April 4, 2025

Nikie Gagnon
Colorado Division of Reclamation, Mining, and Safety
1313 Sherman St, Rm. 215
Denver, CO 80203

Delivered Via Email
RE: Evans Mining Resource, DRMS File M-2024-056
112 Construction Materials Permit Application - Adequacy #3-5 Response

Nikie Gagnon,

The attached letter addresses each adequacy item in your February 25, 2025, March 13, 2025, and March 19 letters regarding the Evans Mining Resource 112 Permit Application. Feel free to contact me with any questions.

Additionally, we request an extension of the decision date by 30 days to accommodate the public comment period.

Regards,

Sydney Connor,
(719)323-9867
sydney@lewicki.biz

Ben Langenfeld, P.E.
Lewicki & Associates, PLLC
(303) 960-5613
benl@lewicki.biz

February 25, 2025 Adequacy Letter

1. *The Public Notice affidavit from Prairie Mountain Media lists incorrect information for the location of the site. The section should be 36 not 6. Additionally, the Division contacted the consultant, Lewicki and Associates, and determined the notice letter sent to adjacent landowners within 200 feet also lists the incorrect section. Therefore, the Per Rule 1.6.6, if the notice is in error, the Applicant shall be required to publish and mail a new notice of the application. Please rerun the newspaper notice for four consecutive weeks and send corrected notices to all owners of the surface and mineral rights of the affected land, and the owners of record of all land surface within 200 feet of the boundary of the affected land. All applicable deadlines shall begin to run anew based on the new newspaper publication date.*

A new public notice has been issued in the newspaper and to neighbors within 200 feet. Proof of mailing and the affidavit of publishing are provided. Additionally, the corrected notice is provided for the DRMS's records.

2. *The Public notice states, "comment must be in writing and must be received by the Division of Reclamation, Mining, and Safety by 4:00 p.m., 20 days after the final publication of this notice." For clarity, please insert the due date for comments, rather than just stating 20 days after final publication.*

The corrected public notice, which is attached, includes the requested language.

3. *Maps C-2, C-3, F-1, and G-1 depict the inlet/outlet structure in the northeast corner extending outside the permit boundary. Please redraw the permit boundary to show the entire structure within the affected acres and permit boundary and list the acres. If this changes the permitted acres, Per Rule 1.8.1, you will need to submit an amendment application to the Division and place a copy with the County Clerk and Recorder, prior to re-noticing the public for item #1 above. This will set a new decision date for the consideration of the application.*

The inlet/outlet structure location has been revised to stay entirely within the permit boundary. New maps showing the adjusted location are provided. The structure still maintains the same flood protection capacities.

March 13, 2025 Adequacy Letter

In the context of Rule 3.1.6 and our Floodplain Standards, a detailed analysis of the inflow/outflow structure is required. This requirement is described in the Division's Floodplain Protection Standards for Sand and Gravel Pits Adjacent to Rivers and Perennial Streams. The operator has included a detailed design drawing (F-2 Flow Structures), but additional information is needed. Is the design based on a standard methodology from a drainage criteria manual or other source? This must be discussed in Exhibit G. Also, Exhibit G requires a description of how the velocity on the F-2 figure (7.09 feet/second) was determined.

a. The Applicant needs to provide more information on the HEC-RAS model. It appears that this was a 1D model. Explain why a 1D model, rather than a 2D model, is sufficient to estimate flow velocity through the proposed structure.

A 2D HEC-RAS model has been run, as the Division has required.

b. The text on page G-3 discusses the design velocity of 7 feet/second and mentions previous designs that use this value for velocity. The Applicant should provide detailed references for example designs and/or studies that are applicable to this reach of the river. In particular, it would be useful to provide a reference to a related report from the Colorado Water Conservation Board. As an alternative to referencing other designs and reports, the Applicant can provide a detailed report that presents the inputs and assumptions to their HEC-RAS analysis, including cross-sections, the design flow for the 100-year storm, and other important inputs to the model.

A 2D HEC-RAS model for the Evans Mining Resource has been run to confirm the velocity used in the design of the flow structures. A memo on this model and its results can be found in Appendix G-4. Exhibit G has been revised to incorporate this new appendix.

c. On the Flow Structures figure (Exhibit F-2), within the detail for the Pit Side Concrete Cutoff Wall, the label for pitside armoring states that "D50 = 48". The Applicant should indicate if this is correct. If it is correct, why are boulder-sized rocks proposed for this structure, rather than 6-inch riprap, as indicated in the notes of this figure?

The pitside armoring has been corrected. See the attached revised Map F-2.

March 19, 2025 Letter

Exhibit S – Permanent Man-Made Structures (Rule 6.4.19): In accordance with Rule 6.4.19, when mining operations will adversely affect the stability of any significant, valuable and permanent man-made structure located within 200 feet of the affected area the applicant shall provide a notarized agreement between the applicant and the person(s) having an interest in the structure, that the applicant is to provide compensation for any damage to the structure. Please submit the signed/notarized structure agreements to the Division for each structure listed on Table S-1.

Applicant Response: No structure agreements were signed by the owners listed in Table S-1. If any agreements are received in the future, they will be provided to the Division.

***Additional Comment:** The Division reviewed Table S-1, the C-1 Baseline map, and the mailing receipts submitted to the Division in the adequacy response. Based on the Weld County Property Portal map, there are several residences, outbuildings, fences, utility structures, and groundwater wells located on the parcels listed below for which no evidence was submitted demonstrating an attempt was made to obtain a notarized structure agreement. Please revise Table S-1 to include all structures within 200 feet of the affected area and submit either a signed and notarized structure agreement for each or provide sufficient evidence that an attempt was made to obtain and agreement with the structure owners. Parcels: R2747286, R2753286, R4378986, R8952790, R2751386, R2751486, R8962584, and R2747186*

Map C-1 and Exhibit S have been revised to include all structures within 200-ft of the affected area. The revised components and the appropriate structure agreement notices are attached.

The applicant states, "In the event that a structure agreement is unobtainable, defer to the Geotechnical Stability Exhibit which indicates that all structures will be protected." A Geotechnical Evans Mining Resource 5th Adequacy Review Page 2 of 3 Stability Exhibit was not included in the application package. Pursuant to Rule 6.4.19, the Division requires the Applicant to demonstrate that they attempted to obtain notarized structure agreements with all owners of the structures within 200 feet of the affected area of the proposed mine site. This attempt must be made prior to the Division's consideration of a stability analysis. Please provide this demonstration; this can be in the form of certified mailing receipts or similar documentation.

***Applicant Response:** The geotechnical stability exhibit and structure agreement mailing receipts are provided with this letter.*

Additional Comment: Per Rule 6.5, the applicant submitted a Geotechnical Stability Exhibit which states that slurry walls will be 30-ft. away from the edge of mining. Map C-2 shows a minimum 20- foot setback from the edge of the slurry wall to mining and Map F-1 shows a minimum 10-foot setback from the slurry wall to the reclaimed pond. Additionally, the cross sections in C-3 show both, a 10-foot and a 20-foot setback. Please revise the maps and the cross sections to show minimum 30-foot setback from the slurry wall to the edge of mining consistent with the Geotech Stability Exhibit text. Additionally, the Division is particularly concerned with the stability of the slopes on the east side of the Phase 6 area, adjacent to the Conover Property. Based on the Weld County Property Portal map, the adjacent property contains a residence, outbuildings, a driveway, and a groundwater well, within 200 feet of the affected area. Per Rule 6.5(2), please submit a slope stability analysis for the east side of Phase 6 and which addresses structures or facilities that could be adversely affected by slope failure in this area.

The geotechnical stability exhibit has been revised to state the minimum setback is 10-ft from the slurry wall to the crest of the reclaimed pond slope. The analysis in the geotechnical stability exhibit is unchanged by this revision.

An additional analysis has been incorporated into the geotechnical stability exhibit. It addresses the Conover Property.

It should be noted by the Division that the slope stability analysis in the geotechnical stability exhibit shows that there is no risk to **any structure** outside the mining slope, including structures outside the Evans property.

Attachments

- Newspaper Publishing Affidavit
- Proof of Neighbor Notice
- Corrected Public Notice
- Maps C-2, C-3, F-1, F-2 and G-1
- Revised Exhibit G and Appendix G-4
- Revised Exhibit S
- Revised Geotechnical Stability Exhibit

PUBLIC NOTICE

Asphalt Specialties; 345 W 62nd Avenue, Denver, Colorado 80216, (303) 289-8555, has filed an application for a Regular (112) Construction Materials Operation Reclamation Permit with the Colorado Mined Land Reclamation Board under provisions of the Colorado Land Reclamation Act for the Extraction of Construction Materials. The proposed mine is known as the Evans Mining Resource, and is located at or near Section 36, Township 5N, Range 66W, 6th Prime Meridian.

The proposed date of commencement is April 2025, and the proposed date of completion is April 2046. The proposed future use of the land is Rangeland and Water Storage Ponds. Additional information and tentative decision date may be obtained from the Division of Reclamation, Mining and Safety, 1313 Sherman St, Room 215, Denver, Colorado 80203, (303) 866-3567, or at the Weld County Clerk and Recorder's Office, 1250 H Street, Greeley, Colorado 80631, or the above-named applicant.

Comments must be in writing and must be received by the Division of Reclamation, Mining, and Safety by April 11, 2025, at 4:00p.m., 20 days after the final publication of this notice.

Please note that under the provisions of C.R.S. 34-32.5-101 et seq. Comments related to noise, truck traffic, hours of operation, visual impacts, effects on property values and other social or economic concerns are issues not subject to this Office's jurisdiction. These subjects, and similar ones, are typically addressed by your local governments, rather than the Division of Reclamation, Mining, and Safety or the Mined Land Reclamation Board.

Published: Greeley Tribune March 1, 8, 15, 22, 2025-2101782

Prairie Mountain Media, LLC

PUBLISHER'S AFFIDAVIT

County of Weld
State of Colorado

The undersigned, Agent, being first duly sworn under oath, states and affirms as follows:

1. He/she is the legal Advertising Reviewer of Prairie Mountain Media LLC, publisher of the *Greeley Tribune*.
2. The *Greeley Tribune* is a newspaper of general circulation that has been published continuously and without interruption for at least fifty-two weeks in Weld County and meets the legal requisites for a legal newspaper under Colo. Rev. Stat. 24-70-103.
3. The notice that is attached hereto is a true copy, published in the *Greeley Tribune* in Weld County on the following date(s):

Mar 1, 8, 15, 22, 2025

Melissa Najera
Signature

Subscribed and sworn to me before me this 24th day of March, 2025.

Shayla Najera
Notary Public

(SEAL)

SHAYLA NAJERA
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20174031965
MY COMMISSION EXPIRES July 31, 2025

Account:	1064948
Ad Number:	2101782
Fee:	$197.20

PUBLIC NOTICE

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U.S. Postal Service
Certified Mail Receipt

OUTBOUND TRACKING NUMBER
9414 7118 9956 0939 1218 78

RETURN RECEIPT TRACKING NUMBER
9490 9118 9956 0939 1217 11

FEES

Postage per piece	$0.690
Certified Fee	$4.850
Return Receipt Fee	$4.100
Total Postage & Fees:	**$9.640**

ARTICLE ADDRESS TO:

Jerry Loeffler
23896 County Road 35
La Salle CO 80645-7805

Postmark Here

TOWER POST OFFICE
MAR 0 8 2025
AURORA, CO. 80015

U.S. Postal Service
Certified Mail Receipt

OUTBOUND TRACKING NUMBER
9414 7118 9956 0939 1478 61

RETURN RECEIPT TRACKING NUMBER
9490 9118 9956 0939 1478 27

FEES

Postage per piece	$0.690
Certified Fee	$4.850
Return Receipt Fee	$4.100
Total Postage & Fees:	**$9.640**

ARTICLE ADDRESS TO:

Hunt Brothers Properties Inc
10100 Dallas St
Commerce City CO 80640-8491

Postmark Here

TOWER POST OFFICE
MAR 0 8 2025
AURORA, CO. 80015

U.S. Postal Service
Certified Mail Receipt

OUTBOUND TRACKING NUMBER
9414 7118 9956 0939 1461 61

RETURN RECEIPT TRACKING NUMBER
9490 9118 9956 0939 1461 27

FEES

Postage per piece	$0.690
Certified Fee	$4.850
Return Receipt Fee	$4.100
Total Postage & Fees:	**$9.640**

ARTICLE ADDRESS TO:

Jenna and David Conover
17509 County Road 394
La Salle CO 80645-7716

Postmark Here

TOWER POST OFFICE
MAR 0 8 2025
AURORA, CO. 80015

U.S. Postal Service
Certified Mail Receipt

OUTBOUND TRACKING NUMBER
9414 7118 9956 0939 1790 08

RETURN RECEIPT TRACKING NUMBER
9490 9118 9956 0939 1790 95

FEES

Postage per piece	$0.690
Certified Fee	$4.850
Return Receipt Fee	$4.100
Total Postage & Fees:	**$9.640**

ARTICLE ADDRESS TO:

Diana Mendoza and Luis Villalobos
17231 County Road 394
La Salle CO 80645-7716

Postmark Here

TOWER POST OFFICE
MAR 0 8 2025
AURORA, CO. 80015

U.S. Postal Service
Certified Mail Receipt

OUTBOUND TRACKING NUMBER
9414 7118 9956 0939 1727 95

RETURN RECEIPT TRACKING NUMBER
9490 9118 9956 0939 1727 44

FEES

Postage per piece	$0.690
Certified Fee	$4.850
Return Receipt Fee	$4.100
Total Postage & Fees:	**$9.640**

ARTICLE ADDRESS TO:

Dream Family Revocable Trust
17043 County Road 394
La Salle CO 80645-7716

Postmark Here

TOWER POST OFFICE
MAR 0 8 2025
AURORA, CO. 80015

U.S. Postal Service
Certified Mail Receipt

OUTBOUND TRACKING NUMBER
9414 7118 9956 0939 1768 61

RETURN RECEIPT TRACKING NUMBER
9490 9118 9956 0939 1768 27

FEES

Postage per piece	$0.690
Certified Fee	$4.850
Return Receipt Fee	$4.100
Total Postage & Fees:	**$9.640**

ARTICLE ADDRESS TO:

Liam Mccury Teague
17011 County Road 394
Evans CO 80645-7716

Postmark Here

TOWER POST OFFICE
MAR 0 8 2025
AURORA, CO. 80015

U.S. Postal Service
Certified Mail Receipt

OUTBOUND TRACKING NUMBER
9414 7118 9956 0939 1920 52

RETURN RECEIPT TRACKING NUMBER
9490 9118 9956 0939 1920 63

FEES

Postage per piece	$0.690
Certified Fee	$4.850
Return Receipt Fee	$4.100
Total Postage & Fees:	**$9.640**

ARTICLE ADDRESS TO:

William Folley
16957 County Road 394
La Salle CO 80645-7712

Postmark Here

TOWER POST OFFICE
MAR 0 8 2025
AURORA, CO. 80015

U.S. Postal Service
Certified Mail Receipt

OUTBOUND TRACKING NUMBER
9414 7118 9956 0939 1976 44

RETURN RECEIPT TRACKING NUMBER
9490 9118 9956 0939 1976 86

FEES

Postage per piece	$0.690
Certified Fee	$4.850
Return Receipt Fee	$4.100
Total Postage & Fees:	**$9.640**

ARTICLE ADDRESS TO:

City of Aurora
15151 E Alameda Pkwy # 3200
Aurora CO 80012-1555

Postmark Here

TOWER POST OFFICE
MAR 0 8 2025
AURORA, CO. 80015

U.S. Postal Service
Certified Mail Receipt

OUTBOUND TRACKING NUMBER
9414 7118 9956 0939 1276 10

RETURN RECEIPT TRACKING NUMBER
9490 9118 9956 0939 1276 52

FEES

Postage per piece	$0.690
Certified Fee	$4.850
Return Receipt Fee	$4.100
Total Postage & Fees:	**$9.640**

ARTICLE ADDRESS TO:

Phyllis Burkgren
1890 S Marshall Cir
Lakewood CO 80232-7086

Postmark Here

TOWER POST OFFICE
MAR 0 8 2025
AURORA, CO. 80015

U.S. Postal Service
Certified Mail Receipt

OUTBOUND TRACKING NUMBER
9414 7118 9956 0939 1259 06

RETURN RECEIPT TRACKING NUMBER
9490 9118 9956 0939 1259 93

FEES

Postage per piece	$0.690
Certified Fee	$4.850
Return Receipt Fee	$4.100
Total Postage & Fees:	**$9.640**

