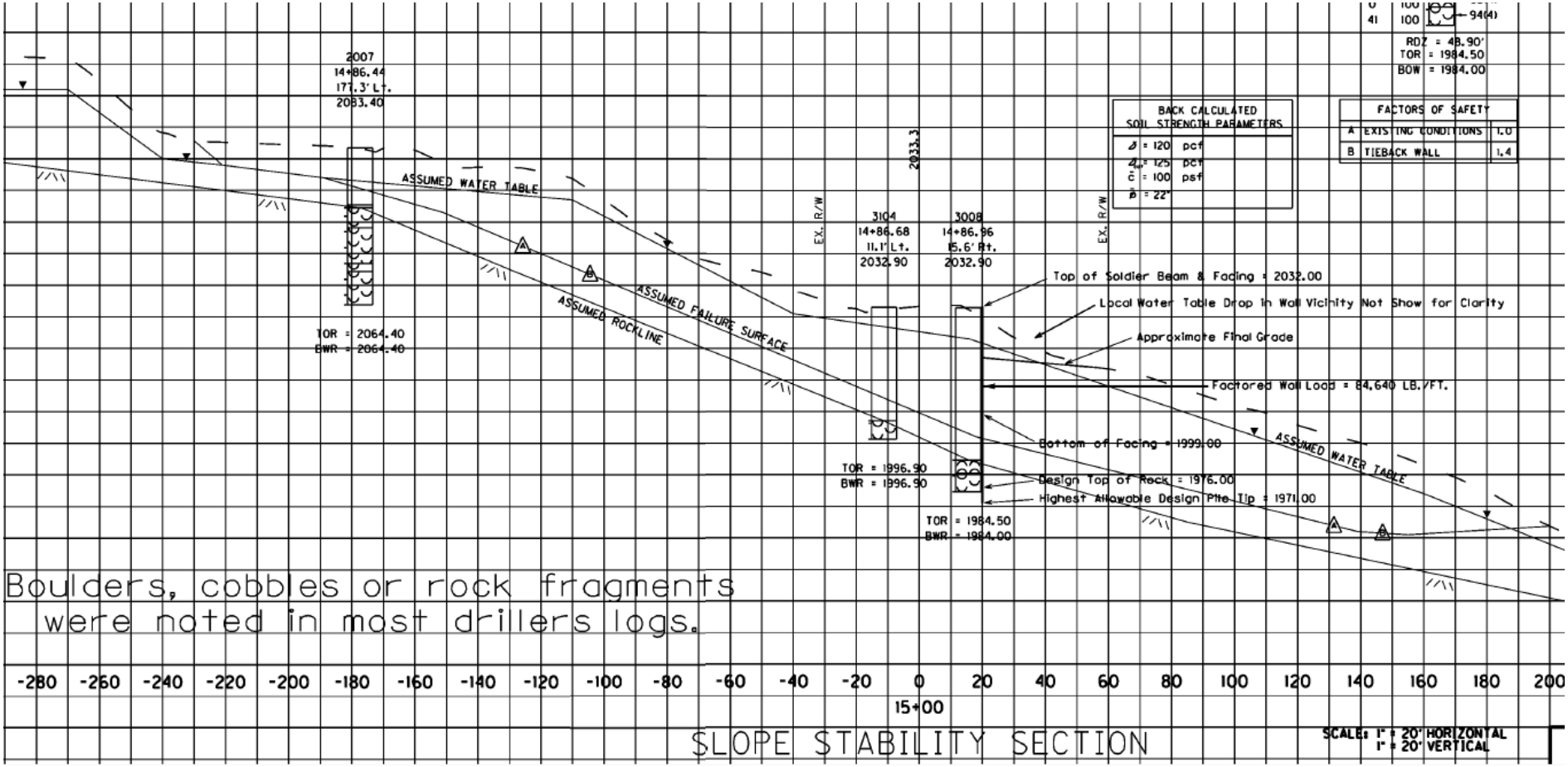
on Division of Construction Procurement Website

- Detailed discussion of subsurface exploration, site conditions, data, engineering analyses, recommendations etc.
- Numerous appendices containing various types of documentation

