Via Hand Delivery

March 3, 2017

Michael Cunningham
Division of Reclamation and Mine Safety
Department of Natural Resources
1313 Sherman Street, Room 2
Denver, CO 80203

RE: Schwartzwalder Mine; DRMS File No. M-1977-300; Technical Revision (TR-23)

Dear Mr. Cunningham:

By letter dated December 23, 2016, the Division of Reclamation and Mine Safety ("DRMS") issued its latest round of adequacy review comments for the Cotter Corporation (N.S.L.) ("Cotter") Technical Revision 23 ("TR-23"). Enclosed are Cotter's responses to the specific comments contained in DRMS' aforementioned adequacy review letter. Cotter's response includes a text document presenting our responses and revised Attachments C, F, and G.

Cotter appreciates your attention in this matter. If you have any questions, please contact me at (720)554-6207, or via email at ken.mushinski@cotterusa.com.

Sincerely,

Ken Mushinski
President

Enclosure

Cc: Tony Waldron, DRMS
Stephen J. Cohen, Cotter

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COTTER CORPORATION (N.S.L.)
SCHWARTZWALDER MINE, GOLDEN, COLORADO
PERMIT NO. M-1977-300
RESPONSE TO COMMENTS REGARDING
TECHNICAL REVISION 23 (TR-23)

December 23, 2016 Comment Letter

1. The design drawings provided in Attachment C for the storm water diversion ditches are not stamped by a licensed professional engineer. As required by Rule 6.4.21(10)(a), please provide design drawings which have been certified by a licensed professional engineer for all Environmental Protection Facilities.

   Attachment C has been updated to include drawings signed and sealed by a professional engineer of the diversion ditches. The revised Attachment C is dated February 24, 2017.

2. The Operator has indicated the storm water diversion ditches have been designed to accommodate a 100-year flood event with a peak discharge of 60 cfs. Appendix E (pg. 51) of the 1983 Amendment, states the estimated peak discharge above the east/south Waste Rock Pile (WRP) is 119 cfs for the 100-year flood event. The peak discharge for the west/north WRP was not analyzed. Please provide the Division with a hydrologic analysis which demonstrates 60 cfs is the appropriate peak discharge for the design of the storm water diversion ditches.

   A Drainage Area Map (revised Attachment C, sheet 30) containing the hydrology calculations for both diversion ditches have been added to the plan set and permit submittal. The hydrology calculations were conducted with USACE's HEC-HMS program.

3. The design drawings show the storm water diversion ditches terminate several feet above the toe of slope of the WRP's. The design should include a means to safely convey the diverted flow from the base of the diversion ditches to Ralston Creek. Please describe how storm water will be safely conveyed to Ralston Creek so that erosion of the WRP's or the access roads does not occur.

   The diversion ditches have been updated as shown on the revised Attachment C, sheets 22-27. The Southern WRP diversion ditch will end to the North of the cut off dam and will be protected with concrete riprap to allow the water to flow to the Ralston Creek. Surface water will not flow over the access road Cotter submitted a response to the Division's Adequacy Review #1, Comment # 18 on November 8, 2016 As a result of the update of the diversion ditch design, this response has been changed and is included in Attachment G, a February 23, 2017 report form Engineering Analytics, Inc. One of the primary changes is the

removal of benches from the WRP design, which has been analyzed by Engineering Analytics, Inc. in its report included as Appendix G.

4. The design drawings show weep drains will be placed vertically in the storm water diversion ditches. In the Division's experience, horizontal weep drains are less subject to plugging and sediment deposition. Please provide a technical justification for constructing vertical weep drains.

   The initial weep drains were based on the weep drain details available from Colorado's Urban Drainage and Flood Control. The weep drain details have been updated to have the pipes drain horizontally.

5. The design drawings for the storm water diversion ditches do not address freeboard. Please indicate if the design of the storm water diversion ditches accounts for freeboard. If so, specify the freeboard. The Division recommends the design provide for one foot of freeboard or half the velocity head.

   The hydraulic calculations have been added to Sheet 3 of 3 of the Concrete Lined Ditch Miscellaneous Detail sheets, Sheet 31 in the plans. One foot of freeboard has been provided for both diversion ditches.

6. The Southern WRP Ditch Typical Section on Sheet No. 27 of the design drawings shows placement of fill adjacent to the storm water diversion ditch. Please specify the nature of the fill and describe how it will be compacted.

   The Southern WRP Diversion Ditch has been revised and the additional fill has been removed.

7. The Division requests detail call-outs for all plan profiles for Sheets No. 22-28 of the design drawings. All features should be labeled on the detail call-outs and referenced on the plan and profile drawings.

   Additional callouts have been added to Sheets 22-29 to clarify the link between the plan and profile sections and the diversion ditch typical sections and details.

8. Please specify if rebar will be used with the concrete lined storm water diversion ditches. If so, specify the rebar size, spacing, and clearance. In addition, provide specifications for the type of concrete to be used.

   Cotter is utilizing steel reinforcing bar in the concrete ditch. The reinforcement and concrete requirements for the concrete lined ditches has been added to the appropriate detail on Sheet 29 of the plans, Concrete Lined Ditch Miscellaneous Details Sheet 2 of 2.

9. The construction schedule provided in Attachment A contains a task for disposing of waste in the Minnesota Adit. Please provide an inventory of all of the materials (with approximate volumes) to be placed in the Minnesota Adit. In addition, please clarify if the materials to be disposed of will be contained to the Minnesota Adit or if they will be placed in the glory hole.

Attachment F provides a preliminary estimate of the waste inventory planned for disposal in the Glory Hole (Minnesota Adit). It total estimate is currently approximately 5,000 cubic yards. A more precise inventory will be provided to the Division after project completion.

10. In regards to the construction schedule provided in Attachment A, the Division will conduct inspections during the following phases of the alluvial valley excavation:

a. Prior to Site Clean Up
b. Prior to Excavation of Alluvial Fill
c. Prior to placement of temporary soil cap (if necessary)
d. Prior to Construction of WRP Diversion Channels
e. Post Project Completion

Please commit to notifying the Division in writing, at least two weeks prior to the commencement of each of the above listed construction phases so that inspections may be scheduled. The Division may schedule additional inspections as required.

Cotter commits to notifying Mr. Michael Cunningham, DRMS, by email, at least two weeks prior to the commencement of each of the above listed construction phases so that inspections may be scheduled. The Division may schedule additional inspections as required.

ATTACHMENT F

INVENTORY OF MATERIALS TO BE DISPOSED IN MINNESOTA ADIT

Attachment F – Minnesota Adit Disposal Inventory

		Summary of All Material	
Table	Item	Trucked Placement Volume (cu.ft.)	Trucked Placement Volume (cu.yd.)
Table 1	Boneyard	2,352	87
Table 2	Main WTP Area	88,061	3,262
Table 3	Hillside Adits	4,076	151
Table 4	Alexco WTP	19,822	734
Table 5	Valley Floor Sites	16,156	598
	Total Facilities Disposal Volume	130,468	4,832

			Boneyard
	Item	Trucked Placement Volume (cu.ft.)	Description
1	Building, Domestic Well	128	Wood Frame with Metal Siding
2	Building, Domestic Well Vault	307	Concrete
3	Foundation, Domestic Well Vault	450	Concrete
4	Bridge	95	Steel
5	Stairs, Steel	68	Steel
6	Stairs (Wood, Old)	75	Wood
7	Water Heater	6	Steel
8	Rock Grizzly	48	Steel
9	Concrete, Wing Walls	972	Concrete
10	Culvert, 3ft dia	56	Steel
11	Culvert, 5ft dia	78	Steel
12	Planks, Timber	70	Steel
	Total	2,352	

Attachment F – Minnesota Adit Disposal Inventory

			Original Waste Treatment Plant Area
	Item	Trucked Placement Volume (cu.ft.)	Description
1	Building, WTP	18,900	Steel - structural + Siding + Interior equipment
2	Building Foundation, WTP	12,960	Concrete
3	Concrete Containment Ponds-Sides	2,700	Concrete
4	Concrete Containment Ponds - Floor	28,200	Concrete
5	Fencing	15,667	Steel
6	Pump House Foundation	384	Concrete
7	Pump Support + Electrical Panel	50	Steel
8	Monitor Well	0	Steel
9	Monitor Well Foundation	2	Concrete
10	Power Poles	26	Wood
11	Propane Tanks, 1000 Gals	85	Steel
12	Propane Tanks, 500 Gals	28	Steel
13	Concrete Box (Sides)	38	Concrete
14	Concrete Box (Bottom)	32	Concrete
15	Receiver Tank	23	Steel
16	Pipe, PVC to Alexco	175	PVC
17	60,000 Gal Tank (Creek Water)	641	Steel
18	Foundation, 60,000 Gal Tank (Creek)	754	Concrete
19	Pipe, PVC to WTP	3	PVC
20	Septic Tank	180	PVC
21	Power Poles	13	Steel
22	"Old" WTP Foundation	7,200	Concrete
	Total	88,061	

Attachment F – Minnesota Adit Disposal Inventory

			Hillside Adits
	Item	Trucked Placement Volume (cu.ft.)	Description
	Minnesota Adit		
1	Pipe, PVC, Misc.	963	PVC-Plastic
2	Steel, Misc.	1,650	Concrete
3	Portal Gate	75	Steel
4	Portal Steel	150	Steel
5	Portal Walls, Steel	23	Steel
6	Portal Walls, Timber	300	Wood
	CV Adit		
1	Vent Riser	47	Steel
2	Portal Steel	203	Steel
3	Telephone Poles	16	Steel
4	Power Cable	2	Steel
	Sunshine Adit		
1	Telephone Poles	21	Wood
2	Power Cable	7	Copper + Ins
3	Steel, Misc.	38	Steel
4	Portal Walls, Sheet Steel	25	Steel
5	Portal Walls, Timber	133	Wood
	Pierce Adit		
1	Portal Steel	27	Steel
2	Culvert	34	Steel
3	Monitor Well	2	Steel
4	Monitor Well Foundation	2	Concrete
	Black Forest Adit		
1	Gate	183	Steel
2	Pallets	64	Wood
3	Steel, Misc., Lift	28	Steel
4	Fence	30	Steel
5	East Portal Entrance - Culvert	51	Steel
6	Monitor Well	2	Steel
7	Monitor Well Foundation	2	Concrete
	Total	4,076	

Attachment F – Minnesota Adit Disposal Inventory

			New Waste Treatment Plant
	Item	Trucked Placement Volume (cu.ft.)	Description
1	Building, Steel Frame	5,760	Steel - Structural + Siding
2	Building, Concrete Foundation	5,760	Concrete
3	Fan + Frame	180	Steel
4	Fan Duct	53	Steel
5	Liner, PVC	179	PVC-Plastic
6	Mix Tanks, Tall	848	Fiberglass
7	Mix Tanks, Short	157	Fiberglass
8	Pump Shed	160	Wood
9	Power Center (5 Poles)	26	Wood
10	Portal Timbers (incl. lagging)	300	Wood
11	Pipe, Misc.	40	PVC-Plastic
12	Power Box	7	Steel
13	RO Units	720	Steel + PVC
14	Clarifiers	1,008	Steel
15	Clarifier stairs	450	Steel
16	Tanks	2,651	Fiberglass
17	Tanks, Clear Water	353	Fiberglass
18	Tank, Plastic - Potable Water	79	Plastic
19	Rock, Dirt and Debris	1,089	Rock
20	Pipe, PVC	1	Plastic
	Total	19,822	

Attachment F – Minnesota Adit Disposal Inventory

			Valley Floor Sites (1 of 2)
	Items	Trucked Placement Volume (cu.ft.)	Description
	Valley Creek Pipe		
1	Pipe, PVC	4,665	PVC
2	Electric Cable	58	Copper + Ins
3	Electrical Panel	7	Steel
4	Power Boxes	13	Steel
	Sump 4		
1	Power Panel	16	Steel
2	Sump	30	Steel
	Office Trailer		
1	Trailer	871	Steel Siding + Wood
	Substation		
1	Building	403	Steel + Wood
2	Foundation, Concrete	720	Concrete
3	Step, Concrete	7	Concrete
4	Transformer	432	Steel
5	Transformer Pad, Concrete	96	Concrete
6	Electrical Apparatus	216	Steel
7	Wall, Concrete	60	Concrete
8	Fence	363	Steel
	Ore Sorter Area		
1	Electrical Boxes	48	Steel + Wood
2	Electrical Boxes	16	Steel + Wood
3	Electrical Box Support	160	Steel + Wood
4	Scale Posts	2	Steel
5	Pipe, PVC	682	PVC
6	Culverts	424	Steel
7	Culvert Scrap	4,158	Steel
8	Elbow, Vent	79	Steel
	Subtotal (1 of 2)	13,526	

Attachment F – Minnesota Adit Disposal Inventory

			Valley Floor Sites (2 of 2)
	Items	Trucked Placement Volume (cu.ft.)	Description
	Creek Head Gate		
1	Pipe, Creek Discharge Pipe	754	Steel
2	Gate, Creek Discharge Pipe	13	Steel
3	Gate Mounting, Creek Discharge Pipe	64	Steel
4	Control Panel	13	Wood + Steel
5	Control Panel Foundation	24	Concrete
6	Concrete, Dam Wall	900	Concrete
	Old Emergency Storage Pond		
1	Power Poles	105	Wood
2	Electrical Box	13	Steel
3	Electrical Cable	9	Copper + Ins
4	Monitor Well	2	Steel
5	Monitor Well Foundation	2	Concrete
6	Sump	15	Steel
	Entry Gate Area		
1	Gate	30	Steel
2	Gate Posts	8	Concrete
3	Stairs, Metal - BPL	54	Steel
4	Monitor Well	2	Steel
5	Monitor Well Foundation	2	Concrete
6	Monitor Well	1	Steel
7	Monitor Well Foundation	2	Concrete
8	Creek Sump	81	Steel
9	Old Sumps	151	Steel
10	Electric Panel Skids	192	Steel
11	Concrete Sump - Walls	50	Concrete
12	Concrete Sump - Floor	144	Concrete
	Subtotal (2 of 2)	2,630	
	Total	16,156	

ATTACHMENT G

ENGINEERING ANALYTICS, INC.

DESIGN CALCULATIONS

February 23, 2017 Project No: 110385

Mr. Robert Noren, P.E.
Cotter Corporation (N.S.L.)
P.O. Box 1750
Cañon City, CO 81212

Subject: Responses to CDRMS Comments
Schwartzwalder Mine
DRMS File No. M-1977-300; Technical Revision (TR-23)
Jefferson County, Colorado

Dear Mr. Noren:

Engineering Analytics was tasked to provide responses to comments 6 and 18 in the Colorado Division of Reclamation, Mining and Safety (CDRMS) letter dated July 20, 2016 (Adequacy Review #1) and comment 6 from CDRMS' August 2, 2016 letter (Adequacy Review #2). This work is being provided as a follow up to Engineering Analytics' (EA) submittal for Technical Revision 23 to Mining Permit M-1977-300 dated December 28, 2015. We offer the following comments.

1. **Adequacy Review #1, Comment # 6:** *"Please describe how the Operator will place and compact 4 – 6 inches of topsoil on the tops and sides of the WRPs. In addition, clarify if the 4,300 cubic yard estimate of required topsoil accounts for compaction."*

   Response: The 4,300 cubic yard estimate was determined assuming 9 inches of topsoil would be placed and track walked to lightly compact it to a final thickness of about 6 inches. In addition to what was presented in TR-23 (EA, 2015), we recommend the following with regard to topsoil placement and revegetation procedures.

   Topsoil Placement: The topsoil should be end-dumped on the crest of the slope and graded by dozers. Slopes should be graded to avoid concentrated water flow and subsequent erosion. The "Best Practices in Abandoned Mines Land Reclamation" by the Colorado Division of Minerals and Geology (CDMG, 2002) states that for covers *"…that the surface of the final slope should be moderately roughened to help in establishing vegetation, but not so rough as to promote pooling of water…. The potential for erosion can be reduced by creating grooves across the slope (or perpendicular to the slope direction). This can be done easily on the last pass of the heavy equipment using a track vehicle running up and down the slope."* They further state that *"Ideally, the surface to be vegetated should consist of good uncontaminated soil, moderately roughened to allow the seeds to hold and some moisture to collect. Roughening can simply be the caterpillar tracks of heavy equipment that has been used at the site for regrading."* Thus, we recommend track-walking the cover to provide a "dimpled" surface that allows for water infiltration and promotes root growth.

Seeding: The USDA (2005) states that *"…drill seeding is generally limited to slopes less than 3:1."* Thus, we do not recommend drill seeding due this recommendation along with safety concerns related to placing seeding equipment on a 2H:1V slope. In addition, direct seeding requires a vertical alignment of the seeder for placement due to the steep nature of the slope and vertically aligning the vegetation can lead to increased surface water flow. We instead recommend broadcast seeding followed by hydromulching. Hydroseeding is not recommended as it is not typically successful in our arid climate.

Mulching: For 2H:1V and steeper slopes, mulch is necessary to keep the seed and topsoil in place. Mulch can also provide shade to the seedlings and help the soil to retain moisture. We recommend Hydromulching with addition of a tackifier. Tackifier is a botanical glue that can also be applied to the slope to prevent erosion. The hydromulch and tackifier should effectively stabilize the surface of the slope. For example, a publication by Munshower titled "Practical Handbook of Disturbed Land Revegetation", states that *"…the slopes were capped with oxidized rock, topsoiled, pitted with large depressions, broadcast seeded, and hydromulched with a tackifier. In the second growing season the slopes had remained stable and erosion was controlled."*

Soil Amendments: Soil amendments may be required to improve the performance of the vegetation. This could include composted biosolids or manufactured amendments such as Biosol.

2. **Adequacy Review #1, Comment # 18:** *"Appendix D addresses terracing of the WRPs. Cotter's response to Comment No. 4 is contained within Section 7.2 of Appendix E-4. The recommendations within Section 7.2 state a 10 foot wide terrace would be included in the WRP construction. Please clarify how many terraces will be constructed on the expanded WRPs. Also, provide the Division with cross sections showing the terraces on the WRPs or specify where these documents may be found in the permit file."*

   Response: Section 7.2 of Appendix E-4 (McDermid and Geo-Hydro, 1983) recommends a 10-foot wide terrace to provide an additional factor of safety against slope failure. However, the results of the slope stability analyses presented in the 1983 Cotter Corporation Mine Permit Revision (Cotter, 1983) showed that terraces were not required for stability purposes.

   EA collected soil samples from the north and south waste rock piles (WRPs), additional alluvial waste rock source (new waste rock), topsoil source, and colluvium for strength testing to be used in stability analyses. The complete results of the field investigation and laboratory testing are provided in Attachment A. The locations of the test pits are presented on Figure A-1 and a summary of the laboratory testing is provided in Table A-1. Slope stability analyses were performed for the waste rock piles using the laboratory obtained strength values and published strength values for the underlying bedrock. The slope stability analyses are discussed in Attachment B. The stability analyses were used to confirm that benches are not needed for the south WRP. However, benching has been included for the north WRP in order to provide access to the reclaimed area and for utilization in surface water conveyance structures and erosion control. The configurations of the reclaimed waste rock piles are shown on Figures B-2 and B-3. The regrading proposed on Figure B-2 results in 103,700 cubic yards (cy) of additional storage capacity from the current waste rock pile

configurations. The south WRP has a reclaimed slope of 2H:1V. The reclaimed slope for the north WRP has a maximum interbench slope of 2H:1V. The results of the slope stability analyses are discussed in Attachment B and a summary of the factor of safety for the analyses is shown on Table B-2.

3. **Adequacy Review #2, Comment # 6:** *"The Division views the waste rock piles as critical structures as they are designed to keep waste rock out of Ralston Creek. Plates 12 and 13 prepared by McDermid Engr. Assoc. Inc. in February 1983 summarize slope stability analyses results. It appears only the cover stability and the contact with the native ground were analyzed as potential failure surfaces. The various strength parameters used for bedrock, alluvial soils and colluvial soils were obtained from simple soil testing and/or literature data. It does not appear that slope failure surfaces thought (SIC) the waste rock itself were considered as is the current general practice for slope stability. As such it does not appear any strength parameters of the waste rock itself are discussed. Please revisit the slope stability of the waste rock piles and consider potential circular failures that may extend through the waste rock, using the Division's factors of safety in Table 1."*

DRMS Table 1. Minimum Factors of Safety for Slope Stability Analyses(1)

Type of Structure/Consequence of Failure	Generalized, Assumed, or Single Test Strength Measurements	Strength Measurements Resulting from Multiple Tests(1)
Non-Critical Structures (e.g., fences) / No imminent danger to human life, minor environmental impact, and minor repair costs if slope fails	1.3 (1.15)(2)	1.25 (1.1)(2)
Critical Structures (e.g., residences, utilities) / Potential human safety risk, major environmental impact, and major repair costs if slope fails	1.5 (1.3)(2)	1.3 (1.15)(2)

(1) The number of tests required to provide a high degree of confidence in the strength parameters used depends on the variability of the material being tested and the extent of the highwall disturbance.
(2) Numbers without parentheses apply for analyses using static conditions and those within parentheses apply to analyses using seismic acceleration conditions

Note: 1) Table provided in Adequacy Review #2

Response: As discussed above, a field investigation and laboratory testing have been completed for use in slope stability analyses. EA has completed stability analyses for the future configurations of the waste rock piles. The results of these analyses are provided in Attachment B. Three failure surfaces are included for each cross-section through both the north and south waste rock piles. The cover stability and the contact with the native ground were analyzed as the surficial and deep failures. In addition, EA analyzed an optimized intermediate failure through the waste rock. The results indicate that the factor of safety meets the minimum 1.5 criteria for static analyses and the minimum 1.3 criteria for pseudo-static analyses.

Limitations

This report has been prepared based upon review of the field investigation, laboratory testing, and our experience. No warranty is made, express or implied. The conclusions presented represent our best judgment based on the information available. Should additional information become available we should be allowed to review that information and modify our conclusions accordingly.

References

Colorado Division of Minerals and Geology (CDMG). (2002). "Best Practices in Abandoned Mine Land Reclamation: the remediation of past mining activities"

Colorado Division of Reclamation, Mining, and Safety (CDRMS). (2016). "Schwartzwalder Mine; DRMS File No. M-1977-300; Technical Revision (TR-23)". July 20.

Colorado Division of Reclamation, Mining, and Safety (CDRMS). (2016). "Schwartzwalder Mine; DRMS File No. M-1977-300; Technical Revision (TR-23)." August 2.

Cotter Corporation (N.S.L.). (1983). "Mined Land Reclamation Division, Mine Permit, Amended February 1983, Approved by Division July 27, 1983."

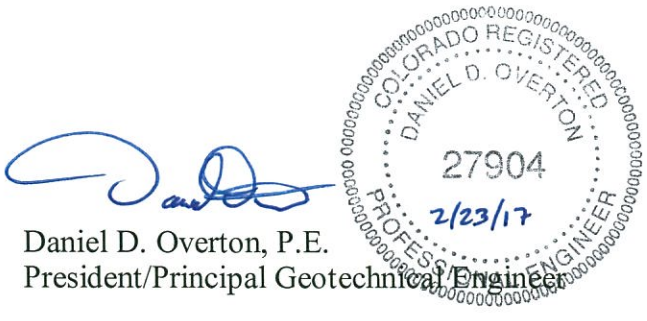
Engineering Analytics, Inc. (2015) "Disposal of Alluvial Fill Source Term Materials Schwartzwalder Mine Site; Technical Revision 23, Mining Permit M-1977-300, Schwartzwalder Mine, Jefferson County, CO." December 28.

McDermid Engineering Associates, Inc. and Geo-Hydro Consulting, Inc. (1983). "Responses to the State of Colorado Mined Land Reclamation Division Comments on Waste Pile, Related Portions of Permit Amendment Application." July.

Munshower, Fank F. (1994) "Practical Handbook of Disturbed Land Revegetation" Reclamation Research Unit, Montana State University. Bozeman, Montana. Lewis Publishers.

U.S. Department of Agriculture (USDA). (2005) "Technical Notes, Natural Resources Conservation Service, Plant Materials -6. Seedbed Preparation and Seed Soil Contact." Spokane, Washington. Dated: February.

Very truly yours,
Engineering Analytics, Inc.



Daniel D. Overton, P.E.
President/Principal Geotechnical Engineer

Attachments:

Attachment A	Field Investigation and Laboratory Testing
Attachment B	Slope Stability Analyses

ATTACHMENT A
FIELD INVESTIGAITON AND LABORATORY TESTING

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

LIST OF APPENDICES

1.0 TEST PIT FIELD INVESTIGATION

Engineering Analytics conducted a field investigation that included excavation of seven test pits at the Schwartzwalder Mine Site. The location of test pits is shown on Figure A-1. Test pit EA-TP1 was excavated in the alluvial material that will constitute the new waste rock to be placed on the existing piles. Test pits EA-TP2, EA-TP3, EA-TP5, and EA-TP6 were excavated in the existing waste rock piles. Test pit EA-TP4 was excavated in the colluvial material and EA-TP7 was excavated in the proposed topsoil material. Test pits EA-TP1 through EA-TP6 were excavated with a CAT 330C excavator operated by Kessler Reclamation personnel. Personnel from EA supervised the excavation and logged the materials encountered in the test pits. Test pit EA-TP7 was excavated with a shovel.

Test pits EA-TP1 through EA-TP6 were excavated to a depth of 3 feet where a bulk bucket sample was retrieved with a shovel, by EA, from the spoils pile. The test pits were then excavated to a depth of 5 feet where another bulk bucket sample was retrieved from the spoils pile. Laboratory testing was performed on the bulk samples to measure geotechnical engineering properties of the subsurface materials. The test pit logs and photographs of the test pit excavations are included in Appendix A to this attachment. Following excavation the test pits were backfilled with the spoils.

Test pit EA-TP7 was excavated in the topsoil material. This material was taken by EA, with a shovel, from ground surface in the location shown on Figure A-1. Another sample was taken by Cotter Corporation at a later date to obtain additional material for laboratory testing. The test pit log is included in Appendix A to this attachment.

2.0 LABORATORY TESTING

Laboratory testing was conducted on selected samples obtained from the test pits to determine geotechnical engineering properties of the materials. Laboratory testing included measurements of in-place water content, Atterberg limits, and grain size analyses. Large scale direct shear testing was also performed. The direct shear testing was performed by Advanced Terra Testing of Lakewood, Colorado. The remainder of the laboratory testing was performed by EA's lab in Fort Collins, Colorado. The laboratory test results are included in Appendix B to this attachment and are summarized in Table A-1.

Water Content: Measurements of water content were conducted on each bulk sample in accordance with ASTM test methods D2216. The values of water content ranged from 4.2 to 9.3 percent for the waste rock, alluvial, and colluvial material. The water content was 1.8 percent for the topsoil.

Grain Size: The particle size distribution was determined on each bulk sample in general accordance with ASTM D4318. The particle size distribution reports are included in Appendix B. The measured value of percent passing the #200 mesh sieve was 8.4 percent for the alluvial material, 15.2 percent for the colluvial material, ranged from 8.0 to 34.7 for the waste rock, and was 11.7 percent for the topsoil.

Atterberg Limits: Atterberg limits were determined on each bulk sample in accordance with ASTM test method D4318. Using the results of the grain size analyses and the Atterberg limits the samples can be classified according to the USCS classification. For the waste rock the top of south pile (EA-TP2) was classified as a clayey sand. The other waste rock samples were classified as silty/clayey gravel or poorly graded gravel with silt. The alluvial material was classified as poorly graded gravel with clay and the colluvial material was classified as clayey gravel. The topsoil was classified as poorly graded sand with clay.

Large Scale Direct Shear Testing: Large scale internal direct shear testing was completed on each of the bulk samples collected from the site. The direct shear testing was completed with a 12-inch square box in general accordance with ASTM D3080. The peak friction angle for the topsoil was 41.2 degrees, the colluvial material was 51.3 degrees, and the alluvial material was 51.6 degrees. The peak friction angles for the waste rock were measured to be 25.1, 50.9, 52.9, and 54.1 degrees. The peak friction angle of 25.1 degrees was measure on EA-TP2 and as shown with the other testing this sample had significantly more fines than the other samples.

TABLE AND FIGURE

Table A-1 Summary of Laboratory Test Results

Test Pit Number	Location	Moisture Content (%)	Atterberg Limits LL/PL/PI	% Passing #200 Sieve	USCS Classification	Peak Friction Angle	Peak Cohesion (psf)	Ultimate Friction Angle	Ultimate Cohesion (psf)
EA-TP1	New Waste Rock	5.3	24/19/5	8.4	GP-GC/GM	51.6	917.0	52.5	702.0
EA-TP2	Top of South Pile	7.9	31/18/13	34.7	SC	25.1	633.2	24.2	475.1
EA-TP3	Bottom of South Pile	4.2	26/22/4	15.1	GM	50.9	919.5	50.9	919.5
EA-TP4	Colluvium	9.3	30/22/8	15.2	GC/GM	51.3	(1)	51.4	(1)
EA-TP5	Bottom of North Pile	6.8	22/NP	8.0	GP-GM	52.9	89.5	53.5	(1)
EA-TP6	Top of North Pile	5.5	24/19/5	13.7	GC-GM	54.1	135.5	54.3	72.0
EA-TP7	Topsoil	1.8	28/21/7	11.7	SP-SC/SM	41.2	(1)	41.2	(1)

Note (1) Data suggest negative intercept therefore no value is reported

T:\110385 Schwartzwalder\Site Boring Locs.dwg SAVED:10/17/16 PRINTED:2/21/17

Project No. 110385

February 2017

Engineering Analytics, Inc.

FIGURE A-1
TEST PIT LOCATIONS
COTTER SCHWARTZWALDER MINE

APPENDIX A
TEST PIT LOGS AND PHOTOGRAPHS

Engineering Analytics, Inc.

TEST PIT LOG

PAGE: 1 OF 2

DATE: 8/31/2016

TEST PIT NO.: EA-TP1

PROJECT INFORMATION

PROJECT: SCHWARTZWALDER MINE

PROJECT NO.: 110385

CLIENT: COTTER CORP

OWNER: COTTER CORP

LOCATION: NEW WASTE ROCK

TEST PIT LOCATION

SEE FIGURE A-1

FIELD INFORMATION

DATE & TIME ARRIVED: 8/31/2016 9:20 AM

TEST PIT LOGGED BY: DCG

VISITORS: NONE

WEATHER: SUNNY, 60°s - 80°s

EXCAVATION INFORMATION

EXCAVATION COMPANY: KESSLER RECLAMATION

START TIME: 9:20 AM

TEST PIT DEPTH: 5' TEST PIT DIA.: 13'

EXCAVATION METHOD: CAT 330C EXCAVATOR

SAMPLING METHOD: BULK

TIME EXCAVATION COMPLETE: 9:40 AM

TEST PIT COMPLETION / ABANDONMENT INFORMATION

START TIME: 9:40 AM COMPLETE TIME: 9:42 AM

INSTRUMENTATION: N/A BACKFILL: SPOILS

GROUNDWATER CONDITIONS

NO GROUNDWATER ENCOUNTERED

FOLLOWING FIELD WORK

TIME OF CLEAN-UP COMPLETE: 9:42 AM TIME LEFT SITE: 9:42 AM

NOTES:

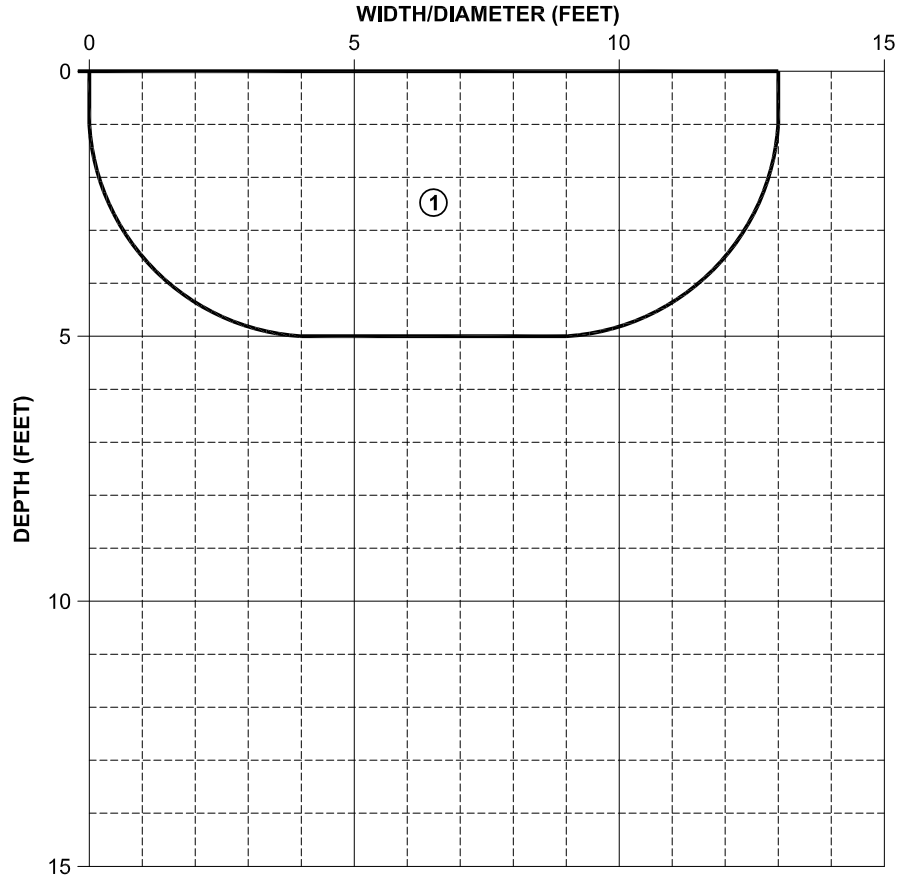
Engineering Analytics, Inc.

TEST PIT LOG

PROJECT: SCHWARTZWALDER MINE **PAGE:** 2 OF 2

PROJECT NO.: 110385 **DATE:** 8/31/2016

TEST PIT NO.: EA-TP1



DEPTH	SAMPLE I.D.	SAMPLE TYPE
3'	3'	BULK
5'	5'	BULK

SOIL TYPE	SOIL DEPTH	SOIL DESCRIPTION AND EXCAVATION NOTES
①	0- E.O.T.P.	**SANDY/ COBBLEY GRAVEL** SLIGHTLY MOIST, DARK BROWN (10YR 3/3), SANDY/ COBBLEY GRAVEL WITH TRACE BOULDERS, ROCKS ARE ANGULAR UP TO 24" ESTIMATION OF GRAIN SIZE OF SPOILS PILE: 25% SAND OR SMALLER 50% GRAVEL 20% COBBLES 5% BOULDERS **- (APPROX. 5')** (E.O.T.P.)

NOTES: _____

IMG_2709

IMG_2710

IMG_2711

IMG_2712

IMG_2713

IMG_2714

IMG_2715

IMG_2716

Engineering Analytics, Inc.

TEST PIT LOG

PAGE: 1 OF 2

DATE: 8/31/2016

TEST PIT NO.: EA-TP2

PROJECT INFORMATION

PROJECT: SCHWARTZWALDER MINE

PROJECT NO.: 110385

CLIENT: COTTER CORP

OWNER: COTTER CORP

LOCATION: SOUTH PILE TOP

TEST PIT LOCATION

SEE FIGURE A-1

FIELD INFORMATION

DATE & TIME ARRIVED: 8/31/2016 10:00 AM

TEST PIT LOGGED BY: DCG

VISITORS: NONE

WEATHER: SUNNY, 60°s - 80°s

EXCAVATION INFORMATION

EXCAVATION COMPANY: KESSLER RECLAMATION

START TIME: 10:05 AM

TEST PIT DEPTH: 5' TEST PIT DIA.: 11'

EXCAVATION METHOD: CAT 330C EXCAVATOR

SAMPLING METHOD: BULK

TIME EXCAVATION COMPLETE: 10:20 AM

TEST PIT COMPLETION / ABANDONMENT INFORMATION

START TIME: 10:20 AM COMPLETE TIME: 10:22 AM

INSTRUMENTATION: N/A BACKFILL: SPOILS

GROUNDWATER CONDITIONS

NO GROUNDWATER ENCOUNTERED

FOLLOWING FIELD WORK

TIME OF CLEAN-UP COMPLETE: 10:22 AM TIME LEFT SITE: 10:22 AM

NOTES:

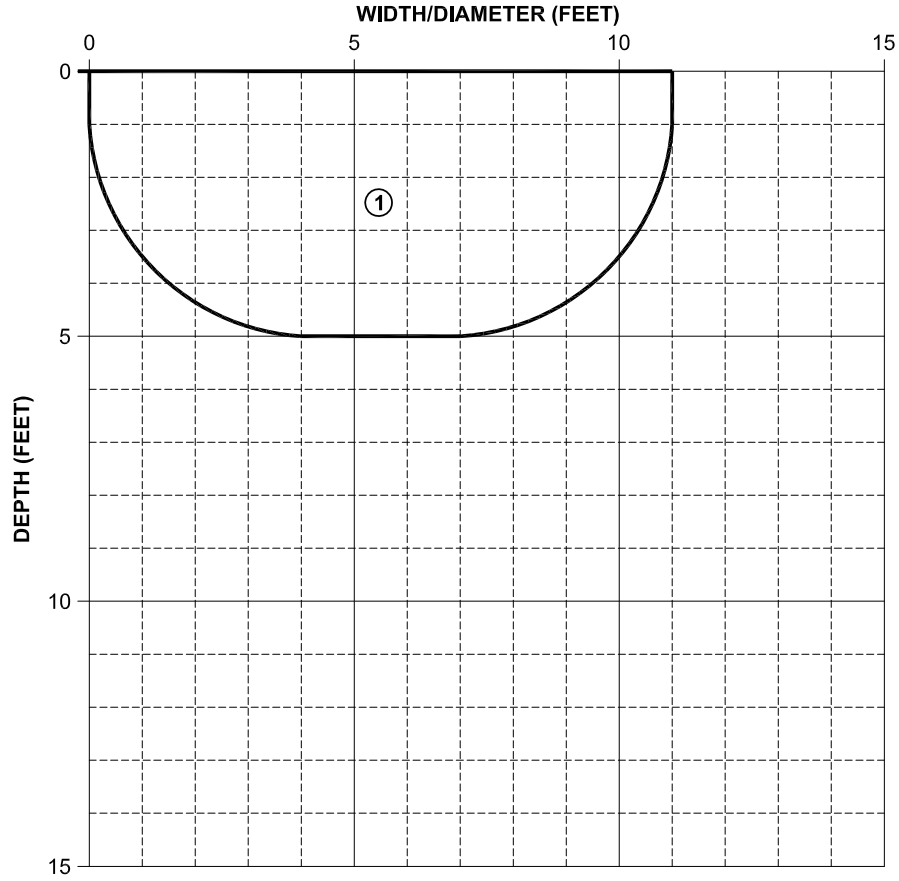
Engineering Analytics, Inc.

TEST PIT LOG

PROJECT: SCHWARTZWALDER MINE **PAGE:** 2 OF 2

PROJECT NO.: 110385 **DATE:** 8/31/2016

TEST PIT NO.: EA-TP2



DEPTH	SAMPLE I.D.	SAMPLE TYPE
3'	3'	BULK
5'	5'	BULK

SOIL TYPE	SOIL DEPTH	SOIL DESCRIPTION AND EXCAVATION NOTES
①	0- E.O.T.P.	**GRAVELLY CLAYEY SAND WITH COBBLES** SLIGHTLY MOIST TO DRY, REDDISH BROWN (2.5YR 4/4), GRAVELLY CLAYEY SAND WITH SILT AND COBBLES AND TRACE BOULDERS, ANGULAR AND SUBANGULAR ROCK ESTIMATION OF GRAIN SIZE OF SPOILS PILE: 74% SAND OR SMALLER 15% GRAVEL 8% COBBLES 3% BOULDERS **- (APPROX. 5')** (E.O.T.P.)

NOTES: ATTEMPTED THIN WALL SAMPLER WITHOUT SUCCESS

IMG_2717

IMG_2718

IMG_2719

IMG_2720

IMG_2721

IMG_2722

IMG_2723

IMG_2724

IMG_2725

IMG_2726

IMG_2734

Engineering Analytics, Inc.

TEST PIT LOG

PAGE: 1 OF 2

DATE: 8/31/2016

TEST PIT NO.: EA-TP3

PROJECT INFORMATION

PROJECT: SCHWARTZWALDER MINE

PROJECT NO.: 110385

CLIENT: COTTER CORP

OWNER: COTTER CORP

LOCATION: SOUTH PILE BOTTOM

TEST PIT LOCATION

SEE FIGURE A-1

FIELD INFORMATION

DATE & TIME ARRIVED: 8/31/2016 10:00 AM

TEST PIT LOGGED BY: DCG

VISITORS: NONE

WEATHER: SUNNY, 60°s - 80°s

EXCAVATION INFORMATION

EXCAVATION COMPANY: KESSLER RECLAMATION

START TIME: 10:30 AM

TEST PIT DEPTH: 5' TEST PIT DIA.: 10'

EXCAVATION METHOD: CAT 330C EXCAVATOR

SAMPLING METHOD: BULK

TIME EXCAVATION COMPLETE: 10:55 AM

TEST PIT COMPLETION / ABANDONMENT INFORMATION

START TIME: 10:55 AM COMPLETE TIME: 11:00 AM

INSTRUMENTATION: N/A BACKFILL: SPOILS

GROUNDWATER CONDITIONS

NO GROUNDWATER ENCOUNTERED

FOLLOWING FIELD WORK

TIME OF CLEAN-UP COMPLETE: 11:00 AM TIME LEFT SITE: 11:00 AM

NOTES:

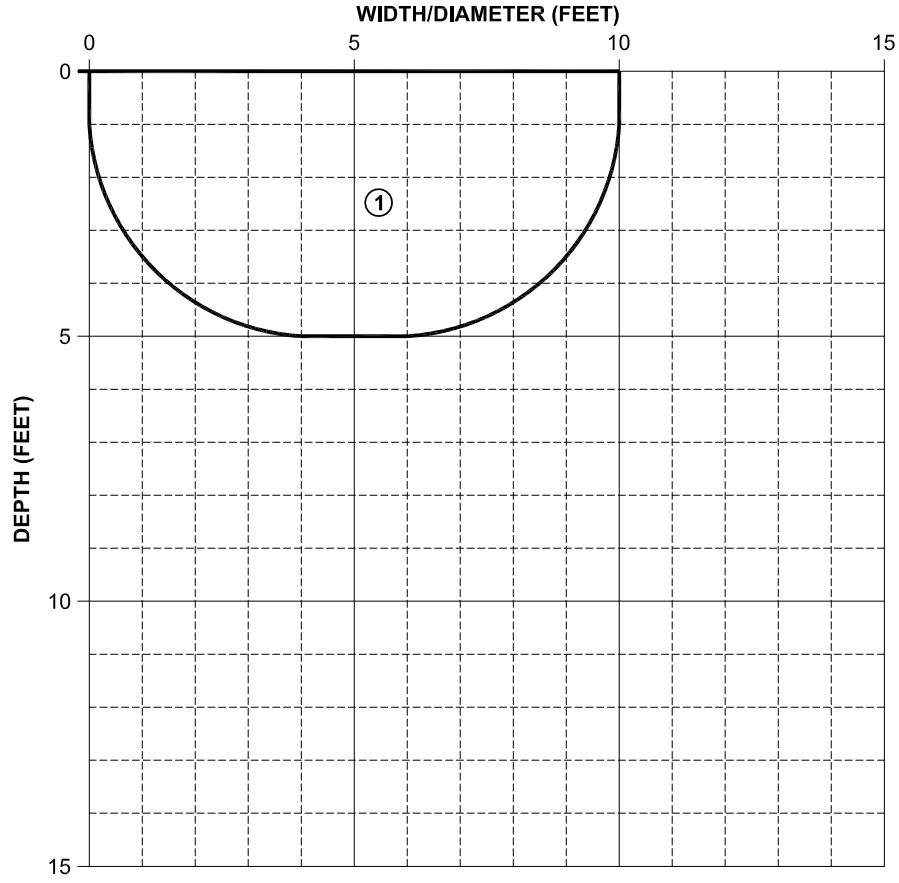
Engineering Analytics, Inc.

TEST PIT LOG

PROJECT: SCHWARTZWALDER MINE **PAGE:** 2 OF 2

PROJECT NO.: 110385 **DATE:** 8/31/2016

TEST PIT NO.: EA-TP3



DEPTH	SAMPLE I.D.	SAMPLE TYPE
3'	3'	BULK
5'	5'	BULK

SOIL TYPE	SOIL DEPTH	SOIL DESCRIPTION AND EXCAVATION NOTES
①	0- E.O.T.P.	**SANDY/ COBBLEY GRAVEL** SLIGHTLY MOIST, DARK BROWN (10YR 3/3), SANDY/ COBBLEY GRAVEL WITH TRACE BOULDERS, ANGULAR AND SUBANGULAR ROCKS ESTIMATION OF GRAIN SIZE OF SPOILS PILE: 30% SAND OR SMALLER 40% GRAVEL 25% COBBLES 5% BOULDERS **- (APPROX. 5')** (E.O.T.P.)

NOTES:

IMG_2736

IMG_2737

IMG_2738

IMG_2739

IMG_2740

IMG_2741

IMG_2742

IMG_2743

IMG_2744

IMG_2745

IMG_2746

IMG_2747

IMG_2748

IMG_2749

Engineering Analytics, Inc.

TEST PIT LOG

PAGE: 1 OF 2

DATE: 8/31/2016

TEST PIT NO.: EA-TP4

PROJECT INFORMATION

PROJECT: SCHWARTZWALDER MINE

PROJECT NO.: 110385

CLIENT: COTTER CORP

OWNER: COTTER CORP

LOCATION: COLLUVIUM WEST OF SOUTH PILE NEAR DRAINAGE

TEST PIT LOCATION

SEE FIGURE A-1

FIELD INFORMATION

DATE & TIME ARRIVED: 8/31/2016 11:00 AM

TEST PIT LOGGED BY: DCG

VISITORS: NONE

WEATHER: SUNNY, 60°s - 80°s

EXCAVATION INFORMATION

EXCAVATION COMPANY: KESSLER RECLAMATION

START TIME: 11:05 AM

TEST PIT DEPTH: 5' TEST PIT DIA.: 13'

EXCAVATION METHOD: CAT 330C EXCAVATOR

SAMPLING METHOD: BULK

TIME EXCAVATION COMPLETE: 11:25 AM

TEST PIT COMPLETION / ABANDONMENT INFORMATION

START TIME: 11:25 AM COMPLETE TIME: 11:30 AM

INSTRUMENTATION: N/A BACKFILL: SPOILS

GROUNDWATER CONDITIONS

NO GROUNDWATER ENCOUNTERED

FOLLOWING FIELD WORK

TIME OF CLEAN-UP COMPLETE: 11:30 AM TIME LEFT SITE: 11:30 AM

NOTES:

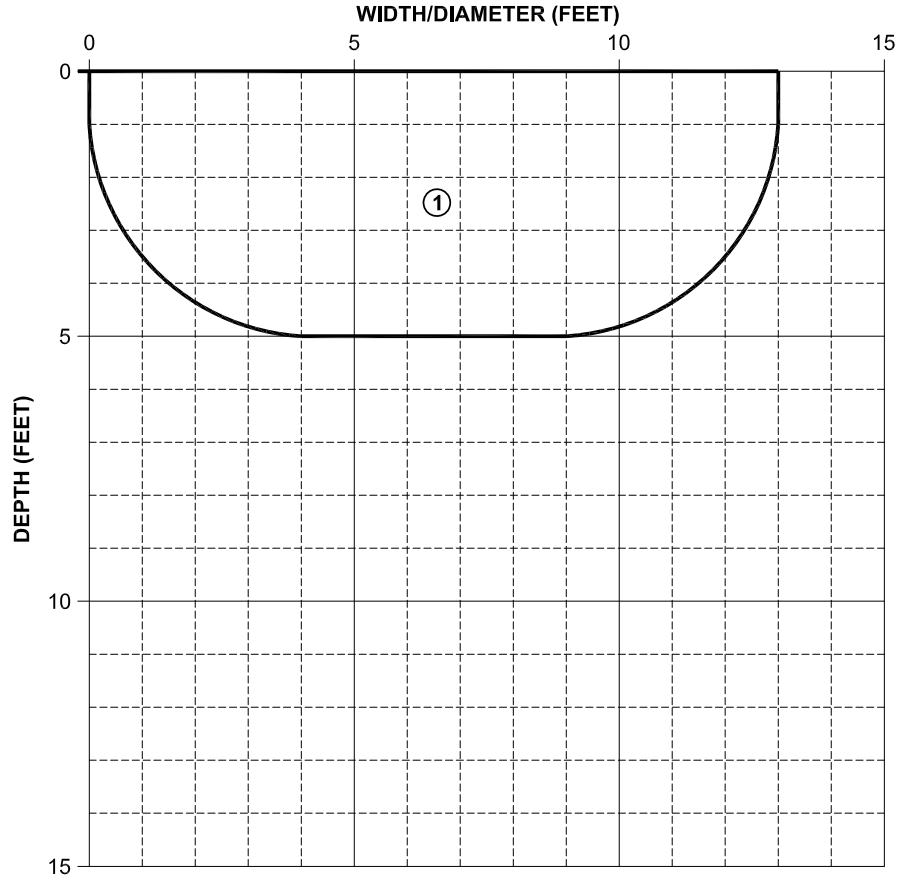
Engineering Analytics, Inc.

TEST PIT LOG

PROJECT: SCHWARTZWALDER MINE **PAGE:** 2 OF 2

PROJECT NO.: 110385 **DATE:** 8/31/2016

TEST PIT NO.: EA-TP4



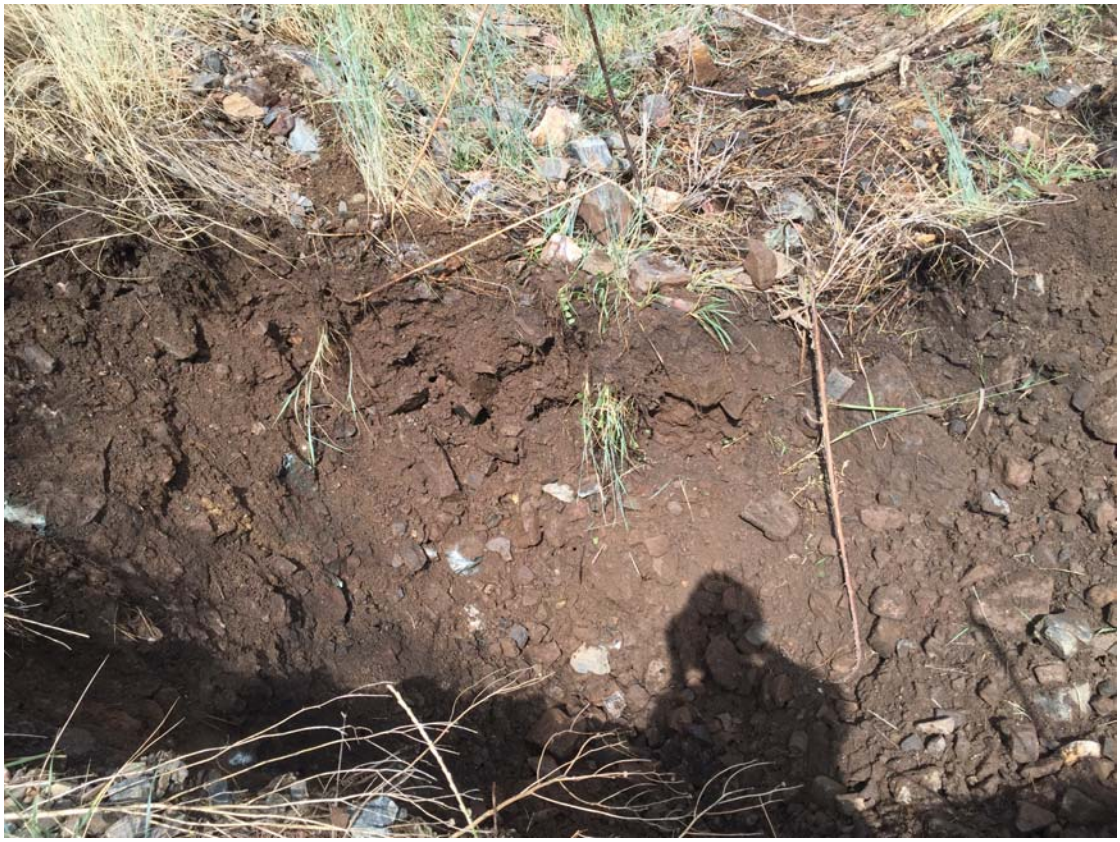
DEPTH	SAMPLE I.D.	SAMPLE TYPE
3'	3'	BULK
5'	5'	BULK

SOIL TYPE	SOIL DEPTH	SOIL DESCRIPTION AND EXCAVATION NOTES
①	0- E.O.T.P.	**SANDY/ COBBLEY GRAVEL** MOIST, DARK REDDISH BROWN (2.5YR 2.5/3), SANDY/ COBBLEY GRAVEL WITH TRACE BOULDERS, ROCKS ARE SUBANGULAR TO SUBROUNDED, MORE ROUNDED ROCK THAN WASTE ROCK ESTIMATION OF GRAIN SIZE OF SPOILS PILE: 30% SAND OR SMALLER 45% GRAVEL 22% COBBLES 3% BOULDERS **- (APPROX. 5')** (E.O.T.P.)

NOTES:

IMG_2750

IMG_2751



IMG_2752

IMG_2753

IMG_2754

IMG_2755

IMG_2756

IMG_2757

Engineering Analytics, Inc.

TEST PIT LOG

PAGE: 1 OF 2

DATE: 8/31/2016

TEST PIT NO.: EA-TP5

PROJECT INFORMATION

PROJECT: SCHWARTZWALDER MINE

PROJECT NO.: 110385

CLIENT: COTTER CORP

OWNER: COTTER CORP

LOCATION: NORTH PILE BOTTOM

TEST PIT LOCATION

SEE FIGURE A-1

FIELD INFORMATION

DATE & TIME ARRIVED: 8/31/2016 11:30 AM

TEST PIT LOGGED BY: DCG

VISITORS: NONE

WEATHER: SUNNY, 60°s - 80°s

EXCAVATION INFORMATION

EXCAVATION COMPANY: KESSLER RECLAMATION

START TIME: 11:30 AM

TEST PIT DEPTH: 5' TEST PIT DIA.: 12'

EXCAVATION METHOD: CAT 330C EXCAVATOR

SAMPLING METHOD: BULK

TIME EXCAVATION COMPLETE: 11:45 AM

TEST PIT COMPLETION / ABANDONMENT INFORMATION

START TIME: 11:45 AM COMPLETE TIME: 11:50 AM

INSTRUMENTATION: N/A BACKFILL: SPOILS

GROUNDWATER CONDITIONS

NO GROUNDWATER ENCOUNTERED

FOLLOWING FIELD WORK

TIME OF CLEAN-UP COMPLETE: 11:50 AM TIME LEFT SITE: 11:50 AM

NOTES:

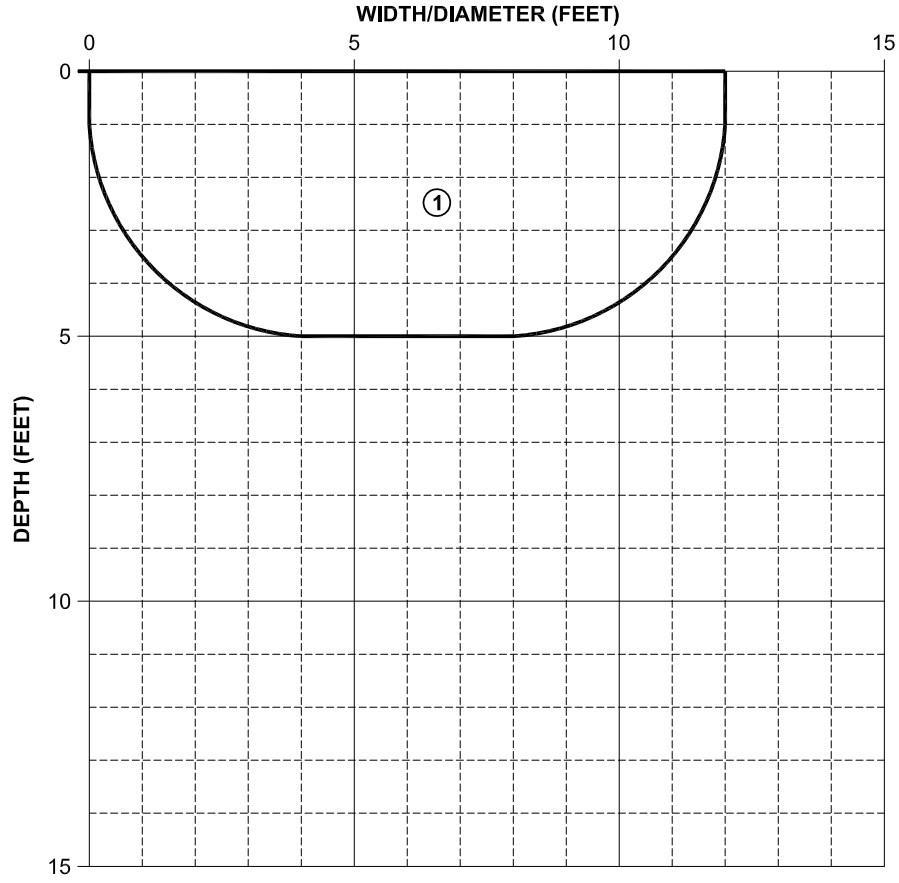
Engineering Analytics, Inc.

TEST PIT LOG

PROJECT: SCHWARTZWALDER MINE **PAGE:** 2 OF 2

PROJECT NO.: 110385 **DATE:** 8/31/2016

TEST PIT NO.: **EA-TP5**



DEPTH	SAMPLE I.D.	SAMPLE TYPE
3'	3'	BULK
5'	5'	BULK

SOIL TYPE	SOIL DEPTH	SOIL DESCRIPTION AND EXCAVATION NOTES
①	0- E.O.T.P.	**SANDY/ COBBLEY GRAVEL** MOIST, DARK BROWN (10YR 3/3), SANDY/ COBBLEY GRAVEL WITH TRACE BOULDERS, ANGULAR TO SUBANGULAR ROCK ESTIMATION OF GRAIN SIZE OF SPOILS PILE: 30% SAND OR SMALLER 45% GRAVEL 20% COBBLES 5% BOULDERS **- (APPROX. 5')** (E.O.T.P.)

NOTES: _____

IMG_2759

IMG_2760

IMG_2761

IMG_2762

IMG_2763

IMG_2764

IMG_2765

IMG_2766

IMG_2767

IMG_2768

IMG_2769

IMG_2770

IMG_2784

Engineering Analytics, Inc.

TEST PIT LOG

PAGE: 1 OF 2

DATE: 8/31/2016

TEST PIT NO.: EA-TP6

PROJECT INFORMATION

PROJECT: SCHWARTZWALDER MINE

PROJECT NO.: 110385

CLIENT: COTTER CORP

OWNER: COTTER CORP

LOCATION: NORTH PILE TOP

TEST PIT LOCATION

SEE FIGURE A-1

FIELD INFORMATION

DATE & TIME ARRIVED: 8/31/2016 12:00 PM

TEST PIT LOGGED BY: DCG

VISITORS: NONE

WEATHER: SUNNY, 60°s - 80°s

EXCAVATION INFORMATION

EXCAVATION COMPANY: KESSLER RECLAMATION

START TIME: 12:00 PM

TEST PIT DEPTH: 5' TEST PIT DIA.: 13'

EXCAVATION METHOD: CAT 330C EXCAVATOR

SAMPLING METHOD: BULK

TIME EXCAVATION COMPLETE: 12:15 PM

TEST PIT COMPLETION / ABANDONMENT INFORMATION

START TIME: 12:15 PM COMPLETE TIME: 12:20 PM

INSTRUMENTATION: N/A BACKFILL: SPOILS

GROUNDWATER CONDITIONS

NO GROUNDWATER ENCOUNTERED

FOLLOWING FIELD WORK

TIME OF CLEAN-UP COMPLETE: 12:20 PM TIME LEFT SITE: 12:20 PM

NOTES:

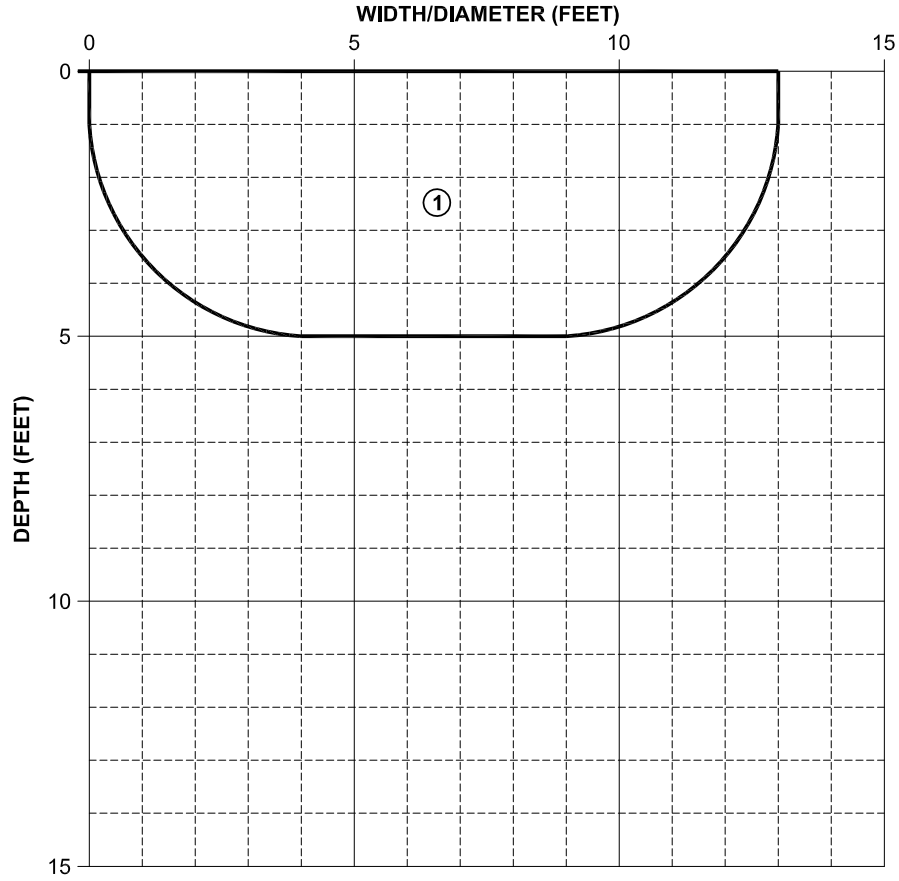
Engineering Analytics, Inc.

TEST PIT LOG

PROJECT: SCHWARTZWALDER MINE **PAGE:** 2 OF 2

PROJECT NO.: 110385 **DATE:** 8/31/2016

TEST PIT NO.: EA-TP6



DEPTH	SAMPLE I.D.	SAMPLE TYPE
3'	3'	BULK
5'	5'	BULK

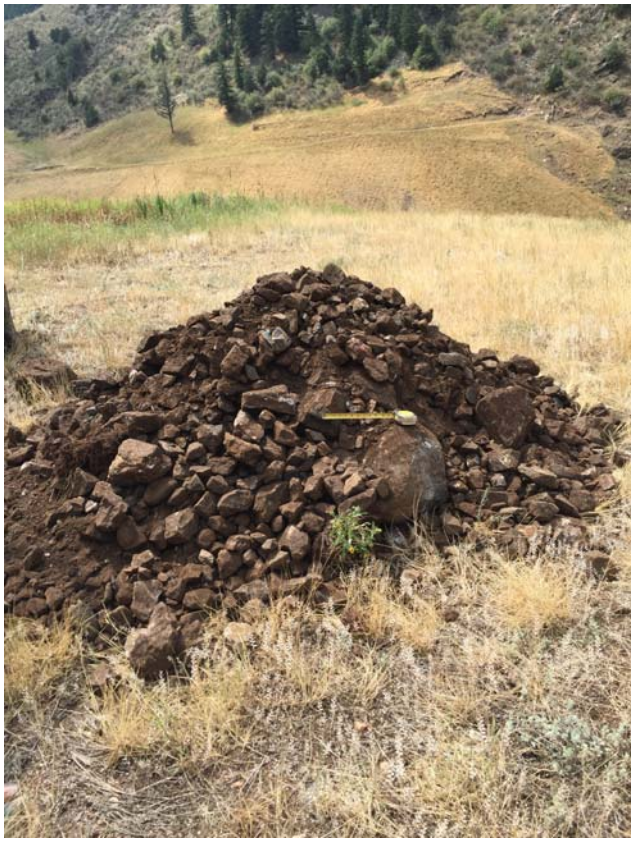
SOIL TYPE	SOIL DEPTH	SOIL DESCRIPTION AND EXCAVATION NOTES
①	0- E.O.T.P.	**SANDY/ COBBLEY GRAVEL** SLIGHTLY MOIST, DARK BROWN (10YR 3/3), SANDY/ COBBLEY GRAVEL WITH BOULDERS, ANGULAR TO SUBANGULAR ROCKS ESTIMATION OF GRAIN SIZE OF SPOILS PILE: 30% SAND OR SMALLER 40% GRAVEL 20% COBBLES 10% BOULDERS
		- (APPROX. 5') (E.O.T.P.)

NOTES: _____

IMG_2775

IMG_2776

IMG_2777



IMG_2778

IMG_2779

IMG_2780

IMG_2781

IMG_2782

IMG_2783

Engineering Analytics, Inc.

TEST PIT LOG

PAGE: 1 OF 2

DATE: 8/17/2016

TEST PIT NO.: EA-TP7

PROJECT INFORMATION

PROJECT: SCHWARTZWALDER MINE

PROJECT NO.: 110385

CLIENT: COTTER CORP

OWNER: COTTER CORP

LOCATION: HILL SLOPE NORTH OF WATER TREATMENT PLANT

TEST PIT LOCATION

SEE FIGURE A-1

FIELD INFORMATION

DATE & TIME ARRIVED: 8/17/2016 11:00 AM

TEST PIT LOGGED BY: JSA

VISITORS: BOB TENNANT (COTTER)

WEATHER: SUNNY, 80°s

EXCAVATION INFORMATION

EXCAVATION COMPANY: KESSLER RECLAMATION

START TIME: 10:15 AM

TEST PIT DEPTH: 1' TEST PIT DIA.:

EXCAVATION METHOD: HAND SHOVEL

SAMPLING METHOD: BULK

TIME EXCAVATION COMPLETE: 11:00 AM

TEST PIT COMPLETION / ABANDONMENT INFORMATION

START TIME: 11:00 AM COMPLETE TIME: 11:00 AM

INSTRUMENTATION: N/A BACKFILL: N/A

GROUNDWATER CONDITIONS

NO GROUNDWATER ENCOUNTERED

FOLLOWING FIELD WORK

TIME OF CLEAN-UP COMPLETE: 11:00 AM TIME LEFT SITE: 11:00 AM

NOTES:

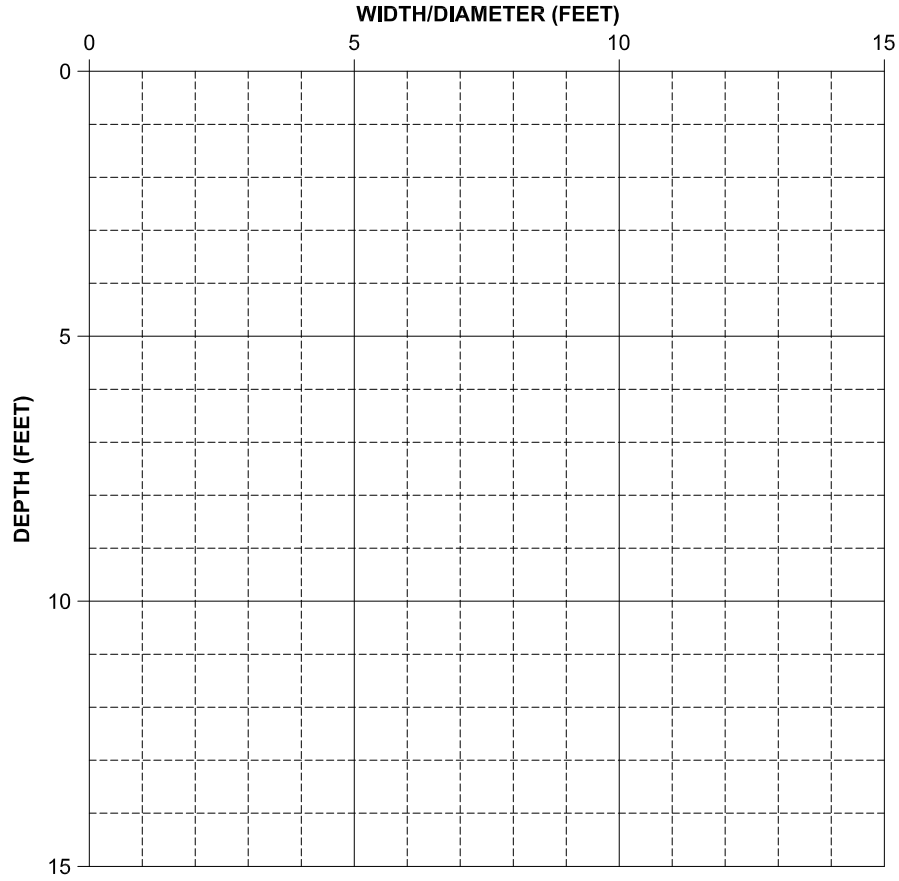
Engineering Analytics, Inc.

TEST PIT LOG

PROJECT: SCHWARTZWALDER MINE **PAGE:** 2 OF 2

PROJECT NO.: 110385 **DATE:** 8/17/2016

TEST PIT NO.: EA-TP7



DEPTH	SAMPLE I.D.	SAMPLE TYPE
0-1'	EA-TP7	BULK

SOIL TYPE	SOIL DEPTH	SOIL DESCRIPTION AND EXCAVATION NOTES
①	0- E.O.T.P.	**GRAVELLY SAND** DRY, LOOSE, GRAVELLY SAND WITH 4" MINUS GRAVEL (~15%) AND SAND, MEDIUM- TO FINE-GRAINED SAND
		- (APPROX. 1') (E.O.T.P.)

NOTES:

APPENDIX B
LABORATORY TESTING RESULTS

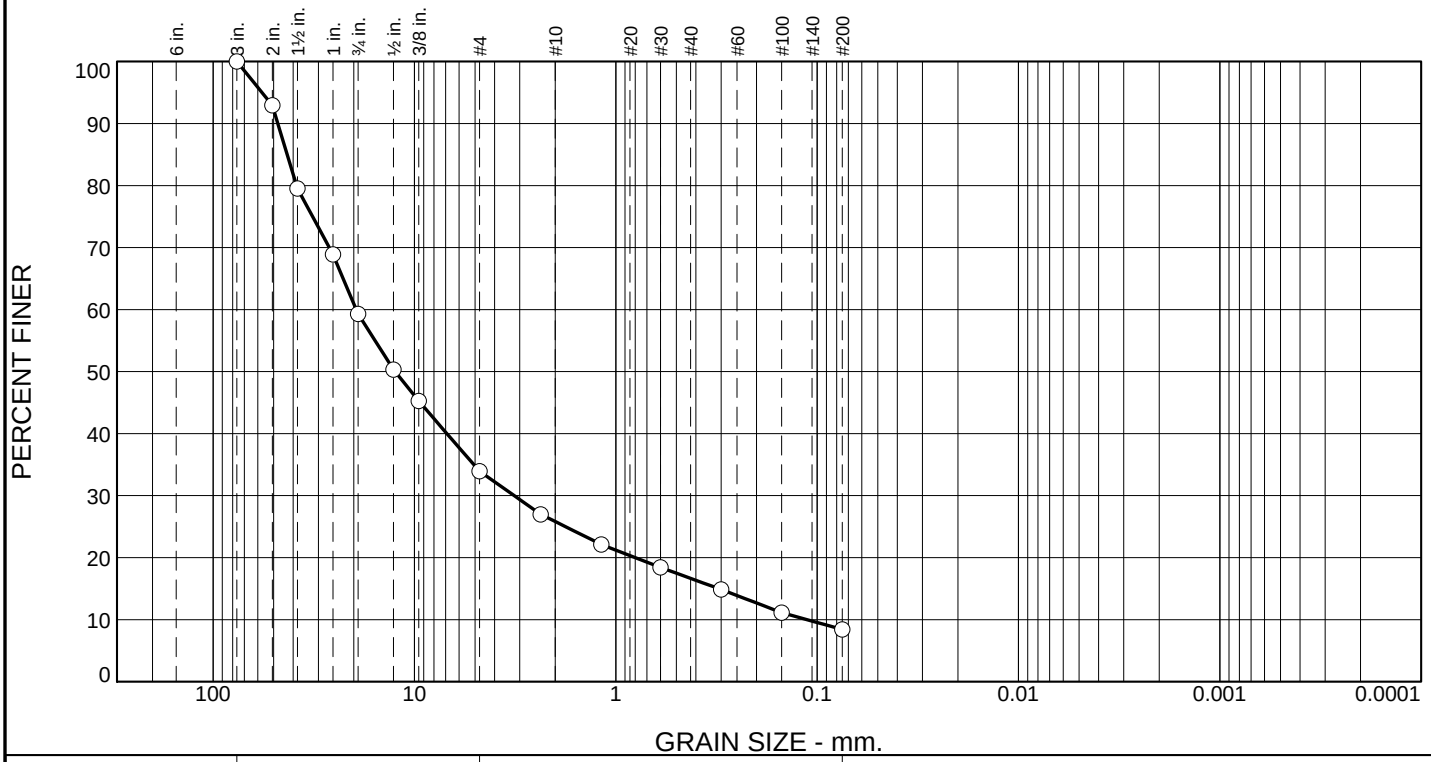
SUMMARY OF LABORATORY TEST RESULTS

JOB NAME: Cotter Schwartzwalder Waste Rock Pile Design JOB NUMBER: 110385T Date: September-2016

Depth (ft)	Sample Type	Moisture (%)	Dry Density (pcf)	Atterberg Limits LL / PL / PI *	% Passing #200 Sieve	Grain Size Analysis	Standard Proctor Max γ (pcf) /Opt. w (%	Swell Pressure (psf)	% Swell	Inundation Pressure (psf)
EA-TP1										
3 and 5	BKT	5.3		24 / 19 / 5	8.4	(1)				
EA-TP2										
3 and 5	BKT	7.9		31 / 18 / 13	34.7	(1)				
EA-TP3										
3 and 5	BKT	4.2		26 / 22 / 4	15.1	(1)				
EA-TP4										
3 and 5	BKT	9.3		30 / 22 / 8	15.2	(1)				
EA-TP5										
3 and 5	BKT	6.8		22 / NP / NP	8.0	(1)				
EA-TP6										
3 and 5	BKT	5.5		24 / 19 / 5	13.7	(1)				
EA-TP7										
3 and 5	BKT	1.8		28 / 21 / 7	11.7	(1)				

*LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index (1) See Attached

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	40.7	25.4	8.1	9.1	8.3	8.4	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100.0		
2	92.9		
1.5	79.5		
1	68.9		
.75	59.3		
.5	50.3		
.375	45.2		
#4	33.9		
#8	27.0		
#16	22.1		
#30	18.4		
#50	14.9		
#100	11.1		
#200	8.4		

* (no specification provided)

Material Description

poorly graded Gravel with siltyclay and sand, Dark Brown, Moist

Atterberg Limits (ASTM D 4318)

PL= 19 **LL=** 24 **PI=** 5

Classification

USCS (D 2487)= GP-GC **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 47.6915 D_{85}= 42.8441 D_{60}= 19.4626
D_{50}= 12.4705 D_{30}= 3.1970 D_{15}= 0.3082
D_{10}= 0.1124 C_u= 173.19 C_c= 4.67

Remarks

Date Received: **Date Tested:** 9/25/2015

Tested By: _____

Checked By: _____

Title: _____

Source of Sample: EA-TP-1 **Depth:** 3' and 5'
Sample Number: BKT

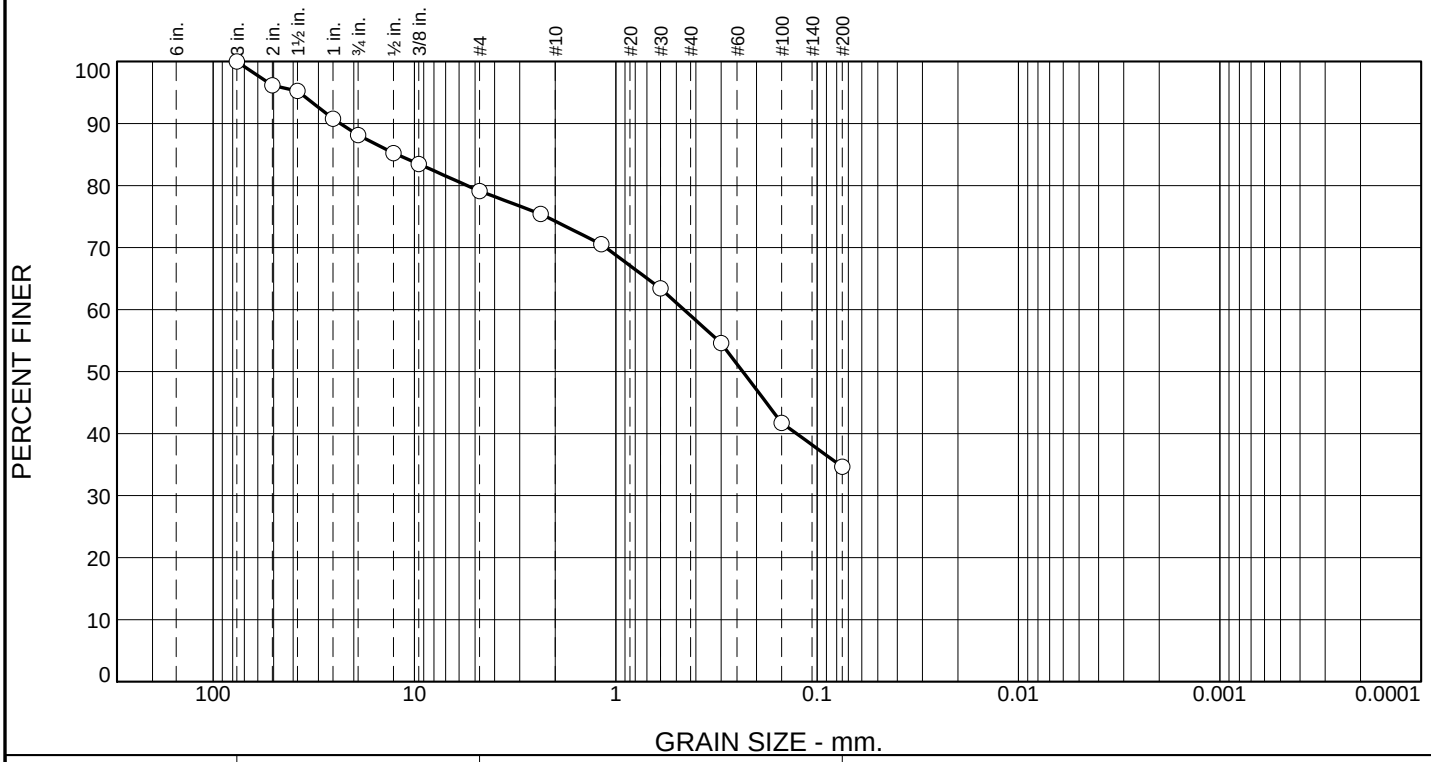
Date Sampled: 9/1/2016

ENIGNEERING ANALYTICS, INC.

Client: Cotter Corporation
Project: Cotter Schwartzwalder Waste Rock Pile Design

Project No: 110385T **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.9	9.0	4.8	15.3	24.3	34.7	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100.0		
2	96.2		
1.5	95.3		
1	90.8		
.75	88.1		
.5	85.2		
.375	83.5		
#4	79.1		
#8	75.4		
#16	70.5		
#30	63.4		
#50	54.6		
#100	41.7		
#200	34.7		

* (no specification provided)

Material Description

clayey sandy with Gravel, Reddish Brown, Moist

Atterberg Limits (ASTM D 4318)

PL= 18 **LL=** 31 **PI=** 13

Classification

USCS (D 2487)= SC **AASHTO (M 145)=** A-2-6(1)

Coefficients

D_{90}= 23.3164 D_{85}= 12.2228 D_{60}= 0.4588
D_{50}= 0.2342 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:** 9/13/2016

Tested By: _____

Checked By: _____

Title: _____

Source of Sample: EA-TP-2 **Depth:** 3' and 5'
Sample Number: BKT

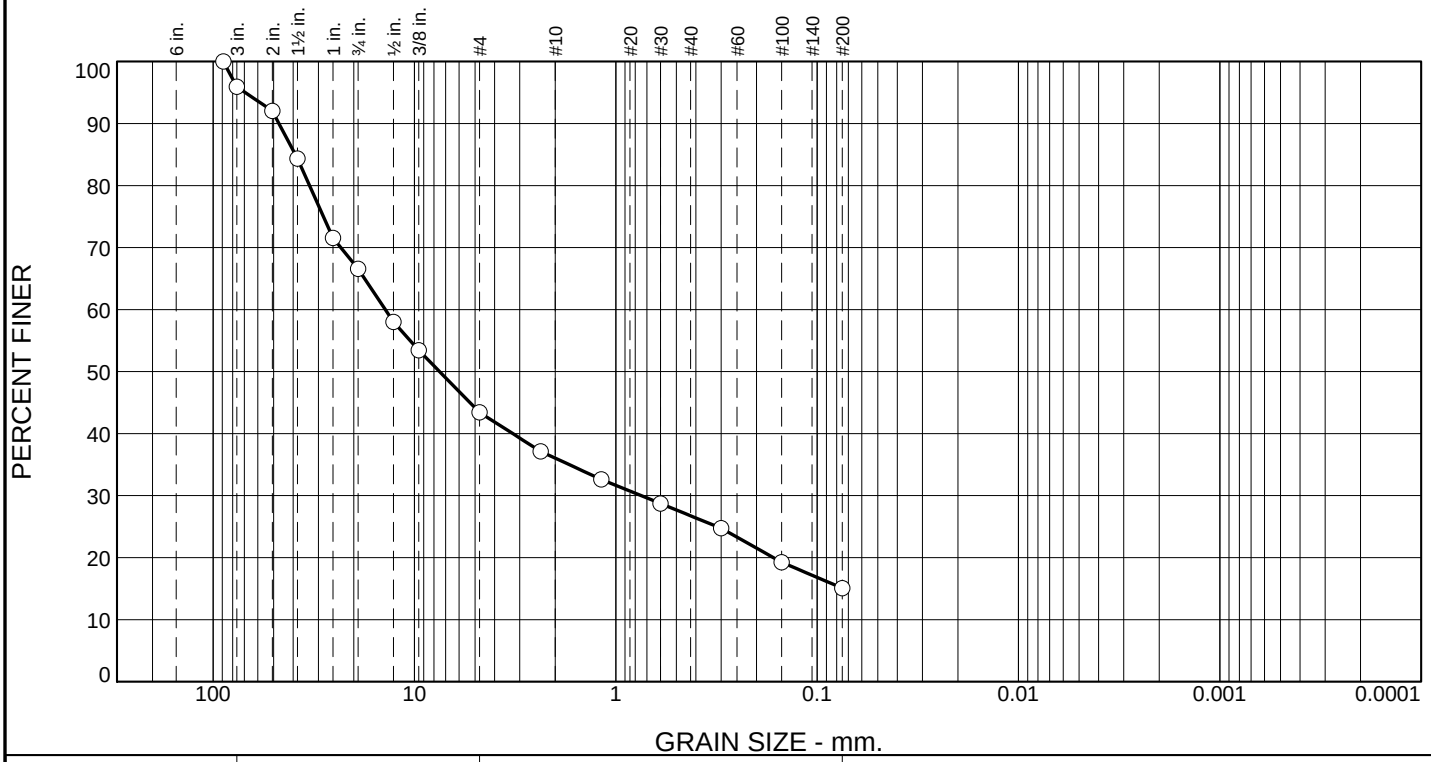
Date Sampled: 9/1/2016

ENIGNEERING ANALYTICS, INC.

Client: Cotter Corporation
Project: Cotter Schwartzwalder Waste Rock Pile Design

Project No: 110385T **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
4.1	29.3	23.2	7.4	9.3	11.6	15.1	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3.5	100.0		
3	95.9		
2	92.0		
1.5	84.3		
1	71.5		
.75	66.6		
.5	58.0		
.375	53.4		
#4	43.4		
#8	37.1		
#16	32.6		
#30	28.7		
#50	24.7		
#100	19.3		
#200	15.1		

* (no specification provided)

Material Description

Silty Clayey Gravel with sand, Brown, Moist

Atterberg Limits (ASTM D 4318)

PL= 22 **LL=** 26 **PI=** 4

Classification

USCS (D 2487)= GC-GM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 47.0767 D_{85}= 39.0419 D_{60}= 13.9568
D_{50}= 7.5043 D_{30}= 0.7482 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:**

Tested By: _____

Checked By: _____

Title: _____

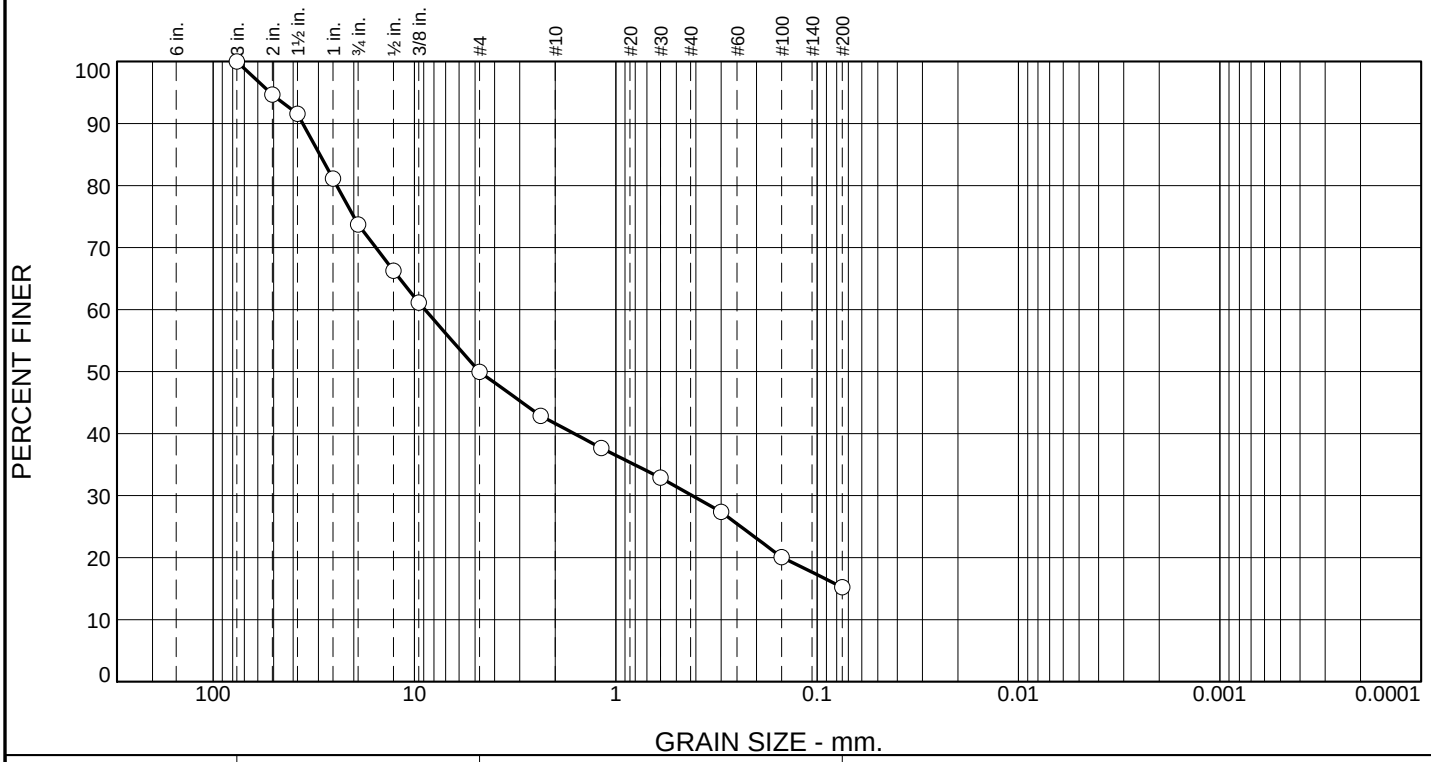
Source of Sample: EA-TP-3 **Depth:** 3' and 5' **Date Sampled:**
Sample Number: BKT

ENIGNEERING ANALYTICS, INC.