ARTICLE ADDRESS TO:

City of Evans
1100 37th St
Evans CO 80620-2036

Postmark Here

TOWER POST OFFICE
MAR 0 8 2025
AURORA, CO. 80015

U.S. Postal Service
Certified Mail Receipt

OUTBOUND TRACKING NUMBER
9414 7118 9956 0939 1202 46

RETURN RECEIPT TRACKING NUMBER
9490 9118 9956 0939 1202 88

FEES

Postage per piece	$0.690
Certified Fee	$4.850
Return Receipt Fee	$4.100
Total Postage & Fees:	**$9.640**

ARTICLE ADDRESS TO:

Roger & Bonnie Piel
17645 County Road 394
La Salle CO 80645-7716

Postmark Here

TOWER POST OFFICE
MAR 0 8 2025
AURORA, CO. 80015

U.S. Postal Service
Certified Mail Receipt

OUTBOUND TRACKING NUMBER
9414 7118 9956 0939 1234 14

RETURN RECEIPT TRACKING NUMBER
9490 9118 9956 0939 1234 56

FEES

Postage per piece	$0.690
Certified Fee	$4.850
Return Receipt Fee	$4.100
Total Postage & Fees:	**$9.640**

ARTICLE ADDRESS TO:

Cade Brodbeck and George Sagner
14054 W 84th Pl
Arvada CO 80005-5880

Postmark Here

TOWER POST OFFICE
MAR 0 8 2025
AURORA, CO. 80015

U.S. Postal Service
Certified Mail Receipt

OUTBOUND TRACKING NUMBER
9414 7118 9956 0939 1292 01

RETURN RECEIPT TRACKING NUMBER
9490 9118 9956 0939 1292 98

FEES

Postage per piece	$0.690
Certified Fee	$4.850
Return Receipt Fee	$4.100
Total Postage & Fees:	**$9.640**

ARTICLE ADDRESS TO:

Esther M Schank
4020 54th Street Rd
Greeley CO 80634-9147

Postmark Here

TOWER POST OFFICE
MAR 0 8 2025
AURORA, CO. 80015

U.S. Postal Service
Certified Mail Receipt

OUTBOUND TRACKING NUMBER
9414 7118 9956 0939 1996 62

RETURN RECEIPT TRACKING NUMBER
9490 9118 9956 0939 1996 28

FEES

Postage per piece	$0.690
Certified Fee	$4.850
Return Receipt Fee	$4.100
Total Postage & Fees:	**$9.640**

ARTICLE ADDRESS TO:

Jodi and David Miles
23981 County Road 35
La Salle CO 80645-7804

Postmark Here

TOWER POST OFFICE
MAR 0 8 2025
AURORA, CO. 80015

STRUCTURE OWNERS

NUMBER	STRUCTURE	OWNER	MAILING ADDRESS	CITY	STATE	ZIP
1	OIL TANKS, SEPARATOR, EQUIPMENT	PDC ENERGY	1775 SHERMAN ST SUITE 3000	DENVER	CO	80203
2	35TH AVE ROW & BARN	CITY OF EVANS	1100 37TH STREET	EVANS	CO	80620
3	IRRIGATION DITCH	GODFREY DITCH CO.	23896 WCR 35	LA SALLE	CO	80645
4	POWER POLES AND ELECTRIC CABLE	XCEL ENERGY	1123 W 3RD AVE	DENVER	CO	80223
5	WATER PIPE	WELD COUNTY	2235 2ND AVE	GREELEY	CO	80631
6	BURIED COMMUNICATION ASSETS	CENTURY LINK	2505 1ST AVE ROOM CO3.23	GREELEY	CO	80631
7	CR 394 ROW	WELD COUNTY	1150 0 ST	GREELEY	CO	80631
8	GAS LINES & METER STATION	CP MIDSTREAM LLC	370 17TH ST, SUITE 2500	DENVER	CO	80202
9	GAS LINE	ATMOS ENERGY	1200 11TH AVE	GREELEY	CO	80631
10	AUGMENTATION POUNDS, FENCES, ROAD	CITY OF AURORA	15151 E ALAMEDA PKWY #3200	AURORA	CO	80012
11	FENCES, DIRT ROAD	SCHANK ESTHER M	4020 54TH STREET RD	GREELEY	CO	80221
12	FENCES, DIRT ROAD	BRODBECK CADE K	14054 W 84TH PL	ARVADA	CO	80005
13	FENCES, DIRT ROAD	SAGNER GEORGE W	14054 W 84TH PL	ARVADA	CO	80005
14	RESIDENCES, SHEDS, DIRT ROAD, WELL	DREAM FAMILY REVOCABLE TRUST	17043 COUNTY RD 394	LA SALLE	CO	80645
15	RESIDENCES, SHEDS, DIRT ROADS, FENCES	FOLLEY WILLIAM	16957 COUNTY RD 394	LA SALLE	CO	80645
16	RESIDENCES, SHEDS, DIRT ROADS, FENCES	MCCURY TEAGUE	17011 COUNTY ROAD 394	EVANS	CO	80645
17	WELL	MARTIN HERNANDEZ	3216 RED TAIL WAY	EVANS	CO	80620
18	RESIDENCES, SHEDS, DIRT ROADS, FENCES	MENDOZA DIANA & VILLALOBOS LUIS	17231 COUNTY RD 394	LA SALLE	CO	80645
19	FENCES, ROADS, SOLAR PANELS, OTHER RELATED STRUCTURES	LOEFFLER JERRY	23896 COUNTY RD 35	LA SALLE	CO	80645
20	FENCES, ROADS, RESIDENCES, SHEDS, WELL, OTHER RELATED STRUCTURES	CONOVER JENNA & DAVID	17509 COUNTY RD 394	LA SALLE	CO	80645

LEGEND

BUILDINGS AND RELATED STRUCTURES
- Building
- Tanks
- Fence
- Easements

LAND SURVEYS
- Mining claim or property boundary
- City Boundary

ROADS AND RELATED FEATURES
- Highway
- Light duty road, gravel

RIVERS, LAKES, SHORELINES, AND CANALS
- Perennial stream/ditch
- Perennial river
- Perennial lake/pond
- Waterwell (Well Permit No. Owner)
- Floodplain & Floodway

VEGETATION
- Agricultural Fields
- NWI Wetlands
- Existing Trees
- Soils (NRCS) (Soil ID)

TRANSMISSION LINES AND PIPELINES
- Power transmission line; pole; tower

MINING FEATURES
- DRMS Permit Boundary
- 200' Offset of DRMS Permit Boundary
- 600' Offset of DRMS Permit Boundary
- Affected Area Boundary
- Mining Disturbance Boundary

BASELINE CONTOURS
- Index (Approximate of indefinite)
- Intermediate (Approximate of indefinite)
- Supplementary

SOUTH PLATTE RIVER

R8957230 R2752286 R6784352 R2457603 R2457703

ASPHALT SPECIALTIES CO INC (GERAS, GREG) 332481-

ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332482-

0.25 Mile Eagle Nest Radius

UNDERGROUND GAS PIPELINES

AURORA WATER LINE EASEMENT

SORIN NATURAL RESOURCES PARTNERS LLC 55479-MH

CENTERLINE OF PIPELINE EASEMENT

R2747086 R2747186 R8955593 R8962585 R2751786

ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332483-

GAS PIPELINE EASEMENT

R8962584

ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332484-

CONOVER JR, DAVID 28406-

R2751886

ENTIRE NORTHERN PORTION OF SITE IN FLOODWAY

ENTIRE SOUTHERN PORTION OF SITE IN 100-YR FLOODPLAIN

ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332478-

SORIN NATURAL RESOURCES PARTNERS LLC 55498-MH

EXISTING INDUSTRIAL / COMMERCIAL AREA HMA PLANT & AGGREGATE RECYCLING OPERATIONS APPROX. 9.5 AC.

EXISTING INDUSTRIAL / COMMERCIAL AREA OFFICE, TRUCK SALES, & WASH PLANT OPERATIONS APPROX. 11 AC.

EXISTING SITE ACCESS WITH EASEMENT

R2751386 R2751586

HERNANDEZ MARTIN 3216?

R8952790 R2753286 R2751486

ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332479-

CO RD 394

PERMIT & AFFECTED AREA: 159.2 ACRES

GODFREY DITCH

R2747286 R4379286 R4378986 R4378886

GURNEY, NORMAN 103102-

ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332480-

C-1 Baseline Map

Evans Pit

DRMS Permit Number: N/A — **Asphalt Specialties**

Mine Entry Location:	Latitude: 40.06158	Longitude: -104.81903	
State: COLORADO	County: Weld	Nearest Town: Evans	
Section: 35 & 36	Township: 5N	Range: 66W	PM: 6th
Major Watershed:	South Platte River	MSHA ID: -----	

Map Scale: 1": 200'

0 200 400

Map Georeferencing Information: Datum: NAD83 — Projection: CO NORTH

Survey Source: Drone	**Drawn by:** SAC	Date: 4/30/24
Imagery Source: GoogleEarth	**Checked by:** BHM	Date: -----
Survey Date: 2019	**Approved by:** -----	Date: -----
Imagery Date: 2023		

File Name: Evans Pit Maps

Lewicki & Associates

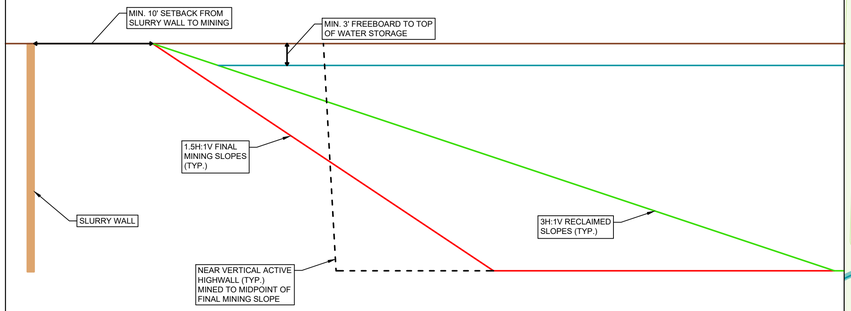
3375 West Powers Circle, Littleton, CO USA 80123 — (303)-346-5196 — info@lewicki.biz

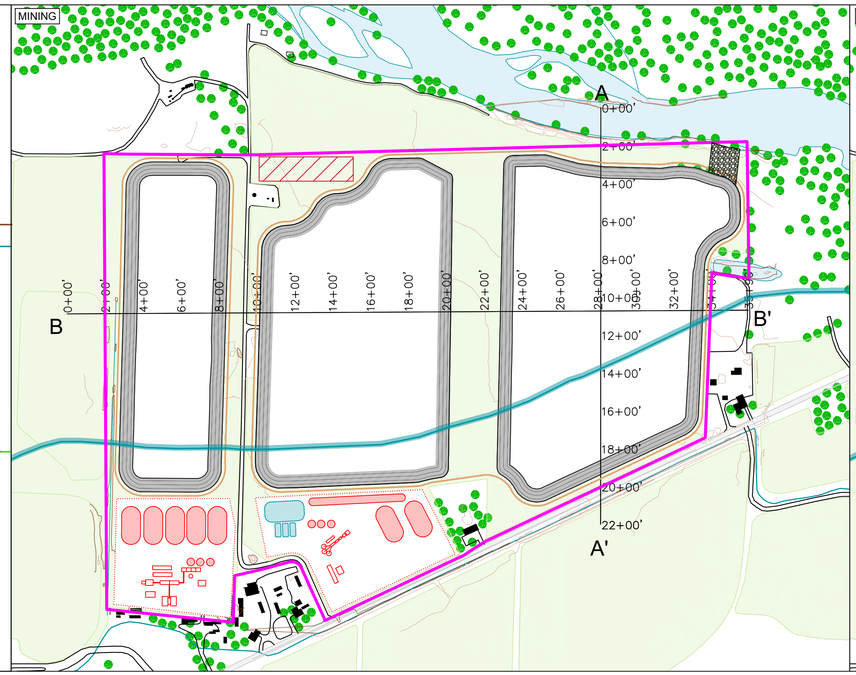
PROPERTY OWNERS

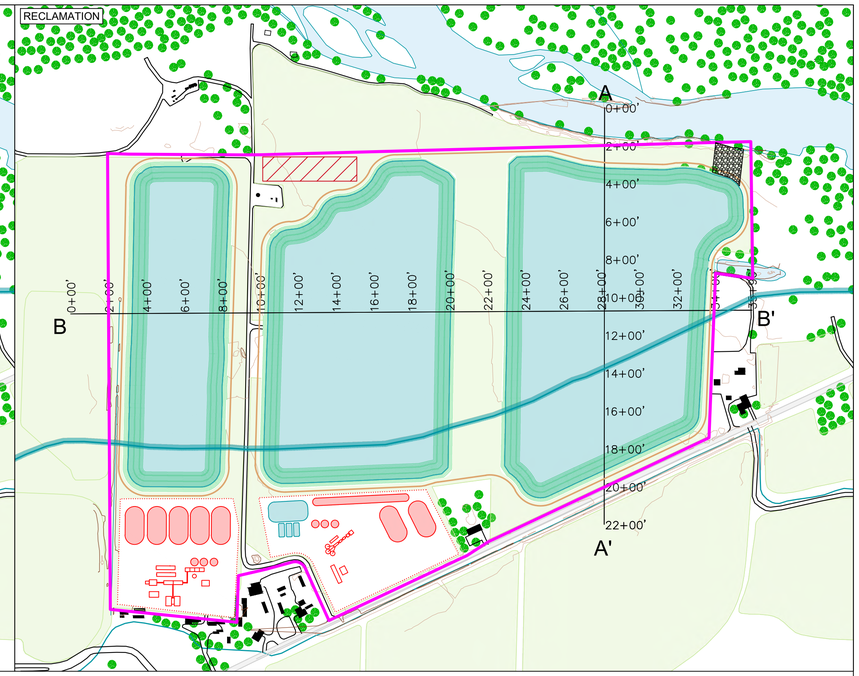
ACCOUNT NUMBER	PARCEL NUMBER	NAME	ADDRESS	CITY	STATE	ZIP
R2747186	095935000005	HUNT BROTHERS PROPERTIES INC	10100 DALLAS ST	HENDERSON	CO	80640
R8955593	095936300040	"	"	"	"	"
R8962585	095936300042	"	"	"	"	"
R8962584	095936300041	CONOVER JENNA & DAVID JR	17509 COUNTY RD 394	LA SALLE	CO	806457
R2751386	095936000008	MENDOZA DIANA & VILLALOBOS LUIS	17231 COUNTY RD 394	LA SALLE	CO	806457
R8955592	095936300039	"	"	"	"	"
R8952790	095936300037	DREAM FAMILY REVOCABLE TRUST	17043 COUNTY RD 394	LA SALLE	CO	806457
R2753286	095936000032	MCCURY TEAGUE LIAM	17011 COUNTY RD 394	EVANS	CO	806457
R2747286	095935000006	FOLLEY WILLIAM ERIC	16957 COUNTY RD 394	LA SALLE	CO	80645
R4378986	105702000051	"	"	"	"	"
R4378886	105702000050	MILES JODI & DAVID	23981 COUNTY RD 35	LA SALLE	CO	806457
R4379286	105702000056	CITY OF AURORA	15151 E ALAMEDA PKWY #3200	AURORA	CO	800121
R2747086	095935000004	"	"	"	"	"
R2457703	095935105014	SCHANK ESTHER M	4020 54TH STREET RD	GREELEY	CO	806349
R2457603	095935105013	"	"	"	"	"
R8957230	095936201002	BRODBECK CADE & SAGNER GEORGE	14054 W 84TH PL	ARVADA	CO	800055
R2752286	095936000017	CITY OF EVANS	1100 37TH ST	EVANS	CO	806202
R6784352	095936100019	"	"	"	"	"
R2751786	095936000012	PIEL ROGER & BONNIE	17645 COUNTY RD 394	LA SALLE	CO	806457
R2751886	095936000013	BURKGREN PHYLLIS	1890 S MARSHALL CIR	LAKEWOOD	CO	802327
R2751586	095936000010	"	"	"	"	"
R2751486	095936000009	LOEFFLER JERRY L	23896 COUNTY RD 35	LA SALLE	CO	806457