Subsurface Conditions

- Overburden generally described as brown and gray moist clay with **rock fragments**, **cobbles**, **floaters** and **boulders**
- Bedrock Consists of Chattanooga Shale and Grainger Formation
  - Chattanooga
    - Unconfined Compressive Strength – 754 to 3341 psi (Avg = 2315 psi)
    - KY RQD – 0 to 71 (Avg = 14)
  - Grainger
    - Unconfined Compressive Strength – 47 to 5963 psi (Avg = 1755 psi)
    - KY RQD - from 0 to 94 (Avg = 10)

Typical Cross Section - Station 15+00



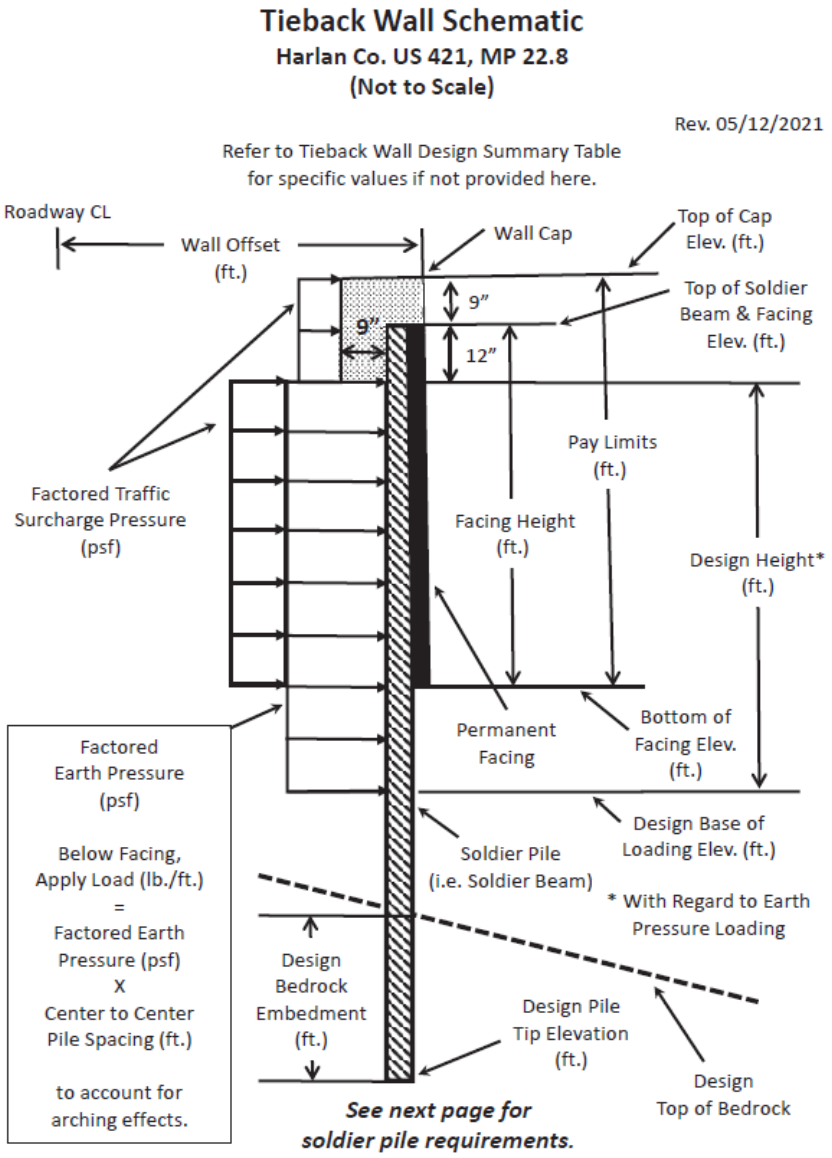
Stabilization Work Items

- Tieback Retaining Wall
- Foundation Preparation
- Horizontal Drains
- Instrumentation
- Quality Control

Tieback Retaining Wall

- Retaining Wall - 18,612.5 SF
- Special Note for Tieback Walls
  - Appendix A – Project Specific Requirements
  - Appendix B - Instrumentation
  - Appendix C – Tieback Wall Design Summary & Geotechnical Drawings
- Special Note for Temporary Shotcrete Facing
  - Only if Contractor Elects to use temporary shotcrete rather than timber
- Special Note for Sulfate Resistant Cement
  - ASTM C-150 Type II Required for Grout & Soldier Pile Backfill due to potential corrosivity of Chattanooga Shale