Client: Cotter Corporation
Project: Cotter Schwartzwalder Waste Rock Pile Design

Project No: 110385T **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	26.3	23.7	8.4	11.5	14.9	15.2	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100.0		
2	94.7		
1.5	91.6		
1	81.1		
.75	73.7		
.5	66.3		
.375	61.1		
#4	50.0		
#8	42.9		
#16	37.7		
#30	32.9		
#50	27.4		
#100	20.1		
#200	15.2		

* (no specification provided)

Material Description

Clayey Gravel with Sand, Brown, Moist

Atterberg Limits (ASTM D 4318)

PL= 22 **LL=** 30 **PI=** 8

Classification

USCS (D 2487)= GC **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 35.8560 D_{85}= 29.5315 D_{60}= 8.8753
D_{50}= 4.7631 D_{30}= 0.4173 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:**

Tested By:

Checked By:

Title:

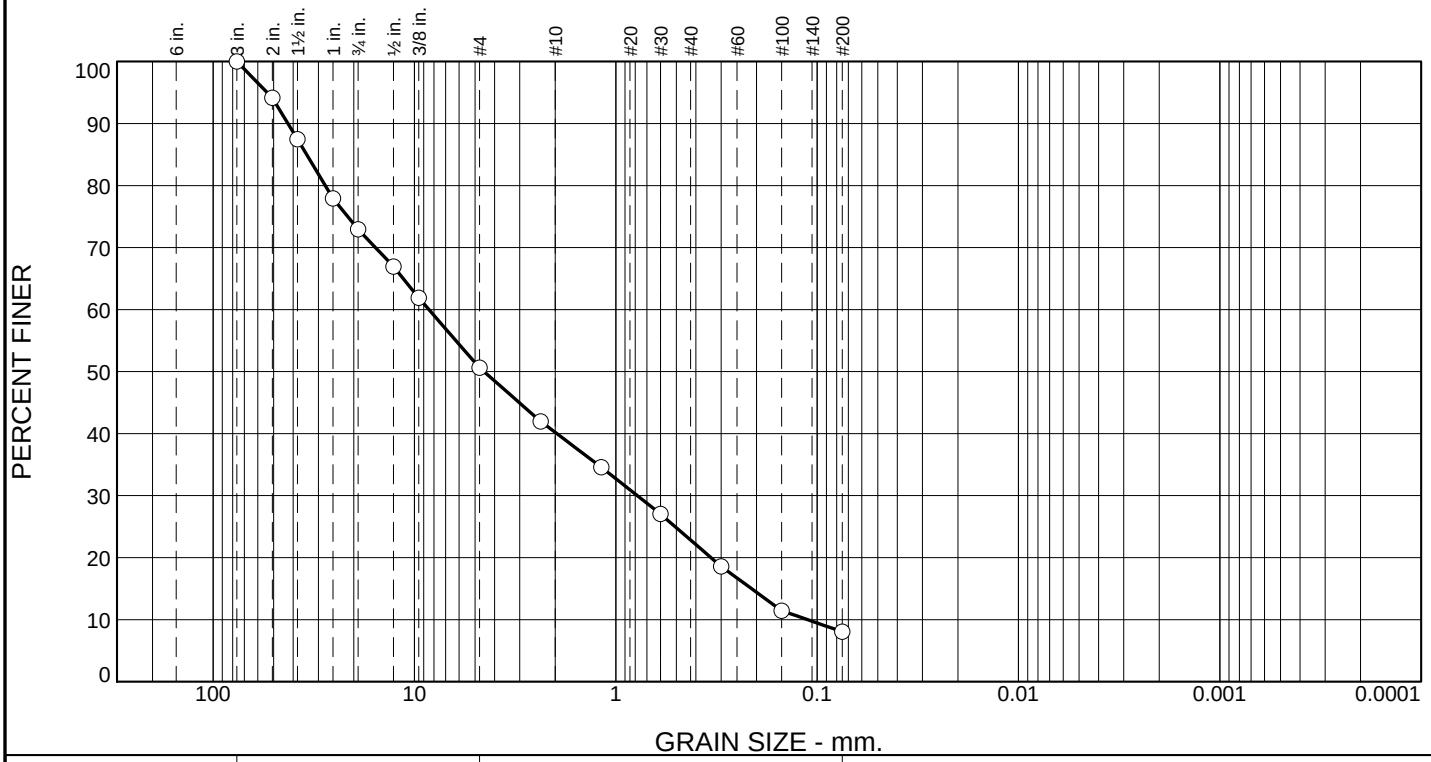
Source of Sample: EA-TP-4 **Depth:** 3' and 5' **Date Sampled:**
Sample Number: BKT

ENIGNEERING ANALYTICS, INC.

Client: Cotter Corporation
Project: Cotter Schwartzwalder Waste Rock Pile Design

Project No: 110385T **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	27.1	22.3	10.4	17.4	14.8	8.0	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100.0		
2	94.2		
1.5	87.5		
1	77.9		
.75	72.9		
.5	66.9		
.375	61.9		
#4	50.6		
#8	42.0		
#16	34.6		
#30	27.0		
#50	18.6		
#100	11.4		
#200	8.0		

* (no specification provided)

Material Description

poorly graded Gravel with silt and sand, Dark Brown, Moist

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** 22 **PI=** NP

Classification

USCS (D 2487)= GP-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 42.4813 D_{85}= 34.3030 D_{60}= 8.4755
D_{50}= 4.5198 D_{30}= 0.7825 D_{15}= 0.2118
D_{10}= 0.1117 C_u= 75.84 C_c= 0.65

Remarks

Date Received: **Date Tested:**

Tested By: _____

Checked By: _____

Title: _____

Source of Sample: EA-TP-5 **Depth:** 3' and 5' **Date Sampled:**

Sample Number: BKT

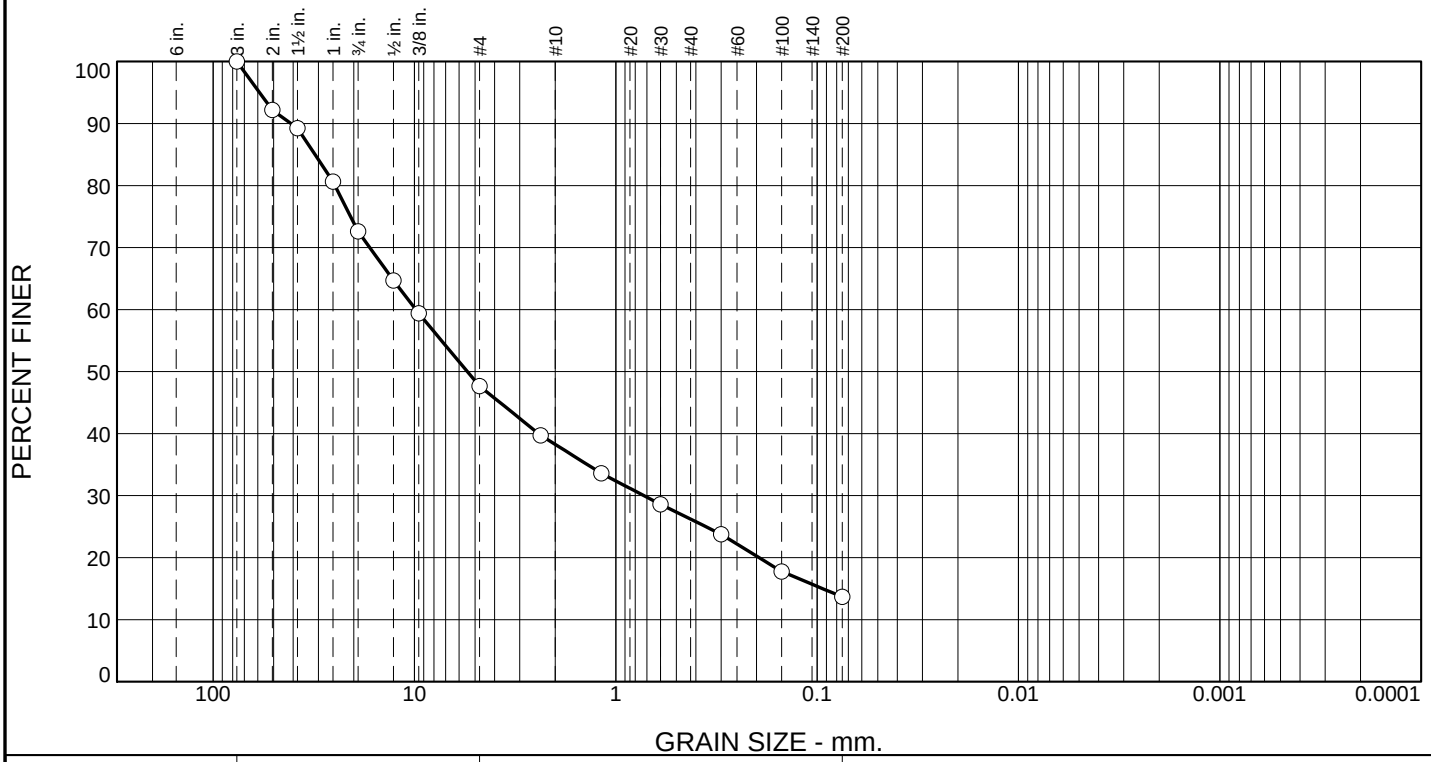
ENIGNEERING ANALYTICS, INC.

Client: Cotter Corporation

Project: Cotter Schwartzwalder Waste Rock Pile Design

Project No: 110385T **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	27.4	24.9	9.4	12.1	12.5	13.7	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100.0		
2	92.2		
1.5	89.3		
1	80.6		
.75	72.6		
.5	64.7		
.375	59.4		
#4	47.7		
#8	39.7		
#16	33.6		
#30	28.6		
#50	23.8		
#100	17.8		
#200	13.7		

* (no specification provided)

Material Description

silty clayey gravel with sand, Brown, Moist

Atterberg Limits (ASTM D 4318)

PL= 19 **LL=** 24 **PI=** 5

Classification

USCS (D 2487)= GC-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 40.9921 D_{85}= 31.1884 D_{60}= 9.8442
D_{50}= 5.4557 D_{30}= 0.7254 D_{15}= 0.0939
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:** 9/13/2016

Tested By: _____

Checked By: _____

Title: _____

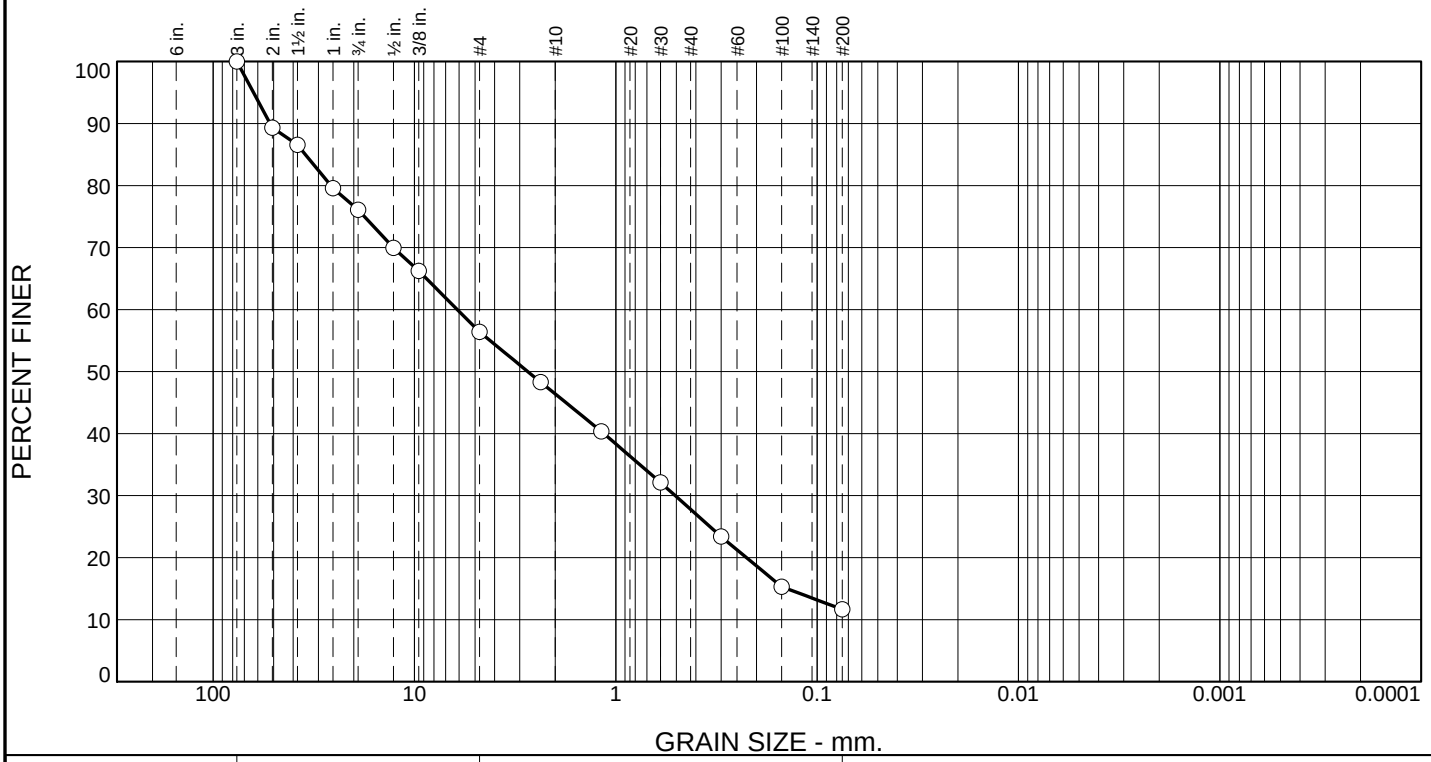
Source of Sample: EA-TP-6 **Depth:** 3' and 5' **Date Sampled:** 9/1/2016
Sample Number: BKT

ENIGNEERING ANALYTICS, INC.

Client: Cotter Corporation
Project: Cotter Schwartzwalder Waste Rock Pile Design

Project No: 110385T **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	23.9	19.7	10.0	18.6	16.1	11.7	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100.0		
2	89.3		
1.5	86.6		
1	79.6		
.75	76.1		
.5	70.0		
.375	66.2		
#4	56.4		
#8	48.3		
#16	40.4		
#30	32.1		
#50	23.4		
#100	15.3		
#200	11.7		

* (no specification provided)

Material Description

poorly graded Sand with Siltyclay and Gravel, Reddish Brown, Dry

Atterberg Limits (ASTM D 4318)

PL= 21 **LL=** 28 **PI=** 7

Classification

USCS (D 2487)= SP-SC **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 52.0926 D_{85}= 34.8047 D_{60}= 6.1287
D_{50}= 2.7351 D_{30}= 0.5069 D_{15}= 0.1415
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:**

Tested By: _____

Checked By: _____

Title: _____

Source of Sample: EA-TP-7 **Depth:** 0' Top Soil **Date Sampled:**
Sample Number: BKT

ENIGNEERING ANALYTICS, INC.

Client: Cotter Corporation
Project: Cotter Schwartzwalder Waste Rock Pile Design

Project No: 110385T **Figure**

Large Scale Internal Direct Shear
ASTM D3080 Modified

Client: Smith Geotechnical Engineering Consultants
Job Number.: 2406-73
Project Number: 110385
Conditions: Inundated
Location: --
Project: Schwartzwalder Mine TR23 Responses

Speed Rate (in/min): 0.02
Normal Stress 1 (psf): 1440
Normal Stress 2 (psf): 2880
Normal Stress 3 (psf): 5760

Test Date: 9/15/2016
Technician: BDF
Data Entered By: BDF
Date: 9/29/2016
File Name: 2406_73_largeScaleDirectShear-ASTMD3080m-5321-6243-R0_0.xls
Data Files: SGTP1DSC.TXT,SGTP1DSA.TXT,SGTP1DSB.TXT

Displacement (in)	Normal Stress 1 (psf):	Normal Stress 2 (psf):	Normal Stress 3 (psf):
0.000	0	0	0
0.023	169	470	493
0.097	315	698	1291
0.169	418	919	1715
0.245	524	1110	2060
0.314	614	1350	2319
0.387	714	1546	2586
0.457	828	1727	2882
0.531	910	1878	3137
0.601	1008	2067	3398
0.671	1084	2164	3685
0.739	1182	2365	3893
0.809	1271	2547	4213
0.876	1378	2740	4439
0.945	1452	2927	4701
1.012	1559	3120	5003
1.079	1658	3379	5279
1.144	1743	3553	5548
1.210	1853	3646	5609
1.275	1858	3857	5958
1.339	1939	3962	6084
1.402	2015	4093	6214
1.466	2196	4247	6463
1.530	2075	4413	6566
1.593	2097	4608	6604
1.654	2110	4518	6846
1.715	2171	4692	7004
1.775	2188	4870	7243
1.835	2205	5029	7318
1.894	2210	5114	7388
1.953	2166	4994	7550
2.011	2173	5071	7733
2.070	2146	5121	7869
2.109	1995	5326	7912

Sample Information

Boring: EA-TP1
Depth: 3-5'
Sample Number: Composite
Dry Density (pcf): 111.5
% Moisture: 5.3

	Peak	Ultimate
Friction Angle	51.6	52.5
Cohesion (psf)	917.0	702.0

	Peak Strength(psf)	Ultimate Strength(psf)
Normal Stress 1	2210	1995
Normal Stress 2	5326	5326
Normal Stress 3	7912	7912

Data Checked By CKP

Date 10/3/16

ATT
ADVANCED TERRA TESTING

Sample Configuration

Sample Information

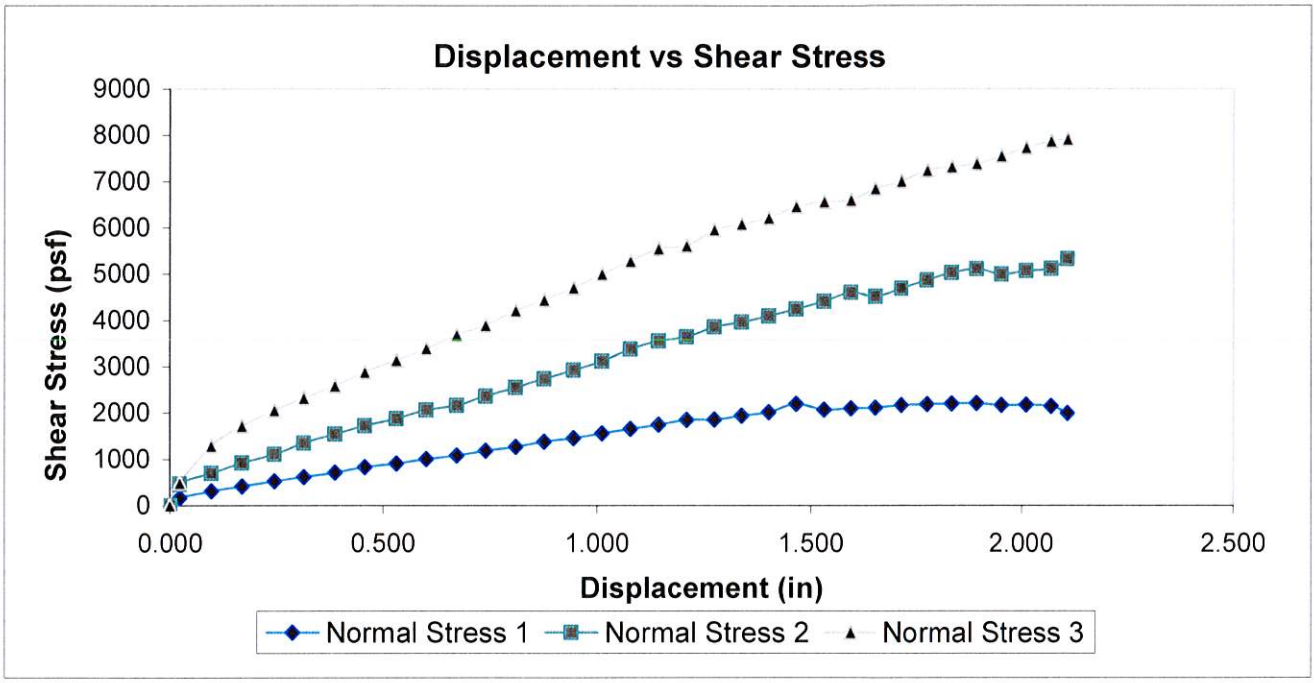
Boring: EA-TP1

Depth: 3-5'

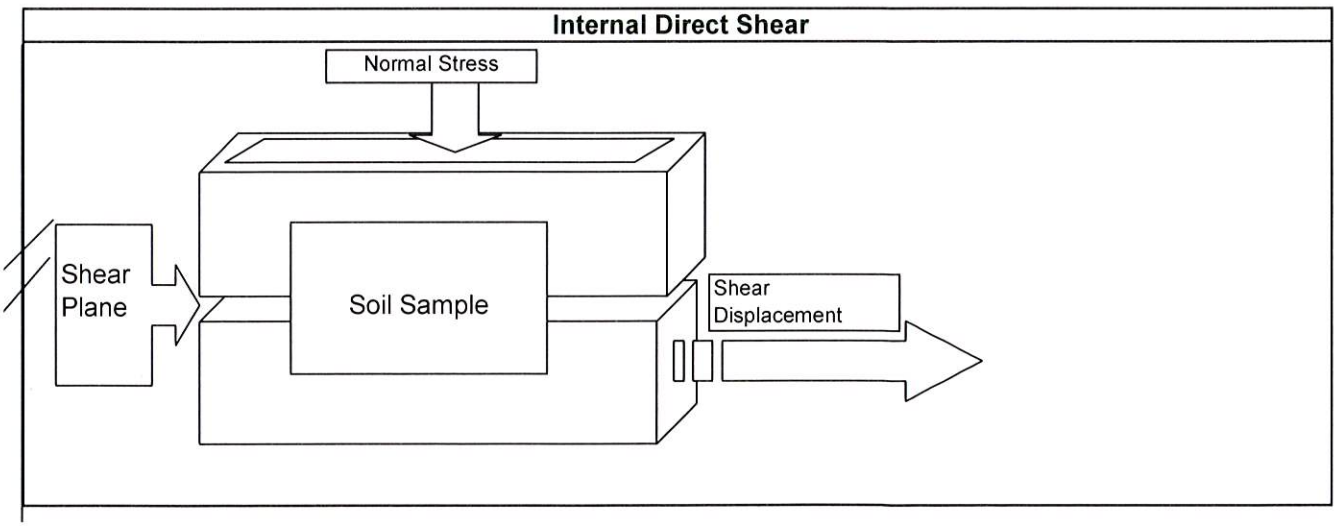
Sample Number: Composite

Dry Density (pcf): 111.5

% Moisture: 5.3

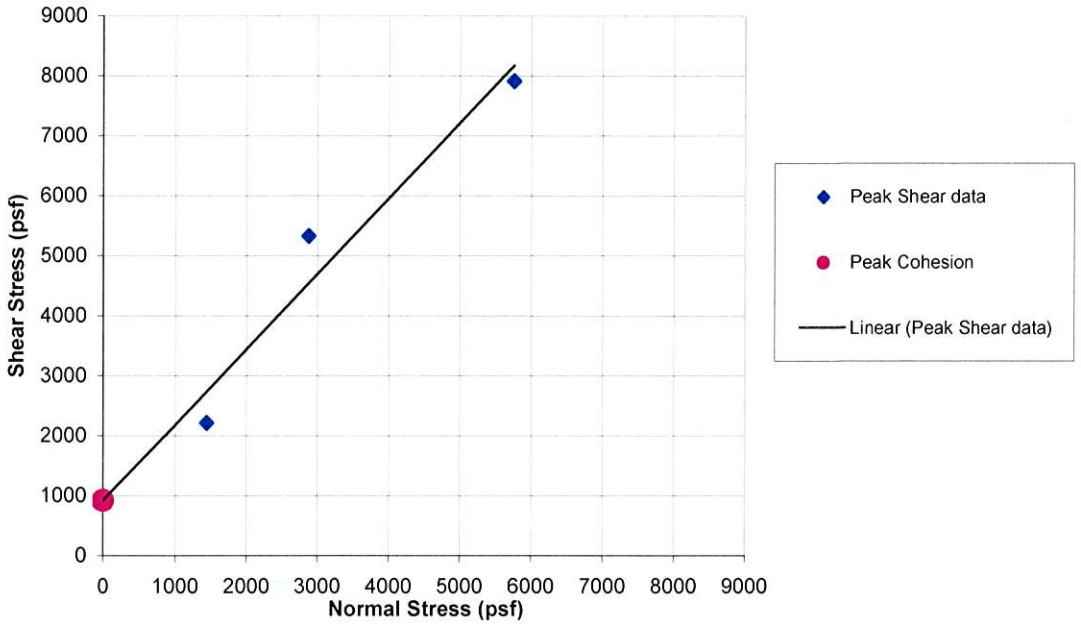


Diagram



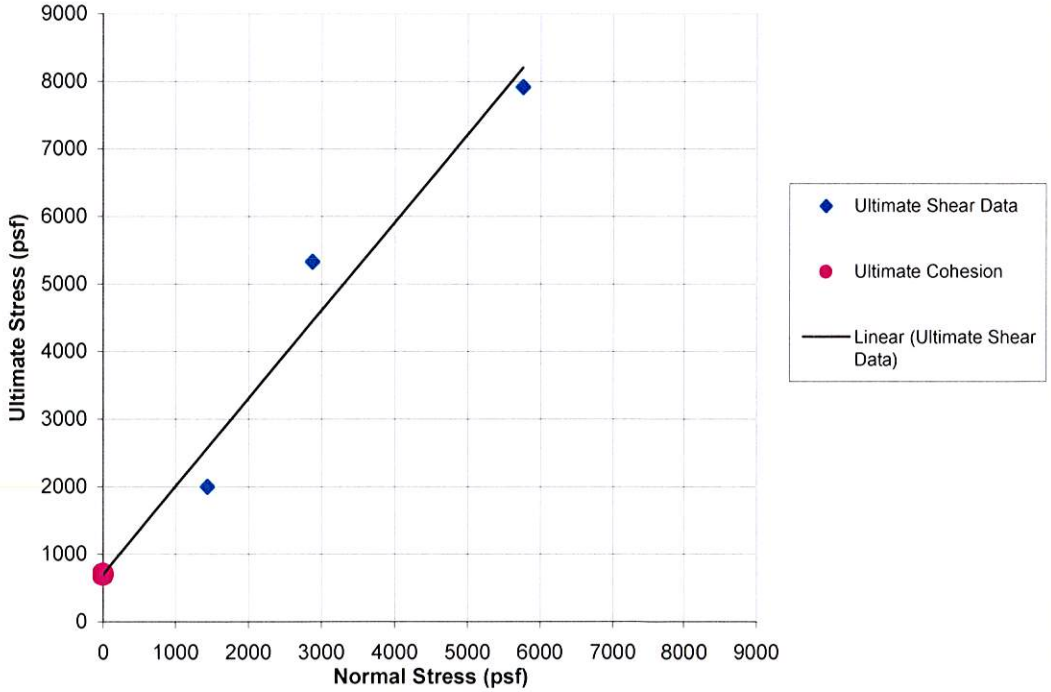
ATT
ADVANCED TERRA TESTING

Peak Shear Stress vs Normal Stress



Cohesion = 917.0 psf *Friction Angle = 51.6°*

Ultimate Shear Stress vs. Normal Stress



Cohesion = 702.0 psf *Friction Angle = 52.5°*

ATT
ADVANCED TERRA TESTING

Large Scale Internal Direct Shear
ASTM D3080 Modified

Client: Smith Geotechnical Engineering Consultants
Job Number.: 2406-73
Project Number: 110385
Conditions: Inundated
Location: --
Project: Schwartzwalder Mine TR23 Responses

Speed Rate (in/min): 0.02
Normal Stress 1 (psf): 1440
Normal Stress 2 (psf): 5760
Normal Stress 3 (psf): 11520

Test Date: 9/15/2016
Technician: BDF
Data Entered By: BDF
Date: 9/29/2016
File Name: 2406_73_largeScaleDirectShear-ASTMD3080m-5321-6243-R0_1.xls
Data Files: SGTP2DSC.TXT,SGTP2DSB.TXT,SGTP2DSA.TXT

Displacement (in)	Normal Stress 1 (psf):	Normal Stress 2 (psf):	Normal Stress 3 (psf):
0.000	0	0	0
0.026	229	484	789
0.103	373	1240	1798
0.180	463	1607	2429
0.259	529	1974	2972
0.335	586	2276	3375
0.411	631	2525	3684
0.487	672	2702	3928
0.563	710	2853	4164
0.636	747	2978	4355
0.710	778	3096	4534
0.784	808	3204	4673
0.856	836	3315	4853
0.929	870	3416	5017
1.001	898	3521	5160
1.073	919	3622	5299
1.143	938	3720	5455
1.213	961	3355	5593
1.283	984	3283	5719
1.352	999	3244	5852
1.419	1017	3217	4046
1.488	1031	3195	4891
1.554	1049	3179	5112
1.622	1059	3164	5248
1.688	1064	3151	5396
1.753	1071	3141	5520
1.817	1082	3131	5618

Sample Information

Boring: EA-TP2
Depth: 3-5'
Sample Number: Composite
Dry Density (pcf): 92.9
% Moisture: 7.9

Note: Material exhibited a significant amount of consolidation throughout the test.

	Peak	Ultimate
Friction Angle	25.1	24.2
Cohesion (psf)	633.2	475.1

	Peak Strength(psf)	Ultimate Strength(psf)
Normal Stress 1	1082	1082
Normal Stress 2	3720	3131
Normal Stress 3	5852	5618

Data Checked By CKP

Date 10/3/16

ATT
ADVANCED TERRA TESTING

Sample Configuration

Sample Information

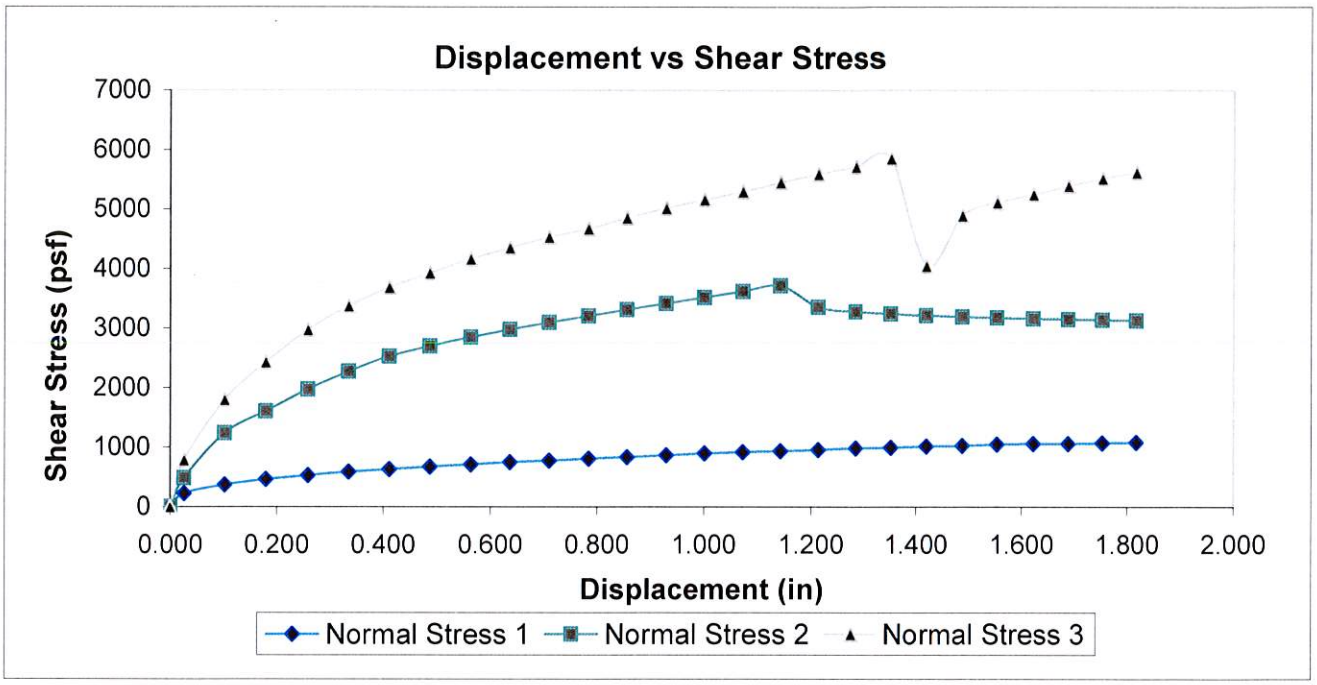
Boring: EA-TP2

Depth: 3-5'

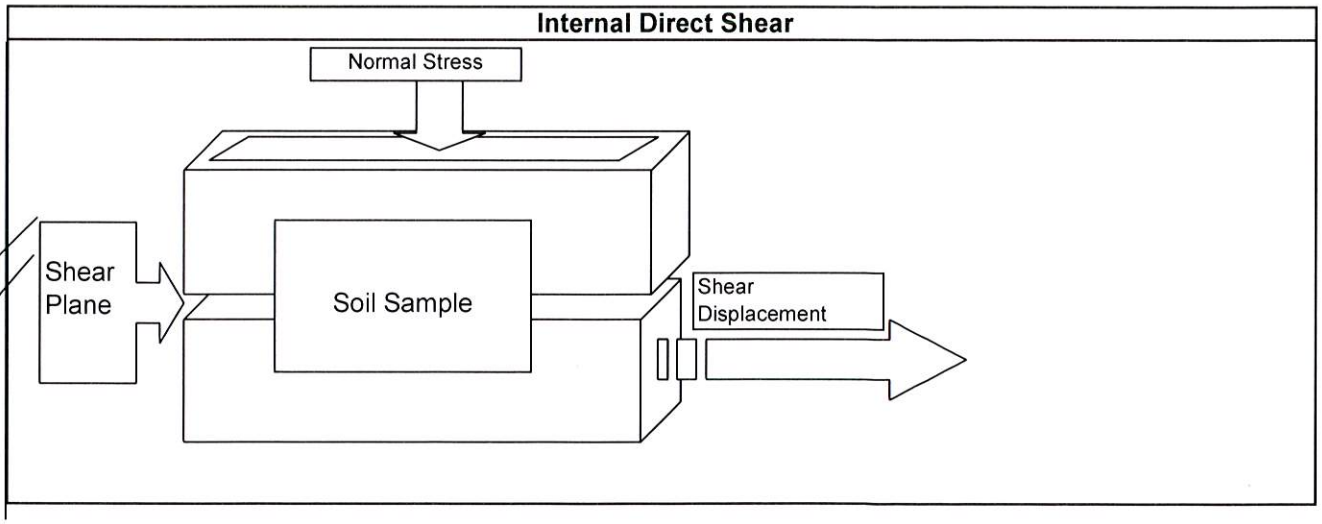
Sample Number: Composite

Dry Density (pcf): 92.9

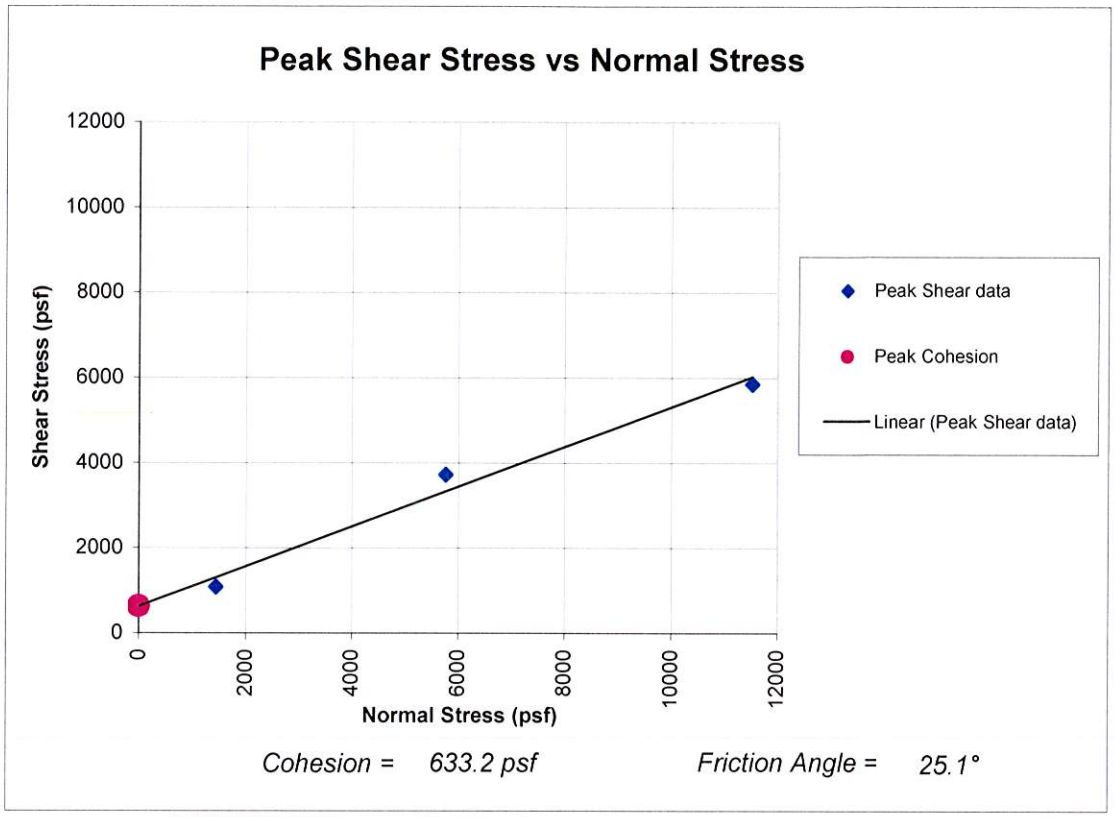
% Moisture: 7.9

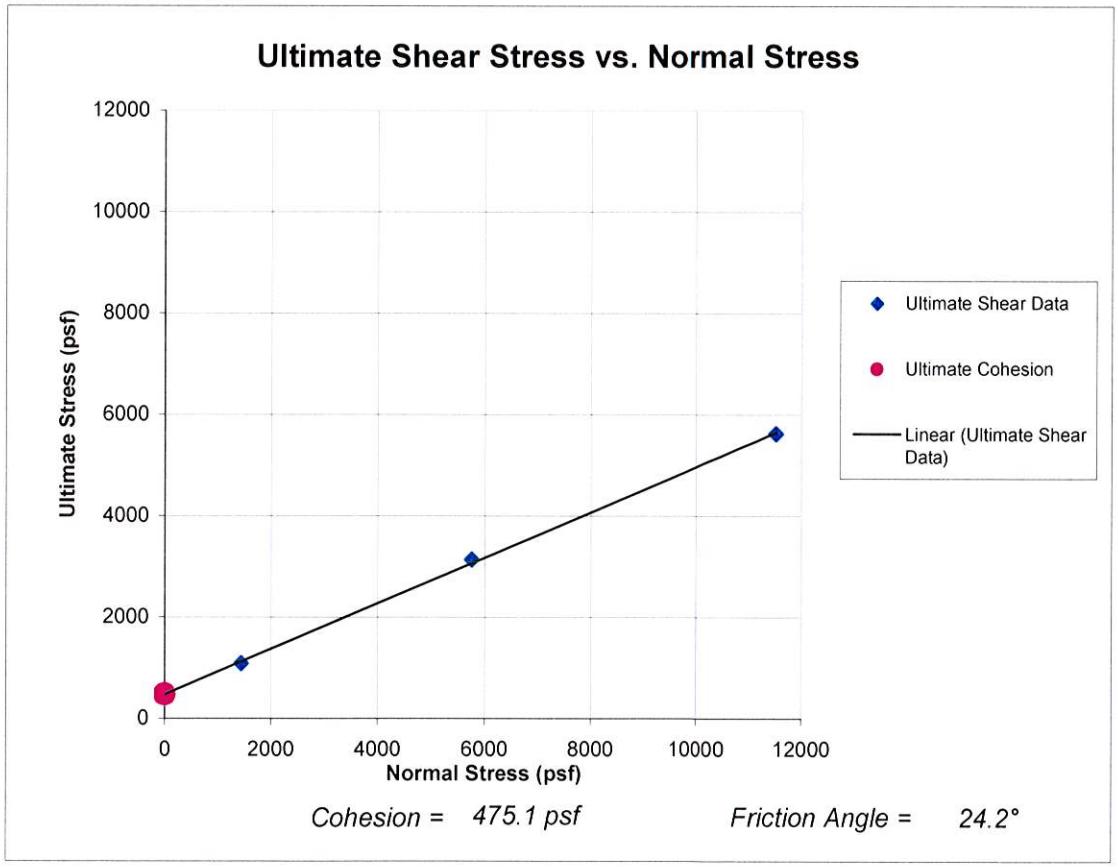


Diagram



ADVANCED TERRA TESTING





ATT
ADVANCED TERRA TESTING

Large Scale Internal Direct Shear
ASTM D3080 Modified

Client: Smith Geotechnical Engineering Consultants
Job Number.: 2406-73
Project Number: 110385
Conditions: Inundated
Location: --
Project: Schwartzwalder Mine TR23 Responses

Speed Rate (in/min): 0.02
Normal Stress 1 (psf): 1440
Normal Stress 2 (psf): 2880
Normal Stress 3 (psf): 5760

Test Date: 9/16/2016
Technician: BDF
Data Entered By: BDF
Date: 9/29/2016
File Name: 2406_73_largeScaleDirectShear-ASTMD3080m-5321-6243-R0_2.xls
Data Files: SGTP3DSC.TXT,SGTP3DSA.TXT,SGTP3DSB.TXT

Displacement (in)	Normal Stress 1 (psf):	Normal Stress 2 (psf):	Normal Stress 3 (psf):
0.000	0	0	0
0.017	257	367	734
0.086	473	633	1290
0.155	634	832	1702
0.226	732	1026	2095
0.295	825	1189	2434
0.365	953	1318	2653
0.433	1058	1455	2939
0.502	1154	1617	3242
0.570	1252	1687	3569
0.637	1351	1886	3882
0.702	1446	2019	4136
0.769	1536	2155	4368
0.833	1665	2268	4640
0.898	1806	2394	4904
0.963	1886	2524	5175
1.027	1966	2652	5492
1.089	2075	2789	5804
1.151	2167	2879	5857
1.212	2241	2940	5998
1.275	2363	3010	6159
1.334	2434	3093	6405
1.393	2543	3191	6726
1.453	2573	3327	6918
1.512	2635	3432	7160
1.570	2610	3425	7280
1.627	2774	3427	7456
1.685	2854	3452	7680
1.742	2949	3475	7859
1.796	2998	3541	7793
1.853	3018	3624	7928
1.907	2944	3732	8015
1.964	2990	3815	8069
2.019	3023	3955	8162

Sample Information

Boring: EA-TP3
Depth: 3-5'
Sample Number: Composite
Dry Density (pcf): 120.3
% Moisture: 4.2

	Peak	Ultimate
Friction Angle	50.9	50.9
Cohesion (psf)	919.5	919.5

	Peak Strength(psf)	Ultimate Strength(psf)
Normal Stress 1	3023	3023
Normal Stress 2	3955	3955
Normal Stress 3	8162	8162

Data Checked By CKP

Date 10/3/16

ATT
ADVANCED TERRA TESTING

Sample Configuration

Sample Information

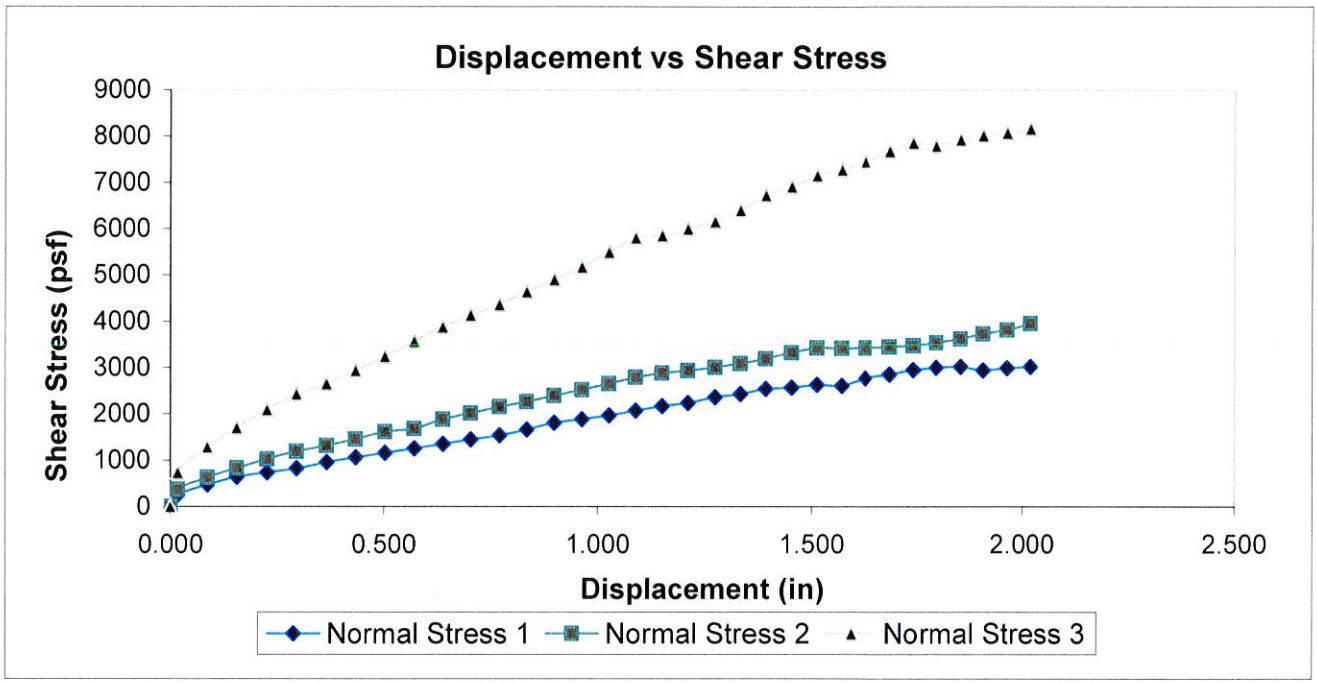
Boring: EA-TP3

Depth: 3-5'

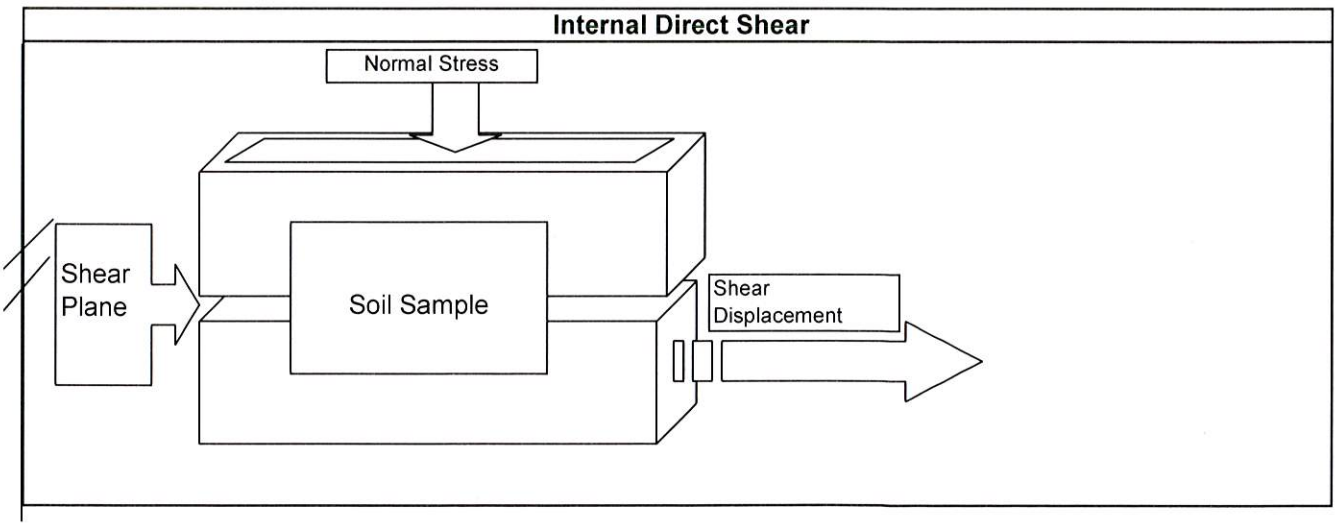
Sample Number: Composite

Dry Density (pcf): 120.3

% Moisture: 4.2

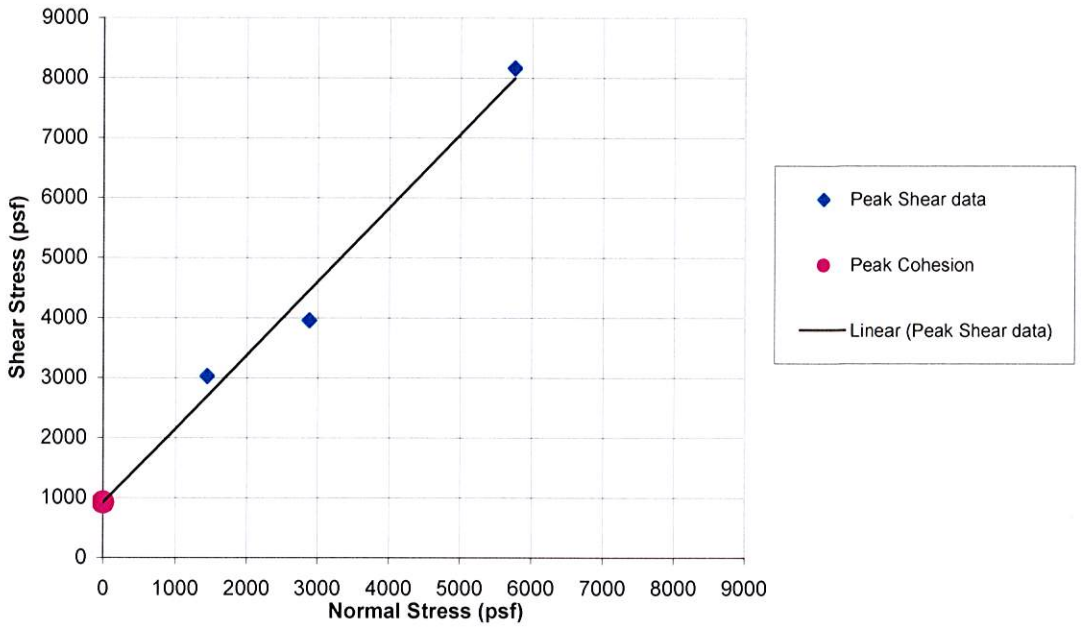


Diagram



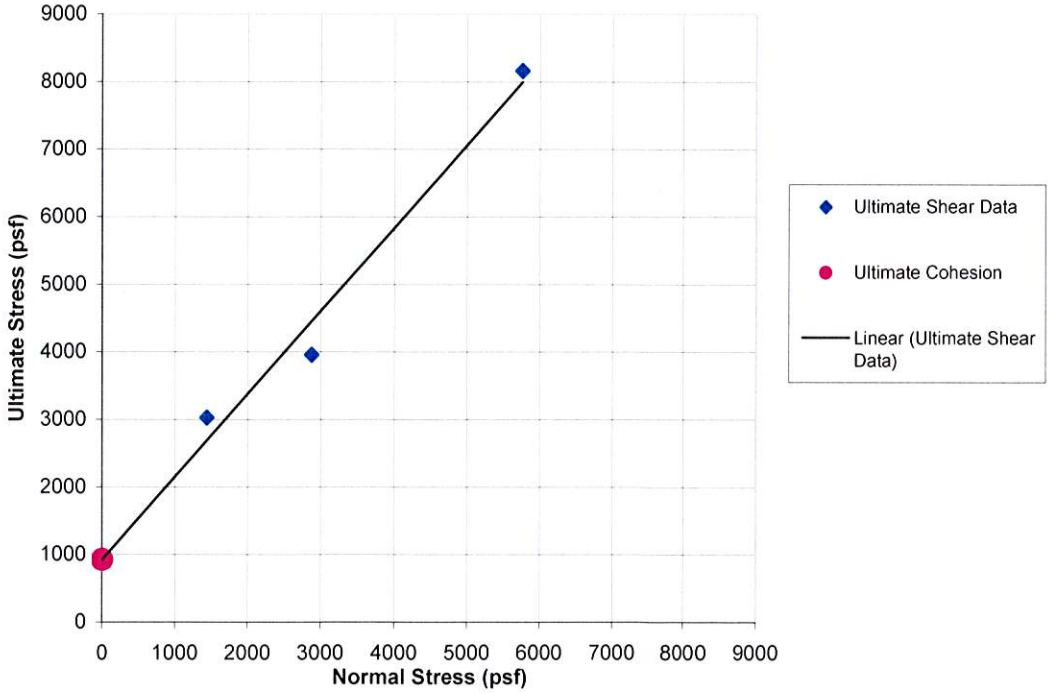
ATT
ADVANCED TERRA TESTING

Peak Shear Stress vs Normal Stress



Cohesion = 919.5 psf *Friction Angle = 50.9°*

Ultimate Shear Stress vs. Normal Stress



Cohesion = 919.5 psf *Friction Angle = 50.9°*

ATT
ADVANCED TERRA TESTING

Large Scale Internal Direct Shear
ASTM D3080 Modified

Client: Smith Geotechnical Engineering Consultants
Job Number.: 2406-73
Project Number: 110385
Conditions: Inundated
Location: --
Project: Schwartzwalder Mine TR23 Responses

Speed Rate (in/min): 0.02
Normal Stress 1 (psf): 1440
Normal Stress 2 (psf): 2880
Normal Stress 3 (psf): 5760

Test Date: 9/29/2016
Technician: BDF
Data Entered By: BDF
Date: 10/11/2016
File Name: 2406_73_largeScaleDirectShear-ASTMD3080m-5321-6243-R0_5.xls
Data Files: SGTP4DSC.TXT,SGTP4DSB.TXT,SGTP4DSA.TXT

Displacement (in)	Normal Stress 1 (psf):	Normal Stress 2 (psf):	Normal Stress 3 (psf):
0.000	0	0	0
0.021	176	478	611
0.083	289	709	1098
0.149	386	893	1433
0.214	449	1028	1650
0.276	547	1136	1919
0.343	603	1255	2087
0.405	666	1418	2251
0.467	724	1521	2490
0.531	764	1652	2739
0.592	819	1775	2955
0.652	864	1891	3233
0.713	887	2004	3472
0.773	935	2060	3727
0.832	970	2250	3963
0.892	990	2372	4199
0.954	1038	2497	4526
1.016	1065	2585	4728
1.079	1143	2688	5006
1.141	1201	2758	5241
1.203	1236	2776	5454
1.269	1284	2900	5716
1.333	1353	2904	5965
1.398	1408	2993	6140
1.464	1435	3018	6304
1.531	1463	3075	6437
1.598	1486	3208	6525
1.668	1423	3168	6616
1.734	1520	3309	6751
1.801	1568	3387	6858
1.867	1609	3472	6810
1.933	1646	3481	6920
1.997	1682	3579	7029
2.064	1651	3672	7106

Sample Information

Boring: EA-TP4
Depth: 3-5'
Sample Number: Composite
Dry Density (pcf): 115.6
% Moisture: 9.3

Note: Data suggests negative intercept. No value is reported.

	Peak	Ultimate
Friction Angle	51.3	51.4
Cohesion (psf)	N/A	N/A

	Peak Strength(psf)	Ultimate Strength(psf)
Normal Stress 1	1682	1651
Normal Stress 2	3672	3672
Normal Stress 3	7106	7106

Data Checked By KR

Date 10/12/16

ATT
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Sample Configuration

Sample Information

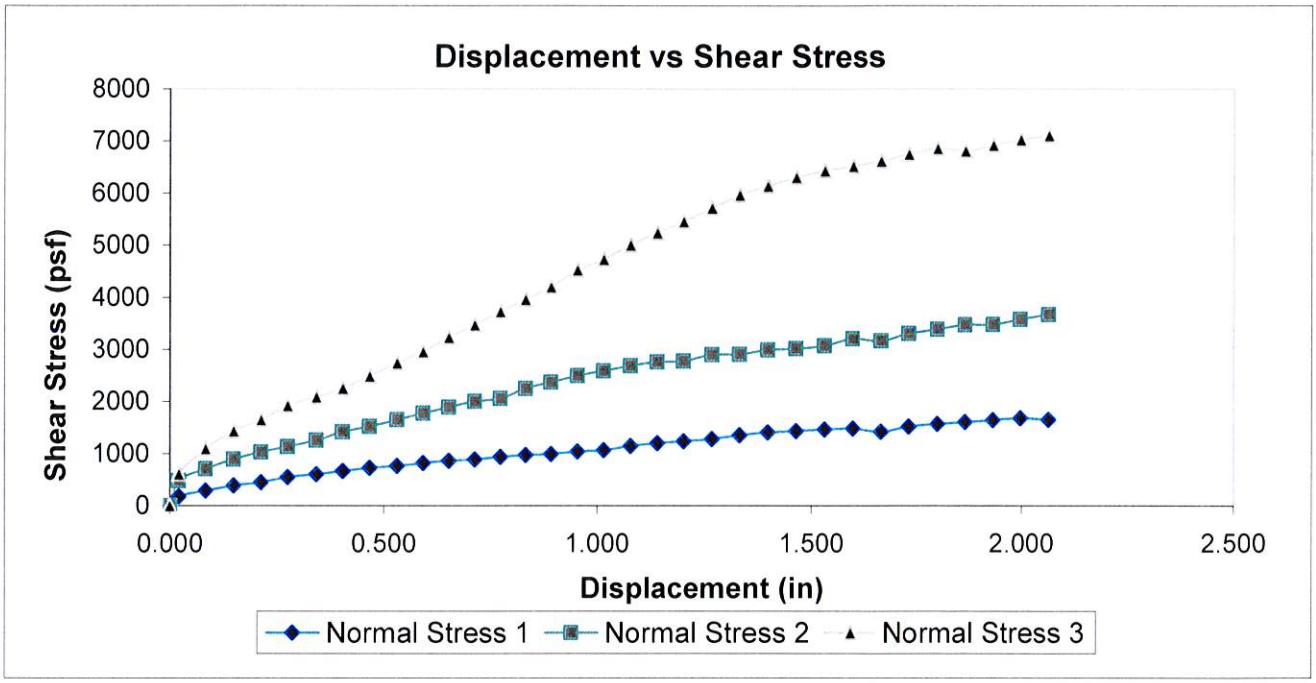
Boring: EA-TP4

Depth: 3-5'

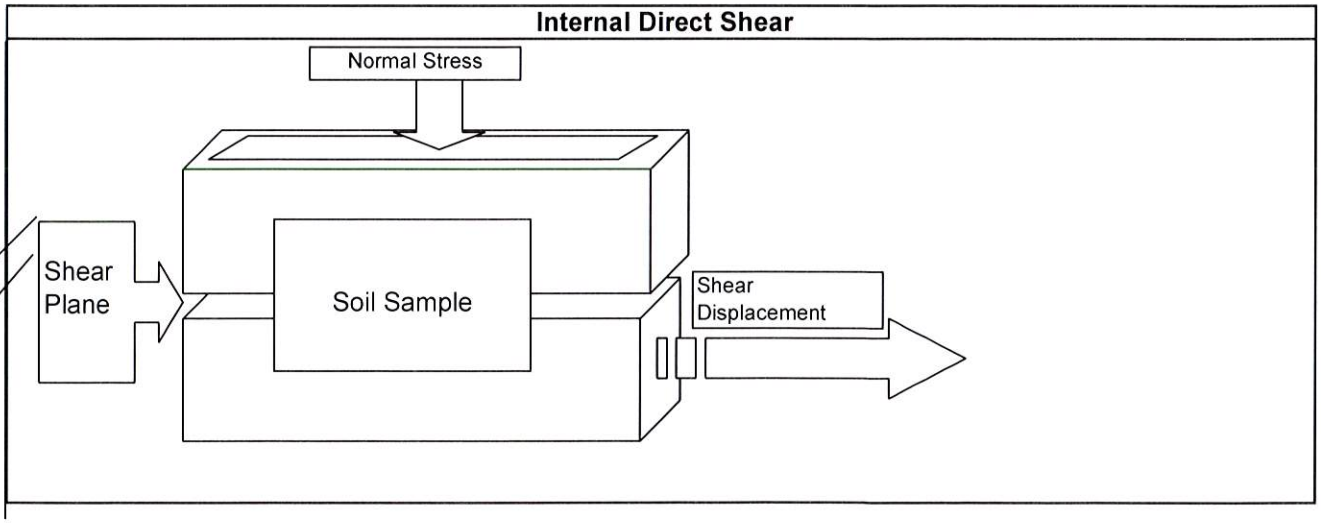
Sample Number: Composite

Dry Density (pcf): 115.6

% Moisture: 9.3

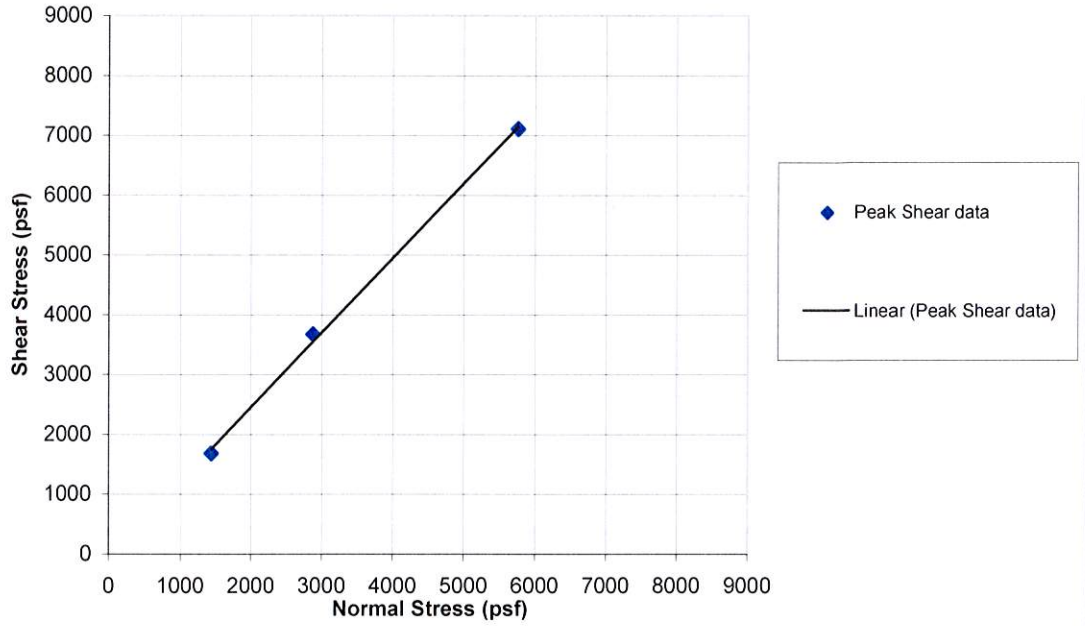


Diagram



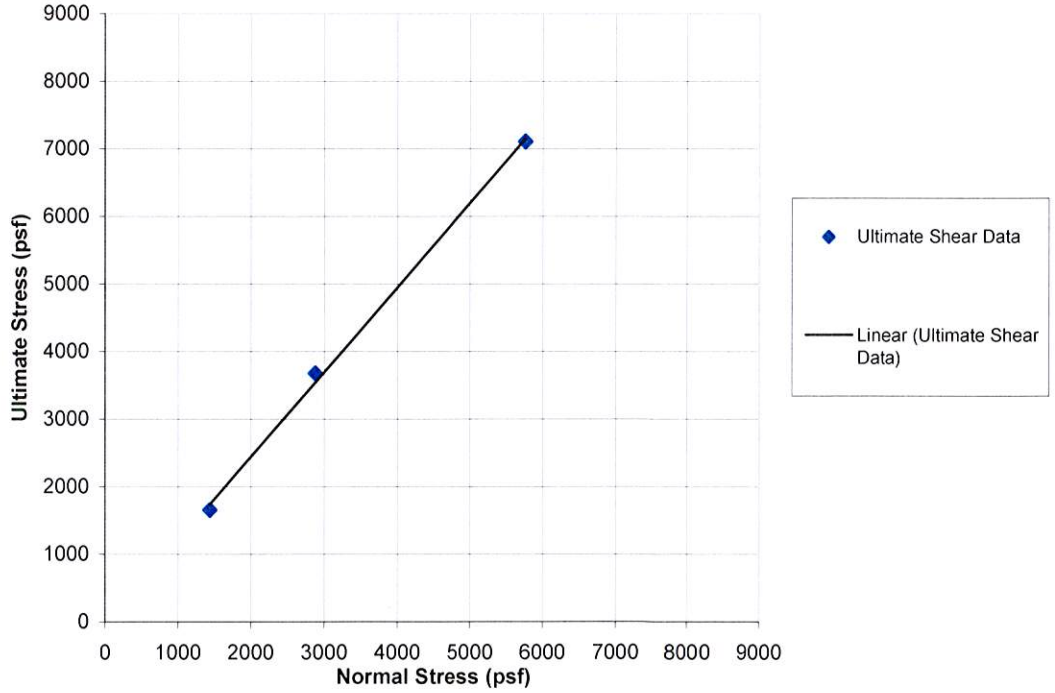
ADVANCED TERRA TESTING

Peak Shear Stress vs Normal Stress



Cohesion = N/A *Friction Angle = 51.3°*

Ultimate Shear Stress vs. Normal Stress



Cohesion = N/A *Friction Angle = 51.4°*

ATT
ADVANCED TERRA TESTING

Large Scale Internal Direct Shear
ASTM D3080 Modified

Client: Smith Geotechnical Engineering Consultants
Job Number.: 2406-73
Project Number: 110385
Conditions: Inundated
Location: --
Project: Schwartzwalder Mine TR23 Responses

Speed Rate (in/min): 0.02
Normal Stress 1 (psf): 1440
Normal Stress 2 (psf): 2880
Normal Stress 3 (psf): 5760
File Name: 2406_73_largeScaleDirectShear-ASTMD3080m-5321-6243-R0_3.xls
Data Files: SGTP5DSC.TXT,SGTP5DSB.TXT,SGTP5DSA.TXT

Test Date: 9/30/2016
Technician: BDF
Data Entered By: BDF
Date: 10/10/2016

Displacement (in)	Normal Stress 1 (psf):	Normal Stress 2 (psf):	Normal Stress 3 (psf):
0.000	0	0	0
0.028	241	370	700
0.101	391	654	1378
0.175	490	853	1861
0.250	587	1034	2326
0.322	681	1199	2774
0.395	758	1355	3139
0.467	826	1519	3488
0.541	914	1662	3763
0.611	998	1820	4012
0.680	1075	1954	4286
0.752	1146	2050	4569
0.821	1214	2188	4804
0.891	1279	2306	5045
0.959	1324	2449	5279
1.027	1377	2602	5465
1.094	1445	2809	5701
1.161	1490	3010	5845
1.227	1530	3156	5948
1.294	1549	3304	6142
1.357	1596	3392	6295
1.421	1629	3364	6458
1.486	1687	3481	6546
1.549	1697	3638	6662
1.611	1732	3779	6788
1.675	1757	3483	6946
1.735	1807	3777	7114
1.797	1837	3975	7187
1.857	1837	4061	7276
1.918	1855	4021	7404
1.978	1762	4097	7522
2.038	1749	3960	7603
2.095	1749	3900	7628

Sample Information

Boring: EA-TP5
Depth: 3-5'
Sample Number: Composite
Dry Density (pcf): 120.5
% Moisture: 6.8

Note: Ultimate cohesion not reported; data suggests negative value.

	Peak	Ultimate
Friction Angle	52.9	53.5
Cohesion (psf)	89.5	N/A

	Peak Strength(psf)	Ultimate Strength(psf)
Normal Stress 1	1855	1749
Normal Stress 2	4097	3900
Normal Stress 3	7628	7628

Data Checked By KR

Date 10/10/16

ATT
ADVANCED TERRA TESTING

Sample Configuration

Sample Information

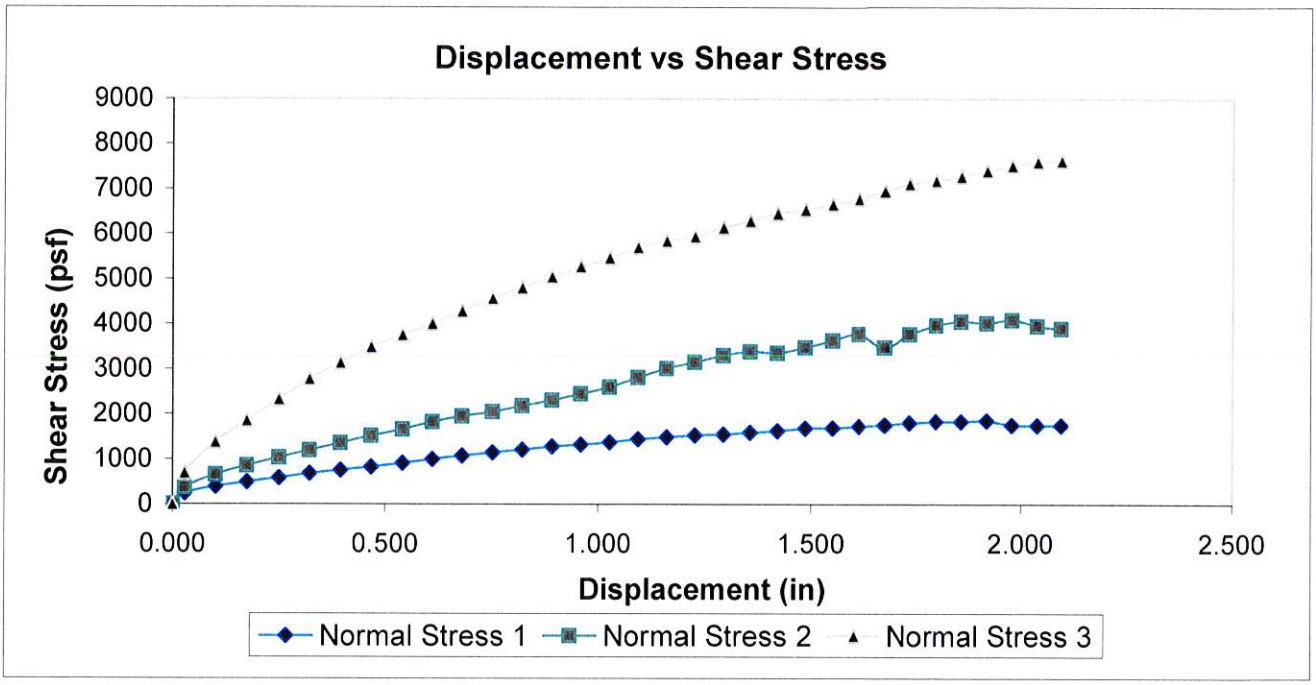
Boring: EA-TP5

Depth: 3-5'

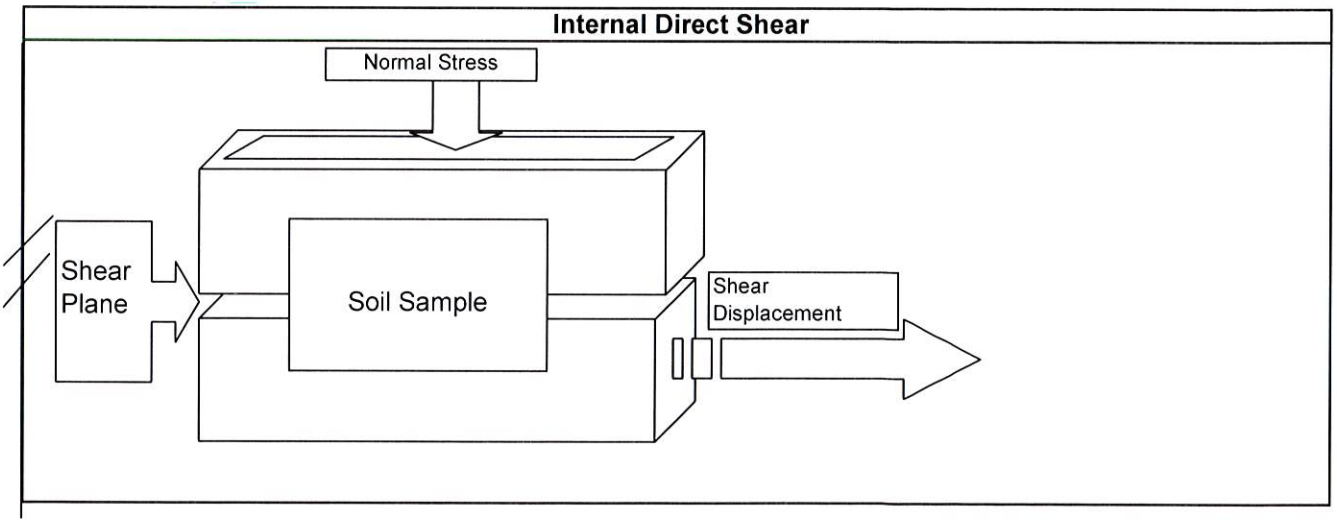
Sample Number: Composite

Dry Density (pcf): 120.5

% Moisture: 6.8

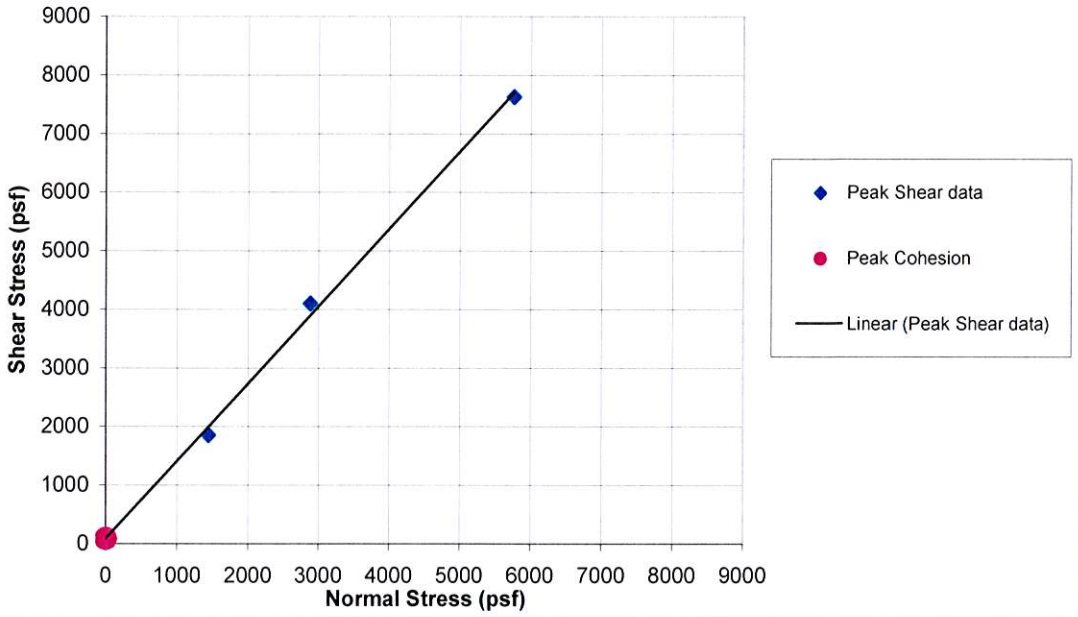


Diagram



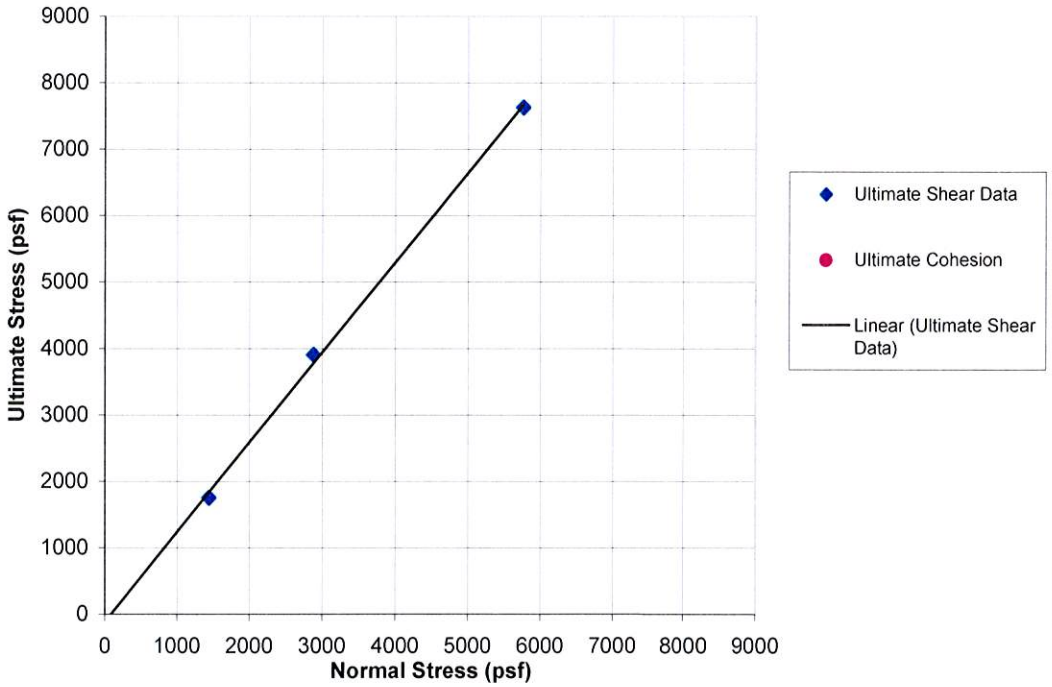
ATT
ADVANCED TERRA TESTING

Peak Shear Stress vs Normal Stress



Cohesion = 89.5 psf *Friction Angle = 52.9°*

Ultimate Shear Stress vs. Normal Stress



Cohesion = N/A *Friction Angle = 53.5°*

ATT
ADVANCED TERRA TESTING

Large Scale Internal Direct Shear
ASTM D3080 Modified

Smith Geotechnical Engineering

Client: Consultants
Job Number.: 2406-73
Project Number: 110385
Conditions: Inundated
Location: --
Project: Schwartzwalder Mine TR23 Responses

Speed Rate (in/min): 0.02
Normal Stress 1 (psf): 1440
Normal Stress 2 (psf): 2880
Normal Stress 3 (psf): 5760

Test Date: 9/30/2016
Technician: BDF
Data Entered By: BDF
Date: 10/10/2016
File Name: 2406_73_largeScaleDirectShear-ASTMD3080m-5321-6243-R0_4.xls
Data Files: SGTP6DSC.TXT,SGTP6DSB.TXT,SGTP6DSA.TXT

Displacement (in)	Normal Stress 1 (psf):	Normal Stress 2 (psf):	Normal Stress 3 (psf):
0.000	0	0	0
0.023	210	419	754
0.089	351	696	1343
0.155	459	922	1753
0.221	527	1129	2196
0.286	620	1325	2555
0.354	709	1508	2947
0.416	794	1682	3251
0.481	889	1896	3661
0.546	938	2041	4013
0.609	1012	2243	4268
0.671	1095	2369	4569
0.734	1178	2545	4918
0.795	1342	2710	5172
0.856	1443	2804	5552
0.916	1546	2882	5884
0.976	1601	3002	6153
1.034	1687	3067	6442
1.095	1702	3170	6719
1.151	1774	3253	6993
1.210	1808	3339	6956
1.269	1848	3443	7081
1.329	1885	3513	7151
1.388	1931	3573	7224
1.450	2006	3651	7298
1.510	2081	3570	7398
1.573	2104	3580	7444
1.636	2109	3644	7602
1.701	2160	3669	7745
1.763	2222	3761	7873
1.829	2277	3719	7934
1.894	2292	3689	8092
1.961	2368	3634	8226

Sample Information

Boring: EA-TP6
Depth: 3-5'
Sample Number: Composite
Dry Density (pcf): 121.8
% Moisture: 5.5

	Peak	Ultimate
Friction Angle	54.1	54.3
Cohesion (psf)	135.5	72.0

	Peak Strength(psf)	Ultimate Strength(psf)
Normal Stress 1	2368	2368
Normal Stress 2	3761	3634
Normal Stress 3	8226	8226

Data Checked By KR

Date 10/10/16

ATT
ADVANCED TERRA TESTING

Sample Configuration

Sample Information

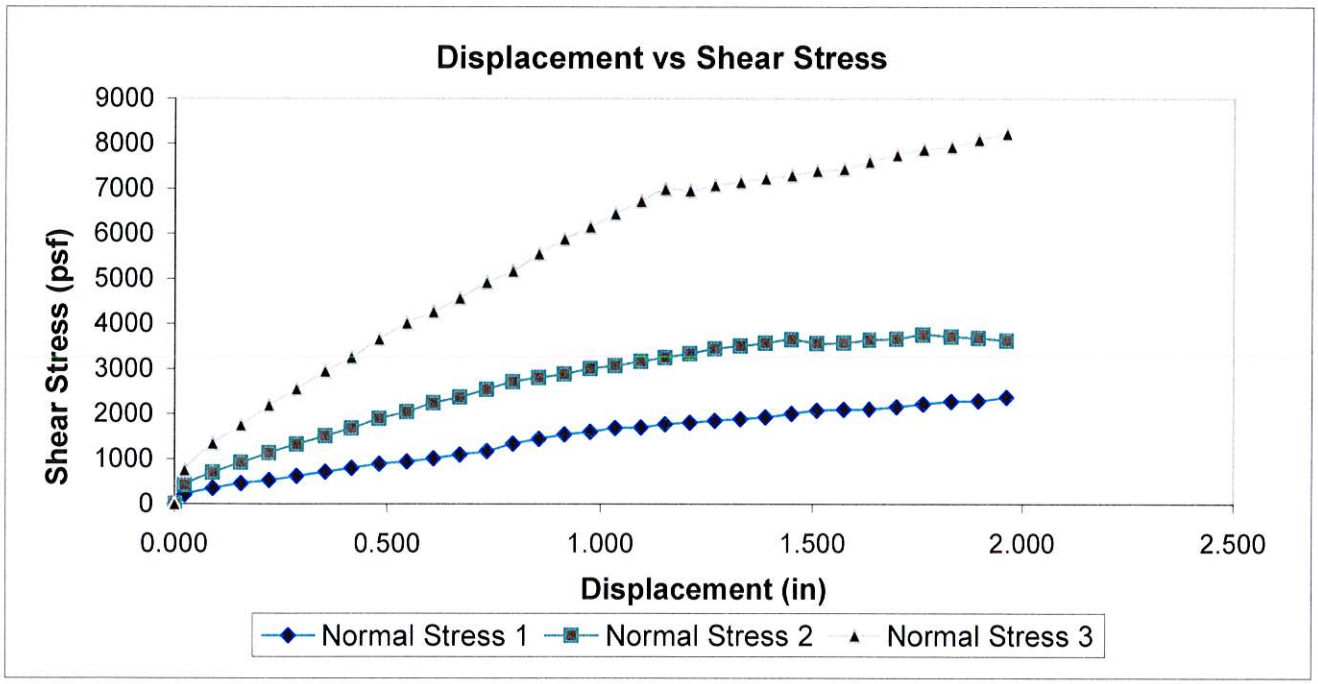
Boring: EA-TP6

Depth: 3-5'

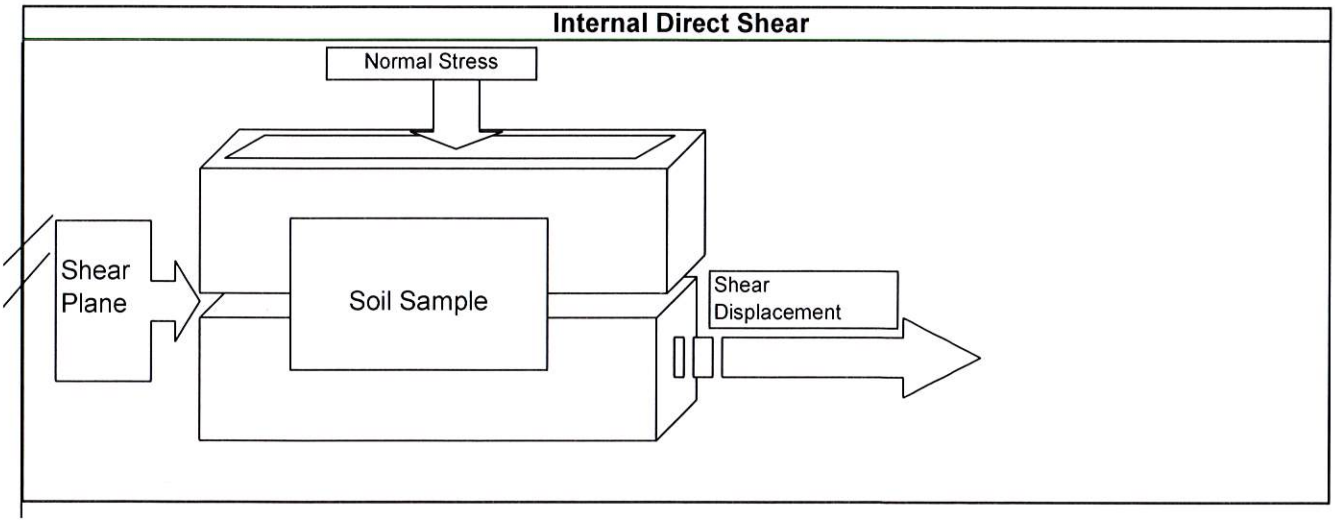
Sample Number: Composite

Dry Density (pcf): 121.8

% Moisture: 5.5



Diagram



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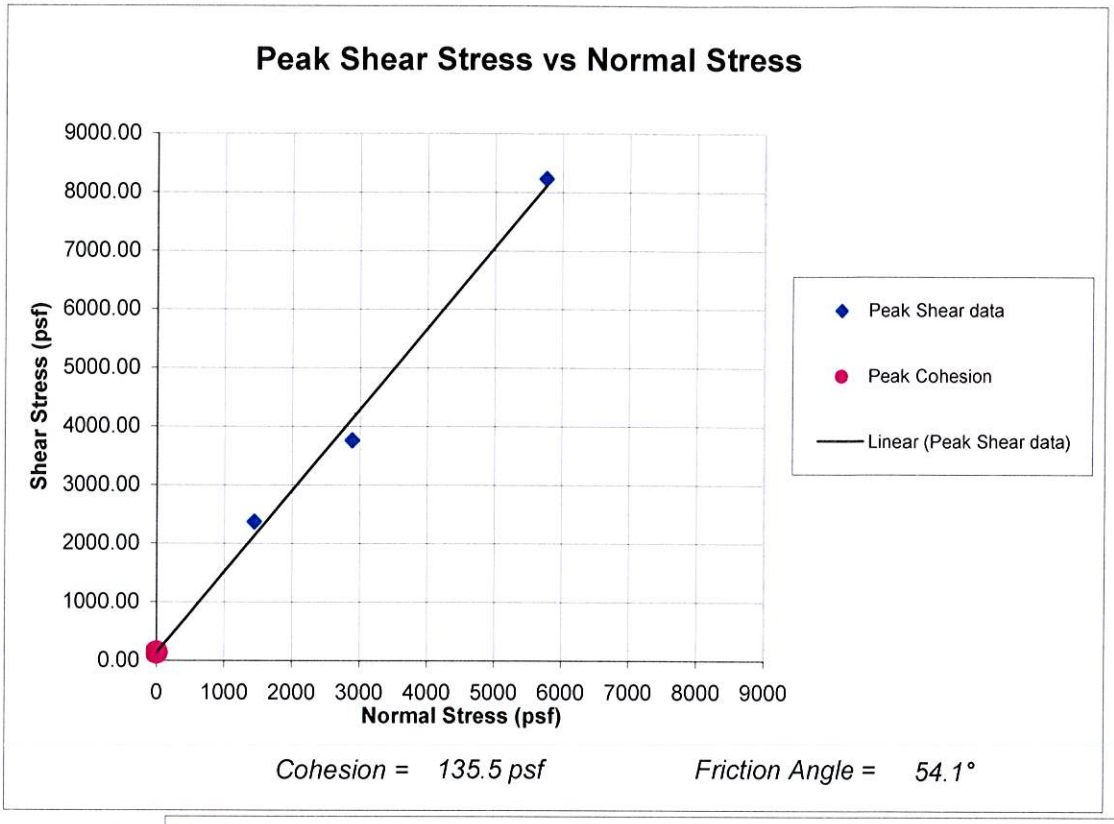
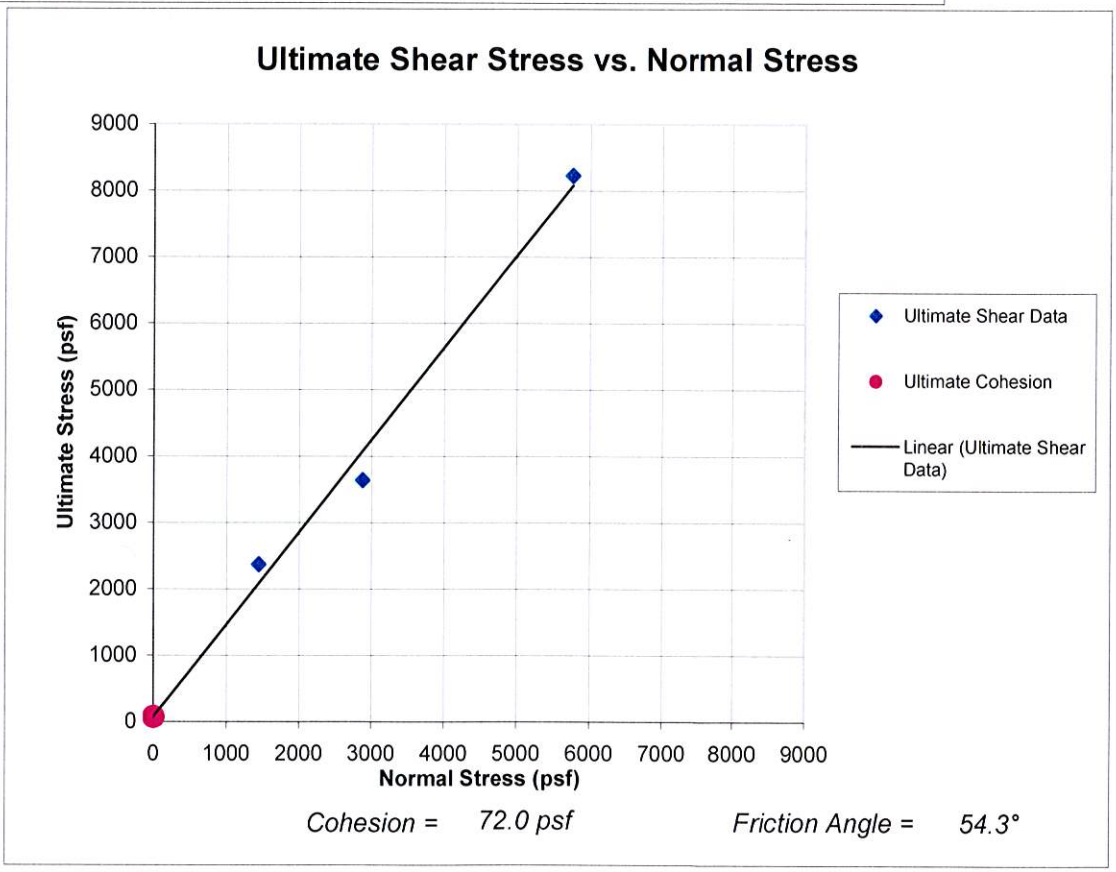
ADVANCED TERRA TESTING





ATT
ADVANCED TERRA TESTING

Large Scale Internal Direct Shear
ASTM D3080 Modified

Client: Smith Geotechnical Engineering Consultants
Job Number.: 2406-73
Project Number: 110385
Conditions: Inundated
Location: --
Project: Schwartzwalder Mine TR23 Responses

Speed Rate (in/min): 0.02
Normal Stress 1 (psf): 720
Normal Stress 2 (psf): 1440
Normal Stress 3 (psf): 2880

Test Date: 10/7/2016
Technician: BDF
Data Entered By: BDF
Date: 10/11/2016
File Name: 2406_73_largeScaleDirectShear-ASTMD3080m-5321-6243-R0_6.xls
Data Files: SGTP7DSC.TXT,SGTP7DSB.TXT,SGTP7DSA.TXT

Displacement (in)	Normal Stress 1 (psf):	Normal Stress 2 (psf):	Normal Stress 3 (psf):
0.000	0	0	0
0.024	125	218	218
0.084	195	354	387
0.147	239	433	546
0.209	273	506	706
0.274	306	565	842
0.338	331	616	985
0.401	356	663	1119
0.466	379	704	1239
0.533	399	749	1360
0.596	414	794	1426
0.659	430	830	1501
0.723	444	865	1577
0.784	457	893	1649
0.846	467	922	1710
0.910	477	945	1780
0.972	489	971	1840
1.037	498	986	1903
1.103	508	1005	1951
1.167	517	1019	2001
1.232	515	1028	2046
1.297	515	1036	2087
1.360	520	1043	2132
1.425	528	1051	2173
1.487	533	1066	2203
1.549	533	1073	2227
1.614	535	1073	2265
1.679	538	1076	2303
1.743	540	1083	2331
1.809	553	1107	2364
1.874	557	1121	2398
1.938	560	1131	2414
2.001	562	1144	2427
2.066	563	1159	2447

Sample Information

Boring: EA-TP7
Depth:
Sample Number: Topsoil
Dry Density (pcf): 100.7
% Moisture: 1.8

Note: Data suggests negative intercept. No value is reported.