LEGEND
BUILDINGS AND RELATED STRUCTURES
Building
Tanks
Fence
Easements
LAND SURVEYS
Mining claim or property boundary
ROADS AND RELATED FEATURES
Highway
Light duty road, gravel
RIVERS, LAKES, SHORELINES, AND CANALS
Perennial stream/ditch
Perennial river
Perennial lake/pond
Waterwell
Floodplain & Floodway
VEGETATION
Agricultural Fields
NWI Wetlands
Existing Trees
TRANSMISSION LINES AND PIPELINES
Power transmission line; pole; tower
MINING FEATURES
DRMS Permit/Affected Boundary
Mining Disturbance Extent
Berm/windrow
Slurry Wall
BASELINE CONTOURS
Index
Approximate of indefinite
Intermediate
Approximate of indefinite
Supplementary
POST-MINING CONTOURS
Index
Approximate of indefinite
Intermediate
Approximate of indefinite
Dump
SOUTH PLATTE RIVER
MIN. 20' SETBACK FROM PROPERTY BOUNDARY
WATER INFILTRATION GALLERY DESIGN TBD
ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332481-
MIN. 150' SETBACK FROM RIVER TO MINING
INFLOW / OUTFLOW STRUCTURE SEE MAP F-2
150' RIVER HIGH WATER LINE SETBACK
MIN 20' SETBACK FROM PROPERTY BOUNDARIES
ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332482-
2H:1V MINING SLOPES (TYP.)
MIN. SLURRY WALL RADIUS 150'
0.25 Mile Eagle Nest Radius
400' RIVER HIGH WATER LINE SETBACK
500' RIVER HIGH WATER LINE SETBACK
FRENCH DRAIN OUTSIDE AND UPSTREAM OF SLURRY WALL SEE DETAIL 1 (APPROX. 0.0013H:1V SOUTH TO NORTH SLOPE)
MIN 15' SETBACK FROM AURORA EASEMENT CENTERLINE TO SLURRY WALL
PHASE 2 GENERAL MINING DIRECTION
PHASE 3 GENERAL MINING DIRECTION
PHASE 5 GENERAL MINING DIRECTION
PHASE 6 GENERAL MINING DIRECTION
PHASE 4 GENERAL MINING DIRECTION
NATURAL GAS PIPELINE CORRIDOR NO MINING (APPROX. 250' WIDE, MAY VARY)
MIN. 20' FROM UTILITIES TO MINING
PARTIALLY BACKFILL POND
ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332483-
GAS STRUCTURES REMOVED
MIN 10' SETBACK FROM SLURRY WALL TO MINING
2H:1V MINING SLOPES (TYP.)
SLURRY WALL A
NO STRUCTURES OR STOCKPILING IN FLOODWAY
ENTIRE SOUTHERN PORTION OF SITE IN 100-YR FLOODPLAIN
MIN. SLURRY WALL RADIUS 150'
SLURRY WALL B
ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332478-
ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332480-
MATERIAL STOCKPILES (TYP.)
TOPSOIL / OVERBURDEN STOCKPILE (TYP.)
EXISTING INDUSTRIAL / COMMERCIAL AREA HMA PLANT & AGGREGATE RECYCLING OPERATIONS APPROX. 9.5 AC.
600' FROM SOUTH PROPERTY BOUNDARY TO SLURRY WALL
FRESHWATER & WASH PONDS (TYP.)
EXISTING INDUSTRIAL / COMMERCIAL AREA OFFICE, TRUCK SALES, & WASH PLANT OPERATIONS APPROX. 11 AC.
CO RD 394
PERMIT & AFFECTED AREA: 159.2 ACRES
ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332479-
SITE ACCESS
DETAIL 1: FRENCH DRAIN DESIGN (TYP.)
RIVER STONE
EXISTING GRADE
EXISTING GRADE
1' DEPTH BELOW GROUNDWATER (APPROX. 4666' WATER LEVEL AT MW-1)
#57 GRAVEL
FILTER CLOTH
4" PERFORATED TUBE WRAPPED IN FILTER CLOTH
NOTE: NOT TO SCALE
HIGH RIVER LINE SETBACK DETAILS:
150 Feet: Minimum Setback to Mining with Pitside and Riverside Armoring (Inflow/Outflow Structure)
400 Feet: Minimum Setback to Mining with no Armoring
500 Feet: Setback from river for CPW Timing Limitations for Mule Deer HPH (No new ground disturbances from Dec. 1 - Apr. 30)
0.25 MILE ACTIVE EAGLE NEST SETBACK:
Timing Limitation: No new ground disturbances (Dec.1 - Jul. 31)
C-2 Mining Map
Evans Pit
DRMS Permit Number: N/A
Asphalt Specialties
Mine Entry Location: Latitude: 40.06158 Longitude: -104.81903
State: COLORADO County: Weld Nearest Town: Evans
Section: 35 & 36 Township: 5N Range: 66W PM: 6th
Major Watershed: South Platte River MSHA ID: ----
Map Scale: 1": 200'
0
200
400
N
Map Georeferencing Information: Datum: NAD83 Projection: CO NORTH
Survey Source: Drone
Imagery Source: GoogleEarth
Survey Date: 2019
Imagery Date: 2023
Drawn by: SAC Date: 4/30/24
Checked by: BHM Date: ----
Approved by: ---- Date: ----
File Name: Evans Pit Maps
Lewicki & Associates
3375 West Powers Circle Littleton, CO USA 80123
(303)-346-5196
info@lewicki.biz

DETAIL 1 - TYPICAL SLOPES







LEGEND

ROADS AND RELATED FEATURES
- Highway
- Light duty road, gravel

RIVERS, LAKES, SHORELINES, AND CANALS
- Perennial stream/ditch
- Perennial river
- Perennial lake/pond
- Floodplain & Floodway

MINING FEATURES
- DRMS Permit/Affected Boundary
- Slurry Wall

VEGETATION
- Agricultural Field
- NWI Wetlands

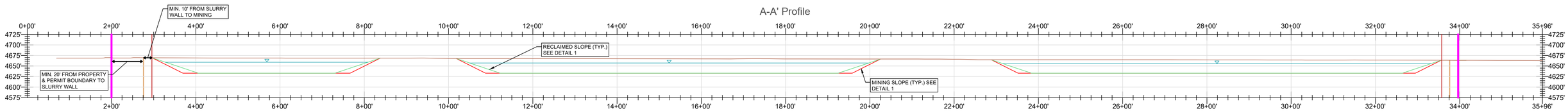
TRANSMISSION LINES AND PIPELINES
- Power transmission line; pole; tower

BASELINE CONTOURS
- Index
- Intermediate

POST-MINING CONTOURS
- Index
- Intermediate

POST-RECLAMATION CONTOURS
- Index
- Intermediate

A-A' Profile

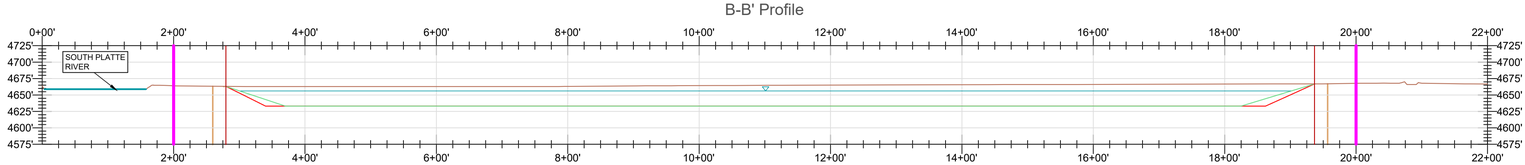


CROSS SECTION LEGEND

MINING FEATURES
- DRMS Permit Boundary
- Disturbance Limit

CROSS SECTIONS
- Baseline Topography
- Mining
- Reclamation
- Anticipated Lake Level
- Slurry Wall

B-B' Profile



C-3 Cross Sections

Evans Pit

DRMS Permit Number: N/A — **Asphalt Specialties**

Mine Entry Location:	Latitude: 40.06158	Longitude: -104.81903
State: COLORADO	County: Weld	Nearest Town: Evans
Section: 35 & 36	Township: 3N	Range: 66W PM: 6th
Major Watershed:	South Platte River	MSHA ID: ----

Map Scale: 1"=400'

0 400 800 N

Map Georeferencing Information: **Datum:** NAD83 **Projection:** CO NORTH

Survey Source: Drone
Imagery Source: GoogleEarth
Survey Date: 2019
Imagery Date: 2023

Drawn by: SAC — Date: 4/30/24
Checked by: BHM — Date: ----
Approved by: ---- — Date: ----

File Name: Evans Pit Maps

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COLORADO LICENSED — BRIAN H. LEWICKI — 47751 — PROFESSIONAL ENGINEER — 05/20/24

SOUTH PLATTE RIVER

FRENCH DRAIN (SEE MAP C-2 FOR DETAILS)

WATER INFILTRATION GALLERY DESIGN TBD

ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332481-

ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332482-

INFLOW / OUTFLOW STRUCTURE SEE MAP F-2

MIN. 150' SETBACK FROM RIVER

3H:1V RECLAMATION SLOPES (TYP.)

WATER STORAGE POND MAX. 19.0 ACRES SOME OR ALL OF THE POND MAY BE BACKFILLED WITH A TECHNICAL REVISION

WATER STORAGE POND MAX. 35.0 ACRES SOME OR ALL OF THE POND MAY BE BACKFILLED WITH A TECHNICAL REVISION

WATER STORAGE POND MAX. 40 ACRES SOME OR ALL OF THE POND MAY BE BACKFILLED WITH A TECHNICAL REVISION

PARTIALLY BACKFILL POND

ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332483-

MIN. 10' SETBACK FROM SLURRY WALL TO RECLAIMED POND

ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332478-

INDUSTRIAL AREAS REMAIN AFTER RECLAMATION

SITE ACCESS

CO RD 394

ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332479-

ASPHALT SPECIALTIES CO INC (GERAS, GREG) MONITORING WELL 332480-

PERMIT & AFFECTED AREA: 159.2 ACRES

LEGEND

BUILDINGS AND RELATED STRUCTURES
- Building
- Tanks
- Fence
- Easements

LAND SURVEYS
- Mining claim or property boundary
- City Boundary

ROADS AND RELATED FEATURES
- Highway
- Light duty road, gravel

RIVERS, LAKES, SHORELINES, AND CANALS
- Perennial stream/ditch
- Perennial river
- Perennial lake/pond
- Waterwell (Well Name)
- Floodplain & Floodway

VEGETATION
- Agricultural Fields
- NWI Wetlands
- Existing Trees

TRANSMISSION LINES AND PIPELINES
- Power transmission line; pole; tower

MINING FEATURES
- DRMS Permit/Affected Boundary
- Mining Disturbance Extent
- Berm/windrow
- Slurry Wall

BASELINE CONTOURS
- Index
  - Approximate of indefinite
- Intermediate
  - Approximate of indefinite
- Supplementary

POST-MINING CONTOURS
- Index
  - Approximate of indefinite
- Intermediate
  - Approximate of indefinite
- Dump

F-1 Reclamation Map

Evans Pit

DRMS Permit Number: N/A — **Asphalt Specialties**

Mine Entry Location:	Latitude: 40.06158	Longitude: -104.81903
State: COLORADO	County: Weld	Nearest Town: Evans
Section: 35 & 36	Township: 5N	Range: 66W PM: 6th
Major Watershed:	South Platte River	MSHA ID: ----

Map Scale: 1": 200'

0 200 400

Map Georeferencing Information: **Datum:** NAD83 **Projection:** CO NORTH

Survey Source: Drone	**Drawn by:** SAC	Date: 4/30/24
Imagery Source: GoogleEarth	**Checked by:** BWM	Date: ----
Survey Date: 2019	**Approved by:** ----	Date: ----
Imagery Date: 2023		

File Name: Evans Pit Maps

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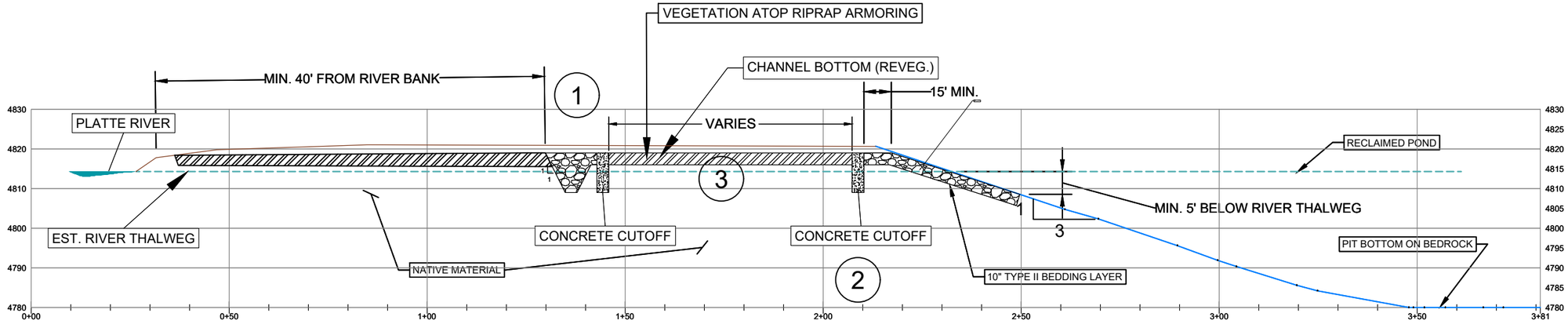
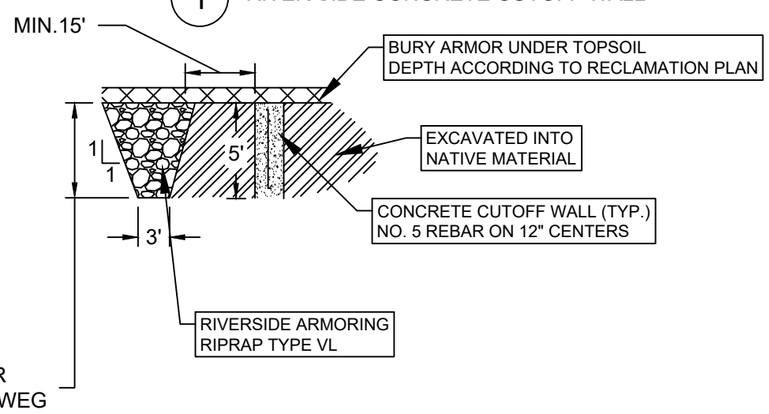
(303)-346-5196
info@lewicki.biz

COLORADO LICENSED
BRIAN W. MACKEY
PE
10/23
PROFESSIONAL ENGINEER

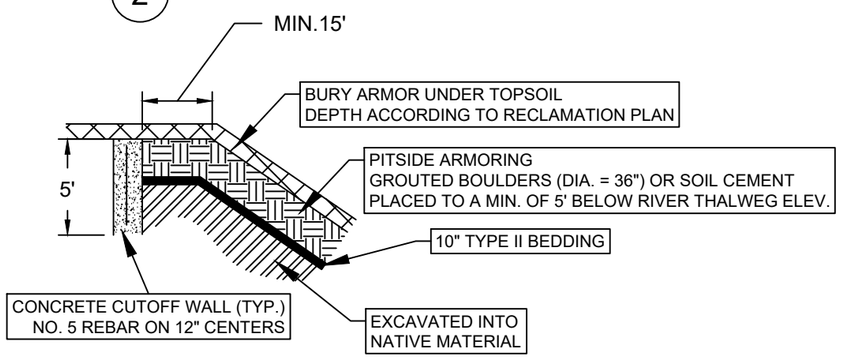
FLOW STRUCTURE TYPICAL PROFILE



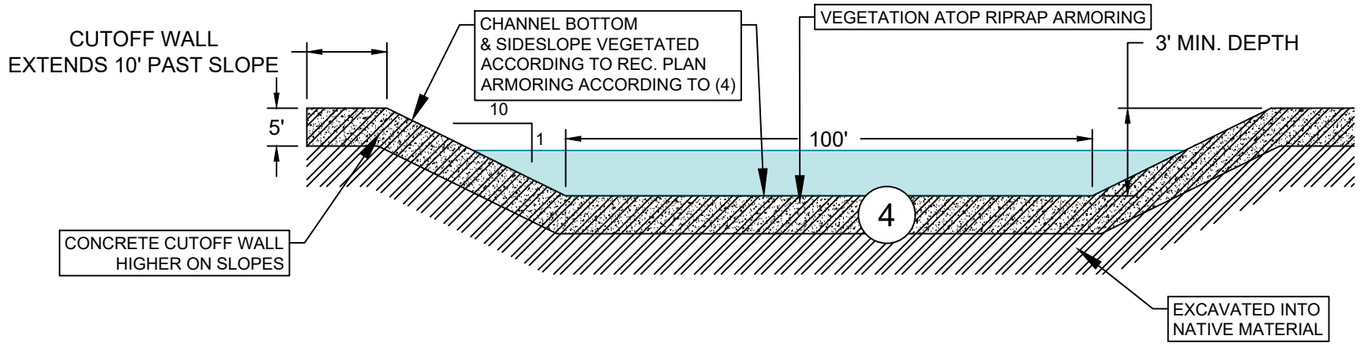
1 RIVER SIDE CONCRETE CUTOFF WALL



2 PIT SIDE CONCRETE CUTOFF WALL



3 FLOW STRUCTURE SECTION (TYP.)



NOTES:

A) CONCRETE CUTOFF WALL TO BE INSTALLED IN AN EXCAVATED TRENCH.

