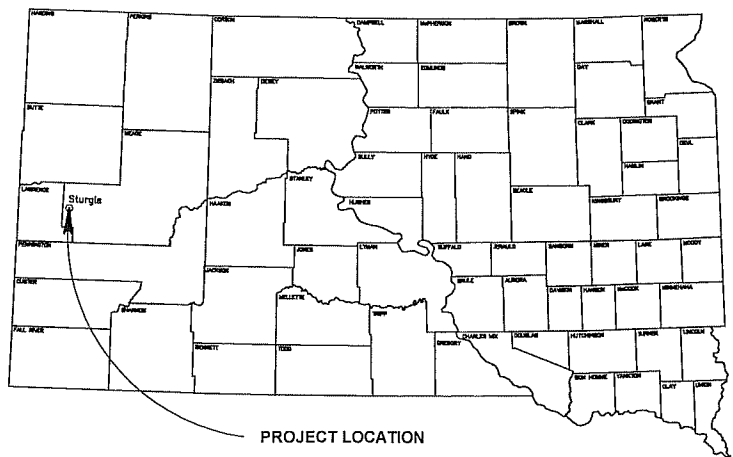


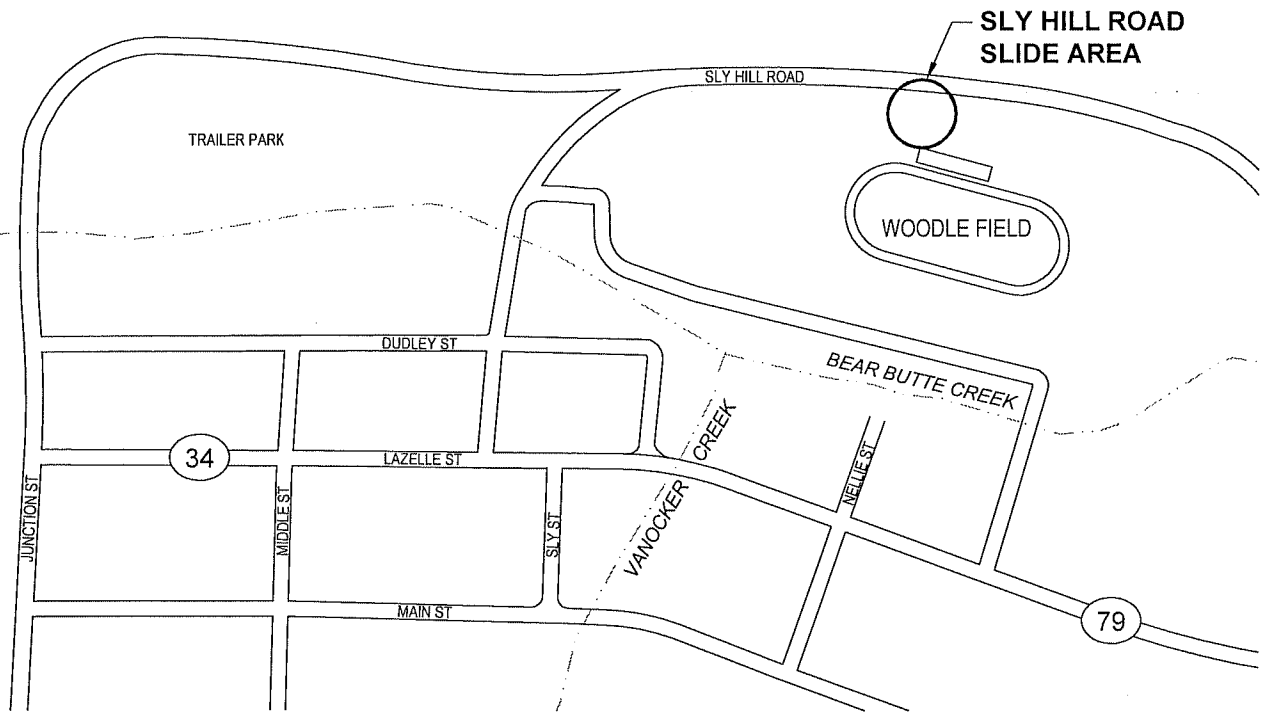
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PROJECT P 7701 (03), PCN 02JE
SLY HILL ROAD RETAINING WALL
STURGIS, SOUTH DAKOTA
SEPTEMBER 2009

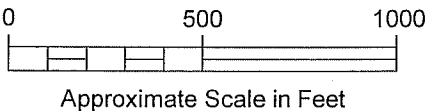
GROUND ANCHOR RETAINING WALL



PROJECT LOCATION MAP

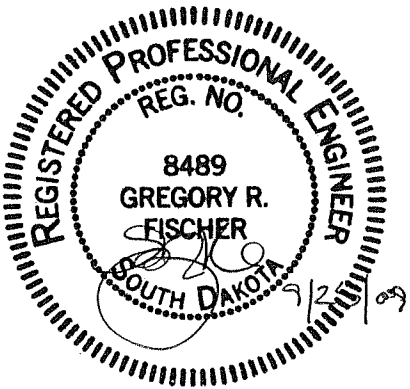


VICINITY MAP



INDEX OF DRAWINGS

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15	GROUND ANCHOR DETAILS
16	GROUND ANCHOR CONNECTION DETAILS
17	WOOD LAGGING DETAILS
18	GUARDRAIL REALIGNMENT
19	GUARDRAIL INSTALLATION DETAILS
20	GUARDRAIL AND HARDWARE DETAILS
21	FINAL GRADING PLAN



REVISIONS	NO.	DATE	DESCRIPTION

APPROVALS
DESIGNED: MCH
DRAWN: MCH
CHECKED: TMG
APPROVED: GRF
SCALE: Not to Scale

CONSULTANT
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SHEET TITLE
GROUND ANCHOR RETAINING WALL TITLE SHEET AND VICINITY MAP

PROJECT
Project P 7701(03), PCN 02JE Sly Hill Road Retaining Wall STURGIS, SOUTH DAKOTA SEPTEMBER 2009

SHEET NUMBER
1

Filename: I:\WP\23-1-01200s\23-1-01214 (Sly Hill Road Wall Design)\Shoring Plans\Revised\Sheets 2, 13, 15-17\23-1-01214-001 Plan Set.dwg Layout: SH 2 Date: 09-25-2009 Login: David Asunskis

ESTIMATE OF QUANTITIES

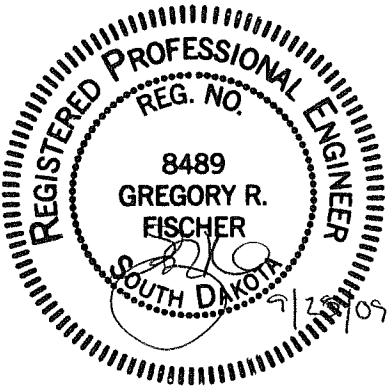
BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
120E0010	Unclassified Excavation	1,500	CuYd
120E7000	Select Granular Backfill	1,200	Ton
230E0020	Placing Contractor Furnished Topsoil	400	CuYd
260E3010	Gravel Surfacing	140	Ton
462E0200	Controlled Density Fill	85	CuYd
630E1010	Straight Class A W Beam Guardrail with Wood Posts	300	Ft
634E0100	Traffic Control	736	Unit
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
730E0100	Cover Crop Seeding	1.0	Bu
730E0210	Type F Permanent Seed Mixture	26	Lb
732E0200	Fiber Mulching	1.0	Ton
734E0102	Type 2 Erosion Control Blanket	1,000	SqYd
734E0154	12" Diameter Erosion Control Wattle	350	Ft
831E0300	MSE Geotextile Fabric	94	SqYd
900E4750	C15x40 Steel Channel	182	Ft
900E7050	4" Wood Lagging	2,670	SqFt
900E7070	HP12x53 Soldier Pile	910	Ft
900E8950	Ground Anchors	11	Each

NOTES

- Quantities are not exact and are based on topographic survey conducted by Brosz Engineering, Inc. Survey represents site conditions on July 6, 2009.
- Work required for the installation of bearing plates, HP8x36 sections, trumpet, C10x15.3 channel (attached to wood lagging), and ground anchor hardware (See Sheets 16 and 17) shall be incidental to the Ground Anchor bid item (Bid Item No. 900E8950).
- Work required for the installation of stiffener and stitch plates to the 2-C15x40 waler (See Sheet 16) shall be incidental to the C15x40 Steel Channel bid item (Bid Item No. 900E4750).

CONSTRUCTION SEQUENCE

- Install and perform verification testing on sacrificial ground anchor.
- Install soldier piles.
- For areas that select granular backfill is required behind the wall:
 - Install wood lagging and geotextile separator to an elevation 2 feet above the row of anchors.
 - Place select granular backfill to within 3 inches of top of wood lagging.
 - Install and test production ground anchors. To avoid slope instability, backfilling material at and in front of the wall (to create a working bench) for ground anchor installation is prohibited. Ground anchors shall be installed with crane and leads.
- For cut areas of the wall in native soil:
 - Excavate and install wood lagging to an elevation 2 feet below the row of anchors.
 - Install and test production ground anchors.
- Excavate and install wood lagging below the ground anchor excavation level.
- Install wood lagging and geotextile fabric in backfill areas to top of roadway elevation. Place select granular backfill behind wall to within 1 foot of roadway elevation.
- Install guardrail along roadway.
- Place gravel surfacing.
- Regrade slope in front of wall and provide erosion control and seeding.



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SHEET TITLE	
GROUND ANCHOR RETAINING WALL	
ESTIMATE OF QUANTITIES AND SEQUENCE	

PROJECT	SHEET NUMBER
Project P 7701(03), PCN 02JE Sly Hill Road Retaining Wall STURGIS, SOUTH DAKOTA SEPTEMBER 2009	2

Filename: I:\WP123-1-01200s\23-1-01214 (Sly Hill Road Wall Design)\Shoring Plans\Revised\23-1-01214-001\SH3-9.dwg Layout: SH 3 Date: 09-25-2009 Login: David Asunskis

SPECIFICATIONS

Standard Specifications for Roads & Bridges, 2004 Edition and Required Provisions, Supplemental Specifications and/or Special Provisions as included in the Proposal.

PURCHASING MATERIALS

The day that the apparent low bidder is determined, the Contractor is approved to order all materials necessary for the wall construction. Should the contract not be awarded, the SDDOT will purchase the necessary wall materials at invoice price plus administrative markup.

PLACING CONTRACTOR FURNISHED TOPSOIL

The Contractor will be required to furnish and place 4 inches of topsoil on all disturbed areas.

All costs to furnish and place the topsoil shall be incidental to the contract unit price per cubic yard for "Placing Contractor Furnished Topsoil".

COVER CROP SEEDING

Cover crop seeding may be used on this project as a temporary erosion control measure. The actual limits and use of cover crop seeding shall be determined by the Engineer during construction.

PERMANENT SEEDING

The areas to be seeded comprise of all newly graded areas within the project limits except for the top of roadways and temporary easements under cultivation.

All permanent seed shall be planted in the topsoil at a depth of ¼" to ½". The Contractor may elect to use hydroseeding at no additional cost to the State.

All seed broadcast must be raked or dragged in (incorporated) within the top ¼" to ½" of topsoil when possible. This requirement may be waived by the Engineer during construction when raking or dragging is deemed not feasible by conventional methods.

Type F Permanent Seed Mixture shall consist of the following:

Grass Species	Variety	Pure Live Seed (PLS) (Pounds/Acre)
Western Wheatgrass	Flintlock, Rodan, Rosana	7
Green Needlegrass	Lodorm	4
Sideoats Grama	Butte, Killdeer, Pierre, Trailway	3
Blue Grama	Bad River, Willis	2
Oats or Spring Wheat: April through July; Winter Wheat: August through November		10
Total:		26

FIBER MULCHING

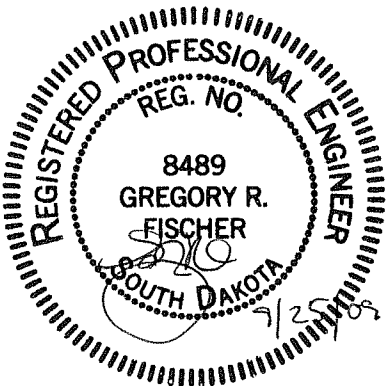
Fiber mulch shall be applied in a separate operation following hydroseeding. Fiber mulch shall be premixed with a guar gum tackifier or synthetic tackifier. The products shown below include 3% guar gum or synthetic tackifier. An additional 2% of tackifier shall be added to the fiber mulch. If the product selected has guar gum tackifier included, then the additional 2% tackifier shall be guar gum. If the product selected has synthetic tackifier included, then the additional 2% tackifier shall be synthetic. The additional 2% of tackifier shall be applied at the rate of 40 pounds per acre. Fiber mulch shall be applied at the rate of 2000 pounds per acre.

The Contractor shall allow the fiber mulch to cure a minimum of 18 hours prior to watering or any storm event to ensure proper cohesion between the soil and fiber particles.

All costs for the additional tackifier added to the fiber mulch including labor, equipment, and materials shall be incidental to the contract unit price per ton for "Fiber Mulching".

The fiber mulch used on this project shall be one from the list below:

Product	Manufacturer
Mat-Fiber Plus	Mat, Inc. Floodwood, MN Phone: 1-888-477-3028 www.soilguard.com
Conwed Hydro Mulch 2000	Profile Products LLC Buffalo Grove, IL Phone: 1-800-366-1180 www.conwedfibers.com
EcoFibre Plus Tackifier	Profile Products LLC Buffalo Grove, IL Phone: 1-800-366-1180 www.profile-eco.com
Terra-Mulch Wood with Tacking Agent 3	Profile Products LLC Buffalo Grove, IL Phone: 1-800-726-6371 www.terra-mulch.com
Excel Fiber Mulch II with Tackifier	American Excelsior Co. Arlington, TX Phone: 1-800-777-7645 www.curlex.com



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SHEET TITLE	
GROUND ANCHOR RETAINING WALL PLAN NOTES	

PROJECT	
Project P 7701(03), PCN 02JE Sly Hill Road Retaining Wall STURGIS, SOUTH DAKOTA SEPTEMBER 2009	

SHEET NUMBER	
3	

Filename: I:\WP\23-1-01200s\23-1-01214 (Sly Hill Road Wall Design)\Shoring Plans\Revised\23-1-01214-001\SH3-9.dwg Layout: SH 4 Date: 09-25-2009 Login: David Asunskis

EROSION CONTROL WATTLE

Erosion control wattles for restraining the flow of runoff and sediment shall be installed at perimeter of the grading limits. Installation shall be in accordance with manufactures reommentdations.

The Contractor shall provide certification that the erosion control wattles do not contain noxious weed seeds.

The erosion control wattle provided shall be from the list shown below:

Product	Manufacturer
Curlex Sediment Log	American Excelsior Company Arlington, TX Phone: 1-800-777-7645 www.amerexcel.com
Aspen Excelsior Logs	Western Excelsior Corporation Mancos, CO Phone: 1-800-833-8573 www.westernexcelsior.com
Bio Logs	Flaxtech, LLC Rock Lake, ND Phone: 1-866-444-3529
Winters Wattles	Winters Excelsior Company Birmingham, AL Phone: 1-800-248-7237 www.wintersexcelsior.com
Patriot Wood Fiber Logs	Patriot Environmental Products, Inc. Mesa, AZ Phone: 1-480-345-7293 www.digitaldesigncore.com/patriot/WattleSpecs.pdf

EROSION CONTROL BLANKET

Erosion control blanket shall be installed 20' wide along the perimeter of the excavation on slopes steeper than a 10:1.