Wall Schematic



Wall Schematic – Soldier Piles

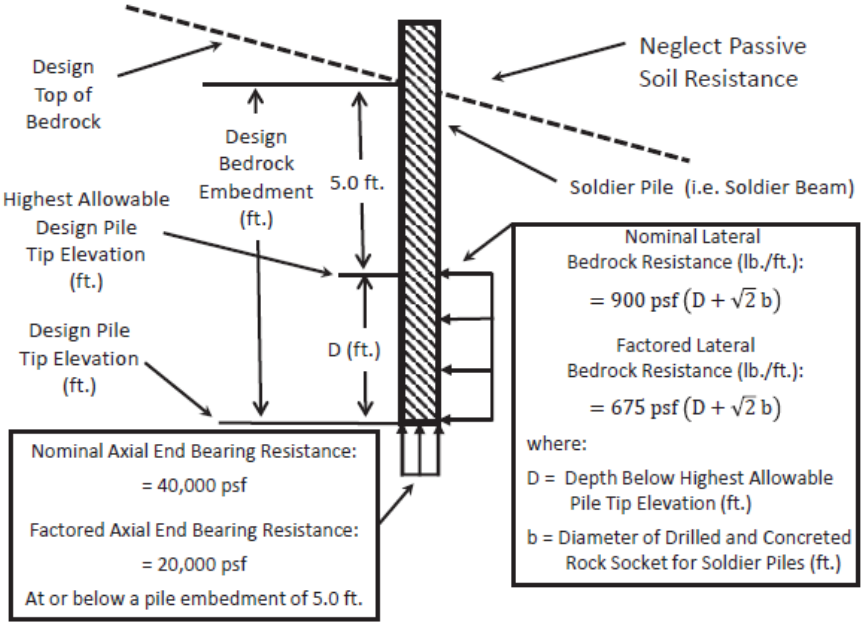
Tieback Wall Schematic

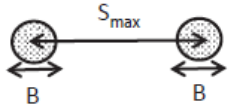
Soldier Pile Embedment, Resistance & Spacing Requirements

Harlan Co. US 421, MP 22.8
(Not to Scale)

Rev. 04/26/2021

Refer to Tieback Wall Design Summary Table
for specific values if not provided here.