B) EXTEND RIPRAP ARMORING AND CUTOFF WALLS A MINIMUM OF 10' BEYOND THE TOP OF SPILLWAY SLOPES ON BOTH ENDS.

C) ALL DESIGNS BASED ON MILE HIGH FLOOD CONTROL DISTRICT TECHNICAL REVIEW GUIDELINES FOR GRAVEL MINING & WATER STORAGE ACTIVITIES (JAN. 2013) SECTION 2.4.5

COLORADO LICENSED
BENJAMIN E LANGFELD
47151
PROFESSIONAL ENGINEER
3/13/25

RIPRAP SIZING FOR MILD CHANNEL

SOURCE: MILE HIGH FLOOD CONTROL DISTRICT, VOL. 1, SECTION 8.1.1

Mile High Flood Control District
Riprap Sizing Shallow

4

Assuming channel is running full up to 1-ft of freeboard.

Mean Channel Velocity: $V = 7\ \frac{ft}{s}$

Channel Slope: $S = 0.02$

Mean Rock Size: $d50 = \left(\frac{V * S^{0.17}}{4.5\ \frac{ft}{s} * (2.5 - 1)^{0.66}} \right)^2$ ft = 4.496 in

Riprap d50 = 6 inches

Lewicki & Associates

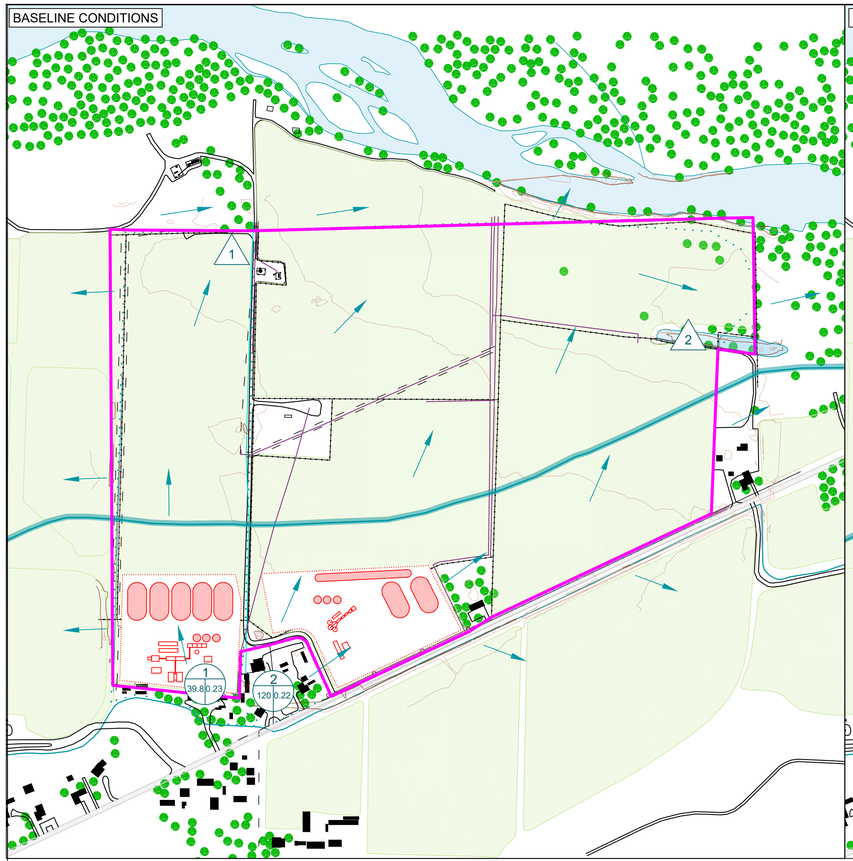
Asphalt Specialties

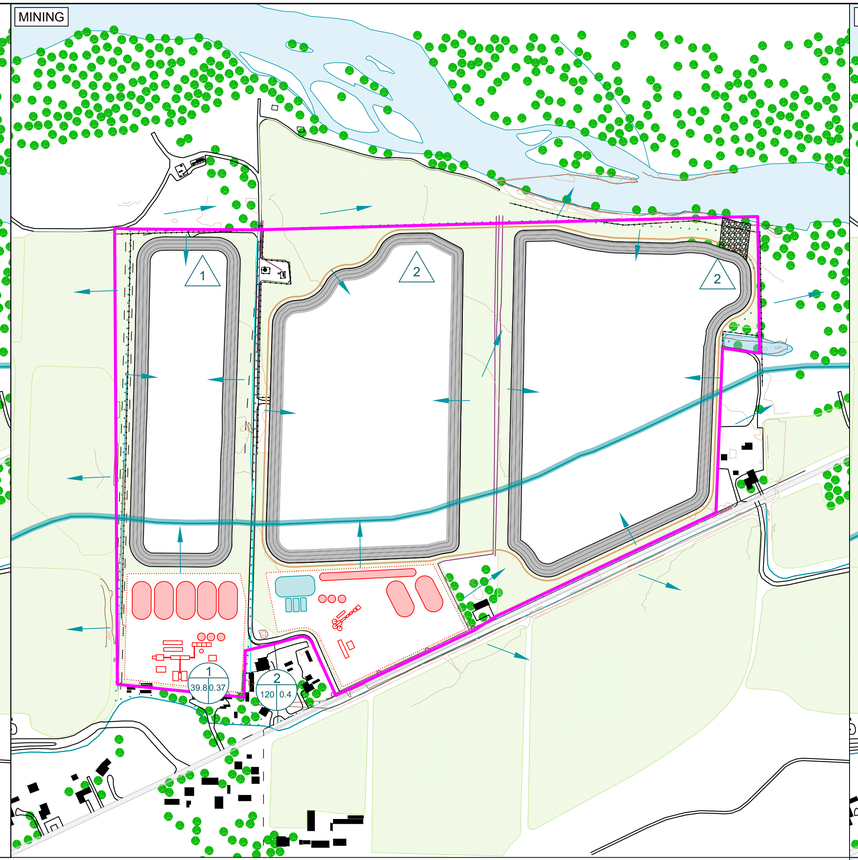
Map Geo. Info.: Datum: NAD83 Projection: CO NORTH
Survey Source: Drone Survey Date: 2019
Imagery Source: GoogleEarth Imagery Date: 2023
Drawn by: SAC Date: 4/30/24
Checked by: BHM Date: ----
Approved by: ---- Date: ----

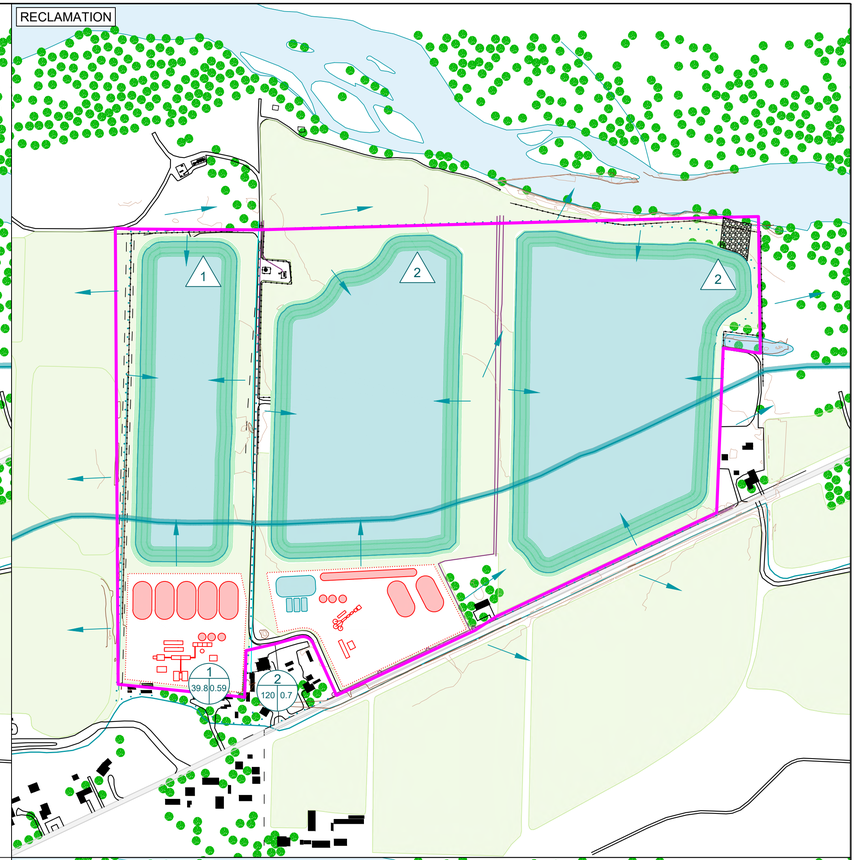
DRMS Permit Number: N/A
Mine Entry Location: Latitude: 40.06158 Longitude: -104.81903
State: COLORADO County: Weld Nearest Town: Evans
Section: 35 & 36 Township: 5N Range: 66W PM: 6th
Major Watershed: South Platte River
Map Scale as Shown

F-2 Flow Structures
Evans Pit

File Name: Evans Pit Maps







LEGEND

ROADS AND RELATED FEATURES
- Highway
- Light duty road, gravel

RIVERS, LAKES, SHORELINES, AND CANALS
- Perennial stream/ditch
- Perennial river
- Perennial lake/pond
- Drainage Basin Floodplain & Floodway
- Drainage Direction

MINING FEATURES
- DRMS Permit Boundary
- Slurry Wall
- Affected Area
- Stormwater Berm

VEGETATION
- Woodland
- NWI Wetlands

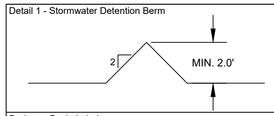
TRANSMISSION LINES AND PIPELINES
- Power transmission line; pole; tower

BASELINE CONTOURS
- Index
- Intermediate

POST-MINING CONTOURS
- Index
- Intermediate

POST-RECLAMATION CONTOURS
- Index
- Intermediate

Detail 1 - Stormwater Detention Berm



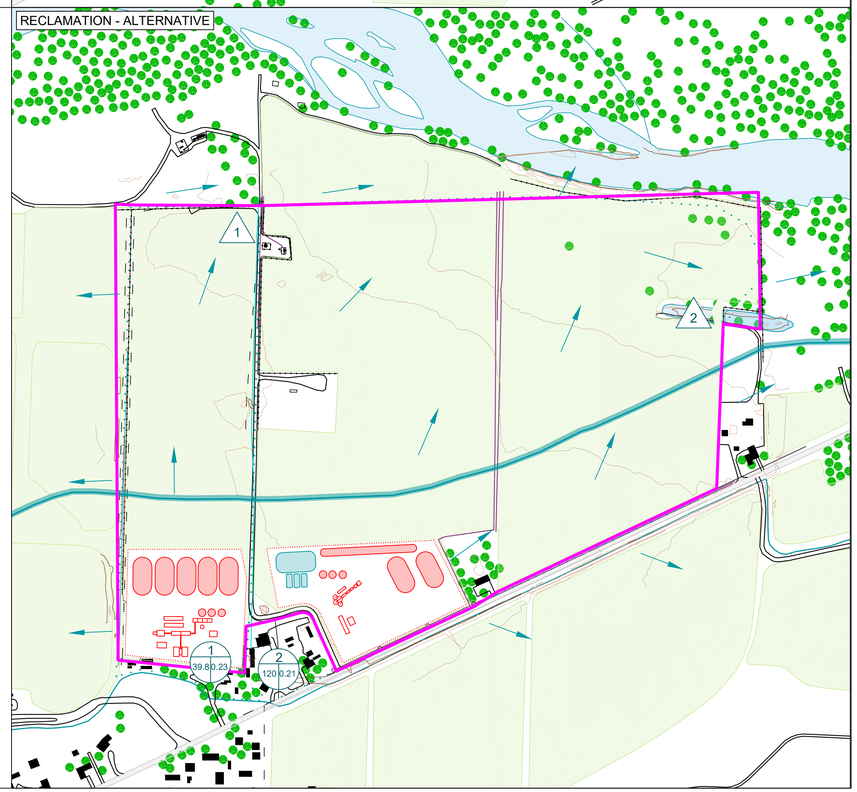
Drainage Basin Labels

Drainage Basin Runoff & Destination

Drainage Basin	Phase of Operation	Area (ac)	Runoff Coefficient	100-YR 24-HR Runoff (ac-ft)	Detention Capacity (ac-ft)
1	Baseline	39.8	0.23	3.09	N/A
	Mining		0.37	5.79	500+
	Reclamation		0.59	9.24	43
	Reclamation Alternative		0.23	3.09	N/A
2	Baseline	120	0.22	9.69	N/A
	Mining		0.4	18.87	2000+
	Reclamation		0.7	36.74	156
	Reclamation Alternative		0.21	9.25	N/A

Note: Detention capacity is calculated as the volume of storage in the pit during mining, and above the water storage level during reclamation.

RECLAMATION - ALTERNATIVE



G-1 Drainage Map

Evans Pit

DRMS Permit Number: N/A

Asphalt Specialties

Mine Entry Location:	Latitude: 40.06158	Longitude: -104.81903	
State: COLORADO	County: Weld	Nearest Town: Evans	
Section: 35 & 36	Township: 5N	Range: 66W	PM: 6th
Major Watershed:	South Platte River	MSHA ID: ----	

Map Scale: 1"= 400'

0 400 800 N

Map Georeferencing Information:	**Datum:** NAD83	**Projection:** CO NORTH
Survey Source: Drone	**Drawn by:** SAC	Date: 4/30/24
Imagery Source: GoogleEarth	**Checked by:** BHM	Date: ----
Survey Date: 2019	**Approved by:** ----	Date: ----
Imagery Date: 2023		

File Name: Evans Pit Maps

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(303)-346-5196
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COLORADO LICENSED
BRIAN H. MACKEY
47151
PROFESSIONAL ENGINEER
5/1/2024

EXHIBIT G WATER INFORMATION

1. General

The Evans Mining Resource is within the floodplain and floodway of the South Platte River. Mining within the floodway will be conducted with no filling or stockpiling above the natural ground grade. Groundwater is located roughly five feet below the natural grade. All groundwater onsite is part of the South Platte River alluvial aquifer. Prior to mining, slurry walls will be installed around the perimeter, as shown on Map C-3. These slurry walls will be for the development of water storage reservoirs following reclamation. Asphalt Specialties is committed to protecting the hydrological balance and water quality at the site.

2. Water Quality Protection

The primary concerns surrounding water quality protection at the Evans Mining Resource site are the potential impacts to the surface and groundwater from sediment, hydraulic fluids, and diesel fuel. Sediment will be controlled through the use of stormwater retention within the disturbance area through the life of the mine. The site will be graded in a manner that maintains all surficial flows within the disturbed area, in turn containing all sediment and unwanted discharges from leaving the site. Hydraulic fluids and diesel fuels will be contained within vehicles that follow best practices of maintenance; these practices include regular inspections of vehicles, hydraulic lines, and any other potential spill sources. Diesel fuel or other oils will not be stored on-site.

Any surface water discharges from the site will be sampled in accordance with the existing NPDES discharge permit. All discharge will be via the approved Outfall under the existing permit number COG502204.

Table G-1. Surface Water Discharge Monitoring Requirements from Existing NPDES Discharge Permit

Parameter	Monitoring Frequency	Sample Type
Flow	Instantaneous, Monthly	In-situ
pH	2x/month	Grab
Total Suspended Solids	2x/month	Grab
Oil and Grease Visual	2x/month	Visual
Oil and Grease	Contingent on visibility of oil and grease	Grab
Total Flow	Instantaneous, Monthly	Calculated
Electrical Conductivity	Quarterly	Grab
Arsenic, Total Recoverable	2x/month	Grab

3. Floodplain

The majority of the site is within the 100-year floodplain and floodway as reported by the Federal Emergency Management Agency. These boundaries are shown in the Exhibit C and F maps. The minimum distance maintained from the South Platte River to excavation activities is 150 feet where river and pit-side armoring will occur. This can be seen on Map C-2 and F-1 in the easternmost pit. All other mining activities will maintain a minimum 400 foot setback from the river which is the minimum setback for no armoring. Additionally, no stockpiling or filling above the natural grade will occur in the floodway. Overall, the downstream flood impacts should remain the same or be reduced from activity at the site as the removal of material results in more storage space for flood water below the existing grade. A no-rise certification will be provided to Weld County as part of its floodplain development permit.