	Peak	Ultimate
Friction Angle	41.2	41.2
Cohesion (psf)	N/A	N/A

	Peak Strength(psf)	Ultimate Strength(psf)
Normal Stress 1	563	563
Normal Stress 2	1159	1159
Normal Stress 3	2447	2447

Data Checked By KR

Date 10/12/16

ATT
ADVANCED TERRA TESTING

Sample Configuration

Sample Information

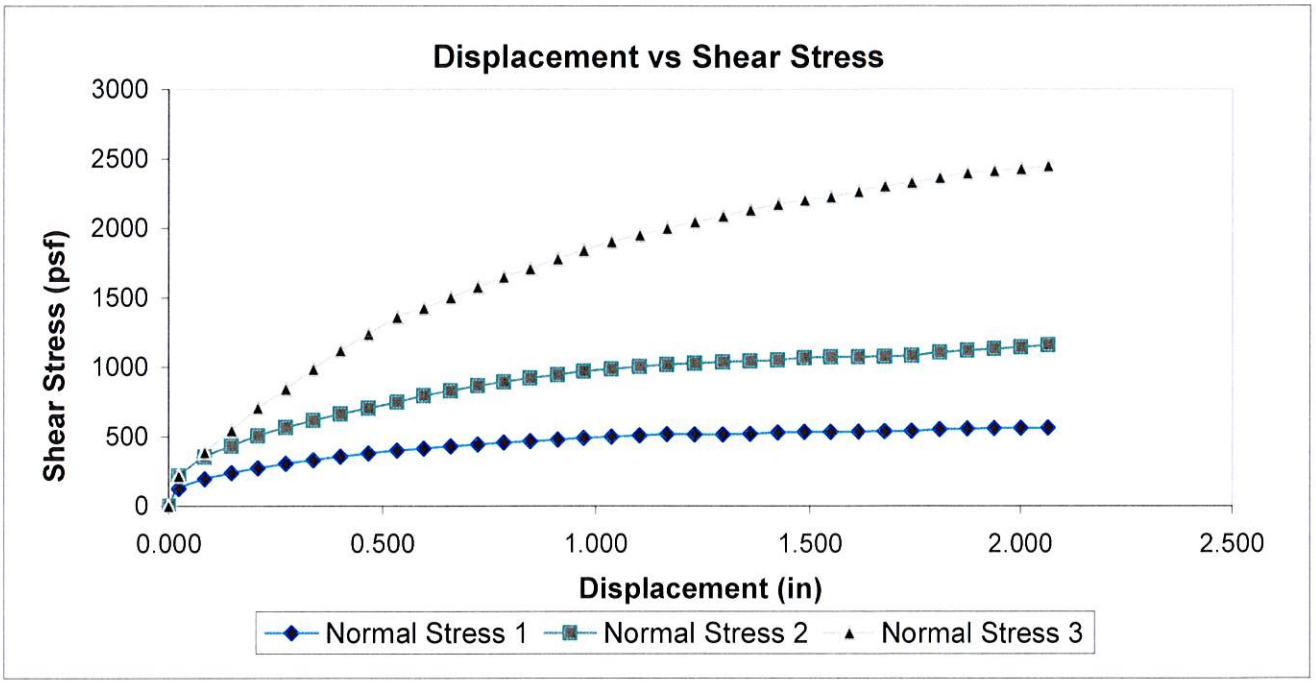
Boring: EA-TP7

Depth: 0.0

Sample Number: Topsoil

Dry Density (pcf): 100.7

% Moisture: 1.8



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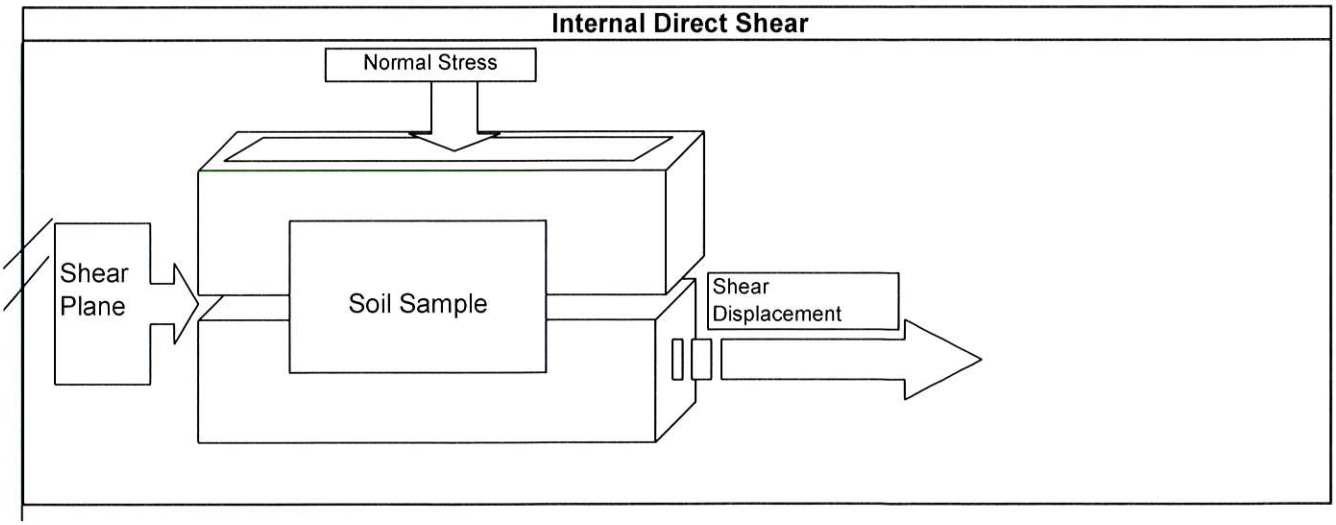
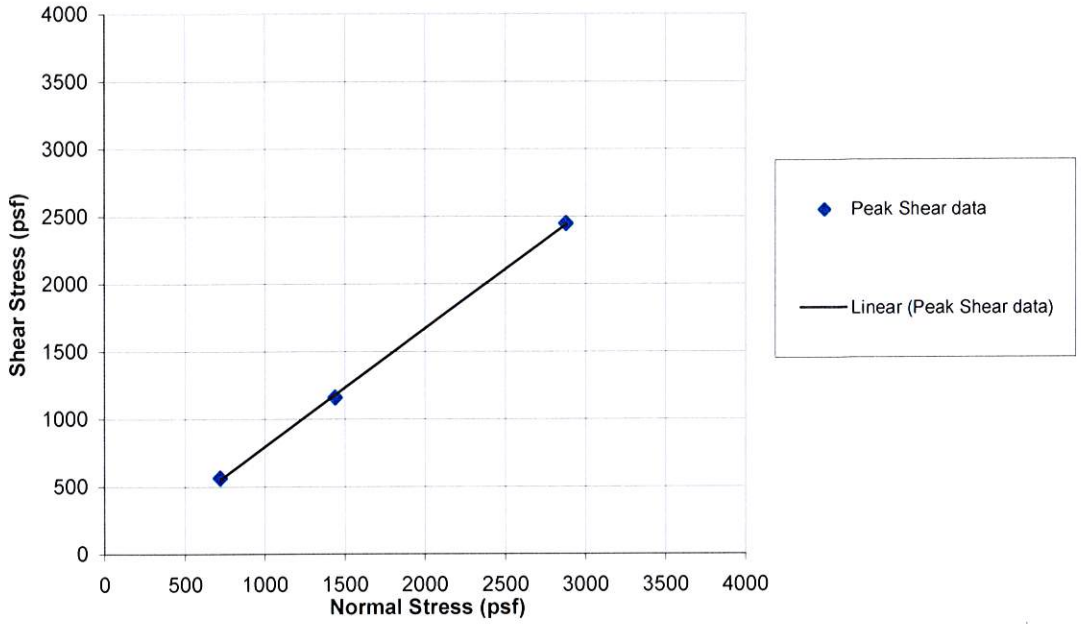


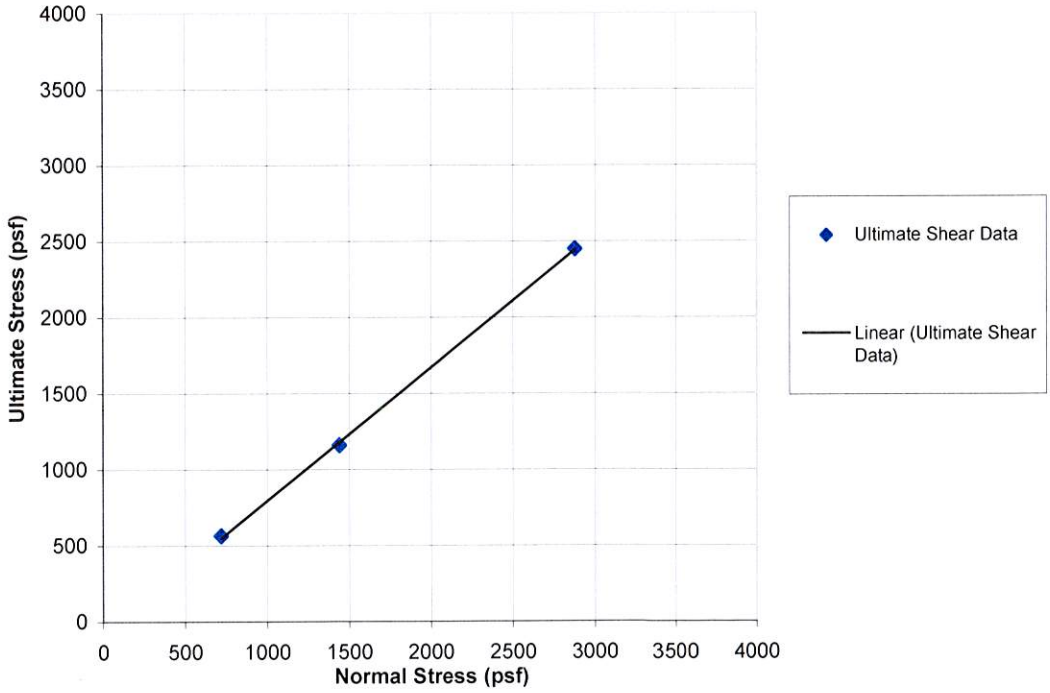
ATT
ADVANCED TERRA TESTING

Peak Shear Stress vs Normal Stress



Cohesion = *N/A* *Friction Angle =* *41.2°*

Ultimate Shear Stress vs. Normal Stress



Cohesion = *N/A* *Friction Angle =* *41.2°*

ATT
ADVANCED TERRA TESTING

ATTACHMENT B
SLOPE STABILITY ANALYSES

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 GENERAL

The Schwartzwalder Mine is an inactive uranium mine in Jefferson County, Colorado historically operated by Cotter Corporation (N.S.L.) (Cotter) under Mining Permit M-1977-30 with amendments. Technical Revision 23 (TR-23) to the Schwartzwalder Mining Permit M-1977-30 was submitted to update Mine Permit Amendment 4. The reclamation plan submitted as part of Amendment 4 discusses the removal of Solid Source Term Material from the Schwartzwalder valley floor and transfer to a permanent disposal location in an existing mine void, the "CV Glory Hole" (Cotter, 2012). TR-23 was submitted to request additional approval to place the Solid Source Term Material in the existing Waste Rock Piles (WRP). The volume of the Solid Source Term Material that will be placed on the existing WRPs is estimated to be 32,000 cy to 54,000 cy. This attachment presents the results of geotechnical slope stability analyses that were performed to assist in design of the waste rock pile reconfigurations and to address comments on TR-23 provided by the Colorado Division of Reclamation, Mining and Safety (CDRMS).

2.0 METHODS OF ANALYSES

The stability analyses were performed utilizing the computer program SLOPE/W (GEO-SLOPE, 2012). SLOPE/W solves slope stability problems by any of the following methods: (1) Ordinary Fellenius, (2) Bishop Simplified, (3) Janbu's Simplified, (4) Spencer, (5) Morgenstern-Price, (6) U.S. Army Corps of Enigeers, (7) Lowe-Karafiath, and (8) Generalized Limit Equilibrium. The method chosen for use in the analyses was Spencer's method. Both static and pseudo-static analyses were performed.

3.0 MATERIAL PROPERTIES USED IN THE ANALYSES

Engineering Analytics collected bulk soil samples from the north and south waste rock piles, alluvial waste rock source (new waste rock), topsoil source, and colluvium for strength testing. Large scale internal direct shear testing was completed on each of the bulk samples collected from the site. The peak friction angles for the waste rock were measured to be 25.1, 50.9, 52.9, and 54.1 degrees. The peak friction angle of 25.1 degrees was measured on the sample from EA-TP2. It was shown with the other laboratory testing that this sample had significantly more fines than the other samples. In order to determine a peak friction angle for the waste rock, all of the values from the direct shear testing were plotted together and fitted with a best-fit line. This plot is shown on Figure B-1. Based on this analysis it was determined to use a peak friction angle of 42.5 degrees for the waste rock material. The strength parameter values for the bedrock are from West (1995). We used the lower bound of the provided strength values for the bedrock in our analysis. The total unit weight for each material type was taken from the laboratory results and a published value from West (1995) was used for the bedrock. Table B-1 summarizes the material shear strength parameters for all of the material types used in the stability analyses.

4.0 DESCRIPTION AND RESULTS OF ANALYSES

Three types of failures were analyzed. McDermid and Geo-Hydro (1983) analyzed cover stability and the contact with the native ground. EA analyzed these two failures and called them surficial and deep failures. In addition, EA analyzed an intermediate optimized failure surface. Based on the laboratory results described above, the strength of the waste rock material was analyzed as being lower than the colluvium, therefore the deep failure was run at the interface between the waste rock and the colluvium. The stability analyses were run for one cross-section through each of the waste rock piles. The locations of the cross-sections are shown on Figure B-2 and the cross-sections are shown on Figure B-3. For one case it was assumed that no water was present in the waste rock piles. The assumption of 5 feet of water above the colluvium at the base of the waste rock piles as presented in McDermid and Geo-Hydro (1983) was used for the second analyses.

EA also completed pseudo-static stability analyses. EA used the seismic hazard deaggregation tool provided by the USGS in order to obtain a peak ground acceleration (PGA) for use in the pseudo static stability analyses. The results of the seismic analysis are presented in Figure B-4. The analysis showed a PGA of 0.11g. Hynes-Griffin and Franklin (1984) report that one half of the PGA can be used in analyses, therefore, EA used 0.055g.

The results of the static stability analyses for these cross-sections are presented in Figures B-5 through B-16 and summarized in Table B-2. The results of the pseudo-static analyses are presented in Figures B-17 through B-28 and are summarized in Table B-2. The results of the analyses indicate that the factor of safety meets the minimum 1.5 criteria for static analysis and the minimum 1.3 criteria for pseudo-static analysis.

5.0 REFERENCES

Cotter Corporation (N.S.L.). (2012). “Application Amendment 4, Mine Permit M-1977-300, Schwartzwalder Mine.” May 1.

GEO-SLOPE International (2012). Slope/W 2012 Slope Stability Analysis, http://www.geoslope.com/products/slopew.aspx.

Hynes-Griffin, M.E. and A.G. Franklin (1984). “Rationalizing the seismic coefficient method” Miscellaneous Paper GL-84-13, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi, 21 p.

McDermid Engineering Associates, Inc. and Geo-Hydro Consulting, Inc. (1983). “Responses to the State of Colorado Mined Land Reclamation Division Comments on Waste Pile, Related Portions of Permit Amendment Application.” July.

West, T.R. (1995). “Geology Applied to Engineering.” Prentice Hall, Englewood Cliffs, New Jersey.

TABLES

Table B-1 Material Shear Strength Parameters Used in Stability Analyses

Material Type	Total Unit Weight (pcf)	Angle of Internal Friction (degrees)	Cohesion (psf)
Topsoil[(1)]	102.5	41.2	0
New Waste Rock[(2)]	117	51.6	0
Existing Waste Rock[(3)]	120.6	42.5	0
Colluvium[(4)]	126	51.3	0
Bedrock[(5)]	175	48.0	700

Notes: 1) Results from EA-TP7
2) Results from EA-TP1
3) Best fit of strength results from EA-TP2, EA-TP3, EA-TP5, and EA-TP6. For total unit weight the average was used.
4) Results from EA-TP4
5) Lower bound published values from West (1995)

Table B-2 Summary of Minimum Factors of Safety for Slope Stability Analyses

Loading Conditions	Cross-Section	Water Conditions	Surficial Failure FOS	Intermediate Failure FOS	Deep Failure FOS
Static	XS-N1	No Water	2.2 (B-5)	2.4 (B-7)	3.7 (B-9)
		Water at 5’ above base	2.1 (B-6)	2.4 (B-8)	3.5 (B-10)
	XS-S1	No Water	2.1 (B-11)	2.2 (B-13)	2.6 (B-15)
		Water at 5’ above base	2.1 (B-12)	2.1 (B-14)	2.5 (B-16)
Pseudo-Static	XS-N1	No Water	1.9 (B-17)	2.1 (B-19)	3.0 (B-21)
		Water at 5’ above base	1.9 (B-18)	2.0 (B-20)	2.9 (B-22)
	XS-S1	No Water	1.8 (B-23)	1.9 (B-25)	2.3 (B-27)
		Water at 5’ above base	1.8 (B-24)	1.9 (B-26)	2.2 (B-28)

Note: The citation in parentheses corresponds to the Figure number with the results

FIGURES

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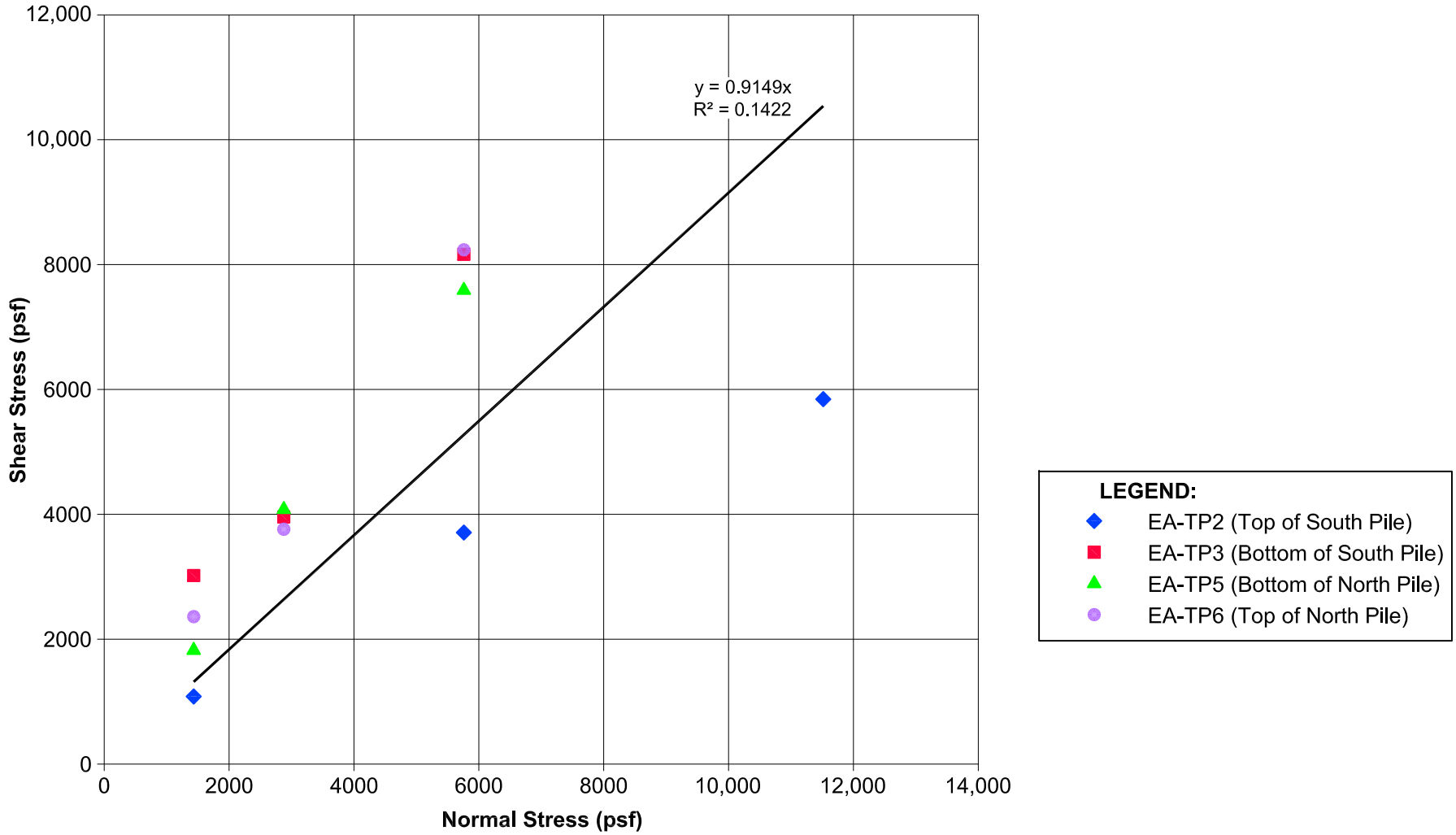


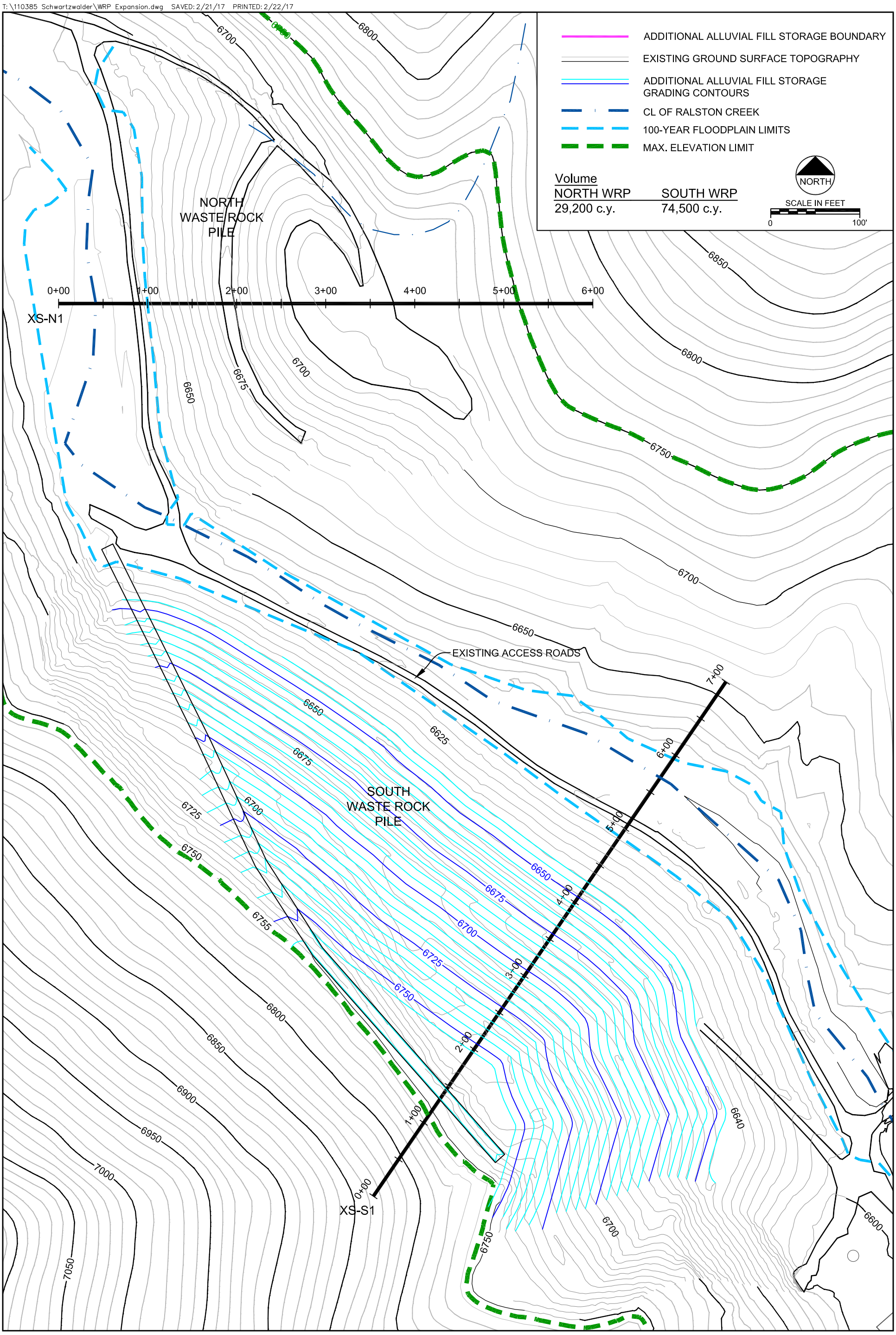
Project No. 110385

February 2017

Engineering Analytics, Inc.

FIGURE B-1
PEAK SHEAR STRESS vs NORMAL STRESS FOR WASTE ROCK MATERIAL
COTTER SCHWARTZWALDER MINE

T: \110385 Schwartzwalder\WRP Expansion.dwg SAVED: 2/21/17 PRINTED: 2/22/17

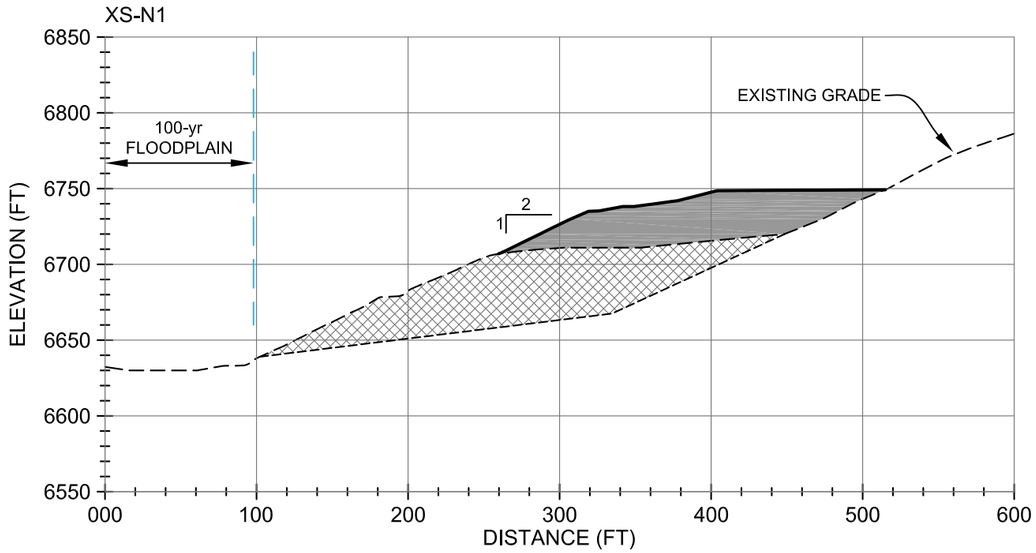


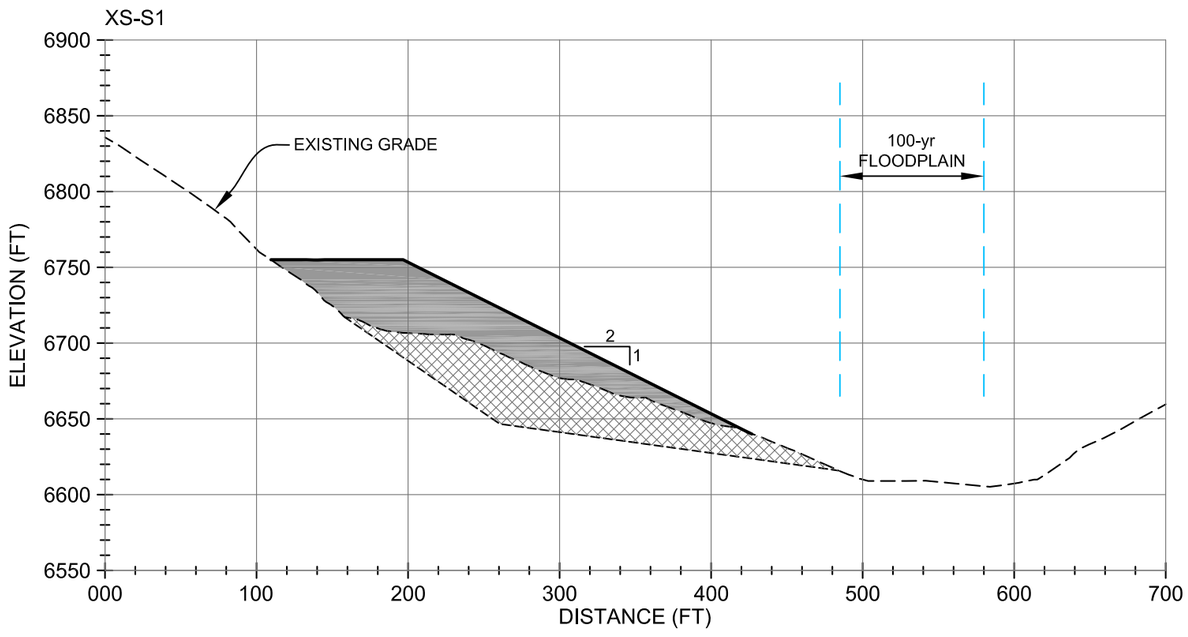
Project No. 110385

February 2017

Engineering Analytics, Inc.

FIGURE B-2
LOCATION OF CROSS SECTION USED IN SLOPE STABILITY ANALYSES
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN





ADDITIONAL ALLUVIAL FILL STORAGE

APPROXIMATE EXISTING WASTE ROCK PILE

SCALE IN FEET
0 100'

T:\110385 Schwartzwalder\WRP Exponsion.dwg SAVED:2/14/17 PRINTED:2/21/17

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FIGURE B-3
SLOPE STABILITY CROSS SECTION
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

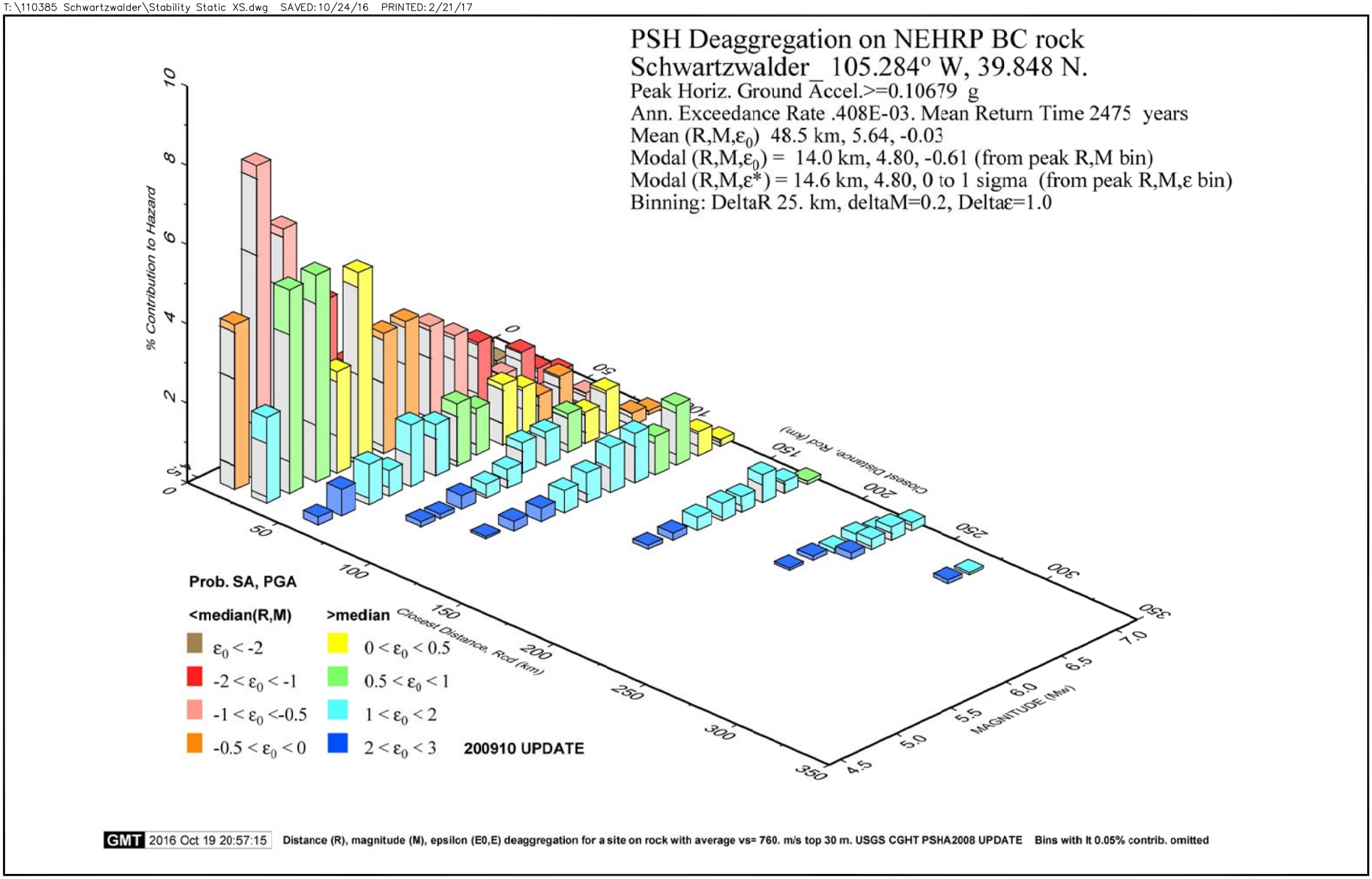

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FIGURE B-4
USGS SEISMIC HAZARD ANALYSIS RESULTS
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability Static XS.dwg SAVED: 10/24/16 PRINTED: 2/21/17

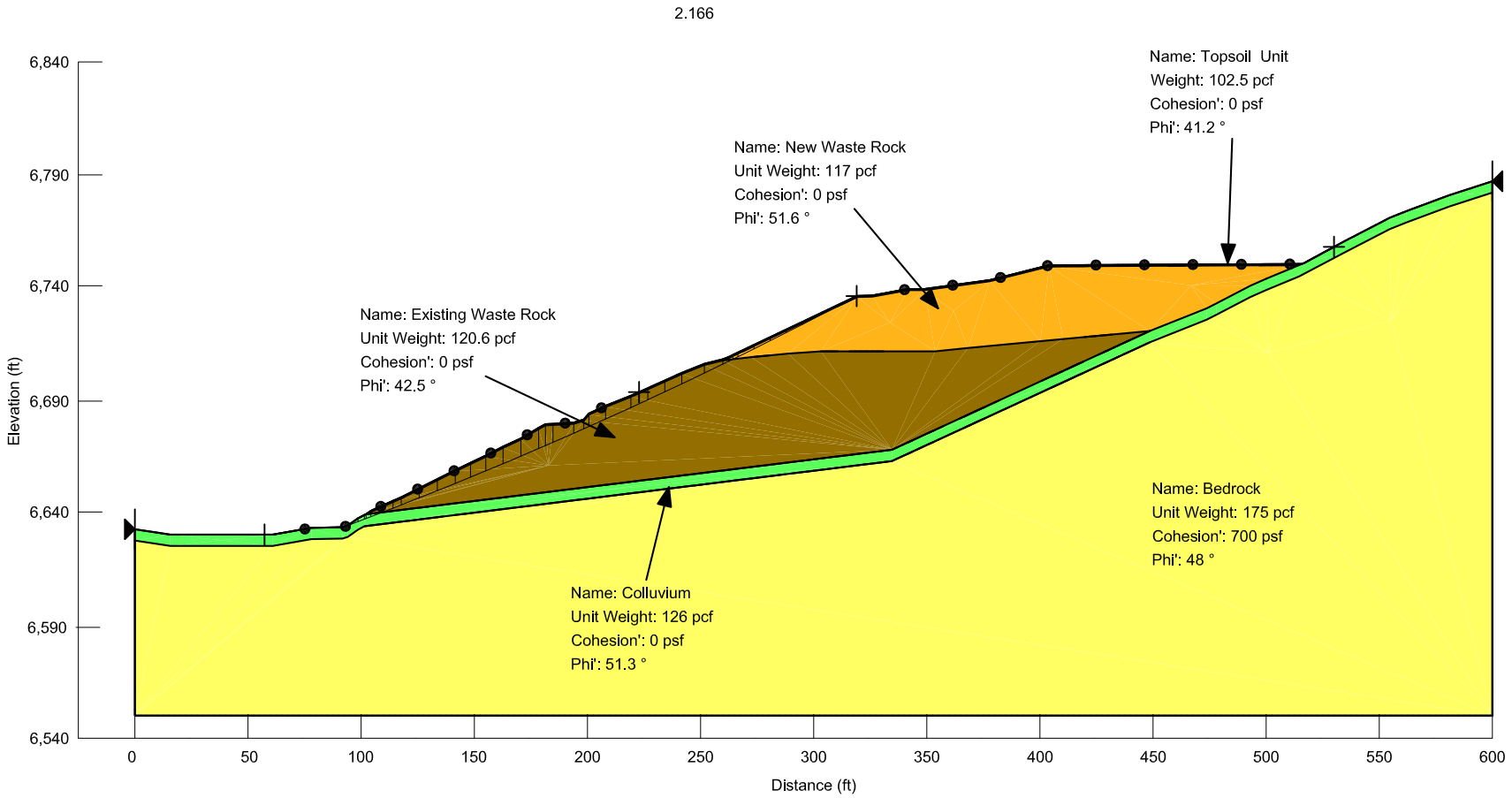

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FIGURE B-5
STATIC SLOPE STABILITY RESULTS XS-N1 SURFICIAL FAILURE
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability Static XS.dwg SAVED:10/24/16 PRINTED:2/21/17

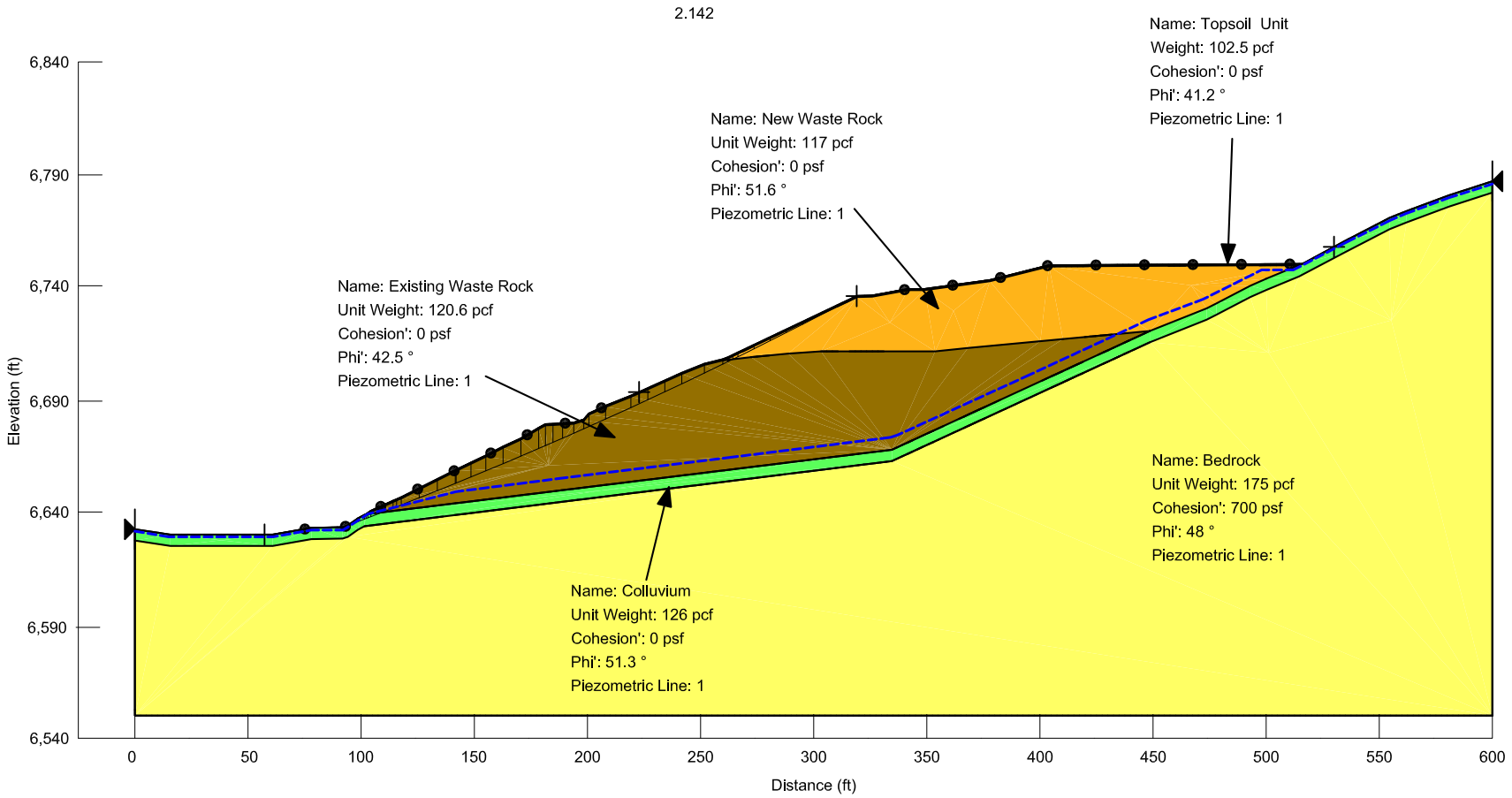

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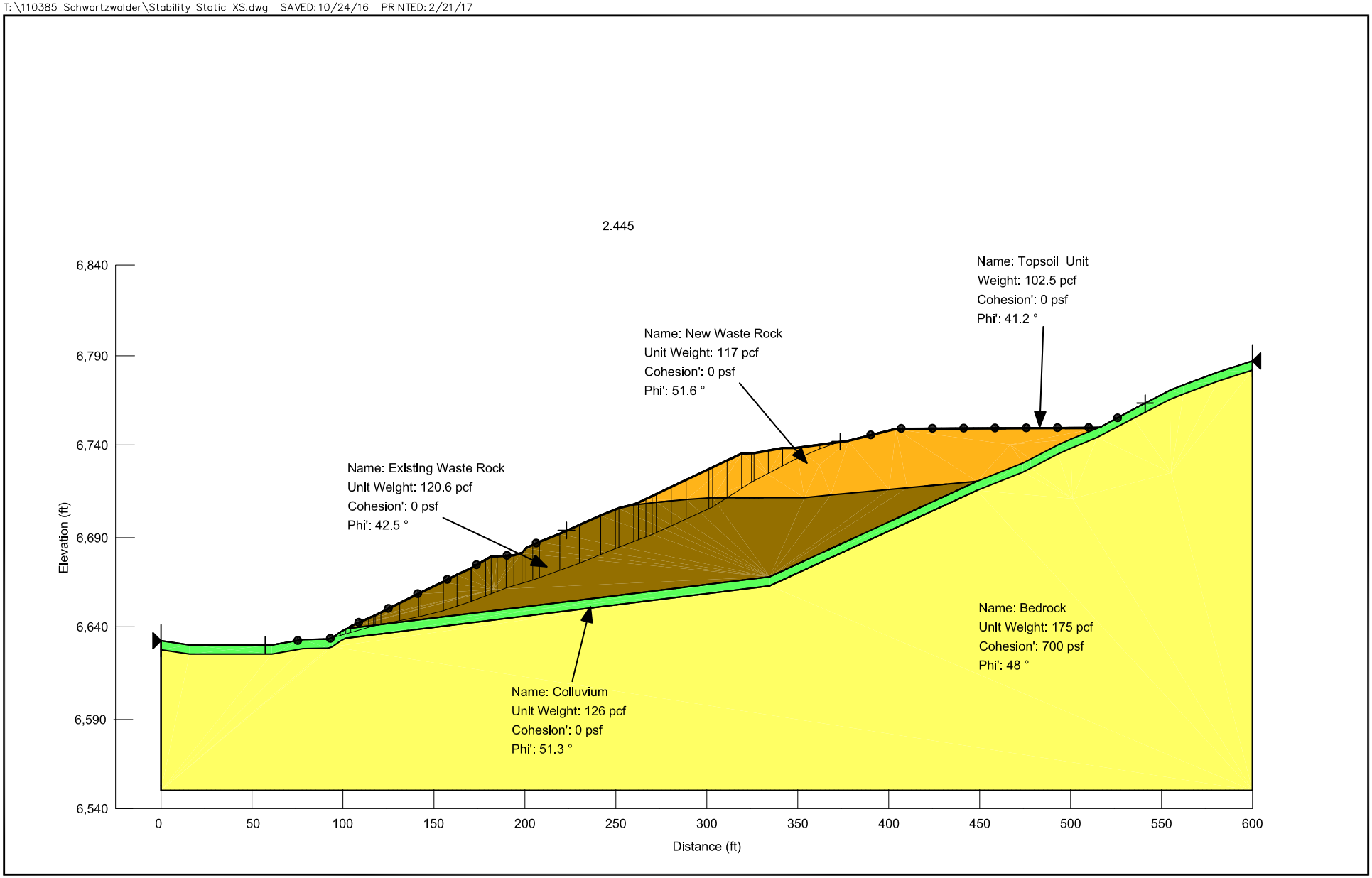
FIGURE B-6
STATIC SLOPE STABILITY RESULTS XS-N1 SURFICIAL FAILURE WITH WATER
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T: \110385 Schwartzwalder\Stability Static XS.dwg SAVED: 10/24/16 PRINTED: 2/21/17



Project No. 110385

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FIGURE B-7
STATIC SLOPE STABILITY RESULTS XS-N1 INTERMEDIATE FAILURE
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability Static XS.dwg SAVED:10/24/16 PRINTED:2/21/17

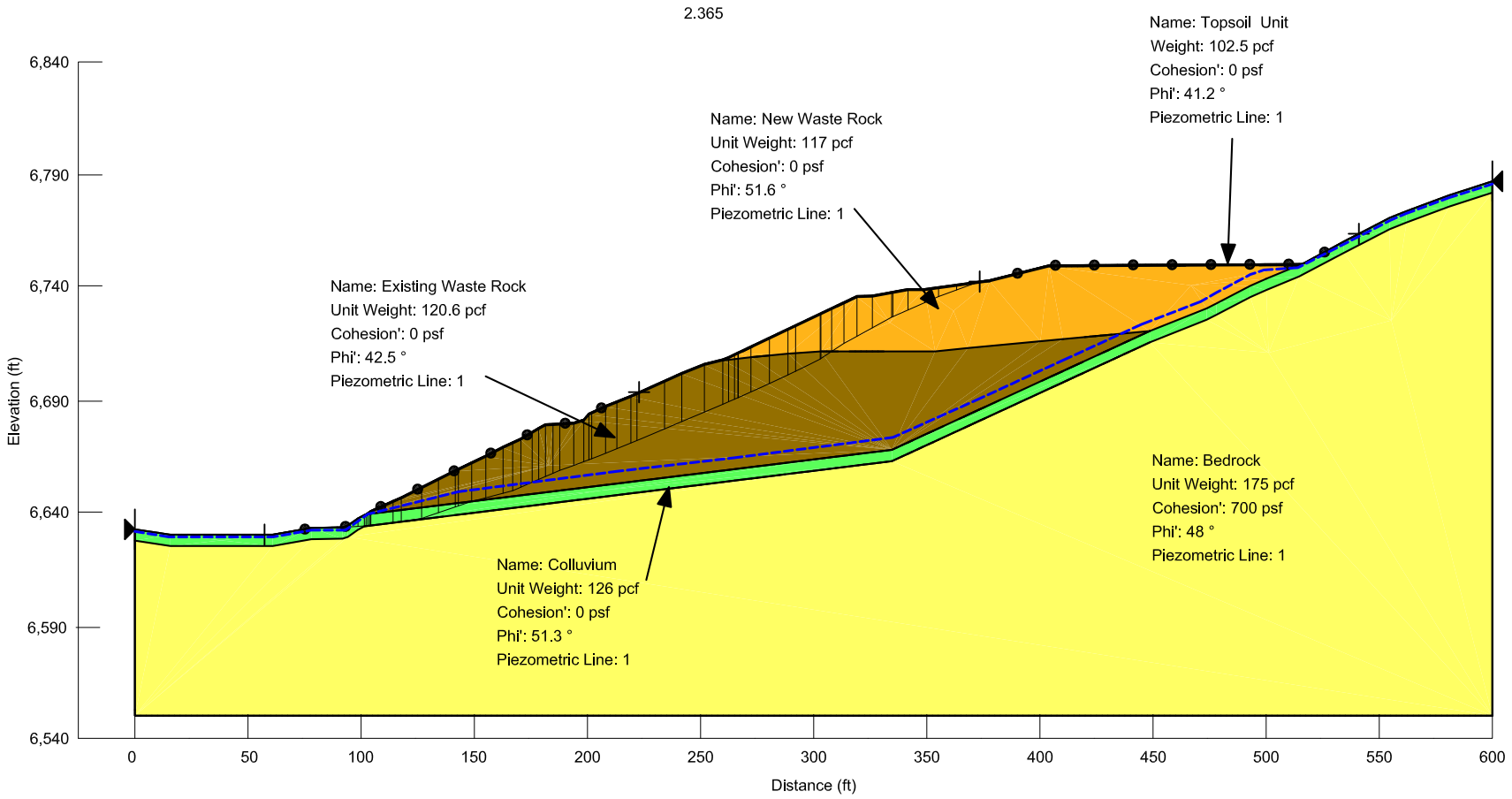

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FIGURE B-8
STATIC SLOPE STABILITY RESULTS XS-N1 INTERMEDIATE FAILURE WITH WATER
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T: \110385 Schwartzwalder\Stability Static XS.dwg SAVED: 10/24/16 PRINTED: 2/21/17

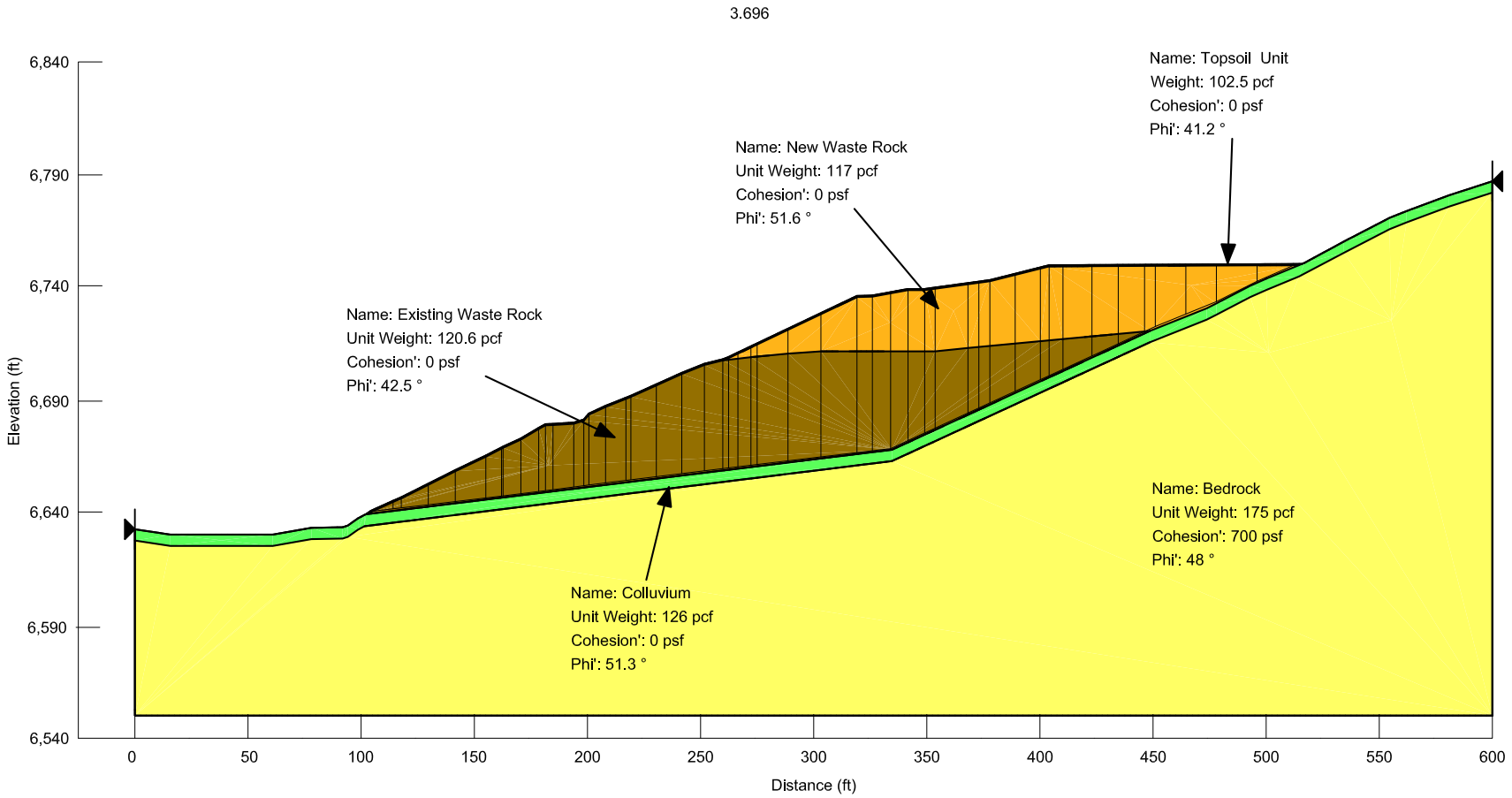

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FIGURE B-9
STATIC SLOPE STABILITY RESULTS XS-N1 DEEP FAILURE
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T: \110385 Schwartzwalder\Stability Static XS.dwg SAVED: 10/24/16 PRINTED: 2/21/17

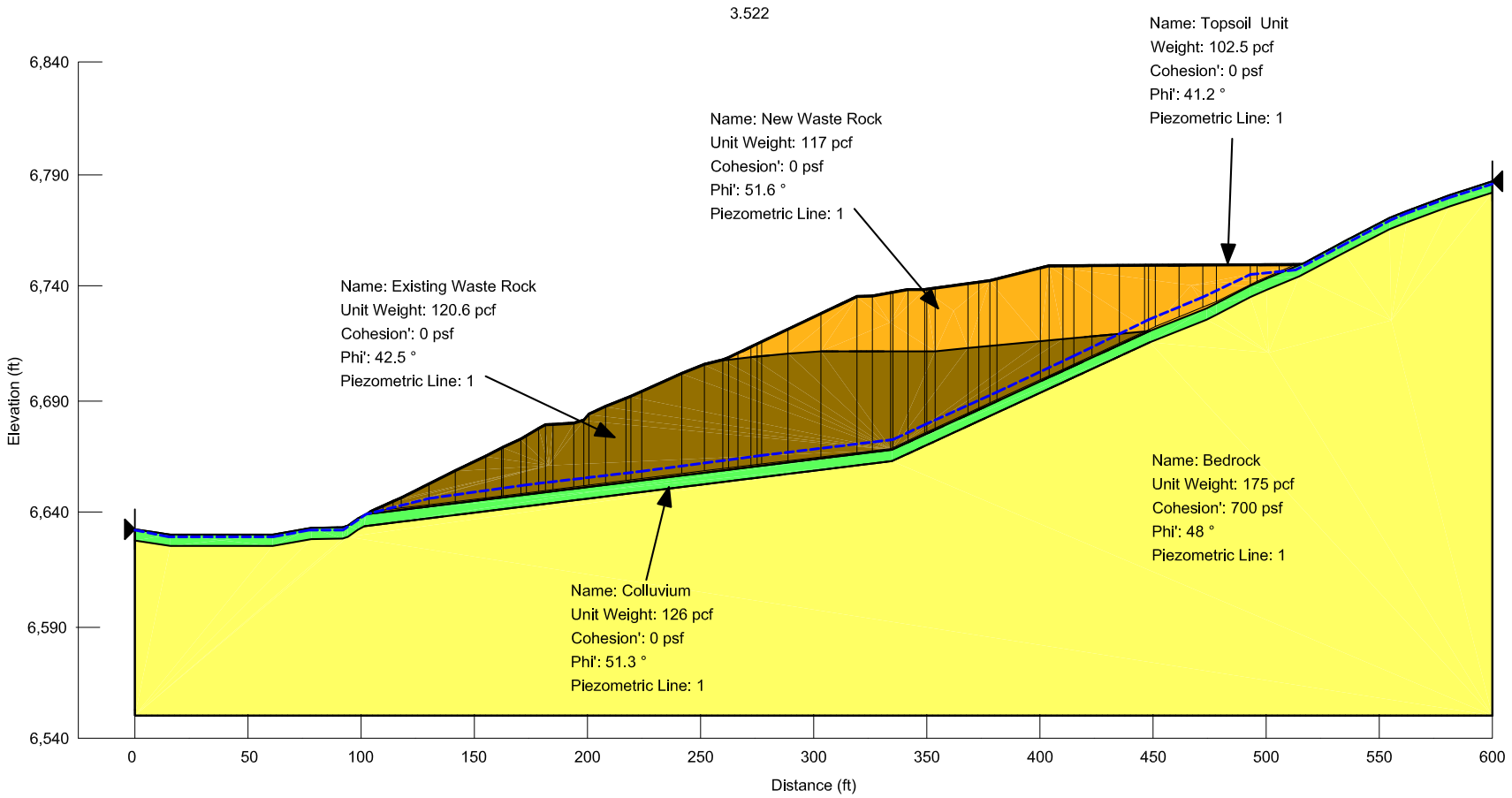

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FIGURE B-10
STATIC SLOPE STABILITY RESULTS XS-N1 DEEP FAILURE WITH WATER
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability South 2-17.dwg SAVED: 2/14/17 PRINTED: 2/21/17

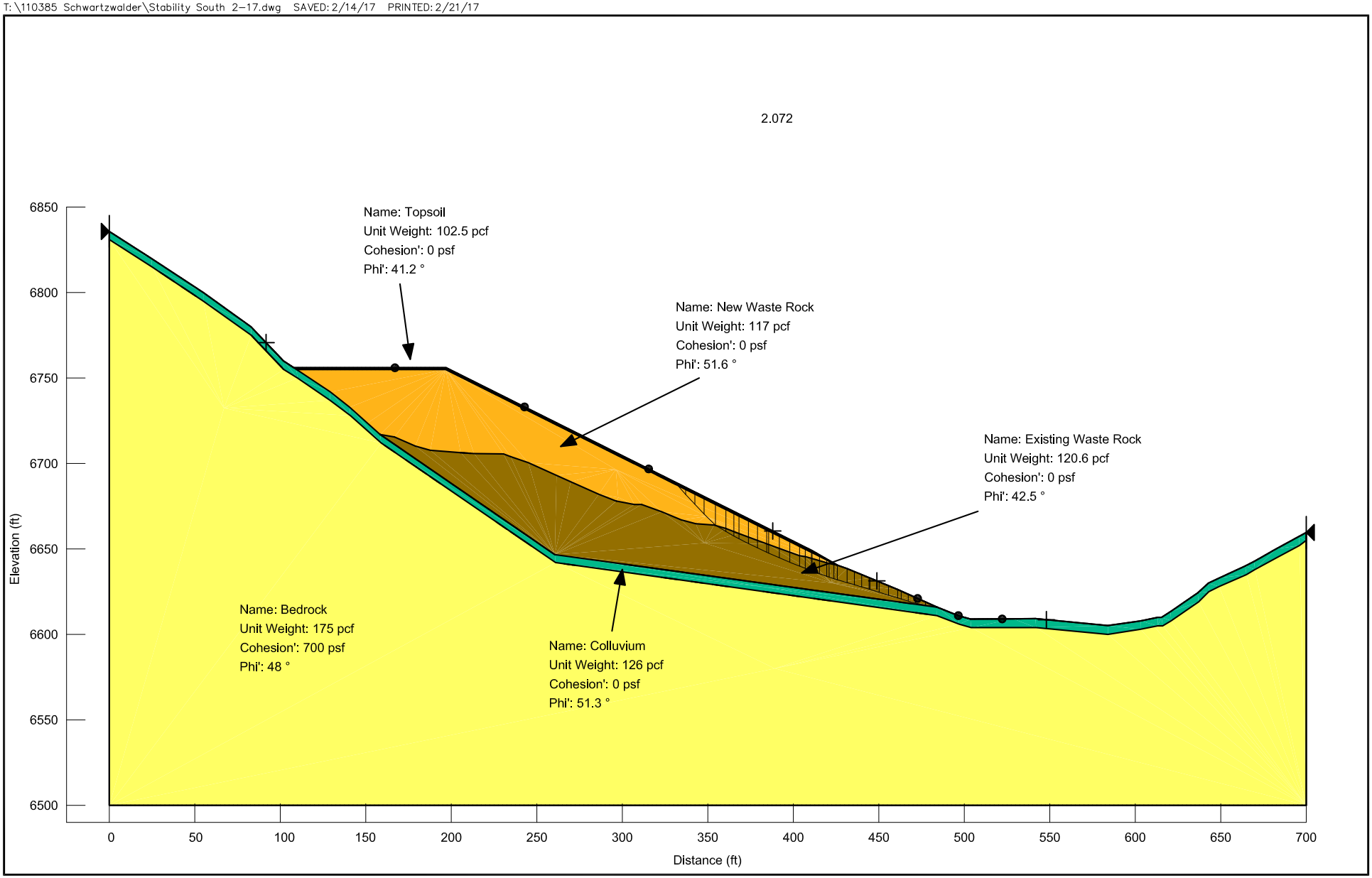

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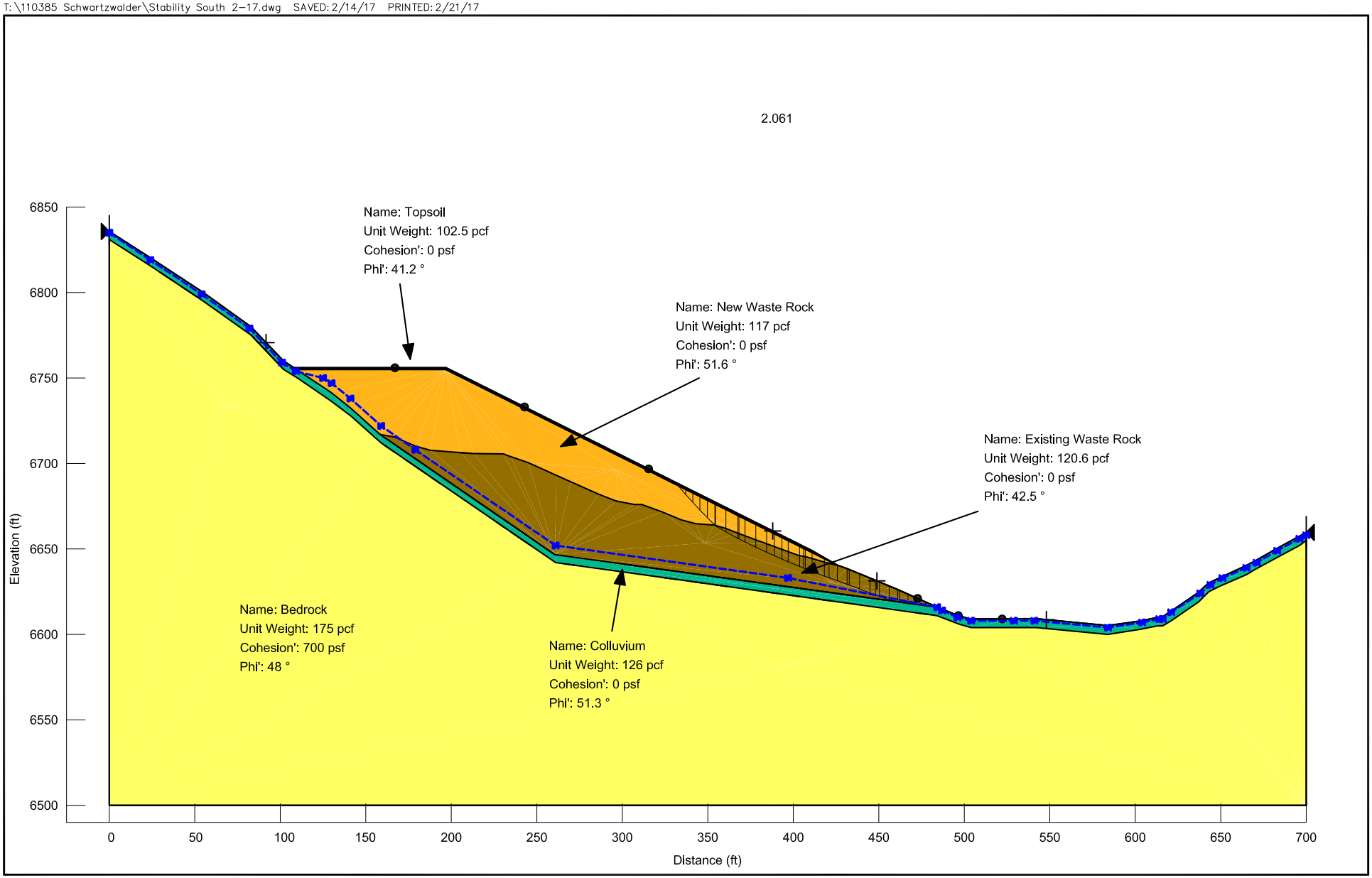
FIGURE B-11
STATIC SLOPE STABILITY RESULTS FOR XS-S1 SURFICIAL FAILURE
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability South 2-17.dwg SAVED: 2/14/17 PRINTED: 2/21/17



Project No. 110385

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FIGURE B-12
STATIC SLOPE STABILITY RESULTS FOR XS-S1 SURFICIAL FAILURE WITH WATER
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability South 2-17.dwg SAVED: 2/14/17 PRINTED: 2/21/17

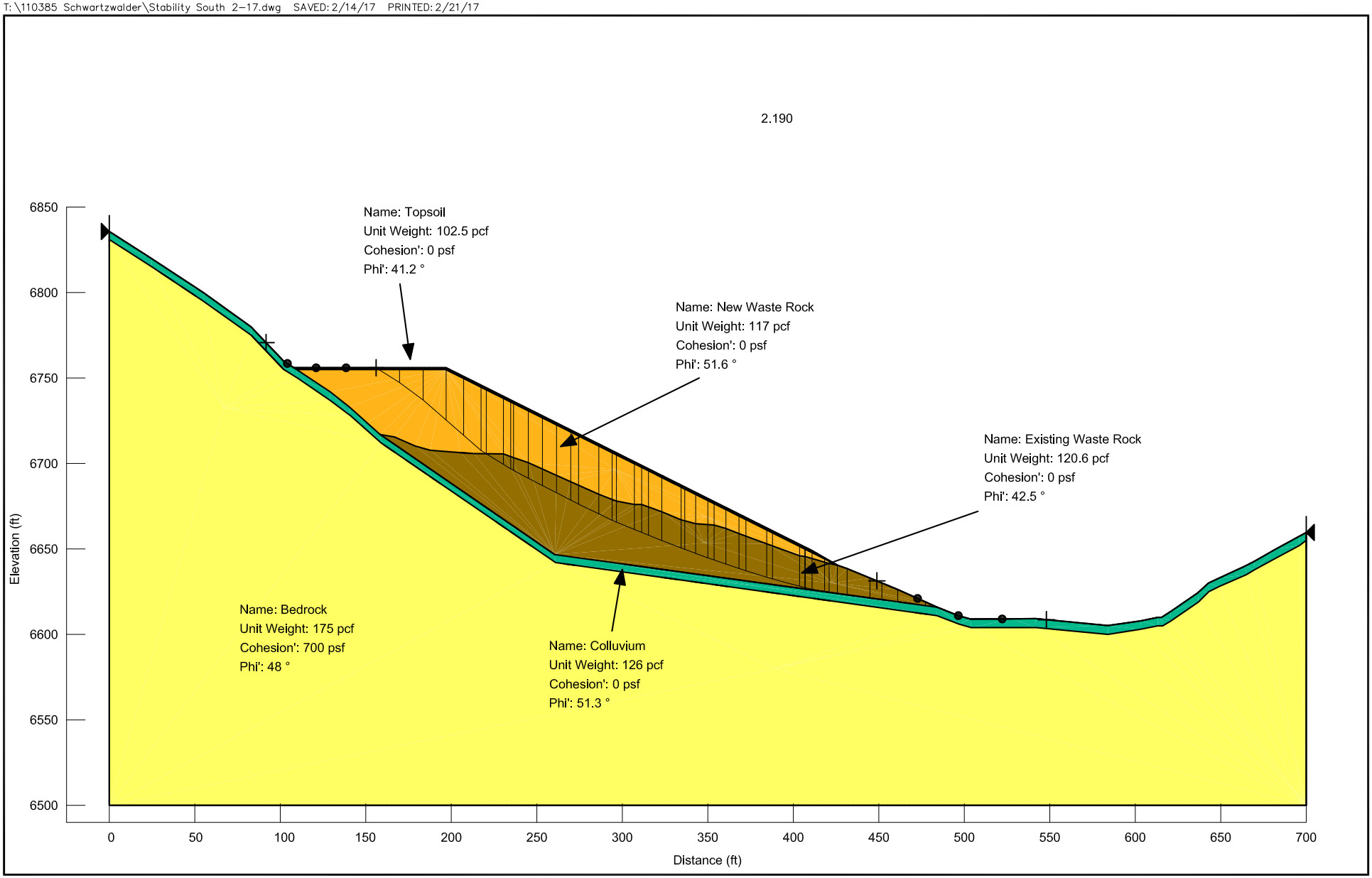

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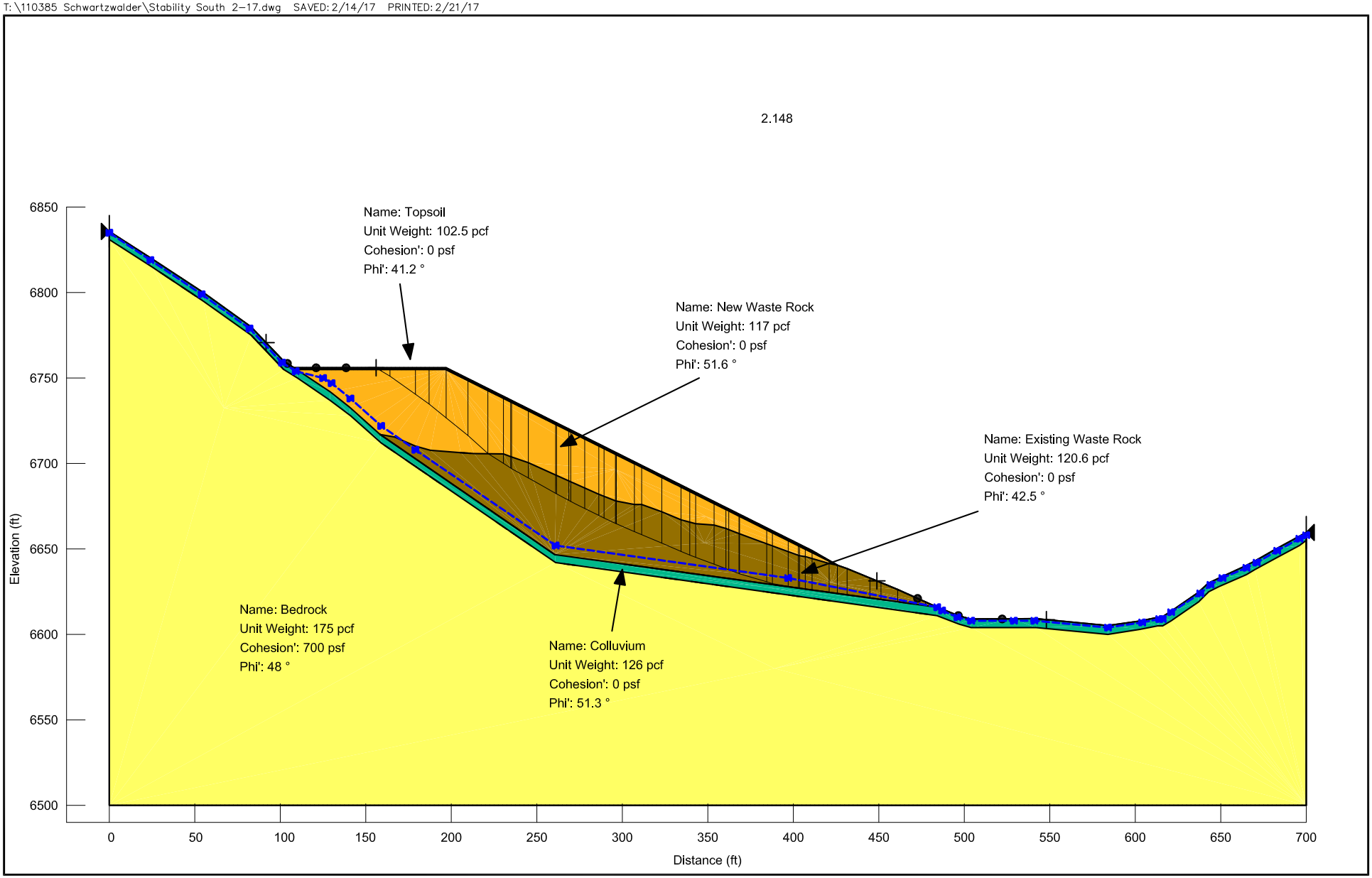
FIGURE B-13
STATIC SLOPE STABILITY RESULTS FOR XS-S1 INTERMEDIATE FAILURE
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability South 2-17.dwg SAVED: 2/14/17 PRINTED: 2/21/17



Project No. 110385

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FIGURE B-14
STATIC SLOPE STABILITY RESULTS FOR XS-S1 INTERMEDIATE FAILURE WITH WATER
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability South 2-17.dwg SAVED: 2/14/17 PRINTED: 2/21/17

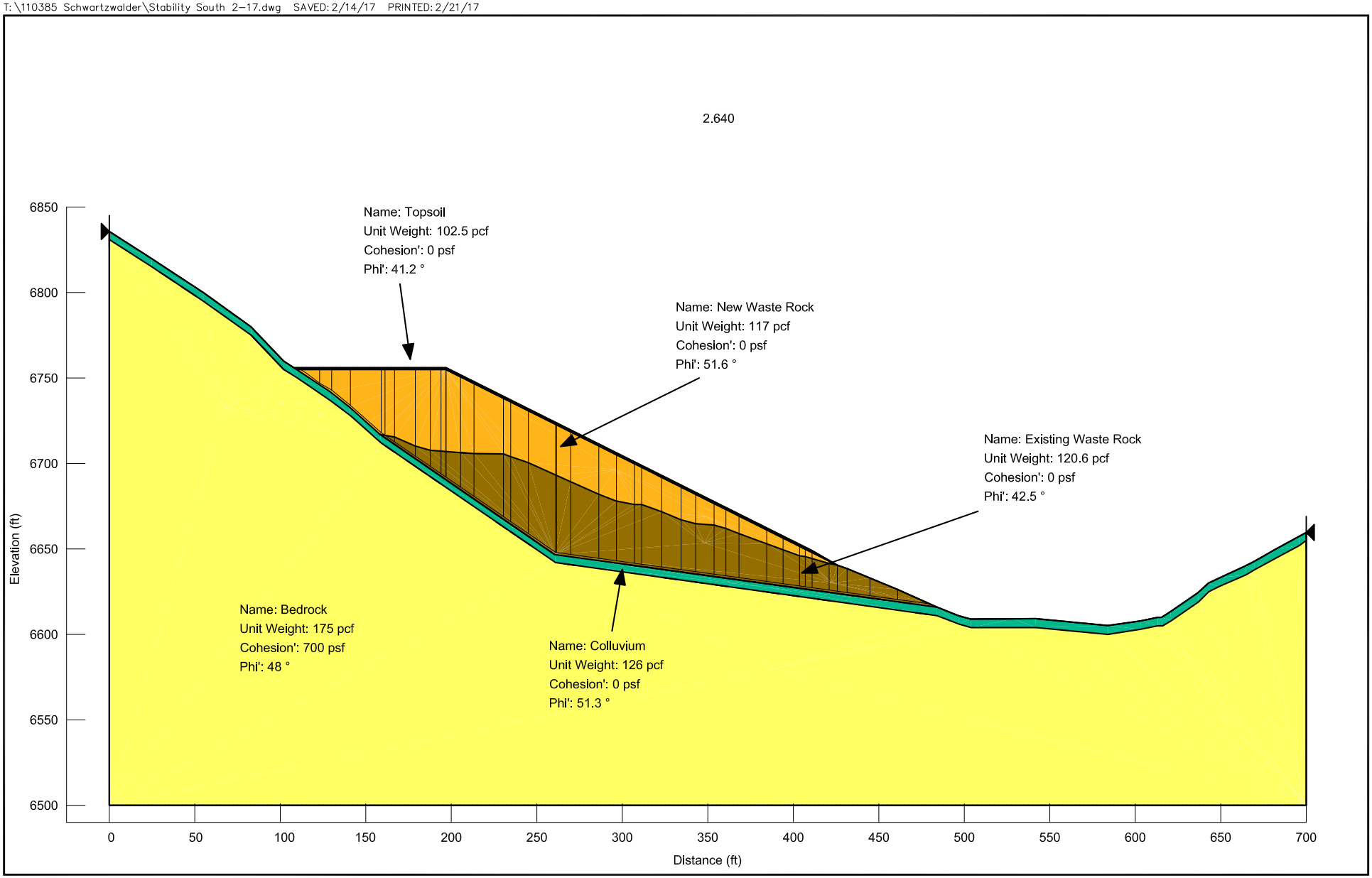

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FIGURE B-15
STATIC SLOPE STABILITY RESULTS FOR XS-S1 DEEP FAILURE
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability South 2-17.dwg SAVED: 2/14/17 PRINTED: 2/21/17

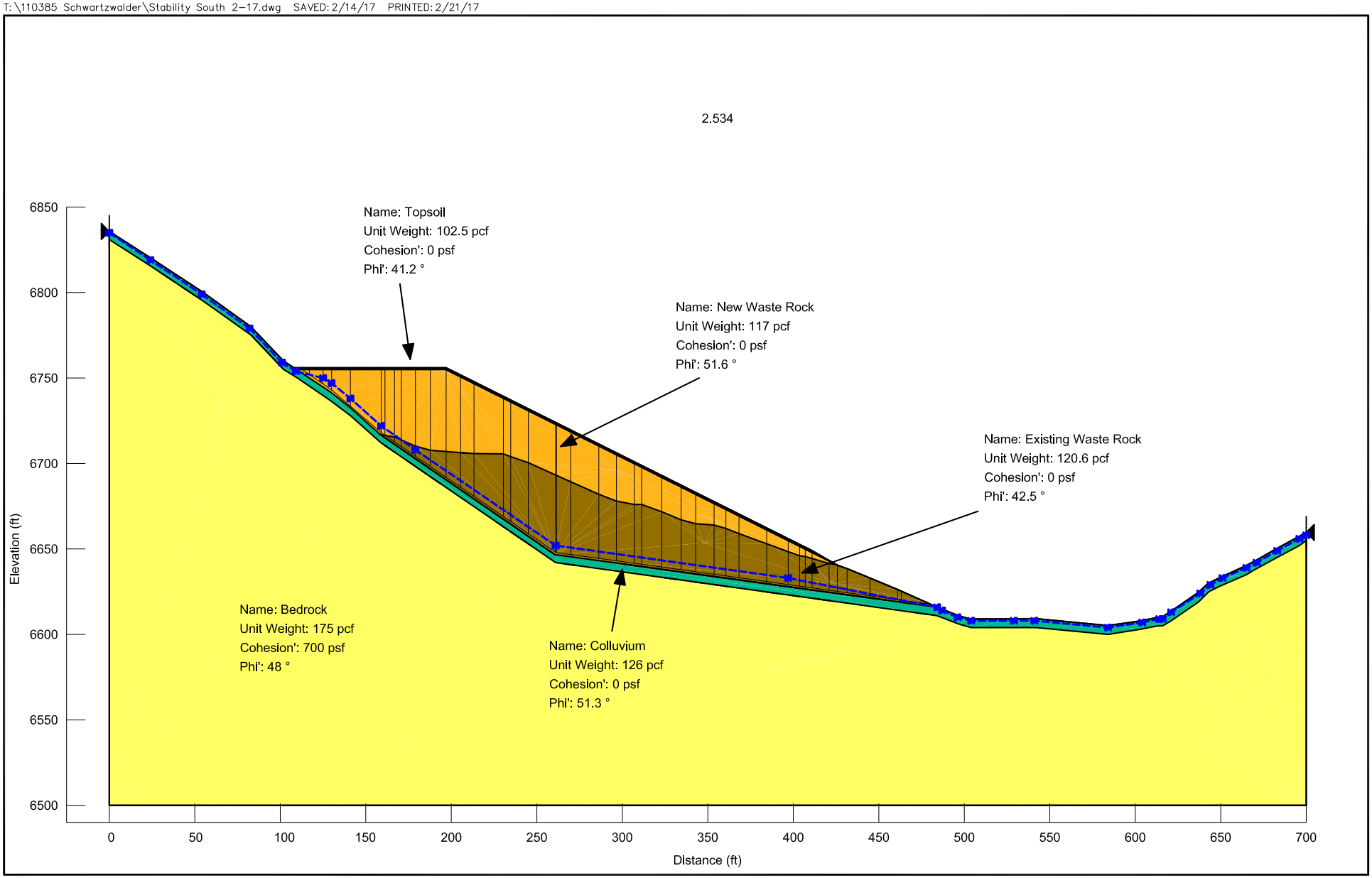

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FIGURE B-16
STATIC SLOPE STABILITY RESULTS FOR XS-S1 DEEP FAILURE WITH WATER
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability Psuedo XS.dwg SAVED: 10/24/16 PRINTED: 2/21/17

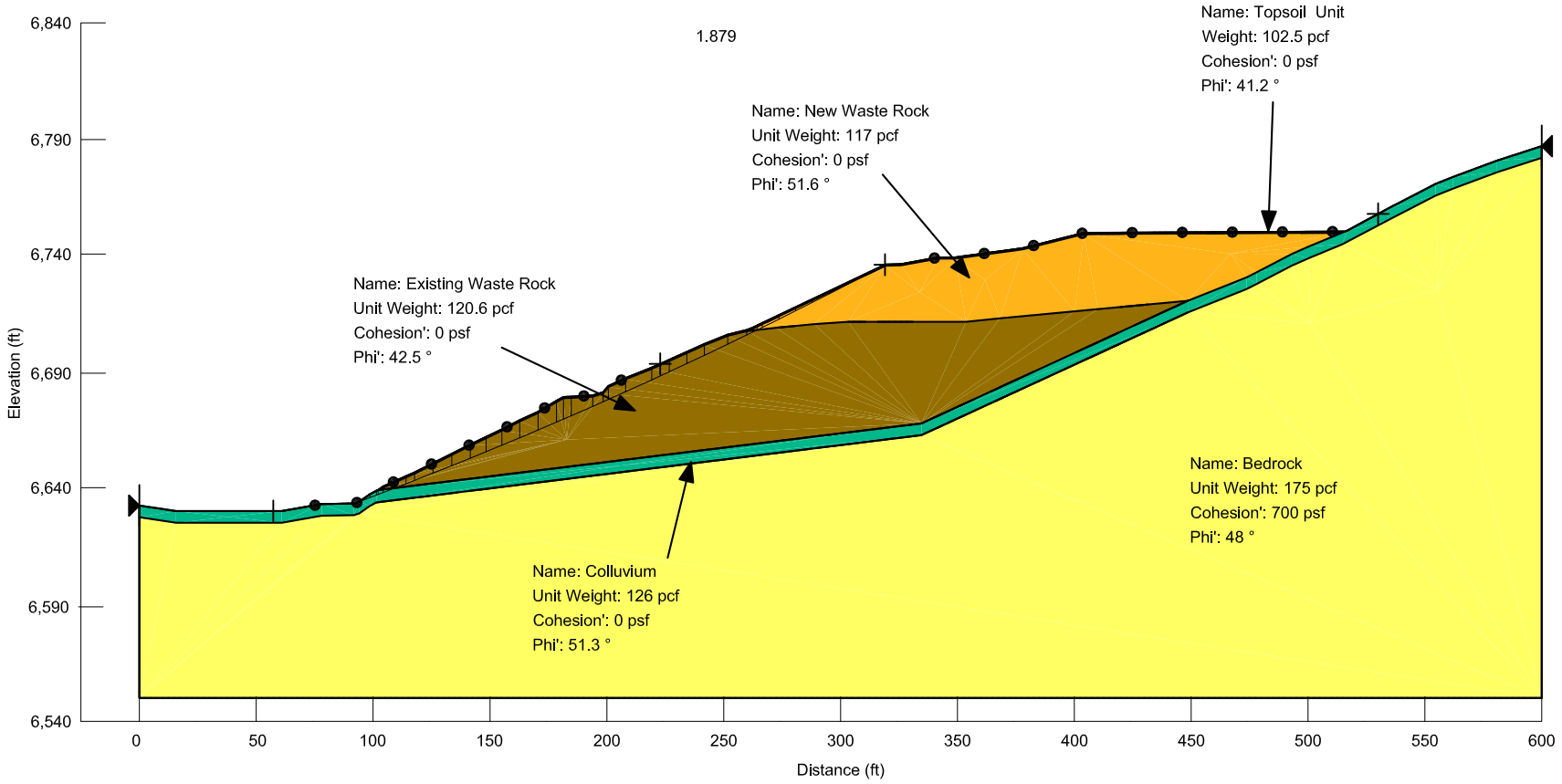

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FIGURE B-17
PSEUDO-STATIC SLOPE STABILITY RESULTS XS-N1 SURFICIAL FAILURE
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability Psuedo XS.dwg SAVED: 10/24/16 PRINTED: 2/21/17