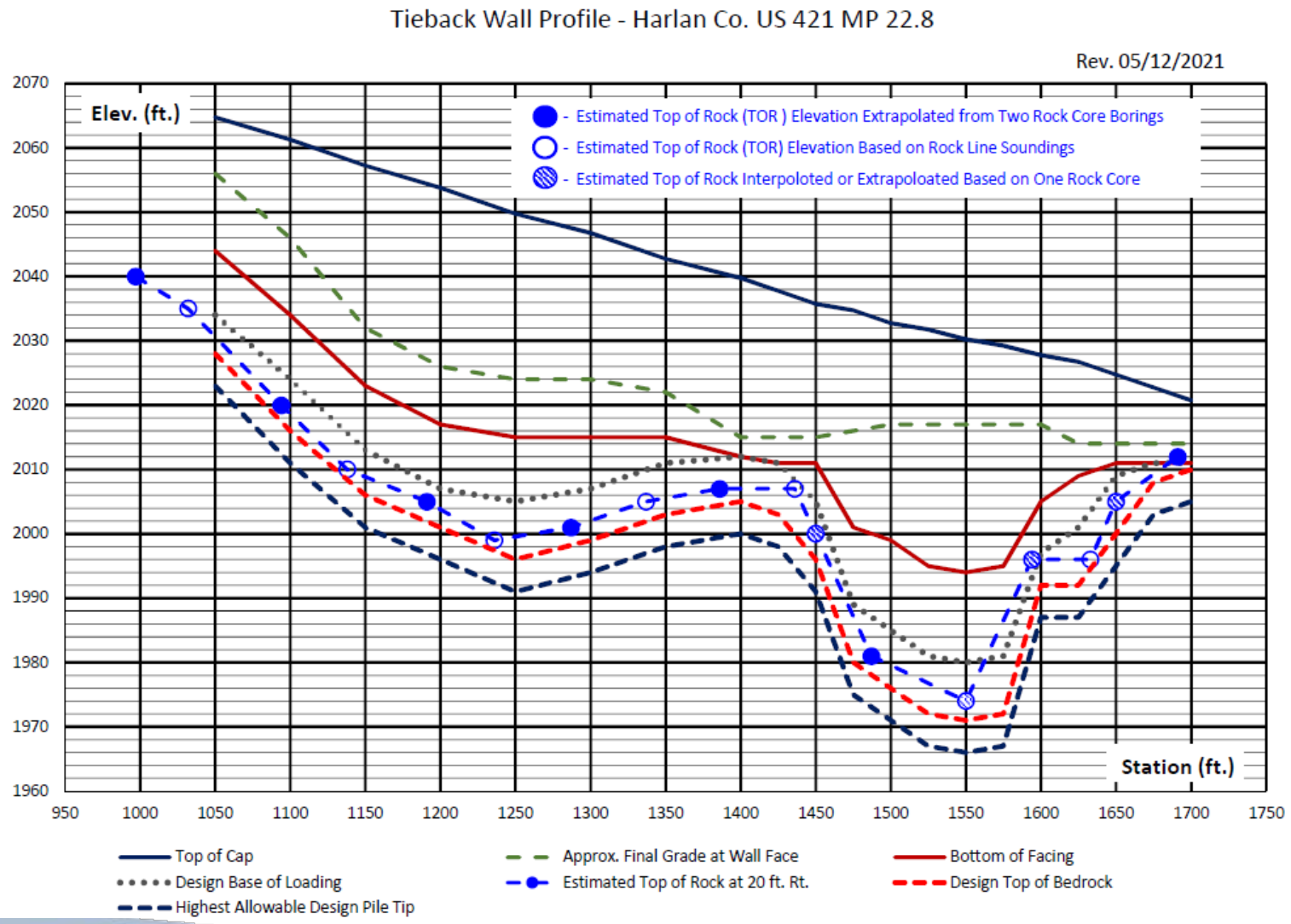
B = diameter of soldier pile concrete backfill from the bottom of lagging to top of rock (ft.)

S_{max} = maximum center-to-center spacing between soldier pile concrete backfill (ft.)

Max. Allowable Center-to-Center Spacing:

Station 10+50 to 14+50:	S_{max} = 3.5 B
Station 14+50 to 16+00:	S_{max} = 3.0 B
Station 16+00 to 17+00:	S_{max} = 3.5 B