In accordance with the Mile High Flood Control District technical guidelines, an inflow/outflow structure will be installed along the riverbank where mining reaches its closest point to the South Platte River to prevent erosion of the bank. Details of these designs can be seen on Map F-2.

The inflow/outflow structure design included is from the Mile High Flood Control District's *Technical Review Guidelines For Gravel Mining & Water Storage Activities Within Or Adjacent To 100-Year Floodplains* dated January 2013, specifically *Section 2.4.5 Side Channel Spillway*. Using the design guidelines in this section, the design shown on Map F-2 Flow Structures was developed. It should be noted that, in accordance with advice and insight from Division engineers regarding these types of structures, the river side was designed for installation into ground between the pit slope and the riverbank for cases where disturbing the riparian habitats along the river bank was inadvisable. The flow structures will provide an armored channel for flood waters to enter the pit during mining or the lakes following reclamation, preventing erosion that might lead to pit capture.

The velocity used in the design for sizing riprap is based on previous approved designs along the South Platte River in this region with flood water velocity within the river of ~7 feet/second (ex: Ewing Pit, Markovich Mining Resource, etc.). In order to confirm that this velocity is still sufficient for riprap sizing, a HEC-RAS model was run for the Evans Mining Resource with the pits mined out and empty. The HEC-RAS model uses publicly available data from the Colorado Water Conservancy Board for floodplain and floodway modeling along the South Platte River from Denver to Nebraska. LIDAR digital elevation models (DEMs) for this area were modified to include the presence of the mining pits proposed. Appendix G-4 details the HEC-RAS analysis. The results of the analysis show that a 7 feet/second design velocity will be sufficient for the flow structure design at Evans Mining Resource. The location of the flow structure should be as noted on Map F-1: somewhere along the north side of Mining Pod 3.

In the event of flooding at the site, equipment from the active mining floor will be removed and the pit will be allowed to fill with water. The flooded pit will be pumped only after the flood has subsided. All fuel will be stored at least one foot above the base flood elevation and in sufficient secondary containment with 110% carrying capacity.

4. Wetlands

No wetlands exist on the site.

5. Aquifers

The only identified aquifer located at the site is the shallow alluvial aquifer of the South Platte River. The depth to this aquifer varies throughout the year but is typically five feet below surface. According to the U.S. Geological Survey's Ground Water Atlas of the United States[1], the underlying bedrock aquifer is the Laramie Fox Hills Aquifer of the Denver Basin system. The entirety of the Evans Mining Resource operation will take place in the overlaying alluvium above a shale/siltstone layer; the Laramie Fox Hills Aquifer will not be mined.

6. Surface Water

The mining operation will impact surface water in the area through the stormwater runoff that enters the site. Map G-1 shows the drainage patterns and how they are affected throughout the life of the mine. The maps include information on the drainage basins currently, during mining, and post reclamation as well as the drainage directions throughout these stages. The primary concern for surface water protection at the site is preventing the discharge of sediment, oil, and/or hydraulic fluids from the operation areas. Oils and hydraulic fluids are stored on site following the standard best management practices. These practices include the use of secondary containment at fluid storage and transfer points, spill kits, and employee training regarding safe handling practices. Sediment is trapped onsite using controls and best

[1] https://pubs.usgs.gov/ha/ha730/ch_c/

management practices by directing and controlling surface water runoff that enters the disturbed areas. More information on sediment and surface water control is provided below.

6.1. Surface Water Handling

One drainage basin collects all stormwater runoff on and around the Evans site. This is shown on the Drainage Map.

6.1.1. Mining

During all phases of mining, surface water runoff will drain to the active pit or reclaimed reservoir. Water collected in the active mining pod will be allowed to evaporate or will be discharge via the approved CDPHE outfall once sediment has settled out.

6.1.2. Post Reclamation

The drainage patterns during mining will be retained following reclamation of the site. Any surface water runoff will collect in the reclaimed reservoir. There is enough storage capacity above the anticipated reservoir level and the top of the shore to store the 100-year storm events.

6.1.3. Flood Protection

Mining will extend to within 150 feet from the South Platte River as shown on the Drainage Map. Due to this proximity to the river, measures will be taken to protect the riverbank from erosion during a flood event. An inflow and outflow structure will be constructed between the River and the mining pod once mining is within 300 feet of the river. These structures will allow for the safe exchange of flood waters between the pit and river which prevents erosion of the riverbank and pitside slope during flood events. These structures are of a design approved for use by the Mile High Flood District. Details of the inflow/outflow structure are shown on Map F-2.

6.2. Disturbed Area Runoff

During all stages of mining, there is enough water storage capacity to contain the 5-year and 100-year 24-hour storm events and prevent erosion from surface water discharge. The expected rainfall from these events at the Evans Site is provided in Table G-2 below.

Table G-2. Area Storm Events (from NOAA[2])

Event Probability	Event Rainfall (inches)
100-YR 24-HR	4.74

The peak runoff was generated from these values for the three drainage basins during all stages of mining. Pre-mine, mining, and reclamation conditions are delineated on the Drainage Map. The discharge volumes from these storm events are calculated in Appendix G-1 at the end of this exhibit. Table G-3 summarizes the runoff volumes and storage volumes for each

[2] National Oceanic and Atmospheric Administration

drainage. All drainage calculations were made using the Rational Method identified in the Mile High Flood Control District.

Table G-3. Drainage Calculations

Drainage Basin Runoff & Destination						
Drainage Basin	Phase of Operation	Area (ac)	Runoff Coefficient	100-YR 24-HR Runoff (ac-ft)	Detention Capacity (ac-ft)***	Discharge Flow Rate (gpm)*
1	Baseline	39.8	0.23	3.09	N/A	0
	Mining		0.37	5.79	500+	1000-3000**
	Reclamation		0.59	9.24	43	0
	Reclamation Alternative		0.23	3.09	N/A	0
2	Baseline	120	0.22	9.69	N/A	0
	Mining		0.4	18.87	2000+	1000-3000**
	Reclamation		0.7	36.74	156	0
	Reclamation Alternative		0.21	9.25	N/A	0

* The discharge flow rate is calculated from the peak discharge of the 100-Yr 24-Hr storm event.

**Discharge flow rate is variable and controlled during mining as all discharges are pumped from the pit
***Detention Capacity calculated in CAD as volume in pit or volume above water storage.

7. Groundwater

Groundwater is located approximately five feet below the surface at the Evans site. This was determined from wells installed onsite. Table G-4 outlines all wells within 600' of the permit area. These well locations are also shown on Map C-2. Groundwater quality data was gathered in advance of mining. This data and discussion of it can be seen in the Groundwater Monitoring Plan in Appendix G-2.

Table G-4. Wells Within 600' of Permit Area

Applicant/Well ID	Permit ID	Total Depth (feet)	Purpose	Distance from nearest mining area (ft)
ASPHALT SPECIALTIES CO INC	332478-	38	MONITORING & SAMPLING	<100 FT
ASPHALT SPECIALTIES CO INC	332479-	41	MONITORING & SAMPLING	<100 FT
ASPHALT SPECIALTIES CO INC	332484-	42	MONITORING & SAMPLING	<100 FT
ASPHALT SPECIALTIES CO INC	332483-	40	MONITORING & SAMPLING	<100 FT
ASPHALT SPECIALTIES CO INC	332482-	37	MONITORING & SAMPLING	<100 FT

ASPHALT SPECIALTIES CO INC	332481-	34	MONITORING & SAMPLING	<100 FT
ASPHALT SPECIALTIES CO IN	332480-	43	MONITORING & SAMPLING	<100 FT
SORIN NATURAL RESOURCES PARTNERS LLC	55499-MH	12	MONITORING & SAMPLING	<400 FT
SORIN NATURAL RESOURCES PARTNERS LLC	55498-MH	12	MONITORING & SAMPLING	<100 FT
GURNEY, NORMAN	103102-	30	DOMESTIC	>600 FT
HERNANDEZ, MARTIN	299707-	40	DOMESTIC	>600 FT
CONOVER JR, DAVID	283674-	21	IRRIGATION STOCK	~150 FT

7.1. Groundwater – Mining

Prior to mining, slurry walls will be installed around the perimeter of the pit to prevent groundwater flow into the mining area. Following slurry wall installation, the operator will mine out the pod by dewatering it via the approved CDPHE discharge point. Pumping to conduct this dewatering will take place during the initial mining and then pumping will cease. Stormwater runoff that is collected may be pumped out to protect local water rights, once sediment has settled. For this reason, the CDPHE discharge point will be maintained over the life of the mine. The pump will be located at least two feet below the active mining floor at the lowest point of the pit. It will be surrounded by a gravel filter. This configuration minimizes the risk of sediment being pumped out of the pit.

7.2. Groundwater – Reclamation

Permanent water storage reservoirs will be left behind, as can be seen on Map F-1. There will be no groundwater consumptive use in reclamation.

7.3. Groundwater – Slurry Wall Impact

The installation of a slurry wall within the alluvial aquifer of the South Platte River creates two main potential impacts to the aquifer: the creation of local groundwater shadows or mounding that damage neighboring structures or property and the potential exacerbation of regional groundwater impacts. These impacts however are anticipated to be very localized and not impact nearby wells. Additionally, a french drain will be constructed up-gradient of the slurry walls to control groundwater mounding. The drain will direct abnormally high water to an infiltration gallery in the permit area that will return the water to the groundwater aquifer and river.

8. Water Related Permits

The operator is applying for all necessary permits that have not already been acquired for water handling at the Evans Mining Resource. This includes a discharge permit with the Colorado Department of Public Health and Environment and a gravel well permit with the Colorado Division of Water Resources.

9. Water Consumption and Source

Water for dust control will be the primary consumptive use at the Evans Mining Resource site. Water will be sourced from ponds in the processing area for processing and aggregate washing purposes. Additional water may be sourced from a groundwater well. The proper permits (gravel well permit, groundwater well permit, augmentation plan) will be acquired prior to construction and use of water from these sources. Water may also be bought from a local source and transported to the site.

No ongoing water consumptive use exists in reclamation, since the water storage pod is lined. Table G-5 summarizes the estimated water consumption for the operation throughout the year.

Table G-5. Water Consumption

Month	Dust Control (ac-ft)	Evaporative Depletions (ac-ft)	Water Removed from Mining (ac-ft)	Total (ac-ft)
Jan	0.11	0.00	0.00	0.1
Feb	0.12	0.00	0.00	0.1
Mar	0.19	0.00	0.00	0.2
Apr	0.32	0.00	0.00	0.3
May	0.42	0.00	0.00	0.4
Jun	0.51	0.00	0.00	0.5
Jul	0.53	0.00	0.00	0.5
Aug	0.47	0.00	0.00	0.5
Sep	0.35	0.00	0.00	0.4
Oct	0.25	0.00	0.00	0.3
Nov	0.14	0.00	0.00	0.1
Dec	0.11	0.00	0.00	0.1
Total	**3.50**	**0.00**	**0.00**	**3.5**

The Evans Mining Resource sources water for operations via water contract. Any groundwater exposure will be covered by a gravel well permit with the Colorado Division of Water Resources.

Appendix G-4 2D Floodplain Analysis

March 25, 2025

MEMO: Evans Mining Resource – Flood Analysis for Flow Structure Design

The Evans Mining Resource is located along the South Platte River and will be mining within 400-feet of said river. In accordance with the Colo. Division of Reclamation, Mining, and Safety requirements for flood analysis and protection, Lewicki and Associates has evaluated the 100-YR flood event for this section of river and designed a flow structure to protect the riverside and pitside slopes from erosion.

An analysis of baseline flood conditions (Existing Conditions) was conducted using the current floodplain mapping along the South Platte River as published by the Federal Emergency Management Administration (FEMA) and the Colorado Water Conservancy Board (CWCB)[1]. The Existing Condition was then modified to incorporate the presence of the mined-out gravel mining pods of the Evans Mining Resource and the HEC-RAS model was reran as a Proposed Condition. The results of the two models were then compared to determine the water velocity that should be used in the design of the flow structure the will be installed between Evans Mining Resource and the South Platte River.

1. Background

The Evans Mining Resource is located roughly 1.0 miles south of Evans, CO along Highway 384. The South Platte River borders the proposed operation to the north; the highway borders it to the south; agricultural fields border it to the west and east. A general location map is shown in Exhibit B. Asphalt Specialties proposes to mine sand and gravel from the site to produce construction material products. Mining will consist of extraction from three mining pods. The top of the mining pods have an average elevation of 4665’ and a bottom elevation of 4632’. The mining pods are within the currently approved FEMA floodplain for the site and partially within the FEMA floodway. All stockpiling and processing above natural grade will take place outside of the floodway.

Floodplain and floodway mapping for the site is listed by FEMA as being current as of 2023. The currently available flood insurance rate maps (FIRMs) reflect this. Figure 2 shows the extents of this mapping for the Evans site. The floodplain (Zone A) extends beyond the southern edge of the site. Given the recency of the publication of the floodplain in this area, the data from the FEMA maps was used to calibrate the CWCB HEC-RAS. This calibrated model serves as the Corrected Effective Model in HEC-RAS. Cross sections of the Corrected Effective Model in the mining pods are attached for reference.

[1] CWCB South Platte HEC-RAS data downloaded from the Colorado Hazard Mapping Program on March 10, 2025

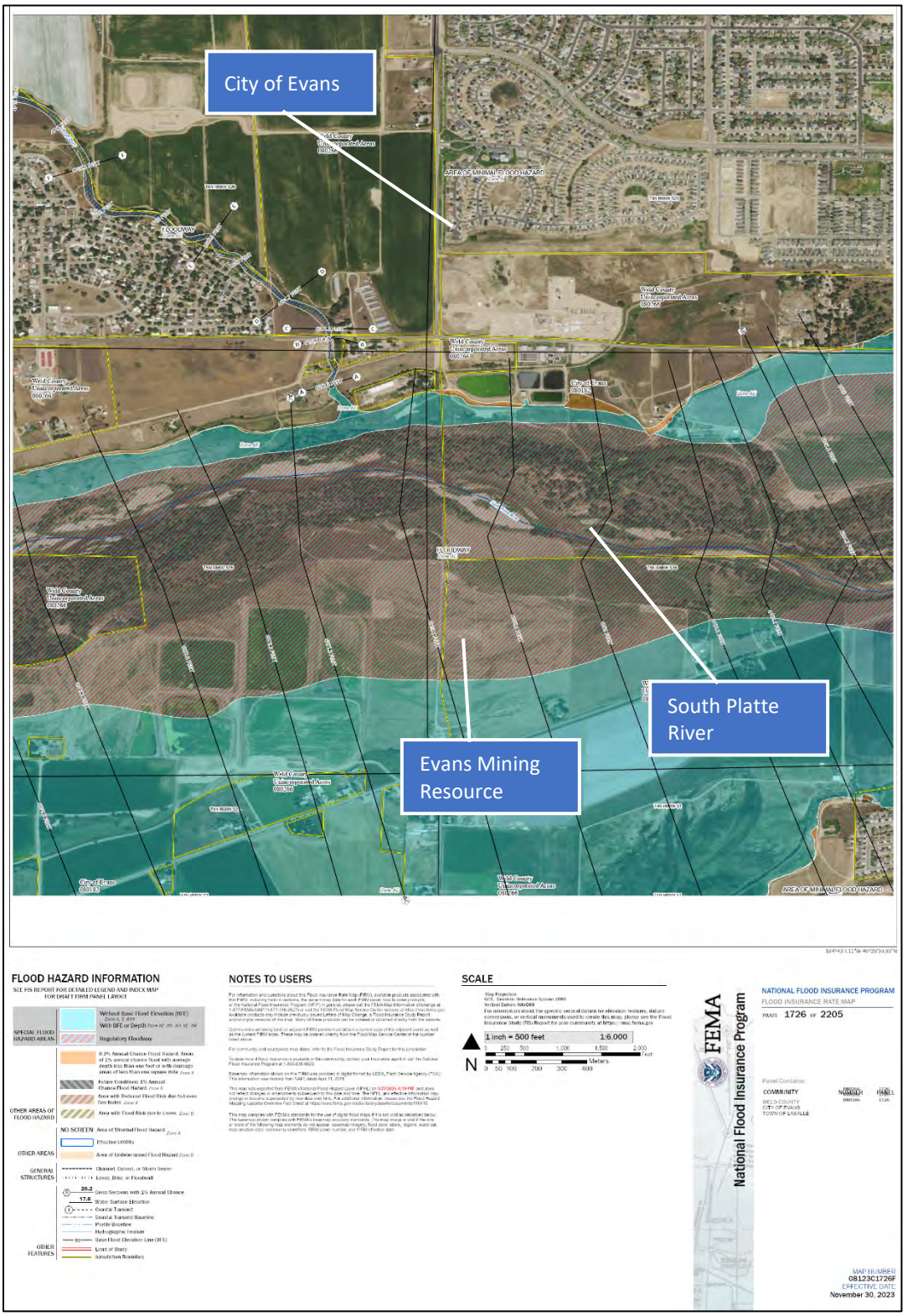


Figure 1. Published Floodplain and Floodway Map - FEMA

2. Analysis

2.1. Corrected Effective Model

The CWCB HEC-RAS model was run as 1D model for the stretch of the South Platte River along the Evans Mining Resource. The Water Surface Elevation (WSE) of this model was then applied to LIDAR digital elevation model (DEM) of the area to determine flood extents. The flood extents from this HEC-RAS output were then compared to the FEMA floodplain that is published for the area. Since the HEC-RAS output floodplain extents and the published floodplain extents were very similar, the CWCB HEC-RAS model applied to the LIDAR DEM is considered calibrated and thus can be used as the Corrected Effective model for the site.