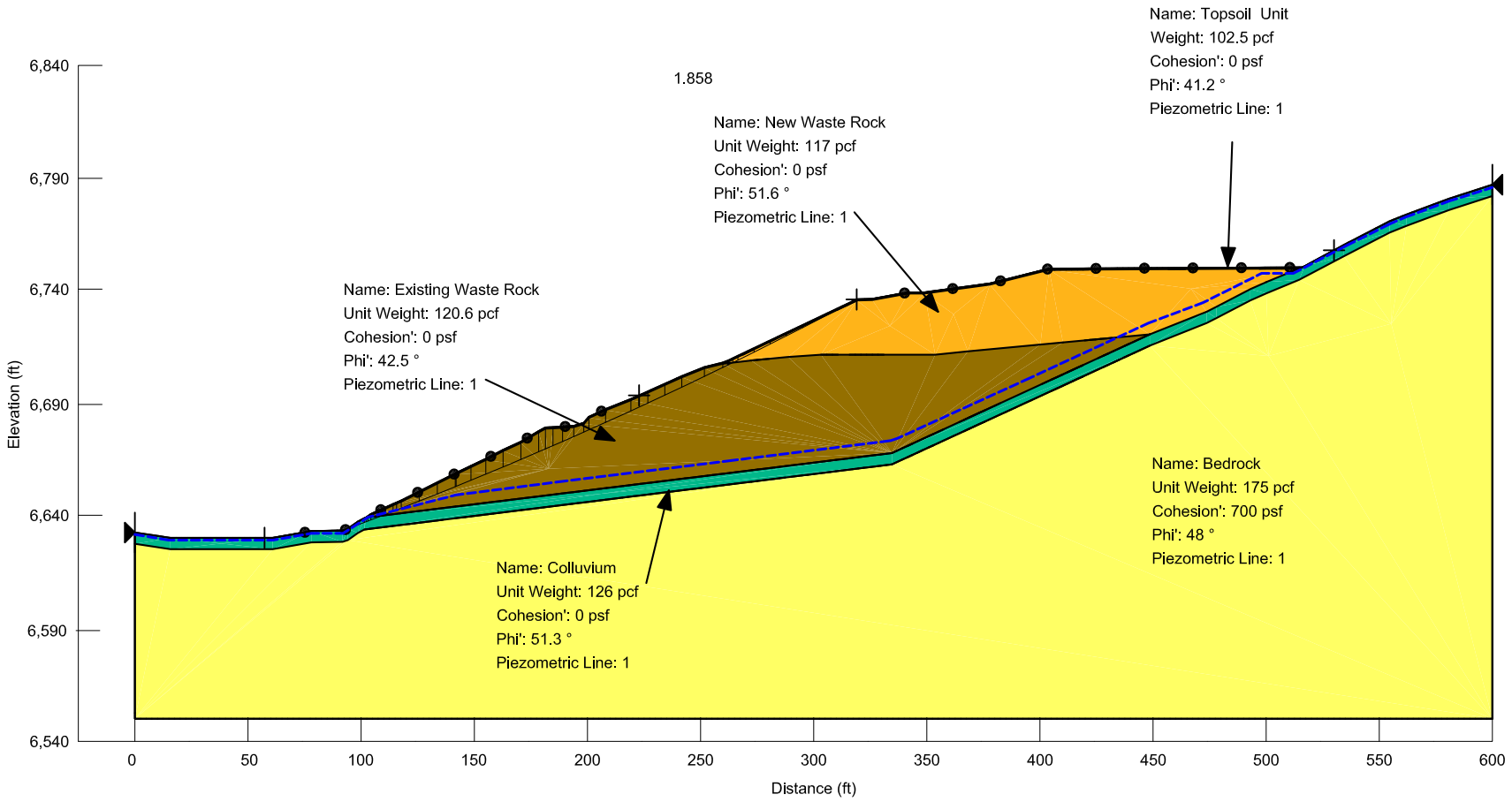

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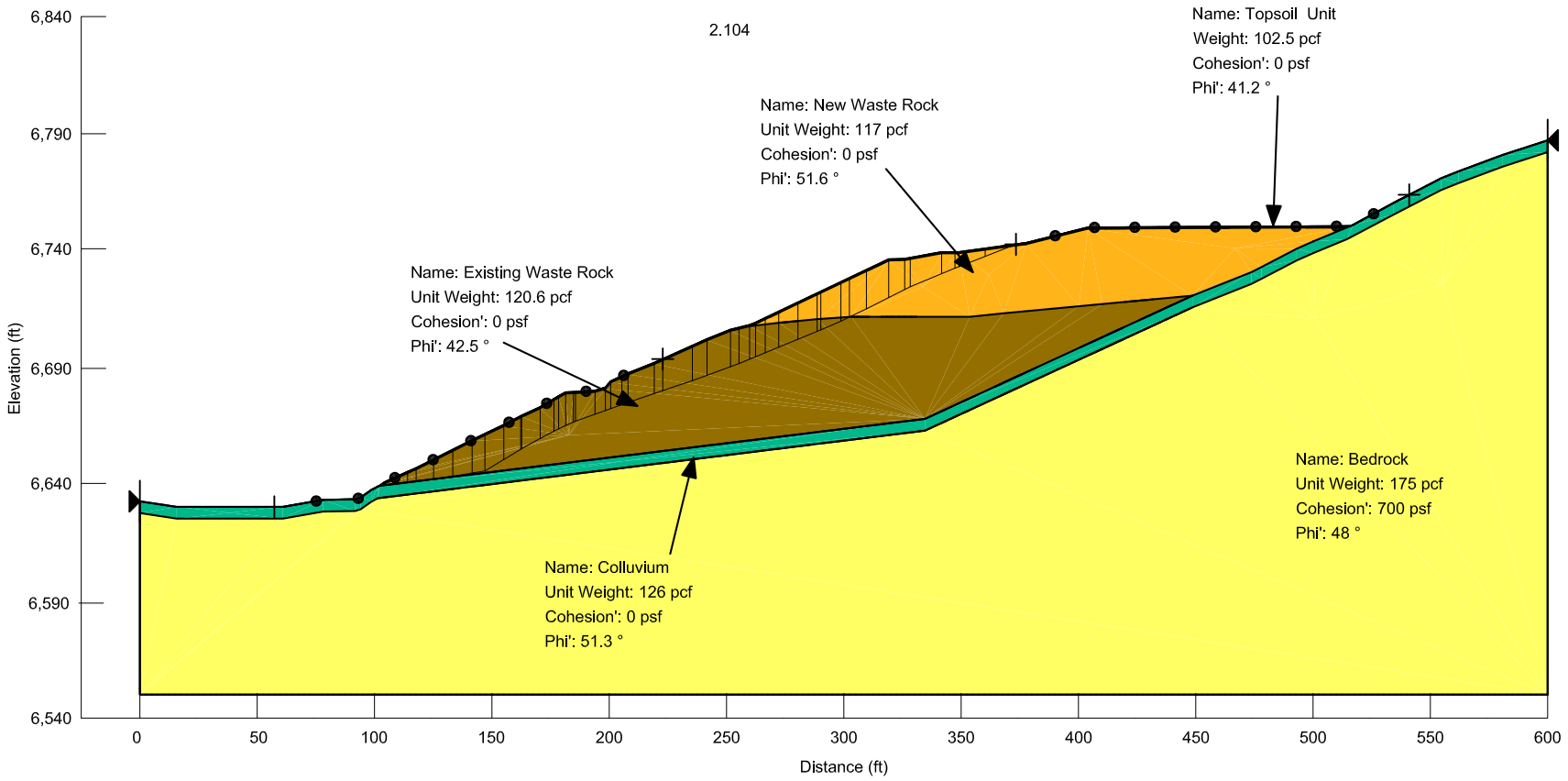
FIGURE B-18
PSEUDO-STATIC SLOPE STABILITY RESULTS XS-N1 SURFICIAL FAILURE WITH WATER
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability Psuedo XS.dwg SAVED: 10/24/16 PRINTED: 2/21/17



Project No. 110385

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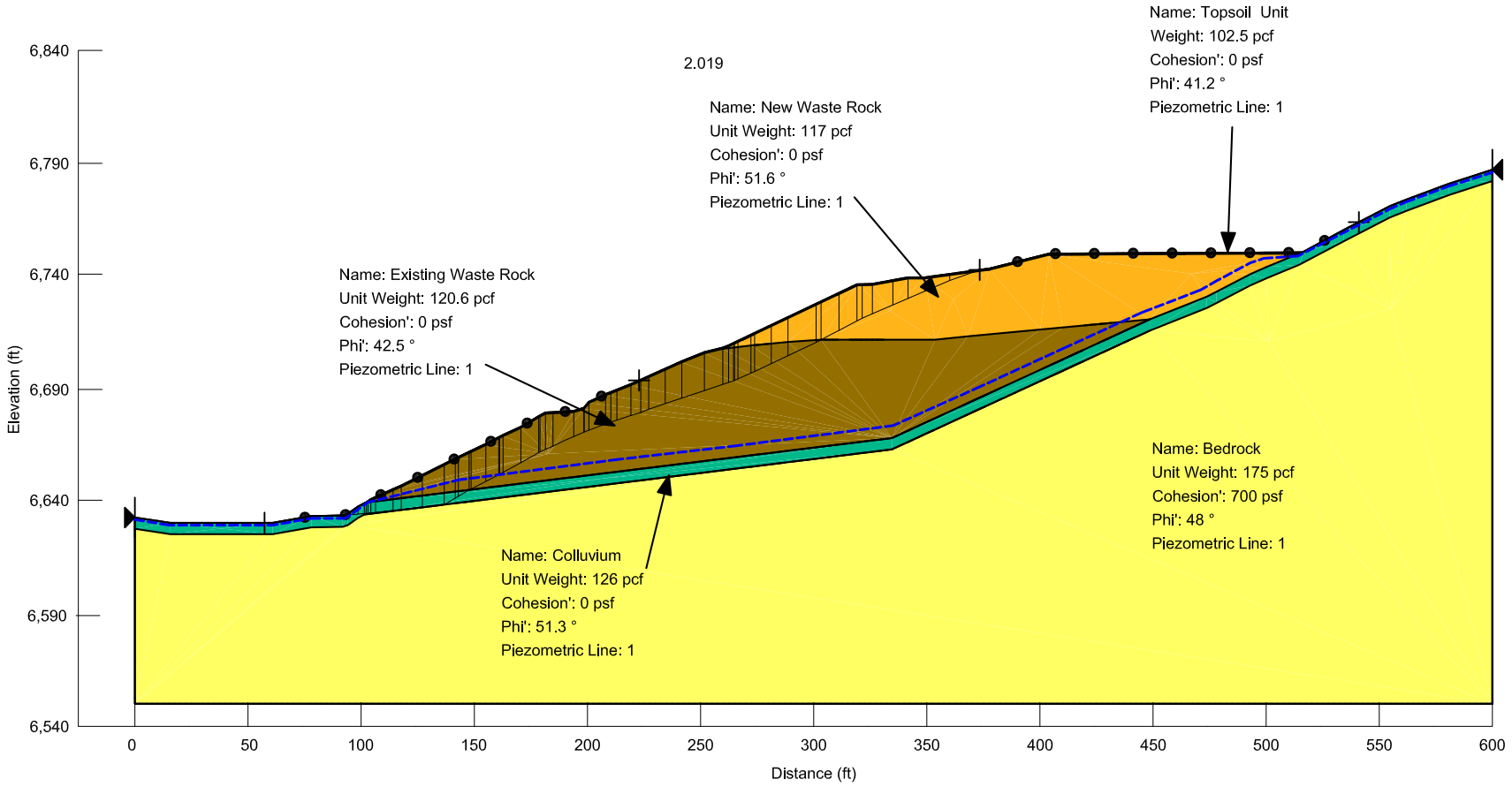
FIGURE B-19
PSEUDO-STATIC SLOPE STABILITY RESULTS XS-N1 INTERMEDIATE FAILURE
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability Psuedo XS.dwg SAVED: 10/24/16 PRINTED: 2/21/17



Project No. 110385

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FIGURE B-20
PSEUDO-STATIC SLOPE STABILITY RESULTS XS-N1 INTERMEDIATE FAILURE WITH WATER
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability Psuedo XS.dwg SAVED: 10/24/16 PRINTED: 2/21/17

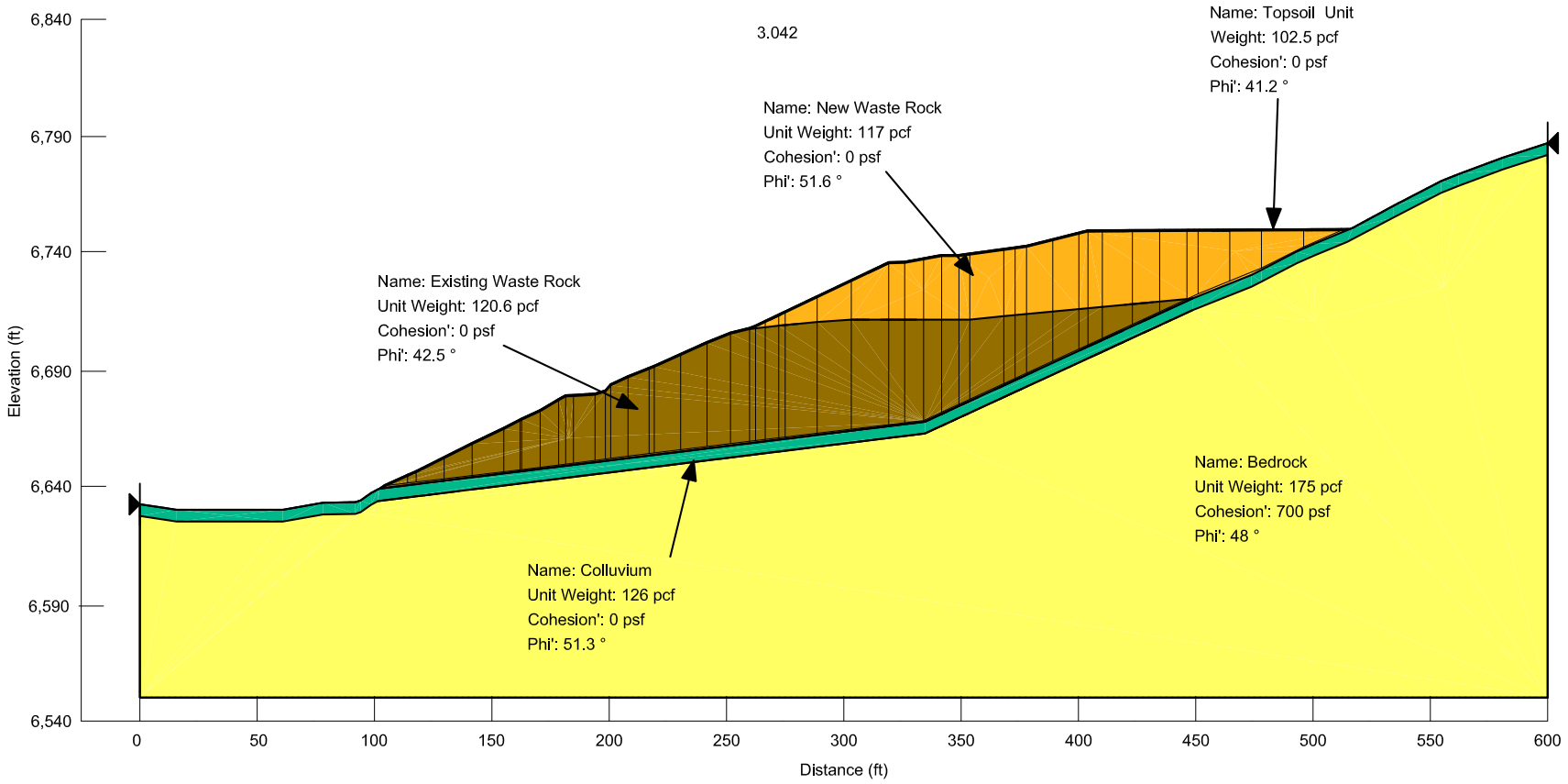

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FIGURE B-21
PSEUDO-STATIC SLOPE STABILITY RESULTS XS-N1 DEEP FAILURE
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability Psuedo XS.dwg SAVED: 10/24/16 PRINTED: 2/21/17

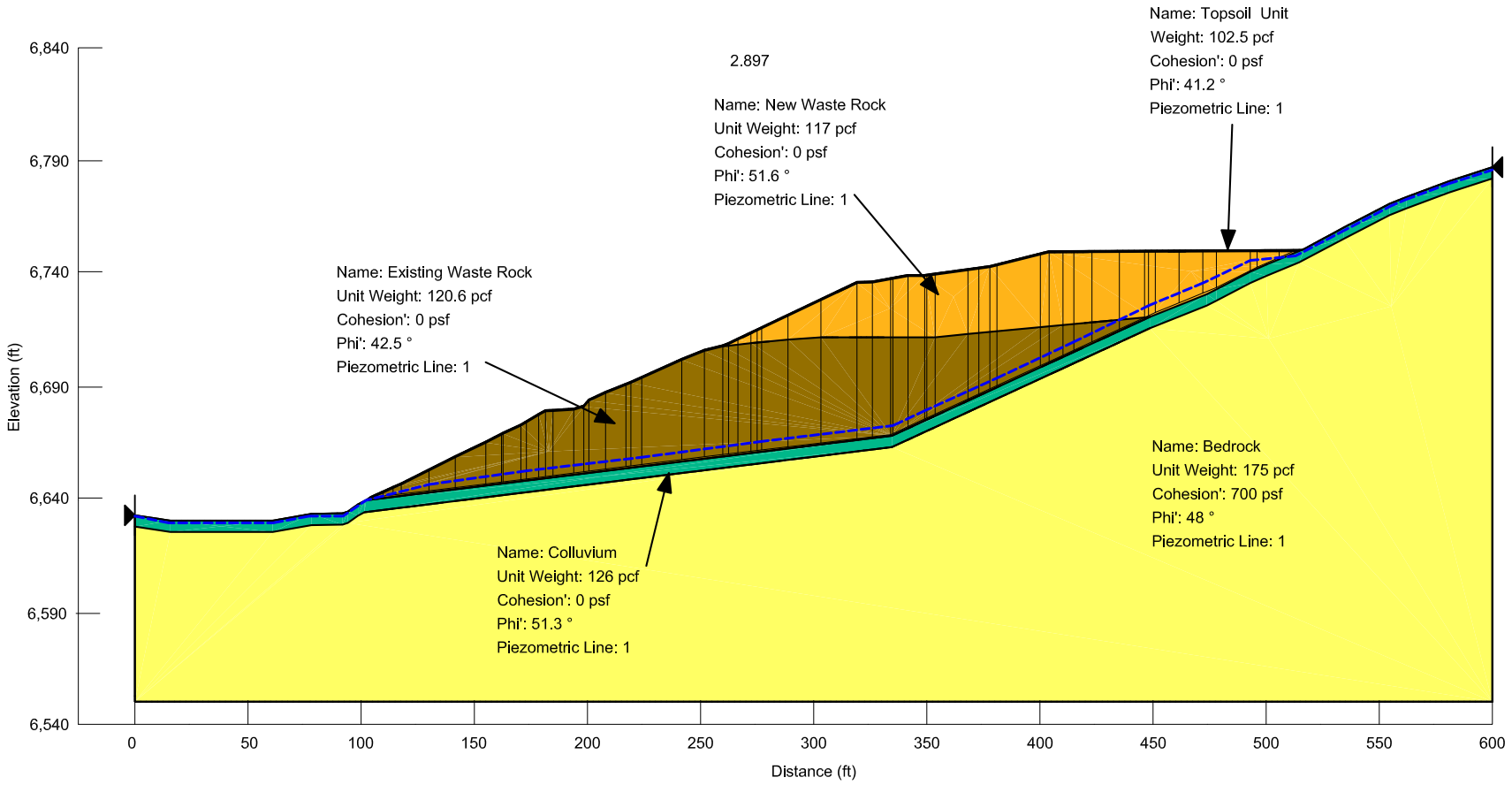

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FIGURE B-22
PSEUDO-STATIC SLOPE STABILITY RESULTS XS-N1 DEEP FAILURE WITH WATER
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability South 2-17.dwg SAVED: 2/14/17 PRINTED: 2/21/17

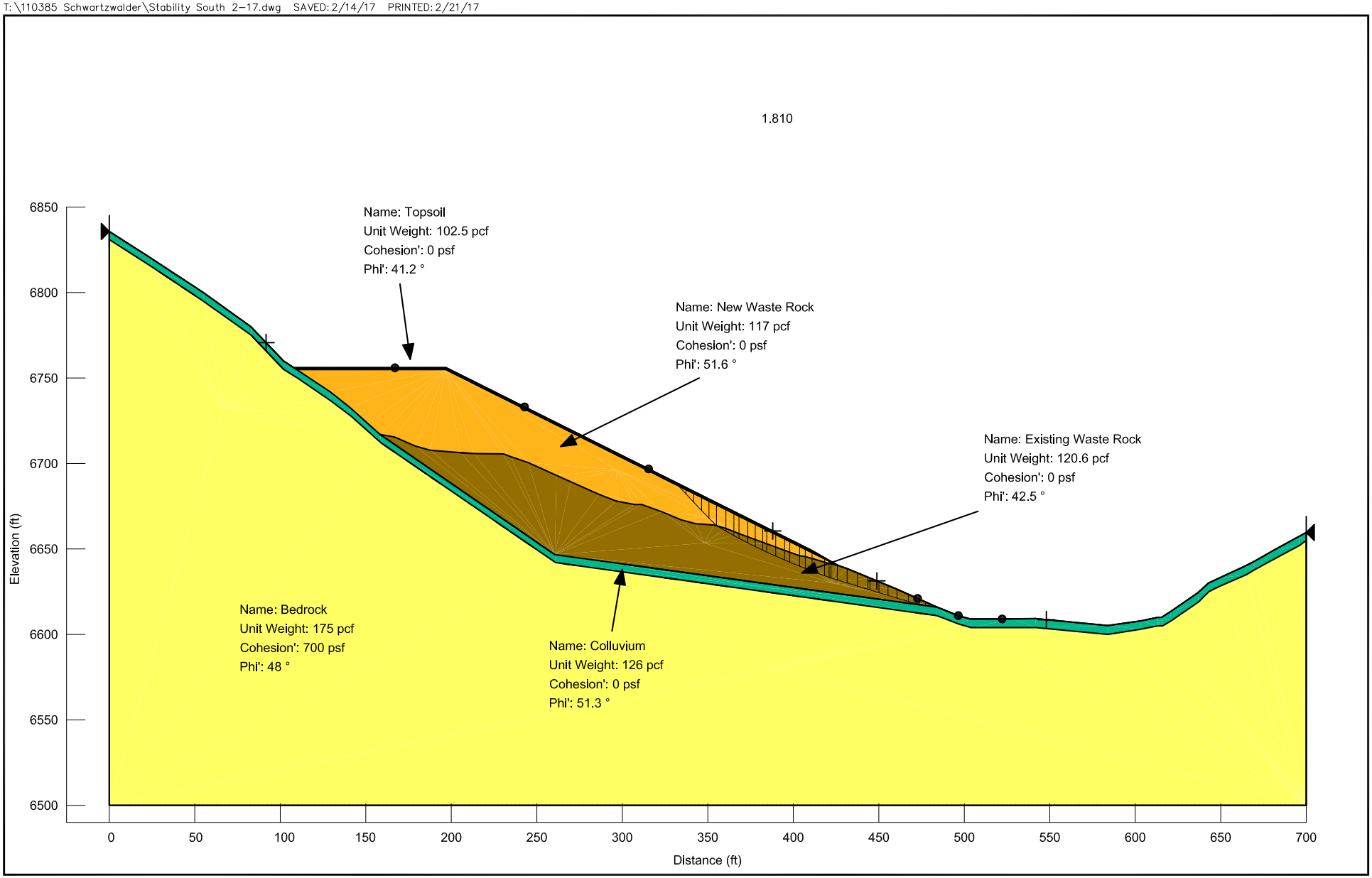

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FIGURE B-23
PSEUDO-STATIC SLOPE STABILITY RESULTS FOR XS-S1 SURFICIAL FAILURE
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability South 2-17.dwg SAVED: 2/14/17 PRINTED: 2/21/17

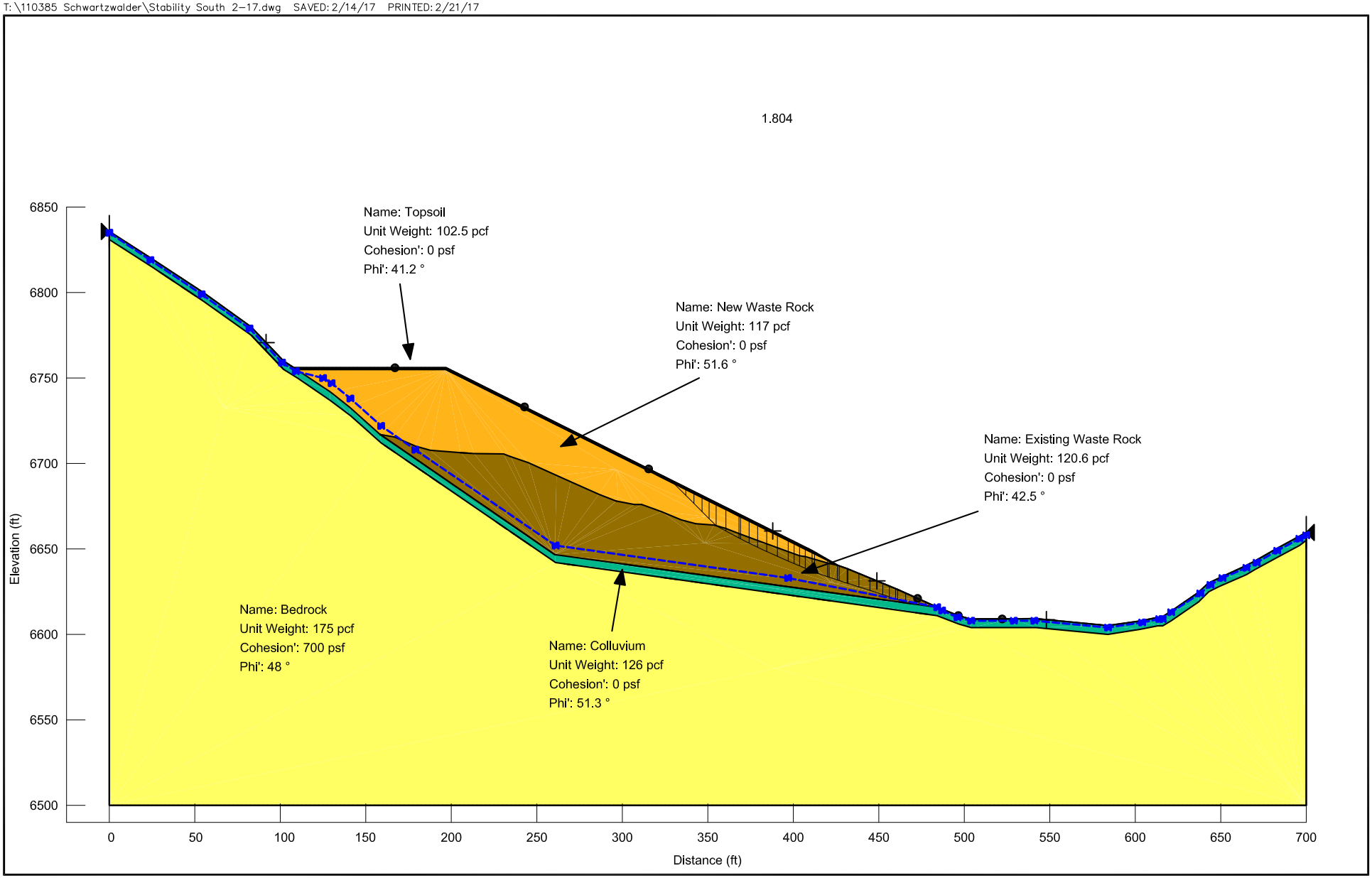

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FIGURE B-24
PSEUDO-STATIC SLOPE STABILITY RESULTS FOR XS-S1 SURFICIAL FAILURE WITH WATER
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability South 2-17.dwg SAVED: 2/14/17 PRINTED: 2/21/17

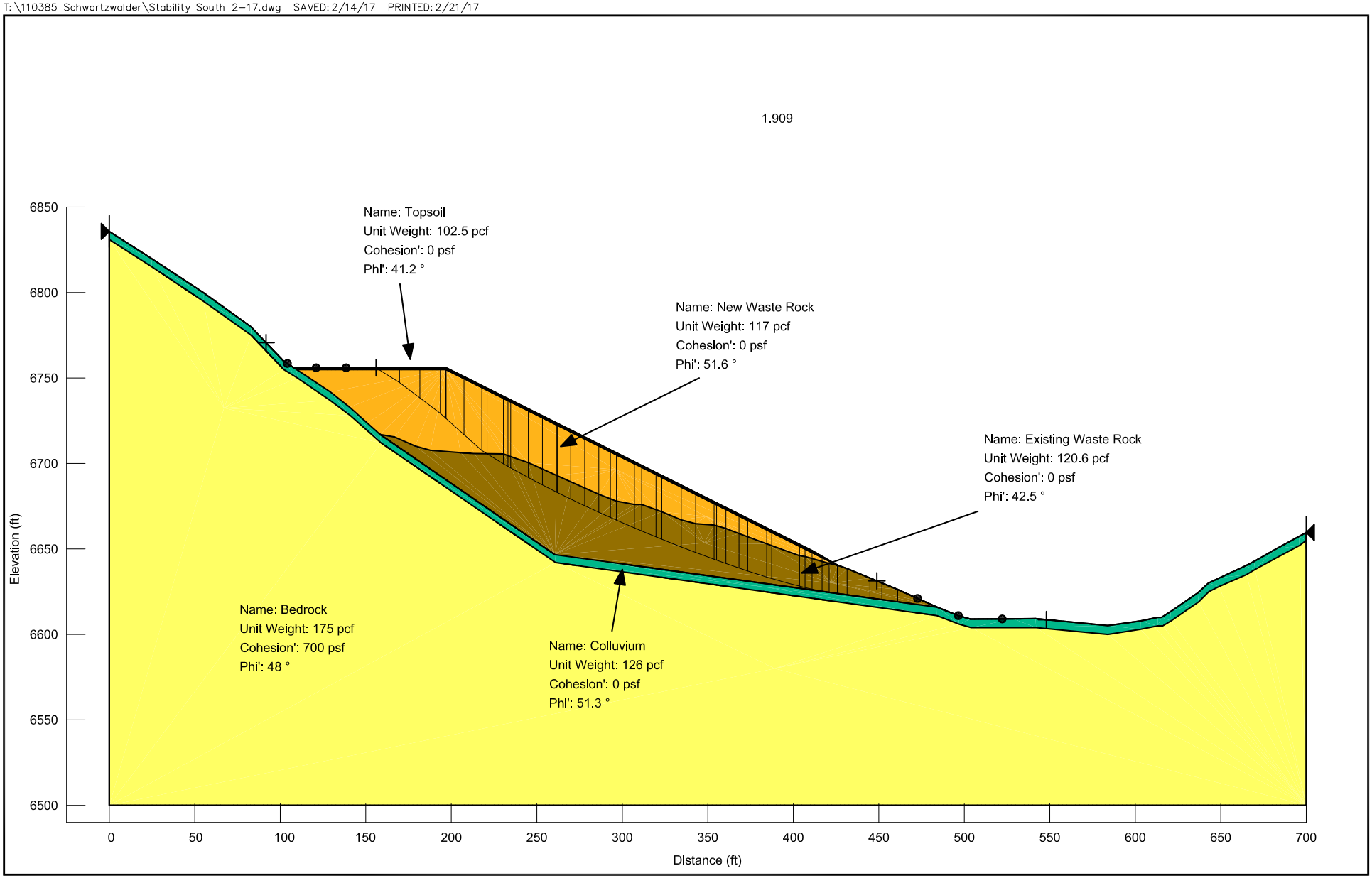

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FIGURE B-25
PSEUDO-STATIC SLOPE STABILITY RESULTS FOR XS-S1 INTERMEDIATE FAILURE
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability South 2-17.dwg SAVED: 2/14/17 PRINTED: 2/21/17

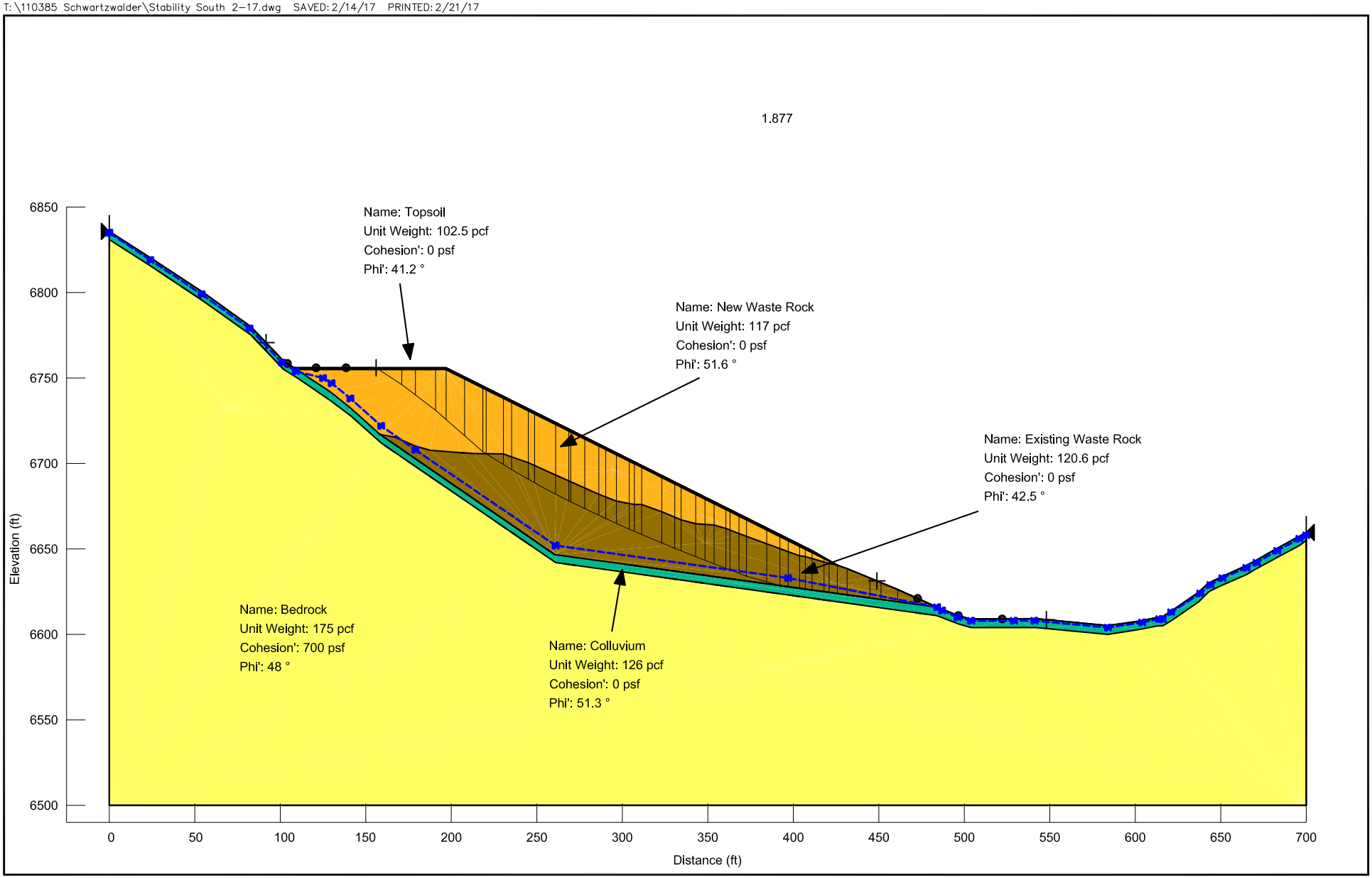

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FIGURE B-26

PSEUDO-STATIC SLOPE STABILITY RESULTS FOR XS-S1 INTERMEDIATE FAILURE WITH WATER
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability South 2-17.dwg SAVED: 2/14/17 PRINTED: 2/21/17

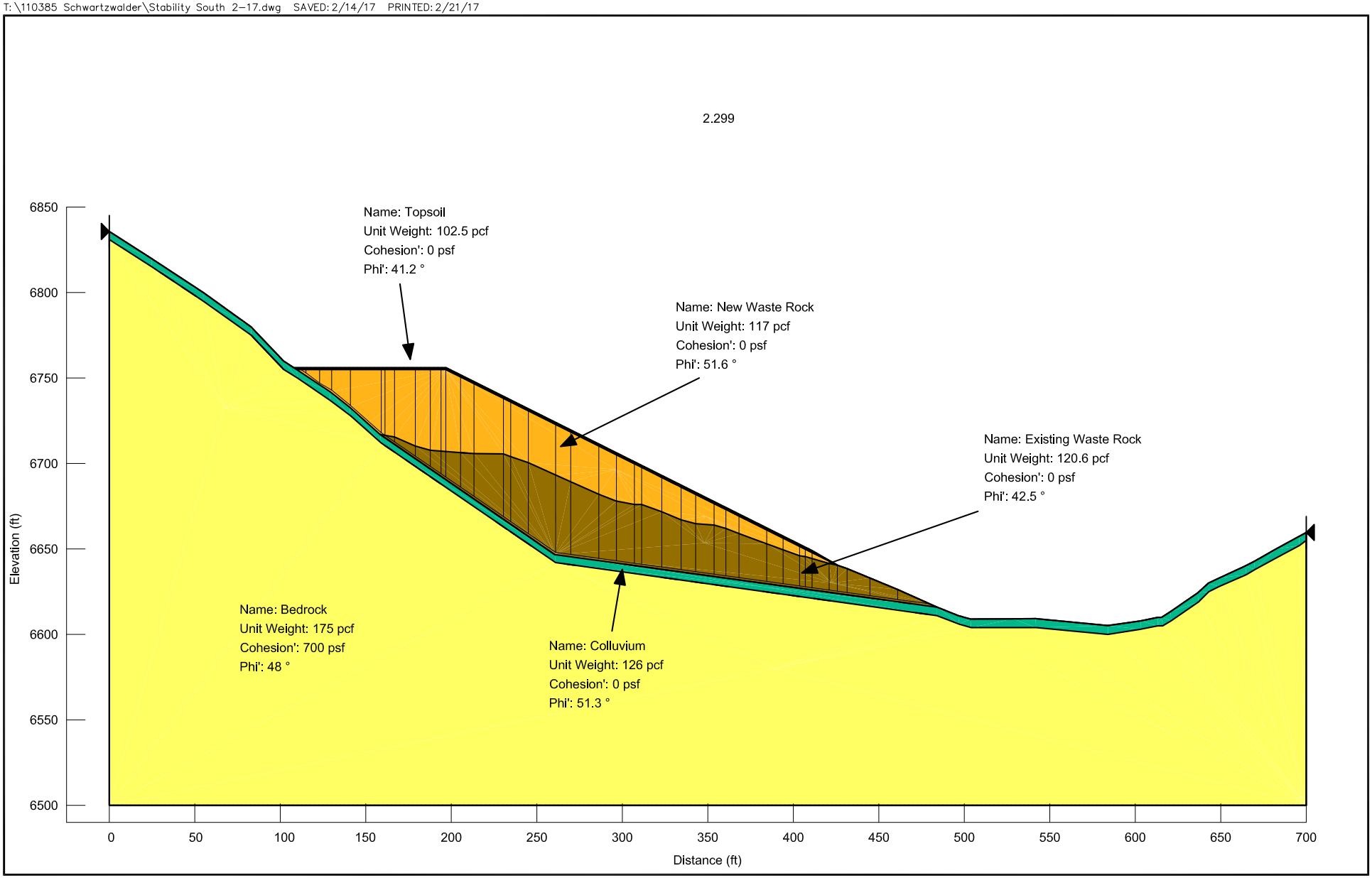

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FIGURE B-27
PSEUDO-STATIC SLOPE STABILITY RESULTS FOR XS-S1 DEEP FAILURE
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

T:\110385 Schwartzwalder\Stability South 2-17.dwg SAVED: 2/14/17 PRINTED: 2/21/17

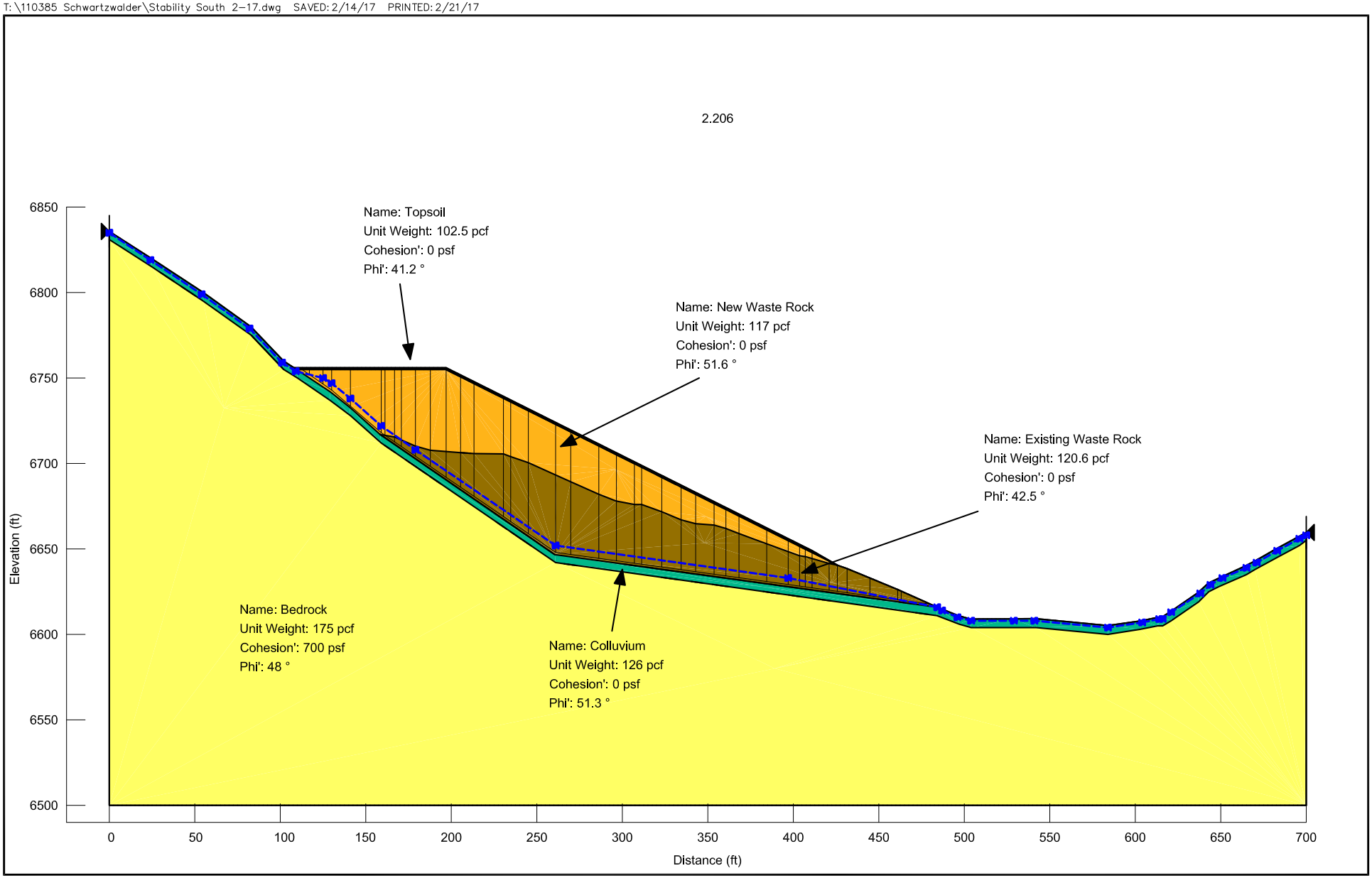

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FIGURE B-28

PSEUDO-STATIC SLOPE STABILITY RESULTS FOR XS-S1 DEEP FAILURE WITH WATER
COTTER SCHWARTZWALDER MINE
WASTE ROCK PILE DESIGN

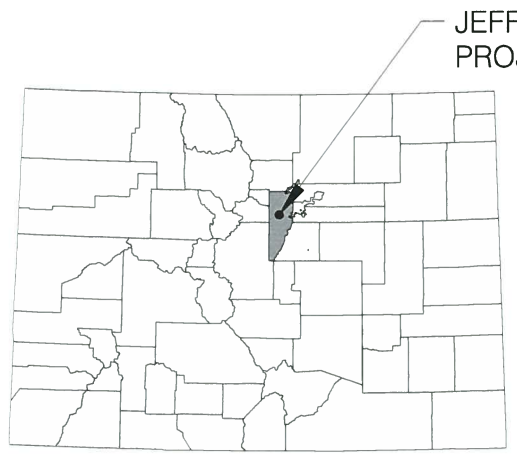
ATTACHMENT C

SIGNED PLANS AND SPECIFICATIONS

COTTER CORPORATION
SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

SHEET INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET AND INDEX
2	GENERAL NOTES AND QUANTITIES
3	GPS SURVEY AND LIDAR REPORT EXCERPTS
4-5	REMEDIATION AREA #1 TOP BOUNDARY ALIGNMENT DATA
6-7	REMEDIATION AREA #1 BOTTOM BOUNDARY ALIGNMENT DATA
8-9	REMEDIATION AREA #2 TOP BOUNDARY ALIGNMENT DATA
10-11	REMEDIATION AREA #2 BOTTOM BOUNDARY ALIGNMENT DATA
12-13	PROJECT LAYOUT
14-15	REMEDIATION AREA #1 AND REMEDIATION AREA #2 ELEVATION CONTOURS
16-17	REMEDIATION AREA #1 AND REMEDIATION AREA #2 EXCAVATION CONTOURS
18	REMEDIATION AREA #1 AND #2 CROSS-SECTION
19	RELOCATE AND DEMO PLAN
20	EXIST AND TEMP ACCESS ROAD LAYOUT
21	NORTHERN WASTE ROCK PILE
22	SOUTHERN WASTE ROCK PILE
23-25	NORTHERN WRP CONCRETE LINED DITCH PLAN AND PROFILE
26-27	SOUTHERN WRP CONCRETE LINED DITCH PLAN AND PROFILE
28-29	CONCRETE LINED DITCH MISCELLANEOUS DETAILS
30	DRAINAGE AREA MAP
31-32	STORM WATER MANAGEMENT PLAN NARRATIVE
33-34	SWMP SITE MAP
35-41	GESC STANDARD DETAILS



STATE OF COLORADO

NOTE:

1) CONTRACTOR SHALL MAINTAIN DRAINAGE OF THE SITE AND ALL EXCAVATED AREAS TOWARDS EXISTING SUMP LOCATIONS. ALL EXISTING SUMPS WILL REMAIN AND SHALL BE PROTECTED OR ADJUSTED AS NEEDED.

2.24.17

COLORADO LICENSED
DAN S. LEYENDECKER
42090
PROFESSIONAL ENGINEER

cotter

LNV
TBPE FIRM NO. F-366

8918 TESORO DRIVE
SAN ANTONIO, TEXAS 78217

SHT NO.: 1

2/23/2017
S:\Projects\Cotter\160236 Schwartzwalder Mine Cutfill-SW3P\000\Drawings\Plans\Civil\COTTER_MINE_TSHT.dgn

GENERAL NOTES

1. ALL CONSTRUCTION SHALL CONFORM TO THE COLORADO DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2011, OR LATEST.
2. NO EXTRA PAYMENT SHALL BE ALLOWED FOR WORK CALLED FOR ON THE PLANS, BUT NOT INCLUDED IN THE BID PROPOSAL. THIS INCIDENTAL WORK WILL BE REQUIRED AND SHALL BE INCLUDED IN THE PAY ITEM TO WHICH IT RELATES.
3. CONTRACTOR SHALL PRESERVE ALL CONSTRUCTION STAKES, MARKS, ETC. IF ANY ARE DESTROYED OR REMOVED BY THE CONTRACTOR OR HIS EMPLOYEES, THEY SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
4. THE EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES SHALL BE INVESTIGATED AND VERIFIED BY THE CONTRACTOR BEFORE STARTING WORK THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY DAMAGE TO AND FOR THE MAINTENANCE AND PROTECTION OF THE EXISTING UTILITIES EVEN IF THEY ARE NOT SHOWN ON THE PLANS. ACTUAL LOCATIONS AND DEPTHS MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION AND HE SHALL BE RESPONSIBLE FOR PROTECTION OF SAME DURING CONSTRUCTION.
5. CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE CONSTRUCTION OF PROJECT INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS. THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD HARMLESS THE OWNERS AND THE ENGINEERS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONJUNCTION WITH THE PERFORMANCE OF THE WORK ON THIS PROJECT, EXCEPT FROM LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER RELATED TO ACTIONS OF SAME WHILE ON SITE.
6. SUBMIT AND COORDINATE A CONSTRUCTION SCHEDULE WITH THE ENGINEER PRIOR TO COMMENCING WORK.
7. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING REQUIRED SECURITY TO PROTECT HIS OWN PROPERTY, EQUIPMENT AND WORK IN PROGRESS. REPAIR OF DAMAGED IMPROVEMENTS IS THE CONTRACTOR'S RESPONSIBILITY UNTIL ACCEPTED BY THE OWNER.
8. ANY CHANGES OR REVISIONS TO THESE PLANS REQUIRES THE ENGINEERS APPROVAL. SUBMIT REVISED PLANS TO THE ENGINEER FOR REVIEW AND WRITTEN APPROVAL.
9. ALL DIMENSIONS SHOWN ARE APPROXIMATE. "MATCH EXISTING" SIGNIFIES VERTICAL AND HORIZONTAL ALIGNMENT. CHANGES IN ANY HORIZONTAL OR VERTICAL POSITION OR ALIGNMENT ARE SUBJECT TO ENGINEER REVIEW AND APPROVAL.
10. ESTABLISH FINAL GRADES TO ASSURE POSITIVE DRAINAGE.
11. CONSTRUCT FACILITIES TO THE LINES AND GRADES REQUIRED ON THE PLANS AND TO MEET FIELD CONDITIONS. ADJUSTMENTS TO MATCH FIELD CONDITIONS ARE NOT REASONS FOR ADDITIONAL PAYMENT.
12. COMPLY WITH OSHA REGULATIONS AND STATE OF COLORADO LAW CONCERNING EXCAVATION, TRENCHING AND SHORING.
13. DO NOT BURN ANY MATERIALS AT OR FROM THE SITE.
14. CONTRACTOR SHALL EXECUTE ALL REQUIRED PROVISIONS OF THE STORM WATER POLLUTION PREVENTION AND EROSION CONTROL PLAN.
15. VERIFY ALL DIMENSIONS, ELEVATIONS AND CONTOURS IN THE FIELD BEFORE COMMENCING ANY WORK. REPORT ANY DISCREPANCIES WITHIN THE PLANS TO THE OWNER AND ENGINEER ON A TIMELY MANNER.
16. EXCAVATED AREAS TO BE CONTINUOUSLY TESTED UNTIL ALL CONTAMINATION IS REMOVED.
17. MAINTAIN DRAINAGE TO EXISTING SUMPS AT ALL TIMES.
18. EXISTING SUMPS WILL REMAIN AND WILL BE PROTECTED OR ADJUSTED AS NEEDED.
19. COVER ALL HAUL TRUCKS WHILE TRANSPORTING THE MATERIAL FROM THE EXCAVATION LOCATION TO THE FILL/DISPOSAL LOCATION.
20. APPLY WATER FOR DUST CONTROL CONTINUOUSLY THROUGHOUT CONSTRUCTION. THIS IS NOT PAID FOR SEPARATELY BUT CONSIDERED SUBSIDIARY TO APPLICABLE ITEMS.
21. THE CONTRACTOR SHALL BE AWARE THAT SPILLAGE OF CONTAMINATED SOIL DURING TRANSPORT OR OUTSIDE THE EXCAVATION AND WASTE ROCK PILE AREAS NEEDS TO BE AVOIDED.
22. ALL CONTRACTED SOIL SHALL BE PLACED AT ONE OF THE WASTE ROCK PILE LOCATIONS SHOWN IN THE PLANS AND NOT PLACED ANYWHERE ELSE.

EARTHWORK NOTES

1. REMOVE AND STOCK PILE THE TOPSOIL FROM THE TOP OF THE TWO EXIST ENGINEERED WASTE ROCK PILES.
2. WASTE ROCK PILES SHALL BE CONSTRUCTED IN HORIZONTAL LIFTS BY PLACING CONTAMINATED MATERIAL IN UNIFORM HORIZONTAL LAYERS NOT EXCEEDING TWELVE (12) INCHES (LOOSE LIFT). IF THE PADS OF THE COMPACTOR TO BE USED WILL NOT PENETRATE INTO THE TOP OF THE PREVIOUSLY COMPACTED LIFT, THE THICKNESS OF THE LOOSE LIFT WILL BE REDUCED TO ALLOW FOR FULL PENETRATION BY THE COMPACTOR PADS.
3. MINIMUM FIELD COMPACTION CRITERIA FOR A COMPACTED SOIL IS 95% OF THE MAXIMUM DRY DENSITY AT A MOISTURE CONTENT AT 1% DRY TO 3% WET OF OPTIMUM MOISTURE CONTENT, OR THE COMPACTION CRITERIA ESTABLISHED DURING PRE-CONSTRUCTION TESTING. MOISTURE/DENSITY TESTING WILL BE CONDUCTED AT A RATE OF 1 TEST PER 1000 LF OF 12" COMPACTED SOIL.
4. THE TOP OF EACH LIFT SHALL BE ROUGHENED PRIOR TO PLACEMENT OF THE NEXT LIFT OF SOIL FOR COMPACTION.
5. COMPACTED SOIL LAYERS WILL NOT BE COMPACTED WITH A BULLDOZER OR ANY TRACK-MOBILIZED EQUIPMENT UNLESS IT IS USED TO PULL A PAD-FOOTED ROLLER. COMPACTION OF COMPACTED SOIL LAYER MATERIAL LOOSE LIFTS WILL BE PERFORMED WITH AN APPROPRIATELY HEAVY, PROPERLY BALLASTED, PENETRATING FOOT COMPACTOR SUCH AS A PAD FOOT, PRONG-FOOT, OR SHEEPSFOOT COMPACTOR SIMILAR TO A CAT 815 OR EQUIVALENT.
6. AFTER FINAL LIFT OF CONTAMINATED SOIL HAS BEEN COMPACTED AND APPROVED, CONTRACTOR SHALL APPLY THE ENGINEERED WASTE ROCK PILE CAP AND SALVAGED TOPSOIL.
7. AFTER TOPSOIL HAS BEEN COMPLETED, CONTRACTOR SHALL SEED THE TOPSOIL USING THE MIX BELOW AND APPLY A BIODEGRADABLE TURF REINFORCEMENT MAT TO PROTECT THE SOIL FROM EROSION.
8. UNCONTAMINATED EXCAVATION FROM THE DITCH EXCAVATION AREAS SHALL BE STOCKPILED AND COMPACTED BACK INTO THE EXCAVATED REMEDIATION AREAS OR USED AS TOPSOIL, IF SOIL MEETS REQUIREMENTS, AFTER ALL CONTAMINATED SOILS HAVE BEEN REMOVED FROM THE REMEDIATION AREAS.

CONSTRUCTION PHASING

1. CONSTRUCT TEMP ACCESS ROAD ACROSS THE SOUTH EDGE OF REMEDIATION AREA #2.
2. EXCAVATE NORTHERN HALF OF REMEDIATION AREA #2 AND PLACE SPOILS IN LOCATION OF PROP ENGINEERED WASTE ROCK PILE.
3. RECONSTRUCT ACCESS ROAD BACK IN ORIGINAL ALIGNMENT.
4. EXCAVATE SOUTHERN HALF OF REMEDIATION AREA #2 AND PLACE SPOILS IN LOCATION OF PROP ENGINEERED WASTE ROCK PILE.
5. REMOVE STRUCTURES AND CONSTRUCT TEMP ACCESS ROAD ACROSS SOUTHERN EDGE OF REMEDIATION AREA #1
6. EXCAVATE NORTHERN HALF OF REMEDIATION AREA #1 AND PLACE SPOILS IN LOCATION OF PROP ENGINEERED WASTE ROCK PILE.
7. RECONSTRUCT ACCESS ROAD BACK IN ORIGINAL ALIGNMENT.
8. EXCAVATE SOUTHERN HALF OF REMEDIATION AREA #1 AND PLACE SPOILS IN LOCATION OF PROP ENGINEERED WASTE ROCK PILE.
9. CAP ENGINEERED WASTE ROCK PILE AND CONSTRUCT WASTE ROCK PILE DITCHES.

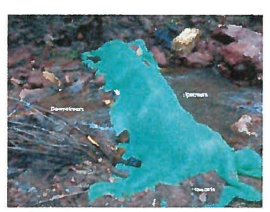
SEEDING TABLE

PERMANENT VEGETATIVE COVER CONSISTING OF (MIX NOTED BELOW) MUST BE (BROADCAST) SEEDED AT 18.9 POUNDS PURE LIVE SEED PER ACRE.

SPECIES	VARIETY	% OF MIX	BROADCAST* PLS/ACRE
BIG BLUESTEM	KAW	20	4.4
SIDEOATS GRAMA	VAUGHN	20	3.6
LITTLE BLUESTEM	PASTURA	20	2.8
YELLOW INDIANGRASS	HOLT	10	2
WESTERN WHEATGRASS***	ARRIBA	10	3.2
NEEDLEANDTHREAD	-	10	2
SWITCHGRASS	NEBRASKA 28	5	0.6
BLU GRAMA	LOVINGTON	5	0.3
TOTAL		100%	18.9 LBS/ACRE

*USE THIS SEEDING RATE FOR BOTH BROADCAST AND HYDROMULCH APPLICATIONS.

***STREAMBANK WHEATGRASS (SODAR) CAN BE SUBSTITUDED FOR THE WESTERN WHEATGRASS



TYPICAL SILT CONTROL IN CREEK

TYPICAL WADDLES TO LINE DIVERSION DITCHES

QUANTITIES TABLE

ITEM	DESCRIPTION	UNIT	TOTAL QUANTITY
201	Clearing and Grubbing	ACRE	20.00
202	Removal of Structures and Obstructions	LS	1.00
203	Contaminated Excavation (Complete In Place)	CY	64,000.00
203	Uncontaminated Excavation (Complete In Place)	CY	26,000.00
203	Contaminated Embankment (Complete In Place)	CY	143,965.00
204	Uncontaminated Embankment (Complete In Place)	CY	34,000.00
208	Erosion Log	LF	4,000.00
208	Erosion Bales	LF	100.00
208	Vehicle Tracking Pad (Construction Entrance)	EA	4.00
1000	Dewatering	LS	1.00
	24" Grouted Rock Riprap	CY	120.00
	Concrete Cloth	SF	21,500.00
	Concrete Toe Down	CY	270.00
	Turf Reinforcement Matting	SY	38,000.00
	Hydromulch Seeding and 6 Inch Topsoil	SY	38,000.00
	Engineered Waste Rock Pile Cap	LS	1.00

COLORADO LICENSED
DAN S. LEYENDECKER
42090
PROFESSIONAL ENGINEER
2.24.17

LNV
TBPE FIRM NO. F-366
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cotter.

SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

GENERAL NOTES AND QUANTITIES

N.T.S.

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 2

2/23/2017
S:\Projects\Cotter\160236 Schwartzwalder Mine Cutfill-SWJP\000\Drawings\Plans\Civil\COTTER_MINE_GEN_NOTES.dgn

Excerpts from "GPS SURVEY AND LIDAR REPORT" for GLENCOE ROAD PROJECT prepared by Aerial Surveys International LLC

Pg. 3

2. NGS Survey Control and GPS Survey
Based on the project location, available airport, available NGS survey and access to the survey control, access to the project site itself and our survey team selected to utilize Jefferson County Airport (Rocky Mountain Metropolitan) as our base of operations. In reviewing available NGS survey control we found (2) 1st order vertical and (1) 3rd order vertical NGS survey control all with GPS derived horizontal positions all within 10 miles of the project area. The selected NGS control included **JEFFCO AZ MK** (1st order vertical) located outside the secure area of the airport with easy access and good GPS sky, **TT 24J** (1st order vertical) located 7.5 miles from the airport & 4.5 miles north of the project area and **F 411 Reset** located 9 miles from the airport and 4 miles east of the project site.

Pgs. 7-8

***Published Values by National Geodetic Survey**

JEFFCO Z MK
NAD83 (2011) Latitude: 39 54 06.44979 (N)
NAD83 (2011)Longitude: 105 05 44.13387(W)
Ellipsoid Height: 1663.418m
Geoid Height: -16.82m
NAVD88 Level Height: 1680.260m / 5512.65 ft
NAVD88 GPS Height: 1680.238m / 5512.58 ft
Adjusted Ellipsoid Height: 1663.44m
Horizontal Order: GPS derived
Vertical Order: First Order, Class II
UTM Zone 13 Northing: 4,416,861.513
UTM Zone 14 Easting: 491,828.554
SPC CO C, sFT Northing: 1,753,614.82
SPC CO C, sFT Easting: 3,113,465.53

*Ellipsoid Height was adjusted to assure the final Computed orthometric height matched the published NAD88 orthomtetric height using Geoid12A

TT 25 J4
NAD83(2011) Latitude: 39 53 25.66695(N)
NAD83(2011) Longitude: 105 14 27.42941(W)
Ellipsoid Height: 1875.756
Geoid Height: -15.71
NAVD88 Level Height: 1891.502m / 6205.70 ft
NAVD88 GPS Height: 1891.466m / 6205.58 ft
Adjusted Ellipsoid Height: 1875.792m

*Ellipsoid Height was adjusted to assure the final Computed orthometric height matched the published NAD88 orthomtetric height using Geoid12A

Horizontal Order: GPS derived
Vertical Order: First(Class II)
UTM Zone 13 Northing: 533,199.597
UTM Zone 13 Easting: 936,558.843
SPC CO C, sFT Northing: 1,749,339.01
SPC CO C, sFT Easting: 3,072,693.47

F 411 RESET
NAD83(2011 Latitude: 39 48 50.64706(N)
NAD83(2011) Longitude: 105 13 19.46440 (W)
Ellipsoid Height: 1797.980m
Geoid Height: -15.71m
NAVD88 Level Height: 1813.68m / 5950.38 ft
NAVD88 GPS Height: 1813.69m / 5950.41 ft
Adjusted Ellipsoid Height: 1797.97m
Horizontal Order: GPS derived
Vertical Order: Third
UTM Zone 13 Northing: 524,722.018
UTM Zone 13 Easting: 938,199.574
SPC CO C, sFT Northing: 1,721,525.48
SPC CO C, sFT Easting: 3,078,076.44

*Ellipsoid Height was adjusted to assure the final Computed orthometric height matched the published NAD88 orthomtetric height using Geoido12A.

Pg. 9

5. GPS Survey & Processing
After each day of GPS collection, the GPS data was downloaded, backed up, constrained 3-d network adjustment performed.

GEOID12A WAS USED IN ALL GPS COMPUTATIONS.

Jd310
We made GPS observations on JEFFCO AZ MK, TT 24J and F411 RESET to conform the internal accuracy of the primary NGS survey control and determine a horizontal position and ellipsoid height for Glen1. We performed a number of 3-d constrained network adjustments and found a vertical difference between the published elevations for TT 24 J, F 411 RESET and JEFFCO Z MK. Based on the results, we felt it was best to constrain (hold) the adjustment to the published positions and elevations for TT 24 J and F 411 RESET because of the close proximity to the project area. We then computed a position and elevation for GLEN1. JEFFCO AZ MK and (2) CORS Stations were held as check points comparing the computed positions and elevations to the published positions and heights. The results indicate that our survey had a vertical error budger of 3m (0.098').

Pg. 11

```
**********************************************************************
CONTROL POINT RESIDUALS (ADJUSTMENT MADE)
**********************************************************************
STA. NAME -- RE -- -- RN -- -- RH --
(m) (m) (m)
Glen1 -0.0000 -0.0000 0.0000
--------------------------------
RMS 0.0000 0.0000 0.0000
**********************************************************************
OUTPUT STATION COORDINATES (LAT/LONG/HT)
**********************************************************************
STA_ID    LATITUDE          LONGITUDE          ELLHGT       ORTHOHGT(M)
Glen1     39 48 03.60814    105 14 54.05149    1853.9039    1869.3038
Glen2     39 48 36.66615    105 15 12.71648    1913.1664    1928.5341
Glen3     39 48 32.25634    105 15 24.78893    1919.4745    1934.8017
Glen4     39 48 46.74165    105 15 19.86072    1899.0814    1914.4350
Glen5     39 48 47.52424    105 15 24.48220    1895.8640    1911.2039
Mine1     39 50 41.81253    105 16 47.01208    1997.0748    2012.2432
Mine2     39 50 47.03842    105 16 54.24220    1992.6056    2007.7571
Mine3     39 50 41.58050    105 16 44.59376    1983.5842    1998.7596

; CoordType: U.S. State Plane for CO Central (502)
; Units(h,v): U.S. Survey Feet, U.S. Survey Feet
; Units for Convergence is degrees, Units for StDev is U.S. Survey Feet
; Geoid: GEOID12A(CONUS).wpg
; Datum: NAD83
;*************************************************************************
NAME      EASTING          NORTHING         HEIGHT
Glen1     3070708.570      1716744.186      6132.874
Glen2     3069242.710      1720085.266      6327.199
Glen3     3068301.785      1719636.507      6347.762
Glen4     3068682.439      1721103.281      6280.942
Glen5     3068321.586      1721181.502      6270.342
Mine1     3061853.287      1732729.790      6601.834
Mine2     3061288.067      1733257.235      6587.116
Mine3     3062041.974      1732706.768      6557.597
```

2-24-17
COLORADO LICENSED
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cotter

SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

GPS SURVEY AND LIDAR REPORT EXCERPTS

N.T.S.

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 3

2/23/2017
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REMEDIATION AREA #1 TOP BOUNDARY

```
*        1   DESCRIBE PARCEL RA1_TOP

Parcel RA1_TOP :  1 CUR 10 CUR 11 CUR 12 CUR 13 CUR 14 CUR 15 CUR 16 CUR 17 CUR 18
          CUR 19 CUR 20 CUR 21 CUR 22 CUR 23 CUR 24 CUR 25 CUR 26 CUR 27 1

Total parent tract area =          177,361.48 sq ft =              4.07 ac
Total taken area        =                0.00 sq ft =              0.00 ac
Remaining area          =          177,361.48 sq ft =              4.07 ac

Description of parcel:  RA1_TOP

Beginning parent tract description
================================================================================

Point 1                    N      1,733,547.73 E      3,060,914.57 Sta       0+00.00

Course from 1 to PC 10 N 42° 46' 58.97" E Dist 23.65

                                  Curve Data
                                 *----------*
Curve 10
P.I.  Station                0+75.10  N        1,733,602.85  E        3,060,965.58
Delta        =      91° 38' 35.56" (RT)
Degree       =     114° 35' 29.61"
Tangent      =               51.45
Length       =               79.97
Radius       =               50.00
External     =               21.75
Long Chord   =               71.72
Mid. Ord.    =               15.16
P.C.  Station                0+23.65  N        1,733,565.09  E        3,060,930.63
P.T.  Station                1+03.62  N        1,733,566.83  E        3,061,002.32
C.C.                                  N        1,733,531.13  E        3,060,967.32
Back         = N  42° 46' 58.97" E
Ahead        = S  45° 34' 25.47" E
Chord Bear   = N  88° 36' 16.75" E

Course from PT 10 to PC 11 S 45° 34' 25.47" E Dist 51.79

                                  Curve Data
                                 *----------*
Curve 11
P.I.  Station                1+73.15  N        1,733,518.16  E        3,061,051.98
Delta        =      20° 06' 51.05" (LT)
Degree       =      57° 17' 44.81"
Tangent      =               17.74
Length       =               35.11
Radius       =              100.00
External     =                1.56
Long Chord   =               34.93
Mid. Ord.    =                1.54
P.C.  Station                1+55.41  N        1,733,530.58  E        3,061,039.31
P.T.  Station                1+90.52  N        1,733,510.86  E        3,061,068.14
C.C.                                  N        1,733,601.99  E        3,061,109.31
Back         = S  45° 34' 25.47" E
Ahead        = S  65° 41' 16.52" E
Chord Bear   = S  55° 37' 50.99" E

Course from PT 11 to PC 12 S 65° 41' 16.52" E Dist 49.02

                                  Curve Data
                                 *----------*
Curve 12
P.I.  Station                2+53.33  N        1,733,485.00  E        3,061,125.38
Delta        =      15° 42' 35.98" (RT)
Degree       =      57° 17' 44.81"
Tangent      =               13.80
Length       =               27.42
Radius       =              100.00
External     =                0.95
Long Chord   =               27.33
Mid. Ord.    =                0.94
P.C.  Station                2+39.54  N        1,733,490.68  E        3,061,112.81
P.T.  Station                2+66.96  N        1,733,476.13  E        3,061,135.95
C.C.                                  N        1,733,399.55  E        3,061,071.64
Back         = S  65° 41' 16.52" E
Ahead        = S  49° 58' 40.54" E
Chord Bear   = S  57° 49' 58.53" E

Course from PT 12 to PC 13 S 49° 58' 40.54" E Dist 90.64

                                  Curve Data
                                 *----------*
Curve 13
P.I.  Station                3+70.01  N        1,733,409.86  E        3,061,214.87
Delta        =      14° 09' 14.82" (LT)
Degree       =      57° 17' 44.81"
Tangent      =               12.41
Length       =               24.70
Radius       =              100.00
External     =                0.77
Long Chord   =               24.64
Mid. Ord.    =                0.76
P.C.  Station                3+57.59  N        1,733,417.84  E        3,061,205.36
P.T.  Station                3+82.30  N        1,733,404.44  E        3,061,226.04
C.C.                                  N        1,733,494.42  E        3,061,269.67
Back         = S  49° 58' 40.54" E
Ahead        = S  64° 07' 55.36" E
Chord Bear   = S  57° 03' 17.95" E

Course from PT 13 to PC 14 S 64° 07' 55.36" E Dist 36.97

                                  Curve Data
                                 *----------*
Curve 14
P.I.  Station                4+61.06  N        1,733,370.08  E        3,061,296.91
Delta        =      45° 21' 29.67" (RT)
Degree       =      57° 17' 44.81"
Tangent      =               41.79
Length       =               79.17
Radius       =              100.00
External     =                8.38
Long Chord   =               77.11
Mid. Ord.    =                7.73
P.C.  Station                4+19.27  N        1,733,388.31  E        3,061,259.31
P.T.  Station                4+98.44  N        1,733,330.51  E        3,061,310.36
C.C.                                  N        1,733,298.33  E        3,061,215.68
Back         = S  64° 07' 55.36" E
Ahead        = S  18° 46' 25.68" E
Chord Bear   = S  41° 27' 10.52" E

Course from PT 14 to PC 15 S 18° 46' 25.68" E Dist 69.70

                                  Curve Data
                                 *----------*
Curve 15
P.I.  Station                5+98.02  N        1,733,236.23  E        3,061,342.41
Delta        =      33° 16' 16.13" (LT)
Degree       =      57° 17' 44.81"
Tangent      =               29.88
Length       =               58.07
Radius       =              100.00
External     =                4.37
Long Chord   =               57.26
Mid. Ord.    =                4.19
P.C.  Station                5+68.14  N        1,733,264.52  E        3,061,332.79
P.T.  Station                6+26.21  N        1,733,217.85  E        3,061,365.97
C.C.                                  N        1,733,296.70  E        3,061,427.47
Back         = S  18° 46' 25.68" E
Ahead        = S  52° 02' 41.81" E
Chord Bear   = S  35° 24' 33.75" E

Course from PT 15 to PC 16 S 52° 02' 41.81" E Dist 93.37

                                  Curve Data
                                 *----------*
Curve 16
P.I.  Station                7+30.78  N        1,733,153.54  E        3,061,448.42
Delta        =       2° 33' 58.41" (LT)
Degree       =      11° 27' 32.96"
Tangent      =               11.20
Length       =               22.39
Radius       =              500.00
External     =                0.13
Long Chord   =               22.39
Mid. Ord.    =                0.13
P.C.  Station                7+19.58  N        1,733,160.42  E        3,061,439.58
P.T.  Station                7+41.97  N        1,733,147.05  E        3,061,457.55
C.C.                                  N        1,733,554.67  E        3,061,747.11
Back         = S  52° 02' 41.81" E
Ahead        = S  54° 36' 40.22" E
Chord Bear   = S  53° 19' 41.02" E

Course from PT 16 to PC 17 S 54° 36' 40.22" E Dist 145.90

                                  Curve Data
                                 *----------*
Curve 17
P.I.  Station                9+27.40  N        1,733,039.66  E        3,061,608.72
Delta        =       9° 02' 26.76" (LT)
Degree       =      11° 27' 32.96"
Tangent      =               39.53
Length       =               78.90
Radius       =              500.00
External     =                1.56
Long Chord   =               78.81
Mid. Ord.    =                1.56
P.C.  Station                8+87.87  N        1,733,062.56  E        3,061,576.49
P.T.  Station                9+66.77  N        1,733,022.12  E        3,061,644.14
C.C.                                  N        1,733,470.18  E        3,061,866.05
Back         = S  54° 36' 40.22" E
Ahead        = S  63° 39' 06.98" E
Chord Bear   = S  59° 07' 53.60" E

Course from PT 17 to PC 18 S 63° 39' 06.98" E Dist 23.47

                                  Curve Data
                                 *----------*
Curve 18
P.I.  Station               10+78.87  N        1,732,972.37  E        3,061,744.59
Delta        =      83° 06' 00.69" (RT)
Degree       =      57° 17' 44.81"
Tangent      =               88.63
Length       =              145.04
Radius       =              100.00
External     =               33.62
Long Chord   =              132.65
Mid. Ord.    =               25.16
P.C.  Station                9+90.24  N        1,733,011.70  E        3,061,665.17
P.T.  Station               11+35.28  N        1,732,888.80  E        3,061,715.08
C.C.                                  N        1,732,922.09  E        3,061,620.79
Back         = S  63° 39' 06.98" E
Ahead        = S  19° 26' 53.71" W
Chord Bear   = S  22° 06' 06.64" E

Course from PT 18 to PC 19 S 19° 26' 53.71" W Dist 37.02

                                  Curve Data
                                 *----------*
Curve 19
P.I.  Station               11+84.29  N        1,732,842.58  E        3,061,698.76
Delta        =      61° 54' 44.52" (RT)
Degree       =     286° 28' 44.03"
Tangent      =               12.00
Length       =               21.61
Radius       =               20.00
External     =                3.32
Long Chord   =               20.58
Mid. Ord.    =                2.85
P.C.  Station               11+72.30  N        1,732,853.89  E        3,061,702.76
P.T.  Station               11+93.91  N        1,732,840.78  E        3,061,686.90
C.C.                                  N        1,732,860.55  E        3,061,683.90
Back         = S  19° 26' 53.71" W
Ahead        = S  81° 21' 38.23" W
Chord Bear   = S  50° 24' 15.97" W

Course from PT 19 to PC 20 S 81° 21' 38.23" W Dist 162.42

                                  Curve Data
                                 *----------*
Curve 20
P.I.  Station               13+80.70  N        1,732,812.72  E        3,061,502.23
Delta        =      51° 58' 27.57" (RT)
Degree       =     114° 35' 29.61"
Tangent      =               24.37
Length       =               45.36
Radius       =               50.00
External     =                5.62
Long Chord   =               43.82
Mid. Ord.    =                5.06
P.C.  Station               13+56.33  N        1,732,816.38  E        3,061,526.33
P.T.  Station               14+01.68  N        1,732,829.44  E        3,061,484.51
C.C.                                  N        1,732,865.81  E        3,061,518.82
Back         = S  81° 21' 38.23" W
Ahead        = N  46° 39' 54.20" W
Chord Bear   = N  72° 39' 07.99" W

Course from PT 20 to PC 21 N 46° 39' 54.20" W Dist 120.77

                                  Curve Data
                                 *----------*
Curve 21
P.I.  Station               15+44.10  N        1,732,927.18  E        3,061,380.92
Delta        =      46° 48' 40.12" (RT)
Degree       =     114° 35' 29.61"
Tangent      =               21.64
Length       =               40.85
Radius       =               50.00
External     =                4.48
Long Chord   =               39.72
Mid. Ord.    =                4.11
P.C.  Station               15+22.45  N        1,732,912.32  E        3,061,396.66
P.T.  Station               15+63.30  N        1,732,948.82  E        3,061,380.98
C.C.                                  N        1,732,948.69  E        3,061,430.98
Back         = N  46° 39' 54.20" W
Ahead        = N   0° 08' 45.92" E
Chord Bear   = N  23° 15' 34.14" W

Course from PT 21 to PC 22 N 0° 08' 45.92" E Dist 48.41
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2.24.17

COLORADO LICENSED
DAN S. LEYENDECKER
42090
PROFESSIONAL ENGINEER

LNV
TBPE FIRM NO. F-366
8918 TESORO DRIVE
SAN ANTONIO, TEXAS 78217

cotter

SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

REMEDIATION AREA #1
TOP BOUNDARY
ALIGNMENT DATA
(SHEET 1 OF 2)

N.T.S.

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 4

2/23/2017
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Curve Data

Curve 22						
P.I. Station	16+30.29	N	1,733,015.81	E	3,061,381.15	
Delta =	40° 46′ 43.97"	(LT)				
Degree =	114° 35′ 29.61"					
Tangent =	18.58					
Length =	35.59					
Radius =	50.00					
External =	3.34					
Long Chord =	34.84					
Mid. Ord. =	3.13					
P.C. Station	16+11.71	N	1,732,997.22	E	3,061,381.10	
P.T. Station	16+47.30	N	1,733,029.91	E	3,061,369.04	
C.C.		N	1,732,997.35	E	3,061,331.10	
Back = N	0° 08′ 45.92" E					
Ahead = N	40° 37′ 58.04" W					
Chord Bear = N	20° 14′ 36.06" W					

Course from PT 22 to PC 23 N 40° 37′ 58.04" W Dist 97.56

Curve Data

Curve 23						
P.I. Station	17+57.19	N	1,733,113.31	E	3,061,297.48	
Delta =	27° 43′ 34.84"	(RT)				
Degree =	114° 35′ 29.61"					
Tangent =	12.34					
Length =	24.20					
Radius =	50.00					
External =	1.50					
Long Chord =	23.96					
Mid. Ord. =	1.46					
P.C. Station	17+44.85	N	1,733,103.95	E	3,061,305.51	
P.T. Station	17+69.05	N	1,733,125.34	E	3,061,294.72	
C.C.		N	1,733,136.51	E	3,061,343.46	
Back = N	40° 37′ 58.04" W					
Ahead = N	12° 54′ 23.21" W					
Chord Bear = N	26° 46′ 10.63" W					

Curve Data

Curve 24						
P.I. Station	18+60.88	N	1,733,214.86	E	3,061,274.21	
Delta =	49° 19′ 40.17"	(LT)				
Degree =	28° 38′ 52.40"					
Tangent =	91.84					
Length =	172.19					
Radius =	200.00					
External =	20.08					
Long Chord =	166.92					
Mid. Ord. =	18.25					
P.C. Station	17+69.05	N	1,733,125.34	E	3,061,294.72	
P.T. Station	19+41.23	N	1,733,257.64	E	3,061,192.95	
C.C.		N	1,733,080.67	E	3,061,099.78	
Back = N	12° 54′ 23.21" W					
Ahead = N	62° 14′ 03.38" W					
Chord Bear = N	37° 34′ 13.29" W					

Curve Data

Curve 25						
P.I. Station	19+63.43	N	1,733,267.98	E	3,061,173.31	
Delta =	47° 52′ 19.10"	(LT)				
Degree =	114° 35′ 29.61"					
Tangent =	22.19					
Length =	41.78					
Radius =	50.00					
External =	4.70					
Long Chord =	40.57					
Mid. Ord. =	4.30					
P.C. Station	19+41.23	N	1,733,257.64	E	3,061,192.95	
P.T. Station	19+83.01	N	1,733,260.35	E	3,061,152.47	
C.C.		N	1,733,213.40	E	3,061,169.65	
Back = N	62° 14′ 03.38" W					
Ahead = S	69° 53′ 37.52" W					
Chord Bear = N	86° 10′ 12.93" W					

Curve Data

Curve 26						
P.I. Station	20+53.59	N	1,733,236.09	E	3,061,086.19	
Delta =	70° 25′ 47.13"	(RT)				
Degree =	57° 17′ 44.81"					
Tangent =	70.58					
Length =	122.92					
Radius =	100.00					
External =	22.40					
Long Chord =	115.33					
Mid. Ord. =	18.30					
P.C. Station	19+83.01	N	1,733,260.35	E	3,061,152.47	
P.T. Station	21+05.93	N	1,733,290.41	E	3,061,041.12	
C.C.		N	1,733,354.26	E	3,061,118.09	
Back = S	69° 53′ 37.52" W					
Ahead = N	39° 40′ 35.35" W					
Chord Bear = N	74° 53′ 28.91" W					

Course from PT 26 to PC 27 N 39° 40′ 35.35" W Dist 226.18

Curve Data

Curve 27						
P.I. Station	23+75.93	N	1,733,498.22	E	3,060,868.74	
Delta =	82° 27′ 34.32"	(RT)				
Degree =	114° 35′ 29.61"					
Tangent =	43.82					
Length =	71.96					
Radius =	50.00					
External =	16.48					
Long Chord =	65.91					
Mid. Ord. =	12.40					
P.C. Station	23+32.11	N	1,733,464.49	E	3,060,896.72	
P.T. Station	24+04.07	N	1,733,530.38	E	3,060,898.50	
C.C.		N	1,733,496.42	E	3,060,935.20	
Back = N	39° 40′ 35.35" W					
Ahead = N	42° 46′ 58.97" E					
Chord Bear = N	1° 33′ 11.81" E					

Course from PT 27 to 1 N 42° 46′ 58.97" E Dist 23.65

Point 1 N 1,733,547.73 E 3,060,914.57 Sta 24+27.72

End of parcel RA1_TOP description

2/23/2017
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2.24.17

COLORADO LICENSED
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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

REMEDIATION AREA #1 TOP BOUNDARY ALIGNMENT DATA (SHEET 2 OF 2)

N.T.S.

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 5

REMEDIATION AREA #1 BOTTOM BOUNDARY

* 1 DESCRIBE PARCEL RA1 BOTTOM

Parcel RA1 BOTTOM : 2 CUR 100 CUR 101 CUR 102 CUR 103 CUR 104 CUR 105 CUR 106
CUR 107 CUR 108 CUR 109 CUR 110 CUR 111 CUR 112 CUR 113
CUR 114 CUR 115 CUR 116 CUR 117 CUR 118 CUR 119 CUR 120
CUR 121 2

Total parent tract area =	78,043.21 sq ft =	1.79 ac
Total taken area =	0.00 sq ft =	0.00 ac
Remaining area =	78,043.21 sq ft =	1.79 ac

Description of parcel: RA1 BOTTOM

Beginning parent tract description

Point 2 N 1,733,441.81 E 3,060,973.73 Sta 0+00.00

Course from 2 to PC 100 N 19° 48′ 30.44" W Dist 61.17

Curve Data

Curve 100					
P.I. Station	0+65.56	N	1,733,503.49	E	3,060,951.51
Delta =	131° 03′ 34.62"	(RT)			
Degree =	2864° 47′ 20.31"				
Tangent =	4.39				
Length =	4.57				
Radius =	2.00				
External =	2.83				
Long Chord =	3.64				
Mid. Ord. =	1.17				
P.C. Station	0+61.17	N	1,733,499.36	E	3,060,953.00
P.T. Station	0+65.74	N	1,733,501.90	E	3,060,955.61
C.C.		N	1,733,500.04	E	3,060,954.88
Back = N	19° 48′ 30.44" W				
Ahead = S	68° 44′ 55.82" E				
Chord Bear = N	45° 43′ 16.87" E				

Course from PT 100 to PC 101 S 68° 44′ 55.82" E Dist 184.27

Curve Data

Curve 101					
P.I. Station	2+59.83	N	1,733,431.55	E	3,061,136.50
Delta =	11° 13′ 14.46"	(RT)			
Degree =	57° 17′ 44.81"				
Tangent =	9.82				
Length =	19.58				
Radius =	100.00				
External =	0.48				
Long Chord =	19.55				
Mid. Ord. =	0.48				
P.C. Station	2+50.01	N	1,733,435.11	E	3,061,127.35
P.T. Station	2+69.59	N	1,733,426.28	E	3,061,144.79
C.C.		N	1,733,341.91	E	3,061,091.10
Back = S	68° 44′ 55.82" E				
Ahead = S	57° 31′ 41.36" E				
Chord Bear = S	63° 08′ 18.59" E				

Course from PT 101 to PC 102 S 57° 31′ 41.36" E Dist 110.01

Curve Data

Curve 102					
P.I. Station	3+90.15	N	1,733,361.55	E	3,061,246.50
Delta =	23° 50′ 35.73"	(RT)			
Degree =	114° 35′ 29.61"				
Tangent =	10.56				
Length =	20.81				
Radius =	50.00				
External =	1.10				
Long Chord =	20.66				
Mid. Ord. =	1.08				
P.C. Station	3+79.60	N	1,733,367.22	E	3,061,237.59
P.T. Station	4+00.40	N	1,733,352.77	E	3,061,252.36
C.C.		N	1,733,325.04	E	3,061,210.75
Back = S	57° 31′ 41.36" E				
Ahead = S	33° 41′ 05.63" E				
Chord Bear = S	45° 36′ 23.49" E				

Course from PT 102 to PC 103 S 33° 41′ 05.63" E Dist 46.86

Curve Data

Curve 103					
P.I. Station	4+63.87	N	1,733,299.95	E	3,061,287.56
Delta =	18° 51′ 22.15"	(RT)			
Degree =	57° 17′ 44.81"				
Tangent =	16.61				
Length =	32.91				
Radius =	100.00				
External =	1.37				
Long Chord =	32.76				
Mid. Ord. =	1.35				
P.C. Station	4+47.27	N	1,733,313.77	E	3,061,278.35
P.T. Station	4+80.18	N	1,733,283.90	E	3,061,291.81
C.C.		N	1,733,258.31	E	3,061,195.14
Back = S	33° 41′ 05.63" E				
Ahead = S	14° 49′ 43.48" E				
Chord Bear = S	24° 15′ 24.55" E				

Course from PT 103 to PC 104 S 14° 49′ 43.48" E Dist 5.60

Curve Data

Curve 104					
P.I. Station	5+08.84	N	1,733,256.20	E	3,061,299.14
Delta =	25° 58′ 01.17"	(LT)			
Degree =	57° 17′ 44.81"				
Tangent =	23.06				
Length =	45.32				
Radius =	100.00				
External =	2.62				
Long Chord =	44.93				
Mid. Ord. =	2.56				
P.C. Station	4+85.78	N	1,733,278.48	E	3,061,293.24
P.T. Station	5+31.10	N	1,733,238.74	E	3,061,314.21
C.C.		N	1,733,304.08	E	3,061,389.91
Back = S	14° 49′ 43.48" E				
Ahead = S	40° 47′ 44.65" E				
Chord Bear = S	27° 48′ 44.06" E				

Course from PT 104 to PC 105 S 40° 47′ 44.65" E Dist 38.40

Curve Data

Curve 105					
P.I. Station	5+87.89	N	1,733,195.75	E	3,061,351.31
Delta =	10° 30′ 29.28"	(LT)			
Degree =	28° 38′ 52.40"				
Tangent =	18.39				
Length =	36.68				
Radius =	200.00				
External =	0.84				
Long Chord =	36.63				
Mid. Ord. =	0.84				
P.C. Station	5+69.50	N	1,733,209.67	E	3,061,339.29
P.T. Station	6+06.18	N	1,733,184.25	E	3,061,365.66
C.C.		N	1,733,340.35	E	3,061,490.70
Back = S	40° 47′ 44.65" E				
Ahead = S	51° 18′ 13.93" E				
Chord Bear = S	46° 02′ 59.29" E				

Course from PT 105 to PC 106 S 51° 18′ 13.93" E Dist 94.76

Curve Data

Curve 106					
P.I. Station	7+07.13	N	1,733,121.14	E	3,061,444.45
Delta =	3° 32′ 49.34"	(RT)			
Degree =	28° 38′ 52.40"				
Tangent =	6.19				
Length =	12.38				
Radius =	200.00				
External =	0.10				
Long Chord =	12.38				
Mid. Ord. =	0.10				
P.C. Station	7+00.94	N	1,733,125.01	E	3,061,439.62
P.T. Station	7+13.32	N	1,733,116.97	E	3,061,449.04
C.C.		N	1,732,968.91	E	3,061,314.58
Back = S	51° 18′ 13.93" E				
Ahead = S	47° 45′ 24.59" E				
Chord Bear = S	49° 31′ 49.26" E				

Course from PT 106 to PC 107 S 47° 45′ 24.59" E Dist 67.61

Curve Data

Curve 107					
P.I. Station	8+09.25	N	1,733,052.48	E	3,061,520.05
Delta =	16° 06′ 59.06"	(LT)			
Degree =	28° 38′ 52.40"				
Tangent =	28.32				
Length =	56.26				
Radius =	200.00				
External =	1.99				
Long Chord =	56.07				
Mid. Ord. =	1.97				
P.C. Station	7+80.93	N	1,733,071.52	E	3,061,499.09
P.T. Station	8+37.19	N	1,733,040.02	E	3,061,545.48
C.C.		N	1,733,219.58	E	3,061,633.55
Back = S	47° 45′ 24.59" E				
Ahead = S	63° 52′ 23.65" E				
Chord Bear = S	55° 48′ 54.12" E				

Course from PT 107 to PC 108 S 63° 52′ 23.65" E Dist 98.06

Curve Data

Curve 108					
P.I. Station	9+50.89	N	1,732,989.95	E	3,061,647.56
Delta =	76° 02′ 40.10"	(RT)			
Degree =	286° 28′ 44.03"				
Tangent =	15.64				
Length =	26.54				
Radius =	20.00				
External =	5.39				
Long Chord =	24.64				
Mid. Ord. =	4.24				
P.C. Station	9+35.25	N	1,732,996.83	E	3,061,633.52
P.T. Station	9+61.79	N	1,732,974.66	E	3,061,644.26
C.C.		N	1,732,978.88	E	3,061,624.71
Back = S	63° 52′ 23.65" E				
Ahead = S	12° 10′ 16.45" W				
Chord Bear = S	25° 51′ 03.60" E				

Course from PT 108 to PC 109 S 12° 10′ 16.45" W Dist 76.98

Curve Data

Curve 109					
P.I. Station	10+57.24	N	1,732,881.36	E	3,061,624.14
Delta =	85° 24′ 46.07"	(RT)			
Degree =	286° 28′ 44.03"				
Tangent =	18.46				
Length =	29.81				
Radius =	20.00				
External =	7.22				
Long Chord =	27.13				
Mid. Ord. =	5.30				
P.C. Station	10+38.78	N	1,732,899.41	E	3,061,628.03
P.T. Station	10+68.59	N	1,732,883.80	E	3,061,605.84
C.C.		N	1,732,903.62	E	3,061,608.48
Back = S	12° 10′ 16.45" W				
Ahead = N	82° 24′ 57.48" W				
Chord Bear = S	54° 52′ 39.49" W				

Course from PT 109 to PC 110 N 82° 24′ 57.48" W Dist 93.66

Curve Data

Curve 110					
P.I. Station	11+71.63	N	1,732,897.40	E	3,061,503.70
Delta =	50° 13′ 34.04"	(RT)			
Degree =	286° 28′ 44.03"				
Tangent =	9.37				
Length =	17.53				
Radius =	20.00				
External =	2.09				
Long Chord =	16.98				
Mid. Ord. =	1.89				
P.C. Station	11+62.25	N	1,732,896.16	E	3,061,513.00
P.T. Station	11+79.79	N	1,732,905.33	E	3,061,498.71
C.C.		N	1,732,915.99	E	3,061,515.64
Back = N	82° 24′ 57.48" W				
Ahead = N	32° 11′ 23.44" W				
Chord Bear = N	57° 18′ 10.46" W				

Course from PT 110 to PC 111 N 32° 11′ 23.44" W Dist 42.16

2.24.17

COLORADO LICENSED
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SAN ANTONIO, TEXAS 78217

cotter

SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

REMEDIATION AREA #1
BOTTOM BOUNDARY
ALIGNMENT DATA
(SHEET 1 OF 2)

N.T.S.

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 6

2/23/2017
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Curve Data

Curve 111
P.I. Station 12+44.50 N 1,732,960.10 E 3,061,464.23
Delta = 12° 52' 19.09" (RT)
Degree = 28° 38' 52.40"
Tangent = 22.56
Length = 44.93
Radius = 200.00
External = 1.27
Long Chord = 44.84
Mid. Ord. = 1.26
P.C. Station 12+21.94 N 1,732,941.01 E 3,061,476.25
P.T. Station 12+66.88 N 1,732,981.39 E 3,061,456.77
C.C. N 1,733,047.55 E 3,061,645.51
Back = N 32° 11' 23.44" W
Ahead = N 19° 19' 04.35" W
Chord Bear = N 25° 45' 13.90" W

Course from PT 111 to PC 112 N 19° 19' 04.35" W Dist 47.24

Curve Data

Curve 112
P.I. Station 13+37.27 N 1,733,047.82 E 3,061,433.48
Delta = 49° 41' 20.06" (LT)
Degree = 114° 35' 29.61"
Tangent = 23.15
Length = 43.36
Radius = 50.00
External = 5.10
Long Chord = 42.02
Mid. Ord. = 4.63
P.C. Station 13+14.11 N 1,733,025.97 E 3,061,441.14
P.T. Station 13+57.48 N 1,733,056.11 E 3,061,411.87
C.C. N 1,733,009.43 E 3,061,393.96
Back = N 19° 19' 04.35" W
Ahead = N 69° 00' 24.41" W
Chord Bear = N 44° 09' 44.38" W

Course from PT 112 to PC 113 N 69° 00' 24.41" W Dist 5.58

Curve Data

Curve 113
P.I. Station 13+78.05 N 1,733,063.48 E 3,061,392.66
Delta = 33° 23' 22.99" (RT)
Degree = 114° 35' 29.61"
Tangent = 15.00
Length = 29.14
Radius = 50.00
External = 2.20
Long Chord = 28.73
Mid. Ord. = 2.11
P.C. Station 13+63.05 N 1,733,058.11 E 3,061,406.66
P.T. Station 13+92.19 N 1,733,075.67 E 3,061,383.93
C.C. N 1,733,104.79 E 3,061,424.58
Back = N 69° 00' 24.41" W
Ahead = N 35° 37' 01.42" W
Chord Bear = N 52° 18' 42.91" W

Course from PT 113 to PC 114 N 35° 37' 01.42" W Dist 94.92

Curve Data

Curve 114
P.I. Station 14+96.68 N 1,733,160.61 E 3,061,323.08
Delta = 5° 28' 37.06" (LT)
Degree = 28° 38' 52.40"
Tangent = 9.57
Length = 19.12
Radius = 200.00
External = 0.23
Long Chord = 19.11
Mid. Ord. = 0.23
P.C. Station 14+87.11 N 1,733,152.84 E 3,061,328.65
P.T. Station 15+06.23 N 1,733,167.82 E 3,061,316.79
C.C. N 1,733,036.36 E 3,061,166.07
Back = N 35° 37' 01.42" W
Ahead = N 41° 05' 38.48" W
Chord Bear = N 38° 21' 19.95" W

Course from PT 114 to PC 115 N 41° 05' 38.48" W Dist 29.34

Curve Data

Curve 115
P.I. Station 15+50.91 N 1,733,201.49 E 3,061,287.43
Delta = 8° 46' 07.84" (RT)
Degree = 28° 38' 52.40"
Tangent = 15.33
Length = 30.61
Radius = 200.00
External = 0.59
Long Chord = 30.58
Mid. Ord. = 0.59
P.C. Station 15+35.57 N 1,733,189.94 E 3,061,297.51
P.T. Station 15+66.18 N 1,733,214.45 E 3,061,279.23
C.C. N 1,733,321.40 E 3,061,448.23
Back = N 41° 05' 38.48" W
Ahead = N 32° 19' 30.64" W
Chord Bear = N 36° 42' 34.56" W

Course from PT 115 to PC 116 N 32° 19' 30.64" W Dist 30.75

Curve Data

Curve 116
P.I. Station 16+05.79 N 1,733,247.92 E 3,061,258.05
Delta = 20° 06' 16.84" (LT)
Degree = 114° 35' 29.61"
Tangent = 8.86
Length = 17.54
Radius = 50.00
External = 0.78
Long Chord = 17.45
Mid. Ord. = 0.77
P.C. Station 15+96.93 N 1,733,240.43 E 3,061,262.79
P.T. Station 16+14.47 N 1,733,253.33 E 3,061,251.02
C.C. N 1,733,213.70 E 3,061,220.54
Back = N 32° 19' 30.64" W
Ahead = N 52° 25' 47.48" W
Chord Bear = N 42° 22' 39.06" W

Course from PT 116 to PC 117 N 52° 25' 47.48" W Dist 39.45

Curve Data

Curve 117
P.I. Station 16+60.86 N 1,733,281.61 E 3,061,214.26
Delta = 15° 47' 01.40" (LT)
Degree = 114° 35' 29.61"
Tangent = 6.93
Length = 13.77
Radius = 50.00
External = 0.48
Long Chord = 13.73
Mid. Ord. = 0.47
P.C. Station 16+53.92 N 1,733,277.38 E 3,061,219.75
P.T. Station 16+67.70 N 1,733,284.18 E 3,061,207.82
C.C. N 1,733,237.75 E 3,061,189.26
Back = N 52° 25' 47.48" W
Ahead = N 68° 12' 48.88" W
Chord Bear = N 60° 19' 18.18" W

Course from PT 117 to PC 118 N 68° 12' 48.88" W Dist 21.01

Curve Data

Curve 118
P.I. Station 17+02.42 N 1,733,297.07 E 3,061,175.58
Delta = 30° 39' 36.36" (LT)
Degree = 114° 35' 29.61"
Tangent = 13.71
Length = 26.76
Radius = 50.00
External = 1.84
Long Chord = 26.44
Mid. Ord. = 1.78
P.C. Station 16+88.71 N 1,733,291.98 E 3,061,188.31
P.T. Station 17+15.47 N 1,733,294.95 E 3,061,162.04
C.C. N 1,733,245.55 E 3,061,169.75
Back = N 68° 12' 48.88" W
Ahead = S 81° 07' 34.76" W
Chord Bear = N 83° 32' 37.06" W

Course from PT 118 to PC 119 S 81° 07' 34.76" W Dist 41.47

Curve Data

Curve 119
P.I. Station 17+64.39 N 1,733,287.41 E 3,061,113.71
Delta = 40° 52' 47.28" (RT)
Degree = 286° 28' 44.03"
Tangent = 7.45
Length = 14.27
Radius = 20.00
External = 1.34
Long Chord = 13.97
Mid. Ord. = 1.26
P.C. Station 17+56.93 N 1,733,288.56 E 3,061,121.07
P.T. Station 17+71.20 N 1,733,291.36 E 3,061,107.38
C.C. N 1,733,308.32 E 3,061,117.98
Back = S 81° 07' 34.76" W
Ahead = N 57° 59' 37.96" W
Chord Bear = N 78° 26' 01.60" W

Course from PT 119 to PC 120 N 57° 59' 37.96" W Dist 79.63

Curve Data

Curve 120
P.I. Station 18+58.09 N 1,733,337.41 E 3,061,033.70
Delta = 16° 31' 34.70" (RT)
Degree = 114° 35' 29.61"
Tangent = 7.26
Length = 14.42
Radius = 50.00
External = 0.52
Long Chord = 14.37
Mid. Ord. = 0.52
P.C. Station 18+50.83 N 1,733,333.56 E 3,061,039.86
P.T. Station 18+65.25 N 1,733,342.85 E 3,061,028.90
C.C. N 1,733,375.96 E 3,061,066.36
Back = N 57° 59' 37.96" W
Ahead = N 41° 28' 03.26" W
Chord Bear = N 49° 43' 50.61" W

Course from PT 120 to PC 121 N 41° 28' 03.26" W Dist 40.19

Curve Data

Curve 121
P.I. Station 19+15.01 N 1,733,380.13 E 3,060,995.95
Delta = 21° 39' 32.83" (RT)
Degree = 114° 35' 29.61"
Tangent = 9.56
Length = 18.90
Radius = 50.00
External = 0.91
Long Chord = 18.79
Mid. Ord. = 0.89
P.C. Station 19+05.44 N 1,733,372.97 E 3,061,002.28
P.T. Station 19+24.34 N 1,733,389.13 E 3,060,992.71
C.C. N 1,733,406.08 E 3,061,039.75
Back = N 41° 28' 03.26" W
Ahead = N 19° 48' 30.44" W
Chord Bear = N 30° 38' 16.85" W

Course from PT 121 to 2 N 19° 48' 30.44" W Dist 55.99

Point 2 N 1,733,441.81 E 3,060,973.73 Sta 19+80.34

End of parcel RA1_BOTTOM description

2-24-17

COLORADO LICENSED
DAN S. LEYENDECKER
42090
PROFESSIONAL ENGINEER

LNV
TBPE FIRM NO. F-366
8918 TESORO DRIVE
SAN ANTONIO, TEXAS 78217

cotter

SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

REMEDIATION AREA #1 BOTTOM BOUNDARY ALIGNMENT DATA (SHEET 2 OF 2)

N.T.S.

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 7

2/23/2017
S:\Projects\Cotter\160236 Schwartzwalder Mine Cut\Fill-SW3P\000\Drawings\Plans\Civil\COTTER_MINE_ALIGN_DATA-2.dgn

REMEDIATION AREA #2 TOP BOUNDARY