Wall Profile



Wall Summary Table

Tieback Wall Design Summary Table

Harlan County US 421, MP 22.8

Rev. 05/12/2021

Station	Incre. Wall Length (ft.)	Wall Offset (ft.)	CL Survey Elev. (ft.)	Top of Cap Elev. (ft.)	Top of Soldier Beam & Facing Elev. (ft.)	Bottom of Facing Elev. (ft.)	Facing Height (ft.)	Approx. Final Grade at Facing (ft.)	Design Base of Loading Elev. (ft.)	Design Height (ft.)	A (pcf)	Factored Earth Load (lb./ft.)	Factored Earth Pressure (psf)	Factored Surcharge Pressure (psf)	Wall Area for Payment ($ft.^2$)	Design Top of Bedrock Elev. (ft.)	Highest Allowable Design Pile Tip Elev. (ft.)
10+50		20.0	2065.1	2064.75	2064.0	2044.0	20.0	2056	2034.0	29.0	40	33,640	1,160	240		2028.0	2023.0
11+00	50	20.0	2061.5	2061.25	2060.5	2034.0	26.5	2046	2024.0	35.5	40	50,410	1,420	240	1200.00	2016.0	2011.0
11+50	50	20.0	2057.5	2057.25	2056.5	2023.0	33.5	2032	2013.0	42.5	40	72,250	1,700	240	1537.50	2006.0	2001.0
12+00	***50***	***20.0***	***2053.9***	***2053.75***	***2053.0***	***2017.0***	***36.0***	***2026***	***2007.0***	***45.0***	***40***	***81,000***	***1,800***	***240***	***1775.00***	***2001.0***	***1996.0***
12+50	50	20.0	2050.2	2049.75	2049.0	2015.0	34.0	2024	2005.0	43.0	40	73,960	1,720	240	1787.50	1996.0	1991.0
13+00	50	20.0	2046.8	2046.75	2046.0	2015.0	31.0	2024	2007.0	38.0	40	57,760	1,520	240	1662.50	1999.0	1994.0
13+50	50	20.0	2043.0	2042.75	2042.0	2015.0	27.0	2022	2011.0	30.0	40	36,000	1,200	240	1487.50	2003.0	1998.0
14+00	***50***	***20.0***	***2039.9***	***2039.75***	***2039.0***	***2012.0***	***27.0***	***2015***	***2012.0***	***26.0***	***40***	***27,040***	***1,040***	***240***	***1387.50***	***2005.0***	***2000.0***
14+25	25	20.0	2038.1	2037.75	2037.0	2011.0	26.0	2015	2011.0	25.0	40	25,000	1,000	240	681.25	2003.0	1998.0
14+50	25	20.0	2036.2	2035.75	2035.0	2011.0	24.0	2015	2005.0	29.0	40	33,640	1,160	240	643.75	1996.0	1991.0
14+75	25	20.0	2034.8	2034.75	2034.0	2001.0	33.0	2016	1989.0	44.0	40	77,440	1,760	240	731.25	1980.0	1975.0
15+00	***25***	***20.0***	***2033.3***	***2032.75***	***2032.0***	***1999.0***	***33.0***	***2017***	***1985.0***	***46.0***	***40***	***84,640***	***1,840***	***240***	***843.75***	***1976.0***	***1971.0***
15+25	25	20.0	2031.9	2031.75	2031.0	1995.0	36.0	2017	1981.0	49.0	40	96,040	1,960	240	881.25	1972.0	1967.0
15+50	25	20.0	2030.5	2030.25	2029.5	1994.0	35.5	2017	1980.0	48.5	40	94,090	1,940	240	912.50	1971.0	1966.0
15+75	25	20.0	2029.4	2029.25	2028.5	1995.0	33.5	2017	1981.0	46.5	40	86,490	1,860	240	881.25	1972.0	1967.0
16+00	25	20.0	2028.2	2027.75	2027.0	2005.0	22.0	2017	1997.0	29.0	40	33,640	1,160	240	712.50	1992.0	1987.0
16+25	25	20.0	2026.8	2026.75	2026.0	2009.0	17.0	2014	2001.0	24.0	40	23,040	960	240	506.25	1992.0	1987.0
16+50	25	20.0	2025.3	2024.75	2024.0	2011.0	13.0	2014	2009.0	14.0	40	7,840	560	240	393.75	2000.0	1995.0
16+75	25	20.0	2023.2	2022.75	2022.0	2011.0	11.0	2014	2011.0	10.0	40	4,000	400	240	318.75	2008.0	2003.0
17+00	25	20.0	2021.0	2020.75	2020.0	2011.0	9.0	2014	2011.0	8.0	40	2,560	320	240	268.75	2010.0	2005.0
														Total Area =	18,612.50 sf		

Bold Italics indicates locations where limit equilbrium analyses performed.

The wall area for payment based on height from top of cap to bottom of facing.

Loads Factored for AASHTO LRFD strength limit state design

Factored Earth Load = A x (Design Height) ^{2}

Factored Earth Pressure = A x (Design Height)

"Design Height" defined with regard to earth pressure loading

Protocol for Adjusting Soldier Pile Tip Elevations

Addressed in Special Note for Tieback Walls Section A12.0

- Bedrock encountered within +/- 3.0 ft. of Design Top of Rock Elev.
  - Field call to raise or lower +/- 3.0 ft. to achieve design bedrock embedment
- Bedrock encountered > 3.0 ft. above Design Top of Rock Elev.
  - Field call to raise up to 3.0 ft.
  - Or contact contractor's wall design engineer & department's geotechnical engineer to raise more than 3.0 ft.
- Bedrock encountered > 3.0 ft. below Design Top of Rock Elev.
  - Contact contractor's wall design engineer & department's geotechnical engineer

Milestone Dates

Addressed in Special Note for Construction Milestone Dates

The Department has established the milestone dates below. The Department will assess liquidated damages of $1,000.00 per calendar day for any milestone dates that the Contractor does not meet.