The erosion control blanket provided shall be from the approved product list. The approved product list for erosion control blanket may be viewed at the following internet site:

http://www.state.sd.us/Applications/HC54ApprovedProducts/main.asp

The Contractor shall install erosion control blanket according to the manufacturer's installation instructions.

MAINTENANCE OF TRAFFIC

The City of Sturgis shall be responsible for snow removal up to the limits of construction and the Contractor shall be responsible for snow removal within the limits of construction.

TABLE OF TRAFFIC CONTROL UNITS

SIGN CODE	SIGN SIZE	DESCRIPTION	NUMBER REQUIRED	UNITS PER SIGN	UNITS
R11-2	48" x 30"	ROAD CLOSED	4	27	108
W20-3	48" x 48"	ROAD CLOSED ### FT. OR AHEAD	2	34	68
*****	*****	TYPE III BARRICADE - 6 FT. DOUBLE SIDED	10	56	560
TOTAL UNITS					736

GROUND ANCHOR INSPECTION

The City of Sturgis shall be responsible for ground anchor inspection and review of anchor testing records to verify compliance with acceptance criteria (See Special Provisions included in Proposal). The Contractor shall be aware of the activities required by the inspector and coordinate these activities within the construction schedule.

SHANNON & WILSON CONSTRUCTION OBSERVATION

Shannon & Wilson, Inc. shall perform a minimum of one site visit during soldier pile installation and a minimum of one site visit during ground anchor installation. Shannon & Wilson shall be notified 48 hours in advance as to the start of soldier pile and ground anchor installation operations. The Contractor shall be aware of the activities required by the Shannon & Wilson representative and coordinate these activities within the construction schedule.

WATER QUALITY

Surface Water Quality

The Contractor is advised the South Dakota Surface Water Quality Standards, administered by the Department of Environment and Natural Resources (DENR), apply to this project.

Surface Water Discharge

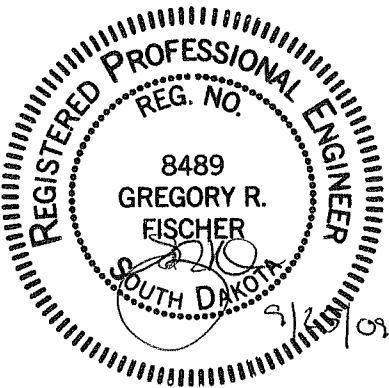
If construction dewatering is required, the Contractor is required to obtain a Surface Water Discharge Permit from the DENR. Contact the DENR Surface Water Program at 605-773-3351 to apply for a permit.

Storm Water

At a minimum and regardless of project size, appropriate erosion and sediment control measures must be installed to control the discharge of pollutants from the construction site.

The Contractor is advised this project is regulated under the Phase II Storm Water Regulations and must receive coverage under the DENR General Permit for Construction Activities. A Notice of Intent (NOI) will be submitted to DENR a minimum of 15 days prior to project start by the DOT Environmental Office. A letter must be received from DENR that acknowledges project coverage under this general permit before project start. The Contractor is advised that permit coverage may also be required by offsite activities, such as borrow and staging areas, which are the responsibility of the Contractor.

A major component of the storm water construction permit is development and implementation of a storm water pollution prevention plan (SWPPP). This plan is a joint effort and responsibility of the DOT and the Contractor. The SWPPP is a dynamic document and is to be available on-site at all times. Information on storm water requirements and SWPPP are available on the following websites:
DOT: http://www.sddot.com/pe/projdev/environment_stormwater.asp
DENR: http://www.denr.sd.gov/des/sw/stormwater.aspx



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SHEET TITLE
GROUND ANCHOR RETAINING WALL PLAN NOTES

PROJECT
Project P 7701(03), PCN 02JE Sly Hill Road Retaining Wall STURGIS, SOUTH DAKOTA SEPTEMBER 2009

SHEET NUMBER
4

Filename: I:\WP\23-1-01200s\23-1-01214 (Sly Hill Road Wall Design)\Shoring Plans\Revised\23-1-01214-001SH3-9.dwg Layout: SH 5 Date: 09-25-2009 Login: David Asunskis

HISTORICAL PRESERVATION OFFICE CLEARANCES

To obtain State Historical Preservation Office (SHPO) clearance, a cultural resources survey may need to be conducted by a qualified archaeologist. In lieu of a cultural resources survey, the Contractor could request a records search from Jim Donohue, State Archaeological Research Center (SARC). Provide SARC with the following: a topographical map or aerial view on which the site is clearly outlined, site dimensions, project number, and PCN. If applicable, provide evidence that the site has been previously disturbed by farming, mining, or construction activities with a landowner statement that no artifacts have been found on the site. The Contractor shall arrange and pay for the cultural resource survey and/or records search.

If any earth disturbing activities occur within the current geographical or historic boundaries of any South Dakota reservation, the Contractor shall obtain Tribal Historical Preservation Office (THPO) clearance. If no THPO exists, the required SHPO clearance shall suffice, with documentation of Tribal contact efforts provided to SHPO

To facilitate SHPO or THPO responses, the Contractor should submit a records search or cultural resources survey report to Tom Lehmkuhl, DOT Environmental Engineer, 700 East Broadway Avenue, Pierre, SD 57501-2586 (605-773-3721). Allow 30 days from the date this information is submitted to the Environmental Engineer for SHPO/THPO approval. The Contractor is responsible for obtaining all required permits and clearances for staging areas, borrow sites, waste disposal sites, and all material processing sites. The Contractor shall provide the required permits and clearances to the Engineer at the preconstruction meeting.

WASTE DISPOSAL SITE

The Contractor will be required to furnish a site(s) for the disposal of construction/demolition debris generated by this project.

Construction/demolition debris may not be disposed of within the State ROW.

The waste disposal site(s) shall be managed and reclaimed in accordance with the following from the General Permit for Highway, Road, and Railway Construction/Demolition Debris Disposal Under the South Dakota Waste Management Program issued by the Department of Environment and Natural Resources.

The waste disposal site(s) shall not be located in a wetland, within 200 feet of surface water, or in an area that adversely affects wildlife, recreation, aesthetic value of an area, or any threatened or endangered species, as approved by the Engineer.

If the waste disposal site(s) is located such that it is within view of any ROW, the following additional requirements shall apply:

1. Construction/demolition debris consisting of concrete, asphalt concrete, or other similar materials shall be buried in a trench completely separate from wood debris. The final cover over the construction/demolition debris shall consist of a minimum of 1 foot of soil capable of supporting vegetation. Waste disposal sites provided outside of the State ROW shall be seeded in accordance with Natural Resources Conservation Service recommendations. The seeding recommendations may be obtained through the appropriate County NRCS Office. The Contractor shall control the access to waste disposal sites not within the State ROW through the use of fences, gates, and placement of a sign or signs at the entrance to the site stating "No Dumping Allowed".

2. Concrete and asphalt concrete debris may be stockpiled within view of the ROW for a period of time not to exceed the duration of the project. Prior to project completion, the waste shall be removed from view of the ROW or buried and the waste disposal site reclaimed as noted above.

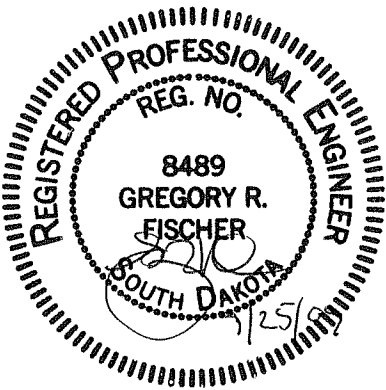
The above requirements will not apply to waste disposal sites that are covered by an individual solid waste permit as specified in SDCL 34A-6-58, SDCL 34A-6-1.13, and ARSD 74:27:10.06.

Failure to comply with the requirements stated above may result in civil penalties in accordance with South Dakota Solid Waste Law, SDCL 34A-6-1.31.

All costs associated with furnishing waste disposal site(s), disposing of waste, maintaining control of access (fence, gates, and signs), and reclamation of the waste disposal site(s) shall be incidental to the various contract items.

COORDINATION WITH THE STATE ARCHAEOLOGICAL RESEARCH CENTER

Prior to beginning any work, the Contractor shall contact Terri Bruce at the State Archaeological Research Center (ARC) at (605)394-1741 to coordinate the installation of orange plastic safety fence from the top of the hill to the bottom. The exact location of the fence shall be determined in the field by the ARC representative. In addition, the Contractor shall install safety fence around the archaeologically sensitive site located closest to the slide area shown on the Final Grading Plan sheet, as directed by the ARC representative. No work on the slope shall begin until the safety fence is installed. The fence is to provide a positive barrier for protection of an archaeologically sensitive area. No work or equipment will be allowed beyond the limits of the safety fence. The quantity of orange plastic safety fence for the project is estimated to be 250 feet. All costs for the labor, materials and equipment to furnish and install the safety fence shall be incidental to the price per cubic yard for Unclassified Excavation.



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SHEET TITLE
GROUND ANCHOR RETAINING WALL PLAN NOTES

PROJECT
Project P 7701(03), PCN 02JE Sly Hill Road Retaining Wall STURGIS, SOUTH DAKOTA SEPTEMBER 2009

SHEET NUMBER
5

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STORM WATER POLLUTION PREVENTION PLAN CHECKLIST
(The numbers right of the title headings are **reference numbers** to the
GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED
WITH CONSTRUCTION ACTIVITIES

- ❖ **SITE DESCRIPTION (4.2 1)**
 - **Project Limits:** See Title Sheet (4.2 1.b)
 - **Project Description:** See Title Sheet (4.2 1.a.)
 - **Site Map(s):** See Title Sheet and Plans (4.2 1.f. (1)-(6))
 - **Major Soil Disturbing Activities** (check all that apply)
 - ☐ Clearing and grubbing
 - ☒ Excavation/borrow
 - ☒ Grading and shaping
 - ☒ Filling
 - ☒ Cutting and filling
 - ☐ Other (describe):
 - **Total Project Area** 1.0 acres (4.2 1.b.)
 - **Total Area To Be Disturbed** 1.0 acres (4.2 1.b.)
 - **Existing Vegetative Cover** (0%)
 - **Soil Properties:** Sand-silt mixtures (4.2 1. d.)
 - **Name of Receiving Water Body/Bodies** N/A (4.2 1.e.)
- ❖ **ORDER OF CONSTRUCTION ACTIVITIES (4.2 1.c.)**

(Stabilization measures shall be initiated as soon as possible, but in no case later than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. Initiation of final or temporary stabilization may exceed the 14-day limit if earth disturbing activities will be resumed within 21 days.)
- ❖ **EROSION AND SEDIMENT CONTROLS (4.2 2.a.(1)(a)-(f))**

(Check all that apply)

 - **Stabilization Practices (See Detail Plan Sheets)**
 - ☒ Temporary or Permanent Seeding
 - ☐ Sodding
 - ☐ Planting
 - ☐ Mulching (Straw or Cellulose Fiber)
 - ☒ Erosion Control Blankets or Mats
 - ☐ Vegetation Buffer Strips
 - ☐ Roughened Surface (e.g. tracking)
 - ☐ Gabions-Gabion Mattress
 - ☐ Other
 - **Structural Temporary Erosion and Sediment Controls**
 - ☐ Silt Fence
 - ☐ Straw Bale Check
 - ☐ Temporary Berm
 - ☐ Temporary Slope Drain
 - ☒ Straw Wattles or Rolls
 - ☐ Diversion Channels/Swales
 - ☐ Channel Liners (TRM)
 - ☐ Stone Rip Rap Sheet
 - ☐ Rock Check Dams
 - ☐ Sediment Traps/Basins
 - ☐ Inlet Protection
 - ☐ Outlet Protection
 - ☐ Surface Inlet Protection
 - ☐ Curb Inlet Protection
 - ☐ Stabilized Construction Entrances
 - ☐ Other

- **Wetland Avoidance**

Will construction and/or erosion and sediment controls impinge on regulated wetlands? Yes ☐ No ☒ If yes, the structural and erosion and sediment controls have been included in the total project wetland impacts and have been included in the 404 permit process with the USACE.
 - **Storm Water Management (4.2 2.b., (1) and (2))**

Storm water management will be handled by temporary controls outlined in "EROSION AND SEDIMENT CONTROLS" above, and any permanent controls needed to meet permanent storm water management needs in the post construction period. Permanent controls will be shown on the plans and noted as permanent.
 - **Other Storm Water Controls (4.2 2.c., (1) and (2))**
 - **Waste Disposal**

All liquid waste materials will be collected and stored in sealed metal containers approved by the project engineer. All trash and construction debris from the site will be deposited in the approved containers. Containers will be serviced as necessary, and the trash will be hauled to an approved disposal site or licensed landfill. All onsite personnel will be instructed in the proper procedures for waste disposal, and notices stating proper practices will be posted in the field office. The general contractor's representative responsible for the conduct of work on the site will be responsible for seeing waste disposal procedures are followed.
 - **Hazardous Waste**

All hazardous waste materials will be disposed of in a manner specified by local or state regulations or by the manufacturer. Site personnel will be instructed in these practices, and the individual designated as the contractor's on-site representative will be responsible for seeing that these practices are followed.
 - **Sanitary Waste**

Portable sanitary facilities will be provided on all construction sites. Sanitary waste will be collected from the portable units in a timely manner by a licensed waste management contractor or as required by any local regulations.
- ❖ **Maintenance and Inspection (4.2 3. and 4.2 4.)**
 - **Maintenance and Inspection Practices**
 - Inspections will be conducted at least one time per week and after a storm event of 0.50 inches or greater.
 - All controls will be maintained in good working order. Necessary repairs will be initiated within 24 hours of the site inspection report.
 - Silt fence will be inspected for depth of sediment and for tears in order to ensure the fabric is securely attached to the posts and that the posts are well anchored. Sediment buildup will be removed from the silt fence when it reaches 1/3 of the height of the silt fence.
 - Sediment basins and traps will be checked. Sediment will be removed when depth reaches approximately 50 percent of the structure's capacity, and at the conclusion of the construction.
 - Check dams will be inspected for stability. Sediment will be removed when depth reaches 1/2 the height of the dam.
 - All seeded areas will be checked for bare spots, washouts, and vigorous growth free of significant weed infestations.

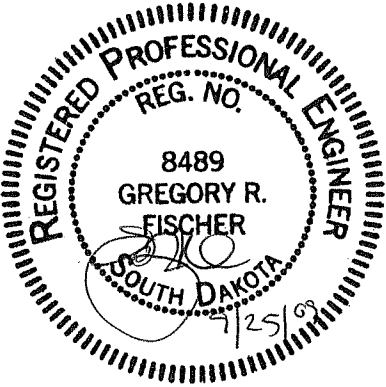
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SHEET TITLE
GROUND ANCHOR RETAINING WALL PLAN NOTES

PROJECT	SHEET NUMBER
Project P 7701(03), PCN 02JE Sly Hill Road Retaining Wall STURGIS, SOUTH DAKOTA SEPTEMBER 2009	6



➤ **Maintenance and Inspection Practices (Continued)**

- Inspection and maintenance reports will be prepared on form DOT 298 for each site inspection, this form will also be used to document changes to the SWPPP. A copy of the completed inspection form will be filed with the SWPPP documents.
- The SDDOT Project Engineer and contractor's site superintendent are responsible for inspections. Maintenance, repair activities are the responsibility of the contractor. The SDDOT Project Engineer will complete the inspection and maintenance reports and distribute copies per the distribution instructions on DOT 298.