```
*        1    DESCRIBE PARCEL RA2_TOP

Parcel RA2_TOP :  3 CUR 50 CUR 51 CUR 52 CUR 53 CUR 54 CUR 55 CUR 56 CUR 57 CUR 58
          CUR 59 CUR 60 CUR 61 CUR 62 CUR 63 CUR 64 CUR 65 CUR 66 3

Total parent tract area =          76,034.52 sq ft =              1.75 ac
Total taken area        =               0.00 sq ft =              0.00 ac
Remaining area          =          76,034.52 sq ft =              1.75 ac

Description of parcel:  RA2_TOP

Beginning parent tract description
==========================================================================

Point 3                  N      1,732,881.84 E      3,061,923.67 Sta       0+00.00

Course from 3 to PC 50 N 83° 36' 44.30" E Dist 16.92

                                  Curve Data
                                 *----------*
Curve 50
P.I.  Station              0+42.56  N      1,732,886.58  E      3,061,965.96
Delta        =     54° 18' 08.02" (RT)
Degree       =    114° 35' 29.61"
Tangent      =              25.64
Length       =              47.39
Radius       =              50.00
External     =               6.19
Long Chord   =              45.63
Mid. Ord.    =               5.51
P.C.  Station              0+16.92  N      1,732,883.73  E      3,061,940.48
P.T.  Station              0+64.30  N      1,732,867.55  E      3,061,983.15
C.C.                                N      1,732,834.04  E      3,061,946.04
Back         = N  83° 36' 44.30" E
Ahead        = S  42° 05' 07.69" E
Chord Bear   = S  69° 14' 11.69" E

Course from PT 50 to PC 51 S 42° 05' 07.69" E Dist 123.26

                                  Curve Data
                                 *----------*
Curve 51
P.I.  Station              1+99.95  N      1,732,766.88  E      3,062,074.07
Delta        =      7° 05' 12.47" (RT)
Degree       =     28° 38' 52.40"
Tangent      =              12.38
Length       =              24.74
Radius       =             200.00
External     =               0.38
Long Chord   =              24.72
Mid. Ord.    =               0.38
P.C.  Station              1+87.56  N      1,732,776.07  E      3,062,065.76
P.T.  Station              2+12.30  N      1,732,756.74  E      3,062,081.17
C.C.                                N      1,732,642.02  E      3,061,917.34
Back         = S  42° 05' 07.69" E
Ahead        = S  34° 59' 55.22" E
Chord Bear   = S  38° 32' 31.45" E

Course from PT 51 to PC 52 S 34° 59' 55.22" E Dist 41.06

                                  Curve Data
                                 *----------*
Curve 52
P.I.  Station              2+71.88  N      1,732,707.93  E      3,062,115.34
Delta        =     10° 35' 00.51" (LT)
Degree       =     28° 38' 52.40"
Tangent      =              18.52
Length       =              36.94
Radius       =             200.00
External     =               0.86
Long Chord   =              36.89
Mid. Ord.    =               0.85
P.C.  Station              2+53.36  N      1,732,723.10  E      3,062,104.72
P.T.  Station              2+90.30  N      1,732,694.96  E      3,062,128.57
C.C.                                N      1,732,837.81  E      3,062,268.55
Back         = S  34° 59' 55.22" E
Ahead        = S  45° 34' 55.73" E
Chord Bear   = S  40° 17' 25.47" E

Course from PT 52 to PC 53 S 45° 34' 55.73" E Dist 238.36

                                  Curve Data
                                 *----------*
Curve 53
P.I.  Station              5+46.54  N      1,732,515.62  E      3,062,311.59
Delta        =      4° 05' 49.59" (LT)
Degree       =     11° 27' 32.96"
Tangent      =              17.88
Length       =              35.75
Radius       =             500.00
External     =               0.32
Long Chord   =              35.75
Mid. Ord.    =               0.32
P.C.  Station              5+28.66  N      1,732,528.14  E      3,062,298.82
P.T.  Station              5+64.41  N      1,732,504.05  E      3,062,325.23
C.C.                                N      1,732,885.27  E      3,062,648.76
Back         = S  45° 34' 55.73" E
Ahead        = S  49° 40' 45.32" E
Chord Bear   = S  47° 37' 50.53" E

Course from PT 53 to PC 54 S 49° 40' 45.32" E Dist 245.90

                                  Curve Data
                                 *----------*
Curve 54
P.I.  Station              8+32.19  N      1,732,330.78  E      3,062,529.39
Delta        =     12° 28' 56.29" (RT)
Degree       =     28° 38' 52.40"
Tangent      =              21.87
Length       =              43.57
Radius       =             200.00
External     =               1.19
Long Chord   =              43.49
Mid. Ord.    =               1.19
P.C.  Station              8+10.32  N      1,732,344.94  E      3,062,512.71
P.T.  Station              8+53.89  N      1,732,313.36  E      3,062,542.61
C.C.                                N      1,732,192.45  E      3,062,383.30
Back         = S  49° 40' 45.32" E
Ahead        = S  37° 11' 49.03" E
Chord Bear   = S  43° 26' 17.18" E

Course from PT 54 to PC 55 S 37° 11' 49.03" E Dist 29.10

                                  Curve Data
                                 *----------*
Curve 55
P.I.  Station              8+98.81  N      1,732,277.58  E      3,062,569.77
Delta        =     76° 41' 25.16" (RT)
Degree       =    286° 28' 44.03"
Tangent      =              15.82
Length       =              26.77
Radius       =              20.00
External     =               5.50
Long Chord   =              24.82
Mid. Ord.    =               4.31
P.C.  Station              8+82.99  N      1,732,290.18  E      3,062,560.21
P.T.  Station              9+09.76  N      1,732,265.37  E      3,062,559.71
C.C.                                N      1,732,278.09  E      3,062,544.27
Back         = S  37° 11' 49.03" E
Ahead        = S  39° 29' 36.13" W
Chord Bear   = S   1° 08' 53.55" W

Course from PT 55 to PC 56 S 39° 29' 36.13" W Dist 4.46

                                  Curve Data
                                 *----------*
Curve 56
P.I.  Station              9+34.61  N      1,732,246.19  E      3,062,543.90
Delta        =     91° 06' 48.85" (RT)
Degree       =    286° 28' 44.03"
Tangent      =              20.39
Length       =              31.80
Radius       =              20.00
External     =               8.56
Long Chord   =              28.56
Mid. Ord.    =               6.00
P.C.  Station              9+14.22  N      1,732,261.93  E      3,062,556.87
P.T.  Station              9+46.02  N      1,732,259.46  E      3,062,528.42
C.C.                                N      1,732,274.65  E      3,062,541.44
Back         = S  39° 29' 36.13" W
Ahead        = N  49° 23' 35.02" W
Chord Bear   = S  85° 03' 00.55" W

Course from PT 56 to PC 57 N 49° 23' 35.02" W Dist 166.21

                                  Curve Data
                                 *----------*
Curve 57
P.I.  Station             11+23.79  N      1,732,375.17  E      3,062,393.46
Delta        =      6° 37' 07.52" (LT)
Degree       =     28° 38' 52.40"
Tangent      =              11.56
Length       =              23.10
Radius       =             200.00
External     =               0.33
Long Chord   =              23.09
Mid. Ord.    =               0.33
P.C.  Station             11+12.23  N      1,732,367.64  E      3,062,402.24
P.T.  Station             11+35.33  N      1,732,381.63  E      3,062,383.87
C.C.                                N      1,732,215.80  E      3,062,272.06
Back         = N  49° 23' 35.02" W
Ahead        = N  56° 00' 42.54" W
Chord Bear   = N  52° 42' 08.78" W

Course from PT 57 to PC 58 N 56° 00' 42.54" W Dist 52.52

                                  Curve Data
                                 *----------*
Curve 58
P.I.  Station             12+01.10  N      1,732,418.40  E      3,062,329.33
Delta        =     29° 41' 40.63" (LT)
Degree       =    114° 35' 29.61"
Tangent      =              13.25
Length       =              25.91
Radius       =              50.00
External     =               1.73
Long Chord   =              25.62
Mid. Ord.    =               1.67
P.C.  Station             11+87.85  N      1,732,410.99  E      3,062,340.32
P.T.  Station             12+13.76  N      1,732,419.39  E      3,062,316.12
C.C.                                N      1,732,369.54  E      3,062,312.37
Back         = N  56° 00' 42.54" W
Ahead        = N  85° 42' 23.17" W
Chord Bear   = N  70° 51' 32.85" W

Course from PT 58 to PC 59 N 85° 42' 23.17" W Dist 3.74

                                  Curve Data
                                 *----------*
Curve 59
P.I.  Station             12+54.34  N      1,732,422.43  E      3,062,275.65
Delta        =     40° 26' 52.04" (RT)
Degree       =     57° 17' 44.81"
Tangent      =              36.84
Length       =              70.59
Radius       =             100.00
External     =               6.57
Long Chord   =              69.14
Mid. Ord.    =               6.17
P.C.  Station             12+17.50  N      1,732,419.67  E      3,062,312.39
P.T.  Station             12+88.10  N      1,732,448.36  E      3,062,249.48
C.C.                                N      1,732,519.39  E      3,062,319.87
Back         = N  85° 42' 23.17" W
Ahead        = N  45° 15' 31.12" W
Chord Bear   = N  65° 28' 57.15" W

Course from PT 59 to PC 60 N 45° 15' 31.12" W Dist 70.54

                                  Curve Data
                                 *----------*
Curve 60
P.I.  Station             13+72.89  N      1,732,508.05  E      3,062,189.25
Delta        =     16° 13' 36.83" (LT)
Degree       =     57° 17' 44.81"
Tangent      =              14.26
Length       =              28.32
Radius       =             100.00
External     =               1.01
Long Chord   =              28.23
Mid. Ord.    =               1.00
P.C.  Station             13+58.64  N      1,732,498.02  E      3,062,199.38
P.T.  Station             13+86.96  N      1,732,514.86  E      3,062,176.73
C.C.                                N      1,732,426.99  E      3,062,128.99
Back         = N  45° 15' 31.12" W
Ahead        = N  61° 29' 07.96" W
Chord Bear   = N  53° 22' 19.54" W

Course from PT 60 to PC 61 N 61° 29' 07.96" W Dist 52.84

                                  Curve Data
                                 *----------*
Curve 61
P.I.  Station             14+50.49  N      1,732,545.19  E      3,062,120.90
Delta        =     24° 09' 22.04" (RT)
Degree       =    114° 35' 29.61"
Tangent      =              10.70
Length       =              21.08
Radius       =              50.00
External     =               1.13
Long Chord   =              20.92
Mid. Ord.    =               1.11
P.C.  Station             14+39.79  N      1,732,540.08  E      3,062,130.30
P.T.  Station             14+60.87  N      1,732,553.70  E      3,062,114.41
C.C.                                N      1,732,584.02  E      3,062,154.17
Back         = N  61° 29' 07.96" W
Ahead        = N  37° 19' 45.91" W
Chord Bear   = N  49° 24' 26.94" W