2.2. Existing Conditions

The Corrected Effective model steady flow of 36,624 cubic feet per second (CFS) (1% or 100-YR event) was used as the peak flow for the 2D model. The Existing Conditions model constrains the Corrected Effective model extents on the river reach to 1.1 miles upstream and ¼ mile downstream of the Evans site. The Corrected Effective model 100-YR event flow was used as the basis for a flow hydrograph which was used as the upstream boundary condition. The Normal Depth was used as the downstream boundary condition. The upstream flow hydrograph begins at a flow of 1000 CFS, sustains that for several hours, and then increases linearly over several hours to the 100-YR event flow of 36,624 CFS. Table 1 summarizes the flows and timestamps of the hydrograph. The 100-YR event flow is maintained in the hydrograph through the end of the model (36 hours).

Table 1. Upstream Boundary Condition – Flow Hydrograph

Simulation Time	Flow (CFS)
1-HR to 10-HR	1000
11-HR to 20-HR	Increasing from 4000 to 36,624
20-HR to 36-HR	36,624

Maps of the WSE across the mining pods over the course of the Proposed Condition model run are used to evaluate where water flows into and out of the mining pods. The time stamps correspond to flood flow rates from the hydrograph. For example, at 10 hours (1000 CFS; Figure 2) into the model, the WSE map shows flood waters entering the pods from the west and north during flooding conditions.

Figure 2. Existing Conditions WSE Map of 1000 CFS at 10-HR with Flow Direction Lines

The goal of the 2D model is to determine the flood water velocities along the river near the mining pods at different river flows, up to the 100-YR event flow. The maximum velocity identified at the location of the flow structure is then used as a basis for designing the flow structure. Since the flow structure is lateral to the river flow, the 2D model was used to estimate the flow velocities in the vicinity of flow structure.

The Existing Conditions 2D model was run using a simplified flow hydrograph: the river flow was started at a low value (1000 CFS), increased to the 100-YR event flow (36,624 CFS), and then maintains the 100-YR event flow. Model was run over a 36 hour period with the 100-YR flood flow maintained for 16-hours of that time period. The resulting 2D model results can then be viewed as a map to see the extents and velocity of the fluid flow. Figure 3 shows the Existing Conditions 2D

model results at the 36-HR mark as an example. Table 2 shows the highest water velocities at the flow structure location at different flow rates and simulation times.

In the Existing Condition, the velocities are all highest in the river along the north side of Mining Pod 3. The Proposed Conditions show an area of distinctly increased velocities in the northwest corner of Mining Pod 3. The precise location of the flow structure may need to be adjusted as mining in Mining Pod 3 approaches the South Platte River and this report recommends only that the flow structure be placed along the north side of Mining Pod 3.

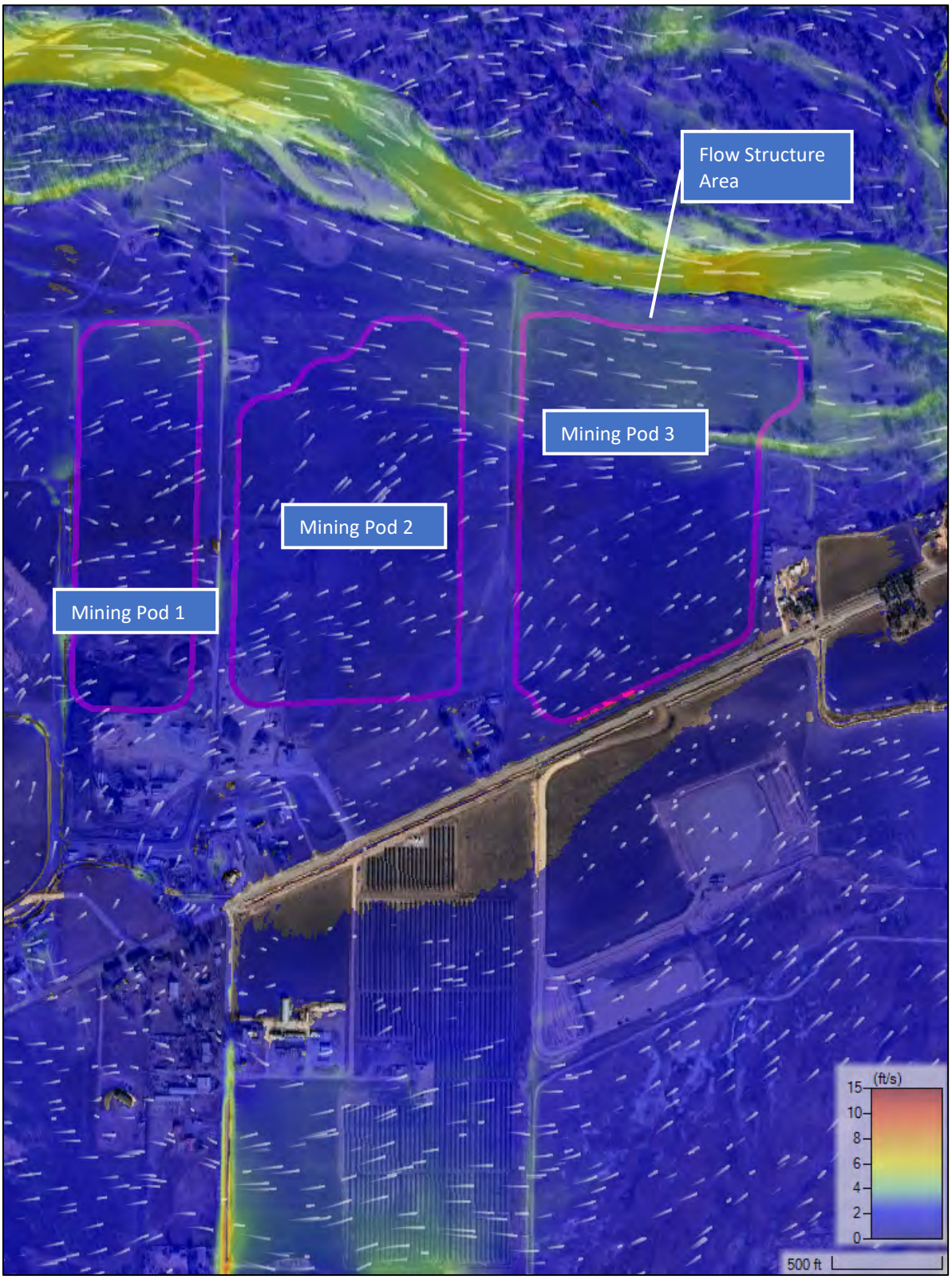


Figure 3. Existing Condition Velocity Map – 36-HR (36,264 CFS)

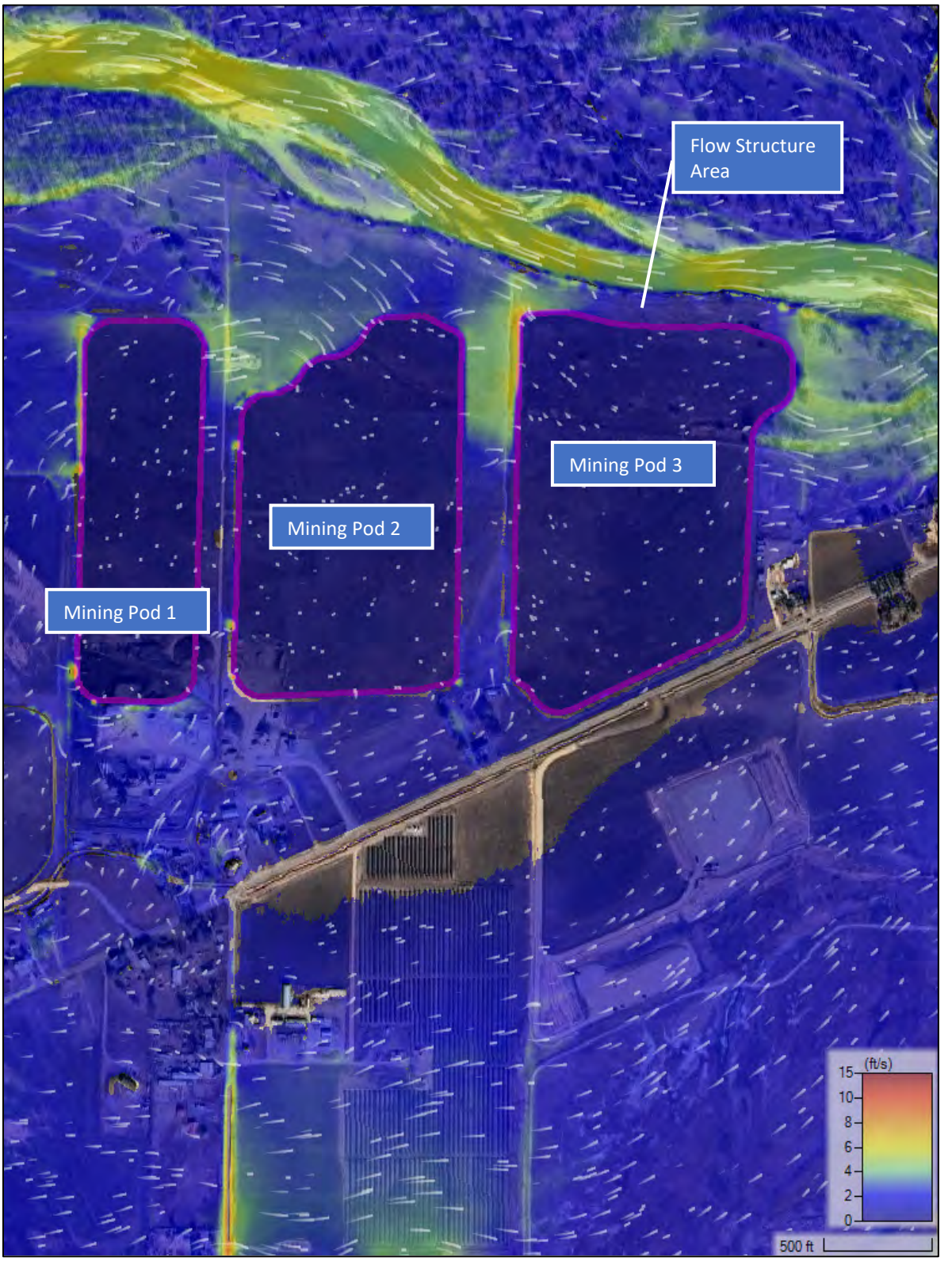


Figure 4. Proposed Condition Velocity Map – 36-HR (36,264 CFS)

Table 2. Water Velocities at Flow Structure at Different Flows

Simulation Time	Flow (CFS)	Velocity (FPS)
Existing Conditions		
1-HR to 10-HR	1000	2-3.5
11-HR to 20-HR	4000 to 36,624	3-3.5
20-HR to 36-HR	36,624	3-3.5
Proposed Conditions		
1-HR to 10-HR	1000	5-7
11-HR to 20-HR	4000 to 36,624	5-7
20-HR to 36-HR	36,624	6-7

3. Results & Conclusion

The 2D HEC-RAS model shows velocities of 3 to 3.5 feet per second in the Existing Condition in the flow structure area. The 2D model for the Proposed Conditions shows velocities of 6 to 7 feet per second in that same area. Based on the results the flow structure should be designed for 7 feet per second. The early hours of the Proposed Condition The flood water flow velocity is roughly the same even with different flows leading up to the 100-YR event flow.

4. Certification

All engineering analysis contained herein was prepared under my supervision and in accordance with sound engineering principles.