❖ **Non-Storm Water Discharges (3.0)**

The following non-storm water discharges are anticipated during the course of this project (check all that apply).

- ☐ Discharges from water line flushing.
- ☐ Pavement wash-water, where no spills or leaks of toxic or hazardous materials have occurred.
- ☐ Uncontaminated ground water associated with dewatering activities.

❖ **Materials Inventory (4.2. 2.c.(2))**

The following materials or substances are expected to be present on the site during the construction period. These materials will be handled as noted under the headings "EROSION AND SEDIMENT CONTROLS" and "SPILL PREVENTION" (check all that apply).

- ☒ Concrete and Portland Cement
- ☐ Detergents
- ☐ Paints
- ☒ Metals
- ☐ Bituminous Materials
- ☒ Petroleum Based Products
- ☐ Cleaning Solvents
- ☒ Wood
- ☐ Cure
- ☐ Texture
- ☐ Chemical Fertilizers
- ☐ Other

❖ **Spill Prevention (4.2 2.c.(2))**

➤ **Material Management**

- **Housekeeping**
 - Only needed products will be stored on-site by the contractor.
 - Except for bulk materials the contractor will store all materials under cover and in appropriate containers.
 - Products must be stored in original containers and labeled.
 - Material mixing will be conducted in accordance with the manufacturer's recommendations.
 - When possible, all products will be completely used before properly disposing of the container off site.
 - The manufacturer's directions for disposal of materials and containers will be followed.
 - The contractor's site superintendent will inspect materials storage areas regularly to ensure proper use and disposal.
 - Dust generated will be controlled in an environmentally safe manner.
 - Vegetation areas not essential to the construction project will be preserved and maintained as noted on the plans.

▪ **Hazardous Materials**

- Products will be kept in original containers unless the container is not resealable.
- Original labels and material safety data sheets will be retained in a safe place to relay important product information.
- If surplus product must be disposed of, manufacturer's label directions for disposal will be followed.
- Maintenance and repair of all equipment and vehicles involving oil changes, hydraulic system drain down, de-greasing operations, fuel tank drain down and removal, and other activities which may result in the accidental release of contaminants will be conducted on an impervious surface and under cover during wet weather to prevent the release of contaminants onto the ground.
- Wheel wash water will be collected and allowed to settle out suspended solids prior to discharge. Wheel wash water will not be discharged directly into any storm water system or storm water treatment system.
- Potential pH-modifying materials such as: bulk cement, cement kiln dust, fly ash, new concrete washings, concrete pumping, and mixer washout waters will be collected on site and managed to prevent contamination of storm water runoff.

➤ **Product Specific Practices (6.8)**

▪ **Petroleum Products**

All on-site vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled.

▪ **Fertilizers**

Fertilizers will be applied only in the amounts specified by the SDDOT. Once applied, fertilizers will be worked into the soil to limit the exposure to storm water. Fertilizers will be stored in an enclosed area. The contents of partially used fertilizer bags will be transferred to sealable containers to avoid spills.

▪ **Paints**

All containers will be tightly sealed and stored when not required for use. The excess will be disposed of according to the manufacturer's instructions and any applicable state and local regulations.

▪ **Concrete Trucks**

Contractors will provide designated truck washout areas on the site. These areas must be self contained and not connected to any storm water outlet of the site. Upon completion of construction washout areas will be properly stabilized.

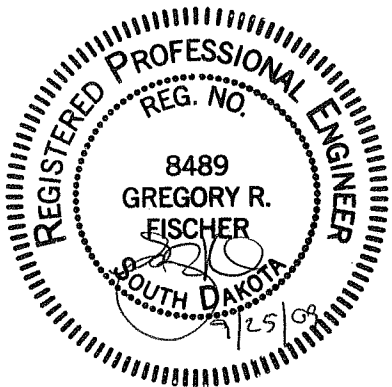
REVISIONS		
NO.	DATE	DESCRIPTION

APPROVALS	
DESIGNED:	MCH
DRAWN:	MCH
CHECKED:	TMG
APPROVED:	GRF
SCALE:	Not to Scale

CONSULTANT
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SHEET TITLE
GROUND ANCHOR RETAINING WALL PLAN NOTES

PROJECT	SHEET NUMBER
Project P 7701(03), PCN 02JE Sly Hill Road Retaining Wall STURGIS, SOUTH DAKOTA SEPTEMBER 2009	7



Filename: I:\WP12\23-1-01200s\23-1-01214 (Sly Hill Road Wall Design)\Shoring Plans\Revised\23-1-01214-001SH3-9.dwg Layout: SH 8 Date: 09-25-2009 Login: David Asunskis

➤ **Spill Control Practices (4.2 2 c.(2))**

In addition to the previous housekeeping and management practices, the following practices will be followed for spill prevention and cleanup if needed.

- For all hazardous materials stored on site, the manufacturer's recommended methods for spill clean up will be clearly posted. Site personnel will be made aware of the procedures and the locations of the information and cleanup supplies.
- Appropriate cleanup materials and equipment will be maintained by the contractor in the materials storage area on-site. As appropriate, equipment and materials may include items such as brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for clean up purposes.
- All spills will be cleaned immediately after discovery and the materials disposed of properly.
- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
- After a spill a report will be prepared describing the spill, what caused it, and the cleanup measures taken. The spill prevention plan will be adjusted to include measures to prevent this type of spill from reoccurring, as well as clean up instructions in the event of reoccurrences.
- The contractor's site superintendent, responsible for day-to-day operations, will be the spill prevention and cleanup coordinator. The contractor is responsible for ensuring that the site superintendent has had appropriate training for hazardous materials handling, spill management, and cleanup.

➤ **Spill Response (4.2 2 c.(2))**

The primary objective in responding to a spill is to quickly contain the material(s) and prevent or minimize migration into storm water runoff and conveyance systems. If the release has impacted on-site storm water, it is critical to contain the released materials on-site and prevent their release into receiving waters. If a spill of pollutants threatens storm water or surface water at the site, the spill response procedures outlined below must be implemented in a timely manner to prevent the release of pollutants.

- The contractor's site superintendent will be notified immediately when a spill or the threat of a spill is observed. The superintendent will assess the situation and determine the appropriate response.
- If spills represent an imminent threat of escaping erosion and sediment controls and entering receiving waters, personnel will be directed to respond immediately to contain the release and notify the superintendent after the situation has been stabilized.
- Spill kits containing appropriate materials and equipment for spill response and cleanup will be maintained by the contractor at the site.
- If oil sheen is observed on surface water (e.g. settling ponds, detention ponds, swales), action will be taken immediately to remove the material causing the sheen. The contractor will use appropriate materials to contain and absorb the spill. The source of the oil sheen will also be identified and removed or repaired as necessary to prevent further releases.
- If a spill occurs the superintendent or the superintendent's designee will be responsible for completing the spill reporting form and for reporting the spill to SD DENR.

- Personnel with primary responsibility for spill response and clean up will receive training by the contractor's site superintendent or designee. The training must include identifying the location of the spill kits and other spill response equipment and the use of spill response materials.
- Spill response equipment will be inspected and maintained as necessary to replace any materials used in spill response activities.

❖ **Spill Notification**

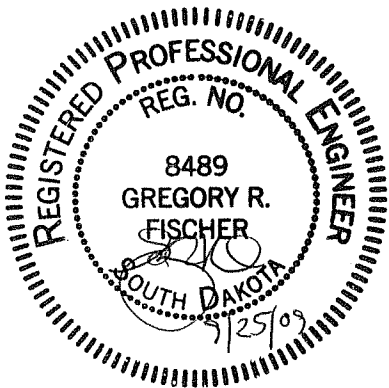
In the event of a spill, the contractor's site superintendent will make the appropriate notification(s), consistent with the following procedures:

- A release or spill of a regulated substance (includes petroleum and petroleum products) must be reported to DENR immediately **if any one of the following** conditions exists:
 - The discharge threatens or is in a position to threaten the waters of the state (surface water or ground water).
 - The discharge causes an immediate danger to human health or safety.
 - The discharge exceeds 25 gallons.
 - The discharge causes a sheen on surface water.
 - The discharge of any substance that exceeds the ground water quality standards of ARSD (Administrative Rules of South Dakota) chapter 74:54:01.
 - The discharge of any substance that exceeds the surface water quality standards of ARSD chapter 74:54:01.
 - The discharge of any substance that harms or threatens to harm wildlife or aquatic life.
 - The discharge of crude oil in field activities under SDCL (South Dakota Codified Laws) chapter 45-9 is greater than 1 barrel (42 gallons).

To report a release or spill, call DENR at 605-773-3296 during regular office hours (8 a.m. to 5 p.m. Central time). To report the release after hours, on weekends or holidays, call State Radio Communications at 605-773-3231. Reporting the release to DENR does not meet any obligation for reporting to other state, local, or federal agencies. Therefore, the responsible person must also contact local authorities to determine the local reporting requirements for releases. DENR recommends that spills also be reported to the National Response Center at (800) 424-8802.

❖ **Construction Changes (4.4)**

When changes are made to the construction project that will require alterations in the temporary erosion controls of the site, the Storm Water Pollution Prevention Plan (SWPPP) will be amended to provide appropriate protection to disturbed areas, all storm water structures, and adjacent waters. The SDDOT Project Engineer will modify the SWPPP plan (DOT 298) and drawings to reflect the needed changes. Copies of changes will be routed per DOT 298. Copies of forms and the SWPPP will be retained in a designated place for review over the course of the project.



REVISIONS		
NO.	DATE	DESCRIPTION

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APPROVED:	GRF
SCALE:	Not to Scale

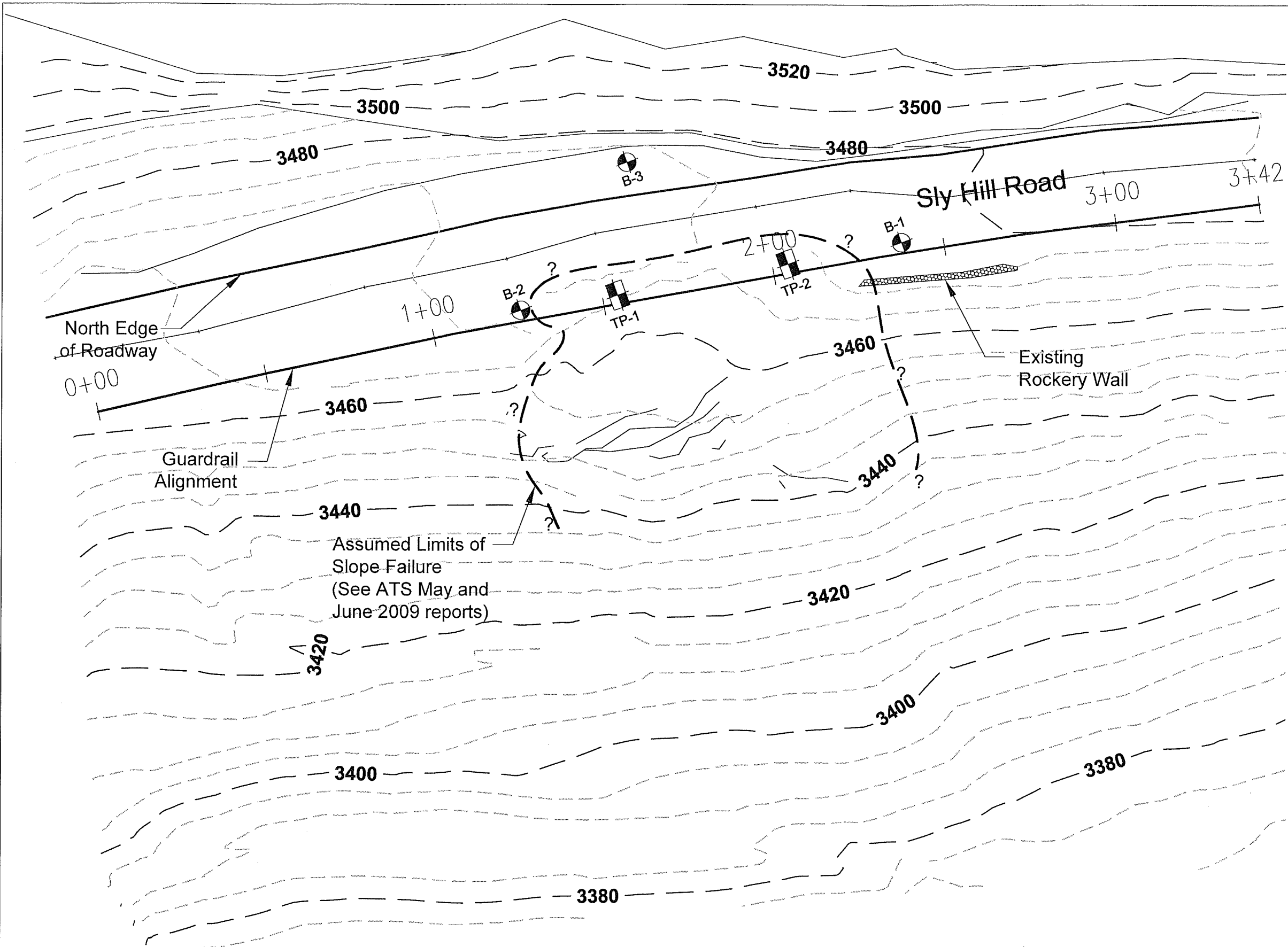
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S&W JOB NUMBER 23-1-01214-001	

SHEET TITLE	
GROUND ANCHOR RETAINING WALL	
PLAN NOTES	



PROJECT	
Project P 7701(03), PCN 02JE	
Sly Hill Road Retaining Wall	
STURGIS, SOUTH DAKOTA	
SEPTEMBER 2009	

SHEET NUMBER	
8	

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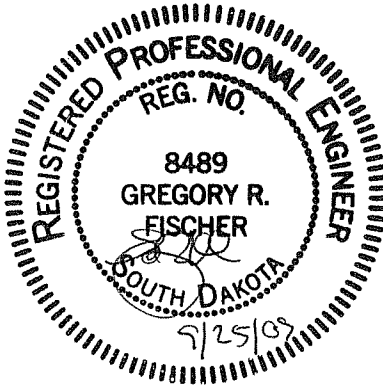
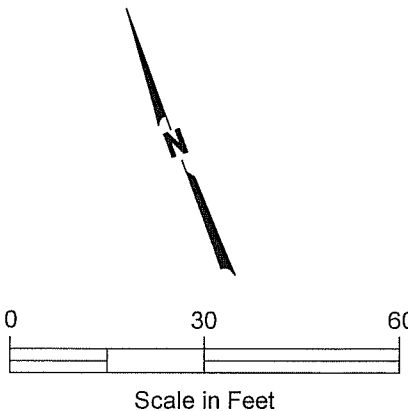


LEGEND

-  B-3 Boring Designation and Approximate Location by American Technical Services (May 2009)
-  TP-1 Test Pit Designation and Approximate Location by American Technical Services (June 2009)
- 2+00 Stationing along Guardrail Alignment

NOTES

1. Topographic survey conducted by Brosz Engineering, Inc. Topographic contours represent site conditions on July 6, 2009.
2. Figure adapted from drawing 09744_updated_7-6-09.dwg by Brosz Engineering, Inc. The drawing was provided by the City of Sturgis on July 10, 2009.
3. The guardrail alignment shown is the south edge of the guardrail post prior to failure of the slope.
4. Survey control point at Station 0+00 to be established by others.