Course from PT 61 to PC 62 N 37° 19' 45.91" W Dist 116.84
```

2-24-17

COLORADO LICENSED
DAN S. LEYENDECKER
42090
PROFESSIONAL ENGINEER

LNV
TBPE FIRM NO. F-369
8918 TESORO DRIVE
SAN ANTONIO, TEXAS 78217

cotter

SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

REMEDIATION AREA #2 TOP BOUNDARY ALIGNMENT DATA (SHEET 1 OF 2)

N.T.S.

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 8

2/23/2017
S:\Projects\Cotter\160236 Schwartzwalder Mine Cut\Fill-SW3P\000\Drawings\Plans\Civil\COTTER_MINE_ALIGN_DATA-3.dgn

Curve Data

Curve 62
P.I. Station 15+89.27 N 1,732,655.79 E 3,062,036.55
Delta = 6° 36′ 46.33" (RT)
Degree = 28° 38′ 52.40"
Tangent = 11.55
Length = 23.08
Radius = 200.00
External = 0.33
Long Chord = 23.07
Mid. Ord. = 0.33
P.C. Station 15+77.71 N 1,732,646.60 E 3,062,043.56
P.T. Station 16+00.80 N 1,732,665.72 E 3,062,030.65
C.C. N 1,732,767.88 E 3,062,202.59
Back = N 37° 19′ 45.91" W
Ahead = N 30° 42′ 59.58" W
Chord Bear = N 34° 01′ 22.75" W

Course from PT 62 to PC 63 N 30° 42′ 59.58" W Dist 32.59

Curve Data

Curve 63
P.I. Station 16+54.84 N 1,732,712.19 E 3,062,003.04
Delta = 24° 13′ 03.11" (LT)
Degree = 57° 17′ 44.81"
Tangent = 21.45
Length = 42.27
Radius = 100.00
External = 2.28
Long Chord = 41.95
Mid. Ord. = 2.22
P.C. Station 16+33.39 N 1,732,693.75 E 3,062,014.00
P.T. Station 16+75.66 N 1,732,724.52 E 3,061,985.48
C.C. N 1,732,642.67 E 3,061,928.03
Back = N 30° 42′ 59.58" W
Ahead = N 54° 56′ 02.69" W
Chord Bear = N 42° 49′ 31.13" W

Course from PT 63 to PC 64 N 54° 56′ 02.69" W Dist 45.16

Curve Data

Curve 64
P.I. Station 17+28.59 N 1,732,754.93 E 3,061,942.16
Delta = 4° 27′ 05.27" (LT)
Degree = 28° 38′ 52.40"
Tangent = 7.77
Length = 15.54
Radius = 200.00
External = 0.15
Long Chord = 15.53
Mid. Ord. = 0.15
P.C. Station 17+20.81 N 1,732,750.46 E 3,061,948.52
P.T. Station 17+36.35 N 1,732,758.88 E 3,061,935.47
C.C. N 1,732,586.76 E 3,061,833.62
Back = N 54° 56′ 02.69" W
Ahead = N 59° 23′ 07.95" W
Chord Bear = N 57° 09′ 35.32" W

Course from PT 64 to PC 65 N 59° 23′ 07.95" W Dist 44.51

Curve Data

Curve 65
P.I. Station 18+06.71 N 1,732,794.72 E 3,061,874.92
Delta = 54° 40′ 54.10" (RT)
Degree = 114° 35′ 29.61"
Tangent = 25.85
Length = 47.72
Radius = 50.00
External = 6.29
Long Chord = 45.93
Mid. Ord. = 5.59
P.C. Station 17+80.86 N 1,732,781.55 E 3,061,897.17
P.T. Station 18+28.58 N 1,732,820.48 E 3,061,872.80
C.C. N 1,732,824.58 E 3,061,922.63
Back = N 59° 23′ 07.95" W
Ahead = N 4° 42′ 13.85" W
Chord Bear = N 32° 02′ 40.90" W

Course from PT 65 to PC 66 N 4° 42′ 13.85" W Dist 16.50

Curve Data

Curve 66
P.I. Station 18+83.93 N 1,732,875.64 E 3,061,868.26
Delta = 88° 18′ 58.14" (RT)
Degree = 143° 14′ 22.02"
Tangent = 38.84
Length = 61.66
Radius = 40.00
External = 15.76
Long Chord = 55.73
Mid. Ord. = 11.30
P.C. Station 18+45.09 N 1,732,836.93 E 3,061,871.44
P.T. Station 19+06.74 N 1,732,879.96 E 3,061,906.86
C.C. N 1,732,840.21 E 3,061,911.31
Back = N 4° 42′ 13.85" W
Ahead = N 83° 36′ 44.30" E
Chord Bear = N 39° 27′ 15.22" E

Course from PT 66 to 3 N 83° 36′ 44.30" E Dist 16.92

Point 3 N 1,732,881.84 E 3,061,923.67 Sta 19+23.66

End of parcel RA2_TOP description

2/24/17
COLORADO LICENSED
DAN S. LEYENDECKER
42090
PROFESSIONAL ENGINEER

LNV
TBPE FIRM NO. F-366
8918 TESORO DRIVE
SAN ANTONIO, TEXAS 78217

cotter

SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

REMEDIATION AREA #2 TOP BOUNDARY ALIGNMENT DATA (SHEET 2 OF 2)

N.T.S.

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 9

2/23/2017
S:\Projects\Cotter\160236 Schwartzwalder Mine CutFill-SW3P\000\Drawings\Plans\Civil\COTTER_MINE_ALIGN_DATA-3.dgn

REMEDIATION AREA #2 BOTTOM BOUNDARY

* 1 DESCRIBE PARCEL RA2_BOTTOM

Parcel RA2_BOTTOM : 4 CUR 500 CUR 501 CUR 502 CUR 503 CUR 504 CUR 505 CUR 506
CUR 507 CUR 508 CUR 509 CUR 510 CUR 511 CUR 512 CUR 513
CUR 514 CUR 515 CUR 516 CUR 517 CUR 518 CUR 519 4

Total parent tract area	=	21,163.64 sq ft =	0.49 ac
Total taken area	=	0.00 sq ft =	0.00 ac
Remaining area	=	21,163.64 sq ft =	0.49 ac

Description of parcel: RA2_BOTTOM

Beginning parent tract description

Point 4 N 1,732,828.80 E 3,061,905.72 Sta 0+00.00

Course from 4 to PC 500 N 22° 29′ 30.91" W Dist 10.50

Curve Data

Curve 500			
P.I. Station	0+18.08	N 1,732,845.51	E 3,061,898.80
Delta =	74° 19′ 57.77"	(RT)	
Degree =	572° 57′ 28.06"		
Tangent =	7.58		
Length =	12.97		
Radius =	10.00		
External =	2.55		
Long Chord =	12.08		
Mid. Ord. =	2.03		
P.C. Station	0+10.50	N 1,732,838.50	E 3,061,901.70
P.T. Station	0+23.48	N 1,732,850.19	E 3,061,904.76
C.C.		N 1,732,842.33	E 3,061,910.94
Back = N 22° 29′ 30.91" W			
Ahead = N 51° 50′ 26.86" E			
Chord Bear = N 14° 40′ 27.98" E			

Course from PT 500 to PC 501 N 51° 50′ 26.86" E Dist 4.04

Curve Data

Curve 501			
P.I. Station	0+36.23	N 1,732,858.07	E 3,061,914.79
Delta =	82° 06′ 34.18"	(RT)	
Degree =	572° 57′ 28.06"		
Tangent =	8.71		
Length =	14.33		
Radius =	10.00		
External =	3.26		
Long Chord =	13.14		
Mid. Ord. =	2.46		
P.C. Station	0+27.52	N 1,732,852.69	E 3,061,907.94
P.T. Station	0+41.85	N 1,732,852.02	E 3,061,921.06
C.C.		N 1,732,844.82	E 3,061,914.12
Back = N 51° 50′ 26.86" E			
Ahead = S 46° 02′ 58.95" E			
Chord Bear = S 87° 06′ 16.05" E			

Course from PT 501 to PC 502 S 46° 02′ 58.95" E Dist 23.73

Curve Data

Curve 502			
P.I. Station	0+81.83	N 1,732,824.27	E 3,061,949.85
Delta =	18° 28′ 05.02"	(LT)	
Degree =	57° 17′ 44.81"		
Tangent =	16.26		
Length =	32.23		
Radius =	100.00		
External =	1.31		
Long Chord =	32.09		
Mid. Ord. =	1.30		
P.C. Station	0+65.58	N 1,732,835.56	E 3,061,938.14
P.T. Station	0+97.81	N 1,732,817.28	E 3,061,964.52
C.C.		N 1,732,907.55	E 3,062,007.54
Back = S 46° 02′ 58.95" E			
Ahead = S 64° 31′ 03.98" E			
Chord Bear = S 55° 17′ 01.47" E			

Course from PT 502 to PC 503 S 64° 31′ 03.98" E Dist 12.30

Curve Data

Curve 503			
P.I. Station	1+26.26	N 1,732,805.04	E 3,061,990.21
Delta =	18° 20′ 58.15"	(RT)	
Degree =	57° 17′ 44.81"		
Tangent =	16.15		
Length =	32.03		
Radius =	100.00		
External =	1.30		
Long Chord =	31.89		
Mid. Ord. =	1.28		
P.C. Station	1+10.11	N 1,732,811.98	E 3,061,975.63
P.T. Station	1+42.14	N 1,732,793.85	E 3,062,001.86
C.C.		N 1,732,721.71	E 3,061,932.60
Back = S 64° 31′ 03.98" E			
Ahead = S 46° 10′ 05.82" E			
Chord Bear = S 55° 20′ 34.90" E			

Course from PT 503 to PC 504 S 46° 10′ 05.82" E Dist 47.46

Curve Data

Curve 504			
P.I. Station	1+96.54	N 1,732,756.18	E 3,062,041.10
Delta =	3° 58′ 21.52"	(RT)	
Degree =	28° 38′ 52.40"		
Tangent =	6.94		
Length =	13.87		
Radius =	200.00		
External =	0.12		
Long Chord =	13.86		
Mid. Ord. =	0.12		
P.C. Station	1+89.60	N 1,732,760.98	E 3,062,036.10
P.T. Station	2+03.47	N 1,732,751.04	E 3,062,045.76
C.C.		N 1,732,616.70	E 3,061,897.59
Back = S 46° 10′ 05.82" E			
Ahead = S 42° 11′ 44.30" E			
Chord Bear = S 44° 10′ 55.06" E			

Course from PT 504 to PC 505 S 42° 11′ 44.30" E Dist 137.57

Curve Data

Curve 505			
P.I. Station	3+68.34	N 1,732,628.89	E 3,062,156.50
Delta =	6° 15′ 03.96"	(LT)	
Degree =	11° 27′ 32.96"		
Tangent =	27.30		
Length =	54.55		
Radius =	500.00		
External =	0.74		
Long Chord =	54.52		
Mid. Ord. =	0.74		
P.C. Station	3+41.03	N 1,732,649.12	E 3,062,138.16
P.T. Station	3+95.59	N 1,732,610.78	E 3,062,176.93
C.C.		N 1,732,984.95	E 3,062,508.59
Back = S 42° 11′ 44.30" E			
Ahead = S 48° 26′ 48.26" E			
Chord Bear = S 45° 19′ 16.28" E			

Course from PT 505 to PC 506 S 48° 26′ 48.26" E Dist 141.82

Curve Data

Curve 506			
P.I. Station	5+54.05	N 1,732,505.67	E 3,062,295.52
Delta =	1° 54′ 28.30"	(LT)	
Degree =	5° 43′ 46.48"		
Tangent =	16.65		
Length =	33.30		
Radius =	1,000.00		
External =	0.14		
Long Chord =	33.30		
Mid. Ord. =	0.14		
P.C. Station	5+37.40	N 1,732,516.71	E 3,062,283.06
P.T. Station	5+70.70	N 1,732,495.04	E 3,062,308.34
C.C.		N 1,733,265.05	E 3,062,946.37
Back = S 48° 26′ 48.26" E			
Ahead = S 50° 21′ 16.56" E			
Chord Bear = S 49° 24′ 02.41" E			

Course from PT 506 to PC 507 S 50° 21′ 16.56" E Dist 102.65

Curve Data

Curve 507			
P.I. Station	6+91.11	N 1,732,418.22	E 3,062,401.05
Delta =	2° 02′ 04.66"	(RT)	
Degree =	5° 43′ 46.48"		
Tangent =	17.76		
Length =	35.51		
Radius =	1,000.00		
External =	0.16		
Long Chord =	35.51		
Mid. Ord. =	0.16		
P.C. Station	6+73.35	N 1,732,429.55	E 3,062,387.38
P.T. Station	7+08.86	N 1,732,406.41	E 3,062,414.32
C.C.		N 1,731,659.54	E 3,061,749.35
Back = S 50° 21′ 16.56" E			
Ahead = S 48° 19′ 11.90" E			
Chord Bear = S 49° 20′ 14.23" E			

Course from PT 507 to PC 508 S 48° 19′ 11.90" E Dist 112.80

Curve Data

Curve 508			
P.I. Station	8+30.59	N 1,732,325.46	E 3,062,505.23
Delta =	5° 06′ 54.24"	(RT)	
Degree =	28° 38′ 52.40"		
Tangent =	8.93		
Length =	17.85		
Radius =	200.00		
External =	0.20		
Long Chord =	17.85		
Mid. Ord. =	0.20		
P.C. Station	8+21.66	N 1,732,331.40	E 3,062,498.56
P.T. Station	8+39.52	N 1,732,318.95	E 3,062,511.35
C.C.		N 1,732,182.03	E 3,062,365.57
Back = S 48° 19′ 11.90" E			
Ahead = S 43° 12′ 17.66" E			
Chord Bear = S 45° 45′ 44.78" E			

Course from PT 508 to PC 509 S 43° 12′ 17.66" E Dist 51.19

Curve Data

Curve 509			
P.I. Station	9+36.06	N 1,732,248.58	E 3,062,577.45
Delta =	173° 41′ 25.52"	(RT)	
Degree =	2291° 49′ 52.25"		
Tangent =	45.36		
Length =	7.58		
Radius =	2.50		
External =	42.93		
Long Chord =	4.99		
Mid. Ord. =	2.36		
P.C. Station	8+90.71	N 1,732,281.64	E 3,062,546.39
P.T. Station	8+98.29	N 1,732,278.03	E 3,062,542.95
C.C.		N 1,732,279.93	E 3,062,544.57
Back = S 43° 12′ 17.66" E			
Ahead = N 49° 30′ 52.14" W			
Chord Bear = S 43° 38′ 25.10" W			

Course from PT 509 to PC 510 N 49° 30′ 52.14" W Dist 139.06

Curve Data

Curve 510			
P.I. Station	10+44.10	N 1,732,372.70	E 3,062,432.04
Delta =	3° 52′ 14.45"	(RT)	
Degree =	28° 38′ 52.40"		
Tangent =	6.76		
Length =	13.51		
Radius =	200.00		
External =	0.11		
Long Chord =	13.51		
Mid. Ord. =	0.11		
P.C. Station	10+37.34	N 1,732,368.31	E 3,062,437.18
P.T. Station	10+50.86	N 1,732,377.42	E 3,062,427.21
C.C.		N 1,732,520.42	E 3,062,567.04
Back = N 49° 30′ 52.14" W			
Ahead = N 45° 38′ 37.69" W			
Chord Bear = N 47° 34′ 44.92" W			

Course from PT 510 to PC 511 N 45° 38′ 37.69" W Dist 18.68

Curve Data

Curve 511			
P.I. Station	10+91.80	N 1,732,406.05	E 3,062,397.94
Delta =	12° 42′ 11.54"	(LT)	
Degree =	28° 38′ 52.40"		
Tangent =	22.26		
Length =	44.34		
Radius =	200.00		
External =	1.24		
Long Chord =	44.25		
Mid. Ord. =	1.23		
P.C. Station	10+69.53	N 1,732,390.48	E 3,062,413.86
P.T. Station	11+13.88	N 1,732,417.73	E 3,062,378.99
C.C.		N 1,732,247.48	E 3,062,274.03
Back = N 45° 38′ 37.69" W			
Ahead = N 58° 20′ 49.23" W			
Chord Bear = N 51° 59′ 43.46" W			

Course from PT 511 to PC 512 N 58° 20′ 49.23" W Dist 45.60

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

REMEDIATION AREA #2
BOTTOM BOUNDARY
ALIGNMENT DATA
(SHEET 1 OF 2)

N.T.S.

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 10

2/23/2017
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Curve Data

Curve 512
P.I. Station 11+78.14 N 1,732,451.45 E 3,062,324.28
Delta = 4° 16′ 31.89" (RT)
Degree = 11° 27′ 32.96"
Tangent = 18.66
Length = 37.31
Radius = 500.00
External = 0.35
Long Chord = 37.30
Mid. Ord. = 0.35
P.C. Station 11+59.48 N 1,732,441.66 E 3,062,340.17
P.T. Station 11+96.79 N 1,732,462.40 E 3,062,309.17
C.C. N 1,732,867.28 E 3,062,602.56
Back = N 58° 20′ 49.23" W
Ahead = N 54° 04′ 17.34" W
Chord Bear = N 56° 12′ 33.29" W

Course from PT 512 to PC 513 N 54° 04′ 17.34" W Dist 152.20

Curve Data

Curve 513
P.I. Station 13+55.80 N 1,732,555.71 E 3,062,180.41
Delta = 7° 47′ 31.80" (LT)
Degree = 57° 17′ 44.81"
Tangent = 6.81
Length = 13.60
Radius = 100.00
External = 0.23
Long Chord = 13.59
Mid. Ord. = 0.23
P.C. Station 13+48.99 N 1,732,551.71 E 3,062,185.93
P.T. Station 13+62.59 N 1,732,558.92 E 3,062,174.40
C.C. N 1,732,470.74 E 3,062,127.25
Back = N 54° 04′ 17.34" W
Ahead = N 61° 51′ 49.14" W
Chord Bear = N 57° 58′ 03.24" W

Course from PT 513 to PC 514 N 61° 51′ 49.14" W Dist 19.28

Curve Data

Curve 514
P.I. Station 13+96.63 N 1,732,574.97 E 3,062,144.39
Delta = 32° 53′ 40.62" (RT)
Degree = 114° 35′ 29.61"
Tangent = 14.76
Length = 28.71
Radius = 50.00
External = 2.13
Long Chord = 28.31
Mid. Ord. = 2.05
P.C. Station 13+81.87 N 1,732,568.01 E 3,062,157.40
P.T. Station 14+10.58 N 1,732,587.89 E 3,062,137.24
C.C. N 1,732,612.10 E 3,062,180.98
Back = N 61° 51′ 49.14" W
Ahead = N 28° 58′ 08.51" W
Chord Bear = N 45° 24′ 58.83" W

Course from PT 514 to PC 515 N 28° 58′ 08.51" W Dist 68.42

Curve Data

Curve 515
P.I. Station 14+90.40 N 1,732,657.72 E 3,062,098.57
Delta = 13° 00′ 44.05" (LT)
Degree = 57° 17′ 44.81"
Tangent = 11.40
Length = 22.71
Radius = 100.00
External = 0.65
Long Chord = 22.66
Mid. Ord. = 0.64
P.C. Station 14+79.00 N 1,732,647.75 E 3,062,104.10
P.T. Station 15+01.71 N 1,732,666.20 E 3,062,090.95
C.C. N 1,732,599.31 E 3,062,016.61
Back = N 28° 58′ 08.51" W
Ahead = N 41° 58′ 52.56" W
Chord Bear = N 35° 28′ 30.54" W

Course from PT 515 to PC 516 N 41° 58′ 52.56" W Dist 74.14

Curve Data

Curve 516
P.I. Station 15+89.18 N 1,732,731.22 E 3,062,032.44
Delta = 15° 11′ 02.35" (LT)
Degree = 57° 17′ 44.81"
Tangent = 13.33
Length = 26.50
Radius = 100.00
External = 0.88
Long Chord = 26.42
Mid. Ord. = 0.88
P.C. Station 15+75.85 N 1,732,721.32 E 3,062,041.35
P.T. Station 16+02.35 N 1,732,738.45 E 3,062,021.24
C.C. N 1,732,654.43 E 3,061,967.02
Back = N 41° 58′ 52.56" W
Ahead = N 57° 09′ 54.91" W
Chord Bear = N 49° 34′ 23.74" W

Course from PT 516 to PC 517 N 57° 09′ 54.91" W Dist 7.26

Curve Data

Curve 517
P.I. Station 16+17.73 N 1,732,746.79 E 3,062,008.32
Delta = 9° 17′ 07.02" (RT)
Degree = 57° 17′ 44.81"
Tangent = 8.12
Length = 16.21
Radius = 100.00
External = 0.33
Long Chord = 16.19
Mid. Ord. = 0.33
P.C. Station 16+09.61 N 1,732,742.39 E 3,062,015.14
P.T. Station 16+25.81 N 1,732,752.24 E 3,062,002.30
C.C. N 1,732,826.41 E 3,062,069.36
Back = N 57° 09′ 54.91" W
Ahead = N 47° 52′ 47.89" W
Chord Bear = N 52° 31′ 21.40" W

Course from PT 517 to PC 518 N 47° 52′ 47.89" W Dist 46.75

Curve Data

Curve 518
P.I. Station 16+93.28 N 1,732,797.48 E 3,061,952.25
Delta = 23° 24′ 09.11" (LT)
Degree = 57° 17′ 44.81"
Tangent = 20.71
Length = 40.85
Radius = 100.00
External = 2.12
Long Chord = 40.56
Mid. Ord. = 2.08
P.C. Station 16+72.57 N 1,732,783.59 E 3,061,967.62
P.T. Station 17+13.41 N 1,732,804.13 E 3,061,932.64
C.C. N 1,732,709.42 E 3,061,900.55
Back = N 47° 52′ 47.89" W
Ahead = N 71° 16′ 57.00" W
Chord Bear = N 59° 34′ 52.45" W

Course from PT 518 to PC 519 N 71° 16′ 57.00" W Dist 11.44

Curve Data

Curve 519
P.I. Station 17+33.93 N 1,732,810.71 E 3,061,913.21
Delta = 48° 47′ 26.10" (RT)
Degree = 286° 28′ 44.03"
Tangent = 9.07
Length = 17.03
Radius = 20.00
External = 1.96
Long Chord = 16.52
Mid. Ord. = 1.79
P.C. Station 17+24.86 N 1,732,807.80 E 3,061,921.80
P.T. Station 17+41.89 N 1,732,819.09 E 3,061,909.74
C.C. N 1,732,826.74 E 3,061,928.22
Back = N 71° 16′ 57.00" W
Ahead = N 22° 29′ 30.91" W
Chord Bear = N 46° 53′ 13.95" W

Course from PT 519 to 4 N 22° 29′ 30.91" W Dist 10.50

Point 4 N 1,732,828.80 E 3,061,905.72 Sta 17+52.39

End of parcel RA2_BOTTOM description

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

REMEDIATION AREA #2 BOTTOM BOUNDARY ALIGNMENT DATA (SHEET 2 OF 2)

N.T.S.

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 11

2/23/2017
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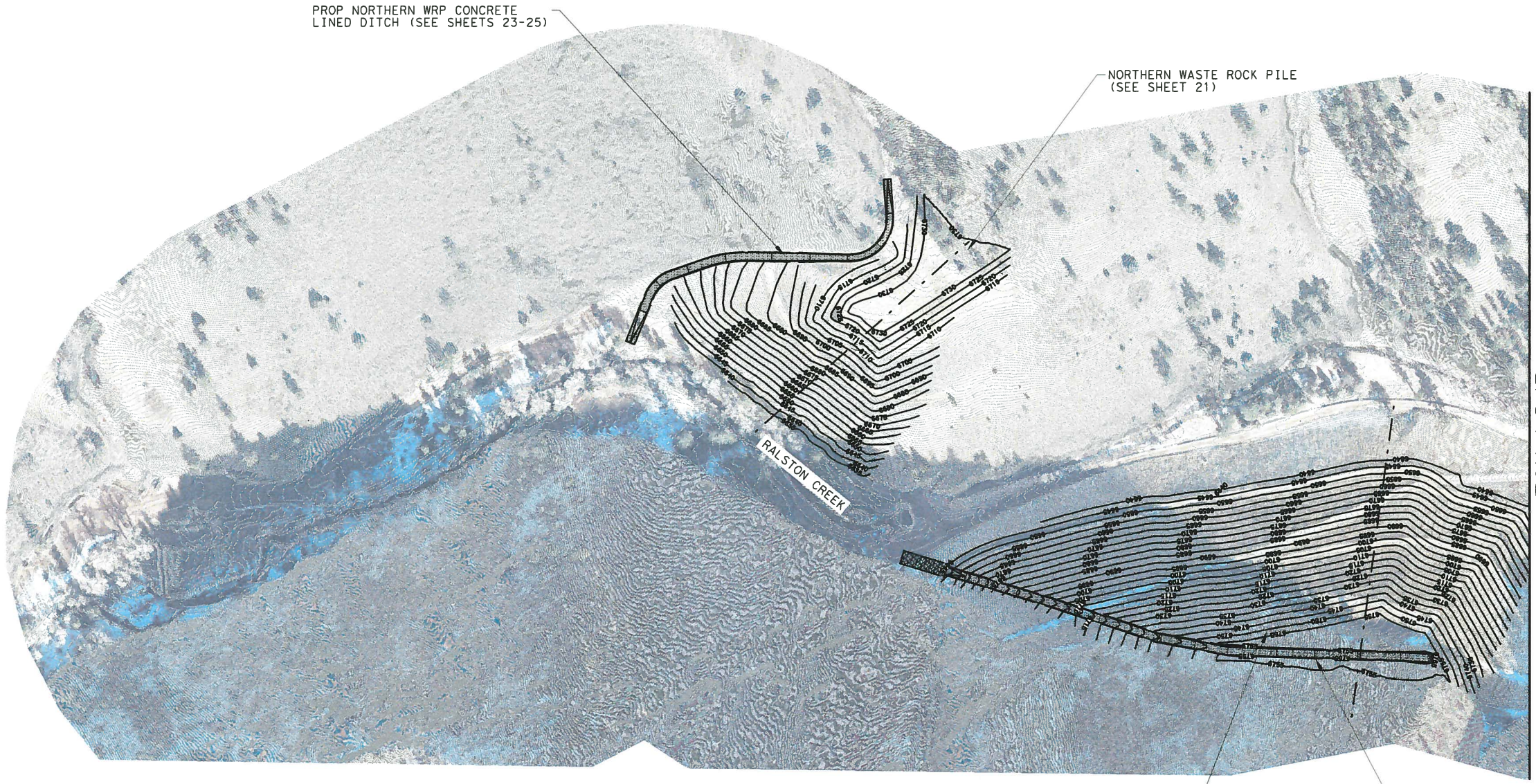

NOTE:

1) CONTRACTOR SHALL MAINTAIN DRAINAGE OF THE SITE AND ALL EXCAVATED AREAS TOWARDS EXISTING SUMP LOCATIONS. ALL EXISTING SUMPS WILL REMAIN AND SHALL BE PROTECTED OR ADJUSTED AS NEEDED.

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

PROJECT LAYOUT
SHEET 1 OF 2

HORIZ. SCALE: 1"=200'

0 100 200
SCALE IN FEET

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 12

2/23/2017
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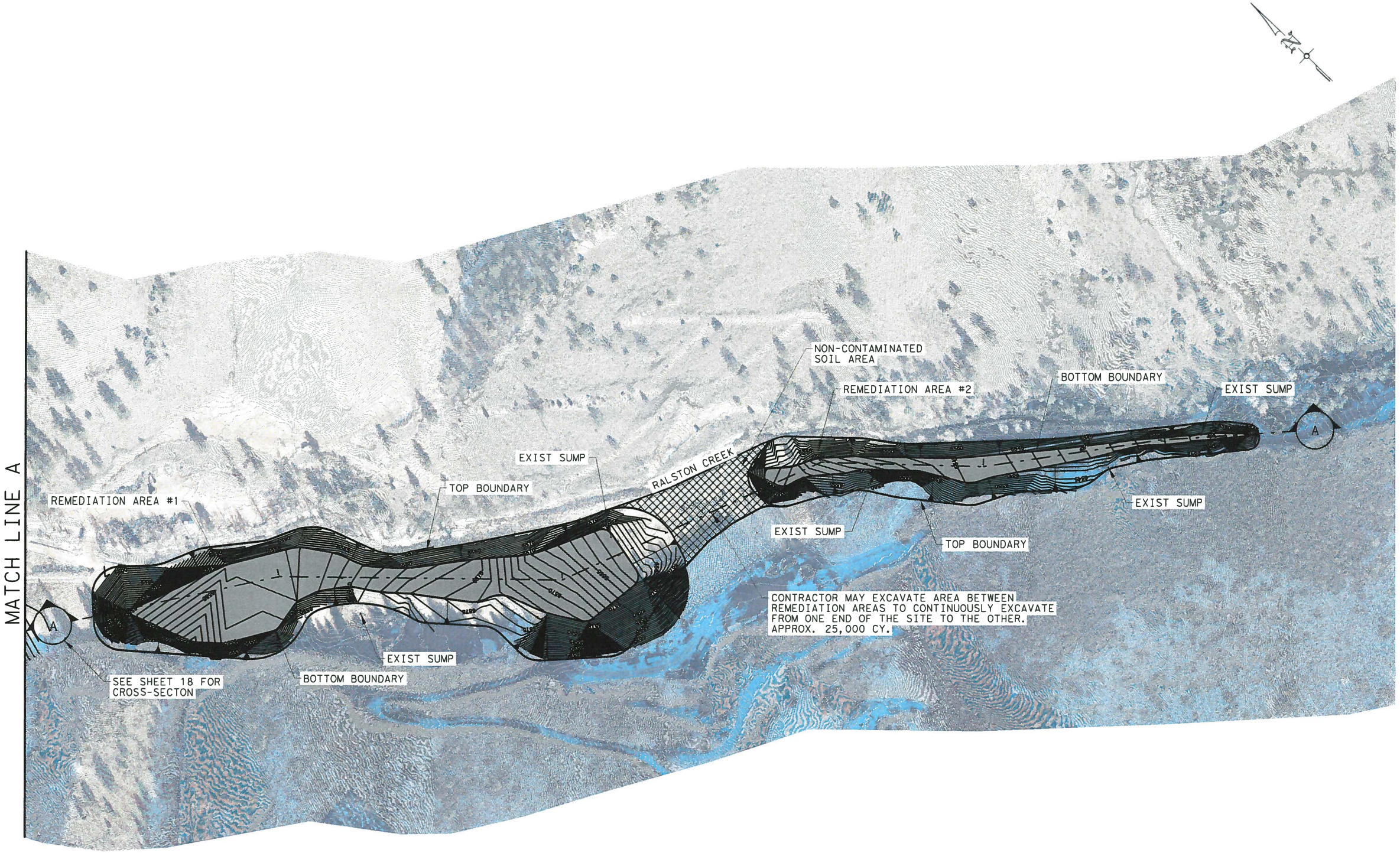

NOTE:

1) CONTRACTOR SHALL MAINTAIN DRAINAGE OF THE SITE AND ALL EXCAVATED AREAS TOWARDS EXISTING SUMP LOCATIONS. ALL EXISTING SUMPS WILL REMAIN AND SHALL BE PROTECTED OR ADJUSTED AS NEEDED.

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

PROJECT LAYOUT
SHEET 2 OF 2

HORIZ. SCALE: 1"=200'

0 100 200
SCALE IN FEET

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 13

2/23/2017
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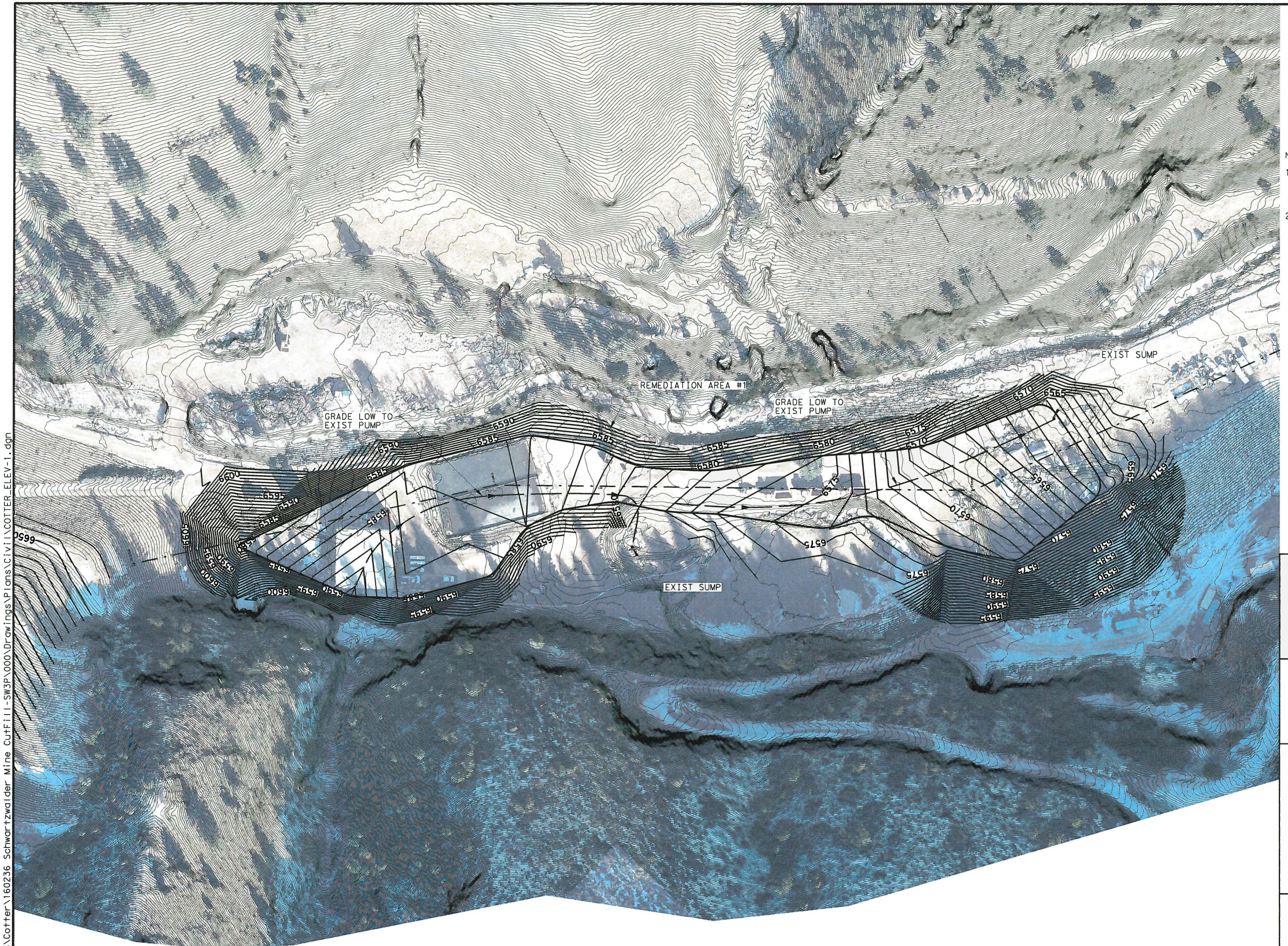

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NOTES:

1. SLOPE EXCAVATIONS TOWARDS ONE OF THE EXIST SUMP LOCATIONS SHOWN SO ALL RUNOFF CAN BE TREATED DUE TO CONTAMINATION.
2. UNCLASSIFIED EXCAVATION FOR REMEDIATION AREA #1 IS APPROX. 50,000 CY.

2-24-17

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

REMEDIATION AREA #1 ELEVATION CONTOURS

HORIZ. SCALE: 1"=100'

0 50 100
SCALE IN FEET

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 14

2/23/2017
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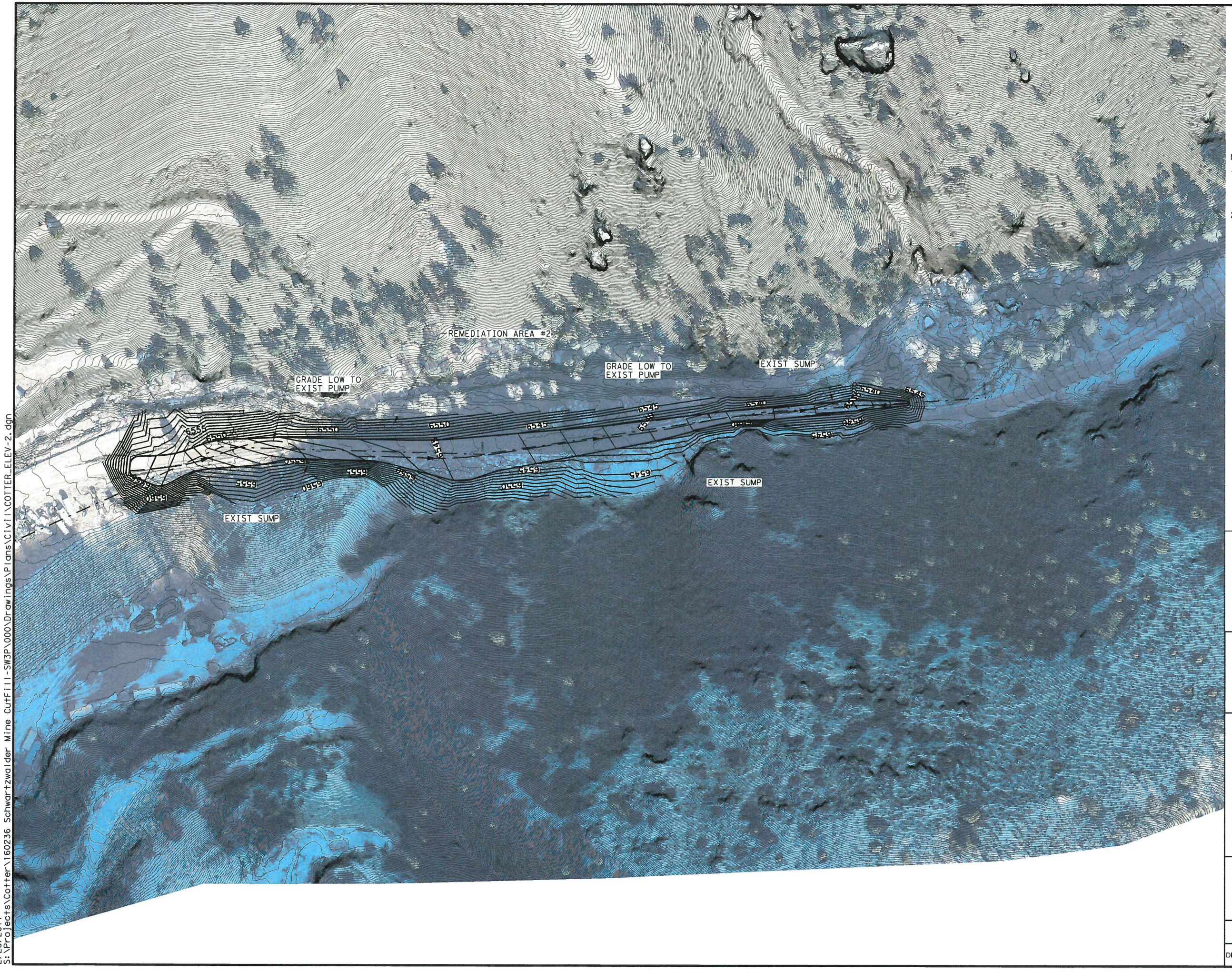

NOTES:

1. SLOPE EXCAVATIONS TOWARDS ONE OF THE EXIST SUMP LOCATIONS SHOWN SO ALL RUNOFF CAN BE TREATED DUE TO CONTAMINATION.
2. UNCLASSIFIED EXCAVATION FOR REMEDIATION AREA #12 IS APPROX. 14,000 CY.

2.24.17

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

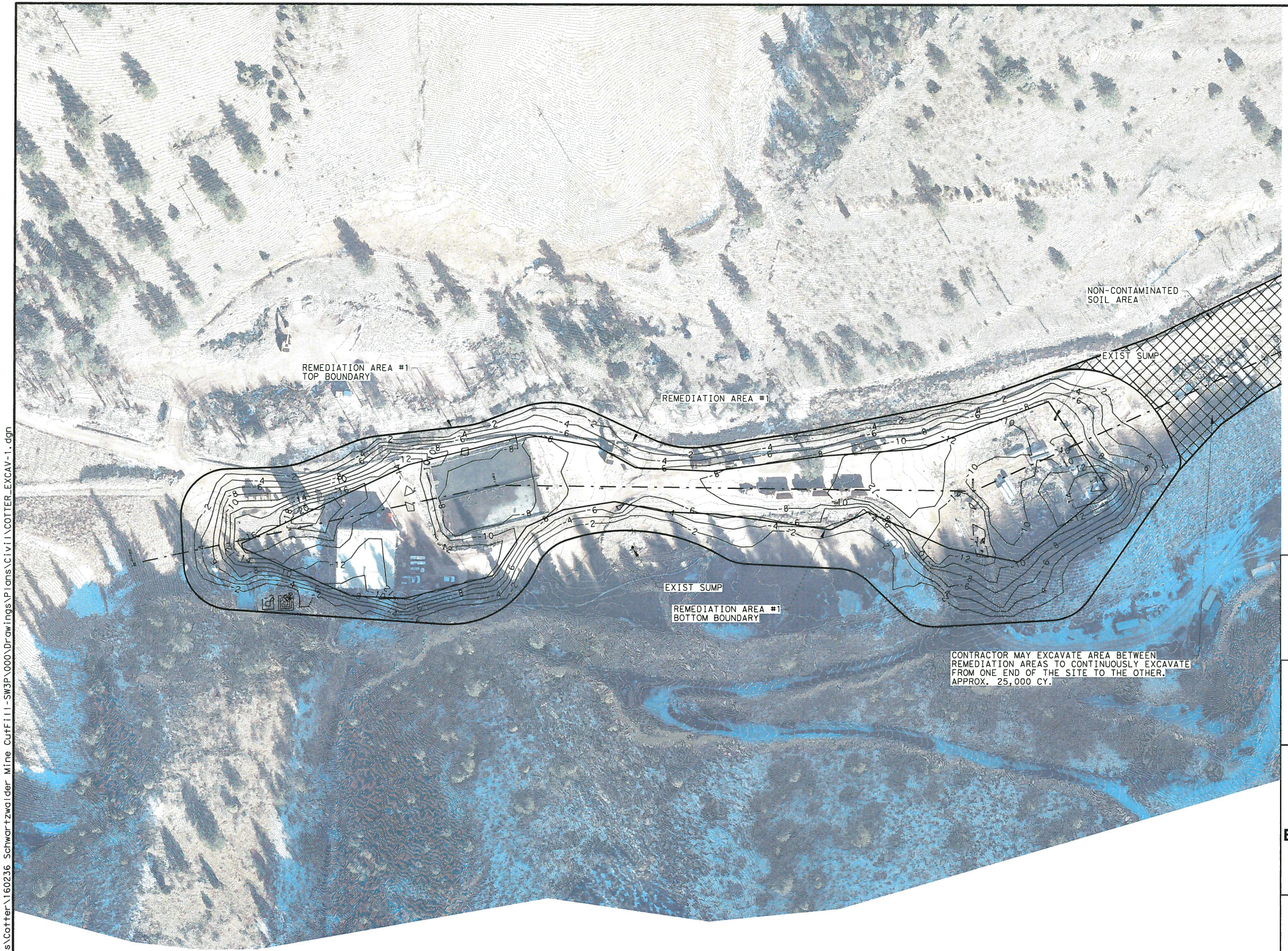
REMEDIATION AREA #2 ELEVATION CONTOURS

HORIZ. SCALE: 1"=100'

0 50 100
SCALE IN FEET

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 15

2/23/2017
S:\Projects\Cotter\160236 Schwartzwalder Mine Cutfill-SWJP\000\Drawings\Plans\Civil\COTTER_ELEV-2.dgn



NOTE:

SLOPE EXCAVATIONS TOWARDS ONE OF THE EXIST SUMP LOCATIONS SHOWN SO ALL RUNOFF CAN BE TREATED DUE TO CONTAMINATION.

2-24-17

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

REMEDIATION AREA #1 EXCAVATION DEPTH CONTOURS

HORIZ. SCALE: 1"=100'

0 50 100
SCALE IN FEET

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 16

2/23/2017
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NOTE:

SLOPE EXCAVATIONS TOWARDS ONE OF THE EXIST SUMP LOCATIONS SHOWN SO ALL RUNOFF CAN BE TREATED DUE TO CONTAMINATION.

2.24.17

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

REMEDIATION AREA #2 EXCAVATION DEPTH CONTOURS

HORIZ. SCALE: 1"=100'

0 50 100
SCALE IN FEET

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 17

2/23/2017
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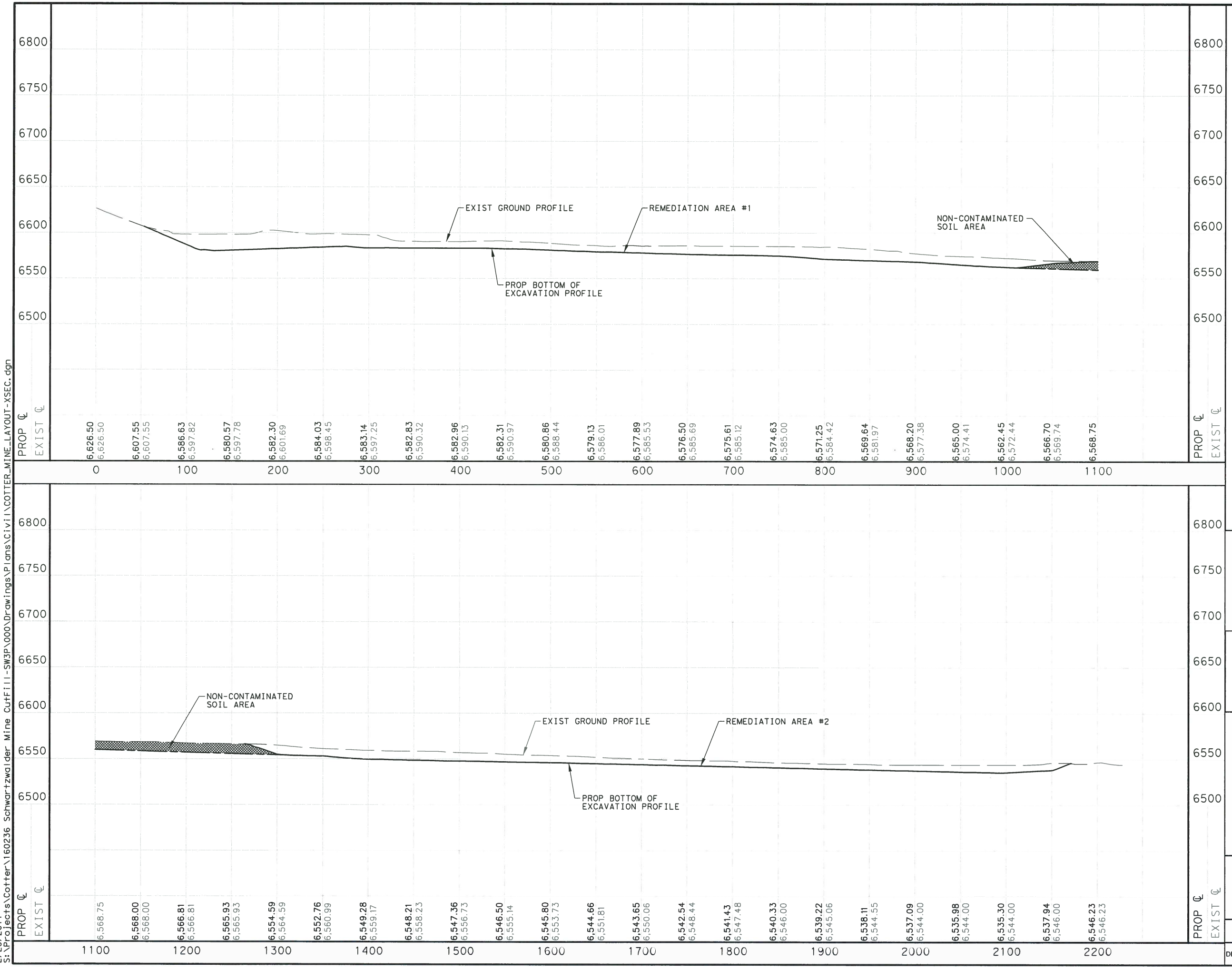

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2-24-17

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DAN S. LEYENDECKER
42090
PROFESSIONAL ENGINEER

LNV
TBPE FIRM NO. F-366
8918 TESORO DRIVE
SAN ANTONIO, TEXAS 78217

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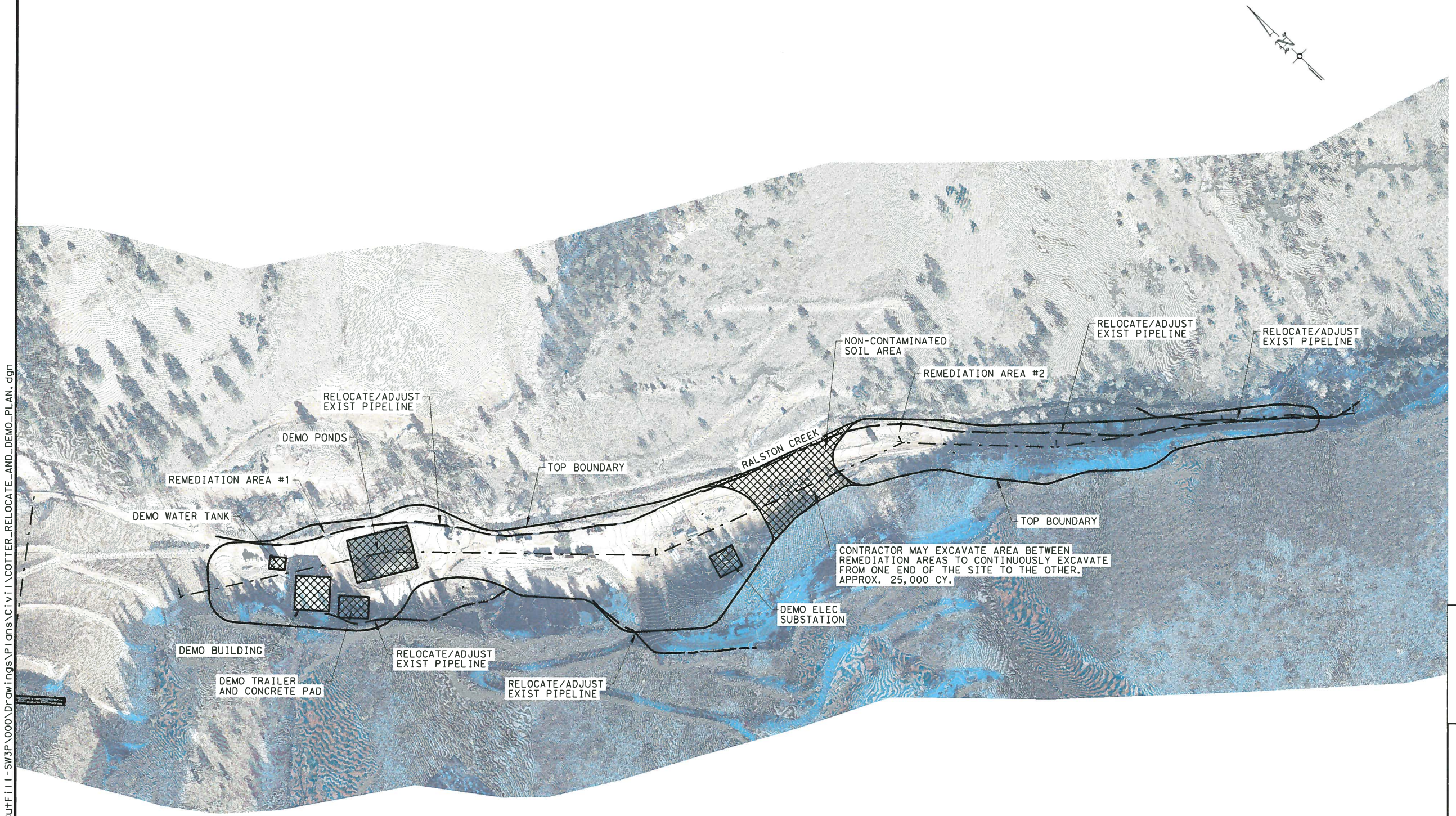
SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

REMEDIATION AREAS #1 AND #2 CROSS SECTION A-A

HORIZ. SCALE: 1"=100'
0 50 100
SCALE IN FEET

VERT. SCALE: 1"=100'
0 50 100
SCALE IN FEET

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 18



NOTES:

1) PIPELINES AND STRUCTURES SHOWN ARE FOR INFORMATIONAL PURPOSES ONLY AND MAY NOT SHOW ALL PIPELINES AND STRUCTURES TO BE RELOCATED OR DEMOED.

2) THE RELOCATION AND/OR DEMOLITION OF ALL STRUCTURES AND PIPELINES WILL BE PAID FOR UNDER "REMOVAL OF STRUCTURES AND OBSTRUCTIONS" AS A LUMP SUM.

3) ALL EXIST SUMPS SHALL REMAIN.

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

RELOCATE AND DEMO PLAN

HORIZ. SCALE: 1"=200'

0 100 200
SCALE IN FEET

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 19

2/23/2017
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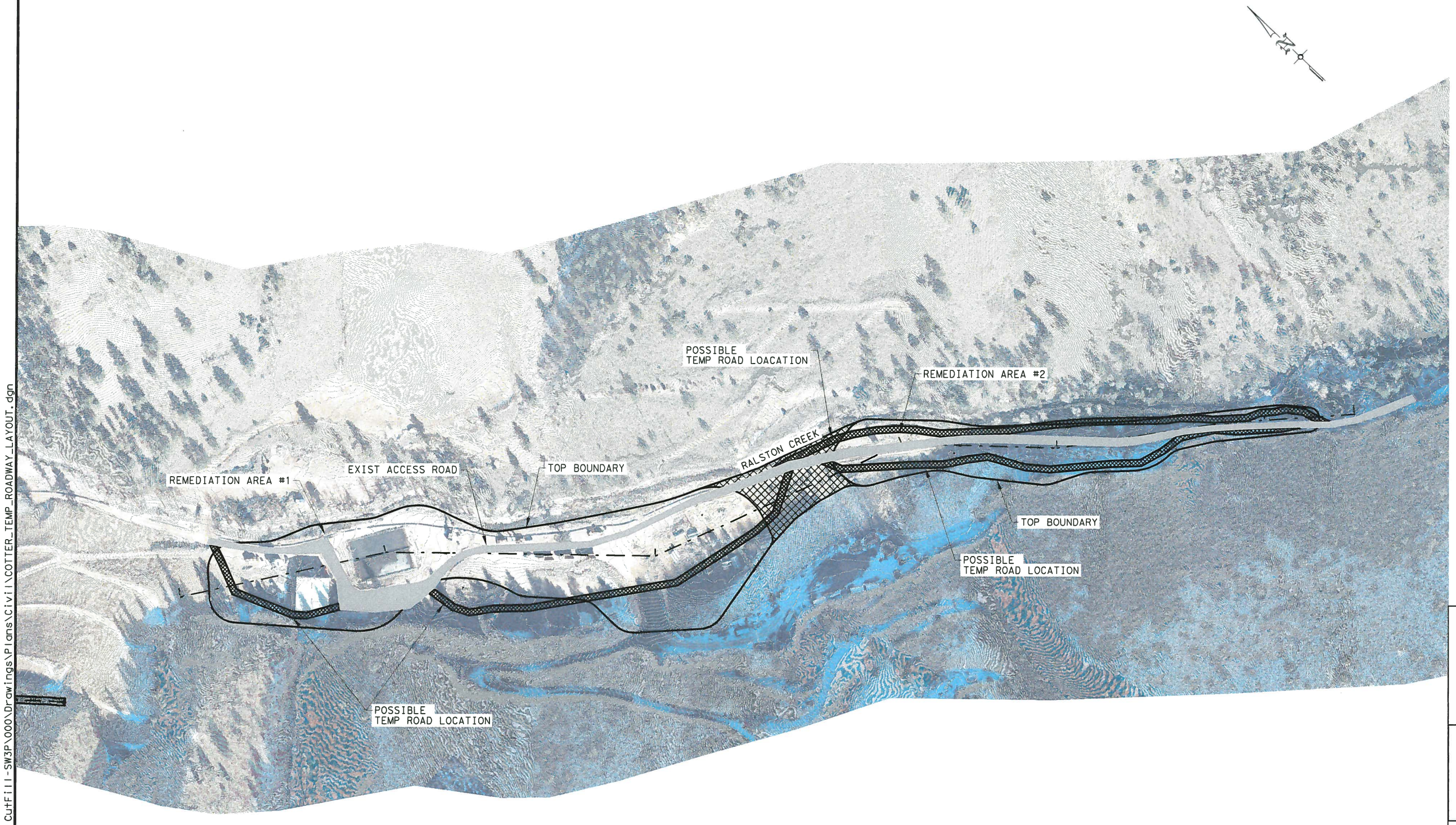

NOTE:

1) THE LOCATION OF THE EXIST ACCESS ROAD AND TEMP ACCESS ROADS ARE FOR INFORMATIONAL PURPOSES ONLY. THE CONTRACTOR SHALL CONSTRUCT TEMP ACCESS ROADS, AS NEEDED, TO EXCAVATE BOTH REMEDIATION AREAS.

2) THE CONSTRUCTION OF TEMP ACCESS ROADS WILL NOT BE PAID FOR SEPERATELY BUT ARE SUBSIDIARY TO APPLICABLE BID ITEMS.

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

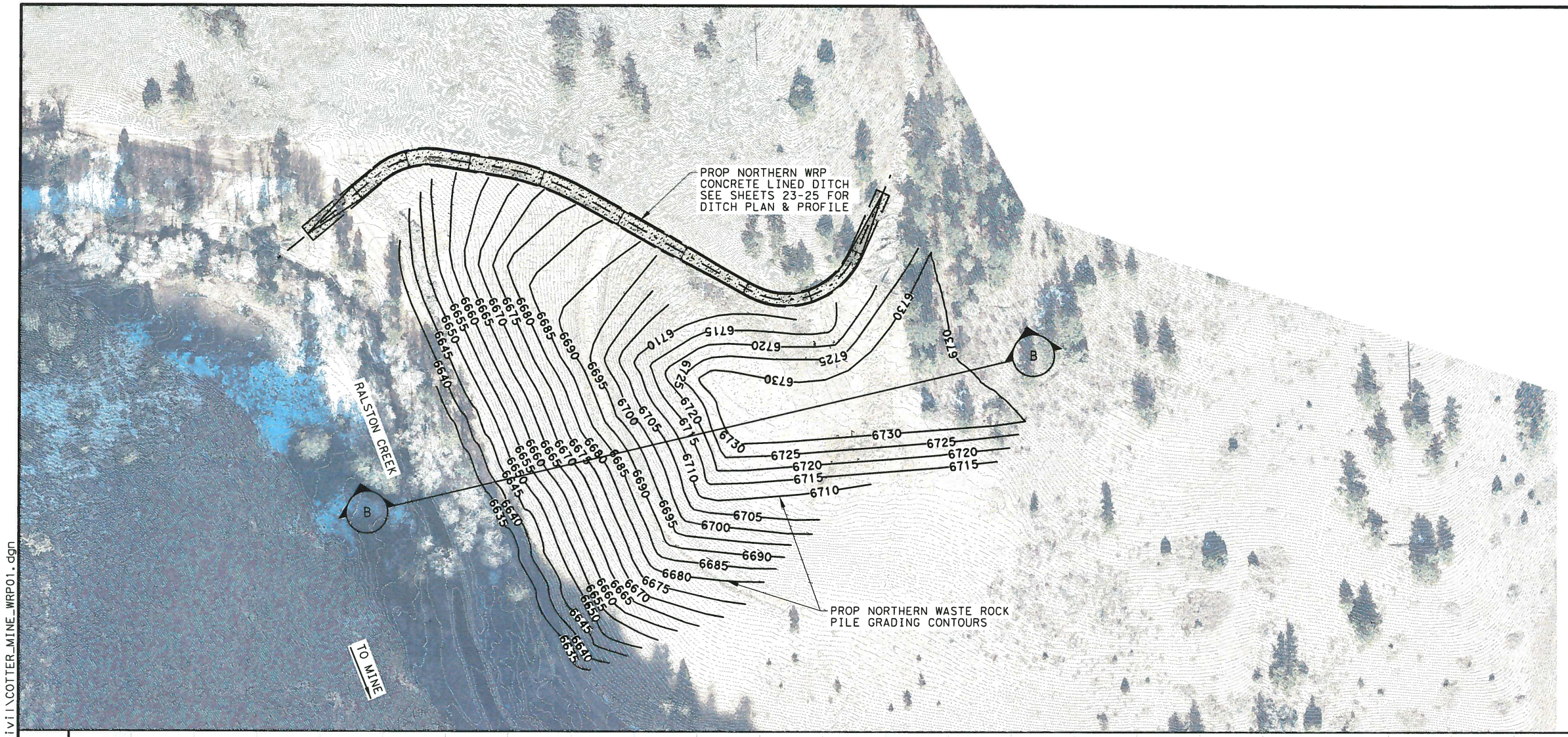
EXIST AND TEMP ACCESS ROAD LAYOUT

HORIZ. SCALE: 1"=200'

0 100 200
SCALE IN FEET

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 20

2/23/2017
S:\Projects\Cotter\160236 Schwartzwalder Mine CutFill-SW3P\000\Drawings\Plans\Civil\COTTER_TEMP_ROADWAY_LAYOUT.dgn



NOTES:

1. TOTAL FILL VOLUME FOR NORTHERN WASTE ROCK PILE IS 34,980 CY.
2. USE DITCH LOCATION AS TEMPORARY ACCESS ROAD AND CONSTRUCT CONCRETE LINED DITCH AFTER COMPLETION OF THE WASTE ROCK PILE ENGINEERED CAPS.

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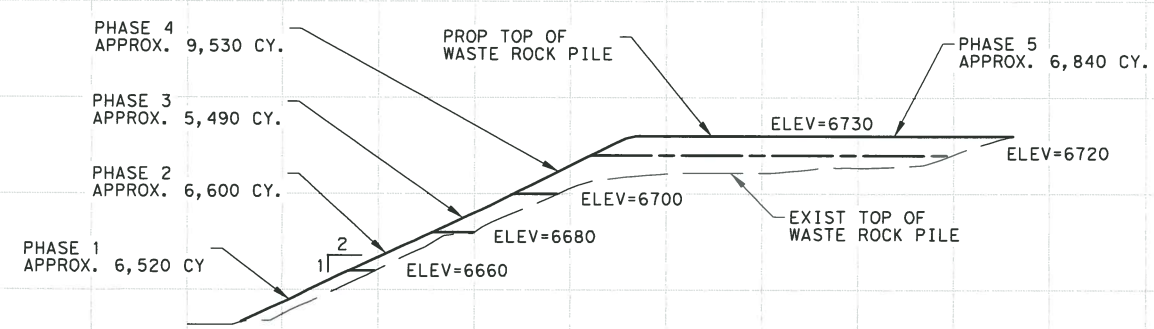

CROSS-SECTION B-B

6900 6850 6800 6750 6700 6650

PROP ℄ EXIST ℄

0 100 200 300 400

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

NORTHERN WASTE ROCK PILE

HORIZ. SCALE: 1"=100'	VERT. SCALE: 1"=100'
0 50 100 SCALE IN FEET	0 50 100 SCALE IN FEET

	PROJECT NO.: 130565.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 21

2/23/2017
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PROP SOUTHERN WRP CONCRETE LINED DITCH SEE SHEETS 26-27 FOR DITCH PLAN & PROFILE

PROP 20-FOOT WIDE 24" GROUTED ROCK RIP-RAP

PROP SOUTHERN WASTE ROCK PILE GRADING CONTOURS

TO MINE

ACCESS ROAD

RALSTON CREEK

NOTE:

1. TOTAL FILL VOLUME FOR SOUTHERN WASTE ROCK PILE IS 108,985 CY.

2.24.17

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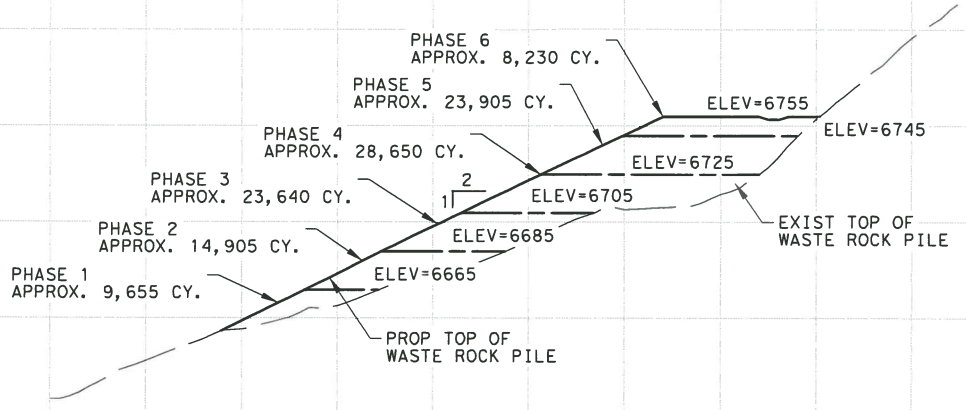

CROSS-SECTION C-C

6900 6850 6800 6750 6700 6650

PROP ℄ EXIST ℄

0 100 200 300 400 500

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

SOUTHERN WASTE ROCK PILE

HORIZ. SCALE: 1"=100'	VERT. SCALE: 1"=100'
0 50 100 SCALE IN FEET	0 50 100 SCALE IN FEET

	PROJECT NO.: 130565.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 22

2/23/2017
S:\Projects\Cotter\160236 Schwartzwalder Mine Cut\Fill-SW3P\000\Drawings\Plans\Civil\COTTER_MINE_WRP02.dgn

PI STATION = 1+30.95
DELTA = 48° 56' 49.88" (RT)
DEGREE OF CURVE = 95° 29' 34.68"
TANGENT = 27.31
LENGTH = 51.26
RADIUS = 60.00
PC STATION = 1+03.64
PT STATION = 1+54.89

PI STATION = 2+39.11
DELTA = 19° 56' 08.33" (RT)
DEGREE OF CURVE = 28° 38' 52.40"
TANGENT = 35.15
LENGTH = 69.59
RADIUS = 200.00
PC STATION = 2+03.96
PT STATION = 2+73.55

PROP TOE-DOWN
PT 1+54.89
PROP DITCH ℄
PROP TOP OF SLOPE
PC 2+03.96
12'
6'
6'
3:1
3:1
S 62° 35' 48.50" E
PROP TOP OF SLOPE
PROP TOE-DOWN
1+03.64
STA 0+80.00
END TRANSITION
N 68° 27' 21.63" E
STA 0+30.00
BEGIN TRANSITION
BEGIN CONCRETE
LINED DITCH
MATCH LINE STA 2+50.00
PROP NORTHERN WASTE ROCK PILE GRADING CONTOURS

NOTES:

1. USE DITCH LOCATION AS TEMPORARY ACCESS ROAD AND CONSTRUCT CONCRETE LINED DITCH AFTER COMPLETION OF THE WASTE ROCK PILE ENGINEERED CAPS.
2. SEE SHEET 28 FOR NORTHERN WRP DITCH TYPICAL SECTION.

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6700
6690
6680
6670
6660
6650

EXIST GROUND PROFILE @ DITCH ℄
PROP GROUND PROFILE @ DITCH ℄
STA 0+30.00
BEGIN CONCRETE
LINED DITCH
6,638.23
(+)1.6826 %
STA = 0+70.00
EL = 6,638.90'
(+)20.0000 %
STA = 2+45.72
EL = 6,674.05'

PROP ℄	6,635.00		6,638.57	6,640.89	6,644.90	6,647.40	6,654.90	6,657.56	6,664.90	6,667.17	6,674.71
EXIST ℄											

0+00 1+00 2+00

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

NORTHERN WRP CONCRETE LINED DITCH PLAN AND PROFILE SHEET 1 OF 3

HORIZ. SCALE: 1"=20'
0 10 20
SCALE IN FEET

VERT. SCALE: 1"=20'
0 10 20
SCALE IN FEET

	PROJECT NO.: 130565.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 23

2/23/2017
S:\Projects\Cotter\160236 Schwartzwalder Mine Cut Fill-SWJP\000\Drawings\Plans\Civil\COTTER_MINE_PP01.dgn

NOTES:

1. USE DITCH LOCATION AS TEMPORARY ACCESS ROAD AND CONSTRUCT CONCRETE LINED DITCH AFTER COMPLETION OF THE WASTE ROCK PILE ENGINEERED CAPS.
2. SEE SHEET 28 FOR NORTHERN WRP DITCH TYPICAL SECTION.

PISTATION = 2+39.11
DELTA = 19° 56' 08.33" (RT)
DEGREE OF CURVE = 28° 38' 52.40"
TANGENT = 35.15
LENGTH = 69.59
RADIUS = 200.00
PC STATION = 2+03.96
PT STATION = 2+73.55

PISTATION = 4+92.03
DELTA = 95° 01' 39.93" (LT)
DEGREE OF CURVE = 95° 29' 34.68"
TANGENT = 65.51
LENGTH = 99.51
RADIUS = 60.00
PC STATION = 4+26.52
PT STATION = 5+26.04

MATCH LINE STA 2+50.00

MATCH LINE STA 5+00.00

PT 2+73.55

PC 4+26.52

PROP TOP OF SLOPE

PROP TOE-DOWN

PROP DITCH ℄

S 42° 39' 40.17" E

3:1

3:1

12'

6'

6'

4.5'

9'

4.5'

STA 3+50.00
BEGIN TRANSITION

PROP TOP OF SLOPE

PROP TOE-DOWN

STA 4+00.00
END TRANSITION

PROP NORTHERN WASTE ROCK PILE GRADING CONTOURS

2/24/17

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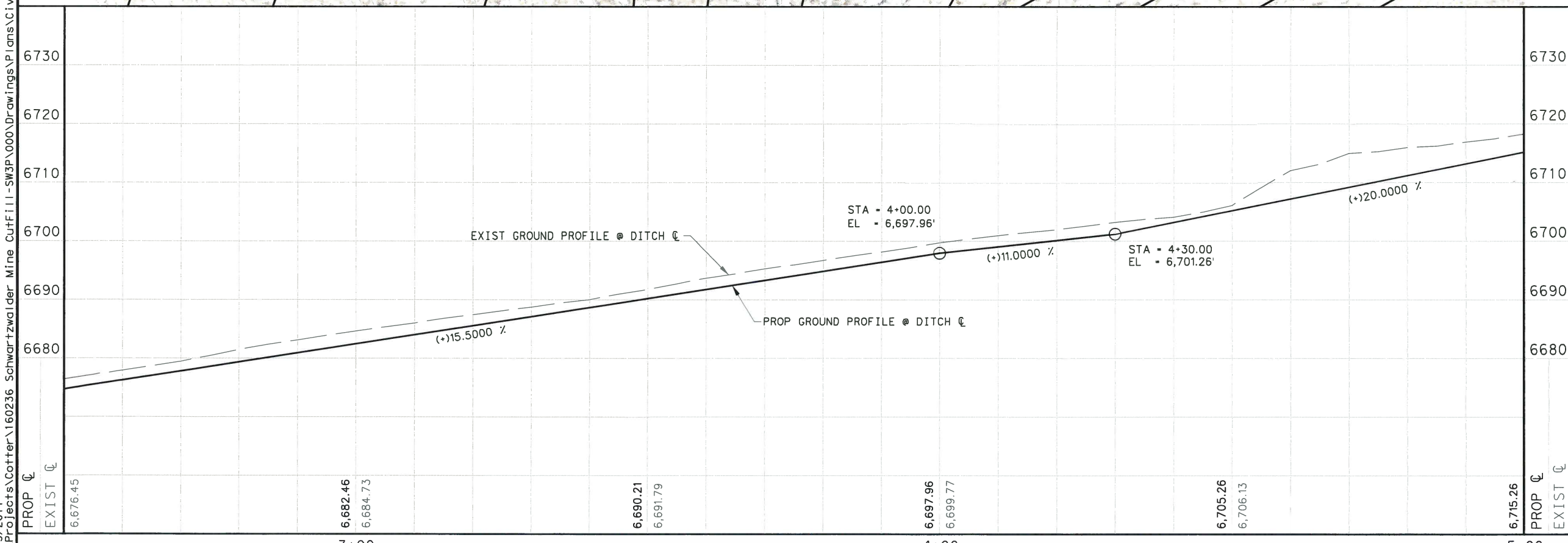
PROFESSIONAL ENGINEER



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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

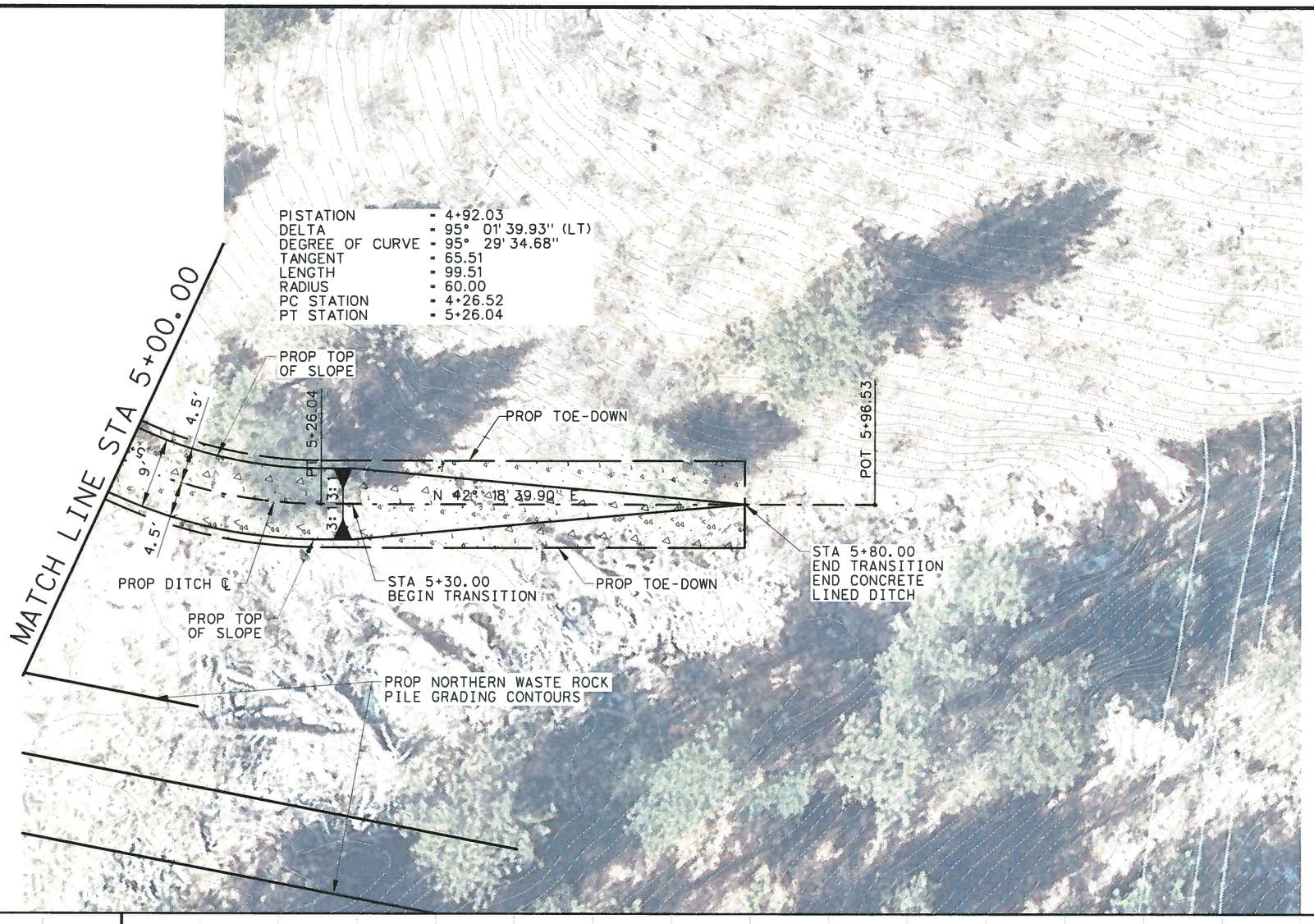
NORTHERN WRP CONCRETE LINED DITCH PLAN AND PROFILE SHEET 2 OF 3

HORIZ. SCALE: 1"=20'
0 10 20
SCALE IN FEET

VERT. SCALE: 1"=20'
0 10 20
SCALE IN FEET

	PROJECT NO.: 130565.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 24

2/23/2017
S:\Projects\Cotter\160236 Schwartzwalder Mine Cutfill-SW3P\000\Drawings\Plans\Civil\COTTER_MINE_PP02.dgn



NOTES:

1. USE DITCH LOCATION AS TEMPORARY ACCESS ROAD AND CONSTRUCT CONCRETE LINED DITCH AFTER COMPLETION OF THE WASTE ROCK PILE ENGINEERED CAPS.
2. SEE SHEET 28 FOR NORTHERN WRP DITCH TYPICAL SECTION.

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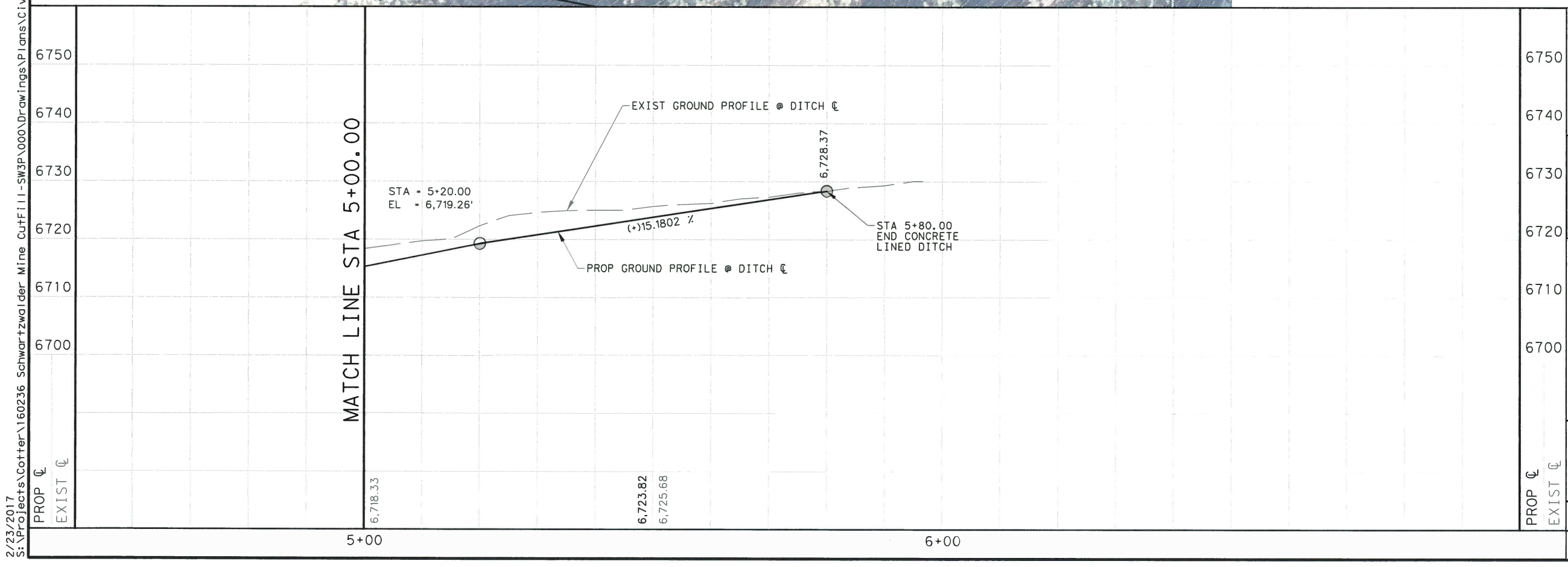

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

NORTHERN WRP CONCRETE LINED DITCH PLAN AND PROFILE SHEET 3 OF 3

HORIZ. SCALE: 1"=20'
0 10 20
SCALE IN FEET

VERT. SCALE: 1"=20'
0 10 20
SCALE IN FEET

PROJECT NO.: 130565.000.2 | DATE: 2/23/2017

DRAWN BY: | DSGN BY: | CHKD BY: | SHT NO.: 25

2/23/2017
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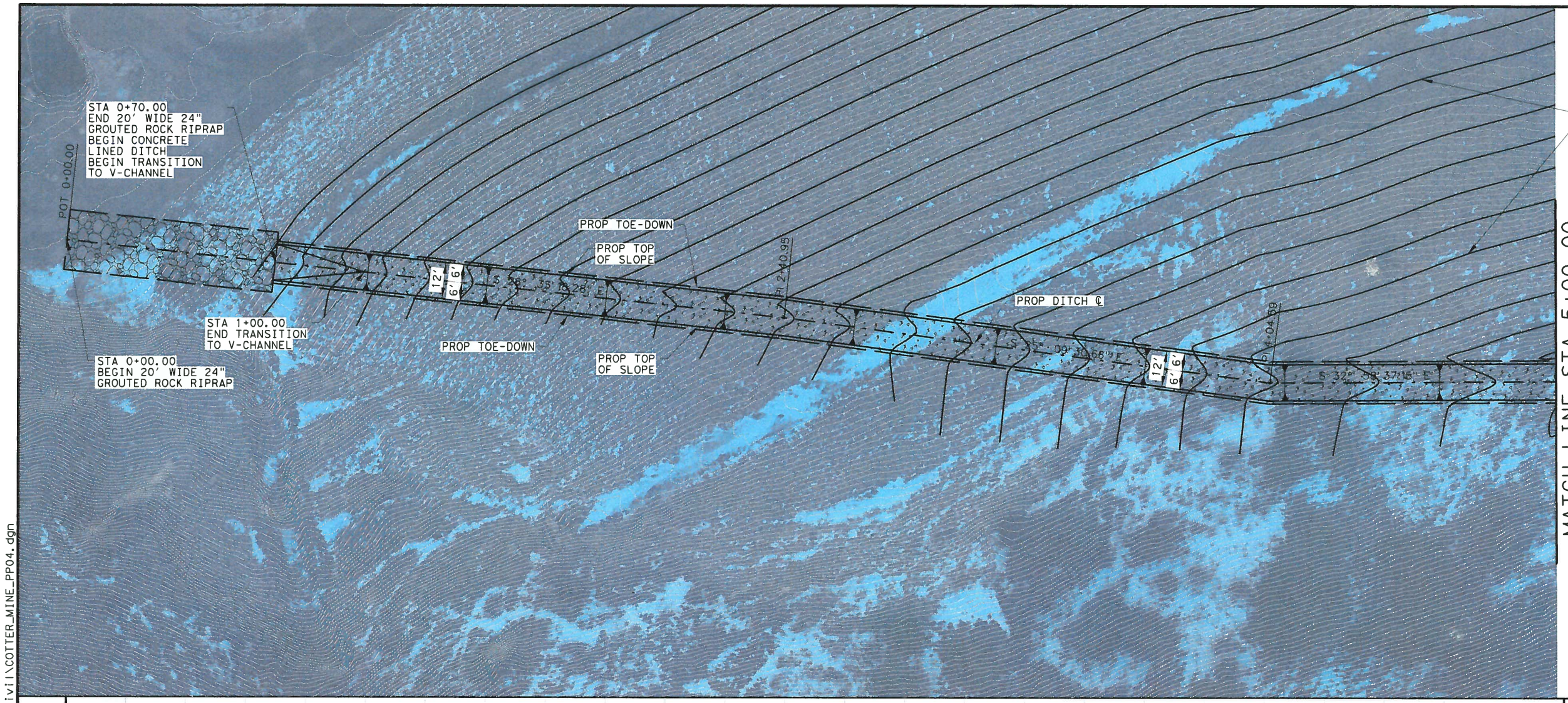

NOTES:

1. USE DITCH LOCATION AS TEMPORARY ACCESS ROAD AND CONSTRUCT CONCRETE LINED DITCH AFTER COMPLETION OF THE WASTE ROCK PILE ENGINEERED CAPS.
2. SEE SHEET 28 FOR SOUTHERN WRP DITCH TYPICAL SECTION.

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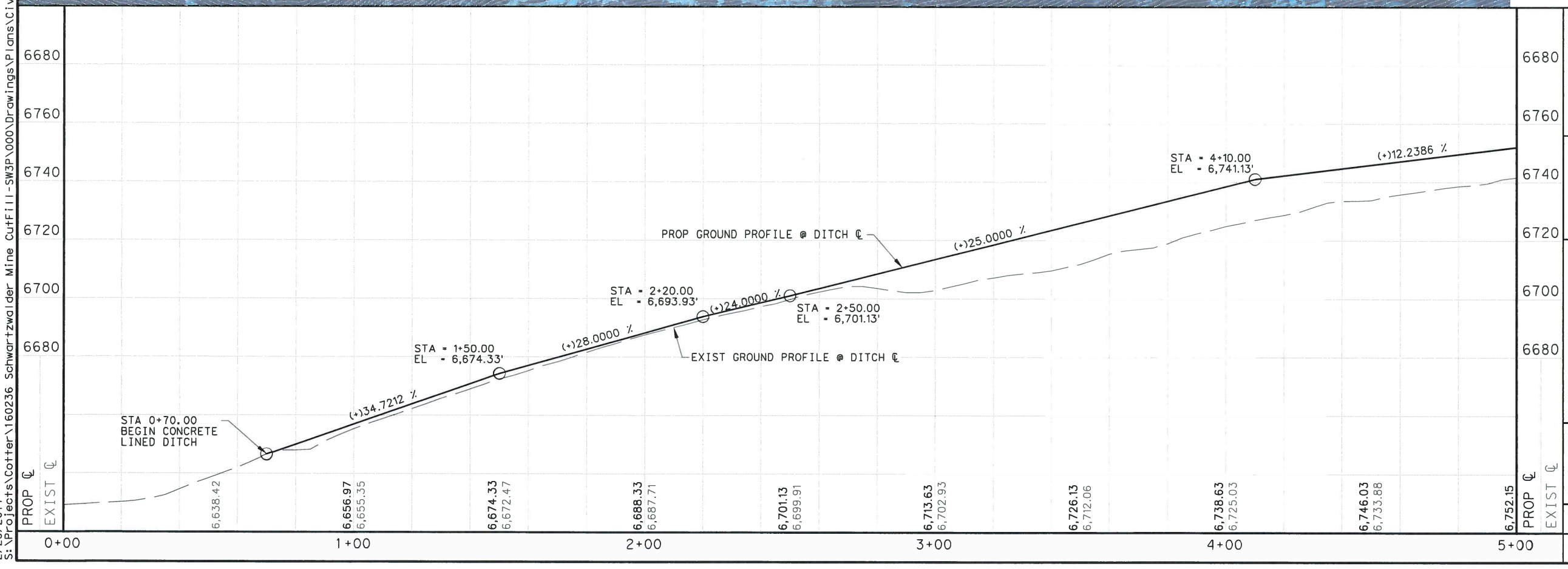

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

SOUTHERN WRP CONCRETE LINED DITCH PLAN AND PROFILE SHEET 1 OF 2

HORIZ. SCALE: 1"=40'	VERT. SCALE: 1"=40'
0 20 40 SCALE IN FEET	0 20 40 SCALE IN FEET

	PROJECT NO.: 130565.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 26

2/23/2017
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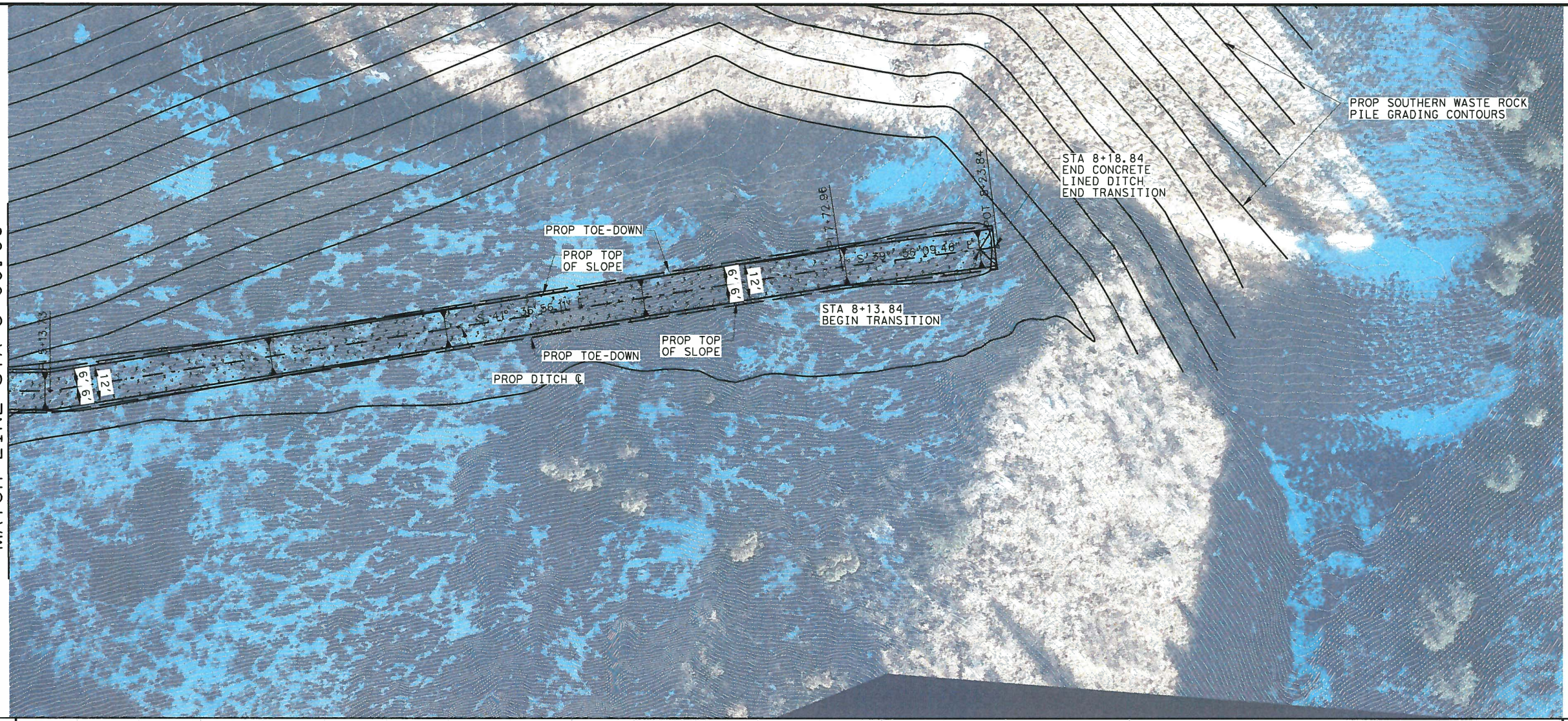

NOTES:

1. USE DITCH LOCATION AS TEMPORARY ACCESS ROAD AND CONSTRUCT CONCRETE LINED DITCH AFTER COMPLETION OF THE WASTE ROCK PILE ENGINEERED CAPS.
2. SEE SHEET 28 FOR SOUTHERN WRP DITCH TYPICAL SECTION.

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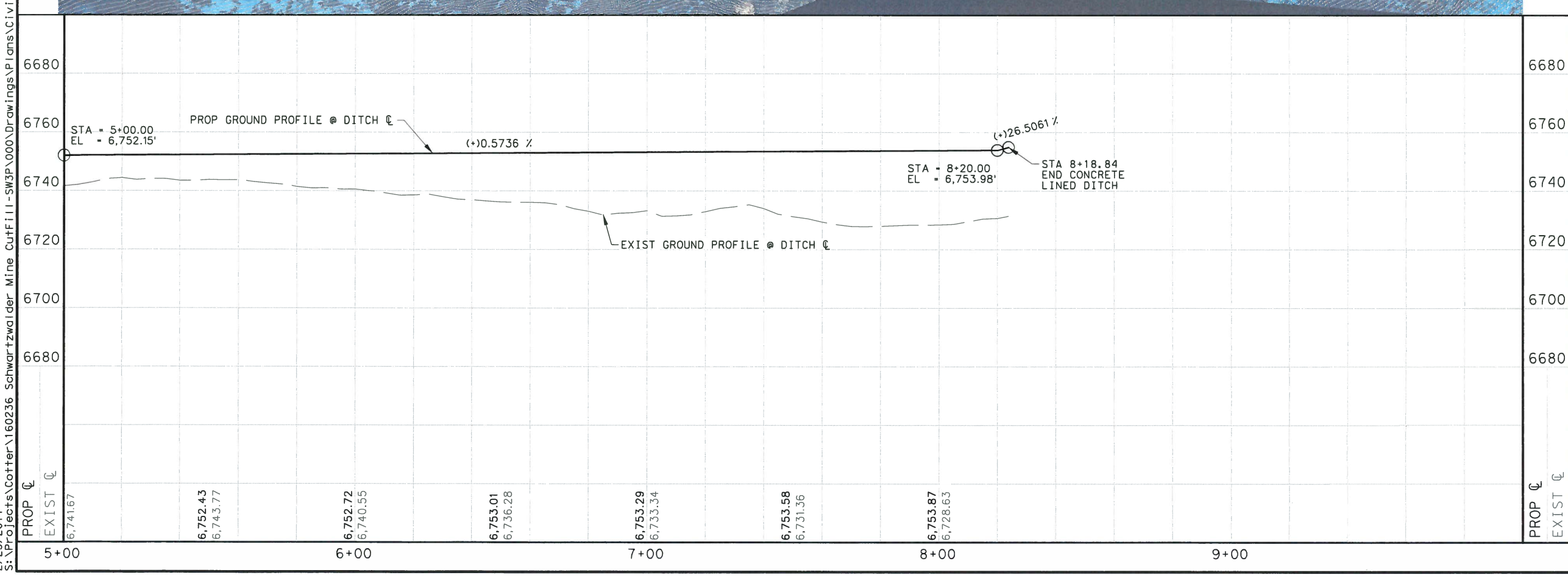

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

SOUTHERN WRP CONCRETE LINED DITCH PLAN AND PROFILE SHEET 2 OF 2

HORIZ. SCALE: 1"=40'	VERT. SCALE: 1"=40'
0 20 40 SCALE IN FEET	0 20 40 SCALE IN FEET

	PROJECT NO.: 130565.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 27

2/23/2017
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NORTHERN WRP DITCH HORIZONTAL ALIGNMENT DATA

Chain DITCH contains:
1000 CUR 1001 CUR 1002 CUR 1003 1004

Beginning chain DITCH description

Point 1000			N	1,734,786.11	E	3,060,055.99 Sta 0+00.00
Course from 1000 to PC 1001 N 68° 27′ 21.63" E Dist 103.64						
		Curve Data				
Curve 1001						
P.I. Station		1+30.95	N	1,734,834.20	E	3,060,177.79
Delta	=	48° 56′ 49.88" (RT)				
Degree	=	95° 29′ 34.68"				
Tangent	=	27.31				
Length	=	51.26				
Radius	=	60.00				
External	=	5.92				
Long Chord	=	49.71				
Mid. Ord.	=	5.39				
P.C. Station		1+03.64	N	1,734,824.17	E	3,060,152.38
P.T. Station		1+54.89	N	1,734,821.63	E	3,060,202.03
C.C.			N	1,734,768.36	E	3,060,174.42
Back	= N 68° 27′ 21.63" E					
Ahead	= S 62° 35′ 48.50" E					
Chord Bear	= S 87° 04′ 13.44" E					
Course from PT 1001 to PC 1002 S 62° 35′ 48.50" E Dist 49.07						
		Curve Data				
Curve 1002						
P.I. Station		2+39.11	N	1,734,782.87	E	3,060,276.80
Delta	=	19° 56′ 08.33" (RT)				
Degree	=	28° 38′ 52.40"				
Tangent	=	35.15				
Length	=	69.59				
Radius	=	200.00				
External	=	3.07				
Long Chord	=	69.24				
Mid. Ord.	=	3.02				
P.C. Station		2+03.96	N	1,734,799.04	E	3,060,245.59
P.T. Station		2+73.55	N	1,734,757.02	E	3,060,300.62
C.C.			N	1,734,621.49	E	3,060,153.54
Back	= S 62° 35′ 48.50" E					
Ahead	= S 42° 39′ 40.17" E					
Chord Bear	= S 52° 37′ 44.34" E					
Course from PT 1002 to PC 1003 S 42° 39′ 40.17" E Dist 152.97						
		Curve Data				
Curve 1003						
P.I. Station		4+92.03	N	1,734,596.35	E	3,060,448.68
Delta	=	95° 01′ 39.93" (LT)				
Degree	=	95° 29′ 34.68"				
Tangent	=	65.51				
Length	=	99.51				
Radius	=	60.00				
External	=	28.83				
Long Chord	=	88.49				
Mid. Ord.	=	19.48				
P.C. Station		4+26.52	N	1,734,644.53	E	3,060,404.28
P.T. Station		5+26.04	N	1,734,644.80	E	3,060,492.78
C.C.			N	1,734,685.19	E	3,060,448.41
Back	= S 42° 39′ 40.17" E					
Ahead	= N 42° 18′ 39.90" E					
Chord Bear	= N 89° 49′ 29.86" E					
Course from PT 1003 to 1004 N 42° 18′ 39.90" E Dist 70.49						
Point 1004			N	1,734,696.93	E	3,060,540.23 Sta 5+96.53

Ending chain DITCH description

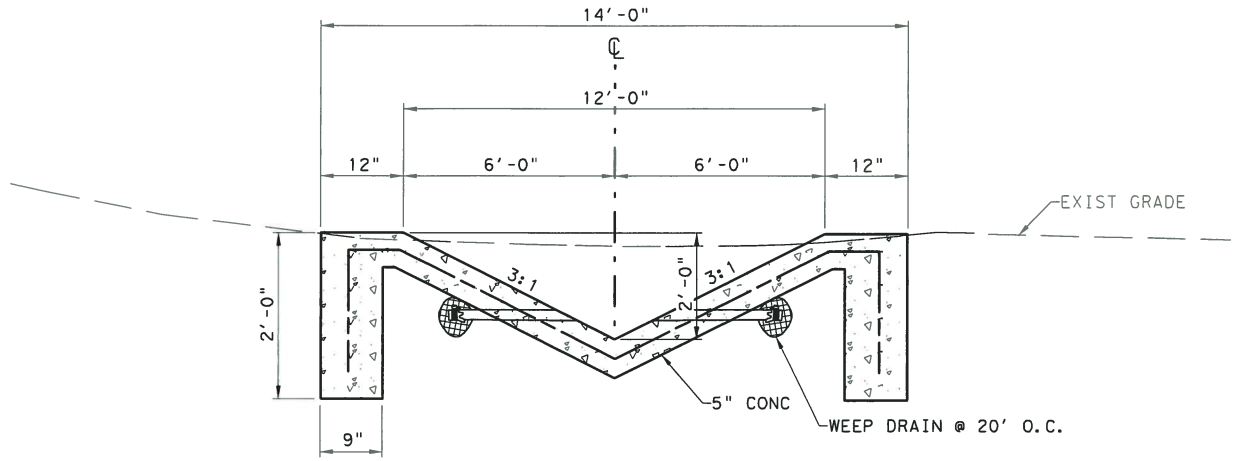
SOUTHERN WRP DITCH HORIZONTAL ALIGNMENT DATA

Chain DITCH_SOUTH contains:
850 851 852 853 854 855

Beginning chain DITCH_SOUTH description

Point 850	N	1,734,277.94	E	3,060,132.46	Sta 0+00.00
Course from 850 to 851 S 26° 35′ 18.28" E Dist 240.95					
Point 851	N	1,734,062.47	E	3,060,240.31	Sta 2+40.95
Course from 851 to 852 S 25° 09′ 30.66" E Dist 163.64					
Point 852	N	1,733,914.36	E	3,060,309.87	Sta 4+04.59
Course from 852 to 853 S 32° 58′ 37.15" E Dist 109.14					
Point 853	N	1,733,822.80	E	3,060,369.28	Sta 5+13.73
Course from 853 to 854 S 41° 36′ 56.11" E Dist 259.23					
Point 854	N	1,733,629.00	E	3,060,541.44	Sta 7+72.96
Course from 854 to 855 S 39° 56′ 09.46" E Dist 50.89					
Point 855	N	1,733,589.98	E	3,060,574.11	Sta 8+23.84

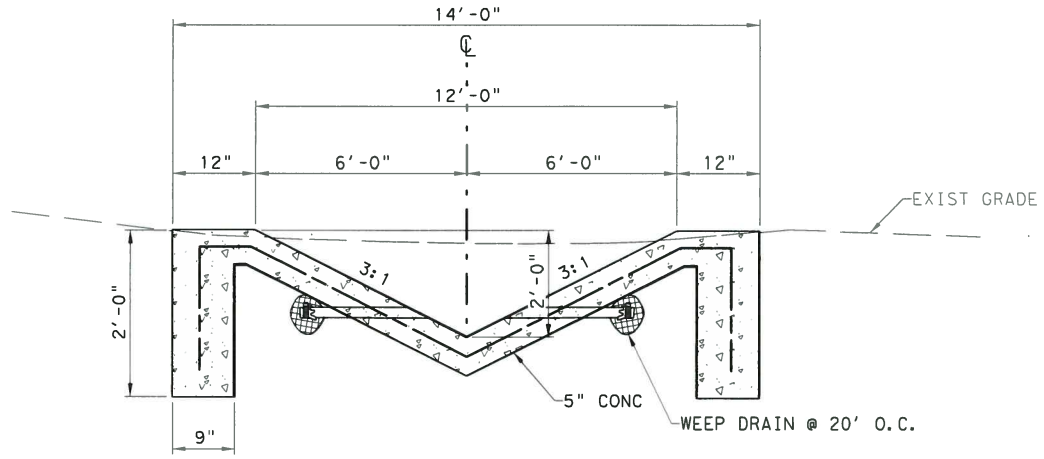
Ending chain DITCH_SOUTH description



NOTE:
SEE SHEET 31 FOR CONCRETE AND REINFORCING REQUIREMENTS OR FOR ALTERNATIVE SUBSTRATES.

NORTHERN WRP DITCH TYPICAL SECTION

NTS



NOTE:
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SOUTHERN WRP DITCH TYPICAL SECTION

NTS

2/24/17

COLORADO LICENSED
DAN S. LEYENDECKER
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PROFESSIONAL ENGINEER

LNV
TBPE FIRM NO. F-366
8918 TESORO DRIVE
SAN ANTONIO, TEXAS 78217

cotter

SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

CONCRETE LINED DITCH MISCELLANEOUS DETAILS SHEET 1 OF 2

N.T.S.

	PROJECT NO.: 160236.000.2		DATE: 2/24/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 28

2/24/2017
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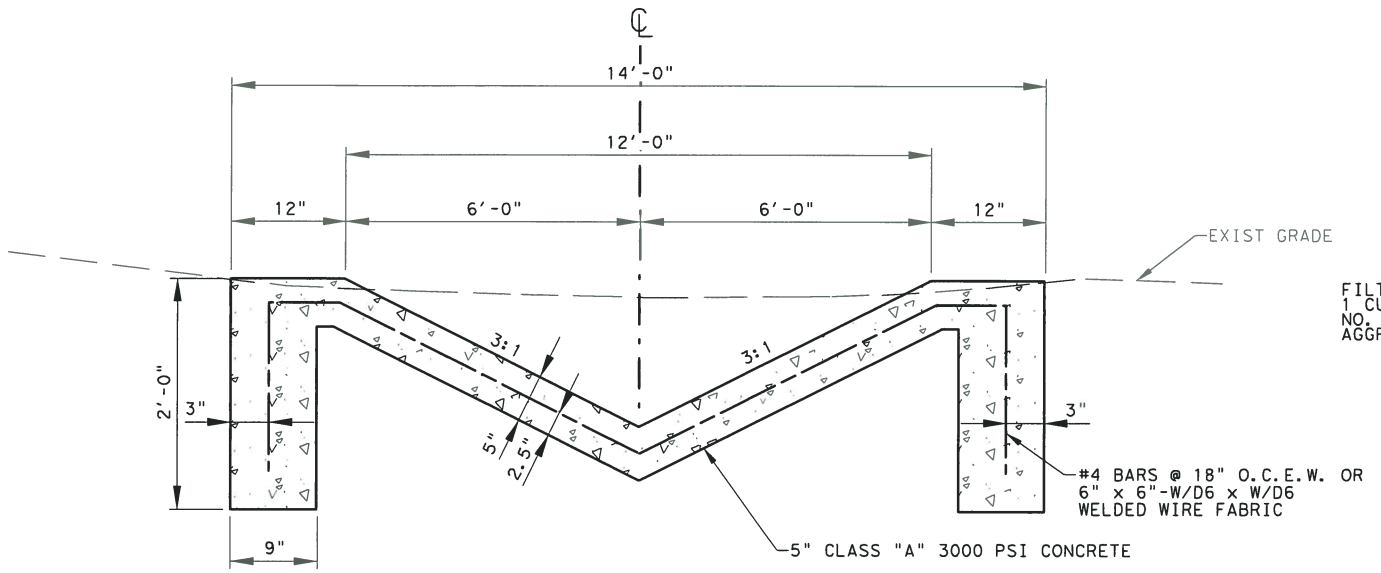
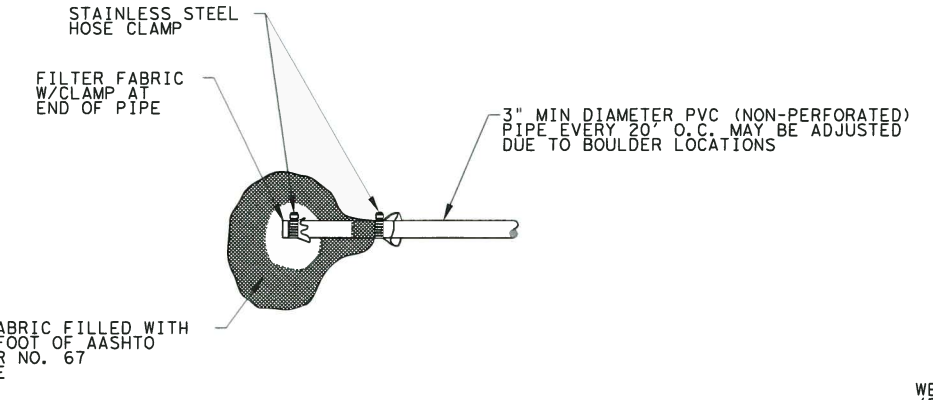
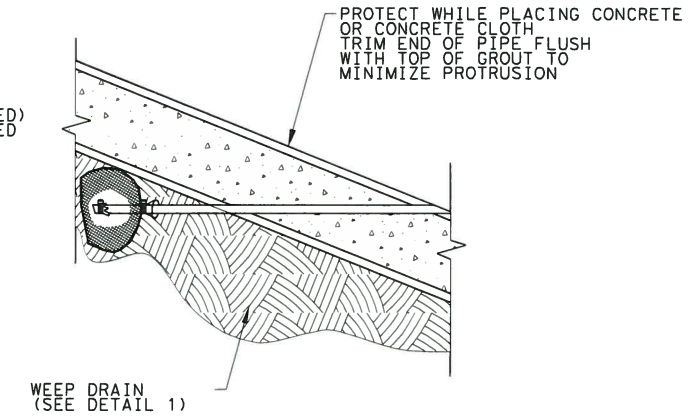


5" CONC RIP-RAP
NTS



WEEP DRAIN
NTS

NOTE: INSTALL WEEP DRAINS AT 20' O.C. AT THE CENTER OF THE CHANNEL BOTTOM AND SIDE SLOPES.



CONCRETE LINING
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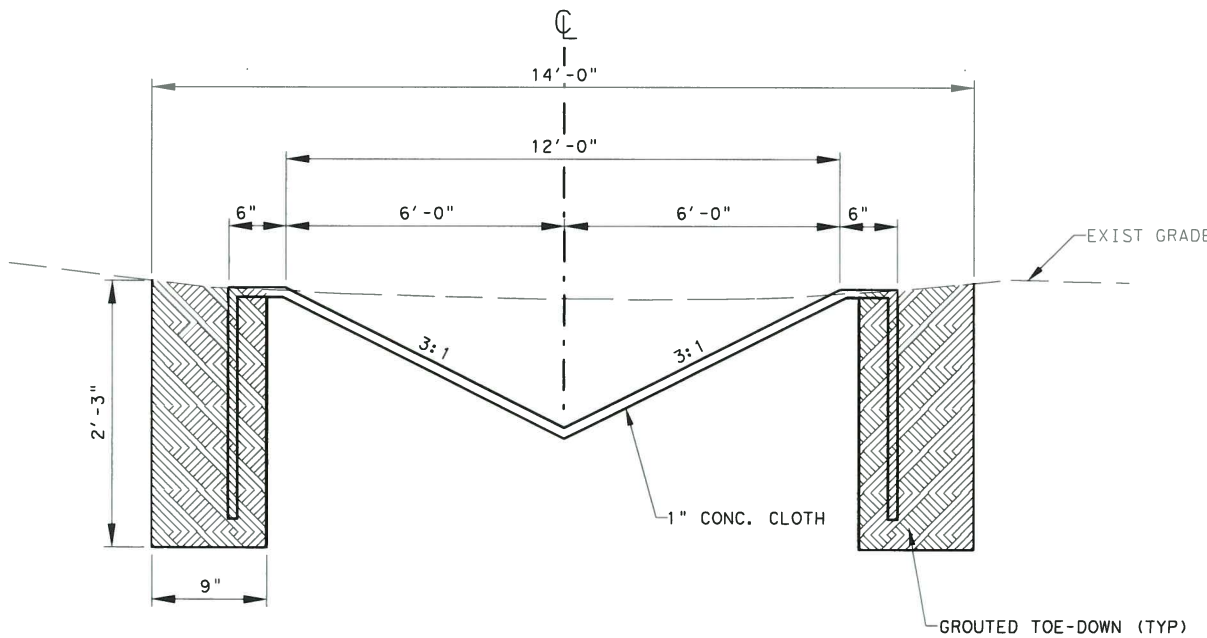
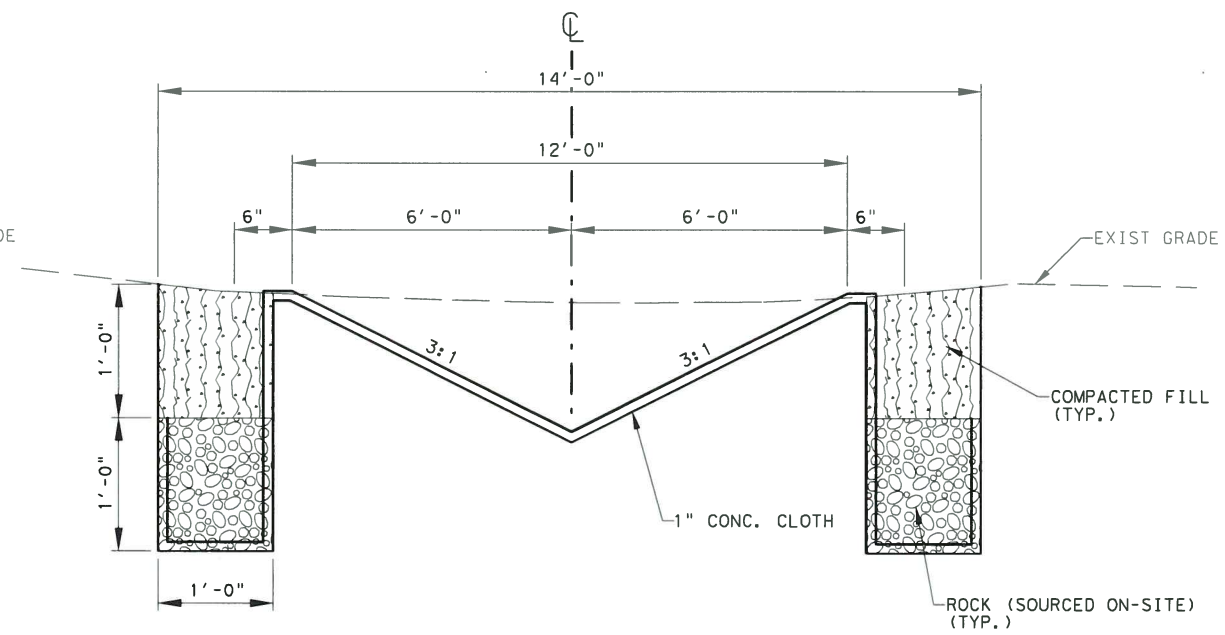


CONC. CLOTH W/ GROUTED TOE-DOWN
NTS



CONC. CLOTH W/ COMPACTED FILL TOE-DOWN
NTS

WRP V-CHANNEL CAPACITY CALCULATIONS

Area #	Depth, D (ft)	Side Slope, SS (X:1)	Slope, S (ft/ft)	Manning's Coefficien	Area, A (sq. ft)	Wetted Perimeter,	Hydraulic Radius, R	Flow, CFS	Freeboard Provided
North WRP	1.00	3.00	0.14	0.013	3.00	6.32	0.47	78.25	1.00
South WRP	1.00	3.00	0.11	0.013	3.00	6.32	0.47	69.36	1.00
$Q = (1.49/n)AR^{(2/3)}S^{(1/2)}$									

CONCRETE LINED DITCH HYDRAULIC CALCULATIONS

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CONCRETE LINED DITCH MISCELLANEOUS DETAILS SHEET 2 OF 2

N.T.S.

	PROJECT NO.: 160236.000.2		DATE: 2/24/2017
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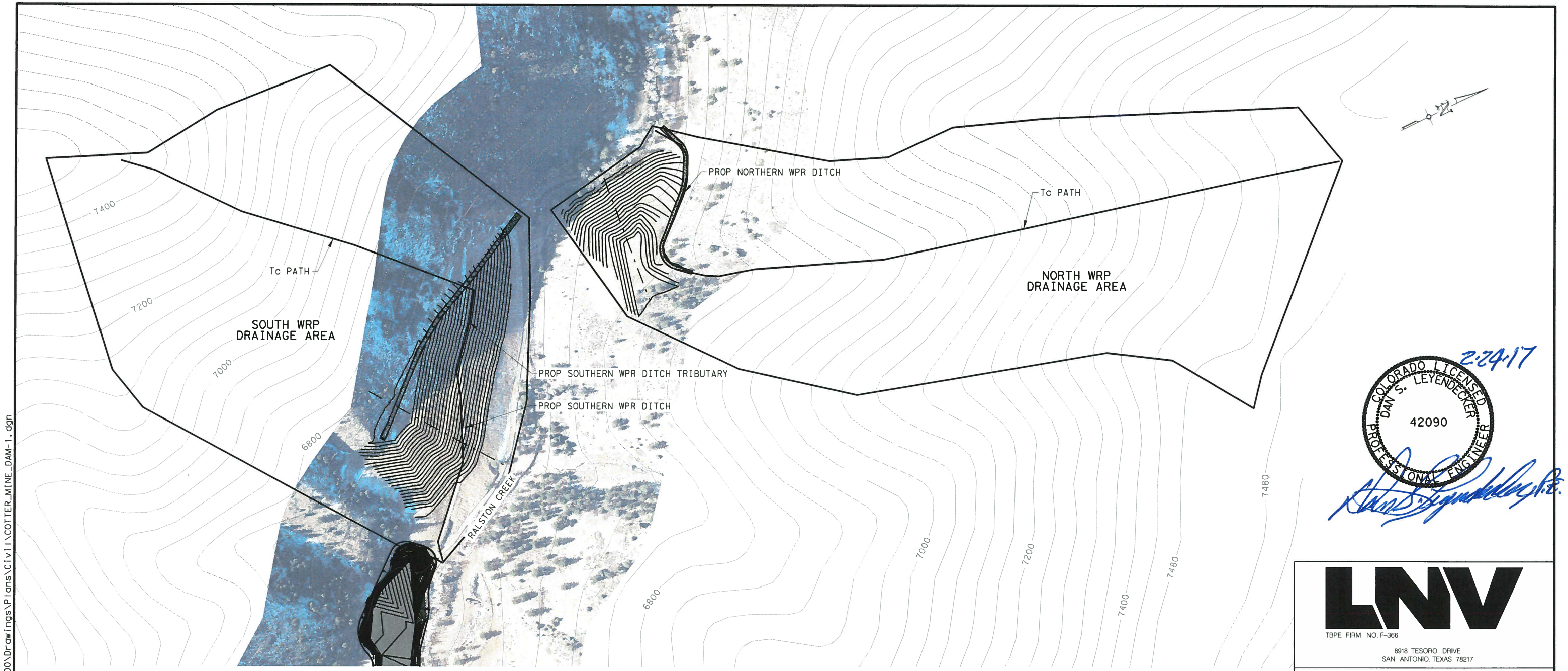

WRP V-Channel Capacity Calculations

Area #	Depth, D (ft)	Side Slope, SS (X:1)	Slope, S (ft/ft)	Manning's Coefficien	Area, A (sq. ft)	Wetted Perimeter,	Hydraulic Radius, R	Flow, CFS	Freeboard Provided
North WRP	1.00	3.00	0.14	0.013	3.00	6.32	0.47	78.25	1.00
South WRP	1.00	3.00	0.11	0.013	3.00	6.32	0.47	69.36	1.00

$Q = (1.49/n)AR^{2/3}S^{1/2}$

WRP SCS Peak Flow Table

DRAINAGE AREA ID	DRAINAGE AREA (SQ	CURVE NUMBER, CN	LAG TIME (HRS)	PEAK FLOW			
				Q_{10} (CFS)	Q_{50} (CFS)	Q_{100} (CFS)	Q_{500} (CFS)
North WRP	0.059	71.00	0.31	21.0	51.7	67.7	112.3
South WRP	0.054	69.00	0.24	20.9	52.0	68.2	113.9

North WRP Curve Number

Hydrologic Soil Type	Percentage of Soil[1]	Curve Number[2]
A	13.3%	32
B	9.3%	58
C	0.0%	72
D	77.4%	79
Weighted Curve Number:		**71**

[1]Data from NRCS Web Soil Survey

[2]Data from NRCS 1986 Runoff Curve Number Table for Good (>70% ground cover)

Note: All three areas have the same approximate soil distribution, land coverage, and land type.

South WRP Curve Number

Hydrologic Soil Type	Percentage of Soil[1]	Curve Number[2]
A	22.2%	32
B	0.0%	58
C	0.0%	72
D	77.8%	79
Weighted Curve Number:		**69**

[1]Data from NRCS Web Soil Survey

[2]Data from NRCS 1986 Runoff Curve Number Table for Good (>70% ground cover)

Note: All three areas have the same approximate soil distribution, land coverage, and land type.

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

DRAINAGE AREA MAP

HORIZ. SCALE: 1"=300'

0 150 300
SCALE IN FEET

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
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2/23/2017
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SWMP TEMPLATE TEXT WITHOUT BMP NARRATIVES FOR PROJECTS WITH 1 ACRE OR MORE OF DISTURBANCE

1. SITE DESCRIPTION

For Information Only to fulfill the CDPS-SCP (Colorado Discharge Permit System - Stormwater Construction Permit) Update to reflect current project site conditions.

A. PROJECT SITE DESCRIPTION: The project site is located the Schwartzwalder Mine at the end of Glencoe Valley Road and along Ralston Creek. The project consists of the removal of the radiologically contaminated alluvial fill soil due to past uranium mining activities at two locations at the mine site and to place the contaminated materials within two engineered waste rock piles on site. The location and approximate depths of contamination have been outlined in a report developed by Cotter Corporation (N.S.L.) titled "Characterization, Remedial Criteria and Disposal Options for Alluvial Fill Source Term Materials at the Schwartzwalder Mine Site."

B. PROPOSED SEQUENCING FOR MAJOR ACTIVITIES: Construction should last approximately six (6) months and will include excavation of contaminated material at two locations at the Schwartzwalder Mine site, placement of the contaminated materials under a engineered waste rock piles at the mine site, construction of a concrete lined ditches to direct water around the northern and southern waste rock piles, and re-establishment of the access road to the mine site after the contaminated soils under the roadway have been removed.

The two contaminated sites will be excavated in phases. The eastern contaminated site, Remediation Site #2, will be excavated first. The excavation will occur in phases, if possible, to provide continual access from Glencoe Valley Road to the mine site. Once the contaminated soil has been removed for each section of Remediation Site #2, the location will be refilled and/or regraded with uncontaminated or new soil to re-establish the access road to the mine site. The western contaminated site, Remediation Site #1, will then be excavated in phases similar to Remediation Site #2.

The engineered waste rock piles will be constructed in phases as shown on the plan sheets. Once all the contaminated soil has been placed and compacted, the engineered rock cap will be placed and then topsoil, seeding and turf reinforcement matting applied to protect against erosion.

C. ACRES OF DISTURBANCE:
1. Total area of construction site: 30 acres
2. Total area of disturbance: 20 acres
3. Acreage of seeding: 4.24 acres

D. EXISTING SOIL DATA: Majority or soil is rock: Argiustolls Rock outcrop, Ratake-Cathedral Rock outcrop, Allens Park variant of Ratake Rock outcrop, Cryofluvents, and Curecanti very stony sandy loam. These soil areas generally consist of 0.5-3.0 feet of gravelly to stony sandy loam over bedrock.

E. EXISTING VEGETATION, INCLUDING PERCENT COVER: General ground cover is Evergreen Trees with small brush understory and areas of grass in between within the overall project area. Percent groundcover is <5% within the areas of disturbance and approximately 15% for the entire construction site

F. POTENTIAL POLLUTANTS SOURCES: See First Construction Activities under Potential Pollutant Sources. The ECS shall prepare a list of all potential pollutants and their locations in accordance with subsection 107.25.

G. RECEIVING WATER:
1. Outfall locations: The entire Schwartzwalder Mine site drains to Ralston Creek. The excavated areas will be directed to sump locations to be pumped to a treatment location before being released into Ralston Creek.
2. Names of receiving water(s) on site and the ultimate receiving water: Ralston Creek and Ralston Reservoir
3. Distance ultimate receiving water is from project: 10,000 feet

H. ALLOWABLE NON-STORMWATER DISCHARGES:
1. Groundwater and stormwater dewatering: Discharges to the ground of water from construction dewatering activities may be authorized provided that:
   a. the source is groundwater and/or groundwater combined with stormwater that does not contain pollutants
   b. the source and BMPs are identified in the SWMP
   c. discharges do not leave the site as surface runoff or to surface waters.

2. If discharges do not meet the above criteria a separate permit from the Department of Health will be required. Contaminated groundwater requiring coverage under a separate permit may include groundwater contaminated with pollutants from a landfill, mining activities, industrial pollutant plumes, underground storage tank, etc.

3. Existing water treatment plant discharge for the water treatment plan on Cotter Corporation's property.

I. ENVIRONMENTAL IMPACTS:
1. Wetland Impacts: YES *NO*
2. Stream Impacts: *YES* NO
3. Threatened and Endangered Species: *N/A*

2. SITE MAP COMPONENTS:

Pre-construction

A. PROJECT CONSTRUCTION POTENTIAL SITE BOUNDARIES Shown on SWMP Site Map

B. ALL AREAS OF GROUND SURFACE DISTURBANCE Shown on SWMP Site Map

C. AREAS OF CUT AND FILL Shown on SWMP Site Map

D. LOCATION OF ALL STRUCTURAL BMPs IDENTIFIED IN THE SWMP Shown on SWMP Site Map

E. LOCATION OF NON-STRUCTURAL BMPs AS APPLICABLE IN THE SWMP Shown on SWMP Site Map

F. SPRINGS, STREAMS, WETLANDS AND OTHER SURFACE WATER Shown on SWMP Site Map

G. PROTECTION OF TREES, SHRUBS, CULTURAL RESOURCES AND MATURE VEGETATION Shown on SWMP Site Map

H. AREAS USED FOR STORING AND STOCKPILING OF MATERIALS, STAGING AREAS (field trailer,fueling,etc) and BATCH PLANTS Shown on SWMP Site Map

3. SWMP ADMINSTRATOR FOR DESIGN: Dan Leyendecker, P.E. – Principal of LNV, Inc.

4. STORMWATER MANAGEMENT CONTROLS FIRST CONSTRUCTION ACTIVITIES

THE CONTRACTOR SHALL PERFORM THE FOLLOWING:

A. DESIGNATE A SWMP ADMINISTRATOR/EROSION CONTROL SUPERVISOR (To be filled out at time of construction; designate the individual(s) responsible for implementing, maintaining and revising SWMP, including the title and contact information. The activities and responsibilities of the administrator shall address all aspects of the projects SWMP.)

Name/Title: Contact information:

B. POTENTIAL POLLUTANT SOURCES
Evaluate, identify and describe all potential sources of pollutants at the site in accordance with subsection 107.25 and place in the SWMP notebook. All BMPs related to potential pollutants shall be shown on the SWMP site map by the contractor's ECS.

C. BEST MANAGEMENT PRACTICES (BMPs) FOR STORMWATER POLLUTION PREVENTION

PHASED BMP IMPLEMENTATION
During Design: "BMP as Designed" boxes are marked when used in the SWMP. During construction: the ECS shall update the "In use on site" boxes to match which BMPs are currently in use on site. Clearly describe the relationship between the phases of construction and the implementation of BMP controls.

STRUCTURAL BMPs that may be potentially used on the project for erosion and sediment control; practices may include, but are not limited to:

BMP	TYPE OF CONTROL	BMP as Designed	In use on site	FIRST CONSTRUCTION ACTIVITIES	DURING CONSTRUCTION	INTERIM/FINAL STABILIZATION
Earth Berm/Diversion	erosion	x		x	x	
*Check Dams	sediment				x	
Erosion Logs	sediment	x		x	x	
Embankment Protector	erosion					
Inlet Protection	erosion					
Outlet Protection	erosion					
Concrete Washouts	construction				x	
Vehicle Tracking Pad	construction			x	x	
Dewatering	sediment	x			x	
Temporary Stream Crossing	erosion					
Clean water diversion					x	
Other						

NON-STRUCTURAL BMPs that may be potentially used on the project for erosion and sediment control; practices may include, but are not limited to:

BMP	TYPE OF CONTROL	BMP as Designed	In use on site	FIRST CONSTRUCTION ACTIVITIES	DURING CONSTRUCTION	INTERIM/FINAL STABILIZATION
Surface Roughening/Grading Techniques	erosion				x	
Soil Binder	erosion				x	
Protection of Trees	erosion			x	x	
Preservation of Mature Vegetation	erosion	x		x	x	x

*Check dams may be rock, erosion logs, silt dike, silt berm, etc. as indicated in the narratives and SWMP site map.

Erosion control devices are used to limit the amount of soil loss on site.
Sediment control devices are designed to capture sediment on the project site.
Construction control are BMPs related to construction access and staging.
BMP locations are indicated on the SWMP site map.

NARRATIVES

EROSION CONTROL LOGS
Place erosion control logs along the top of slopes towards Ralston Creek per the plans or as directed. Maintain and replace the erosion control logs as needed.

EARTH BERM/DIVERSION
During excavation of the contaminated area, divert all runoff within the excavated areas to the closest sump location, so the contaminated runoff will be pumped to the on-site water treatment facility.

DEWATERING
Any dewatering conducted within the areas of excavation shall discharge the water to the on-site water treatment facility.

PRESERVATION OF MATURE VEGETATION
Protect trees and mature vegetation outside the limits of construction.

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

STORM WATER MANAGEMENT PLAN NARRATIVE SHEET 1 OF 2

N.T.S.

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 31

2/23/2017
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BMP details and narratives not covered by the SWMP or Standard Plan M-208-1 shall be added to the SWMP notebook by the ECS.

D. OFFSITE DRAINAGE (RUN ON WATER)

1. Describe and record BMPs on the SWMP site map that has been implemented to address off site run-on water in accordance with subsection 208.03.

E. VEHICLE TRACKING PAD/VEHICLE TRACKING CONTROL

1. BMPs shall be implemented in accordance with subsection 208.04.

F. PERIMETER CONTROL

1. Perimeter control shall be established as the first item on the SWMP to prevent the potential for pollutants leaving the construction site boundaries, entering the stormwater drainage system, or discharging to state waters.
2. Perimeter control may consist of vegetation buffers, berms, silt fence, erosion logs, existing landforms, or other BMPs as approved.
3. Perimeter control shall be in accordance with subsection 208.04.

5. DURING CONSTRUCTION

RESPONSIBILITIES OF THE SWMP ADMINISTRATOR/EROSION CONTROL SUPERVISOR DURING CONSTRUCTION
The SWMP should be considered a "living document" that is continuously reviewed and modified. During construction, the following items shall be added, updated, or amended as needed by the SWMP Administrator/Erosion Control Supervisor (ECS) in accordance with Section 208.

During construction, indicate how items that have not been addressed during design are being handled in construction. If items are covered in the template or other sections of the SWMP notebook indicate below what section the discussion takes place.

A. STOCKPILE MANAGEMENT - shall be done in accordance with subsection 107.25 and 208.07

B. CONCRETE WASHOUT - Concrete wash out water or waste from field laboratories and paving equipment shall be contained in accordance with subsection 208.05.

C. SAW CUTTING - shall be done in accordance with subsection 107.25, 208.04, 208.05

D. STREET CLEANING - shall be done in accordance with subsection 208.04

6. INSPECTIONS

A. Inspections shall be in accordance with subsection 208.03 (c).

7. BMP MAINTENANCE

A. Maintenance shall be in accordance with subsection 208.04 (f).

8. RECORD KEEPING

A. Records shall be kept in accordance with subsection 208.03 (c).

9. INTERIM AND FINAL STABILIZATON

A. SEEDING PLAN

Soil preparation, soil conditioning or topsoil, seeding (native), mulching (weed free) and mulch tackifier will be required for an estimated 4.24 acres over the top cap of the engineered waste rock piles. Native soils are mainly 0.5-3.0 feet of gravelly to stony sandy loam over bedrock. The proposed ditch grading will be rock riprap armored in place of vegetation.

Species	*Variety*	*% of Mix*	*Broadcast* lbs/acre*
Big Bluestem	Kaw	20	4.4
Sideoats Gramma	Vaughn	20	3.6
Little Bluestem	Pastura	20	2.8
Yellow Indiangrass	Holt	10	2
Western Wheatgrass***	Arriba	10	3.2
Needleandthread	-	10	2
Switchgrass	Nebraska 28	5	0.6
Blue Gramma	Lovington	5	0.3
TOTAL		*100%*	*18.9 lbs/acre*

* Use this seeding rate for both broadcast and hydromulch applications.
*** Streambank Wheatgrass (Sodar) can be substituted for the Western Wheatgrass.

10. PRIOR TO FINAL ACCEPTANCE

A. Final Acceptance shall be in accordance with subsection 208.10.

11. TABULATION OF STORMWATER QUANTITIES

Pay Item	Description	Pay Unit	*Quantity
208	Erosion Log	LF	4000
208	Erosion Bales	LF	100
208	Vehicle Tracking Pad (Construction Entrance)	EA	4
1000	Dewatering	LS	1
	Turf Reinforcement Matting	SY	38000
	Hydromulch Seeding and 6 Inch Topsoil	SY	38000

*It is anticipated that additional BMPs and BMP quantities not shown on the SWMP Site Maps shall be required on the project for unforeseen conditions and replacement of items that are beyond their useful service life, see subsection 208.03 and 208.04 (e). Quantities for all BMPs shown above are estimated, and have been increased for unforeseen Project conditions.

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STORM WATER MANAGEMENT PLAN NARRATIVE SHEET 2 OF 2

N.T.S.

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2/23/2017
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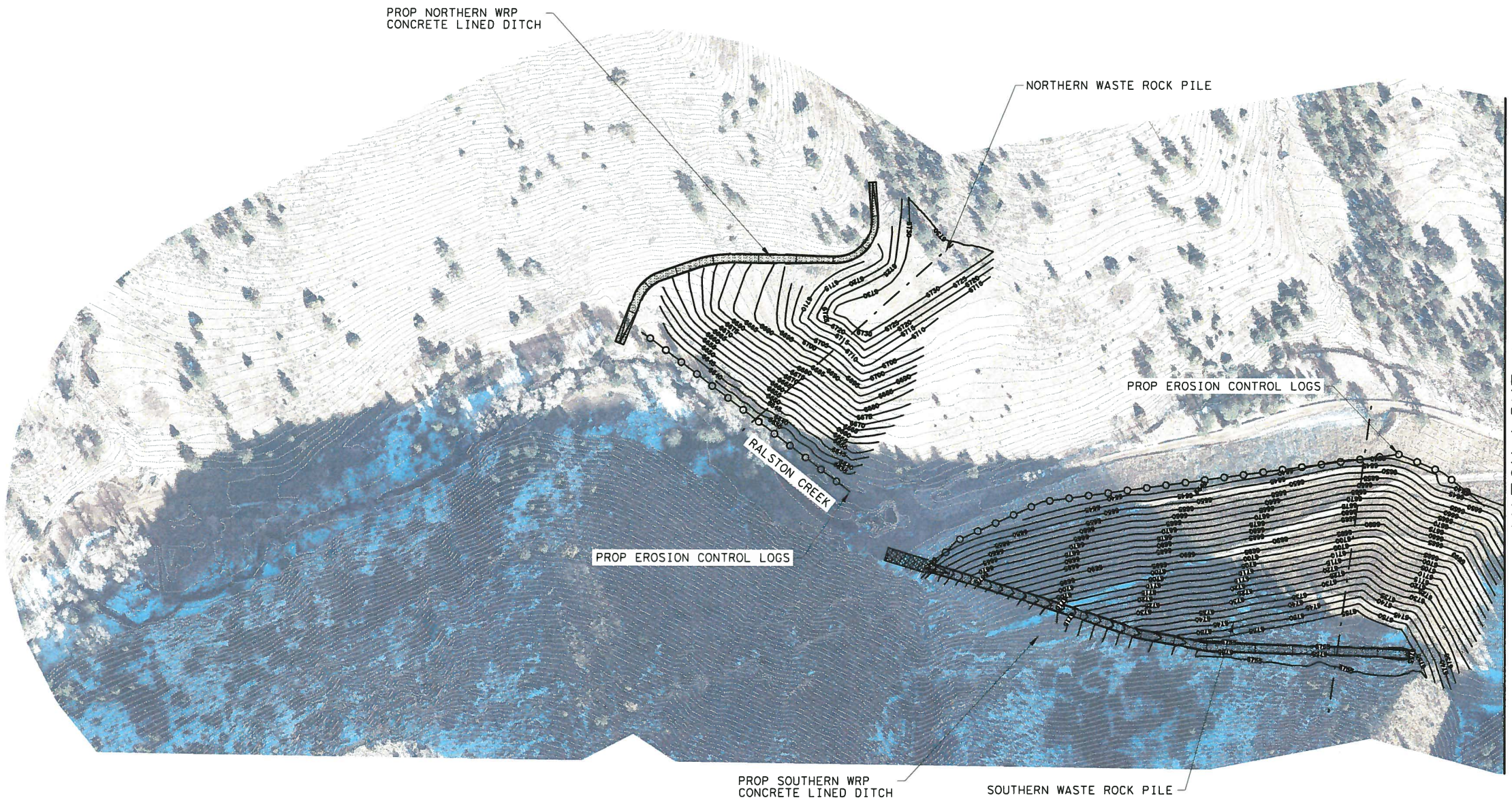

NOTE:
1) ALL TREES AND MATURE PLANTS OUTSIDE THE LIMITS OF CONSTRUCTION WILL BE PROTECTED.

2) CONSTRUCT TEMPORARY STREAM/LOW WATER CROSSINGS AS NEEDED.

3) SLOPE EXCAVATIONS TOWARDS ONE OF THE EXIST SUMP LOCATIONS SHOWN SO ALL RUNOFF CAN BE TREATED DUE TO CONTAMINATION.

LEGEND

- PROP EROSION CONTROL LOGS
- (RCD) PROP ROCK CHECK DAM
- (SBB) PROP STRAW BALE OR WADDLE BARRIER

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

SWMP SITE MAP
SHEET 1 OF 2

HORIZ. SCALE: 1"=200'

0 100 200
SCALE IN FEET

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 33

2/23/2017
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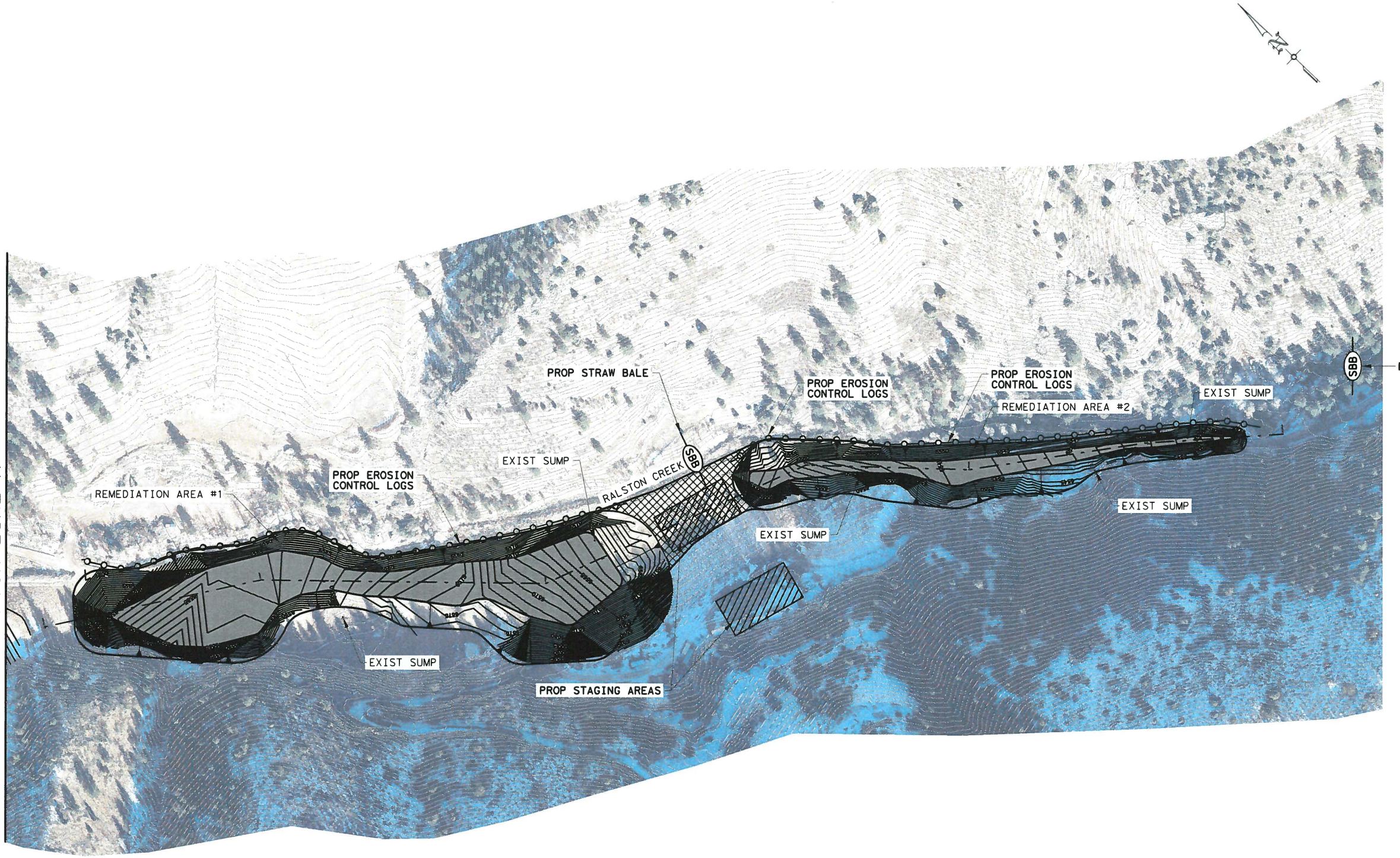

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LEGEND

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- RCD — PROP ROCK CHECK DAM
- SBB — PROP STRAW BALE OR WADDLE BARRIER

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SWMP SITE MAP
SHEET 2 OF 2

HORIZ. SCALE: 1"=200'
0 100 200
SCALE IN FEET

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2/23/2017
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STANDARD EROSION AND SEDIMENT CONTROL NOTES:

1. The contractor must notify the Jefferson County Division of Transportation and Engineering (303.271.8495) at least three days prior to starting construction.

2. All grading, erosion, and sediment control must conform to approved plans. Revisions to land disturbance areas, slopes, and/or erosion and sediment control measures are not permitted without prior approval from the Jefferson County Planning and Zoning Division. Field modifications to an equivalent BMP that does not affect the site hydrology may be approved by Jefferson County Transportation and Engineering staff.

3. The approved plans are valid for two (2) years from the date of approval from Jefferson County.

4. The landowner and/or contractor is responsible for obtaining a permit for Stormwater Discharges Associated with Construction Activity from the Colorado Department of Public Health and Environment, at least 10 days prior the start of construction activities for land disturbance areas of one acre or greater. The permit must be kept current throughout the construction process.

5. Erosion control BMPs must be installed prior to grading activities.

6. Approved erosion and sediment control BMPs shall be maintained and kept in good repair for the duration of the project. At a minimum, the property owner or contractor shall inspect all BMPs in accordance with the approved plans. All necessary maintenance and repair activities shall be completed immediately. Accumulated sediment and construction debris shall be removed and properly disposed.

7. All topsoil must be salvaged, segregated, and stockpiled separately from the overburden. Topsoil and overburden must be redistributed within the graded area after rough grading to provide a suitable base for areas that must be seeded and planted. Runoff from the stockpiled area must be controlled to prevent erosion and sedimentation of receiving waters.