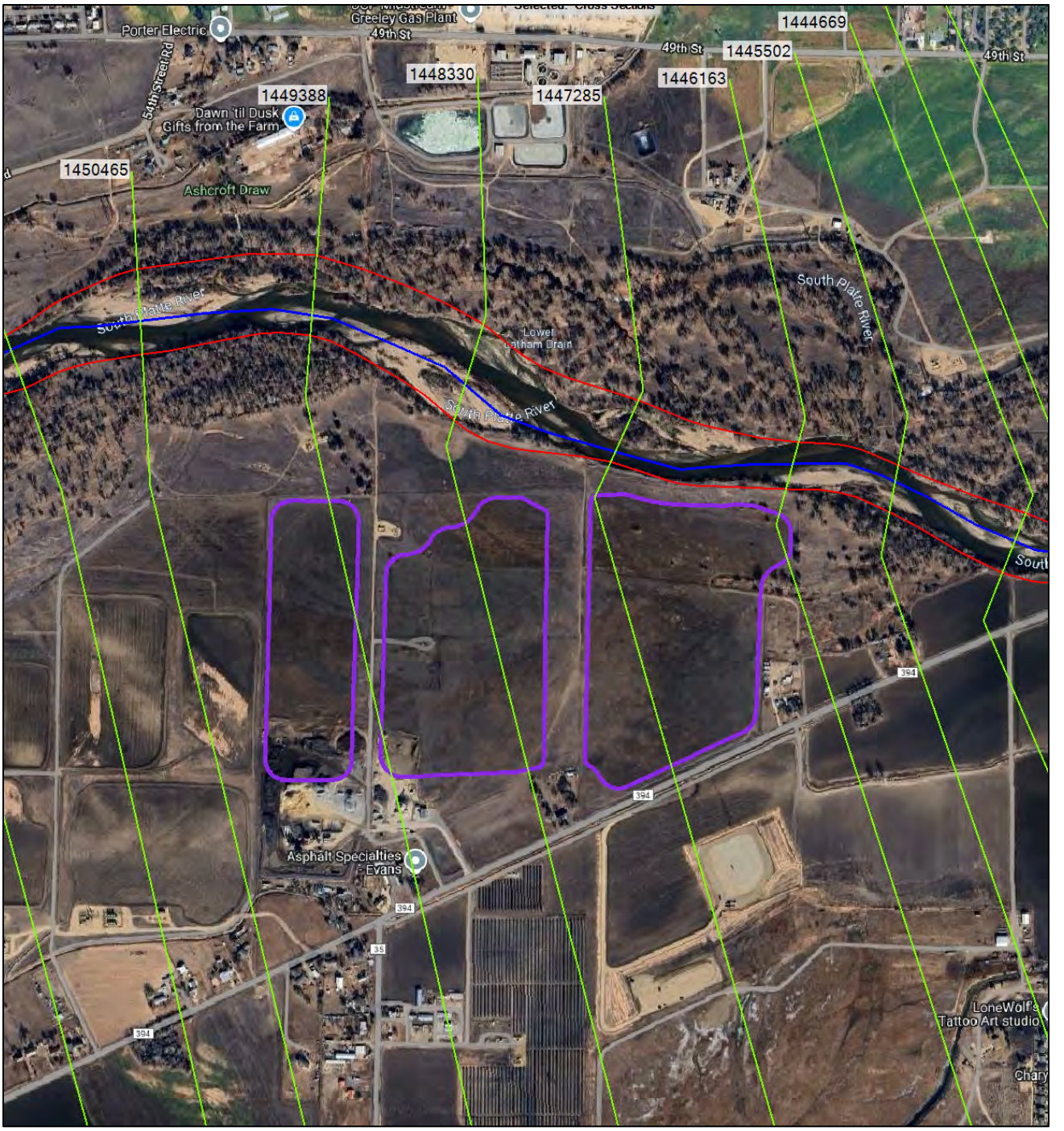
Benjamin E. Langenfeld

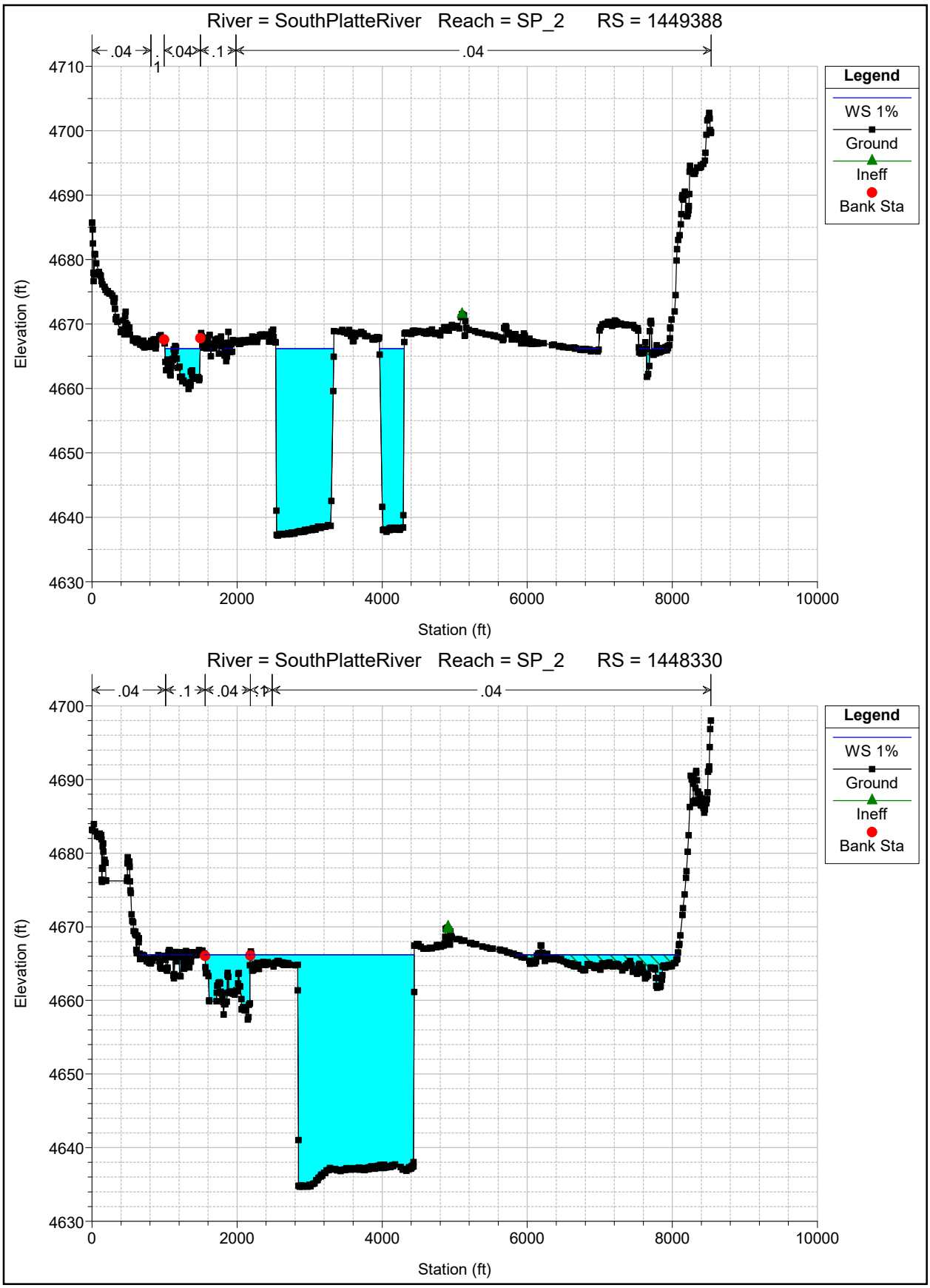
CO#: 47151

Attachments

Corrected Effective Model (1D) Cross Sections

Corrective Model (1D) Cross Sections – Evans Mining Resource Mining Pod

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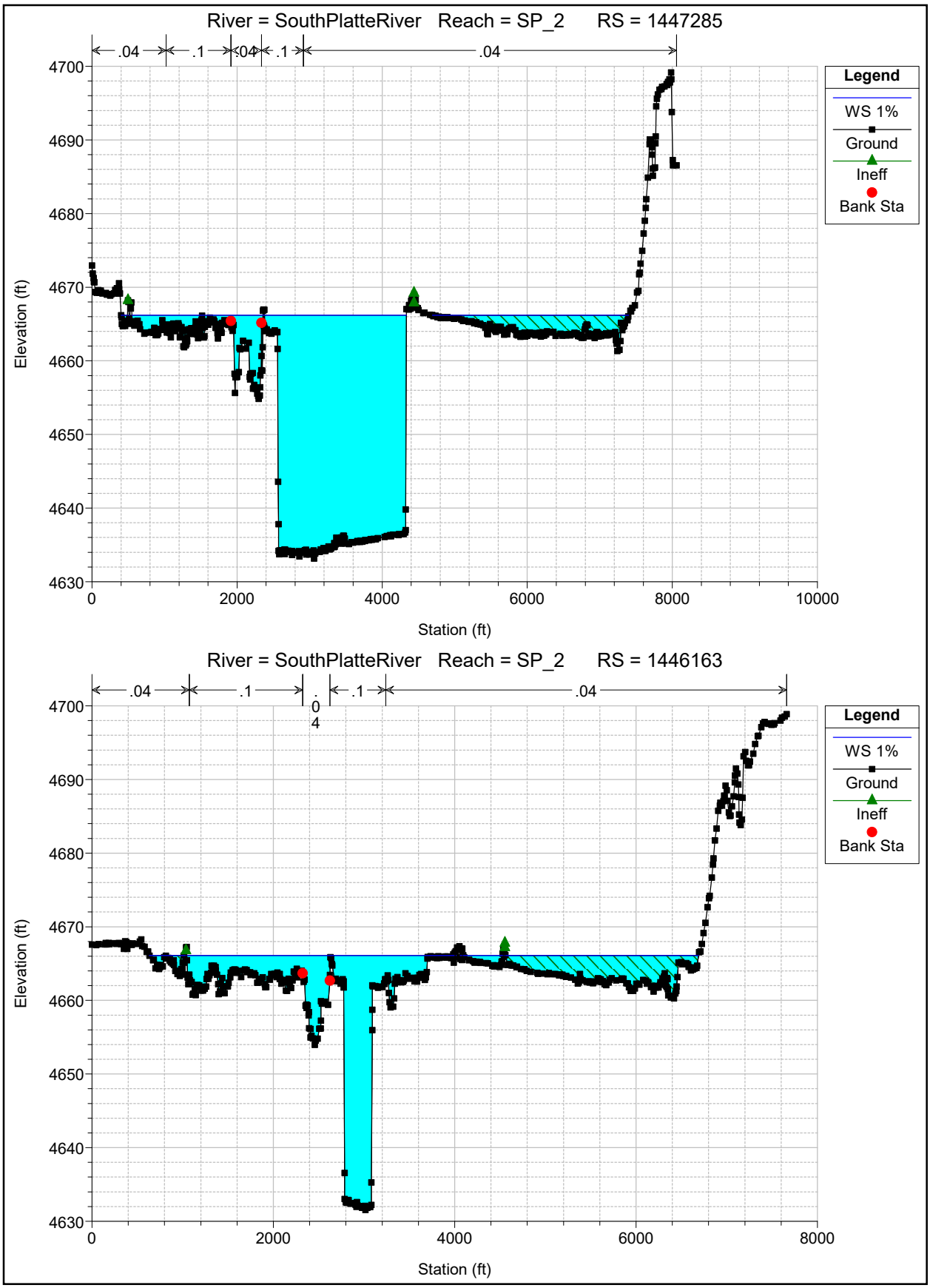
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EXHIBIT S PERMANENT MAN-MADE STRUCTURES

A list of man-made structures within 200 feet of the affected area can be found on Map C-1. Landowner boundaries can also be found on Map C-1. Proof of the attempt to secure structure agreements is attached to this exhibit. In the event that a structure agreement is unobtainable, defer to the Geotechnical Stability Exhibit which indicates that all structures will be protected.

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Certified Mail Receipt

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RETURN RECEIPT TRACKING NUMBER
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ARTICLE ADDRESS TO:

Dream Family Revocable Trust
17043 County Road 394
La Salle CO 80645-7716

Postmark Here

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APR 04 2025
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Jenna and David Conover
17509 County Road 394
La Salle CO 80645-7716

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Jerry Loeffler
23896 County Road 35
La Salle CO 80645-7805

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Martin Hernandez
17043 County Road 394
La Salle CO 80645-7716

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Sorin Natural Resources Partners LLC
1490 W 121st Ave Ste 100
Denver CO 80234-3497

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Evans CO 80645-7716

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Diana Mendoza and Luis Villalobos
17231 County Road 394
La Salle CO 80645-7716

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ARTICLE ADDRESS TO:

William Eric Folley
16957 County Road 394
La Salle CO 80645-7712

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APR 04 2025
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RULE 6.5: GEOTECHNICAL STABILITY EXHIBIT

There are no known geologic hazards on the proposed site. Based on a slope stability analysis, buildings or other structures within 200' of the Evans Pit affected area will not be affected by mining excavation. Sufficient buffers will be maintained to structures. Maps C-3 and F-1 shows these buffers. Slurry walls installed prior to mining will be a minimum of 10-ft away from the edge of mining. Map C-3 shows the mining and reclamation slopes of the mine. A standard slope was analyzed for stability as it is a good example of the nearest structure, the slurry wall.

The material properties are derived from Table 2.5 in the SME Mining Reference Handbook[1], as there is no site-specific strength data of the material available. Therefore, all materials are matched to a classification from this table that best matches the materials in terms of description. The native alluvial material is best classified as sand and gravel with a mixed grain size. A layer of overburden and sand lies atop the sand and gravel deposit. This material is best described as loose sand, mixed grain size. The bedrock is a soft sedimentary rock (claystone/siltstone) according to the SME Table 2.5. A summary of the material properties can be seen in Table GS-1.

Table GS-1. Material Properties

Material	Unit Weight (lbs/ft)	Cohesion	Friction Angle
Sand and gravel, mixed grain size	110	0	45
Loose sand, mixed grain size	99	0	34
Bedrock	110	20,000	25.0

The final mining (1.5H:1V) and final reclamation (3H:1V) slopes were analyzed. Mining will be conducted at a near active highwall angle until the highwall has reached the half-way point of the final mining slope. Then the vertical active highwall slope will be knocked down to the final mining slope of 1.5H:1V. Then it will be backfilled with overburden/sand to the final reclamation slope of 3H:1V. The final mining and reclaimed slope crests will be the closest excavation comes to the slurry wall and any structures.

1. Mining and Reclamation Slopes

Factor of Safety is expressed in terms of strength divided by stress as a ratio. It is arrived at by an iterative computer process where a slope failure is assumed, the strength and stress of that slope failure are calculated, and those values are compared to determine a lowest factor of

[1] Original source: Hoek and Bray 1977

safety. In the case of the Evans Pit slope stability analysis, the Bishop's Method of Slices was the iterative calculation used, and the software GALENA was used to model slopes and calculate the factor of safety. One slope closest to major structures (see Figure GS-1) was analyzed to look at the factor of safety. Table GS-2 lists the analysis conducted and their respective factors of safety.

GALENA data tables and analysis result figures are attached as Appendix GS-1.