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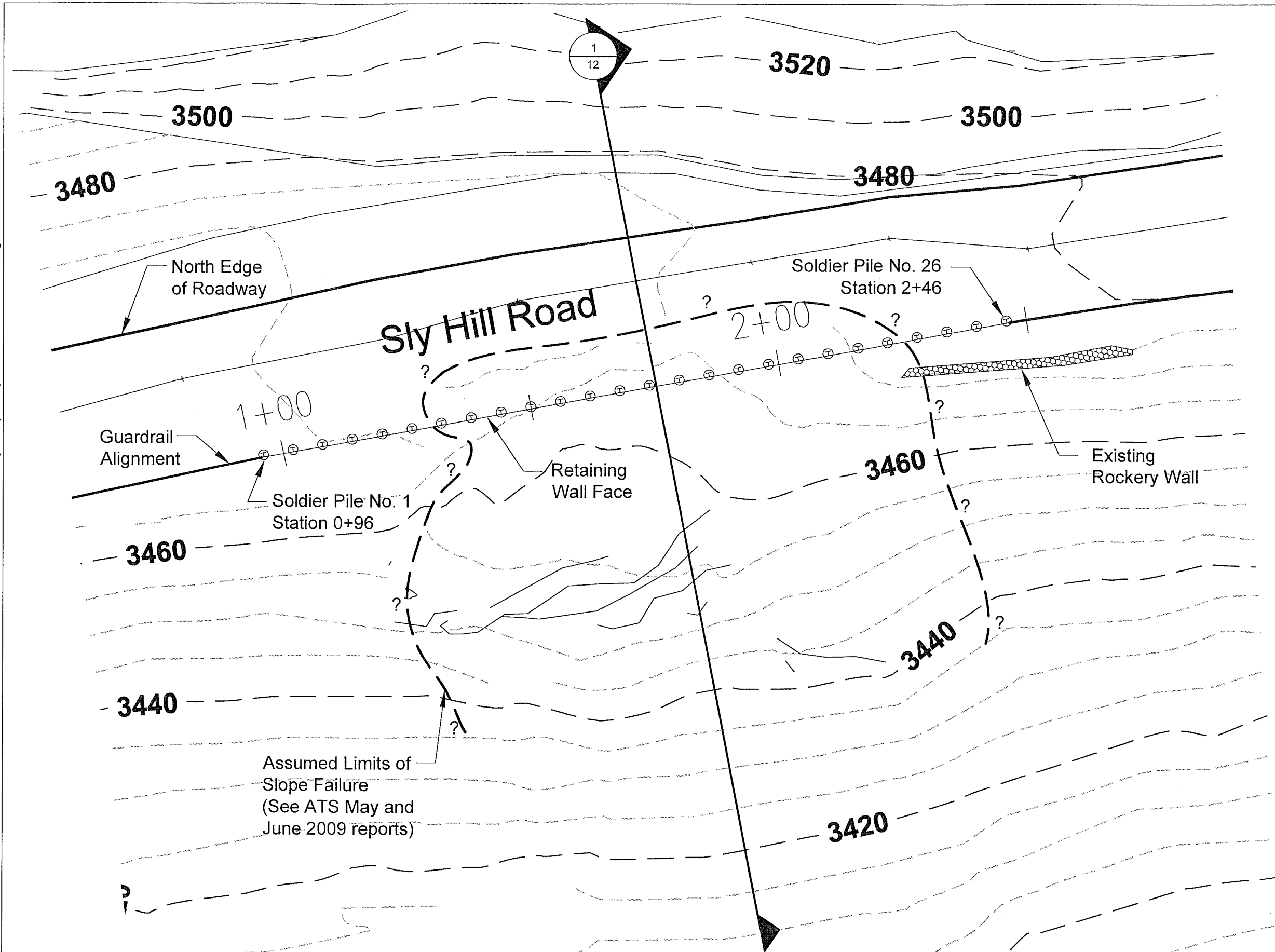
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SHEET TITLE
**GROUND ANCHOR RETAINING WALL
SITE AND EXPLORATION PLAN**

PROJECT
Project P 7701(03), PCN 02JE
Sly Hill Road Retaining Wall
STURGIS, SOUTH DAKOTA
SEPTEMBER 2009

Filename: I:\WIP\23-1-01200s\23-1-01214 (Sly Hill Road Wall Design)\Shoring Plans\Revised\Sheets 10 and 11\23-1-01214-001SH11.dwg Date: 09-25-2009 Layout: Layout1 Login: David Asunskis

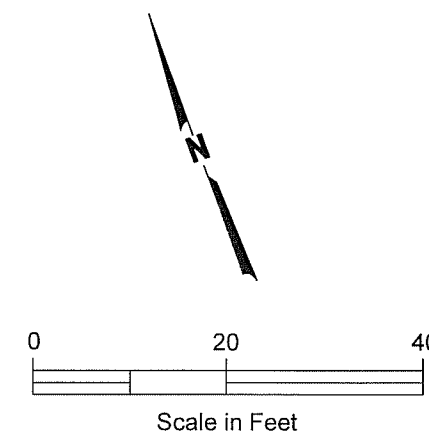


LEGEND

⊕ Soldier Pile Location

NOTES

1. Topographic survey conducted by Brosz Engineering, Inc. Topographic contours represent site conditions on July 6, 2009.
2. Figure adapted from drawing 09744_updated_7-6-09.dwg by Brosz Engineering, Inc. The drawing was provided by the City of Sturgis on July 10, 2009.
3. The guardrail alignment shown is the south edge of the guardrail post prior to failure of the slope.
4. The alignment of the soldier pile retaining wall face is identical to the guardrail alignment.



REVISIONS	
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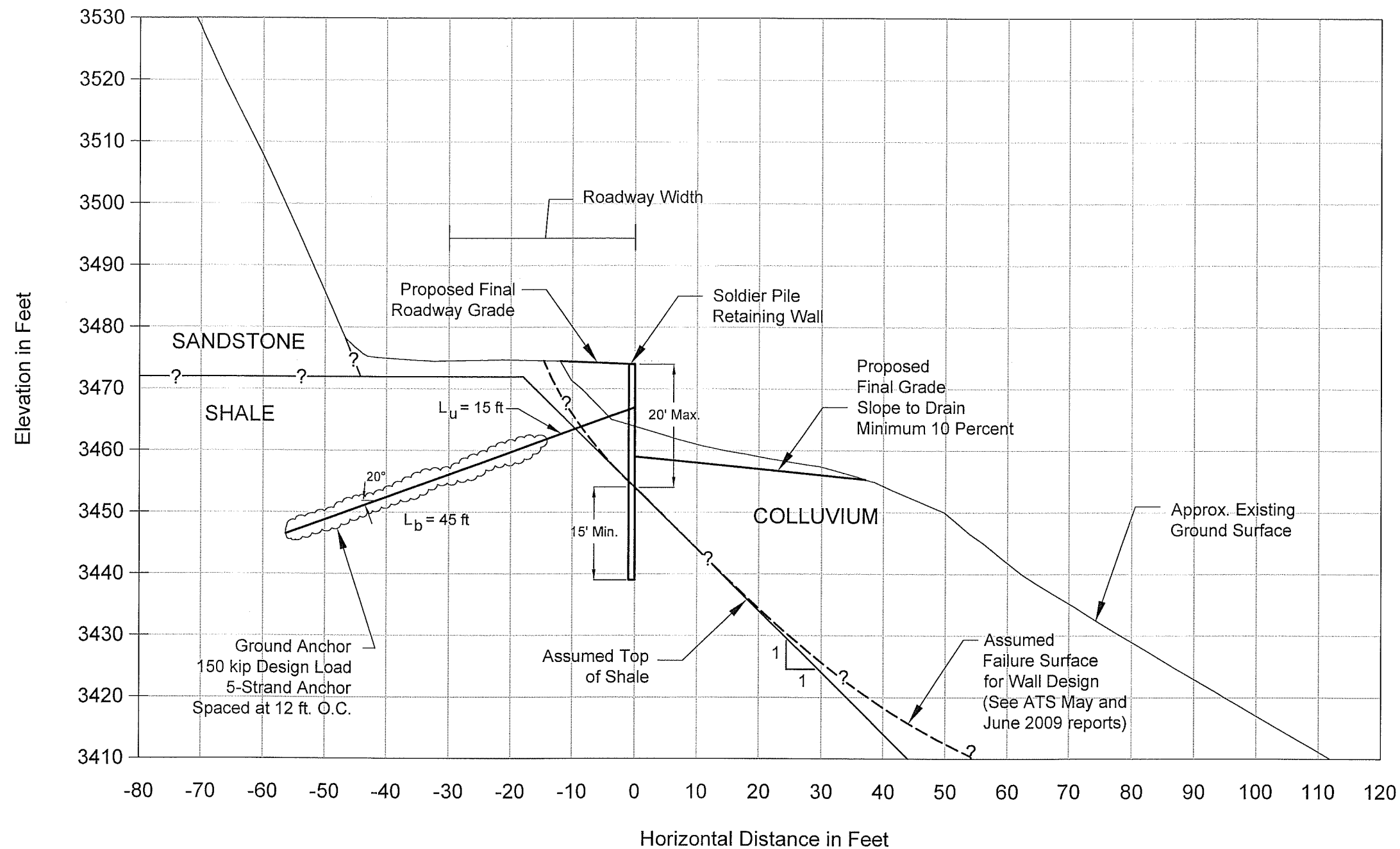
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S&W JOB NUMBER 23-1-01214-001

SHEET TITLE
GROUND ANCHOR RETAINING WALL
WALL PLAN VIEW

PROJECT
Project P 7701(03), PCN 02JE
Sly Hill Road Retaining Wall
STURGIS, SOUTH DAKOTA
SEPTEMBER 2009

SHEET NUMBER
11

Filename: I:\WP\23-1-01200s\23-1-01214 (Sly Hill Road Wall Design)\Shoring Plans\Revised\23-1-01214-001.SH12.dwg Login: David Asunskis Date: 09-25-2009 Layout: Layout1



1 GENERALIZED CROSS SECTION THROUGH SLIDE AREA
12
1 in = 20 ft

NOTES

1. Site stratigraphy was interpolated from subsurface explorations completed by American Technical Services in May and June 2009.
2. Existing ground surface topography shown on the cross section is based on survey conducted by Brosz Engineering, Inc. Topography represents site conditions on July 6, 2009.
3. American Technical Services (ATS) May 22 and June 22, 2009 reports indicate that within the overall slide area, the failure surface is located along the top of shale at a maximum 20 feet below the roadway grade at the top of the existing slope. The assumed hypothetical failure surface shown on the cross section was used as the basis of our wall design. The actual failure surface is unknown and may vary from the assumed failure plane.
4. The soldier pile retaining wall was designed for a maximum 20 foot wall height. The top of shale corresponds to the bottom of wall height.
5. Soldier piles shall have a minimum embedment of 15 feet into shale.



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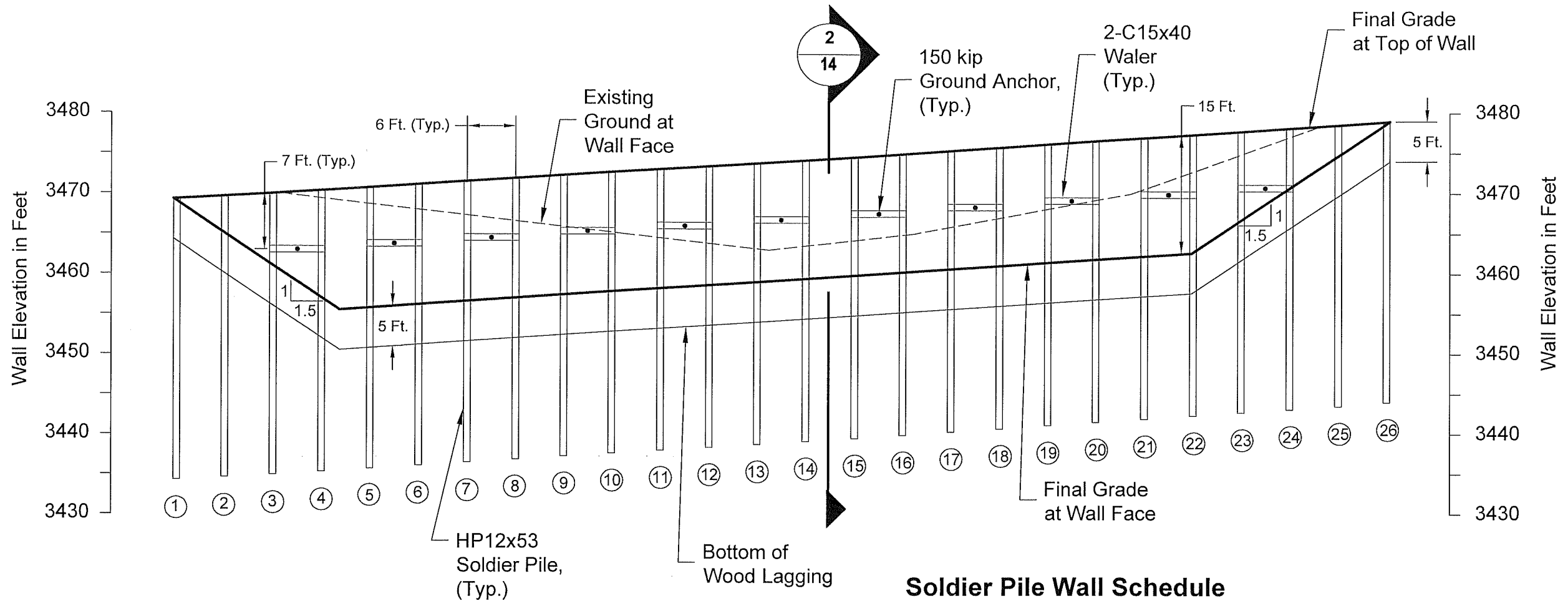
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S&W JOB NUMBER 23-1-01214-001	

SHEET TITLE	
GROUND ANCHOR RETAINING WALL	
GENERALIZED CROSS SECTION	
THROUGH SLIDE AREA	

PROJECT	
Project P 7701(03), PCN 02JE	
Sly Hill Road Retaining Wall	
STURGIS, SOUTH DAKOTA	
SEPTEMBER 2009	

SHEET NUMBER	
12	

Filename: I:\WP\23-1-01200s\23-1-01214 (Sly Hill Road Wall Design)\Shoring Plans\Revised\Sheets 2, 13, 15-17\23-1-01214-001 Plan Set.dwg Layout: SH 13 Date: 09-25-2009 Login: David Asunskis

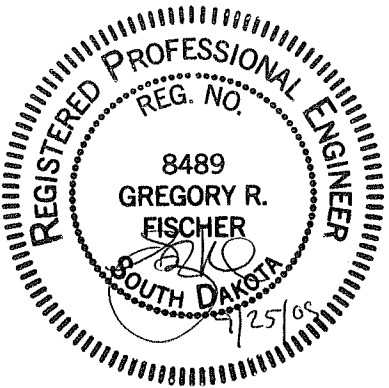
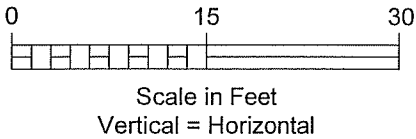


Soldier Pile Wall Schedule

Pile Designation A - B	Pile A		Pile B		Ground Anchor Elevation (feet)
	Top of Pile Elevation (feet)	Bottom of Pile Elevation (feet)	Top of Pile Elevation (feet)	Bottom of Pile Elevation (feet)	
1 - 2	3469.3	3434.3	3469.7	3434.7	-----
3 - 4	3470.0	3435.0	3470.4	3435.4	3463.0
5 - 6	3470.8	3435.8	3471.1	3436.1	3463.8
7 - 8	3471.5	3436.5	3471.9	3436.9	3464.5
9 - 10	3472.3	3437.3	3472.6	3437.6	3465.3
11 - 12	3473.0	3438.0	3473.4	3438.4	3466.0
13 - 14	3473.7	3438.7	3474.1	3439.1	3466.7
15 - 16	3474.5	3439.5	3474.9	3439.9	3467.5
17 - 18	3475.3	3440.3	3475.7	3440.7	3468.3
19 - 20	3476.1	3441.1	3476.5	3441.5	3469.1
21 - 22	3476.9	3441.9	3477.3	3442.3	3469.9
23 - 24	3477.7	3442.7	3478.5	3443.5	3470.7
25 - 26	3478.5	3443.5	3479.0	3444.0	-----

NOTES

- Final grade at top of wall and existing ground elevations are based on topographic survey shown on 09744_updated_7-6-09.dgn by Brosz Engineering, Inc.
- See Sheets 15, 16, and 17 for details on ground anchors, walers, and wood lagging.