8. Soils that are stockpiled for more than thirty (30) days shall be seeded and mulched within fourteen (14) days of stockpile construction.

9. The landowner and/or contractor must immediately take all necessary steps to control sediment discharge.

10. Soil stabilization measures shall be applied within 30 days to disturbed areas, which may not be at final grade, but will be left dormant for longer than 60 days.

11. If applicable, the following note shall be completed:
    Temporary vegetative cover consisting of (species/variety)(mix noted below) must be (drill) (hydro_)(broadcast) seeded at _____ pounds pure live seed per acre. Mulch consisting of _____, applied at a rate of _____ tons per acre and crimped must be used to stabilize the exposed surface.
    Soil amendments consisting of (specify type) must be incorporated into the soil to a depth of _____ inches below grade at _____ cubic yards per 1,000 square feet.
    Permanent vegetative cover consisting of (species/variety)(mix noted below) must be (drill) (hydro_)(broadcast) seeded at _____ pounds pure live seed per acre.
    (Temporary)(Permanent) Seed Mix

Species	Variety	% of Mix	Min. lbs. PLS/Acre

12. All disturbed slopes (unless in a competent rock cut) greater than or equal to 3:1 (H:V), flow lines of swales, gutter downspouts, or additional areas at the discretion of county staff, shall be protected with an erosion control blanket or equivalent BMP..

13. If it is necessary to move material in excess of 300 cubic yards and/or in excess of 10,000 square feet of land disturbance area to or from another unincorporated Jefferson County site, a grading permit or Notice of Intent (NOI) is necessary for the off-site property. If the material is moved to a property located within another jurisdiction, evidence is required that the local government has approved the grading operation.

14. The landowner and/or contractor is responsible for clean up and removal of all sediment and debris from all drainage infrastructure and public facilities during the entire construction process.

15. The landowner and/or contractor must take reasonable precautions to ensure that vehicles do not track or spill earth materials on to streets/roads and must immediately remove such materials if this occurs.

16. The landowner and/or contractor is responsible for controlling litter such as discarded building materials, concrete truck washout, chemicals, and sanitary waste, as applicable. In addition, spill prevention and containment BMPs for construction materials, waste, and fuel must be provided, as applicable. Locations of stockpiles, concrete washout areas, and trash receptacles must be clearly shown on the plans. Littering is defined and enforced by CRS 18-4-511.

17. Fugitive dust emissions resulting from grading activities and/or wind shall be controlled using the best available control technology, as defined by the Colorado Department of Public Health and Environment, at the time of grading.

18. Earth materials and construction supplies are to be stored on a construction site staging area, and are not to be stored on the street or sidewalk. Locations of stockpiles, concrete washout areas and trash receptacles are clearly located on the plans.

19. The Jefferson County Planning and Zoning Division, or its authorized representative, may modify the erosion and sediment control plan as field conditions warrant.

DETAIL NO.	SHEET NO.		BMP LEGEND	
1	2		SR	SURFACE ROUGHENING
2	2		ECB	EROSION CONTROL BLANKET
3	2		TSD	TEMPORARY SLOPE DRAIN
4	3		OP	OUTLET PROTECTION
5	3		RCS	ROUGH CUT STREET CONTROL
6	3		ED/DS	EARTH DIKES AND DRAINAGE SWALES
7	3		TER	TERRACING
8	4		CD	CHECK DAM
9	4		CWA	CONCRETE WASHOUT AREA
10	4		SP	STOCKPILE MANAGEMENT
11	5		SF	SILT FENCE
12	5		SCL	SEDIMENT CONTROL LOG
13	5		SBB	STRAW BALE BARRIER
14	6		RS	ROCK SOCK
15	6		IP	INLET PROTECTION
16	6		SB	SEDIMENT BASIN
17	7		CF	CONSTRUCTION FENCE
18	7		VTC	VEHICLE TRACKING CONTROL
19	7		SSA	STABILIZED STAGING AREA
20	8		TDC	TEMPORARY DIVERSION CHANNEL
21	8		DW	DEWATERING
21	9		TSC	TEMPORARY STREAM CROSSING

Revisions:	Designed By:		Scale: (As Shown)	JEFFERSON COUNTY DIVISION OF PLANNING & ZONING 100 JEFFERSON COUNTY PARKWAY, SUITE 3550 GOLDEN, COLORADO 80419 (303) 271-8700	G.E.S.C. STANDARD NOTES AND DETAILS
Details from UDFCD - November, 2010.	Drawn By:		Date Created: 07/25/2012		
	Checked By: Staff		Plot Date: 7/26/2012		Project No.: Sheet 1 Of 9
	File: GESC_Details_Sht1.dwg				
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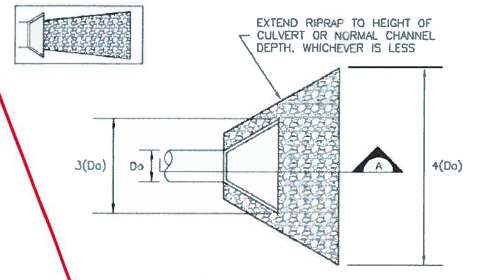
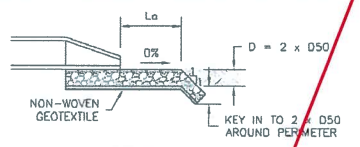
OP



TEMPORARY OUTLET PROTECTION PLAN



SECTION A

TABLE OP-1. TEMPORARY OUTLET PROTECTION SIZING TABLE

PIPE DIAMETER, Do (INCHES)	DISCHARGE, Q (CFS)	APRON LENGTH, La (FT)	RIPRAP D50 DIAMETER MIN (INCHES)
8	2.5	5	4
	5	10	6
12	5	10	4
	10	13	6
18	10	10	6
	20	16	9
	30	23	12
	40	26	16
24	10	10	9
	20	23	9
	30	26	12
	60	30	16

OP-1. TEMPORARY OUTLET PROTECTION

TEMPORARY OUTLET PROTECTION INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   - LOCATION OF OUTLET PROTECTION.
   - DIMENSIONS OF OUTLET PROTECTION.
2. DETAIL IS INTENDED FOR PIPES WITH SLOPE < 10%. ADDITIONAL EVALUATION OF RIPRAP SIZING AND OUTLET PROTECTION DIMENSIONS REQUIRED FOR STEEPER SLOPES.
3. TEMPORARY OUTLET PROTECTION INFORMATION IS FOR OUTLETS INTENDED TO BE UTILIZED LESS THAN 2 YEARS.

TEMPORARY OUTLET PROTECTION INSPECTION AND MAINTENANCE NOTES

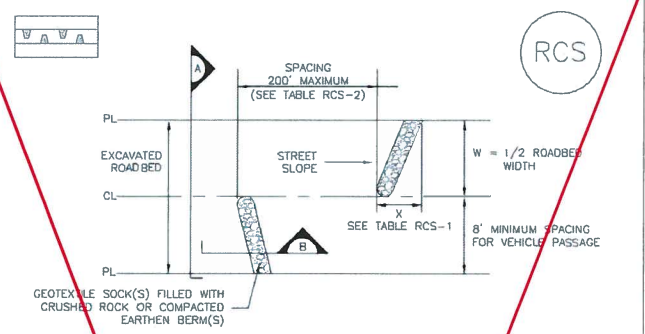
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

TEMPORARY OUTLET PROTECTION

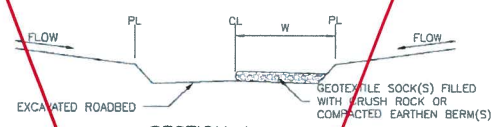
TOP

Detail 4

RCS



ROUGH CUT STREET CONTROL PLAN



SECTION A

SECTION B

TABLE RCS-1

W (FT)	X (FT)
20-30	5
31-40	7
41-50	9
51-60	10.5
61-70	12

TABLE RCS-2

LONGITUDINAL STREET SLOPE (%)	SPACING (FT)
<2	NOT TYPICALLY NEEDED
2	200
3	200
4	150
5	100
6	50
7	25
8	25

RCS-1. ROUGH CUT STREET CONTROL

ROUGH CUT STREET CONTROL INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   - LOCATION OF ROUGH CUT STREET CONTROL MEASURES.
2. ROUGH CUT STREET CONTROL SHALL BE INSTALLED AFTER A ROAD HAS BEEN CUT IN, AND WILL NOT BE PAVED FOR MORE THAN 14 DAYS OR FOR TEMPORARY CONSTRUCTION ROADS THAT HAVE NOT RECEIVED ROAD BASE.

ROUGH CUT STREET CONTROL INSPECTION AND MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

ROUGH CUT STREET CONTROL

RCS

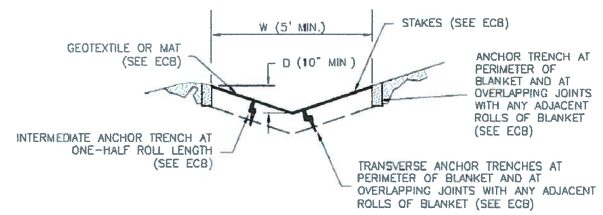
Detail 5

ED/DS

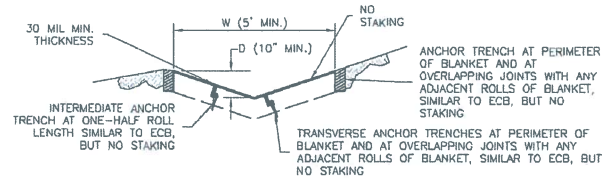
ED-1. COMPACTED UNLINED EARTH DIKE FORMED BY BERM

DS-1. COMPACTED UNLINED EXCAVATED SWALE

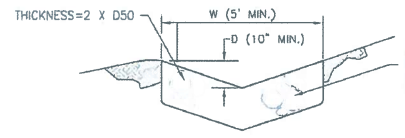
DS-2. COMPACTED UNLINED SWALE FORMED BY CUT AND FILL



DS-3. ECB LINED SWALE (CUT AND FILL OR BERM)



DS-4. SYNTHETIC LINED SWALE



DS-5. RIPRAP LINED SWALE

EARTH DIKE AND DRAINAGE SWALE INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - LOCATION OF DIVERSION SWALE
   - TYPE OF SWALE (UNLINED, COMPACTED AND/OR LINED)
   - LENGTH OF EACH SWALE
   - DEPTH, D, AND WIDTH, W, DIMENSIONS
   - FOR ECB/TRM LINED DITCH, SEE ECB DETAIL
   - FOR RIPRAP LINED DITCH, SIZE OF RIPRAP D50
2. SEE DRAINAGE PLANS FOR DETAILS OF PERMANENT CONVEYANCE FACILITIES AND/OR DIVERSION SWALES EXCEEDING 2-YEAR FLOW RATE OR 10 CFS.
3. EARTH DIKES AND SWALES INDICATED ON GESC PLAN SHALL BE INSTALLED PRIOR TO LAND DISTURBANCE ACTIVITIES.
4. EMBANKMENT IS TO BE COMPACTED TO 90% OF MAXIMUM DENSITY AND WITHIN 2% OF OPTIMUM MOISTURE CONTENT ACCORDING TO ASTM D698.
5. SWALES ARE TO DRAIN TO A SEDIMENT CONTROL BMP.
6. FOR LINED DITCHES, INSTALLATION OF ECB/TRM SHALL CONFORM TO THE ECB DETAIL.
7. WHEN CONSTRUCTION TRAFFIC MUST CROSS A DIVERSION SWALE, INSTALL A TEMPORARY CULVERT WITH A MINIMUM DIAMETER OF 12 INCHES.

EARTH DIKE AND DRAINAGE SWALE MAINTENANCE NOTES

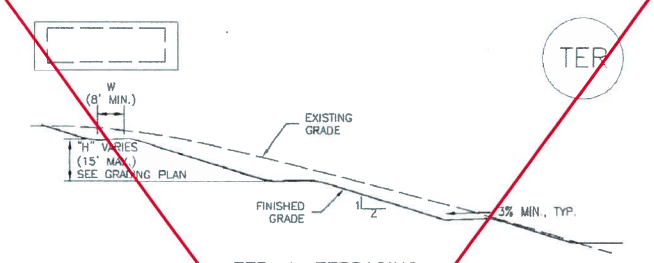
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. J. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. SWALES SHALL REMAIN IN PLACE UNTIL THE END OF CONSTRUCTION; IF APPROVED BY JEFFERSON COUNTY, SWALES MAY BE LEFT IN PLACE.
5. WHEN A SWALE IS REMOVED, THE DISTURBED AREA SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.

EARTH DIKES AND DRAINAGE SWALES

ED/DS

Detail 6

TER



TER-1. TERRACING

TERRACING INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   -LOCATION OF TERRACING
   -WIDTH (W), AND SLOPE (Z).
2. TERRACING IS TYPICALLY NOT REQUIRED FOR SLOPES OF 4:1 OR FLATTER.
3. GRADE TERRACES TO DRAIN BACK TO SLOPE AT A MINIMUM OF 3% GRADE.

TERRACING MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. RILL EROSION OCCURRING ON TERRACED SLOPES SHALL BE REPAIRED, RESEEDED, MULCHED OR STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.
5. TERRACING MAY NEED TO BE RE-GRADED TO RETURN THE SLOPE TO THE FINAL DESIGN GRADE. THE SLOPE SHALL THEN BE COVERED WITH TOPSOIL, SEEDED AND MULCHED, OR OTHERWISE STABILIZED AS APPROVED BY JEFFERSON COUNTY.

TERRACING

TER

Detail 7

Revisions:	Designed By:		Scale: (As Shown)	JEFFERSON COUNTY DIVISION OF PLANNING & ZONING 100 JEFFERSON COUNTY PARKWAY, SUITE 3550 GOLDEN, COLORADO 80419 (303) 271-8700	G.E.S.C. STANDARD PLANS AND DETAILS
	Drawn By:		Date Created: 8/15/2011		
	Checked By: Staff		Plot Date: 7/26/2012 F.I.R. Date:		Project No.: Sheet 3 Of 9
	File: GESC_Details_Sht3.dwg		F.O.R. Date: For Const. Date:		
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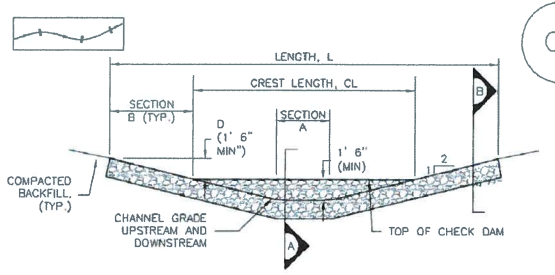
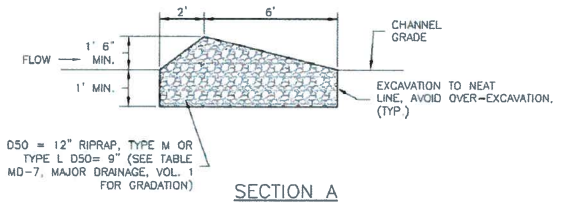
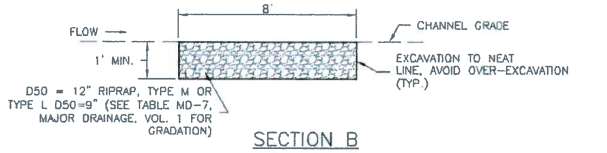
CD



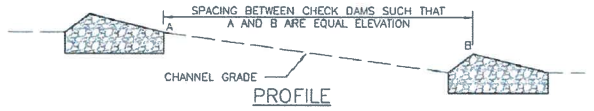
CHECK DAM ELEVATION VIEW



SECTION A



SECTION B



PROFILE

CD–1. CHECK DAM

CHECK DAM INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - LOCATION OF CHECK DAMS
   - CHECK DAM TYPE (CHECK DAM OR REINFORCED CHECK DAM)
   - LENGTH (L), CREST LENGTH (CL), AND DEPTH (D)
2. CHECK DAMS INDICATED ON INITIAL GESC SHALL BE INSTALLED AFTER CONSTRUCTION FENCE, BUT PRIOR TO ANY UPSTREAM LAND DISTURBANCE ACTIVITIES.
3. RIPRAP UTILIZED FOR CHECK DAMS SHOULD BE OF APPROPRIATE SIZE FOR THE APPLICATION. TYPICAL TYPES OF RIPRAP USED FOR CHECK DAMS ARE TYPE M (D50 12") OR TYPE L (D50 9")
4. RIPRAP PAD SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 1 FOOT.
5. THE ENDS OF THE CHECK DAM SHALL BE A MINIMUM OF 1.5 FEET HIGHER THAN THE CENTER OF THE CHECK DAM.

CHECK DAM MAINTENANCE NOTES

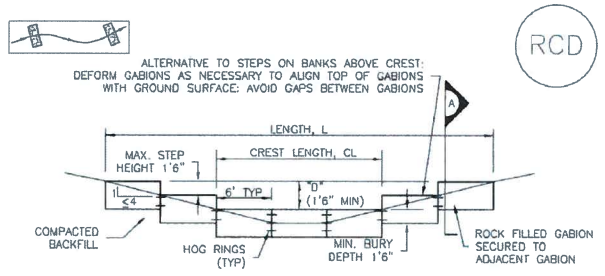
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. SEDIMENT ACCUMULATED UPSTREAM OF THE CHECK DAMS SHALL BE REMOVED WHEN THE SEDIMENT DEPTH IS WITHIN 1/2 OF THE HEIGHT OF THE CREST.
5. CHECK DAMS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY JEFFERSON COUNTY.
6. WHEN CHECK DAMS ARE REMOVED, EXCAVATIONS SHALL BE FILLED WITH SUITABLE COMPACTED BACKFILL. DISTURBED AREA SHALL BE SEEDED AND MULCHED AND COVERED WITH GEOTEXTILE OR OTHERWISE STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.

CHECK DAMS

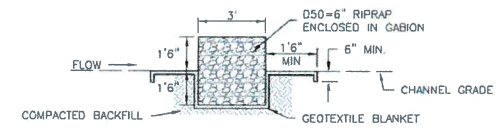
CD

Detail 8

RCD



REINFORCED CHECK DAM ELEVATION VIEW



SECTION A

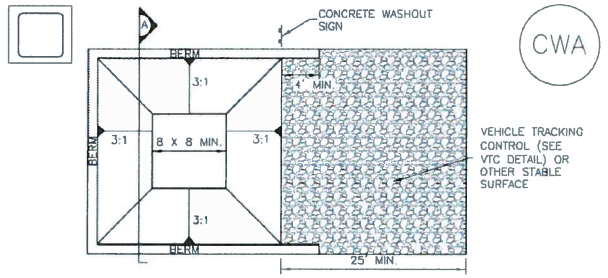
REINFORCED CHECK DAM INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - LOCATION OF CHECK DAMS
   - CHECK DAM TYPE (CHECK DAM OR REINFORCED CHECK DAM)
   - LENGTH (L), CREST LENGTH (CL), AND DEPTH (D)
2. CHECK DAMS INDICATED ON INITIAL GESC SHALL BE INSTALLED PRIOR TO ANY UPSTREAM LAND DISTURBANCE ACTIVITIES.
3. REINFORCED CHECK DAMS, GABIONS SHALL HAVE GALVANIZED TWISTED WIRE NETTING WITH A MAXIMUM OPENING DIMENSION OF 4 5 INCHES AND A MINIMUM WIRE THICKNESS OF 0.10 INCHES. WIRE "HOG RINGS" AT 4 INCH SPACING OR OTHER APPROVED MEANS SHALL BE USED AT ALL GABION SEAMS AND TO SECURE THE GABION TO THE ADJACENT SECTION.
4. THE CHECK DAM SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 1.5 FEET.
5. GEOTEXTILE BLANKET SHALL BE PLACED IN THE REINFORCED CHECK DAM TRENCH EXTENDING A MINIMUM OF 1.5 FEET ON BOTH THE UPSTREAM AND DOWNSTREAM SIDES OF THE REINFORCED CHECK DAM.

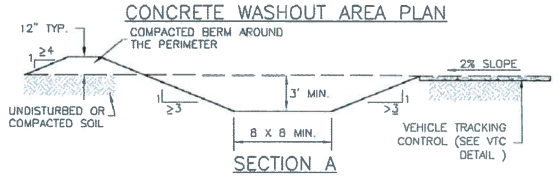
REINFORCED CHECK DAM MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. SEDIMENT ACCUMULATED UPSTREAM OF REINFORCED CHECK DAMS SHALL BE REMOVED AS NEEDED TO MAINTAIN THE EFFECTIVENESS OF BMP, TYPICALLY WHEN THE UPSTREAM SEDIMENT DEPTH IS WITHIN 1/2 THE HEIGHT OF THE CREST.
5. REPAIR OR REPLACE REINFORCED CHECK DAMS WHEN THERE ARE SIGNS OF DAMAGE SUCH AS HOLES IN THE GABION OR UNDERCUTTING.
6. REINFORCED CHECK DAMS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE JEFFERSON COUNTY.
7. WHEN REINFORCED CHECK DAMS ARE REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED, AND COVERED WITH A GEOTEXTILE BLANKET, OR OTHERWISE STABILIZED AS APPROVED BY JEFFERSON COUNTY.

CWA



CONCRETE WASHOUT AREA PLAN



SECTION A

CWA–1. CONCRETE WASHOUT AREA

CWA INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - CWA INSTALLATION LOCATION
2. DO NOT LOCATE AN UNLINED CWA WITHIN 400 FEET OF ANY NATURAL DRAINAGE PATHWAY OR WATER BODY. DO NOT LOCATE WITHIN 1000 FEET OF ANY WELLS OR DRINKING WATER SOURCES. IF THE CWA MUST BE INSTALLED WITH AN IMPERMEABLE LINER (10 MIL MINIMUM THICKNESS) OR SURFACE STORAGE ALTERNATIVES USING PREFABRICATED CONCRETE WASHOUT DEVICES OR A LINED ABOVE GROUND STORAGE ARE SHOULD BE USED.
3. THE CWA SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ONSITE
4. CWA SHALL INCLUDE A FLAT SUBSURFACE PIT THAT IS AT LEAST 8 FEET BY 8 FEET WITH SLOPES LEADING OUT OF THE SUBSURFACE PIT SHALL BE 3:1 OR FLATTER. THE PIT SHALL BE AT LEAST 3 FEET DEEP.
5. BERM SURROUNDING SIDES AND BACK OF THE CWA SHALL HAVE A MINIMUM HEIGHT OF 1 FOOT
6. VEHICLE TRACKING PAD SHALL BE SLOPED 2% TOWARDS THE CWA
7. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CWA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CWA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.
8. USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.

CWA MAINTENANCE NOTES

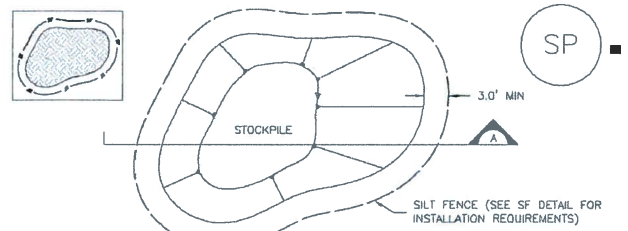
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. THE CWA SHALL BE REPAIRED, CLEANED, OR ENLARGED AS NECESSARY TO MAINTAIN CAPACITY FOR CONCRETE WASTE. CONCRETE MATERIALS ACCUMULATED IN PIT, SHALL BE REMOVED ONCE THE MATERIALS HAVE REACHED A DEPTH OF 2'.
5. CONCRETE WASHOUT WATER, WASTED PIECES OF CONCRETE AND ALL OTHER DEBRIS IN THE SUBSURFACE PIT SHALL BE TRANSPORTED FROM THE JOB SITE IN A WATER-TIGHT CONTAINER AND DISPOSED OF PROPERLY.
6. THE CWA SHALL REMAIN IN PLACE UNTIL ALL CONCRETE FOR THE PROJECT IS PLACED.
7. WHEN THE CWA IS REMOVED, COVER THE DISTURBED AREA WITH TOP SOIL, SEED AND MULCH OR OTHERWISE STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.

Concrete Washout Area

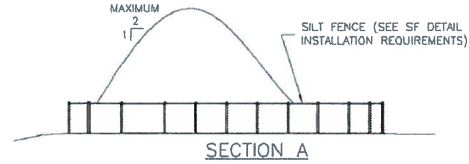
CWA

Detail 9

SP



STOCKPILE PROTECTION PLAN



SECTION A

SP–1. STOCKPILE PROTECTION

STOCKPILE PROTECTION INSTALLATION NOTES

2. SEE PLAN VIEW FOR:
   - LOCATIONS OF STOCKPILES
   - TYPE OF STOCKPILE PROTECTION
3. INSTALL PERIMETER CONTROLS IN ACCORDANCE WITH THEIR RESPECTIVE DESIGN DETAILS. SILT FENCE IS SHOWN IN THE STOCKPILE PROTECTION DETAILS; HOWEVER, OTHER TYPES OF PERIMETER CONTROLS INCLUDING SEDIMENT CONTROL LOGS OR ROCK SOCKS MAY BE SUITABLE IN SOME CIRCUMSTANCES. CONSIDERATIONS FOR DETERMINING THE APPROPRIATE TYPE OF PERIMETER CONTROL FOR A STOCKPILE INCLUDE WHETHER THE STOCKPILE IS LOCATED ON A PERVIOUS OR IMPERVIOUS SURFACE, THE RELATIVE HEIGHTS OF THE PERIMETER CONTROL AND STOCKPILE, THE ABILITY OF THE PERIMETER CONTROL TO CONTAIN THE STOCKPILE WITHOUT FAILING IN THE EVENT THAT MATERIAL FROM THE STOCKPILE SHIFTS OR SLUMPS AGAINST THE PERIMETER AND OTHER FACTORS.
4. STABILIZE THE STOCKPILE SURFACE WITH SURFACE ROUGHENING, TEMPORARY SEEDING AND MULCHING, EROSION CONTROL BLANKETS, OR SOIL BINDERS. SOILS STOCKPILED FOR AN EXTENDED PERIOD (GREATER THAN 60 DAYS) SHOULD BE SEEDED AND MULCHED WITH A TEMPORARY GRASS COVER DO NOT LOCATE AN UNLINED CWA WITHIN 400 FEET OF ANY NATURAL DRAINAGE PATHWAY OR WATER BODY. DO NOT LOCATE WITHIN 1000 FEET OF ANY WELLS OR DRINKING WATER SOURCES. IF THE CWA MUST BE INSTALLED WITH AN IMPERMEABLE LINER (10 MIL MINIMUM THICKNESS) OR SURFACE STORAGE ALTERNATIVES USING PREFABRICATED CONCRETE WASHOUT DEVICES OR A LINED ABOVE GROUND STORAGE ARE SHOULD BE USED
5. FOR TEMPORARY STOCKPILES ON THE INTERIOR PORTION OF A CONSTRUCTION SITE, WHERE OTHER DOWNGRADIENT CONTROLS, INCLUDING PERIMETER CONTROL ARE IN PLACE THAN STOCKPILE PERIMETER CONTROL MAY NOT BE REQUIRED IF DEPICTED ON THE APPROVED PLANS.

STOCKPILE PROTECTION MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. IF PERIMETER PROTECTION MUST BE MOVED TO ACCESS SOIL STOCKPILE, REPLACE PERIMETER STOCKPILE CONTROLS BY THE END OF THE WORKDAY.
5. STOCKPILE PERIMETER CONTROLS CAN BE REMOVED ONCE ALL THE MATERIAL FROM THE STOCKPILE HAS BEEN USED.

STOCKPILE MANAGEMENT

SP

Detail 10

Revisions:	Designed By:		Scale: (As Shown)	JEFFERSON COUNTY DIVISION OF PLANNING & ZONING 100 JEFFERSON COUNTY PARKWAY, SUITE 3550 GOLDEN, COLORADO 80419 (303) 271–8700	G.E.S.C. STANDARD PLANS AND DETAILS
	Drawn By:		Date Created: 8/15/2011		
	Checked By: Staff		Plot Date: 7/26/2012 F.I.R. Date:		
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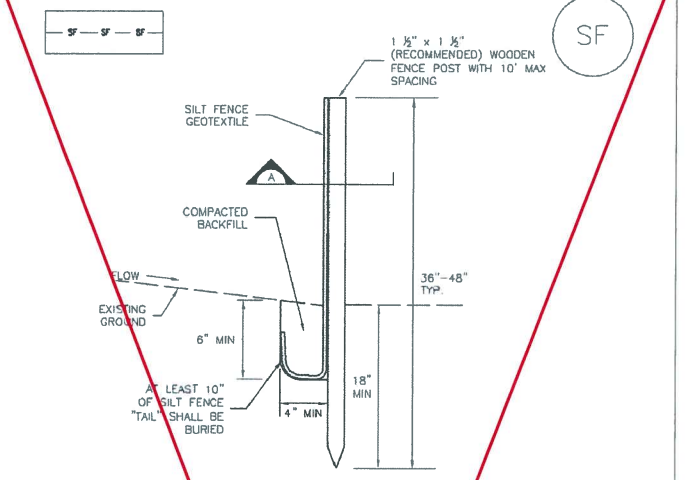
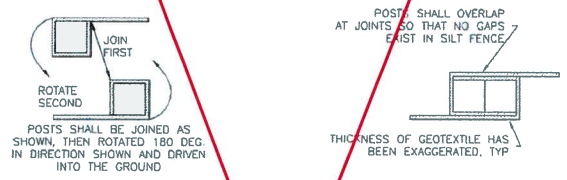


SILT FENCE



SECTION A

SF–1. SILT FENCE

SILT FENCE

SF

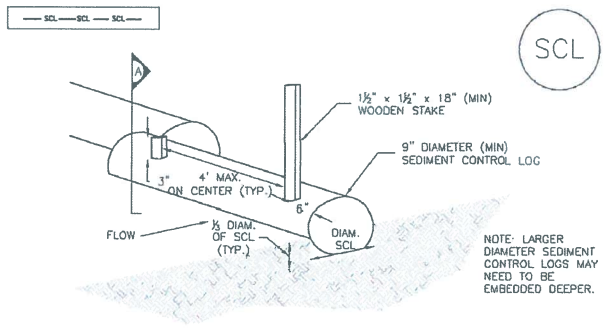
Detail 11

SILT FENCE INSTALLATION NOTES

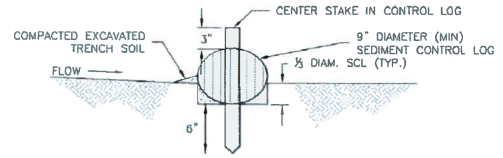
1. SILT FENCE MUST BE PLACED AWAY FROM THE TOW OF THE SLOPE TO ALLOW FOR WATER PONDING. SILT FENCE AT THE TOE OF A SLOPE SHOULD BE INSTALLED IN A FLAT LOCATION AT LEAST SEVERAL (2-5 FEET) FROM THE TOE OF THE SLOPE TO ALLOW ROOM FOR PONDING AND DEPOSITION.
2. A UNIFORM 6 INCH BY 4 INCH ANCHOR TRENCH SHALL BE EXCAVATED USING TRENCHER OR SILT FENCE INSTALLATION DEVICE. NO ROAD GRADERS, BACKHOES, OR SIMILAR EQUIPMENT SHALL BE USED.
3. COMPACT ANCHOR TRENCH BY HAND WITH A JUMPING JACK OR BY WHEEL ROLLING. COMPACTION SHALL BE SUCH THAT SILT FENCE RESISTS BEING PULLED OUT OF ANCHOR TRENCH BY HAND.
4. SILT FENCE SHALL BE PULLED TIGHT AS IT IS ANCHORED TO THE STAKES. THERE SHOULD BE NO NOTICEABLE SAG BETWEEN STAKES AFTER IT HAS BEEN ANCHORED TO THE STAKES.
5. SILT FENCE FABRIC SHALL BE ANCHORED TO THE STAKES USING 1 INCH HEAVY DUTY STAPLES OR NAILS WITH 1 INCH HEADS. STAPLES AND NAILS SHOULD BE PLACED 3 INCHES ALONG THE FABRIC DOWN THE STAKE.
6. AT THE END OF A RUN OF SILT FENCE ALONG A CONTOUR, THE SILT FENCE SHOULD BE TURNED PERPENDICULAR TO THE CONTOUR TO CREATE A "J HOOK". THE "J HOOK" EXTENDING PERPENDICULAR TO THE CONTOUR SHOULD BE OF SUFFICIENT LENGTH TO KEEP RUNOFF FROM FLOWING AROUND THE END OF THE SILT FENCE (TYPICALLY 10 FEET TO 20 FEET).

SILT FENCE MAINTENANCE NOTES

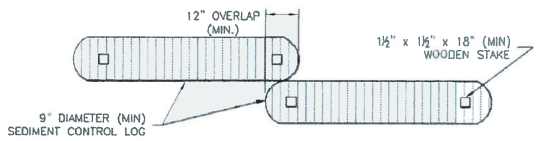
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. SEDIMENT ACCUMULATED UPSTREAM OF THE SILT FENCE SHALL BE REMOVED AS NEEDED TO MAINTAIN THE FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 6 INCHES.
5. REPAIR OR REPLACE SILT FENCE WHEN THERE ARE SIGNS OF WEAR, SUCH AS SAGGING, TEARING, OR COLLAPSE.
6. SILT FENCE IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY JEFFERSON COUNTY, OR IS REPLACED BY AN EQUIVALENT PERIMETER SEDIMENT CONTROL BMP.
7. WHEN SILT FENCE IS REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY JEFFERSON COUNTY.



SEDIMENT CONTROL LOG



SECTION A



SEDIMENT CONTROL LOG JOINTS

SCL–1. SEDIMENT CONTROL LOG

SEDIMENT CONTROL LOG

SCL

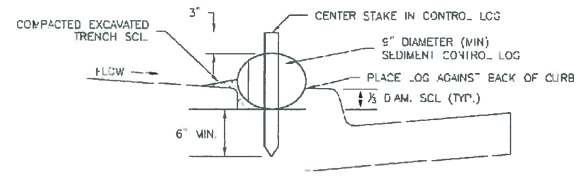
Detail 12

SEDIMENT CONTROL LOG INSTALLATION NOTES

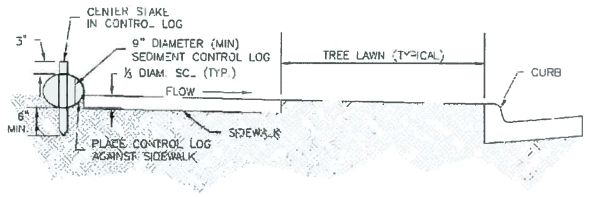
1. SEE SITE PLAN VIEW FOR LOCATION AND LENGTH OF SEDIMENT CONTROL LOGS.
2. SEDIMENT CONTROL LOGS SHALL CONSIST OF STRAW, COMPOST, EXCELSIOR OR COCONUT FIBER, AND SHALL BE FREE OF ANY NOXIOUS WEED SEEDS OR DEFECTS INCLUDING RIPS, HOLES, AND OBVIOUS WEAR.
3. SEDIMENT CONTROL LOGS MAY BE USED AS SMALL CHECK DAMS IN DITCHES AND SWALES. HOWEVER THEY SHOULD NOT BE USED IN PERENNIAL STREAMS OR HIGH VELOCITY DRAINAGEWAYS.
4. IT IS RECOMMENDED THAT SEDIMENT CONTROL LOGS BE TRENCHED INTO THE GROUND TO A DEPTH OF APPROXIMATELY 1/3 THE DIAMETER OF THE LOG. IF TRENCHING TO THIS DEPTH IS NOT FEASIBLE AND/OR DESIRABLE (SHORT TERM INSTALLATION WITH DESIRE NOT TO DAMAGE LANDSCAPE) A LESSER TRENCHING DEPTH WITH MORE ROBUST STAKING MAY BE ACCEPTABLE IF DEPICTED ON THE APPROVED PLANS.
5. THE UPHILL SIDE OF THE SEDIMENT CONTROL LOG SHALL BE BACKFILLED WITH SOIL THAT IS FREE OF ROCKS AND DEBRIS. THE SOIL SHALL BE TIGHTLY COMPACTED INTO THE SHAPE OF A RIGHT TRIANGLE USING A SHOVEL OR WEIGHTED LAWN ROLLER.
6. FOLLOW MANUFACTURERS GUIDANCE FOR STAKING. IF MANUFACTURERS INSTRUCTIONS DO NOT SPECIFY SPACING, STAKES SHALL BE PLACED ON 4 FOOT CENTERS AND EMBEDDED A MINIMUM OF 6 INCHES INTO THE GROUND. 3 INCHES OF THE STAKE SHALL PROTRUDE FROM THE TOP OF THE LOG. STAKES THAT ARE BROKEN PRIOR TO INSTALLATION SHALL BE REPLACED.

SEDIMENT CONTROL LOG MAINTENANCE NOTES

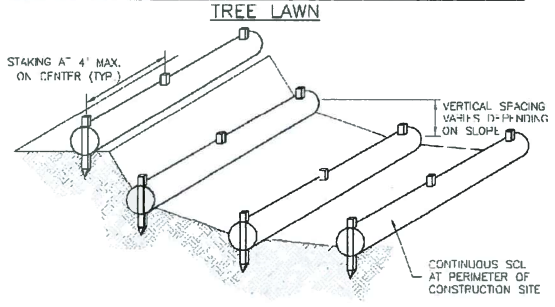
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. SEDIMENT ACCUMULATED UPSTREAM OF SEDIMENT CONTROL LOG SHALL BE REMOVED AS NEEDED TO MAINTAIN FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 1/2 OF THE HEIGHT OF THE SEDIMENT CONTROL LOG.
5. SEDIMENT CONTROL LOG SHALL BE REMOVED AT THE END OF CONSTRUCTION. IF DISTURBED AREAS EXIST AFTER REMOVAL, THEY SHALL BE COVERED WITH TOP SOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.



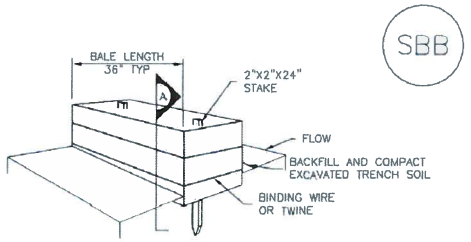
SCL–2. SEDIMENT CONTROL LOG AT BACK OF CURB



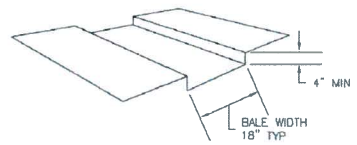
SCL–3. SEDIMENT CONTROL LOG AT SIDEWALK WITH TREE LAWN



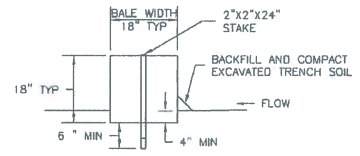
SCL–4. SEDIMENT CONTROL LOGS TO CONTROL SLOPE LENGTH



STRAW BALE



TRENCH FOR STRAW BALE



SECTION A

SBB–1. STRAW BALE

STRAW BALE MAINTENANCE NOTES

1. SEE PLAN VIEW FOR:
   - LOCATIONS OF STRAW BALES
2. STRAW BALES SHALL CONSIST OF CERTIFIED WEED FREE STRAW OR HAY.
3. STRAW BALES SHALL CONSIST OF APPROXIMATELY 5 CUBIC FEET OF STRAW OR HAY AND WEIGH NOT LESS THAN 35 POUNDS.
4. WHEN STRAW BALES ARE USED IN A SERIES AS A BARRIER, THE END OF EACH BALE SHALL BE TIGHTLY ABUTTING ONE ANOTHER.
5. STRAW BALE DIMENSIONS SHALL BE APPROXIMATELY 36 INCHES BY 18 INCHES BY 18 INCHES.
6. A UNIFORM ANCHOR TRENCH SHALL BE EXCAVATED TO A DEPTH OF 4 INCHES. STRAW BALES SHALL BE PLACED SO THAT BINDING TWINE IS ENCOMPASSING THE VERTICAL SIDES OF THE BALES. ALL EXCAVATED SOIL SHALL BE PLACED ON THE UPHILL SIDE OF THE STRAW BALES AND COMPACTED.
7. 2 WOODEN STAKES SHALL BE USED TO HOLD DOWN EACH BALE IN PLACE. WOODEN STAKES SHALL BE 2 INCHES BY 2 INCHES BY 24 INCHES. WOODEN STAKES SHALL BE DRIVEN 6 INCHES INTO THE GROUND.

STRAW BALE MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. STRAW BALES SHALL BE REPLACED IF THEY BECOME HEAVILY SOILED, ROTTEN, OR DAMAGED BEYOND REPAIR.
5. SEDIMENT ACCUMULATED UPSTREAM OF STRAW BALE BARRIER SHALL BE REMOVED AS NEEDED TO MAINTAIN FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 1/2 OF THE HEIGHT OF THE STRAW BALE BARRIER.
6. STRAW BALES ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE JEFFERSON COUNTY.
7. WHEN STRAW BALES ARE REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY JEFFERSON COUNTY.

STRAW BAIL BARRIER

SBB

Detail 13

Revisions:	Designed By:		Scale: (As Shown)	JEFFERSON COUNTY DIVISION OF PLANNING & ZONING 100 JEFFERSON COUNTY PARKWAY, SUITE 3550 GOLDEN, COLORADO 80419 (303) 271-8700	G.E.S.C. STANDARD PLANS AND DETAILS
	Drawn By:		Date Created: 8/15/2011		
	Checked By: Staff		Plot Date: 7/26/2012 F.I.R. Date:		
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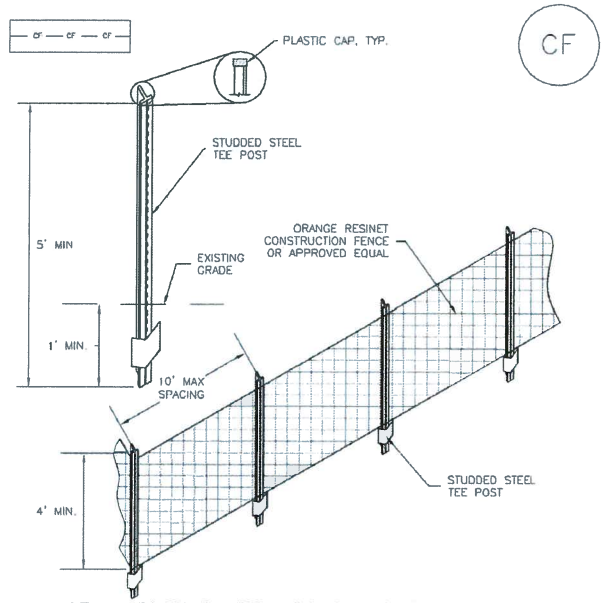
CF



CF–1. PLASTIC MESH CONSTRUCTION FENCE

CONSTRUCTION FENCE INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - LOCATION OF CONSTRUCTION FENCE
2. CONSTRUCTION FENCE SHOWN SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
3. CONSTRUCTION FENCE SHALL BE COMPOSED OF ORANGE CONTRACTOR GRADE MATERIAL THAT IS AT LEAST 4' HIGH. METAL POSTS SHOULD HAVE A PLASTIC CAP FOR SAFETY.
4. STUDDED STEEL TEE POSTS SHALL BE UTILIZED TO SUPPORT THE CONSTRUCTION FENCE. MAXIMUM SPACING FOR STEEL TEE POSTS SHALL BE 10'.
5. CONSTRUCTION FENCE SHALL BE SECURELY FASTENED TO THE TOP, MIDDLE, AND BOTTOM OF EACH POST.

CONSTRUCTION FENCE MAINTENANCE NOTES

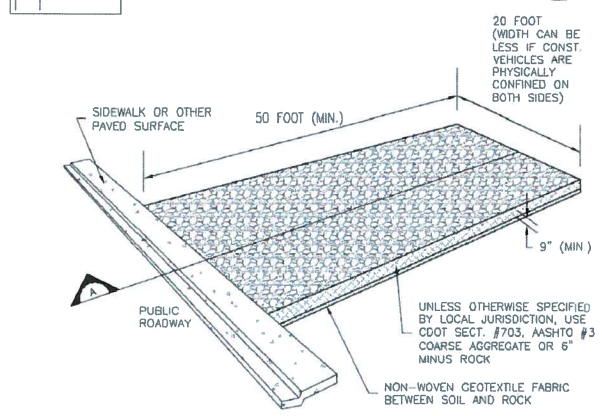
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. CONSTRUCTION FENCE SHALL BE REPAIRED OR REPLACED WHEN THERE ARE SIGNS OF DAMAGE SUCH AS RIPS OR SAGS. CONSTRUCTION FENCE IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY JEFFERSON COUNTY.
5. WHEN CONSTRUCTION FENCES ARE REMOVED, ALL DISTURBED AREAS ASSOCIATED WITH THE INSTALLATION, MAINTENANCE, AND/OR REMOVAL OF THE FENCE SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED.

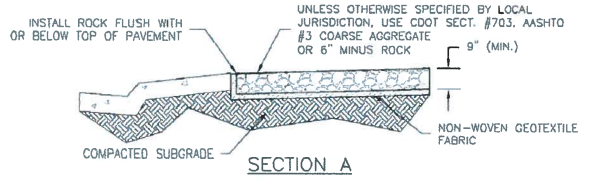
CONSTRUCTION FENCE

CF

Detail 17

VTC



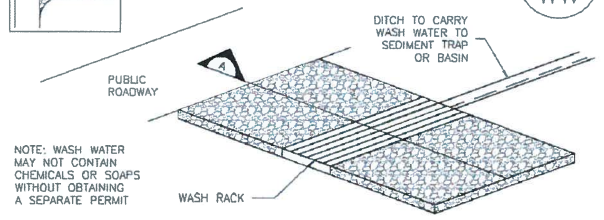


SECTION A

VTC–1. AGGREGATE VEHICLE TRACKING CONTROL

VTC–2. AGGREGATE VEHICLE TRACKING CONTROL WITH WASH RACK

VTC / WW



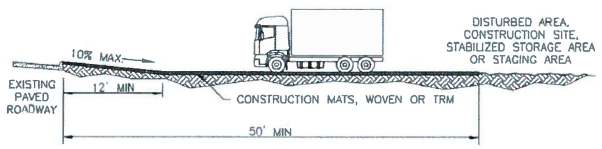
SECTION A

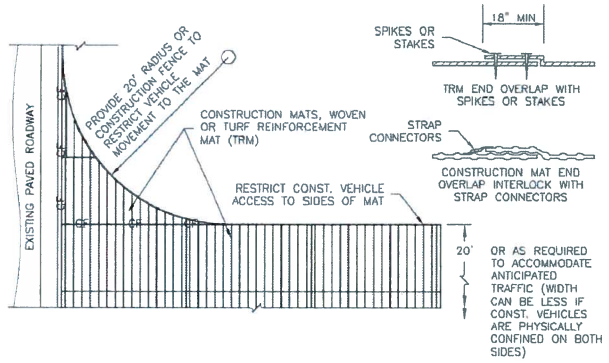
VEHICLE TRACKING CONTROL

VTC

Detail 18

VTC / CM — VTC / TRM





VTC–3. VEHICLE TRACKING CONTROL W/ CONSTRUCTION MAT OR TURF REINFORCEMENT MAT (TRM)

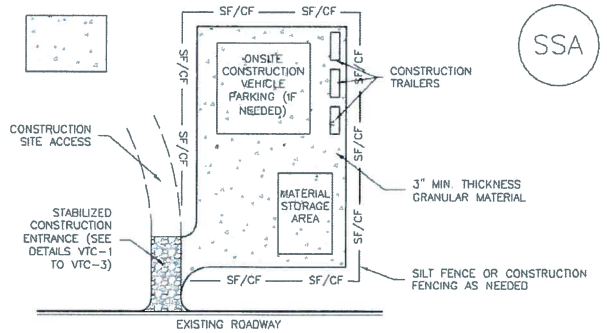
STABILIZED CONSTRUCTION ENTRANCE/EXIT INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   - LOCATION OF CONSTRUCTION ENTRANCE/EXITS.
   - TYPE OF CONSTRUCTION ENTRANCE/EXITS (WITH/WITHOUT WHEEL WASH, CONSTRUCTION MAT OR TRM)
2. CONSTRUCTION MAT OR TRM STABILIZED CONSTRUCTION ENTRANCES ARE ONLY TO BE USED ON SHORT DURATION PROJECTS (TYPICALLY RANGING FROM A WEEK TO A MONTH) WHERE THERE WILL BE LIMITED VEHICULAR ACCESS.
3. A STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE LOCATED AT ALL ACCESS POINTS WHERE VEHICLES ACCESS THE CONSTRUCTION SITE FROM PAVED ROW.
4. STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBANCE ACTIVITIES.
5. A NON WOVEN GEOTEXTILE FABRIC SHALL BE PLACED UNDER THE STABILIZED CONSTRUCTION ENTRANCE/EXIT PRIOR TO THE PLACEMENT OF ROCK.
6. UNLESS OTHERWISE SPECIFIED BY JEFFERSON COUNTY, ROCK SHALL CONSIST OF DOT SECT #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.

STABILIZED CONSTRUCTION ENTRANCE/EXIT MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. ROCK SHALL BE REAPPLIED DR REGRADED AS NECESSARY TO THE STABILIZED ENTRANCE/EXIT TO MAINTAIN A CONSISTENT DEPTH.
5. SEDIMENT TRACKED ONTO PAVED ROADS IS TO BE REMOVED THROUGHOUT THE DAY AND AT THE END OF THE DAY BY SHOVELING OR SWEEPING. SEDIMENT MAY NOT BE WASHED DOWN STORM SEWER DRAINS

SSA



SSA–1. STABILIZED STAGING AREA

STABILIZED STAGING AREA INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   - LOCATION OF STAGING AREA(S).
   - CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM JEFFERSON COUNTY.
2. STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.
3. STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.
4. THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL UNLESS OTHERWISE SPECIFIED BY JEFFERSON COUNTY.
5. ROCK SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL or DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.
6. ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT FENCE AND CONSTRUCTION FENCING.

STABILIZED STAGING AREA MAINTENANCE NOTES

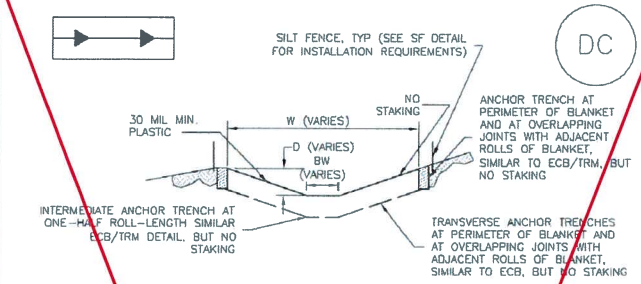
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. ROCK SHALL BE REAPPLIED OR REGRADED IF NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.
5. STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.
6. THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY JEFFERSON COUNTY, USED ON SITE, AND THE AREA COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.

STABILIZED STAGING AREA

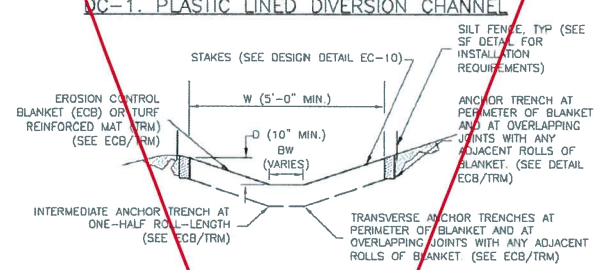
SSA

Detail 19

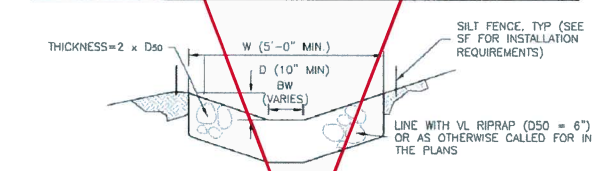
Revisions:	Designed By:		Scale: (As Shown)	JEFFERSON COUNTY DIVISION OF PLANNING & ZONING 100 JEFFERSON COUNTY PARKWAY, SUITE 3550 GOLDEN, COLORADO 80419 (303) 271–8700	G.E.S.C STANDARD NOTES AND DETAILS
	Drawn By:		Date Created: 8/15/2011		
	Checked By: Staff		Plot Date: 7/26/2012 F.I.R. Date:		Project No.: / Sheet 7 / Of 9
	File: GESC_Details_Sht7.dwg		F.O.R. Date: For Const. Date:		
	File Location: G:\PROJECTS_CAD\Standards\PnZ Ersion Control Details				



DC–1. PLASTIC LINED DIVERSION CHANNEL



DC–2. GEOTEXTILE OR MAT LINED DIVERSION CHANNEL



DC–3. RIPRAP LINED DIVERSION CHANNEL

DIVERSION CHANNEL INSTALLATION NOTES

1 SEE PLAN VIEW FOR
- LOCATION OF DIVERSION CHANNEL
- TYPE OF CHANNEL (UNLINED, GEOTEXTILE OR MAT LINED, PLASTIC LINED, OR RIPRAP LINED)
- LENGTH OF EACH TYPE OF CHANNEL
- DEPTH (D), WIDTH (W), AND BOTTOM WIDTH (BW)
- FOR RIPRAP LINED CHANNEL, SIZE OF RIPRAP, D50 SHALL BE SHOWN ON PLANS

2. SEE DRAINAGE PLANS FOR DETAILS OF PERMANENT CONVEYANCE STRUCTURES.
3. DIVERSION CHANNELS INDICATED ON THE SWMP SHALL BE INSTALLED PRIOR TO WORK IN DOWNGRADIENT AREAS OR NATURAL CHANNELS.
4. FOR E GEOTEXTILE OR MAT LINED CHANNELS INSTALLATION OF GEOTEXTILE OR MAT SHALL CONFORM TO THE REQUIREMENTS OF DETAIL ECB. FOR PLASTIC LINED CHANNELS, INSTALLATION OF ANCHOR TRENCHES SHALL CONFORM TO THE REQUIREMENTS OF DETAIL ECB.
5. WHERE CONSTRUCTION TRAFFIC MUST CROSS A DIVERSION CHANNEL, THE PERMITTEE SHALL INSTALL A TEMPORARY STREAM CROSSING CONFORMING TO THE REQUIREMENTS OF DETAIL TSC.

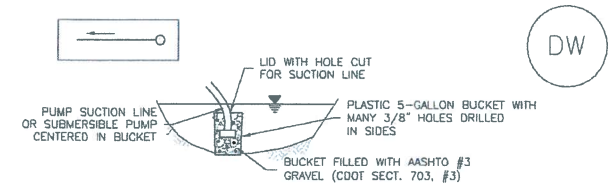
DIVERSION CHANNEL MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. ROCK DIVERSION CHANNELS ARE TO REMAIN IN PLACE UNTIL WORK IN THE DOWNGRADIENT AREA OR NATURAL CHANNEL IS NO LONGER REQUIRED. IF APPROVED BY JEFFERSON COUNTY, DIVERSION CHANNEL MAY BE LEFT IN PLACE.
5. IF DIVERSION CHANNELS ARE REMOVED, THE DISTURBED AREA SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.

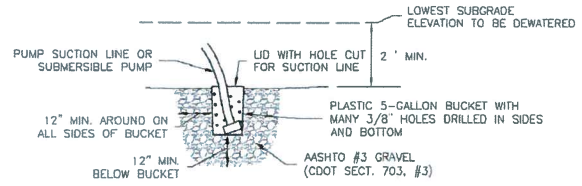
TEMPORARY
DIVERSION CHANNEL

TDC

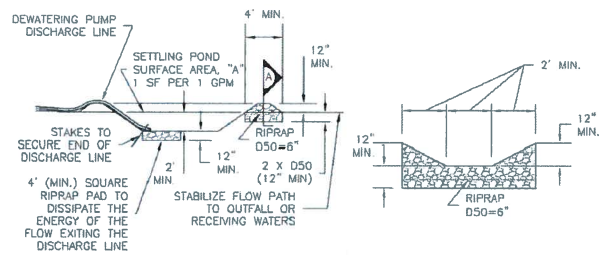
Detail 20



DW–1. DEWATERING POND ALREADY FILLED WITH WATER



DW–2. DEWATERING SUMP FOR SUBMERSED PUMP



DW–3. SUMP DISCHARGE SETTLING BASIN

SETTLING BASIN SECTION A

DEWATERING INSTALLATION NOTES

1 SEE PLAN VIEW FOR
- LOCATION OF DEWATERING EQUIPMENT
- TYPE OF DEWATERING OPERATION (DW-1 TO DW-4)

2. THE OWNER OR CONTRACTOR SHALL OBTAIN A CONSTRUCTION DISCHARGE (DEWATERING) PERMIT FROM THE STATE PRIOR TO ANY DEWATERING OPERATIONS DISCHARGING FROM THE SITE. ALL DEWATERING SHALL BE INA ACCORDANCE WITH THE REQUIREMENTS OF THIS PERMIT.
3. THE OWNER OR OPERATOR SHALL PROVIDE, OPERATE, AND MAINTAIN DEWATERING SYSTEMS OF SUFFICIENT SIZE AND CAPACITY TO PERMIT EXCAVATION AND SUBSEQUENT CONSTRUCTION IN DRY CONDITIONS AND TO LOWER AND MAINTAIN THE GROUNDWATER LEVEL A MINIMUM OF 2-FEET BELOW THE LOWEST POINT OF EXCAVATION AND CONTINUOUSLY MAINTAIN EXCAVATIONS FREE OF WATER UNTIL BACK FILLED TO FINAL GRADE.
4. DEWATERING OPERATIONS SHALL USE ON OR MORE OF THE DEWATERING SUMPS SHOWN ABOVE. WELL POINTS OR OTHER MEANS APPROVED BY JEFFERSON COUNTY TO REDUCE THE PUMPING OF SEDIMENT TO ALLOWABLE LEVELS PRIOR TO RELEASE OFF SITE OR TO A RECEIVING WATER. A SEDIMENT BASIN MAY BE USED IN LIEU OF SUMP DISCHARGE SETTLING BASIN SHOWN ABOVE IF A 4-SQUARE FOOT RIPRAP PAD IS PLACED AT THE DISCHARGE POINT AND THE DISCHARGE END OF THE LINE IS STAKED IN PLACE TO PREVENT MOVEMENT OF THE LINE.

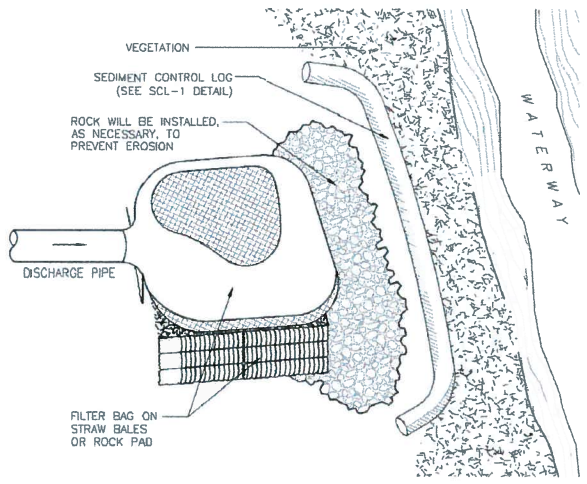
DEWATERING MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. DEWATERING BMPs ARE REQUIRED IN ADDITION TO ALL OTHER PERMIT REQUIREMENTS.
5. TEMPORARY SETTLING BASINS SHALL BE REMOVED WHEN NO LONGER NEEDED FOR DEWATERING OPERATIONS. ANY DISTURBED AREA SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.

DEWATERING
OPERATIONS

DW

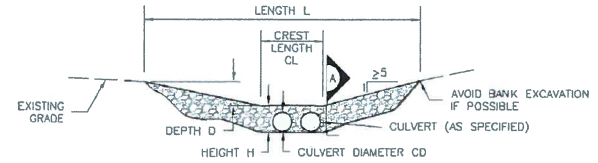
Detail 21



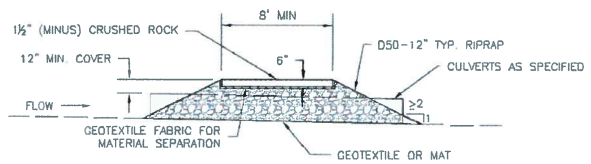
DW–4. DEWATERING FILTER BAG

Revisions:	Designed By:		Scale: (As Shown)	JEFFERSON COUNTY DIVISION OF PLANNING & ZONING 100 JEFFERSON COUNTY PARKWAY, SUITE 3550 GOLDEN, COLORADO 80419 (303) 271-8700	G.E.S.C. STANDARD PLANS AND DETAILS
	Drawn By:		Date Created: 8/15/2011		
	Checked By: Staff		Plot Date: 7/26/2012 F.I.R. Date:		
	File: GESC_Details_Sht8.dwg		F.O.R. Date: For Const. Date:		Project No.: Sheet 8 Of 9
	File Location: G:\PROJECTS_CAD\Standards\PnZ Ersion Control Details				

TSC



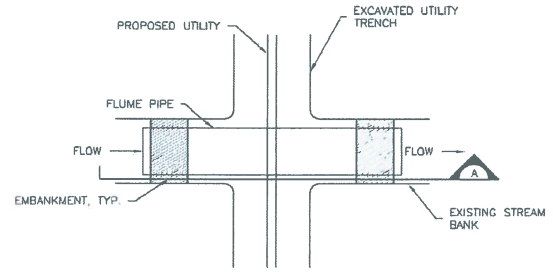
CULVERT CROSSING SECTION



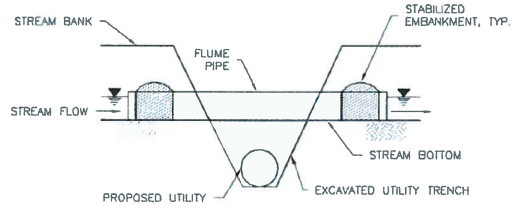
SECTION A

TSC–1. CULVERT CROSSING

TSC

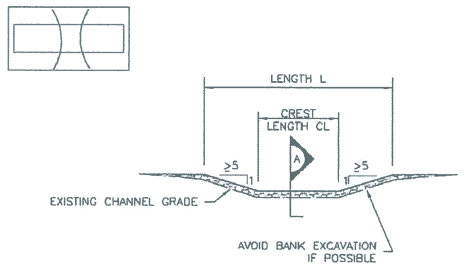


FLUME CROSSING PLAN

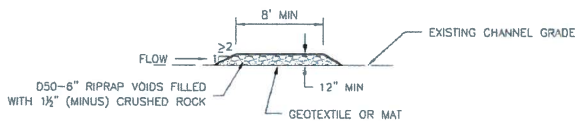


SECTION A

TSC–3. FLUME CROSSING



FORD CROSSING SECTION



SECTION A

TSC–2. FORD CROSSING

TEMPORARY STREAM CROSSING INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   - LOCATION OF TEMPORARY STREAM CROSSINGS.
   - STREAM CROSSING TYPE (FORD, CULVERT, OR FLUME)
   - FOR FORD CROSSING: LENGTH (L), CREST LENGTH (CL) AND DEPTH (D)
   - FOR CULVERT CROSSING: LENGTH (L), CREST LENGTH (CL) AND CROSSING HEIGHT (H), DEPTH (D), CULVERT DIAMETER (CD), AND NUMBER, TYPE, AND CLASS OR GAUGE OF CULVERTS.
2. TEMPORARY STREAM CROSSING DIMENSIONS, D50, AND NUMBER OF CULVERTS INDICATED (FOR CULVERT CROSSINGS) SHALL BE CONSIDERED MINIMUM DIMENSIONS. THE ENGINEER MAY ELECT TO INSTALL LARGER FACILITIES. ANY DAMAGE TO STREAM CROSSING OR EXISTING STREAM CHANNEL DURING BASEFLOW OR FLOOD EVENT SHALL BE IMMEDIATELY REPAIRED.
3. SEE MAJOR DRAINAGE CHAPTER IN UDFCD VOLUME III FOR RIPRAP GRADATIONS.
4. WHERE FAILURE OF A STREAM CROSSING CAN RESULT IN SIGNIFICANT DAMAGE OR HARM, IT MUST BE DESIGNED BY A STRUCTURAL ENGINEER.

TEMPORARY STREAM CROSSING MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. REMOVE SEDIMENT ACCUMULATED UPSTREAM OF CROSSING AS NEEDED TO MAINTAIN THE FUNCTIONALITY OF THE CROSSING.
5. STREAM CROSSINGS ARE TO REMAIN IN PLACE UNTIL NO LONGER NEEDED AND SHALL BE REMOVED PRIOR TO THE END OF CONSTRUCTION.
6. WHEN STREAM CROSSINGS ARE REMOVED, THE DISTURBED AREA SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED AND COVERED WITH GEOTEXTILE OR OTHERWISE STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.

TEMPORARY STREAM CROSSING

TSC

Detail 21

Revisions:	Designed By:		Scale: (As Shown)	JEFFERSON COUNTY DIVISION OF PLANNING & ZONING 100 JEFFERSON COUNTY PARKWAY, SUITE 3550 GOLDEN, COLORADO 80419 (303) 271–8700	G.E.S.C. STANDARD PLANS AND DETAILS
	Drawn By:		Date Created: 8/15/2011		
	Checked By: Staff		Plot Date: 7/26/2012 F.I.R. Date:		Project No.: Sheet 9 Of 9
	File: GESC_Details_Sht9.dwg		F.O.R. Date: For Const. Date:		
	File Location: G:\PROJECTS_CAD\Standards\PnZ Ersion Control Details				

PROP SOUTHERN WRP CONCRETE LINED DITCH SEE SHEETS 26-27 FOR DITCH PLAN & PROFILE

PROP 20-FOOT WIDE 24" GROUTED ROCK RIP-RAP

PROP SOUTHERN WASTE ROCK PILE GRADING CONTOURS

TO MINE

ACCESS ROAD

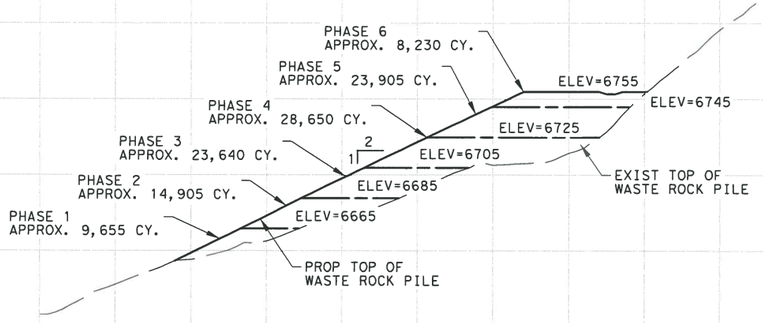
RALSTON CREEK

NOTE:

1. TOTAL FILL VOLUME FOR SOUTHERN WASTE ROCK PILE IS 108,985 CY.

2.24.17

COLORADO LICENSED
DAN S. LEYENDECKER
42090
PROFESSIONAL ENGINEER



CROSS-SECTION C-C

6900 6850 6800 6750 6700 6650

PROP ℄ EXIST ℄

0 100 200 300 400 500

LNV
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8918 TESORO DRIVE
SAN ANTONIO, TEXAS 78217

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

SOUTHERN WASTE ROCK PILE

HORIZ. SCALE: 1"=100'	VERT. SCALE: 1"=100'
0 50 100 SCALE IN FEET	0 50 100 SCALE IN FEET

	PROJECT NO.: 130565.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 22

2/23/2017
S:\Projects\Cotter\160236 Schwartzwalder Mine Cut\Fill-SW3P\000\Drawings\Plans\Civil\COTTER_MINE_WRP02.dgn

PI STATION = 1+30.95
DELTA = 48° 56' 49.88" (RT)
DEGREE OF CURVE = 95° 29' 34.68"
TANGENT = 27.31
LENGTH = 51.26
RADIUS = 60.00
PC STATION = 1+03.64
PT STATION = 1+54.89

PI STATION = 2+39.11
DELTA = 19° 56' 08.33" (RT)
DEGREE OF CURVE = 28° 38' 52.40"
TANGENT = 35.15
LENGTH = 69.59
RADIUS = 200.00
PC STATION = 2+03.96
PT STATION = 2+73.55

PROP TOE-DOWN
PROP DITCH ℄
PROP TOP OF SLOPE
PT 1+54.89
PC 2+03.96
12'
6'
6'
3:1
3:1
60.62'
S 35°48'50" E
PROP TOP OF SLOPE
PROP TOE-DOWN
STA 0+80.00
END TRANSITION
N 68° 27' 21.63" E
STA 0+30.00
BEGIN TRANSITION
BEGIN CONCRETE
LINED DITCH
MATCH LINE STA 2+50.00
PROP NORTHERN WASTE ROCK PILE GRADING CONTOURS

NOTES:

1. USE DITCH LOCATION AS TEMPORARY ACCESS ROAD AND CONSTRUCT CONCRETE LINED DITCH AFTER COMPLETION OF THE WASTE ROCK PILE ENGINEERED CAPS.
2. SEE SHEET 28 FOR NORTHERN WRP DITCH TYPICAL SECTION.

2-24-17
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DAN S. LEYENDECKER
42090
PROFESSIONAL ENGINEER

6700
6690
6680
6670
6660
6650

EXIST GROUND PROFILE @ DITCH ℄
PROP GROUND PROFILE @ DITCH ℄
STA 0+30.00
BEGIN CONCRETE
LINED DITCH
6,638.23
(+)1.6826 %
STA = 0+70.00
EL = 6,638.90'
(+)20.0000 %
STA = 2+45.72
EL = 6,674.05'

PROP ℄	6,635.00		6,638.57		6,644.90		6,654.90		6,664.90		6,674.71	PROP ℄
EXIST ℄		6,640.89		6,647.40		6,657.56		6,667.17		EXIST ℄

0+00 1+00 2+00

LNV
TBPE FIRM NO. F-366
8918 TESORO DRIVE
SAN ANTONIO, TEXAS 78217

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

NORTHERN WRP CONCRETE LINED DITCH PLAN AND PROFILE SHEET 1 OF 3

HORIZ. SCALE: 1"=20'
0 10 20
SCALE IN FEET

VERT. SCALE: 1"=20'
0 10 20
SCALE IN FEET

	PROJECT NO.: 130565.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 23

2/23/2017
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NOTES:

1. USE DITCH LOCATION AS TEMPORARY ACCESS ROAD AND CONSTRUCT CONCRETE LINED DITCH AFTER COMPLETION OF THE WASTE ROCK PILE ENGINEERED CAPS.
2. SEE SHEET 28 FOR NORTHERN WRP DITCH TYPICAL SECTION.

PISTATION - 2+39.11
DELTA - 19° 56' 08.33" (RT)
DEGREE OF CURVE - 28° 38' 52.40"
TANGENT - 35.15
LENGTH - 69.59
RADIUS - 200.00
PC STATION - 2+03.96
PT STATION - 2+73.55

PISTATION - 4+92.03
DELTA - 95° 01' 39.93" (LT)
DEGREE OF CURVE - 95° 29' 34.68"
TANGENT - 65.51
LENGTH - 99.51
RADIUS - 60.00
PC STATION - 4+26.52
PT STATION - 5+26.04

MATCH LINE STA 2+50.00

MATCH LINE STA 5+00.00

PT 2+73.55

PROP TOP OF SLOPE

PROP TOE-DOWN

PROP DITCH ℄

PC 4+26.52

4.5'

9'

4.5'

3:1

3:1

12'

6'

6'

S 42° 39' 40.17" E

STA 3+50.00
BEGIN TRANSITION

PROP TOP OF SLOPE

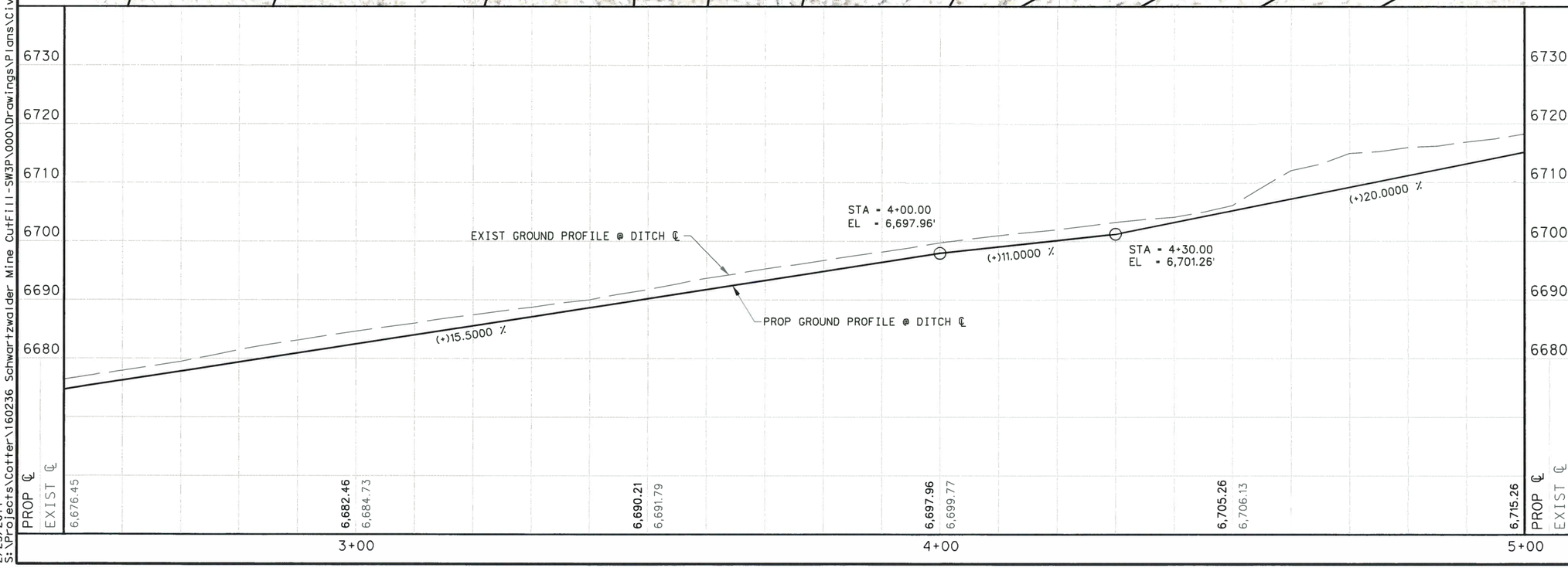
PROP TOE-DOWN

STA 4+00.00
END TRANSITION

PROP NORTHERN WASTE ROCK PILE GRADING CONTOURS

2/24/17

COLORADO LICENSED
DAN S. LEYENDECKER
42090
PROFESSIONAL ENGINEER



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SAN ANTONIO, TEXAS 78217

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

NORTHERN WRP CONCRETE LINED DITCH PLAN AND PROFILE SHEET 2 OF 3

HORIZ. SCALE: 1"=20'	VERT. SCALE: 1"=20'
0 10 20 SCALE IN FEET	0 10 20 SCALE IN FEET

	PROJECT NO.: 130565.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 24

2/23/2017
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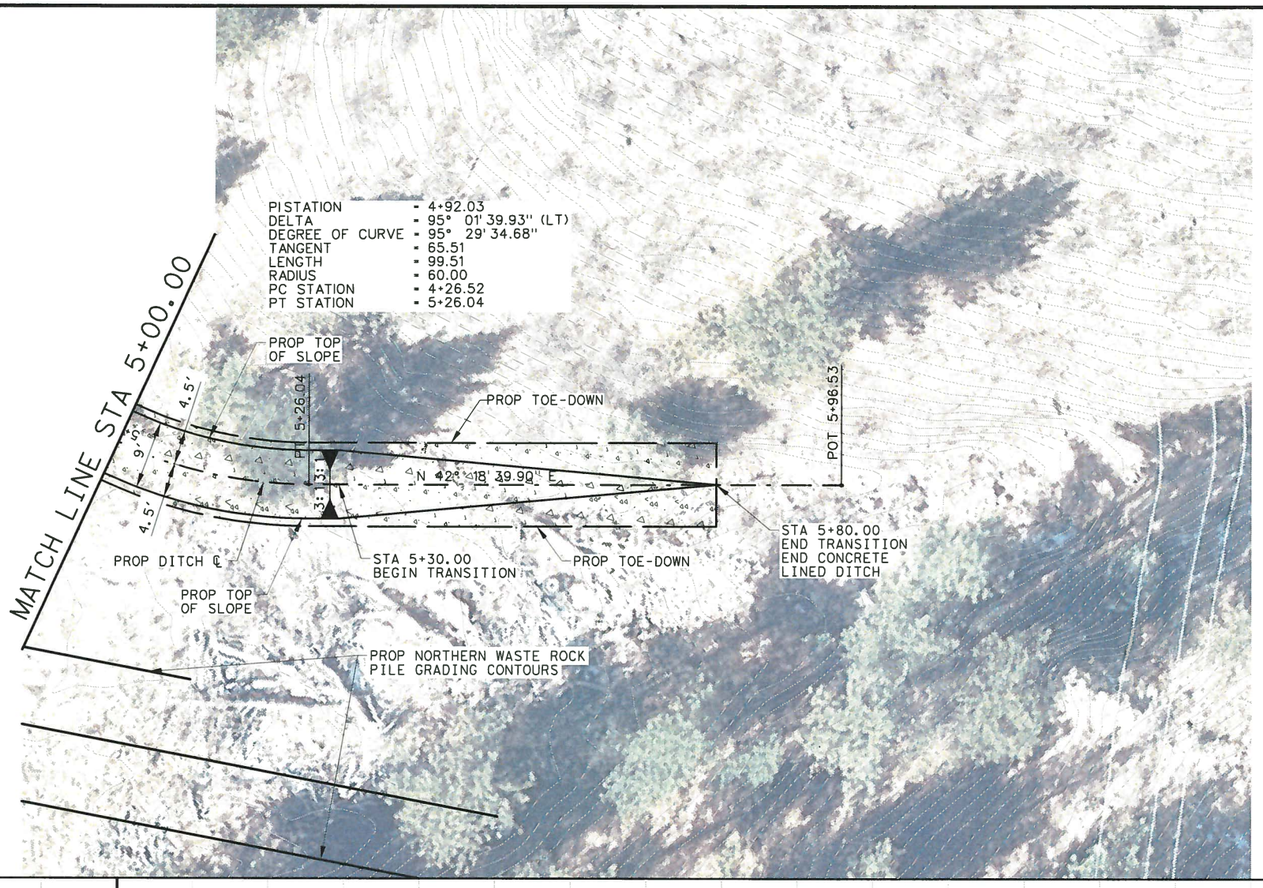
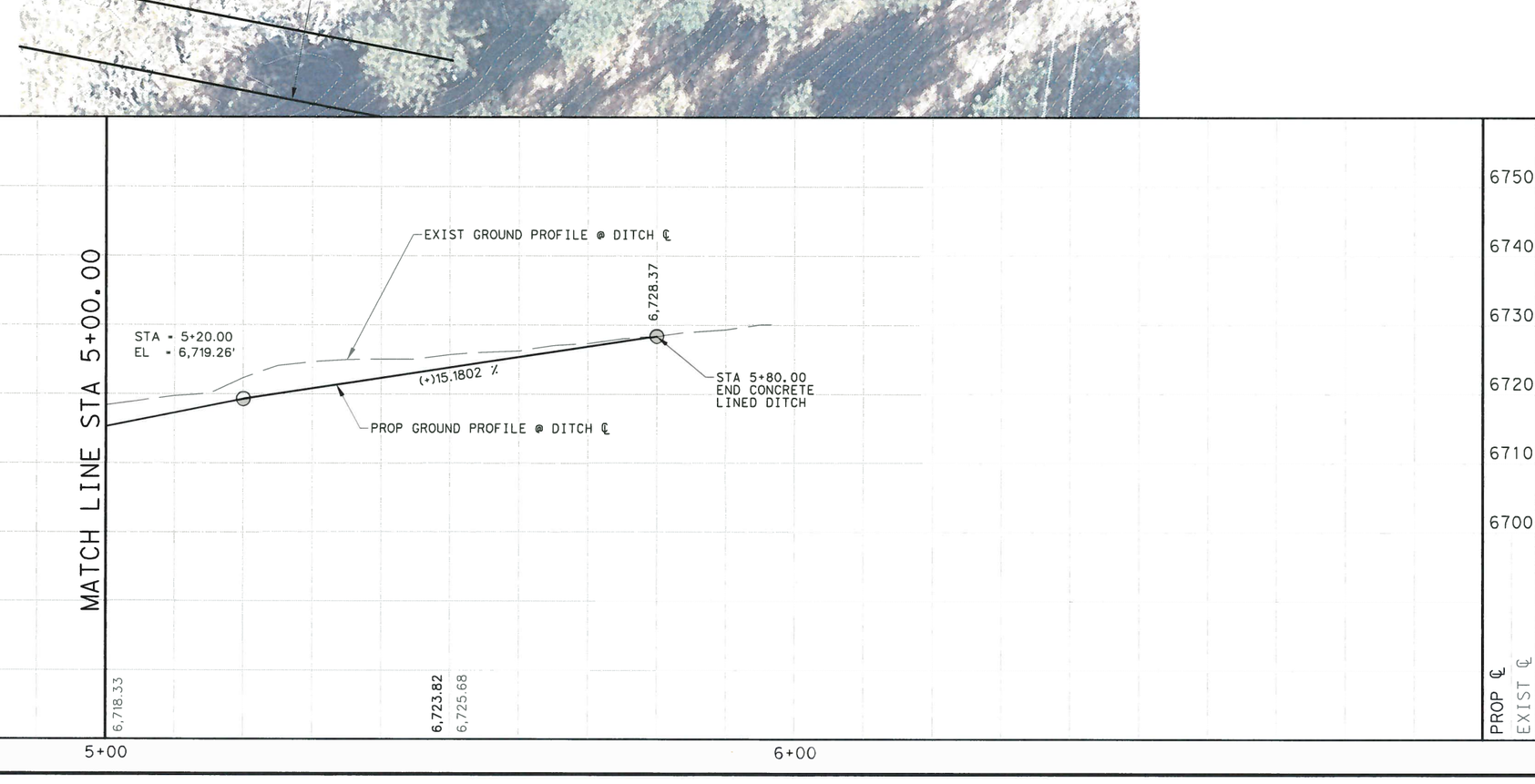


NOTES:

1. USE DITCH LOCATION AS TEMPORARY ACCESS ROAD AND CONSTRUCT CONCRETE LINED DITCH AFTER COMPLETION OF THE WASTE ROCK PILE ENGINEERED CAPS.
2. SEE SHEET 28 FOR NORTHERN WRP DITCH TYPICAL SECTION.

2-24-17

COLORADO LICENSED
DAN S. LEYENDECKER
42090
PROFESSIONAL ENGINEER



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TBPE FIRM NO. F-366
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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

NORTHERN WRP CONCRETE LINED DITCH PLAN AND PROFILE SHEET 3 OF 3

HORIZ. SCALE: 1"=20'
0 10 20
SCALE IN FEET

VERT. SCALE: 1"=20'
0 10 20
SCALE IN FEET

PROJECT NO.: 130565.000.2 | DATE: 2/23/2017

DRAWN BY: | DSGN BY: | CHKD BY: | SHT NO.: 25

2/23/2017
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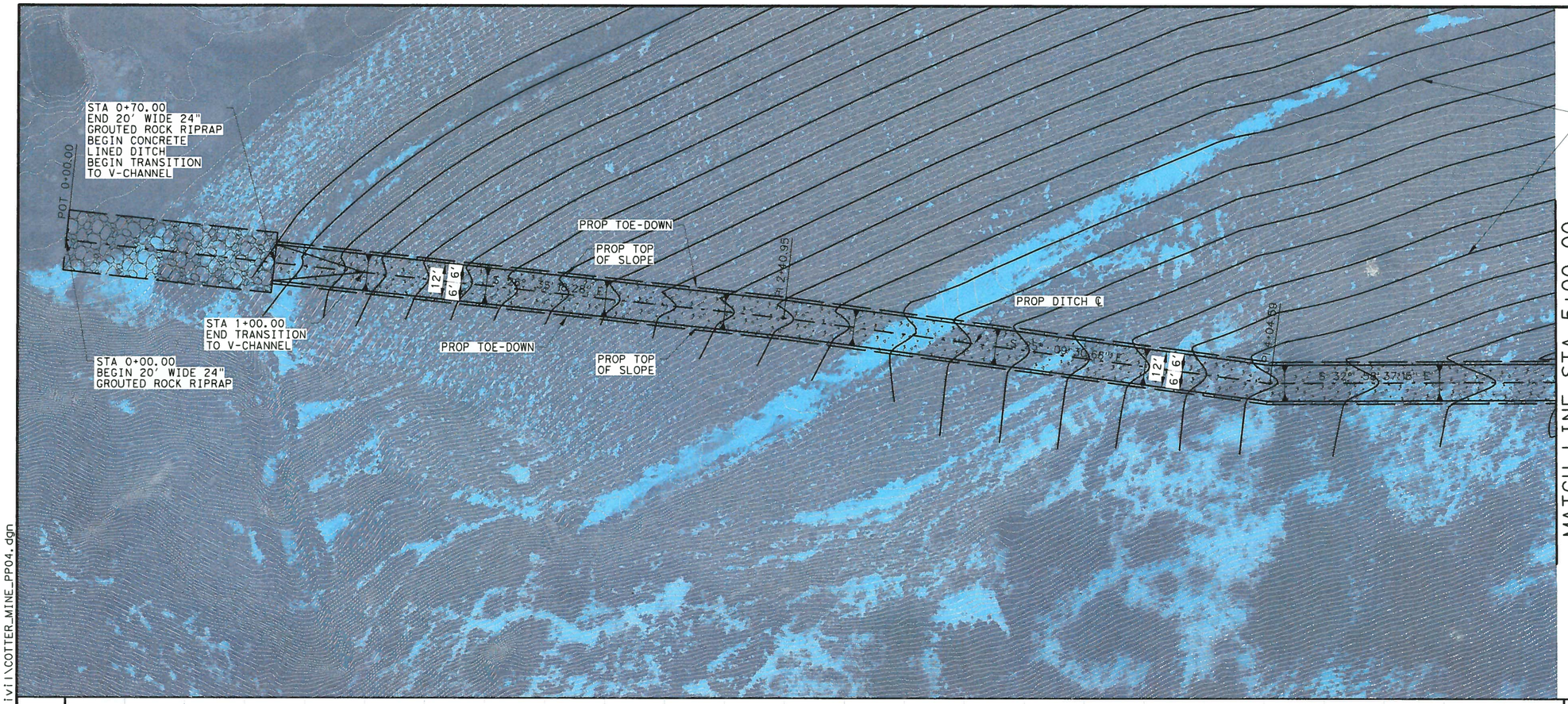

NOTES:

1. USE DITCH LOCATION AS TEMPORARY ACCESS ROAD AND CONSTRUCT CONCRETE LINED DITCH AFTER COMPLETION OF THE WASTE ROCK PILE ENGINEERED CAPS.
2. SEE SHEET 28 FOR SOUTHERN WRP DITCH TYPICAL SECTION.

2/24/17

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DAN S. LEYENDECKER
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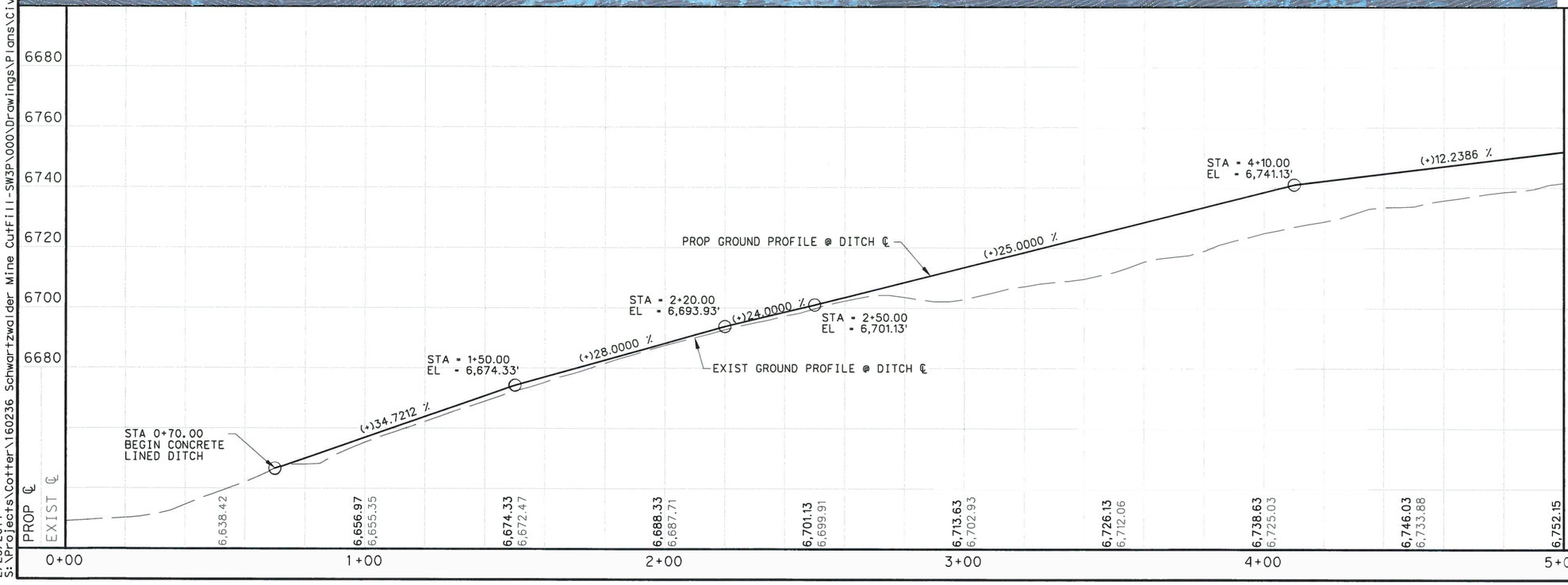

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

SOUTHERN WRP CONCRETE LINED DITCH PLAN AND PROFILE SHEET 1 OF 2

HORIZ. SCALE: 1"=40'	VERT. SCALE: 1"=40'
0 20 40 SCALE IN FEET	0 20 40 SCALE IN FEET

	PROJECT NO.: 130565.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 26

2/23/2017
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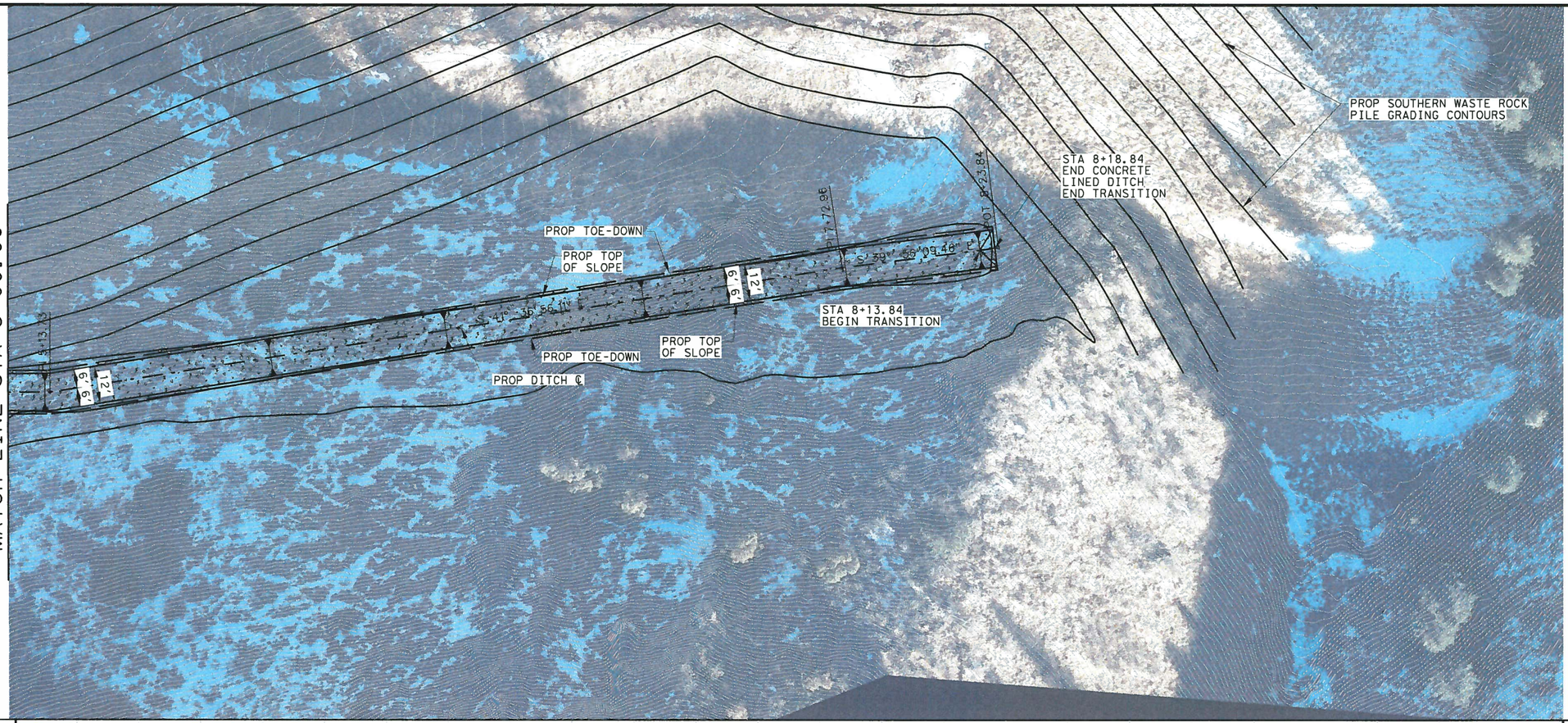

NOTES:

1. USE DITCH LOCATION AS TEMPORARY ACCESS ROAD AND CONSTRUCT CONCRETE LINED DITCH AFTER COMPLETION OF THE WASTE ROCK PILE ENGINEERED CAPS.
2. SEE SHEET 28 FOR SOUTHERN WRP DITCH TYPICAL SECTION.

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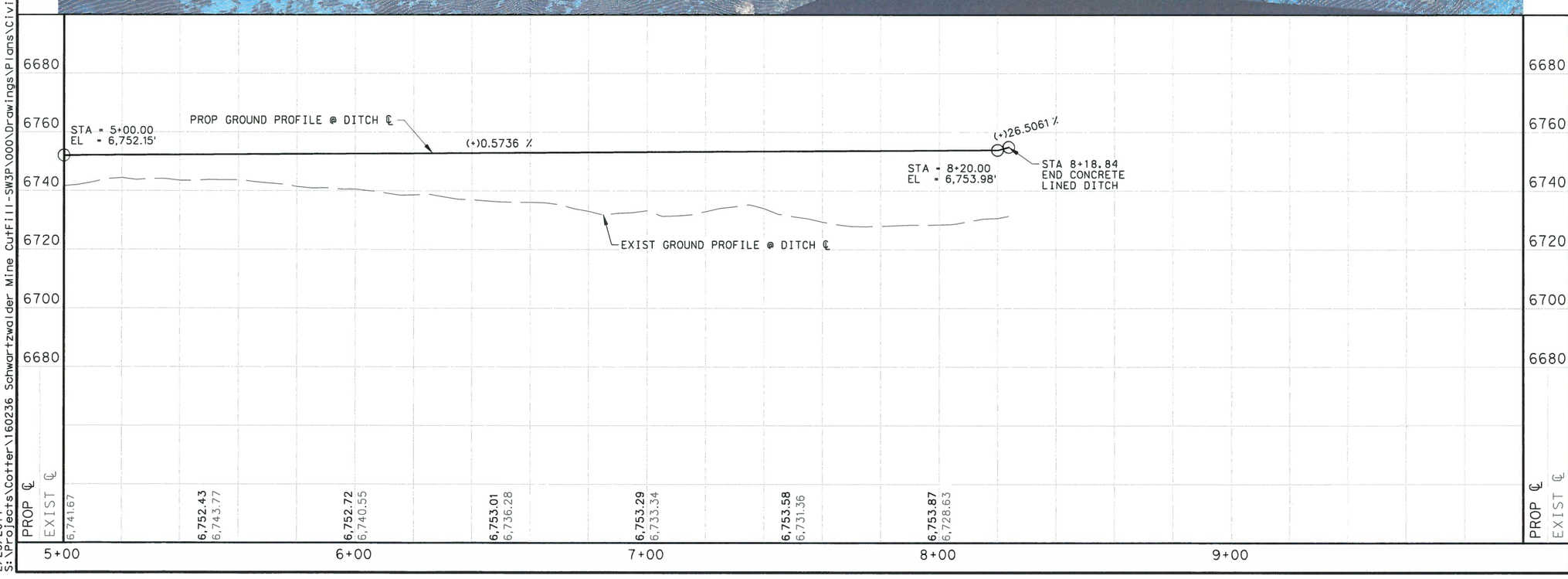

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

SOUTHERN WRP CONCRETE LINED DITCH PLAN AND PROFILE SHEET 2 OF 2

HORIZ. SCALE: 1"=40'	VERT. SCALE: 1"=40'
0 20 40 SCALE IN FEET	0 20 40 SCALE IN FEET

	PROJECT NO.: 130565.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 27

2/23/2017
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NORTHERN WRP DITCH HORIZONTAL ALIGNMENT DATA

Chain DITCH contains:
1000 CUR 1001 CUR 1002 CUR 1003 1004

Beginning chain DITCH description

Point 1000			N	1,734,786.11	E	3,060,055.99 Sta 0+00.00
Course from 1000 to PC 1001 N 68° 27′ 21.63" E Dist 103.64						
		Curve Data				
Curve 1001						
P.I. Station		1+30.95	N	1,734,834.20	E	3,060,177.79
Delta	=	48° 56′ 49.88" (RT)				
Degree	=	95° 29′ 34.68"				
Tangent	=	27.31				
Length	=	51.26				
Radius	=	60.00				
External	=	5.92				
Long Chord	=	49.71				
Mid. Ord.	=	5.39				
P.C. Station		1+03.64	N	1,734,824.17	E	3,060,152.38
P.T. Station		1+54.89	N	1,734,821.63	E	3,060,202.03
C.C.			N	1,734,768.36	E	3,060,174.42
Back	= N 68° 27′ 21.63" E					
Ahead	= S 62° 35′ 48.50" E					
Chord Bear	= S 87° 04′ 13.44" E					
Course from PT 1001 to PC 1002 S 62° 35′ 48.50" E Dist 49.07						
		Curve Data				
Curve 1002						
P.I. Station		2+39.11	N	1,734,782.87	E	3,060,276.80
Delta	=	19° 56′ 08.33" (RT)				
Degree	=	28° 38′ 52.40"				
Tangent	=	35.15				
Length	=	69.59				
Radius	=	200.00				
External	=	3.07				
Long Chord	=	69.24				
Mid. Ord.	=	3.02				
P.C. Station		2+03.96	N	1,734,799.04	E	3,060,245.59
P.T. Station		2+73.55	N	1,734,757.02	E	3,060,300.62
C.C.			N	1,734,621.49	E	3,060,153.54
Back	= S 62° 35′ 48.50" E					
Ahead	= S 42° 39′ 40.17" E					
Chord Bear	= S 52° 37′ 44.34" E					
Course from PT 1002 to PC 1003 S 42° 39′ 40.17" E Dist 152.97						
		Curve Data				
Curve 1003						
P.I. Station		4+92.03	N	1,734,596.35	E	3,060,448.68
Delta	=	95° 01′ 39.93" (LT)				
Degree	=	95° 29′ 34.68"				
Tangent	=	65.51				
Length	=	99.51				
Radius	=	60.00				
External	=	28.83				
Long Chord	=	88.49				
Mid. Ord.	=	19.48				
P.C. Station		4+26.52	N	1,734,644.53	E	3,060,404.28
P.T. Station		5+26.04	N	1,734,644.80	E	3,060,492.78
C.C.			N	1,734,685.19	E	3,060,448.41
Back	= S 42° 39′ 40.17" E					
Ahead	= N 42° 18′ 39.90" E					
Chord Bear	= N 89° 49′ 29.86" E					
Course from PT 1003 to 1004 N 42° 18′ 39.90" E Dist 70.49						
Point 1004			N	1,734,696.93	E	3,060,540.23 Sta 5+96.53

Ending chain DITCH description

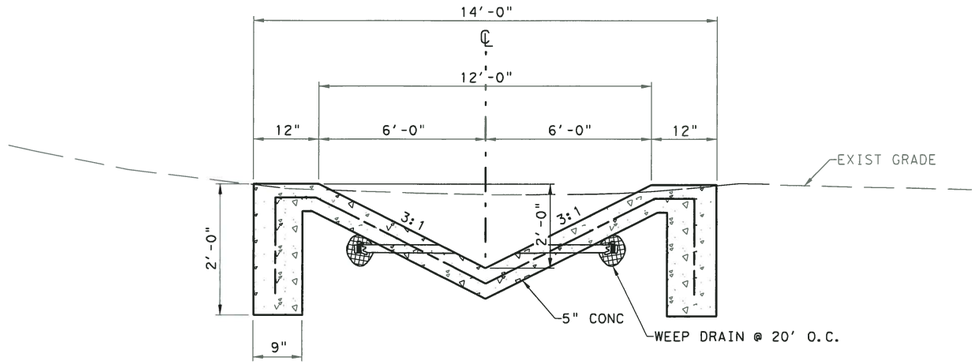
SOUTHERN WRP DITCH HORIZONTAL ALIGNMENT DATA

Chain DITCH_SOUTH contains:
850 851 852 853 854 855

Beginning chain DITCH_SOUTH description

Point 850	N	1,734,277.94	E	3,060,132.46	Sta 0+00.00
Course from 850 to 851 S 26° 35′ 18.28" E Dist 240.95					
Point 851	N	1,734,062.47	E	3,060,240.31	Sta 2+40.95
Course from 851 to 852 S 25° 09′ 30.66" E Dist 163.64					
Point 852	N	1,733,914.36	E	3,060,309.87	Sta 4+04.59
Course from 852 to 853 S 32° 58′ 37.15" E Dist 109.14					
Point 853	N	1,733,822.80	E	3,060,369.28	Sta 5+13.73
Course from 853 to 854 S 41° 36′ 56.11" E Dist 259.23					
Point 854	N	1,733,629.00	E	3,060,541.44	Sta 7+72.96
Course from 854 to 855 S 39° 56′ 09.46" E Dist 50.89					
Point 855	N	1,733,589.98	E	3,060,574.11	Sta 8+23.84

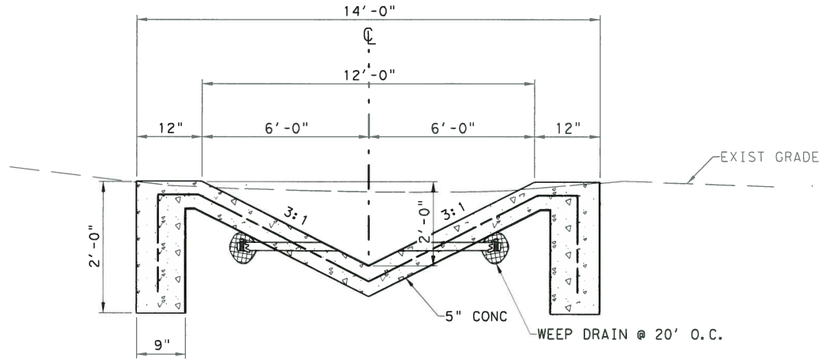
Ending chain DITCH_SOUTH description



NOTE:
SEE SHEET 31 FOR CONCRETE AND REINFORCING REQUIREMENTS OR FOR ALTERNATIVE SUBSTRATES.

NORTHERN WRP DITCH TYPICAL SECTION

NTS



NOTE:
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SOUTHERN WRP DITCH TYPICAL SECTION

NTS

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

CONCRETE LINED DITCH MISCELLANEOUS DETAILS SHEET 1 OF 2

N.T.S.

	PROJECT NO.: 160236.000.2		DATE: 2/24/2017
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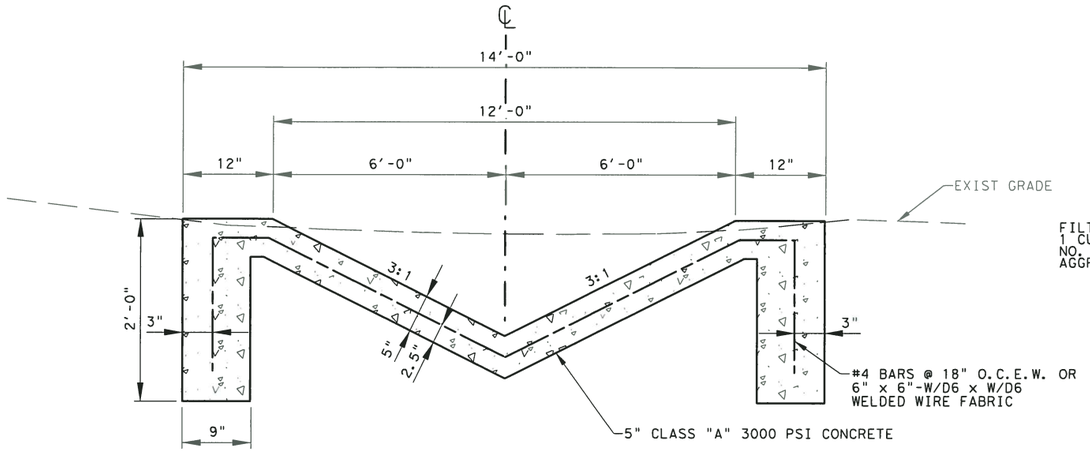
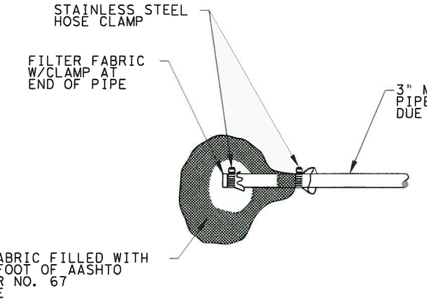


5" CONC RIP-RAP

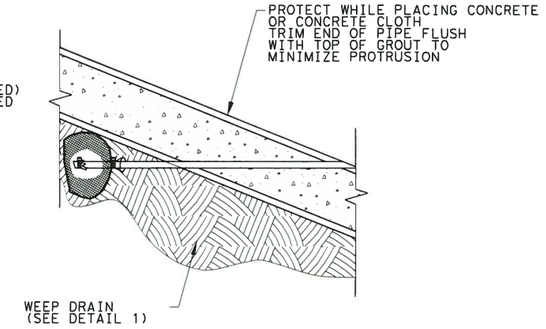
NTS



WEEP DRAIN

NTS

NOTE: INSTALL WEEP DRAINS AT 20' O.C. AT THE CENTER OF THE CHANNEL BOTTOM AND SIDE SLOPES.



CONCRETE LINING

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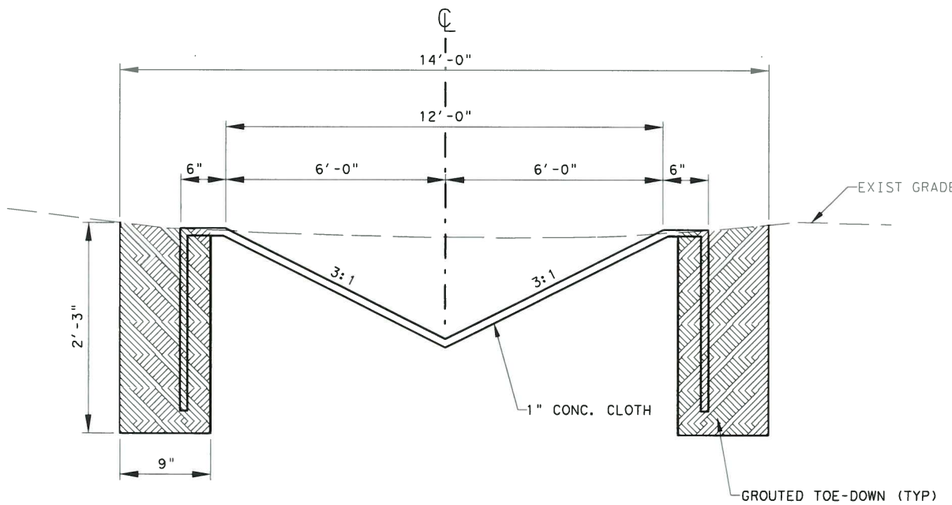
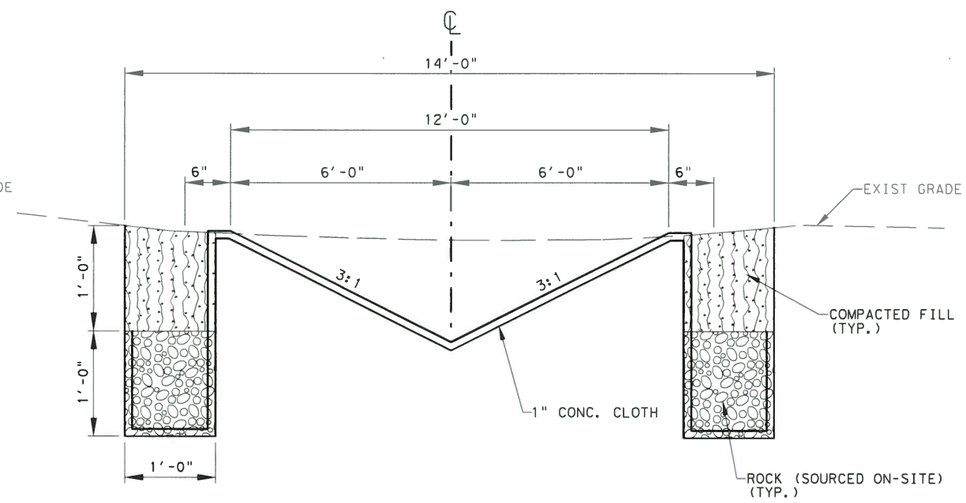


CONC. CLOTH W/ GROUTED TOE-DOWN

NTS



CONC. CLOTH W/ COMPACTED FILL TOE-DOWN

NTS

WRP V-CHANNEL CAPACITY CALCULATIONS

Area #	Depth, D (ft)	Side Slope, SS (X:1)	Slope, S (ft/ft)	Manning's Coefficien	Area, A (sq. ft)	Wetted Perimeter,	Hydraulic Radius, R	Flow, CFS	Freeboard Provided
North WRP	1.00	3.00	0.14	0.013	3.00	6.32	0.47	78.25	1.00
South WRP	1.00	3.00	0.11	0.013	3.00	6.32	0.47	69.36	1.00
$Q = (1.49/n)AR^{(2/3)}S^{(1/2)}$									

CONCRETE LINED DITCH HYDRAULIC CALCULATIONS

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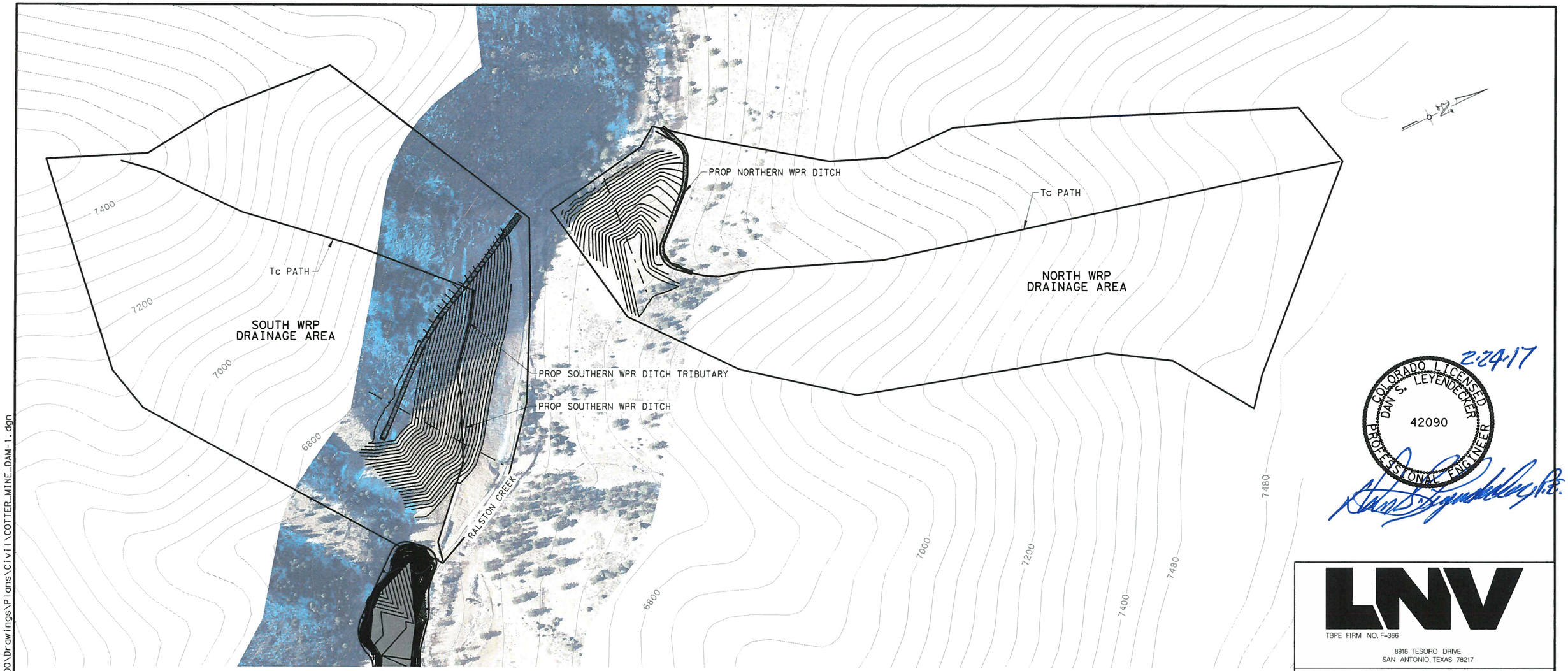
SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

CONCRETE LINED DITCH MISCELLANEOUS DETAILS SHEET 2 OF 2

N.T.S.

	PROJECT NO.: 160236.000.2		DATE: 2/24/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 29



WRP V-Channel Capacity Calculations

Area #	Depth, D (ft)	Side Slope, SS (X:1)	Slope, S (ft/ft)	Manning's Coefficien	Area, A (sq. ft)	Wetted Perimeter,	Hydraulic Radius, R	Flow, CFS	Freeboard Provided
North WRP	1.00	3.00	0.14	0.013	3.00	6.32	0.47	78.25	1.00
South WRP	1.00	3.00	0.11	0.013	3.00	6.32	0.47	69.36	1.00

$Q = (1.49/n)AR^{2/3}S^{1/2}$

WRP SCS Peak Flow Table

DRAINAGE AREA ID	DRAINAGE AREA (SQ	CURVE NUMBER, CN	LAG TIME (HRS)	PEAK FLOW			
				Q_{10} (CFS)	Q_{50} (CFS)	Q_{100} (CFS)	Q_{500} (CFS)
North WRP	0.059	71.00	0.31	21.0	51.7	67.7	112.3
South WRP	0.054	69.00	0.24	20.9	52.0	68.2	113.9

North WRP Curve Number

Hydrologic Soil Type	Percentage of Soil[1]	Curve Number[2]
A	13.3%	32
B	9.3%	58
C	0.0%	72
D	77.4%	79
Weighted Curve Number:		**71**

[1]Data from NRCS Web Soil Survey

[2]Data from NRCS 1986 Runoff Curve Number Table for Good (>70% ground cover)

Note: All three areas have the same approximate soil distribution, land coverage, and land type.

South WRP Curve Number

Hydrologic Soil Type	Percentage of Soil[1]	Curve Number[2]
A	22.2%	32
B	0.0%	58
C	0.0%	72
D	77.8%	79
Weighted Curve Number:		**69**

[1]Data from NRCS Web Soil Survey

[2]Data from NRCS 1986 Runoff Curve Number Table for Good (>70% ground cover)

Note: All three areas have the same approximate soil distribution, land coverage, and land type.

2-24-17

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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

DRAINAGE AREA MAP

HORIZ. SCALE: 1"=300'

0 150 300
SCALE IN FEET

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SWMP TEMPLATE TEXT WITHOUT BMP NARRATIVES FOR PROJECTS WITH 1 ACRE OR MORE OF DISTURBANCE

1. SITE DESCRIPTION

For Information Only to fulfill the CDPS-SCP (Colorado Discharge Permit System - Stormwater Construction Permit) Update to reflect current project site conditions.

A. PROJECT SITE DESCRIPTION: The project site is located the Schwartzwalder Mine at the end of Glencoe Valley Road and along Ralston Creek. The project consists of the removal of the radiologically contaminated alluvial fill soil due to past uranium mining activities at two locations at the mine site and to place the contaminated materials within two engineered waste rock piles on site. The location and approximate depths of contamination have been outlined in a report developed by Cotter Corporation (N.S.L.) titled "Characterization, Remedial Criteria and Disposal Options for Alluvial Fill Source Term Materials at the Schwartzwalder Mine Site."

B. PROPOSED SEQUENCING FOR MAJOR ACTIVITIES: Construction should last approximately six (6) months and will include excavation of contaminated material at two locations at the Schwartzwalder Mine site, placement of the contaminated materials under a engineered waste rock piles at the mine site, construction of a concrete lined ditches to direct water around the northern and southern waste rock piles, and re-establishment of the access road to the mine site after the contaminated soils under the roadway have been removed.

The two contaminated sites will be excavated in phases. The eastern contaminated site, Remediation Site #2, will be excavated first. The excavation will occur in phases, if possible, to provide continual access from Glencoe Valley Road to the mine site. Once the contaminated soil has been removed for each section of Remediation Site #2, the location will be refilled and/or regraded with uncontaminated or new soil to re-establish the access road to the mine site. The western contaminated site, Remediation Site #1, will then be excavated in phases similar to Remediation Site #2.