Milestone Date	Requirements
December 15, 2021	Install all solider piles, and install and lock off (at the specified lock-off load) at least 20% of all anchors.
January 31, 2022	Install and lock off (at the specified lock-off load) at least 75% of all anchors with submitted documentation that at least 60% of all anchors meet the acceptance criteria in Section 10.9 of the Special Note for Tieback Walls.
April 30, 2022	100% completion and acceptance of all tieback wall components (including permanent facing and wall cap) and horizontal drains in wall.
July 31, 2022	Entirety of project completed

Review Protocol for "Urgent" Submittals

Addressed in Special Note for Tieback Walls Section A3.0

- Early Submittal of Critical Items (with regard to ordering soldier piles) within one week of letting
  - Dept. will acknowledge receipt & perform cursory review within 72 hours
  - May require direct communication via phone, MS Teams, Zoom, etc.
  - Will not issue "formal" response prior to Notice to Begin Work
- Similar procedure for subsequent urgent submittals with regard to meeting milestone dates with formal response within one week
- Provide email notice if meeting milestone dates in jeopardy due to submittal reviews
- If everything is urgent nothing is urgent

Horizontal Drains

Special Note for Horizontal Drains

- 6600 LF in Tieback Wall
  - Generally one 50 ft. drain in each tieback wall bay
- 3000 LF in Back Slope Above Road
  - Generally 40 ft. drains on 10 ft. centers

Quality Control

Special Note for

Tieback Wall Quality Control Inspection

- Lump Sum Pay Item
- Includes Drilling, Installing and Testing Ground Anchors
- Specified Personnel Experience Requirements

Foundation Preparation

Special Note for Tieback Walls

Sections A14.0, A22.0, A 23

- Lump Sum pay item
- Includes Excavation and Refill
- Remove Existing Railroad Rails & Deliver to Harlan Co. Maintenance

Instrumentation

Special Note for Tieback Walls

Appendix B

- Furnish and Install Slope Inclinometer Casing in Three Soldier Piles
- Install and Survey Points Every 50 ft. along wall
- Provide Access to Department Personnel to Obtain Slope Inclinometer Readings in Soldier Piles and Department Installed Inclinometers

Harlan Co. US 421 Slope Stabilization
Contract ID 212264

Mandatory Pre-Bid Meeting
Harlan County US 421 MP 22.8
July 9, 2021

Name	Signature	Representing
Kevin Rust	Kevin Rust	KYTC C.O. Maintenance
Darrin Beckett	[illegible]	KYTC Geotech
Ron Blevins	Ron Blevins	Martin Marietta
Chuck Conlon	[illegible]	Schnabel Foundation Co.
Paul Davin	Paul Davin	Schnabel Foundation Co.
Joe Bironas	~~Central Bridge Co~~ J Bironas	Central Bridge Co
Josh Whitaker	~~Central~~ J. Whitaker	Central Bridge Co.
Charlie Conley	Charlie Conley	Central Bridge Co.
Aaron Wallace	[illegible]	KYTC Geotech
Michael Carpenter	[illegible]	KYTC Geotech
T.J. Gilpin	[illegible]	KYTC C.O. Maint.
Joe Burchett	Joe Burchett	Bush + Burchett Inc.
Brian Heck	[illegible]	Richard Goettle, In
Carolina Phonzalez-Arias	Carolina [illegible]	Nicholson Construction
Drew Proffitt	[illegible]	Keller
Mike Robinson	[illegible]	Keller
Rodney Everside	Rodney Everside	[illegible] Contracting
David Fuson	David [illegible]	KYTC
Robert Perkins	Robert Perkins	KYTC
Justin Green	Justin Green	KYTC

Mandatory Site Visit

Harlan US. 421 mp 22.8

Brian Heck	[illegible]	Richard Goettle Inc
CAROLINA P GONZALEZ-A	[illegible]	Nicholson Construction
Drew Puffitt	[illegible]	Keller
MikeRobinson	[illegible]	Keller
Rodney Eversole	Rodney Eversole	Foline Contracting
Paul Davis	[illegible]	Schnabel Found.
Chuck Conlon	[illegible]	Schnabel Foundation Co.