REVISIONS	
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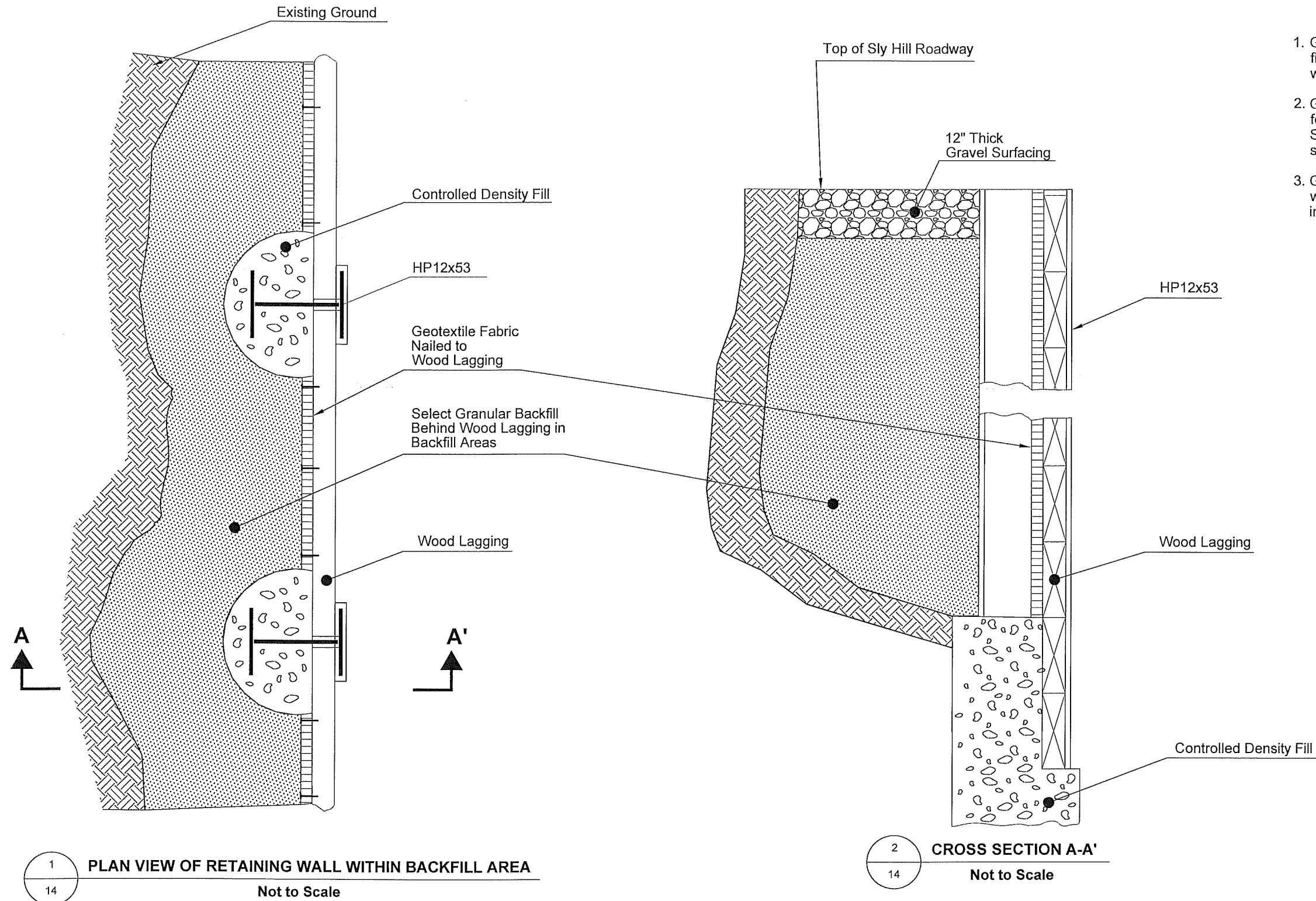
CONSULTANT	
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants 1060 Bannock Street, Suite 200, Denver, Colorado 80202 (303) 825-3800 FAX: (303) 825-3801 S&W JOB NUMBER 23-1-01214-001	

SHEET TITLE	
GROUND ANCHOR RETAINING WALL WALL ELEVATION VIEW	

PROJECT	
Project P 7701(03), PCN 02JE Sly Hill Road Retaining Wall STURGIS, SOUTH DAKOTA SEPTEMBER 2009	

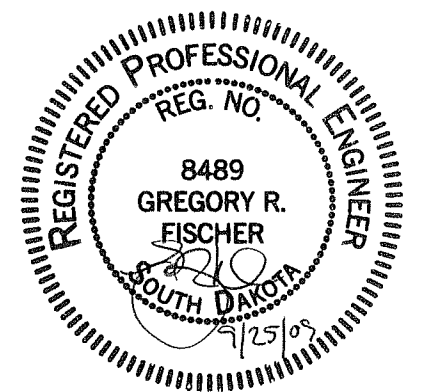
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NOTES

1. Gravel surfacing, geotextile fabric, and select granular fill shall be used only in areas behind the wall and within the roadway that require backfill due to the slide.
2. Gravel road surfacing shall conform to specifications for gravel surfacing set forth in SDDOT Standard Specifications, Section 882. Gravel road surfacing shall be a minimum of 12 inches in thickness.
3. Geotextile fabric shall conform to specifications for woven or non-woven geotextile separator as specified in the SDDOT Standard Specifications, Section 831.



REVISIONS	
NO.	DESCRIPTION

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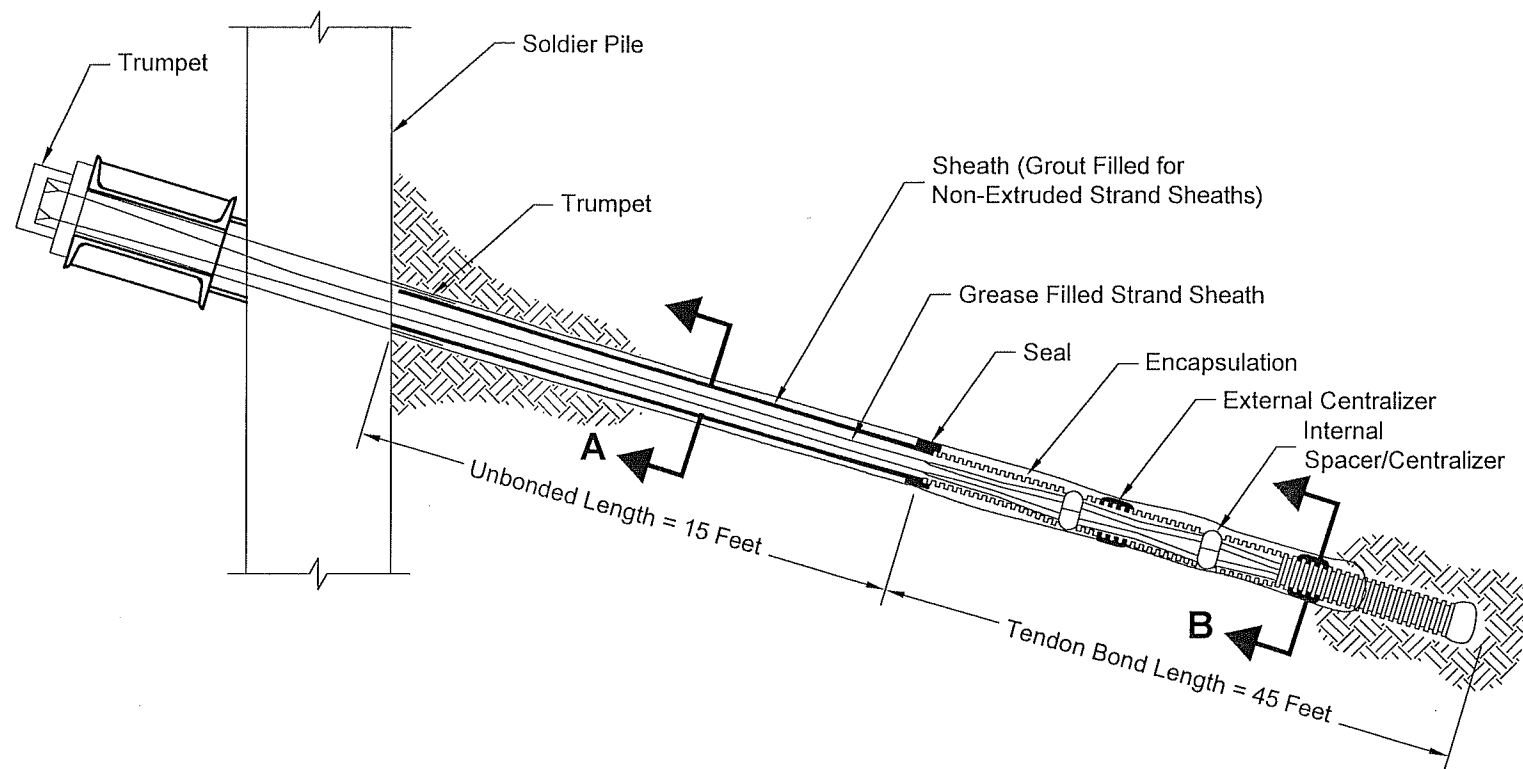
CONSULTANT
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S&W JOB NUMBER 23-1-01214-001

SHEET TITLE
GROUND ANCHOR RETAINING WALL
WALL CROSS SECTION

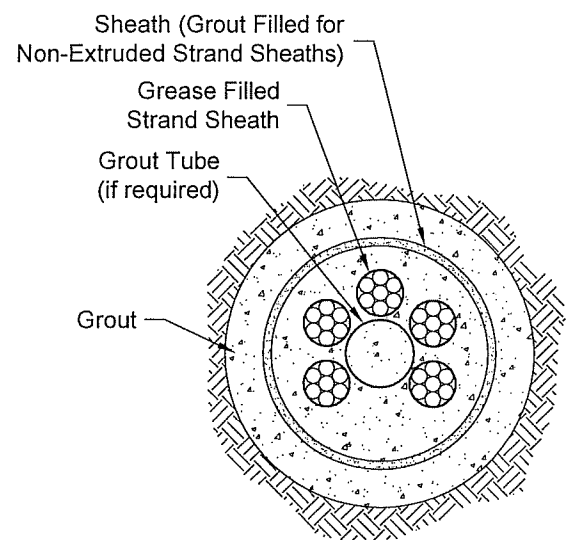
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Project P 7701(03), PCN 02JE
Sly Hill Road Retaining Wall
STURGIS, SOUTH DAKOTA
SEPTEMBER 2009

SHEET NUMBER
14

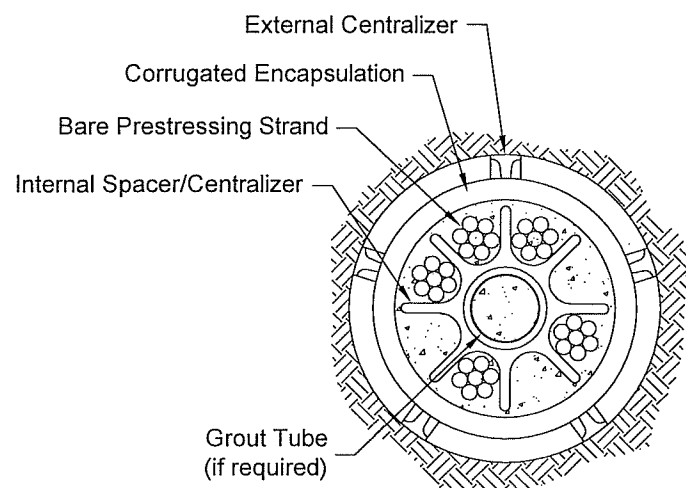
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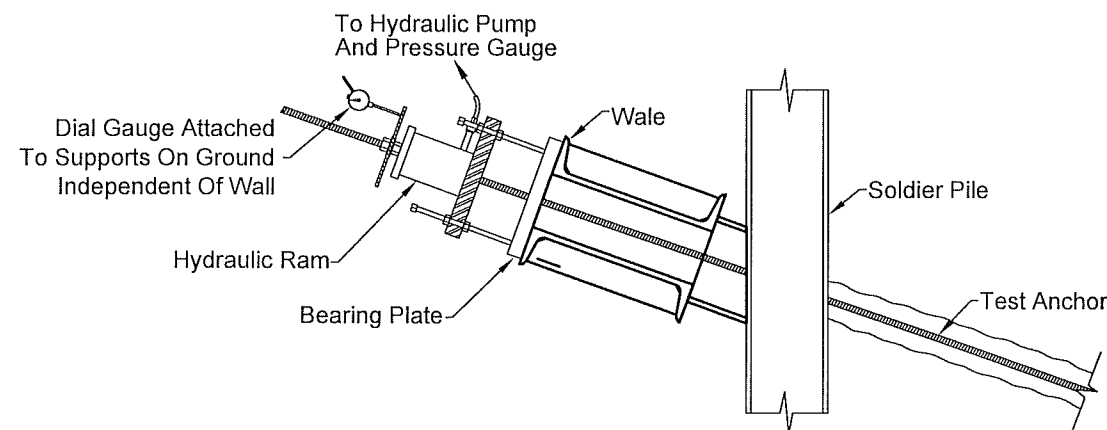
1
15
TYPICAL GROUND ANCHOR SECTION
Not to Scale



2
15
CROSS SECTION A
Not to Scale



3
15
CROSS SECTION B
Not to Scale



4
15
TYPICAL GROUND ANCHOR TEST ASSEMBLY
Not to Scale

NOTES

1. The ground anchors were designed (and shall be installed) in accordance with the Federal Highway Administration (FHWA), Ground Anchors and Anchored Systems Manual, Publication No. FHWA-IF-99-015, dated June 1999.
2. Class I corrosion protection, as defined by the FHWA-IF-99-015 Manual, shall be used on the ground anchors, based on an assumed moderately corrosive environment.
3. The design anchor load is 150 kips. Ground anchors shall be 5-strand anchors with a maximum design load of 175 kips.
4. Ground anchor capacity shall be achieved within the shale bedrock. An allowable soil/grout bond stress of 2 ksf was used in the design. A factor of safety of 2.5 was applied to the ultimate bond stress. The bond length values are based on penetration into shale bedrock at a minimum 7 inch diameter grout bulb. One verification test shall be conducted at the project site to confirm the bond stress values. The bond length and/or diameter may be adjusted based on testing to achieve the indicated capacity.
5. Ground anchors shall be prestressed to a lock-off load equivalent to 75 percent of the design load.