The engineered waste rock piles will be constructed in phases as shown on the plan sheets. Once all the contaminated soil has been placed and compacted, the engineered rock cap will be placed and then topsoil, seeding and turf reinforcement matting applied to protect against erosion.

C. ACRES OF DISTURBANCE:
1. Total area of construction site: 30 acres
2. Total area of disturbance: 20 acres
3. Acreage of seeding: 4.24 acres

D. EXISTING SOIL DATA: Majority or soil is rock: Argiustolls Rock outcrop, Ratake-Cathedral Rock outcrop, Allens Park variant of Ratake Rock outcrop, Cryofluvents, and Curecanti very stony sandy loam. These soil areas generally consist of 0.5-3.0 feet of gravelly to stony sandy loam over bedrock.

E. EXISTING VEGETATION, INCLUDING PERCENT COVER: General ground cover is Evergreen Trees with small brush understory and areas of grass in between within the overall project area. Percent groundcover is <5% within the areas of disturbance and approximately 15% for the entire construction site

F. POTENTIAL POLLUTANTS SOURCES: See First Construction Activities under Potential Pollutant Sources. The ECS shall prepare a list of all potential pollutants and their locations in accordance with subsection 107.25.

G. RECEIVING WATER:
1. Outfall locations: The entire Schwartzwalder Mine site drains to Ralston Creek. The excavated areas will be directed to sump locations to be pumped to a treatment location before being released into Ralston Creek.
2. Names of receiving water(s) on site and the ultimate receiving water: Ralston Creek and Ralston Reservoir
3. Distance ultimate receiving water is from project: 10,000 feet

H. ALLOWABLE NON-STORMWATER DISCHARGES:
1. Groundwater and stormwater dewatering: Discharges to the ground of water from construction dewatering activities may be authorized provided that:
   a. the source is groundwater and/or groundwater combined with stormwater that does not contain pollutants
   b. the source and BMPs are identified in the SWMP
   c. discharges do not leave the site as surface runoff or to surface waters.

2. If discharges do not meet the above criteria a separate permit from the Department of Health will be required. Contaminated groundwater requiring coverage under a separate permit may include groundwater contaminated with pollutants from a landfill, mining activities, industrial pollutant plumes, underground storage tank, etc.

3. Existing water treatment plant discharge for the water treatment plan on Cotter Corporation's property.

I. ENVIRONMENTAL IMPACTS:
1. Wetland Impacts: YES *NO*
2. Stream Impacts: *YES* NO
3. Threatened and Endangered Species: *N/A*

2. SITE MAP COMPONENTS:

Pre-construction

A. PROJECT CONSTRUCTION POTENTIAL SITE BOUNDARIES Shown on SWMP Site Map

B. ALL AREAS OF GROUND SURFACE DISTURBANCE Shown on SWMP Site Map

C. AREAS OF CUT AND FILL Shown on SWMP Site Map

D. LOCATION OF ALL STRUCTURAL BMPs IDENTIFIED IN THE SWMP Shown on SWMP Site Map

E. LOCATION OF NON-STRUCTURAL BMPs AS APPLICABLE IN THE SWMP Shown on SWMP Site Map

F. SPRINGS, STREAMS, WETLANDS AND OTHER SURFACE WATER Shown on SWMP Site Map

G. PROTECTION OF TREES, SHRUBS, CULTURAL RESOURCES AND MATURE VEGETATION Shown on SWMP Site Map

H. AREAS USED FOR STORING AND STOCKPILING OF MATERIALS, STAGING AREAS (field trailer,fueling,etc) and BATCH PLANTS Shown on SWMP Site Map

3. SWMP ADMINSTRATOR FOR DESIGN: Dan Leyendecker, P.E. – Principal of LNV, Inc.

4. STORMWATER MANAGEMENT CONTROLS FIRST CONSTRUCTION ACTIVITIES

THE CONTRACTOR SHALL PERFORM THE FOLLOWING:

A. DESIGNATE A SWMP ADMINISTRATOR/EROSION CONTROL SUPERVISOR (To be filled out at time of construction; designate the individual(s) responsible for implementing, maintaining and revising SWMP, including the title and contact information. The activities and responsibilities of the administrator shall address all aspects of the projects SWMP.)

Name/Title: Contact information:

B. POTENTIAL POLLUTANT SOURCES
Evaluate, identify and describe all potential sources of pollutants at the site in accordance with subsection 107.25 and place in the SWMP notebook. All BMPs related to potential pollutants shall be shown on the SWMP site map by the contractor's ECS.

C. BEST MANAGEMENT PRACTICES (BMPs) FOR STORMWATER POLLUTION PREVENTION

PHASED BMP IMPLEMENTATION
During Design: "BMP as Designed" boxes are marked when used in the SWMP. During construction: the ECS shall update the "In use on site" boxes to match which BMPs are currently in use on site. Clearly describe the relationship between the phases of construction and the implementation of BMP controls.

STRUCTURAL BMPs that may be potentially used on the project for erosion and sediment control; practices may include, but are not limited to:

BMP	TYPE OF CONTROL	BMP as Designed	In use on site	FIRST CONSTRUCTION ACTIVITIES	DURING CONSTRUCTION	INTERIM/FINAL STABILIZATION
Earth Berm/Diversion	erosion	x		x	x	
*Check Dams	sediment				x	
Erosion Logs	sediment	x		x	x	
Embankment Protector	erosion					
Inlet Protection	erosion					
Outlet Protection	erosion					
Concrete Washouts	construction				x	
Vehicle Tracking Pad	construction			x	x	
Dewatering	sediment	x			x	
Temporary Stream Crossing	erosion					
Clean water diversion					x	
Other						

NON-STRUCTURAL BMPs that may be potentially used on the project for erosion and sediment control; practices may include, but are not limited to:

BMP	TYPE OF CONTROL	BMP as Designed	In use on site	FIRST CONSTRUCTION ACTIVITIES	DURING CONSTRUCTION	INTERIM/FINAL STABILIZATION
Surface Roughening/Grading Techniques	erosion				x	
Soil Binder	erosion				x	
Protection of Trees	erosion			x	x	
Preservation of Mature Vegetation	erosion	x		x	x	x

*Check dams may be rock, erosion logs, silt dike, silt berm, etc. as indicated in the narratives and SWMP site map.

Erosion control devices are used to limit the amount of soil loss on site.
Sediment control devices are designed to capture sediment on the project site.
Construction control are BMPs related to construction access and staging.
BMP locations are indicated on the SWMP site map.

NARRATIVES

EROSION CONTROL LOGS
Place erosion control logs along the top of slopes towards Ralston Creek per the plans or as directed. Maintain and replace the erosion control logs as needed.

EARTH BERM/DIVERSION
During excavation of the contaminated area, divert all runoff within the excavated areas to the closest sump location, so the contaminated runoff will be pumped to the on-site water treatment facility.

DEWATERING
Any dewatering conducted within the areas of excavation shall discharge the water to the on-site water treatment facility.

PRESERVATION OF MATURE VEGETATION
Protect trees and mature vegetation outside the limits of construction.

2.24.17
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SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

STORM WATER MANAGEMENT PLAN NARRATIVE SHEET 1 OF 2

N.T.S.

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 31

2/23/2017
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BMP details and narratives not covered by the SWMP or Standard Plan M-208-1 shall be added to the SWMP notebook by the ECS.

D. OFFSITE DRAINAGE (RUN ON WATER)

1. Describe and record BMPs on the SWMP site map that has been implemented to address off site run-on water in accordance with subsection 208.03.

E. VEHICLE TRACKING PAD/VEHICLE TRACKING CONTROL

1. BMPs shall be implemented in accordance with subsection 208.04.

F. PERIMETER CONTROL

1. Perimeter control shall be established as the first item on the SWMP to prevent the potential for pollutants leaving the construction site boundaries, entering the stormwater drainage system, or discharging to state waters.
2. Perimeter control may consist of vegetation buffers, berms, silt fence, erosion logs, existing landforms, or other BMPs as approved.
3. Perimeter control shall be in accordance with subsection 208.04.

5. DURING CONSTRUCTION

RESPONSIBILITIES OF THE SWMP ADMINISTRATOR/EROSION CONTROL SUPERVISOR DURING CONSTRUCTION
The SWMP should be considered a "living document" that is continuously reviewed and modified. During construction, the following items shall be added, updated, or amended as needed by the SWMP Administrator/Erosion Control Supervisor (ECS) in accordance with Section 208.

During construction, indicate how items that have not been addressed during design are being handled in construction. If items are covered in the template or other sections of the SWMP notebook indicate below what section the discussion takes place.

A. STOCKPILE MANAGEMENT - shall be done in accordance with subsection 107.25 and 208.07

B. CONCRETE WASHOUT - Concrete wash out water or waste from field laboratories and paving equipment shall be contained in accordance with subsection 208.05.

C. SAW CUTTING - shall be done in accordance with subsection 107.25, 208.04, 208.05

D. STREET CLEANING - shall be done in accordance with subsection 208.04

6. INSPECTIONS

A. Inspections shall be in accordance with subsection 208.03 (c).

7. BMP MAINTENANCE

A. Maintenance shall be in accordance with subsection 208.04 (f).

8. RECORD KEEPING

A. Records shall be kept in accordance with subsection 208.03 (c).

9. INTERIM AND FINAL STABILIZATON

A. SEEDING PLAN

Soil preparation, soil conditioning or topsoil, seeding (native), mulching (weed free) and mulch tackifier will be required for an estimated 4.24 acres over the top cap of the engineered waste rock piles. Native soils are mainly 0.5-3.0 feet of gravelly to stony sandy loam over bedrock. The proposed ditch grading will be rock riprap armored in place of vegetation.

Species	*Variety*	*% of Mix*	*Broadcast* lbs/acre*
Big Bluestem	Kaw	20	4.4
Sideoats Gramma	Vaughn	20	3.6
Little Bluestem	Pastura	20	2.8
Yellow Indiangrass	Holt	10	2
Western Wheatgrass***	Arriba	10	3.2
Needleandthread	-	10	2
Switchgrass	Nebraska 28	5	0.6
Blue Gramma	Lovington	5	0.3
TOTAL		*100%*	*18.9 lbs/acre*

* Use this seeding rate for both broadcast and hydromulch applications.
*** Streambank Wheatgrass (Sodar) can be substituted for the Western Wheatgrass.

10. PRIOR TO FINAL ACCEPTANCE

A. Final Acceptance shall be in accordance with subsection 208.10.

11. TABULATION OF STORMWATER QUANTITIES

Pay Item	Description	Pay Unit	*Quantity
208	Erosion Log	LF	4000
208	Erosion Bales	LF	100
208	Vehicle Tracking Pad (Construction Entrance)	EA	4
1000	Dewatering	LS	1
	Turf Reinforcement Matting	SY	38000
	Hydromulch Seeding and 6 Inch Topsoil	SY	38000

*It is anticipated that additional BMPs and BMP quantities not shown on the SWMP Site Maps shall be required on the project for unforeseen conditions and replacement of items that are beyond their useful service life, see subsection 208.03 and 208.04 (e). Quantities for all BMPs shown above are estimated, and have been increased for unforeseen Project conditions.

2-24-17
COLORADO LICENSED
DAN S. LEYENDECKER
42090
PROFESSIONAL ENGINEER

LNV
TBPE FIRM NO. F-366
8918 TESORO DRIVE
SAN ANTONIO, TEXAS 78217

cotter

SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

STORM WATER MANAGEMENT PLAN NARRATIVE SHEET 2 OF 2

N.T.S.

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 32

2/23/2017
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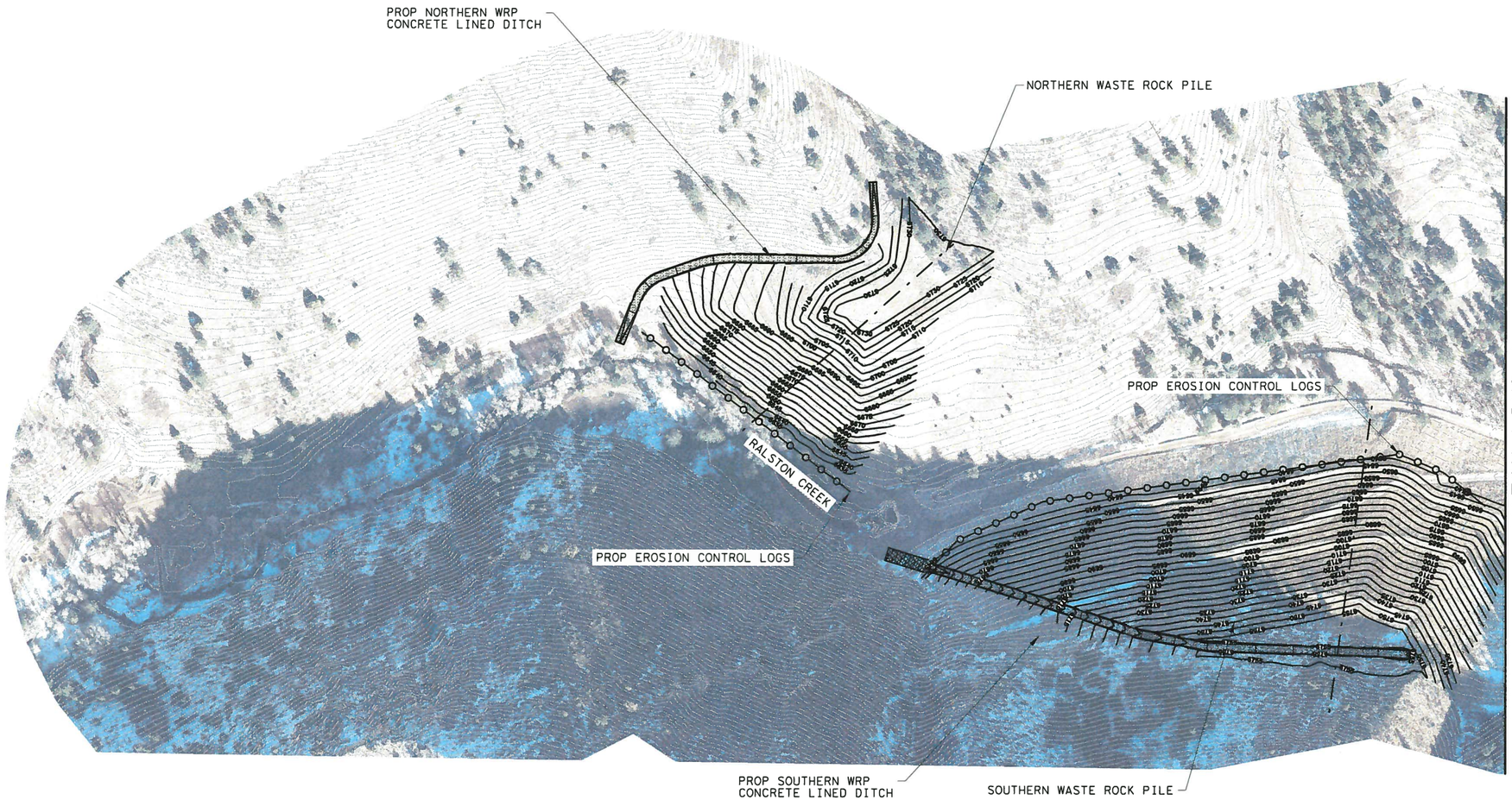

NOTE:
1) ALL TREES AND MATURE PLANTS OUTSIDE THE LIMITS OF CONSTRUCTION WILL BE PROTECTED.

2) CONSTRUCT TEMPORARY STREAM/LOW WATER CROSSINGS AS NEEDED.

3) SLOPE EXCAVATIONS TOWARDS ONE OF THE EXIST SUMP LOCATIONS SHOWN SO ALL RUNOFF CAN BE TREATED DUE TO CONTAMINATION.

LEGEND

- PROP EROSION CONTROL LOGS
- (RCD) PROP ROCK CHECK DAM
- (SBB) PROP STRAW BALE OR WADDLE BARRIER

2-24-17

COLORADO LICENSED
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SAN ANTONIO, TEXAS 78217

cotter

SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

SWMP SITE MAP
SHEET 1 OF 2

HORIZ. SCALE: 1"=200'

0 100 200
SCALE IN FEET

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 33

2/23/2017
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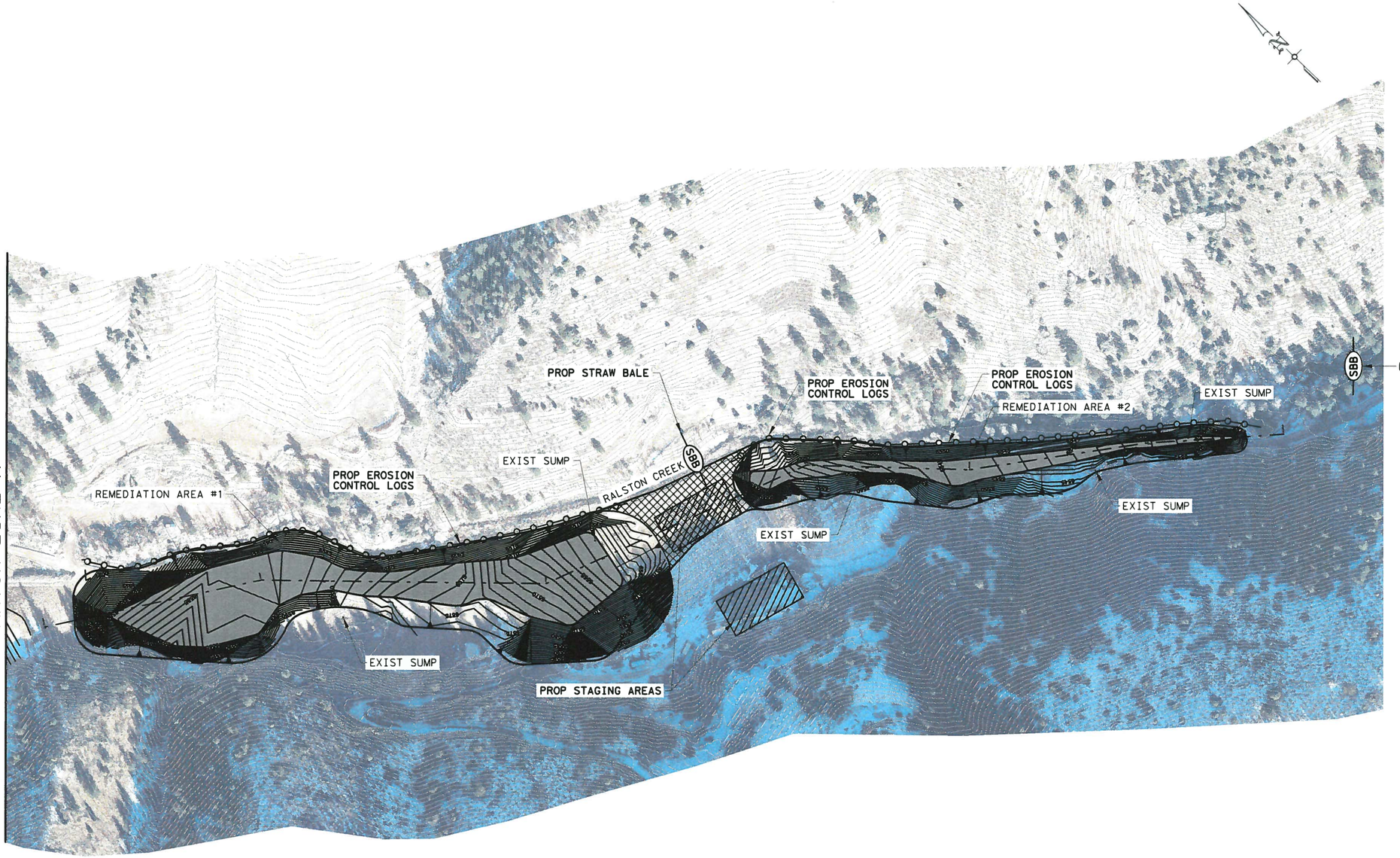

NOTE:
1) ALL TREES AND MATURE PLANTS OUTSIDE THE LIMITS OF CONSTRUCTION WILL BE PROTECTED.

2) CONSTRUCT TEMPORARY STREAM/LOW WATER CROSSINGS AS NEEDED.

3) SLOPE EXCAVATIONS TOWARDS ONE OF THE EXIST SUMP LOCATIONS SHOWN SO ALL RUNOFF CAN BE TREATED DUE TO CONTAMINATION.

LEGEND

- PROP EROSION CONTROL LOGS
- RCD — PROP ROCK CHECK DAM
- SBB — PROP STRAW BALE OR WADDLE BARRIER

2-24-17

COLORADO LICENSED
DAN S. LEYENDECKER
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TBPE FIRM NO. F-366
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SAN ANTONIO, TEXAS 78217

cotter

SCHWARTZWALDER MINE
REMEDIATION CUT AND FILL PROJECT

SWMP SITE MAP
SHEET 2 OF 2

HORIZ. SCALE: 1"=200'
0 100 200
SCALE IN FEET

	PROJECT NO.: 160236.000.2		DATE: 2/23/2017
DRAWN BY:	DSGN BY:	CHKD BY:	SHT NO.: 34

2/23/2017
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STANDARD EROSION AND SEDIMENT CONTROL NOTES:

1. The contractor must notify the Jefferson County Division of Transportation and Engineering (303.271.8495) at least three days prior to starting construction.

2. All grading, erosion, and sediment control must conform to approved plans. Revisions to land disturbance areas, slopes, and/or erosion and sediment control measures are not permitted without prior approval from the Jefferson County Planning and Zoning Division. Field modifications to an equivalent BMP that does not affect the site hydrology may be approved by Jefferson County Transportation and Engineering staff.

3. The approved plans are valid for two (2) years from the date of approval from Jefferson County.

4. The landowner and/or contractor is responsible for obtaining a permit for Stormwater Discharges Associated with Construction Activity from the Colorado Department of Public Health and Environment, at least 10 days prior the start of construction activities for land disturbance areas of one acre or greater. The permit must be kept current throughout the construction process.

5. Erosion control BMPs must be installed prior to grading activities.

6. Approved erosion and sediment control BMPs shall be maintained and kept in good repair for the duration of the project. At a minimum, the property owner or contractor shall inspect all BMPs in accordance with the approved plans. All necessary maintenance and repair activities shall be completed immediately. Accumulated sediment and construction debris shall be removed and properly disposed.

7. All topsoil must be salvaged, segregated, and stockpiled separately from the overburden. Topsoil and overburden must be redistributed within the graded area after rough grading to provide a suitable base for areas that must be seeded and planted. Runoff from the stockpiled area must be controlled to prevent erosion and sedimentation of receiving waters.

8. Soils that are stockpiled for more than thirty (30) days shall be seeded and mulched within fourteen (14) days of stockpile construction.

9. The landowner and/or contractor must immediately take all necessary steps to control sediment discharge.

10. Soil stabilization measures shall be applied within 30 days to disturbed areas, which may not be at final grade, but will be left dormant for longer than 60 days.

11. If applicable, the following note shall be completed:
    Temporary vegetative cover consisting of (species/variety)(mix noted below) must be (drill) (hydro_)(broadcast) seeded at _____ pounds pure live seed per acre. Mulch consisting of _____, applied at a rate of _____ tons per acre and crimped must be used to stabilize the exposed surface.
    Soil amendments consisting of (specify type) must be incorporated into the soil to a depth of _____ inches below grade at _____ cubic yards per 1,000 square feet.
    Permanent vegetative cover consisting of (species/variety)(mix noted below) must be (drill) (hydro_)(broadcast) seeded at _____ pounds pure live seed per acre.
    (Temporary)(Permanent) Seed Mix

Species	Variety	% of Mix	Min. lbs. PLS/Acre

12. All disturbed slopes (unless in a competent rock cut) greater than or equal to 3:1 (H:V), flow lines of swales, gutter downspouts, or additional areas at the discretion of county staff, shall be protected with an erosion control blanket or equivalent BMP..

13. If it is necessary to move material in excess of 300 cubic yards and/or in excess of 10,000 square feet of land disturbance area to or from another unincorporated Jefferson County site, a grading permit or Notice of Intent (NOI) is necessary for the off-site property. If the material is moved to a property located within another jurisdiction, evidence is required that the local government has approved the grading operation.

14. The landowner and/or contractor is responsible for clean up and removal of all sediment and debris from all drainage infrastructure and public facilities during the entire construction process.

15. The landowner and/or contractor must take reasonable precautions to ensure that vehicles do not track or spill earth materials on to streets/roads and must immediately remove such materials if this occurs.

16. The landowner and/or contractor is responsible for controlling litter such as discarded building materials, concrete truck washout, chemicals, and sanitary waste, as applicable. In addition, spill prevention and containment BMPs for construction materials, waste, and fuel must be provided, as applicable. Locations of stockpiles, concrete washout areas, and trash receptacles must be clearly shown on the plans. Littering is defined and enforced by CRS 18-4-511.

17. Fugitive dust emissions resulting from grading activities and/or wind shall be controlled using the best available control technology, as defined by the Colorado Department of Public Health and Environment, at the time of grading.

18. Earth materials and construction supplies are to be stored on a construction site staging area, and are not to be stored on the street or sidewalk. Locations of stockpiles, concrete washout areas and trash receptacles are clearly located on the plans.

19. The Jefferson County Planning and Zoning Division, or its authorized representative, may modify the erosion and sediment control plan as field conditions warrant.

DETAIL NO.	SHEET NO.		BMP LEGEND	
1	2		SR	SURFACE ROUGHENING
2	2		ECB	EROSION CONTROL BLANKET
3	2		TSD	TEMPORARY SLOPE DRAIN
4	3		OP	OUTLET PROTECTION
5	3		RCS	ROUGH CUT STREET CONTROL
6	3		ED/DS	EARTH DIKES AND DRAINAGE SWALES
7	3		TER	TERRACING
8	4		CD	CHECK DAM
9	4		CWA	CONCRETE WASHOUT AREA
10	4		SP	STOCKPILE MANAGEMENT
11	5		SF	SILT FENCE
12	5		SCL	SEDIMENT CONTROL LOG
13	5		SBB	STRAW BALE BARRIER
14	6		RS	ROCK SOCK
15	6		IP	INLET PROTECTION
16	6		SB	SEDIMENT BASIN
17	7		CF	CONSTRUCTION FENCE
18	7		VTC	VEHICLE TRACKING CONTROL
19	7		SSA	STABILIZED STAGING AREA
20	8		TDC	TEMPORARY DIVERSION CHANNEL
21	8		DW	DEWATERING
21	9		TSC	TEMPORARY STREAM CROSSING

Revisions:	Designed By:		Scale: (As Shown)	JEFFERSON COUNTY DIVISION OF PLANNING & ZONING 100 JEFFERSON COUNTY PARKWAY, SUITE 3550 GOLDEN, COLORADO 80419 (303) 271-8700	G.E.S.C. STANDARD NOTES AND DETAILS
Details from UDFCD - November, 2010.	Drawn By:		Date Created: 07/25/2012		
	Checked By: Staff		Plot Date: 7/26/2012		Project No.: Sheet 1 Of 9
	File: GESC_Details_Sht1.dwg				
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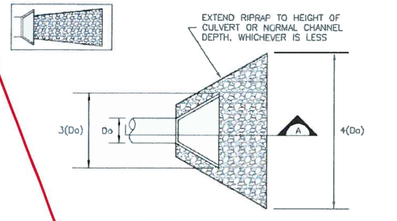
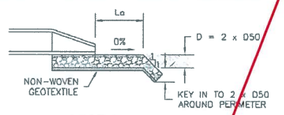
OP



TEMPORARY OUTLET PROTECTION PLAN



SECTION A

TABLE OP-1. TEMPORARY OUTLET PROTECTION SIZING TABLE

PIPE DIAMETER, Do (INCHES)	DISCHARGE, Q (CFS)	APRON LENGTH, La (FT)	RIPRAP D50 DIAMETER MIN (INCHES)
8	2.5	5	4
	5	10	6
12	5	10	4
	10	13	6
18	10	10	6
	20	16	9
	30	23	12
	40	26	16
24	10	10	9
	20	23	9
	30	26	12
	60	30	16

OP-1. TEMPORARY OUTLET PROTECTION

TEMPORARY OUTLET PROTECTION INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   - LOCATION OF OUTLET PROTECTION.
   - DIMENSIONS OF OUTLET PROTECTION.
2. DETAIL IS INTENDED FOR PIPES WITH SLOPE < 10%. ADDITIONAL EVALUATION OF RIPRAP SIZING AND OUTLET PROTECTION DIMENSIONS REQUIRED FOR STEEPER SLOPES.
3. TEMPORARY OUTLET PROTECTION INFORMATION IS FOR OUTLETS INTENDED TO BE UTILIZED LESS THAN 2 YEARS.

TEMPORARY OUTLET PROTECTION INSPECTION AND MAINTENANCE NOTES

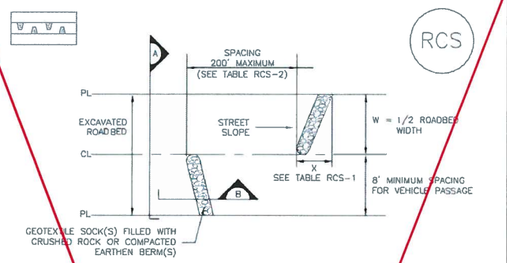
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

TEMPORARY OUTLET PROTECTION

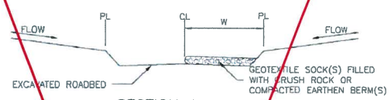
TOP

Detail 4

RCS



ROUGH CUT STREET CONTROL PLAN



SECTION A

SECTION B

TABLE RCS-1

W (FT)	X (FT)
20-30	5
31-40	7
41-50	9
51-60	10.5
61-70	12

TABLE RCS-2

LONGITUDINAL STREET SLOPE (%)	SPACING (FT)
<2	NOT TYPICALLY NEEDED
2	200
3	200
4	150
5	100
6	50
7	25
8	25

RCS-1. ROUGH CUT STREET CONTROL

ROUGH CUT STREET CONTROL INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   - LOCATION OF ROUGH CUT STREET CONTROL MEASURES.
2. ROUGH CUT STREET CONTROL SHALL BE INSTALLED AFTER A ROAD HAS BEEN CUT IN, AND WILL NOT BE PAVED FOR MORE THAN 14 DAYS OR FOR TEMPORARY CONSTRUCTION ROADS THAT HAVE NOT RECEIVED ROAD BASE.

ROUGH CUT STREET CONTROL INSPECTION AND MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

ROUGH CUT STREET CONTROL

RCS

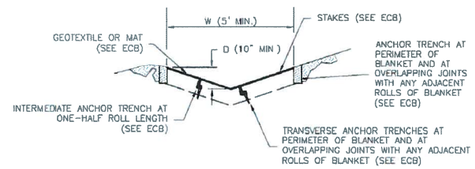
Detail 5

ED/DS

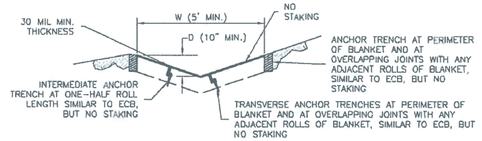
ED-1. COMPACTED UNLINED EARTH DIKE FORMED BY BERM

DS-1. COMPACTED UNLINED EXCAVATED SWALE

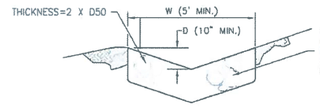
DS-2. COMPACTED UNLINED SWALE FORMED BY CUT AND FILL



DS-3. ECB LINED SWALE (CUT AND FILL OR BERM)



DS-4. SYNTHETIC LINED SWALE



DS-5. RIPRAP LINED SWALE

EARTH DIKE AND DRAINAGE SWALE INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - LOCATION OF DIVERSION SWALE
   - TYPE OF SWALE (UNLINED, COMPACTED AND/OR LINED)
   - LENGTH OF EACH SWALE
   - DEPTH, D, AND WIDTH, W, DIMENSIONS
   - FOR ECB/TRM LINED DITCH, SEE ECB DETAIL
   - FOR RIPRAP LINED DITCH, SIZE OF RIPRAP D50
2. SEE DRAINAGE PLANS FOR DETAILS OF PERMANENT CONVEYANCE FACILITIES AND/OR DIVERSION SWALES EXCEEDING 2-YEAR FLOW RATE OR 10 CFS.
3. EARTH DIKES AND SWALES INDICATED ON GESC PLAN SHALL BE INSTALLED PRIOR TO LAND DISTURBANCE ACTIVITIES.
4. EMBANKMENT IS TO BE COMPACTED TO 90% OF MAXIMUM DENSITY AND WITHIN 2% OF OPTIMUM MOISTURE CONTENT ACCORDING TO ASTM D698.
5. SWALES ARE TO DRAIN TO A SEDIMENT CONTROL BMP.
6. FOR LINED DITCHES, INSTALLATION OF ECB/TRM SHALL CONFORM TO THE ECB DETAIL.
7. WHEN CONSTRUCTION TRAFFIC MUST CROSS A DIVERSION SWALE, INSTALL A TEMPORARY CULVERT WITH A MINIMUM DIAMETER OF 12 INCHES.

EARTH DIKE AND DRAINAGE SWALE MAINTENANCE NOTES

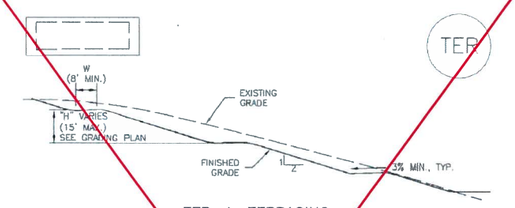
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. J. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. SWALES SHALL REMAIN IN PLACE UNTIL THE END OF CONSTRUCTION; IF APPROVED BY JEFFERSON COUNTY, SWALES MAY BE LEFT IN PLACE.
5. WHEN A SWALE IS REMOVED, THE DISTURBED AREA SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.

EARTH DIKES AND DRAINAGE SWALES

ED/DS

Detail 6

TER



TER-1. TERRACING

TERRACING INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   -LOCATION OF TERRACING
   -WIDTH (W), AND SLOPE (Z).
2. TERRACING IS TYPICALLY NOT REQUIRED FOR SLOPES OF 4:1 OR FLATTER.
3. GRADE TERRACES TO DRAIN BACK TO SLOPE AT A MINIMUM OF 3% GRADE.

TERRACING MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. RILL EROSION OCCURRING ON TERRACED SLOPES SHALL BE REPAIRED, RESEEDED, MULCHED OR STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.
5. TERRACING MAY NEED TO BE RE-GRADED TO RETURN THE SLOPE TO THE FINAL DESIGN GRADE. THE SLOPE SHALL THEN BE COVERED WITH TOPSOIL, SEEDED AND MULCHED, OR OTHERWISE STABILIZED AS APPROVED BY JEFFERSON COUNTY.

TERRACING

TER

Detail 7

Revisions:	Designed By:		Scale: (As Shown)	JEFFERSON COUNTY DIVISION OF PLANNING & ZONING 100 JEFFERSON COUNTY PARKWAY, SUITE 3550 GOLDEN, COLORADO 80419 (303) 271-8700	G.E.S.C. STANDARD PLANS AND DETAILS
	Drawn By:		Date Created: 8/15/2011		
	Checked By: Staff		Plot Date: 7/26/2012 F.I.R. Date:		Project No.: Sheet 3 Of 9
	File: GESC_Details_Sht3.dwg		F.O.R. Date: For Const. Date:		
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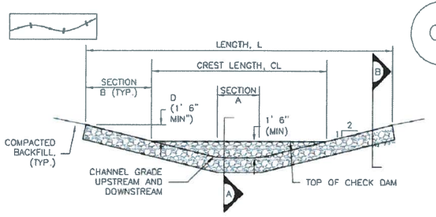
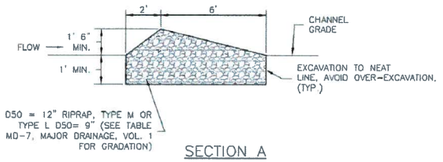
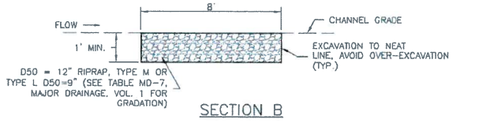
CD



CHECK DAM ELEVATION VIEW



SECTION A



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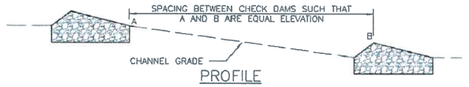


PROFILE

CD–1. CHECK DAM

CHECK DAM INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - LOCATION OF CHECK DAMS
   - CHECK DAM TYPE (CHECK DAM OR REINFORCED CHECK DAM)
   - LENGTH (L), CREST LENGTH (CL), AND DEPTH (D)
2. CHECK DAMS INDICATED ON INITIAL GESC SHALL BE INSTALLED AFTER CONSTRUCTION FENCE, BUT PRIOR TO ANY UPSTREAM LAND DISTURBANCE ACTIVITIES.
3. RIPRAP UTILIZED FOR CHECK DAMS SHOULD BE OF APPROPRIATE SIZE FOR THE APPLICATION. TYPICAL TYPES OF RIPRAP USED FOR CHECK DAMS ARE TYPE M (D50 12") OR TYPE L (D50 9")
4. RIPRAP PAD SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 1 FOOT.
5. THE ENDS OF THE CHECK DAM SHALL BE A MINIMUM OF 1.5 FEET HIGHER THAN THE CENTER OF THE CHECK DAM.

CHECK DAM MAINTENANCE NOTES

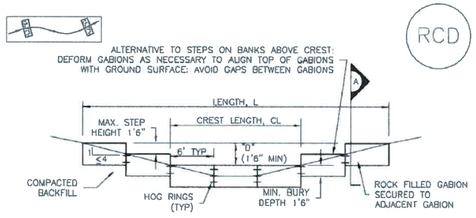
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. SEDIMENT ACCUMULATED UPSTREAM OF THE CHECK DAMS SHALL BE REMOVED WHEN THE SEDIMENT DEPTH IS WITHIN 1/2 OF THE HEIGHT OF THE CREST.
5. CHECK DAMS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY JEFFERSON COUNTY.
6. WHEN CHECK DAMS ARE REMOVED, EXCAVATIONS SHALL BE FILLED WITH SUITABLE COMPACTED BACKFILL. DISTURBED AREA SHALL BE SEEDED AND MULCHED AND COVERED WITH GEOTEXTILE OR OTHERWISE STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.

CHECK DAMS

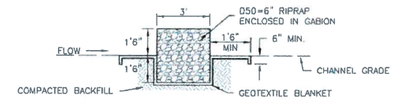
CD

Detail 8

RCD



REINFORCED CHECK DAM ELEVATION VIEW



SECTION A

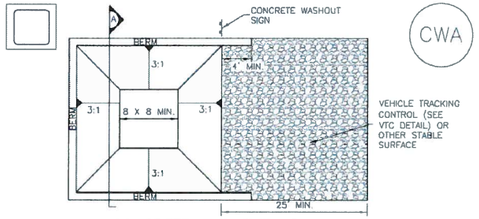
REINFORCED CHECK DAM INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - LOCATION OF CHECK DAMS
   - CHECK DAM TYPE (CHECK DAM OR REINFORCED CHECK DAM)
   - LENGTH (L), CREST LENGTH (CL), AND DEPTH (D)
2. CHECK DAMS INDICATED ON INITIAL GESC SHALL BE INSTALLED PRIOR TO ANY UPSTREAM LAND DISTURBANCE ACTIVITIES.
3. REINFORCED CHECK DAMS, GABIONS SHALL HAVE GALVANIZED TWISTED WIRE NETTING WITH A MAXIMUM OPENING DIMENSION OF 4 5 INCHES AND A MINIMUM WIRE THICKNESS OF 0.10 INCHES. WIRE "HOG RINGS" AT 4 INCH SPACING OR OTHER APPROVED MEANS SHALL BE USED AT ALL GABION SEAMS AND TO SECURE THE GABION TO THE ADJACENT SECTION.
4. THE CHECK DAM SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 1.5 FEET.
5. GEOTEXTILE BLANKET SHALL BE PLACED IN THE REINFORCED CHECK DAM TRENCH EXTENDING A MINIMUM OF 1.5 FEET ON BOTH THE UPSTREAM AND DOWNSTREAM SIDES OF THE REINFORCED CHECK DAM.

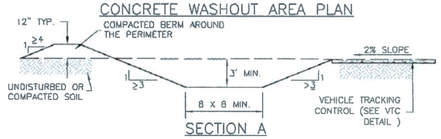
REINFORCED CHECK DAM MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. SEDIMENT ACCUMULATED UPSTREAM OF REINFORCED CHECK DAMS SHALL BE REMOVED AS NEEDED TO MAINTAIN THE EFFECTIVENESS OF BMP, TYPICALLY WHEN THE UPSTREAM SEDIMENT DEPTH IS WITHIN 1/2 THE HEIGHT OF THE CREST.
5. REPAIR OR REPLACE REINFORCED CHECK DAMS WHEN THERE ARE SIGNS OF DAMAGE SUCH AS HOLES IN THE GABION OR UNDERCUTTING.
6. REINFORCED CHECK DAMS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE JEFFERSON COUNTY.
7. WHEN REINFORCED CHECK DAMS ARE REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED, AND COVERED WITH A GEOTEXTILE BLANKET, OR OTHERWISE STABILIZED AS APPROVED BY JEFFERSON COUNTY.

CWA



CONCRETE WASHOUT AREA PLAN



SECTION A

CWA–1. CONCRETE WASHOUT AREA

CWA INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - CWA INSTALLATION LOCATION
2. DO NOT LOCATE AN UNLINED CWA WITHIN 400 FEET OF ANY NATURAL DRAINAGE PATHWAY OR WATER BODY. DO NOT LOCATE WITHIN 1000 FEET OF ANY WELLS OR DRINKING WATER SOURCES. IF THE CWA MUST BE INSTALLED WITH AN IMPERMEABLE LINER (10 MIL MINIMUM THICKNESS) OR SURFACE STORAGE ALTERNATIVES USING PREFABRICATED CONCRETE WASHOUT DEVICES OR A LINED ABOVE GROUND STORAGE ARE SHOULD BE USED.
3. THE CWA SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ONSITE
4. CWA SHALL INCLUDE A FLAT SUBSURFACE PIT THAT IS AT LEAST 8 FEET BY 8 FEET WITH SLOPES LEADING OUT OF THE SUBSURFACE PIT SHALL BE 3:1 OR FLATTER. THE PIT SHALL BE AT LEAST 3 FEET DEEP.
5. BERM SURROUNDING SIDES AND BACK OF THE CWA SHALL HAVE A MINIMUM HEIGHT OF 1 FOOT
6. VEHICLE TRACKING PAD SHALL BE SLOPED 2% TOWARDS THE CWA
7. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CWA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CWA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.
8. USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.

CWA MAINTENANCE NOTES

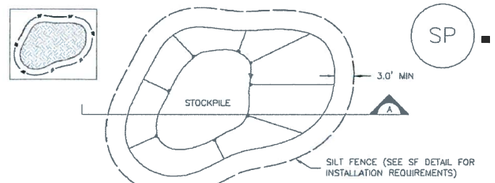
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. THE CWA SHALL BE REPAIRED, CLEANED, OR ENLARGED AS NECESSARY TO MAINTAIN CAPACITY FOR CONCRETE WASTE. CONCRETE MATERIALS ACCUMULATED IN PIT, SHALL BE REMOVED ONCE THE MATERIALS HAVE REACHED A DEPTH OF 2'.
5. CONCRETE WASHOUT WATER, WASTED PIECES OF CONCRETE AND ALL OTHER DEBRIS IN THE SUBSURFACE PIT SHALL BE TRANSPORTED FROM THE JOB SITE IN A WATER-TIGHT CONTAINER AND DISPOSED OF PROPERLY.
6. THE CWA SHALL REMAIN IN PLACE UNTIL ALL CONCRETE FOR THE PROJECT IS PLACED.
7. WHEN THE CWA IS REMOVED, COVER THE DISTURBED AREA WITH TOP SOIL, SEED AND MULCH OR OTHERWISE STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.

Concrete Washout Area

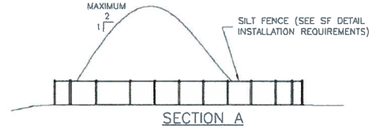
CWA

Detail 9

SP



STOCKPILE PROTECTION PLAN



SECTION A

SP–1. STOCKPILE PROTECTION

STOCKPILE PROTECTION INSTALLATION NOTES

2. SEE PLAN VIEW FOR:
   - LOCATIONS OF STOCKPILES
   - TYPE OF STOCKPILE PROTECTION
3. INSTALL PERIMETER CONTROLS IN ACCORDANCE WITH THEIR RESPECTIVE DESIGN DETAILS. SILT FENCE IS SHOWN IN THE STOCKPILE PROTECTION DETAILS; HOWEVER, OTHER TYPES OF PERIMETER CONTROLS INCLUDING SEDIMENT CONTROL LOGS OR ROCK SOCKS MAY BE SUITABLE IN SOME CIRCUMSTANCES. CONSIDERATIONS FOR DETERMINING THE APPROPRIATE TYPE OF PERIMETER CONTROL FOR A STOCKPILE INCLUDE WHETHER THE STOCKPILE IS LOCATED ON A PERVIOUS OR IMPERVIOUS SURFACE, THE RELATIVE HEIGHTS OF THE PERIMETER CONTROL AND STOCKPILE, THE ABILITY OF THE PERIMETER CONTROL TO CONTAIN THE STOCKPILE WITHOUT FAILING IN THE EVENT THAT MATERIAL FROM THE STOCKPILE SHIFTS OR SLUMPS AGAINST THE PERIMETER AND OTHER FACTORS.
4. STABILIZE THE STOCKPILE SURFACE WITH SURFACE ROUGHENING, TEMPORARY SEEDING AND MULCHING, EROSION CONTROL BLANKETS, OR SOIL BINDERS. SOILS STOCKPILED FOR AN EXTENDED PERIOD (GREATER THAN 60 DAYS) SHOULD BE SEEDED AND MULCHED WITH A TEMPORARY GRASS COVER DO NOT LOCATE AN UNLINED CWA WITHIN 400 FEET OF ANY NATURAL DRAINAGE PATHWAY OR WATER BODY. DO NOT LOCATE WITHIN 1000 FEET OF ANY WELLS OR DRINKING WATER SOURCES. IF THE CWA MUST BE INSTALLED WITH AN IMPERMEABLE LINER (10 MIL MINIMUM THICKNESS) OR SURFACE STORAGE ALTERNATIVES USING PREFABRICATED CONCRETE WASHOUT DEVICES OR A LINED ABOVE GROUND STORAGE ARE SHOULD BE USED
5. FOR TEMPORARY STOCKPILES ON THE INTERIOR PORTION OF A CONSTRUCTION SITE, WHERE OTHER DOWNGRADIENT CONTROLS, INCLUDING PERIMETER CONTROL ARE IN PLACE THAN STOCKPILE PERIMETER CONTROL MAY NOT BE REQUIRED IF DEPICTED ON THE APPROVED PLANS.

STOCKPILE PROTECTION MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. IF PERIMETER PROTECTION MUST BE MOVED TO ACCESS SOIL STOCKPILE, REPLACE PERIMETER STOCKPILE CONTROLS BY THE END OF THE WORKDAY.
5. STOCKPILE PERIMETER CONTROLS CAN BE REMOVED ONCE ALL THE MATERIAL FROM THE STOCKPILE HAS BEEN USED.

STOCKPILE MANAGEMENT

SP

Detail 10

Revisions:	Designed By:		Scale: (As Shown)	JEFFERSON COUNTY DIVISION OF PLANNING & ZONING 100 JEFFERSON COUNTY PARKWAY, SUITE 3550 GOLDEN, COLORADO 80419 (303) 271–8700	G.E.S.C. STANDARD PLANS AND DETAILS
	Drawn By:		Date Created: 8/15/2011		
	Checked By: Staff		Plot Date: 7/26/2012 F.I.R. Date:		
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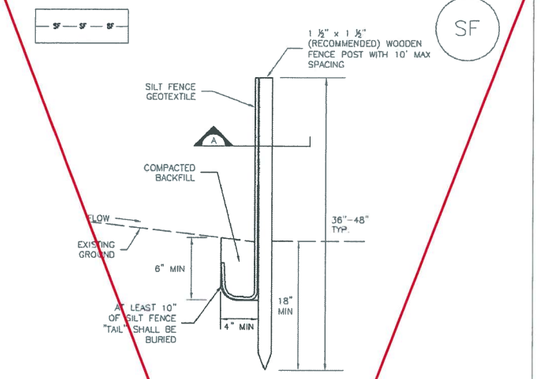


SILT FENCE

SF

Detail 11

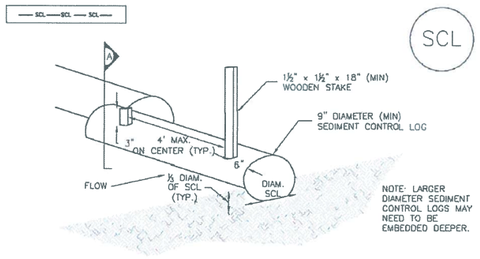
SF–1. SILT FENCE

SILT FENCE INSTALLATION NOTES

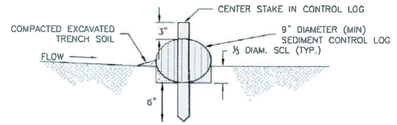
1. SILT FENCE MUST BE PLACED AWAY FROM THE TOW OF THE SLOPE TO ALLOW FOR WATER PONDING. SILT FENCE AT THE TOE OF A SLOPE SHOULD BE INSTALLED IN A FLAT LOCATION AT LEAST SEVERAL (2-5 FEET) FROM THE TOE OF THE SLOPE TO ALLOW ROOM FOR PONDING AND DEPOSITION.
2. A UNIFORM 6 INCH BY 4 INCH ANCHOR TRENCH SHALL BE EXCAVATED USING TRENCHER OR SILT FENCE INSTALLATION DEVICE. NO ROAD GRADERS, BACKHOES, OR SIMILAR EQUIPMENT SHALL BE USED.
3. COMPACT ANCHOR TRENCH BY HAND WITH A JUMPING JACK OR BY WHEEL ROLLING. COMPACTION SHALL BE SUCH THAT SILT FENCE RESISTS BEING PULLED OUT OF ANCHOR TRENCH BY HAND.
4. SILT FENCE SHALL BE PULLED TIGHT AS IT IS ANCHORED TO THE STAKES. THERE SHOULD BE NO NOTICEABLE SAG BETWEEN STAKES AFTER IT HAS BEEN ANCHORED TO THE STAKES.
5. SILT FENCE FABRIC SHALL BE ANCHORED TO THE STAKES USING 1 INCH HEAVY DUTY STAPLES OR NAILS WITH 1 INCH HEADS. STAPLES AND NAILS SHOULD BE PLACED 3 INCHES ALONG THE FABRIC DOWN THE STAKE.
6. AT THE END OF A RUN OF SILT FENCE ALONG A CONTOUR, THE SILT FENCE SHOULD BE TURNED PERPENDICULAR TO THE CONTOUR TO CREATE A "J HOOK". THE "J HOOK" EXTENDING PERPENDICULAR TO THE CONTOUR SHOULD BE OF SUFFICIENT LENGTH TO KEEP RUNOFF FROM FLOWING AROUND THE END OF THE SILT FENCE (TYPICALLY 10 FEET TO 20 FEET).

SILT FENCE MAINTENANCE NOTES

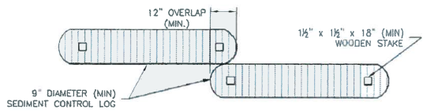
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. SEDIMENT ACCUMULATED UPSTREAM OF THE SILT FENCE SHALL BE REMOVED AS NEEDED TO MAINTAIN THE FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 6 INCHES.
5. REPAIR OR REPLACE SILT FENCE WHEN THERE ARE SIGNS OF WEAR, SUCH AS SAGGING, TEARING, OR COLLAPSE.
6. SILT FENCE IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY JEFFERSON COUNTY, OR IS REPLACED BY AN EQUIVALENT PERIMETER SEDIMENT CONTROL BMP.
7. WHEN SILT FENCE IS REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY JEFFERSON COUNTY.



SEDIMENT CONTROL LOG



SECTION A



SEDIMENT CONTROL LOG JOINTS

SCL–1. SEDIMENT CONTROL LOG

SEDIMENT CONTROL LOG

SCL

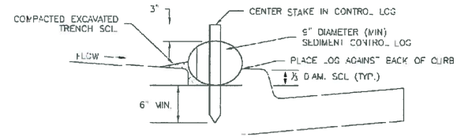
Detail 12

SEDIMENT CONTROL LOG INSTALLATION NOTES

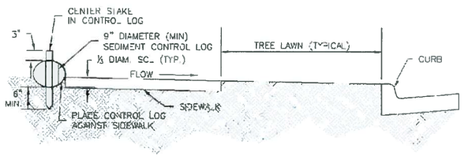
1. SEE SITE PLAN VIEW FOR LOCATION AND LENGTH OF SEDIMENT CONTROL LOGS.
2. SEDIMENT CONTROL LOGS SHALL CONSIST OF STRAW, COMPOST, EXCELSIOR OR COCONUT FIBER, AND SHALL BE FREE OF ANY NOXIOUS WEED SEEDS OR DEFECTS INCLUDING RIPS, HOLES, AND OBVIOUS WEAR.
3. SEDIMENT CONTROL LOGS MAY BE USED AS SMALL CHECK DAMS IN DITCHES AND SWALES. HOWEVER THEY SHOULD NOT BE USED IN PERENNIAL STREAMS OR HIGH VELOCITY DRAINAGEWAYS.
4. IT IS RECOMMENDED THAT SEDIMENT CONTROL LOGS BE TRENCHED INTO THE GROUND TO A DEPTH OF APPROXIMATELY 1/3 THE DIAMETER OF THE LOG. IF TRENCHING TO THIS DEPTH IS NOT FEASIBLE AND/OR DESIRABLE (SHORT TERM INSTALLATION WITH DESIRE NOT TO DAMAGE LANDSCAPE) A LESSER TRENCHING DEPTH WITH MORE ROBUST STAKING MAY BE ACCEPTABLE IF DEPICTED ON THE APPROVED PLANS.
5. THE UPHILL SIDE OF THE SEDIMENT CONTROL LOG SHALL BE BACKFILLED WITH SOIL THAT IS FREE OF ROCKS AND DEBRIS. THE SOIL SHALL BE TIGHTLY COMPACTED INTO THE SHAPE OF A RIGHT TRIANGLE USING A SHOVEL OR WEIGHTED LAWN ROLLER.
6. FOLLOW MANUFACTURERS GUIDANCE FOR STAKING. IF MANUFACTURERS INSTRUCTIONS DO NOT SPECIFY SPACING, STAKES SHALL BE PLACED ON 4 FOOT CENTERS AND EMBEDDED A MINIMUM OF 6 INCHES INTO THE GROUND. 3 INCHES OF THE STAKE SHALL PROTRUDE FROM THE TOP OF THE LOG. STAKES THAT ARE BROKEN PRIOR TO INSTALLATION SHALL BE REPLACED.

SEDIMENT CONTROL LOG MAINTENANCE NOTES

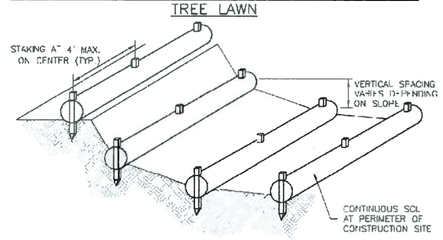
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. SEDIMENT ACCUMULATED UPSTREAM OF SEDIMENT CONTROL LOG SHALL BE REMOVED AS NEEDED TO MAINTAIN FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 1/2 OF THE HEIGHT OF THE SEDIMENT CONTROL LOG.
5. SEDIMENT CONTROL LOG SHALL BE REMOVED AT THE END OF CONSTRUCTION. IF DISTURBED AREAS EXIST AFTER REMOVAL, THEY SHALL BE COVERED WITH TOP SOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.



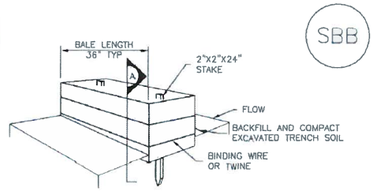
SCL–2. SEDIMENT CONTROL LOG AT BACK OF CURB



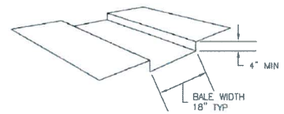
SCL–3. SEDIMENT CONTROL LOG AT SIDEWALK WITH TREE LAWN



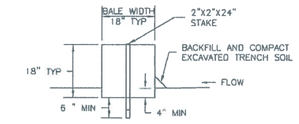
SCL–4. SEDIMENT CONTROL LOGS TO CONTROL SLOPE LENGTH



STRAW BALE



TRENCH FOR STRAW BALE



SECTION A

SBB–1. STRAW BALE

STRAW BALE MAINTENANCE NOTES

1. SEE PLAN VIEW FOR:
   - LOCATIONS OF STRAW BALES
2. STRAW BALES SHALL CONSIST OF CERTIFIED WEED FREE STRAW OR HAY.
3. STRAW BALES SHALL CONSIST OF APPROXIMATELY 5 CUBIC FEET OF STRAW OR HAY AND WEIGH NOT LESS THAN 35 POUNDS.
4. WHEN STRAW BALES ARE USED IN A SERIES AS A BARRIER, THE END OF EACH BALE SHALL BE TIGHTLY ABUTTING ONE ANOTHER.
5. STRAW BALE DIMENSIONS SHALL BE APPROXIMATELY 36 INCHES BY 18 INCHES BY 18 INCHES.
6. A UNIFORM ANCHOR TRENCH SHALL BE EXCAVATED TO A DEPTH OF 4 INCHES. STRAW BALES SHALL BE PLACED SO THAT BINDING TWINE IS ENCOMPASSING THE VERTICAL SIDES OF THE BALES. ALL EXCAVATED SOIL SHALL BE PLACED ON THE UPHILL SIDE OF THE STRAW BALES AND COMPACTED.
7. 2 WOODEN STAKES SHALL BE USED TO HOLD DOWN EACH BALE IN PLACE. WOODEN STAKES SHALL BE 2 INCHES BY 2 INCHES BY 24 INCHES. WOODEN STAKES SHALL BE DRIVEN 6 INCHES INTO THE GROUND.

STRAW BALE MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. STRAW BALES SHALL BE REPLACED IF THEY BECOME HEAVILY SOILED, ROTTEN, OR DAMAGED BEYOND REPAIR.
5. SEDIMENT ACCUMULATED UPSTREAM OF STRAW BALE BARRIER SHALL BE REMOVED AS NEEDED TO MAINTAIN FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 1/2 OF THE HEIGHT OF THE STRAW BALE BARRIER.
6. STRAW BALES ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE JEFFERSON COUNTY.
7. WHEN STRAW BALES ARE REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY JEFFERSON COUNTY.

STRAW BAIL BARRIER

SBB

Detail 13

Revisions:	Designed By:		Scale: (As Shown)	JEFFERSON COUNTY DIVISION OF PLANNING & ZONING 100 JEFFERSON COUNTY PARKWAY, SUITE 3550 GOLDEN, COLORADO 80419 (303) 271-8700	G.E.S.C. STANDARD PLANS AND DETAILS
	Drawn By:		Date Created: 8/15/2011		
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	File: GESC_Details_Sht5.dwg		F.O.R. Date: For Const. Date:		Project No.: Sheet 5 Of 9
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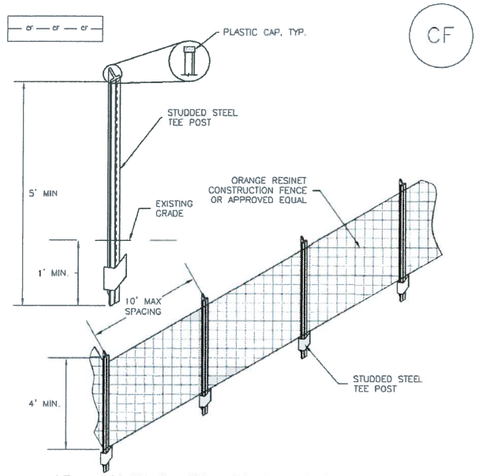
CF



CF–1. PLASTIC MESH CONSTRUCTION FENCE

CONSTRUCTION FENCE INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - LOCATION OF CONSTRUCTION FENCE
2. CONSTRUCTION FENCE SHOWN SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
3. CONSTRUCTION FENCE SHALL BE COMPOSED OF ORANGE CONTRACTOR GRADE MATERIAL THAT IS AT LEAST 4' HIGH. METAL POSTS SHOULD HAVE A PLASTIC CAP FOR SAFETY.
4. STUDDED STEEL TEE POSTS SHALL BE UTILIZED TO SUPPORT THE CONSTRUCTION FENCE. MAXIMUM SPACING FOR STEEL TEE POSTS SHALL BE 10'.
5. CONSTRUCTION FENCE SHALL BE SECURELY FASTENED TO THE TOP, MIDDLE, AND BOTTOM OF EACH POST.

CONSTRUCTION FENCE MAINTENANCE NOTES

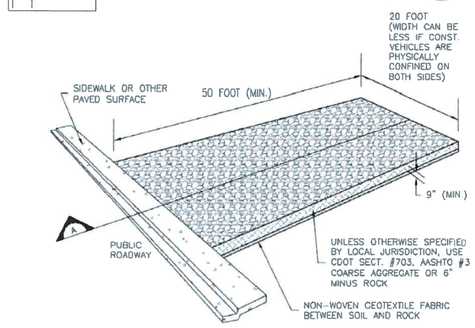
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. CONSTRUCTION FENCE SHALL BE REPAIRED OR REPLACED WHEN THERE ARE SIGNS OF DAMAGE SUCH AS RIPS OR SAGS. CONSTRUCTION FENCE IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY JEFFERSON COUNTY.
5. WHEN CONSTRUCTION FENCES ARE REMOVED, ALL DISTURBED AREAS ASSOCIATED WITH THE INSTALLATION, MAINTENANCE, AND/OR REMOVAL OF THE FENCE SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED.

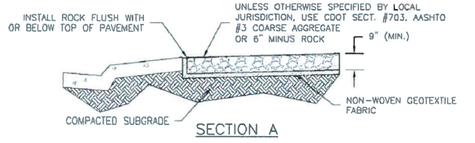
CONSTRUCTION FENCE

CF

Detail 17

VTC



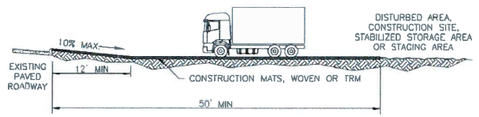


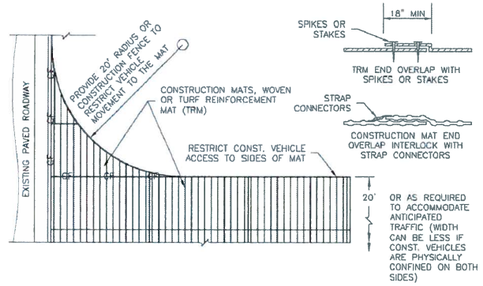
SECTION A

VTC–1. AGGREGATE VEHICLE TRACKING CONTROL

VTC / CM

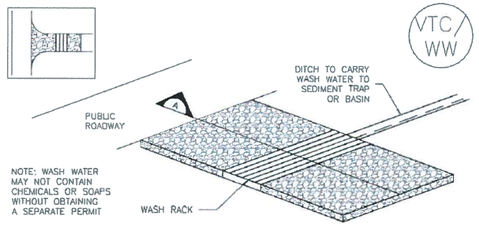
VTC / TRM

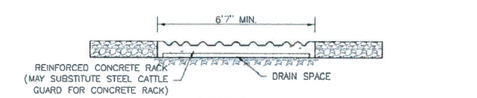




VTC–3. VEHICLE TRACKING CONTROL W/ CONSTRUCTION MAT OR TURF REINFORCEMENT MAT (TRM)

VTC / WW





SECTION A

VTC–2. AGGREGATE VEHICLE TRACKING CONTROL WITH WASH RACK

STABILIZED CONSTRUCTION ENTRANCE/EXIT INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   - LOCATION OF CONSTRUCTION ENTRANCE/EXITS.
   - TYPE OF CONSTRUCTION ENTRANCE/EXITS (WITH/WITHOUT WHEEL WASH, CONSTRUCTION MAT OR TRM)
2. CONSTRUCTION MAT OR TRM STABILIZED CONSTRUCTION ENTRANCES ARE ONLY TO BE USED ON SHORT DURATION PROJECTS (TYPICALLY RANGING FROM A WEEK TO A MONTH) WHERE THERE WILL BE LIMITED VEHICULAR ACCESS.
3. A STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE LOCATED AT ALL ACCESS POINTS WHERE VEHICLES ACCESS THE CONSTRUCTION SITE FROM PAVED ROW.
4. STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBANCE ACTIVITIES.
5. A NON WOVEN GEOTEXTILE FABRIC SHALL BE PLACED UNDER THE STABILIZED CONSTRUCTION ENTRANCE/EXIT PRIOR TO THE PLACEMENT OF ROCK.
6. UNLESS OTHERWISE SPECIFIED BY JEFFERSON COUNTY, ROCK SHALL CONSIST OF DOT SECT #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.

STABILIZED CONSTRUCTION ENTRANCE/EXIT MAINTENANCE NOTES

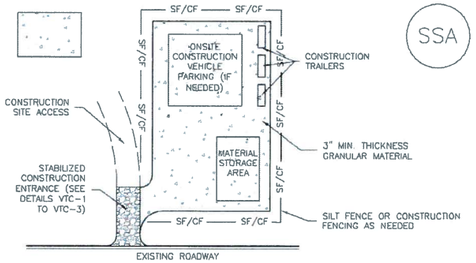
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. ROCK SHALL BE REAPPLIED DR REGRADED AS NECESSARY TO THE STABILIZED ENTRANCE/EXIT TO MAINTAIN A CONSISTENT DEPTH.
5. SEDIMENT TRACKED ONTO PAVED ROADS IS TO BE REMOVED THROUGHOUT THE DAY AND AT THE END OF THE DAY BY SHOVELING OR SWEEPING. SEDIMENT MAY NOT BE WASHED DOWN STORM SEWER DRAINS

VEHICLE TRACKING CONTROL

VTC

Detail 18

SSA



SSA–1. STABILIZED STAGING AREA

STABILIZED STAGING AREA INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   - LOCATION OF STAGING AREA(S).
   - CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM JEFFERSON COUNTY.
2. STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.
3. STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.
4. THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL UNLESS OTHERWISE SPECIFIED BY JEFFERSON COUNTY.
5. ROCK SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL or DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.
6. ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT FENCE AND CONSTRUCTION FENCING.

STABILIZED STAGING AREA MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. ROCK SHALL BE REAPPLIED OR REGRADED IF NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.
5. STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.
6. THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY JEFFERSON COUNTY, USED ON SITE, AND THE AREA COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.

STABILIZED STAGING AREA

SSA

Detail 19

Revisions:	Designed By:		Scale: (As Shown)	JEFFERSON COUNTY DIVISION OF PLANNING & ZONING 100 JEFFERSON COUNTY PARKWAY, SUITE 3550 GOLDEN, COLORADO 80419 (303) 271–8700	G.E.S.C STANDARD NOTES AND DETAILS
	Drawn By:		Date Created: 8/15/2011		
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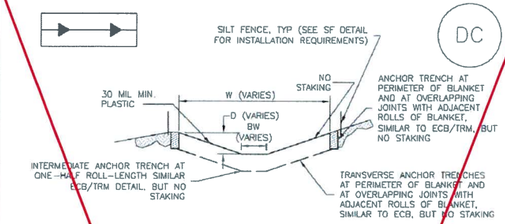
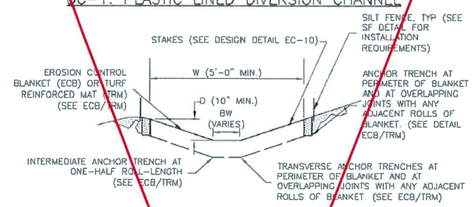
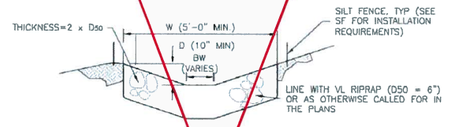
	File: GESC_Details_Sht7.dwg		F.O.R. Date: For Const. Date:		Project No.: / Sheet 7 / Of 9
	File Location: G:\PROJECTS_CAD\Standards\PnZ Ersion Control Details				



DC–1. PLASTIC LINED DIVERSION CHANNEL



DC–2. GEOTEXTILE OR MAT LINED DIVERSION CHANNEL



DC–3. RIPRAP LINED DIVERSION CHANNEL

DIVERSION CHANNEL INSTALLATION NOTES

1 SEE PLAN VIEW FOR
- LOCATION OF DIVERSION CHANNEL
- TYPE OF CHANNEL (UNLINED, GEOTEXTILE OR MAT LINED, PLASTIC LINED, OR RIPRAP LINED)
- LENGTH OF EACH TYPE OF CHANNEL
- DEPTH (D), WIDTH (W), AND BOTTOM WIDTH (BW)
- FOR RIPRAP LINED CHANNEL, SIZE OF RIPRAP, D50 SHALL BE SHOWN ON PLANS

2. SEE DRAINAGE PLANS FOR DETAILS OF PERMANENT CONVEYANCE STRUCTURES.
3. DIVERSION CHANNELS INDICATED ON THE SWMP SHALL BE INSTALLED PRIOR TO WORK IN DOWNGRADIENT AREAS OR NATURAL CHANNELS.
4. FOR E GEOTEXTILE OR MAT LINED CHANNELS INSTALLATION OF GEOTEXTILE OR MAT SHALL CONFORM TO THE REQUIREMENTS OF DETAIL ECB. FOR PLASTIC LINED CHANNELS, INSTALLATION OF ANCHOR TRENCHES SHALL CONFORM TO THE REQUIREMENTS OF DETAIL ECB.
5. WHERE CONSTRUCTION TRAFFIC MUST CROSS A DIVERSION CHANNEL, THE PERMITTEE SHALL INSTALL A TEMPORARY STREAM CROSSING CONFORMING TO THE REQUIREMENTS OF DETAIL TSC.

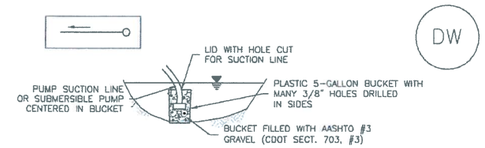
DIVERSION CHANNEL MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. ROCK DIVERSION CHANNELS ARE TO REMAIN IN PLACE UNTIL WORK IN THE DOWNGRADIENT AREA OR NATURAL CHANNEL IS NO LONGER REQUIRED. IF APPROVED BY JEFFERSON COUNTY, DIVERSION CHANNEL MAY BE LEFT IN PLACE.
5. IF DIVERSION CHANNELS ARE REMOVED, THE DISTURBED AREA SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.

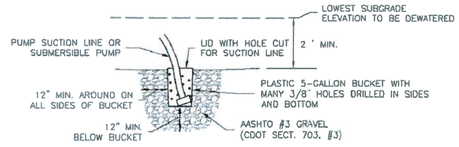
TEMPORARY
DIVERSION CHANNEL

TDC

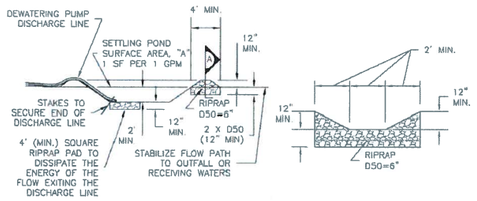
Detail 20



DW–1. DEWATERING POND ALREADY FILLED WITH WATER



DW–2. DEWATERING SUMP FOR SUBMERSED PUMP



DW–3. SUMP DISCHARGE SETTLING BASIN

SETTLING BASIN SECTION A

DEWATERING INSTALLATION NOTES

1 SEE PLAN VIEW FOR
- LOCATION OF DEWATERING EQUIPMENT
- TYPE OF DEWATERING OPERATION (DW-1 TO DW-4)

2. THE OWNER OR CONTRACTOR SHALL OBTAIN A CONSTRUCTION DISCHARGE (DEWATERING) PERMIT FROM THE STATE PRIOR TO ANY DEWATERING OPERATIONS DISCHARGING FROM THE SITE. ALL DEWATERING SHALL BE INA ACCORDANCE WITH THE REQUIREMENTS OF THIS PERMIT.
3. THE OWNER OR OPERATOR SHALL PROVIDE, OPERATE, AND MAINTAIN DEWATERING SYSTEMS OF SUFFICIENT SIZE AND CAPACITY TO PERMIT EXCAVATION AND SUBSEQUENT CONSTRUCTION IN DRY CONDITIONS AND TO LOWER AND MAINTAIN THE GROUNDWATER LEVEL A MINIMUM OF 2-FEET BELOW THE LOWEST POINT OF EXCAVATION AND CONTINUOUSLY MAINTAIN EXCAVATIONS FREE OF WATER UNTIL BACK FILLED TO FINAL GRADE.
4. DEWATERING OPERATIONS SHALL USE ON OR MORE OF THE DEWATERING SUMPS SHOWN ABOVE. WELL POINTS OR OTHER MEANS APPROVED BY JEFFERSON COUNTY TO REDUCE THE PUMPING OF SEDIMENT TO ALLOWABLE LEVELS PRIOR TO RELEASE OFF SITE OR TO A RECEIVING WATER. A SEDIMENT BASIN MAY BE USED IN LIEU OF SUMP DISCHARGE SETTLING BASIN SHOWN ABOVE IF A 4-SQUARE FOOT RIPRAP PAD IS PLACED AT THE DISCHARGE POINT AND THE DISCHARGE END OF THE LINE IS STAKED IN PLACE TO PREVENT MOVEMENT OF THE LINE.

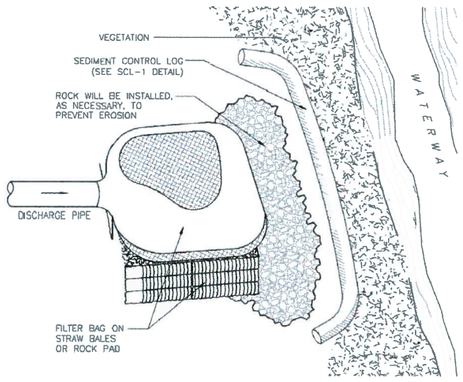
DEWATERING MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. DEWATERING BMPs ARE REQUIRED IN ADDITION TO ALL OTHER PERMIT REQUIREMENTS.
5. TEMPORARY SETTLING BASINS SHALL BE REMOVED WHEN NO LONGER NEEDED FOR DEWATERING OPERATIONS. ANY DISTURBED AREA SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.

DEWATERING
OPERATIONS

DW

Detail 21



DW–4. DEWATERING FILTER BAG

Revisions:	Designed By:		Scale: (As Shown)	JEFFERSON COUNTY DIVISION OF PLANNING & ZONING 100 JEFFERSON COUNTY PARKWAY, SUITE 3550 GOLDEN, COLORADO 80419 (303) 271-8700	G.E.S.C. STANDARD PLANS AND DETAILS
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	File: GESC_Details_Sht8.dwg		F.O.R. Date: For Const. Date:		Project No.: Sheet 8 Of 9
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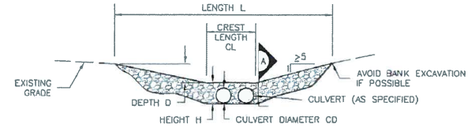
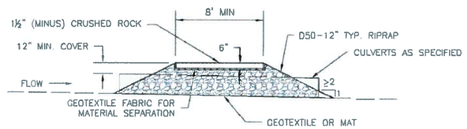
TSC



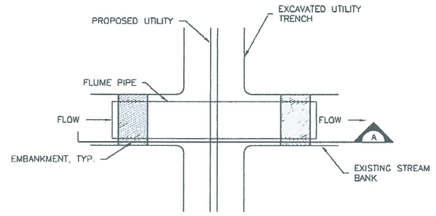
CULVERT CROSSING SECTION



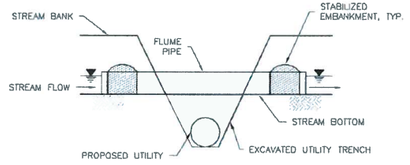
SECTION A

TSC–1. CULVERT CROSSING

TSC

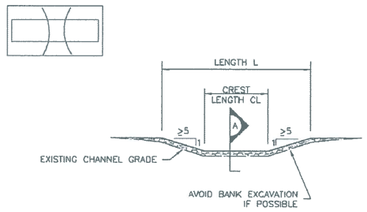


FLUME CROSSING PLAN

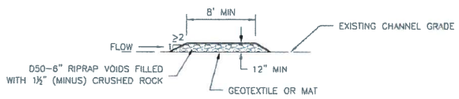


SECTION A

TSC–3. FLUME CROSSING



FORD CROSSING SECTION



SECTION A

TSC–2. FORD CROSSING

TEMPORARY STREAM CROSSING INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   - LOCATION OF TEMPORARY STREAM CROSSINGS.
   - STREAM CROSSING TYPE (FORD, CULVERT, OR FLUME)
   - FOR FORD CROSSING: LENGTH (L), CREST LENGTH (CL) AND DEPTH (D)
   - FOR CULVERT CROSSING: LENGTH (L), CREST LENGTH (CL) AND CROSSING HEIGHT (H), DEPTH (D), CULVERT DIAMETER (CD), AND NUMBER, TYPE, AND CLASS OR GAUGE OF CULVERTS.
2. TEMPORARY STREAM CROSSING DIMENSIONS, D50, AND NUMBER OF CULVERTS INDICATED (FOR CULVERT CROSSINGS) SHALL BE CONSIDERED MINIMUM DIMENSIONS. THE ENGINEER MAY ELECT TO INSTALL LARGER FACILITIES. ANY DAMAGE TO STREAM CROSSING OR EXISTING STREAM CHANNEL DURING BASEFLOW OR FLOOD EVENT SHALL BE IMMEDIATELY REPAIRED.
3. SEE MAJOR DRAINAGE CHAPTER IN UDFCD VOLUME III FOR RIPRAP GRADATIONS.
4. WHERE FAILURE OF A STREAM CROSSING CAN RESULT IN SIGNIFICANT DAMAGE OR HARM, IT MUST BE DESIGNED BY A STRUCTURAL ENGINEER.

TEMPORARY STREAM CROSSING MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. REMOVE SEDIMENT ACCUMULATED UPSTREAM OF CROSSING AS NEEDED TO MAINTAIN THE FUNCTIONALITY OF THE CROSSING.
5. STREAM CROSSINGS ARE TO REMAIN IN PLACE UNTIL NO LONGER NEEDED AND SHALL BE REMOVED PRIOR TO THE END OF CONSTRUCTION.
6. WHEN STREAM CROSSINGS ARE REMOVED, THE DISTURBED AREA SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED AND COVERED WITH GEOTEXTILE OR OTHERWISE STABILIZED IN A MANNER APPROVED BY JEFFERSON COUNTY.

TEMPORARY STREAM CROSSING

TSC

Detail 21

Revisions:	Designed By:		Scale: (As Shown)	JEFFERSON COUNTY DIVISION OF PLANNING & ZONING 100 JEFFERSON COUNTY PARKWAY, SUITE 3550 GOLDEN, COLORADO 80419 (303) 271–8700	G.E.S.C. STANDARD PLANS AND DETAILS
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	Checked By: Staff		Plot Date: 7/26/2012 F.I.R. Date:		Project No.: Sheet 9 Of 9
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