REVISIONS	
NO.	DESCRIPTION

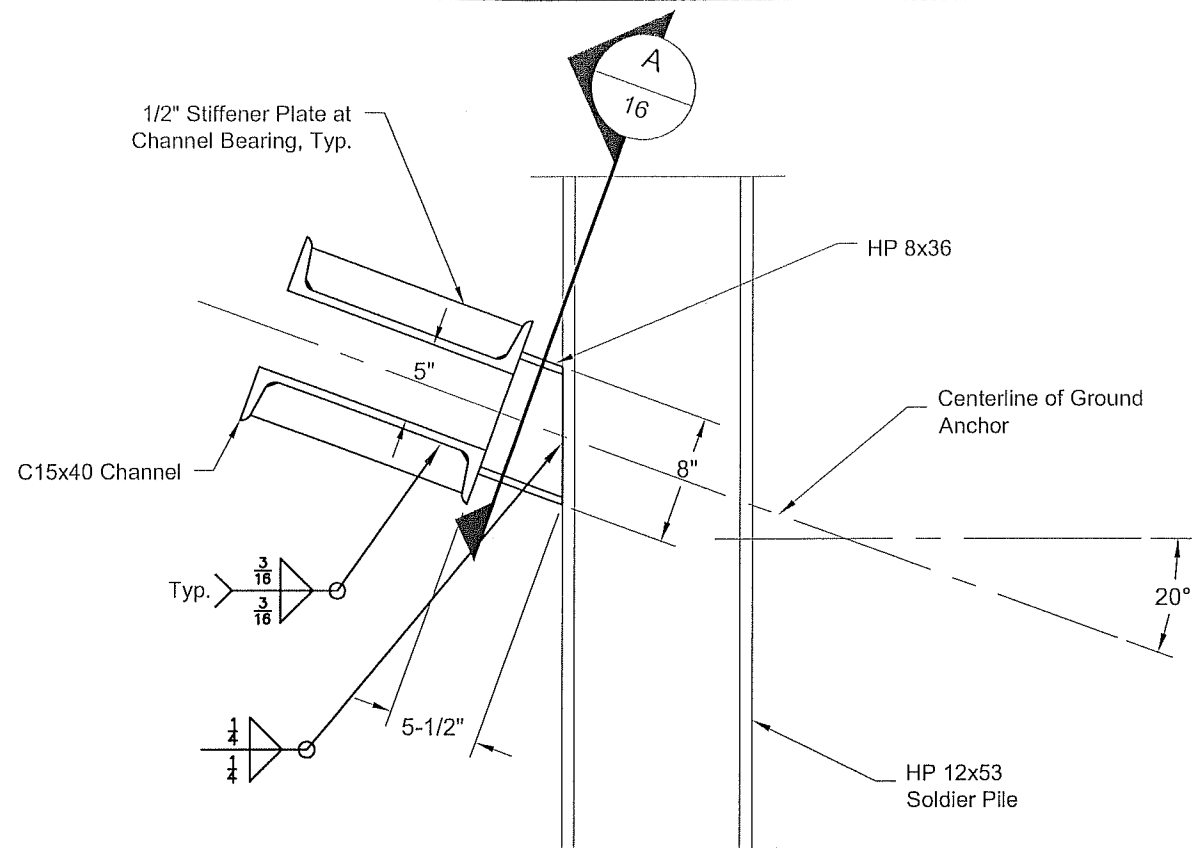
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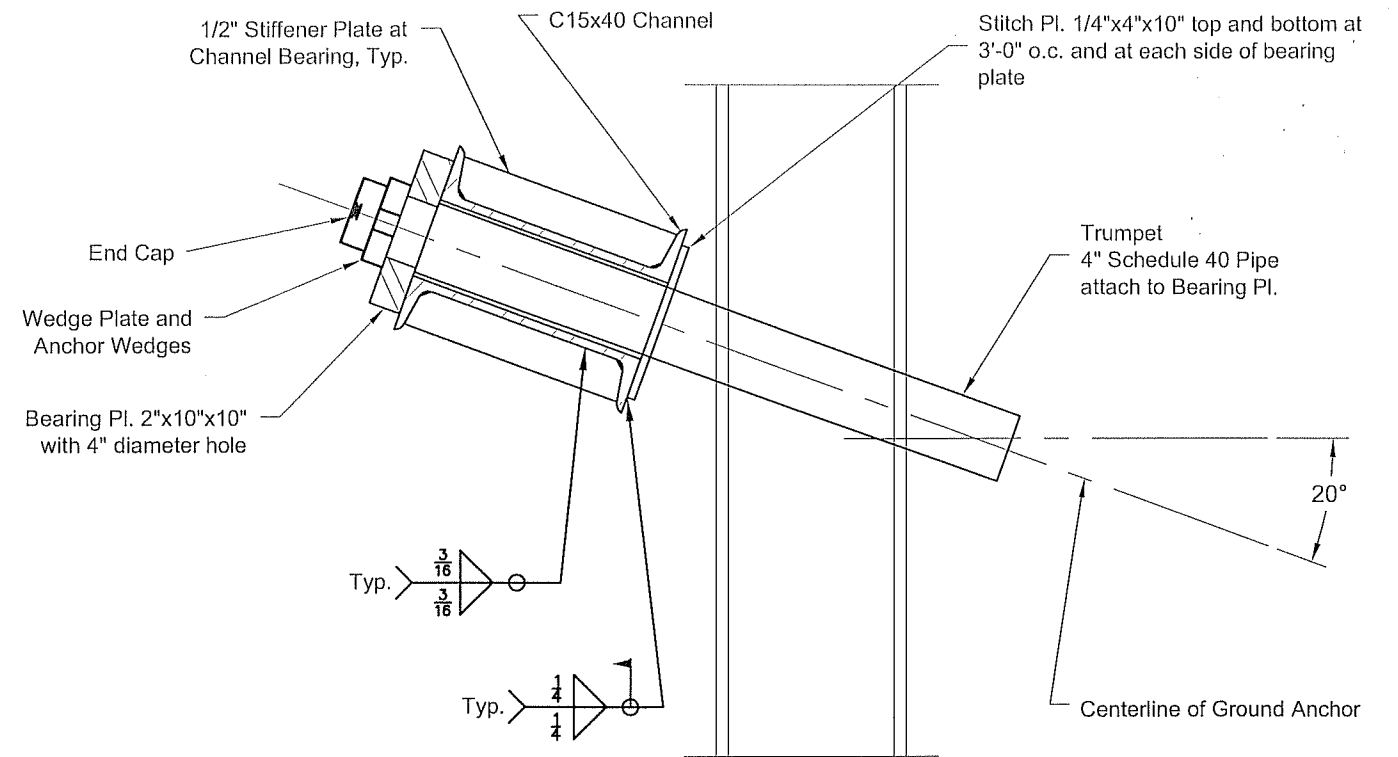
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GROUND ANCHOR RETAINING WALL	
GROUND ANCHOR DETAILS	

PROJECT	SHEET NUMBER
Project P 7701(03), PCN 02JE Sly Hill Road Retaining Wall STURGIS, SOUTH DAKOTA SEPTEMBER 2009	15

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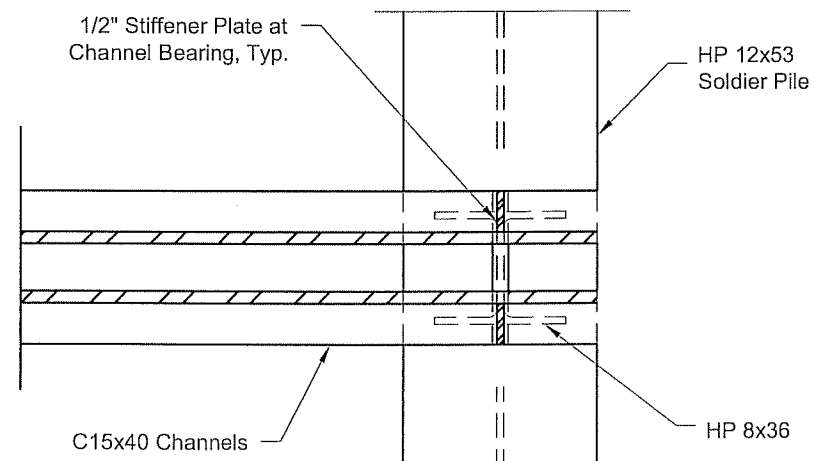
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16
CROSS SECTION AT SOLDIER PILE
Scale : 1" = 1'-0"



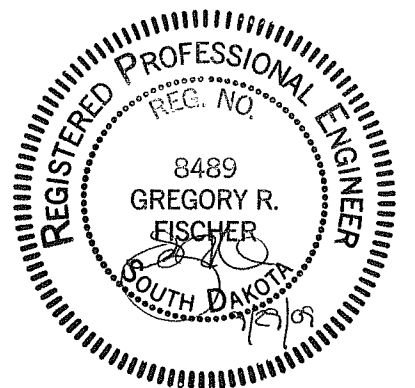
2
16
CROSS SECTION AT TIEBACK
Scale : 1" = 1'-0"

NOTES

1. All HP and channel sections shall be ASTM A572, Grade 50 or better.
2. All stiffener plates shall be ASTM A572, Grade 50 or better.
3. All bearing plates and stitch plates shall be ASTM A36 or better.
4. All weld material shall be E70 Electrodes U.N.O.
5. All welding shall be conducted in accordance with the requirements of AWS D1.1.



3
16
CROSS SECTION A
Scale : 1" = 1'-0"



REVISIONS	
NO.	DESCRIPTION

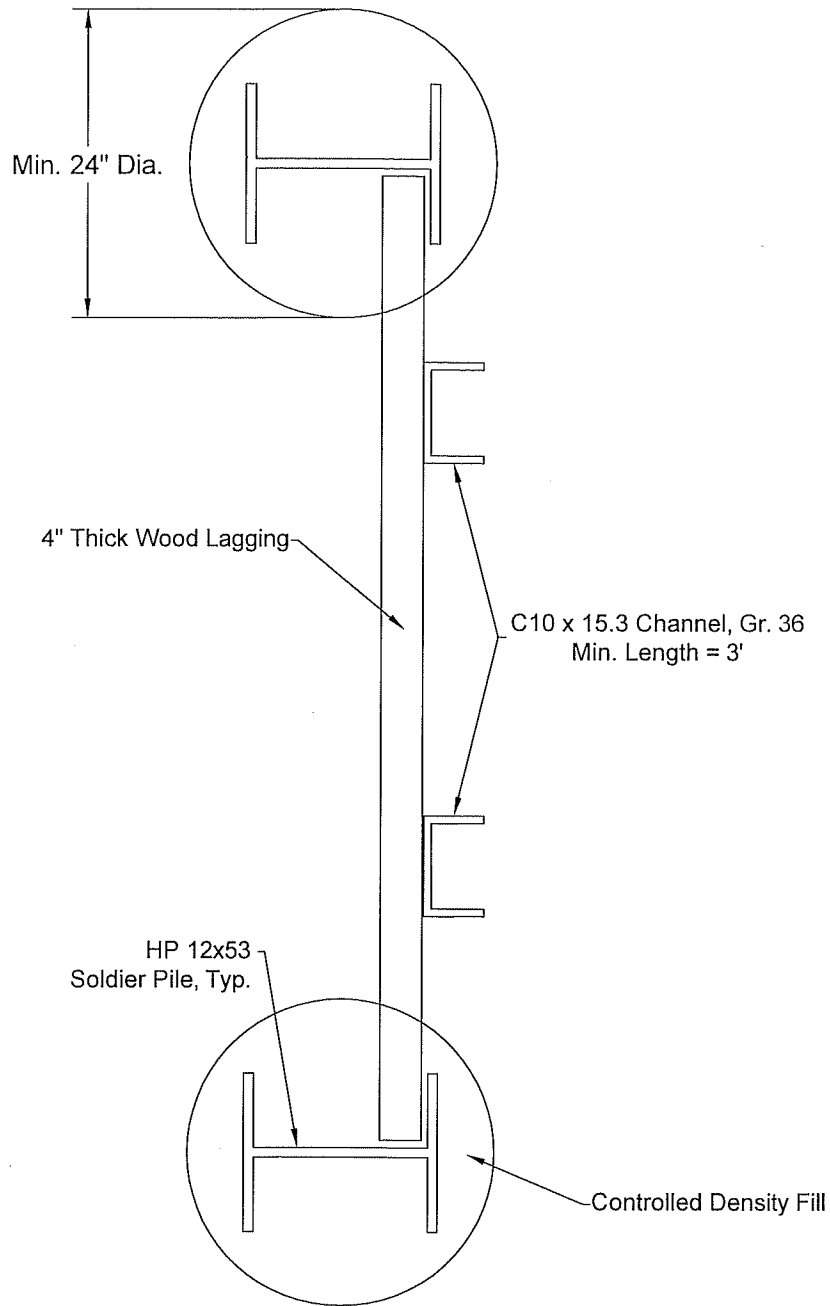
APPROVALS	
DESIGNED: MCH	
DRAWN: MCH	
CHECKED: TMG	
APPROVED: GRF	
SCALE: Not to Scale	

CONSULTANT	
SHANNON & WILSON, INC.	
Geotechnical and Environmental Consultants	
1060 Bannock Street, Suite 200, Denver, Colorado 80202	
(303) 825-3800 FAX: (303) 825-3801	
S&W JOB NUMBER 23-1-01214-001	

SHEET TITLE	
GROUND ANCHOR RETAINING WALL	
GROUND ANCHOR CONNECTION DETAILS	

PROJECT	SHEET NUMBER
Project P 7701(03), PCN 02JE Sly Hill Road Retaining Wall STURGIS, SOUTH DAKOTA SEPTEMBER 2009	16

Filename: I:\WPV23-1-01200s\23-1-01214 (Sly Hill Road Wall Design)\Shoring Plans\Revised\Sheets 2, 13, 15-17\23-1-01214-001 Plan Set.dwg Layout: SH 17 Date: 09-25-2009 Login: David Asunskis



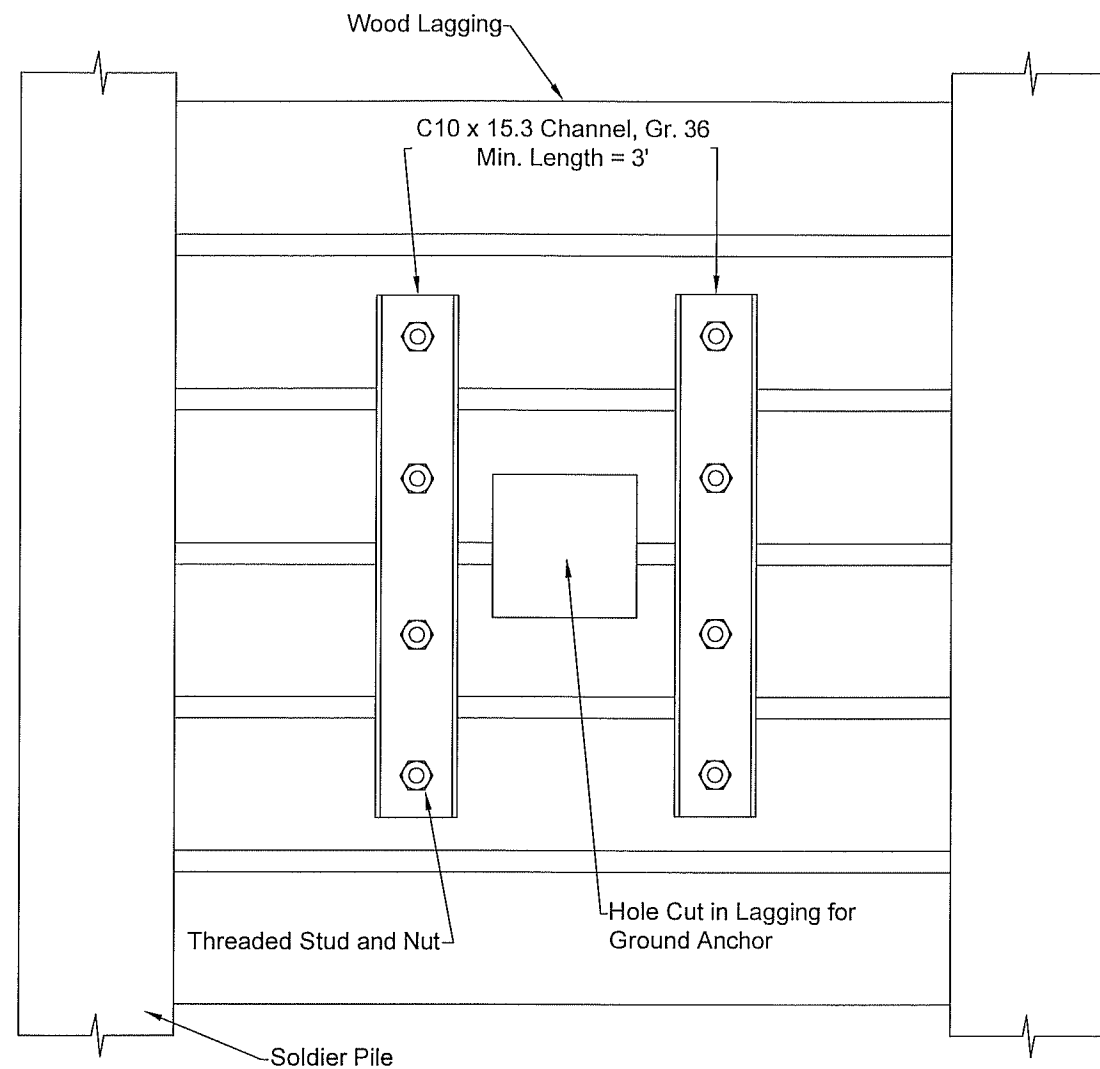
1
17

WOOD LAGGING DETAIL

Not to Scale

NOTES

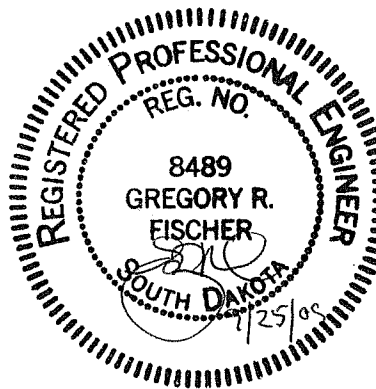
1. Wood Lagging shall be pressure treated Douglas Fir Larch Grade 1 or better. Lagging to be installed from top of pile proceeding downward.
2. Lagging should be placed behind the pile front flange with a maximum clearance of 1.5 inches between the lagging board edge and pile web.
3. Lagging should make direct contact with soil. Any voids should be filled with coarse aggregate.
4. All lagging shall be 4" thick.
5. The drilled shaft diameter shall be determined by the contractor, however, the diameter shall not be less than the specified minimum 24 inches.



2
17

SOLDIER PILE WOOD LAGGING DETAIL

Not to Scale



REVISIONS		
NO.	DATE	DESCRIPTION

APPROVALS	
DESIGNED:	MCH
DRAWN:	MCH
CHECKED:	TMG
APPROVED:	GRF
SCALE:	Not to Scale

CONSULTANT

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SHEET TITLE

GROUND ANCHOR RETAINING WALL

WOOD LAGGING DETAILS

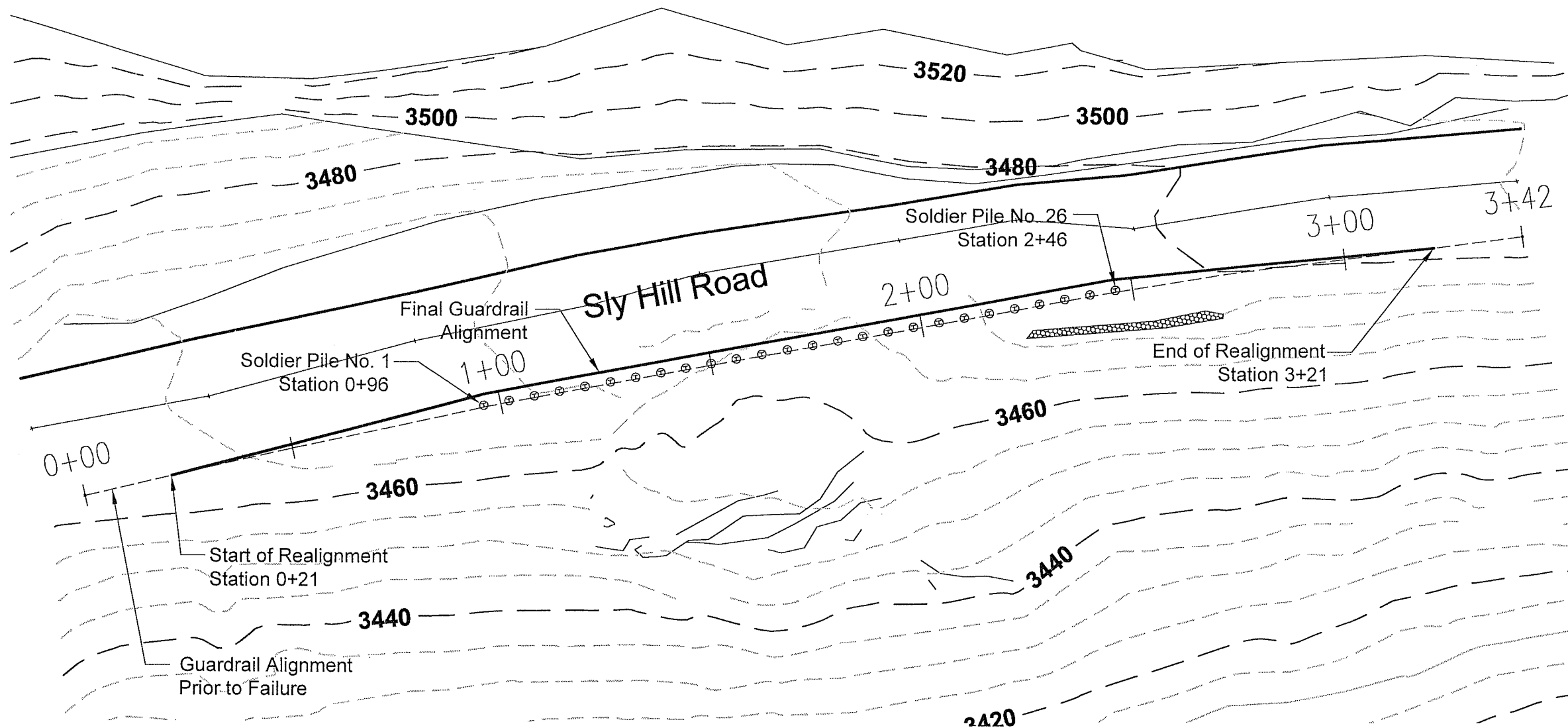
PROJECT

Project P 7701(03), PCN 02JE
Sly Hill Road Retaining Wall
STURGIS, SOUTH DAKOTA
SEPTEMBER 2009

SHEET NUMBER

17

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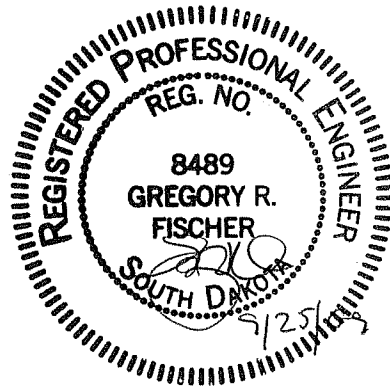
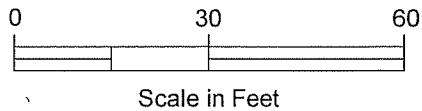
LEGEND
⊕ Soldier Pile Location

Final Guardrail Alignment

Station	Final Guardrail Alignment Offset (feet)
0+00	0.00
0+21	0.00
0+50	1.16
0+75	2.16
0+96	3.00
2+46	3.00
2+75	1.84
3+00	0.84
3+21	0.00
3+42	0.00

NOTES

- Topographic survey conducted by Brosz Engineering, Inc. Topographic contours represent site conditions on July 6, 2009.
- Figure adapted from drawing 09744_updated_7-6-09.dwg by Brosz Engineering, Inc. The drawing was provided by the City of Sturgis on July 10, 2009.
- Survey control point at Station 0+00 to be established be others.
- The guardrail alignment prior to failure of the slope and the final guardrail alignment represent the south edge of the guardrail post.
- The soldier pile retaining wall face is located along the guardrail alignment prior to failure.
- The final guardrail alignment offset is taken perpendicular from the alignment prior to failure.
- Between Station 0+21 to 0+96 and Station 2+46 to 3+21, the offset is a linear transgression.



REVISIONS		DESCRIPTION
NO.	DATE	

APPROVALS	
DESIGNED: MCH	
DRAWN: MCH	
CHECKED: TMG	
APPROVED: GRF	
SCALE: Not to Scale	

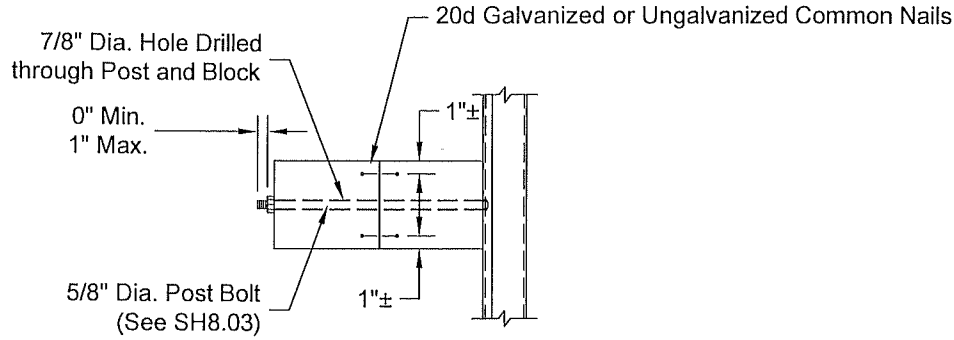
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants
1060 Bannock Street, Suite 200, Denver, Colorado 80202
(303) 825-3800 FAX: (303) 825-3801
S&W JOB NUMBER 23-1-01214-001

SHEET TITLE
**GROUND ANCHOR RETAINING WALL
GUARDRAIL REALIGNMENT**

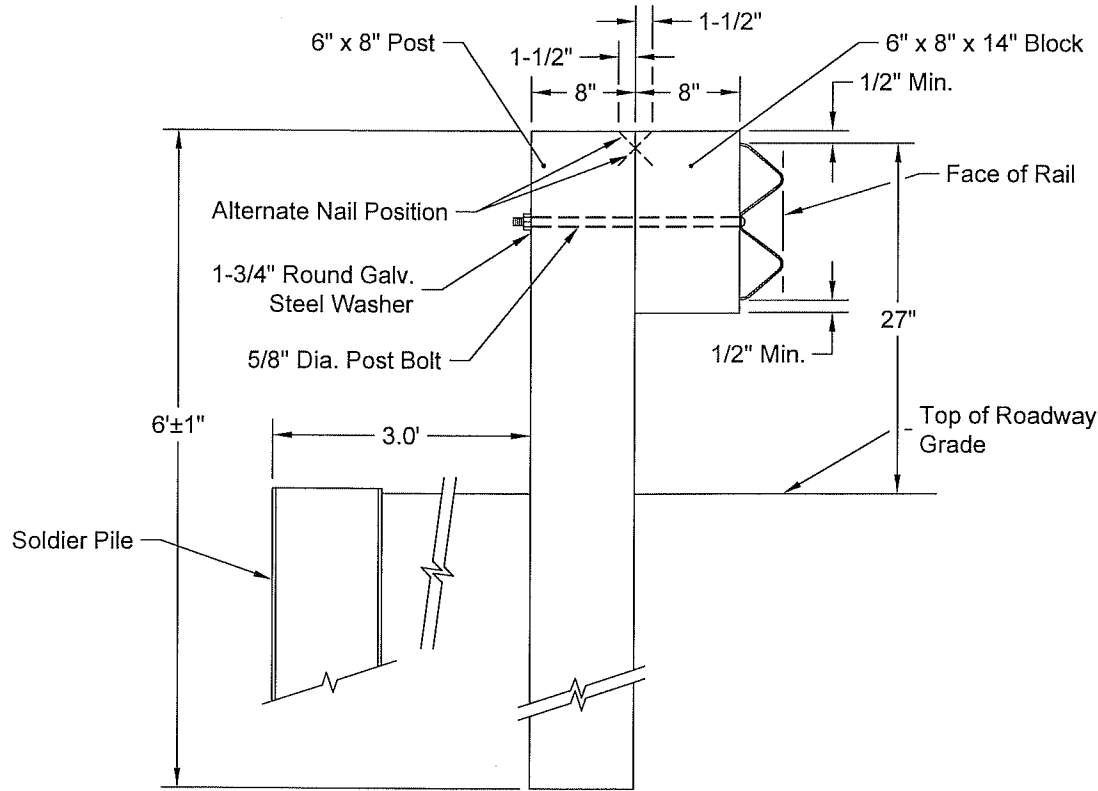
PROJECT
Project P 7701(03), PCN 02JE
Sly Hill Road Retaining Wall
STURGIS, SOUTH DAKOTA
SEPTEMBER 2009

SHEET NUMBER
18

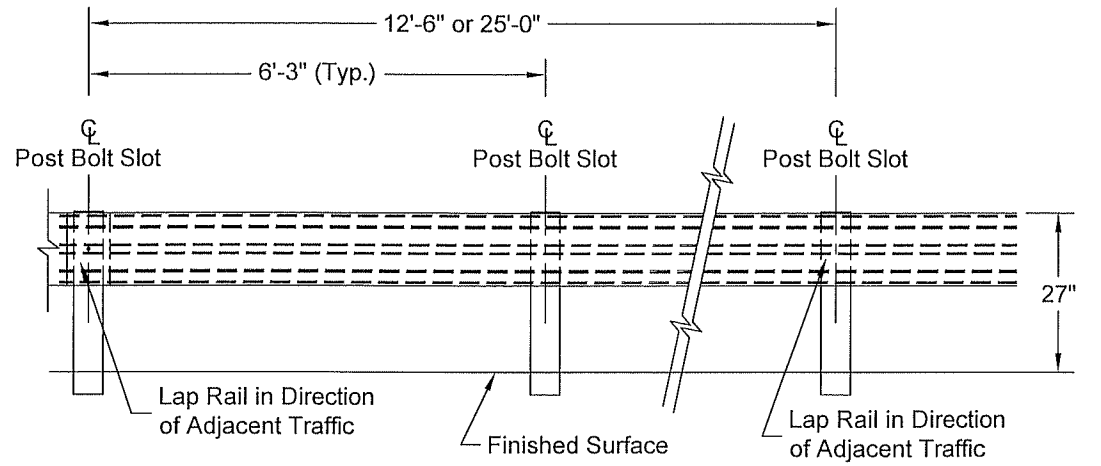
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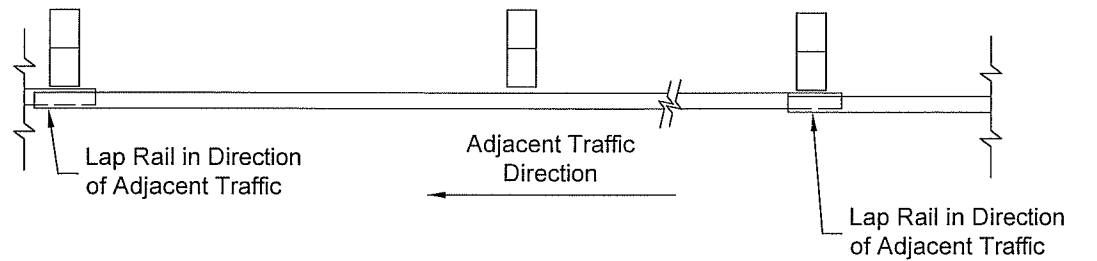
1
19
TOP VIEW OF GUARDRAIL POST INSTALLATION
Not to Scale



2
19
CROSS SECTION OF GUARDRAIL POST INSTALLATION
Not to Scale



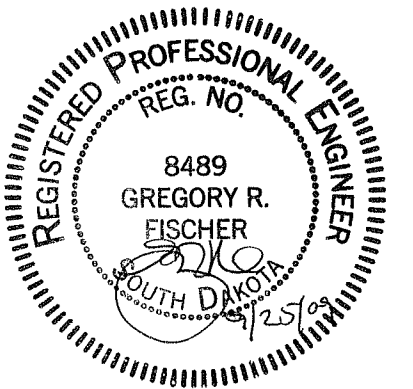
3
19
ELEVATION VIEW OF GUARDRAIL INSTALLATION
Not to Scale



4
19
PLAN VIEW OF GUARDRAIL INSTALLATION
Not to Scale

NOTE

Guardrail installation details taken from SDDOT Standard Plates 630.31 and 630.32.



REVISIONS		
NO.	DATE	DESCRIPTION

APPROVALS	
DESIGNED:	MCH
DRAWN:	CNT
CHECKED:	TMG
APPROVED:	GRF
SCALE:	Not to Scale

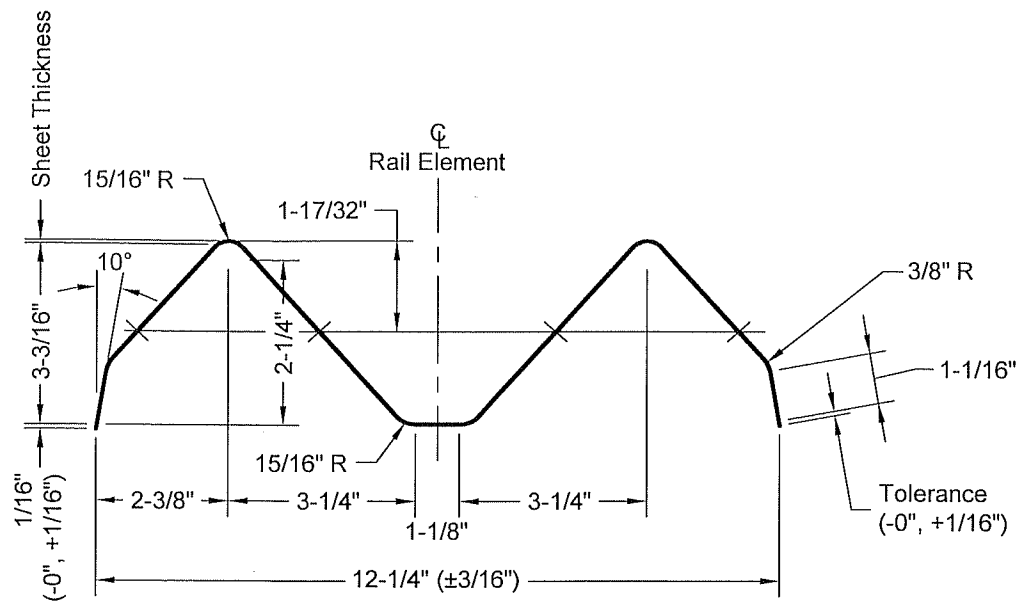
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S&W JOB NUMBER 23-1-01214-001

SHEET TITLE
GROUND ANCHOR RETAINING WALL
GUARDRAIL INSTALLATION DETAILS

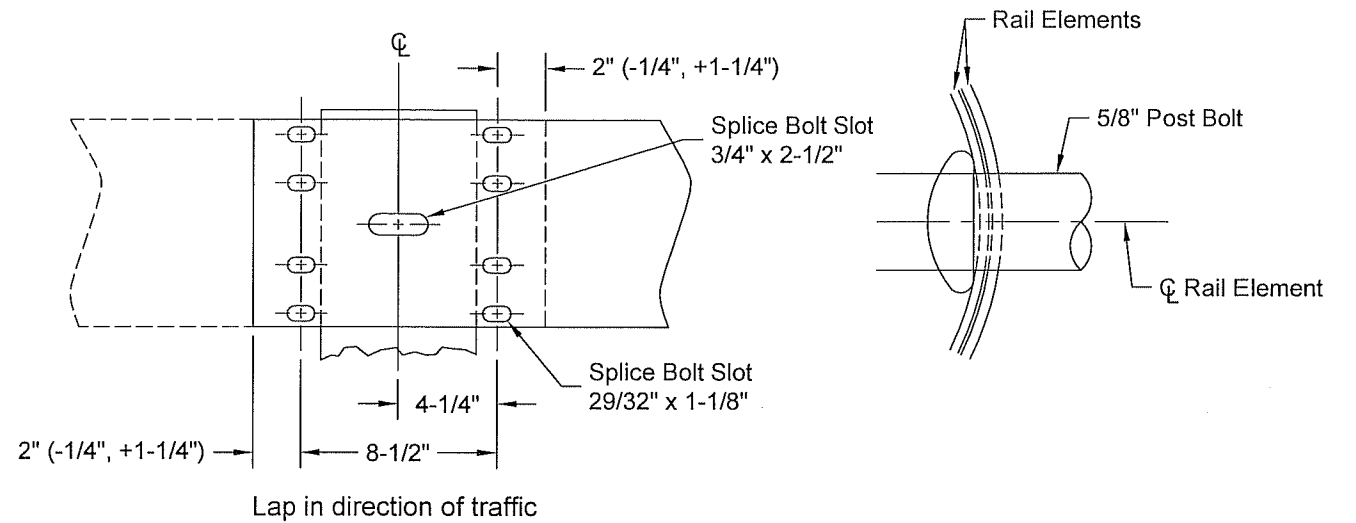
PROJECT
Project P 7701(03), PCN 02JE
Sly Hill Road Retaining Wall
STURGIS, SOUTH DAKOTA
SEPTEMBER 2009

SHEET NUMBER
19

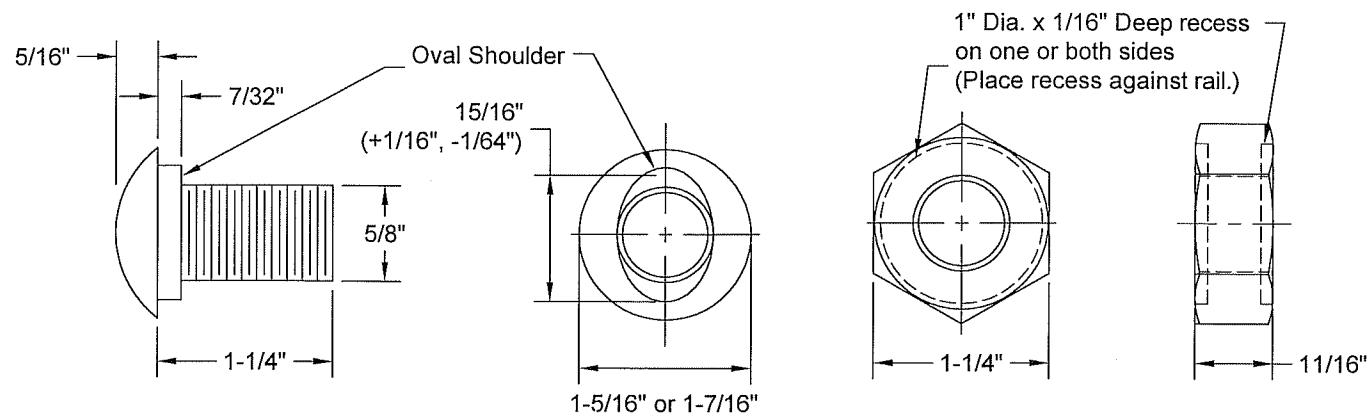
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1
20
SECTION THROUGH W BEAM RAIL ELEMENT
Not to Scale



3
20
RAIL SPLICE DETAIL
Not to Scale



2
20
SPLICE BOLT - 5/8" BUTTON HEAD BOLT AND RECESS NUT
Not to Scale

The Post Bolt is similar except the post bolt is 18" long.

NOTE

Guardrail and hardware details taken from SDDOT Standard Plate 630.33.



REVISIONS	
NO.	DESCRIPTION

APPROVALS	
DESIGNED: MCH	
DRAWN: CNT	
CHECKED: TMG	
APPROVED: GRF	
SCALE: Not to Scale	

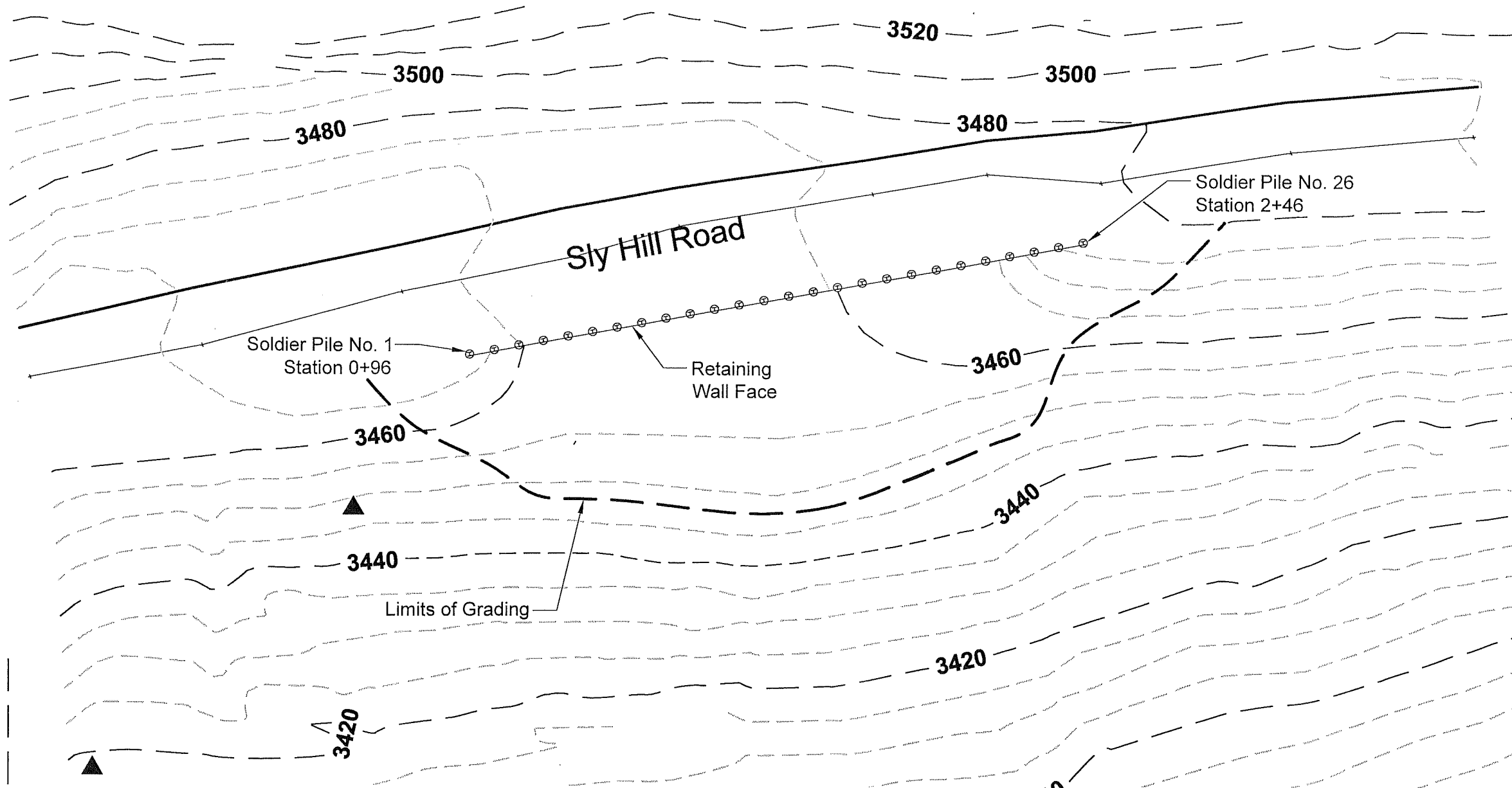
SHANNON & WILSON, INC.
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S&W JOB NUMBER 23-1-01214-001

SHEET TITLE
GROUND ANCHOR RETAINING WALL
GUARDRAIL AND HARDWARE DETAILS

PROJECT
Project P 7701(03), PCN 02JE
Sly Hill Road Retaining Wall
STURGIS, SOUTH DAKOTA
SEPTEMBER 2009

SHEET NUMBER
20

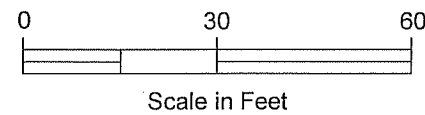
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- LEGEND
- ⊕ Soldier Pile Location
 - ▲ Archaeologically Sensitive Site

NOTES

1. Topographic survey conducted by Brosz Engineering, Inc. Topographic contours represent site conditions on July 6, 2009.
2. Figure adapted from drawing 09744_updated_7-6-09.dwg by Brosz Engineering, Inc. The drawing was provided to us by the City of Sturgis on July 10, 2009.
3. The archaeologically sensitive site locations are approximate and were interpreted from artifact_sly_hill.pdf by Brosz Engineering, Inc. The pdf was provided to us by the City of Sturgis on September 16, 2009.
4. Final roadway grading for Sly Hill Road to match grade prior to slope failure.



REVISIONS	
NO.	DESCRIPTION

APPROVALS	
DESIGNED:	MCH
DRAWN:	MCH
CHECKED:	TMG
APPROVED:	GRF
SCALE:	Not to Scale

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S&W JOB NUMBER 23-1-01214-001

SHEET TITLE
GROUND ANCHOR RETAINING WALL
FINAL GRADING PLAN

PROJECT
Project P 7701(03), PCN 02JE
Sly Hill Road Retaining Wall
STURGIS, SOUTH DAKOTA
SEPTEMBER 2009