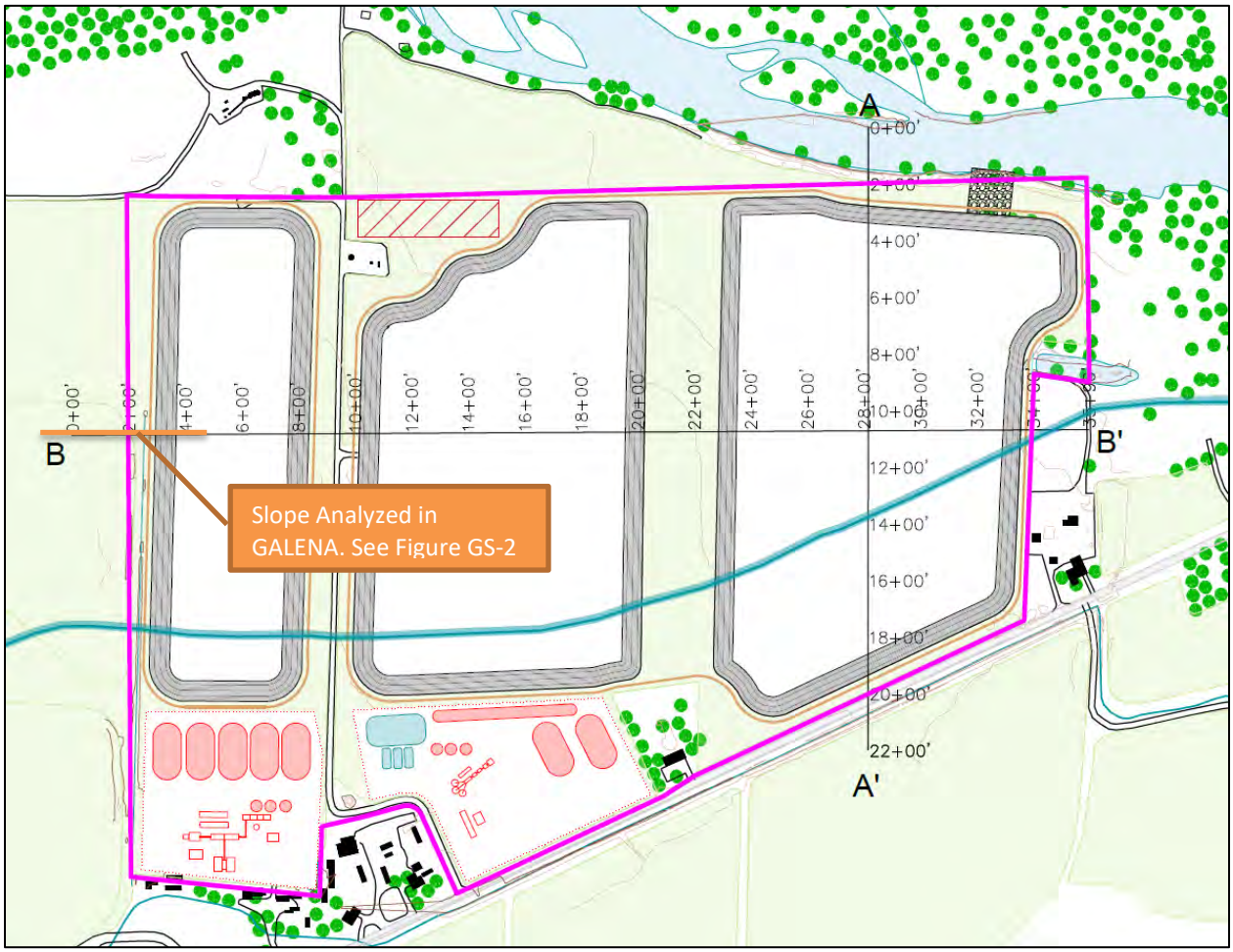

Figure GS-1. Locations of Slope Stability Analysis from Map F-1

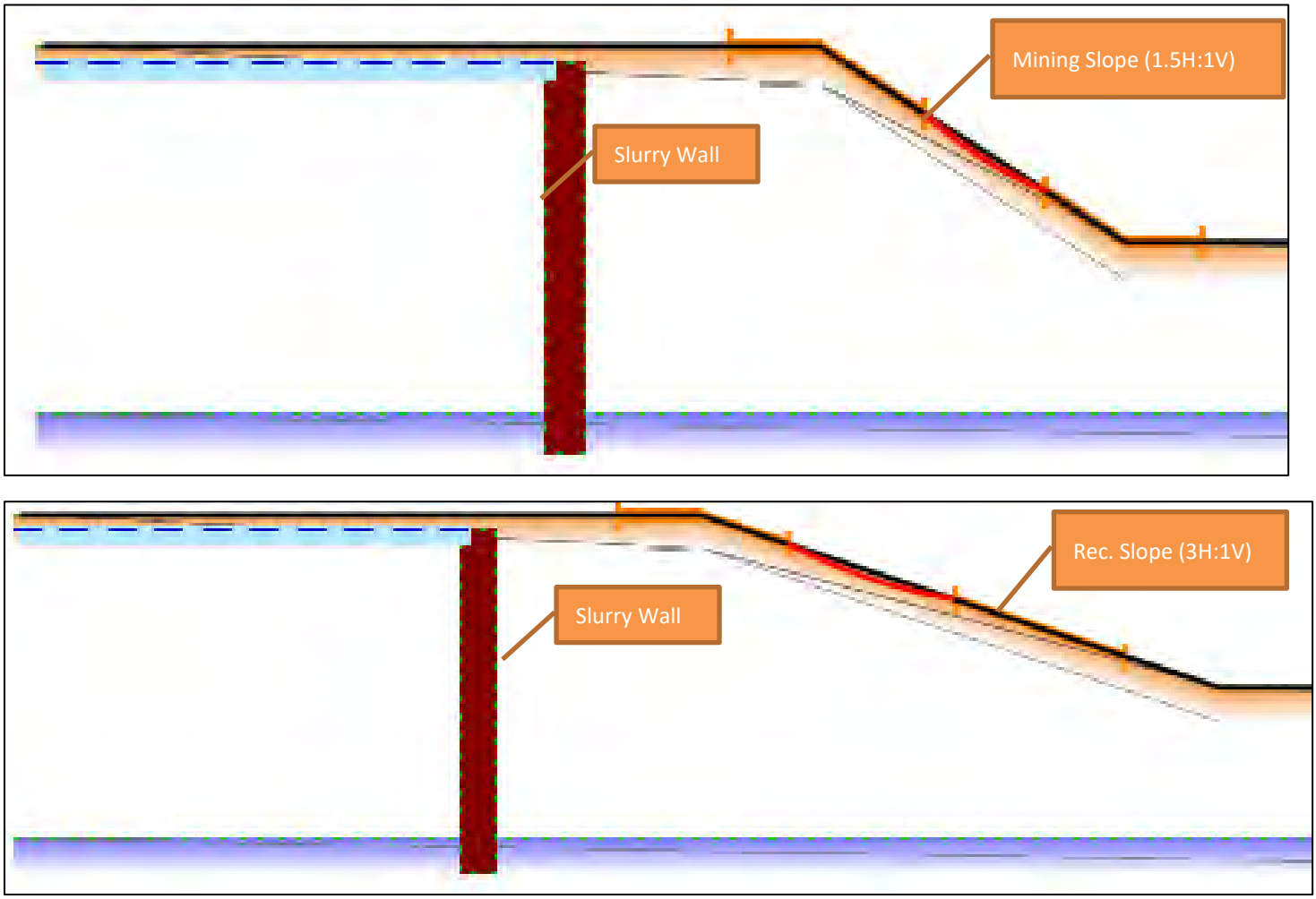

Figure GS-2. GALENA Cross Sections (Mining and Reclamation)

Table GS-2. Factors of Safety for Slope Stability

Slope Condition	Lowest Factor of Safety (static)	Lowest Factor of Safety (seismic)	Nearest Structure
Full Mining	1.51	1.34	Slurry wall (min. 10-ft away)
Final Reclamation	3.03	2.45	Slurry wall (min. 10-ft away)

2.1. Conover Property Structures

East of the southeast corner of the mining operation is the Conover Property (see Figure GS-3). This property is home to several structures including a residence, outbuildings, a driveway, and a groundwater well. The depth of mining and slopes are the same in the southeast corner as on the west side. Therefore, the same cross sections and Bishop's method of slices analysis in GALENA software used for other locations at the Evans Mining Resource are valid adjacent to the Conover Property.

As shown in the GALENA analysis, the failure circle for the lowest Factor of Safety in both Full Mining and Final Reclamation conditions is located completely within the slope itself. The crests of the Full Mining and Final Reclamation slopes are a minimum of 20-feet from the property boundaries. Therefore, no factor of safety failure circle comes within 20-feet of the property boundaries. Given all of the Conover structures are located at or beyond the property line, all Conover structures are at least as far from the slope crest as the property line, which means they are beyond the reach of the lowest Factor of Safety failure circles. A list of the distances of each Conover structure from the property line and the slope crest is shown below in Table GS-3.

Table GS-3. Conover Structures

Conover structure	Approx. Distance from Property Line (ft)	Distance from Slope Crest (ft)
Fence	0	Min. 20
Driveway	4	Min. 24
Outbuilding	16	Min. 36
Residence	140	Min. 166
Groundwater well*	110	Min. 130

*Distance measured to the recorded location from the Colo. Div. of Water Resource. Actual well is likely within a building, not beneath the driveway.

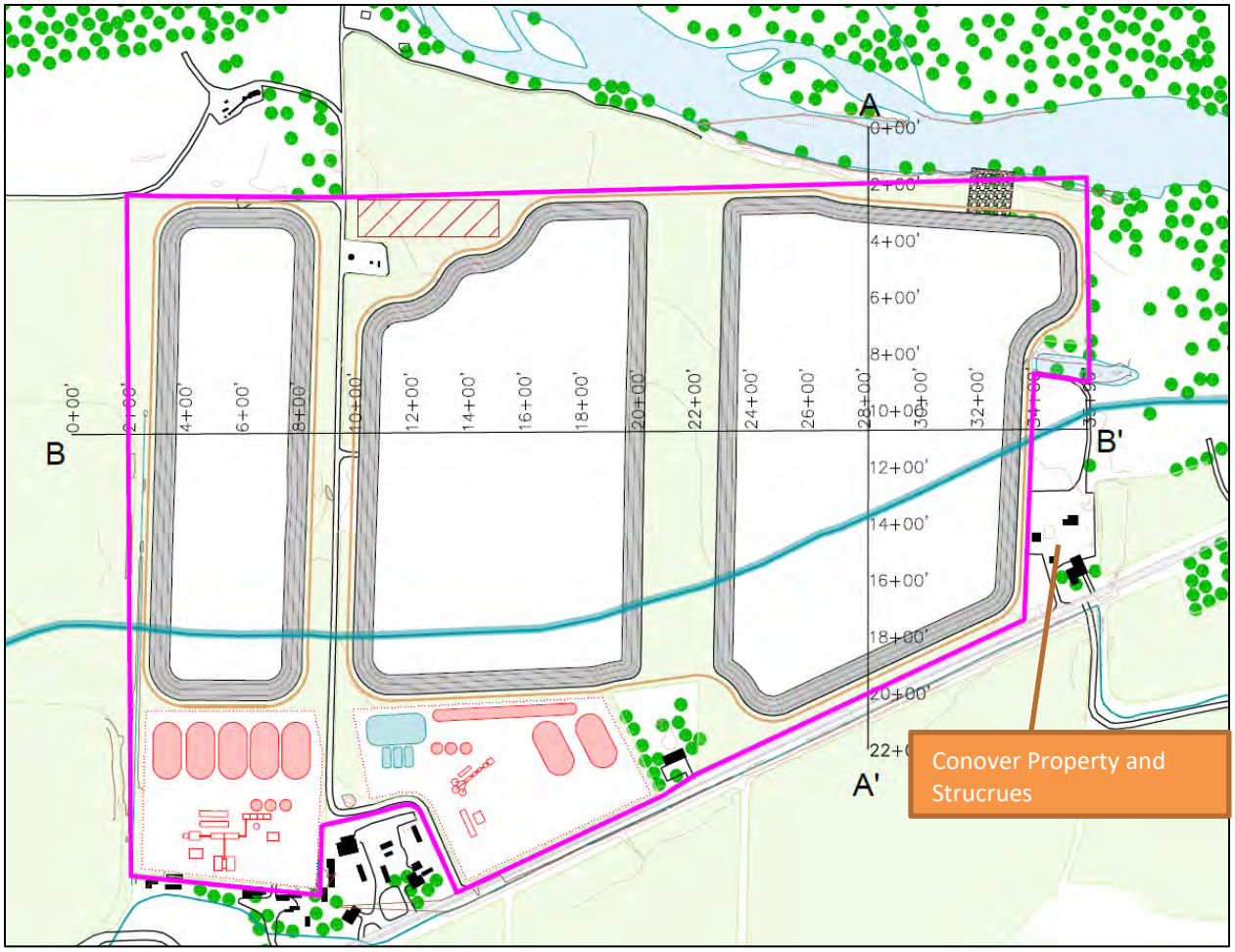

Figure GS-3 Location of Conover Property and Structures

3. Conclusion

The Final Reclamation slope has a minimum factor of safety (FoS = 3.03) of greater than 1.5 for static conditions. The Final Mining slope also has a minimum FoS greater than 1.5 (1.51) for static conditions. These Factors of Safety are greater than the CDRMS minimum for critical structure of 1.5. The seismic conditions analysis for both scenarios are similarly above the CDRMS minimums for critical structures: 1.34 > 1.3 and 2.45 > 1.3

The slope stability analysis in this permit has been prepared according to appropriate engineering standards and practices.

COLORADO LICENSED
BENJAMIN E LANGENFELD
47151
PROFESSIONAL ENGINEER
3/13/25

Ben Langenfeld, P.E.

P.E.# 0047151

APPENDIX GS-1 GALENA INFORMATION

Project: Evans Pit
File: E:\Work\GLA Dropbox\Ben Langenfeld\Asphalt Specialties\Evans Mining Resource\Slope S...\Evans Slope Stability 250321.gmf
Processed: 21 Mar 2025 12:31:22

DATA: Analysis 1 - Mining Condition

Material Properties (4 materials)

Material: 1 (Mohr-Coulomb Isotropic) - Sand and gravel, mixed grain size
Cohesion Phi UnitWeight Ru
0.00 45.0 110.00 Auto
Material: 2 (Mohr-Coulomb Isotropic) - OB - loose sand, mixed grain size
Cohesion Phi UnitWeight Ru
0.00 34.0 99.00 Auto
Material: 3 (Mohr-Coulomb Isotropic) - Bedrock - claystone
Cohesion Phi UnitWeight Ru
20000.00 25.0 110.00 Auto
Material: 4 (Mohr-Coulomb Isotropic) - Slurry Wall
Cohesion Phi UnitWeight Ru
Unsaturated: 0.00 0.0 112.00 Auto
Saturated: 0.00 0.0 115.00 Auto

Water Properties

Unit weight of water: 62.400 Unit weight of water/medium above ground: 0.000

Material Profiles (4 profiles)

Profile: 1 (2 points) Material beneath: 2 - OB - loose sand, mixed grain size
0.00 4670.00 300.00 4670.00
Profile: 2 (2 points) Material beneath: 1 - Sand and gravel, mixed grain size
0.00 4667.00 300.00 4667.00
Profile: 3 (2 points) Material beneath: 3 - Bedrock - claystone
0.00 4633.00 300.00 4633.00
Profile: 4 (5 points) Material within: 4 - Slurry Wall
85.00 4670.00 90.00 4670.00 90.00 4630.00 85.00 4630.00 85.00 4670.00

Slope Surface (4 points)

1.00 4670.00 100.00 4670.00 152.00 4635.00 300.00 4635.00

Phreatic Surface (2 points)

0.00 4665.00 85.00 4665.00

Piezometric Surfaces (1 surface)

Failure Surface

Initial circular surface for critical search defined by: XL,XR,R
Intersects: XL: 100.90 YL: 4669.39 XR: 138.80 YR: 4643.88
Centre: XC: 144.68 YC: 4693.54 Radius: R: 50.00

Variable Restraints

Parameter descriptor:	XL	XR	R
Range of variation:	25.00	20.00	10.50
Trial positions within range:	10	10	10

- -

RESULTS: Analysis 1 - Mining Condition

Bishop Simplified Method of Analysis - Circular Failure Surface

Critical Failure Surface Search using Multiple Circle Generation Techniques

Factor of Safety for initial failure surface approximation: 1.686

There were: 1001 successful analyses from a total of 1001 trial surfaces

Critical (minimum) Factor of Safety: 1.51

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	
1	113.40	4660.98	128.80	4650.62	151.51	4700.98	55.25	1.510	<-- Critical Surface
2	113.40	4660.98	128.80	4650.62	150.85	4700.00	54.08	1.511	
3	113.40	4660.98	128.80	4650.62	150.19	4699.02	52.92	1.512	
4	113.40	4660.98	128.80	4650.62	149.53	4698.03	51.75	1.513	
5	113.40	4660.98	128.80	4650.62	148.87	4697.05	50.58	1.515	
6	113.40	4660.98	128.80	4650.62	148.20	4696.06	49.42	1.516	
7	113.40	4660.98	131.02	4649.12	152.49	4700.03	55.25	1.518	
8	113.40	4660.98	128.80	4650.62	147.54	4695.08	48.25	1.518	
9	113.40	4660.98	131.02	4649.12	151.82	4699.04	54.08	1.519	
10	113.40	4660.98	128.80	4650.62	146.87	4694.09	47.08	1.519	
11	110.62	4662.85	128.80	4650.62	149.95	4701.66	55.25	1.520	
12	113.40	4660.98	131.02	4649.12	151.16	4698.06	52.92	1.521	
13	113.40	4660.98	128.80	4650.62	146.21	4693.10	45.92	1.521	
14	110.62	4662.85	128.80	4650.62	149.28	4700.67	54.08	1.521	
15	113.40	4660.98	131.02	4649.12	150.49	4697.07	51.75	1.522	
16	110.62	4662.85	128.80	4650.62	148.62	4699.68	52.92	1.523	
17	113.40	4660.98	128.80	4650.62	145.54	4692.11	44.75	1.523	
18	113.40	4660.98	131.02	4649.12	149.83	4696.08	50.58	1.524	
19	110.62	4662.85	128.80	4650.62	147.95	4698.69	51.75	1.525	
20	113.40	4660.98	131.02	4649.12	149.16	4695.09	49.42	1.526	
21	113.40	4660.98	133.24	4647.62	153.44	4699.05	55.25	1.527	
22	110.62	4662.85	128.80	4650.62	147.29	4697.70	50.58	1.527	
23	113.40	4660.98	131.02	4649.12	148.49	4694.10	48.25	1.528	
24	113.40	4660.98	133.24	4647.62	152.77	4698.06	54.08	1.528	
25	110.62	4662.85	128.80	4650.62	146.62	4696.71	49.42	1.529	
26	110.62	4662.85	131.02	4649.12	150.90	4700.67	55.25	1.529	
27	113.40	4660.98	131.02	4649.12	147.82	4693.10	47.08	1.530	
28	113.40	4660.98	133.24	4647.62	152.11	4697.07	52.92	1.530	
29	110.62	4662.85	128.80	4650.62	145.95	4695.71	48.25	1.531	
30	110.62	4662.85	131.02	4649.12	150.23	4699.68	54.08	1.531	
31	107.84	4664.72	128.80	4650.62	148.36	4702.29	55.25	1.532	
32	113.40	4660.98	133.24	4647.62	151.44	4696.07	51.75	1.533	
33	113.40	4660.98	131.02	4649.12	147.15	4692.11	45.92	1.533	
34	110.62	4662.85	131.02	4649.12	149.56	4698.68	52.92	1.533	
35	110.62	4662.85	128.80	4650.62	145.28	4694.72	47.08	1.533	
36	107.84	4664.72	128.80	4650.62	147.69	4701.29	54.08	1.534	
37	113.40	4660.98	133.24	4647.62	150.77	4695.08	50.58	1.535	
38	113.40	4660.98	131.02	4649.12	146.48	4691.11	44.75	1.535	

39	110.62	4662.85	131.02	4649.12	148.89	4697.69	51.75	1.535
40	110.62	4662.85	128.80	4650.62	144.61	4693.72	45.92	1.536
41	107.84	4664.72	128.80	4650.62	147.02	4700.30	52.92	1.536
42	113.40	4660.98	135.47	4646.13	154.38	4698.04	55.25	1.537
43	113.40	4660.98	133.24	4647.62	150.10	4694.08	49.42	1.537
44	110.62	4662.85	131.02	4649.12	148.22	4696.69	50.58	1.538
45	107.84	4664.72	128.80	4650.62	146.34	4699.30	51.75	1.538
46	110.62	4662.85	128.80	4650.62	143.94	4692.73	44.75	1.539
47	113.40	4660.98	135.47	4646.13	153.70	4697.04	54.08	1.539
48	110.62	4662.85	133.24	4647.62	151.83	4699.65	55.25	1.539
49	113.40	4660.98	133.24	4647.62	149.42	4693.08	48.25	1.540
50	110.62	4662.85	131.02	4649.12	147.55	4695.69	49.42	1.540
51	107.84	4664.72	128.80	4650.62	145.67	4698.30	50.58	1.541
52	113.40	4660.98	135.47	4646.13	153.03	4696.04	52.92	1.542
53	110.62	4662.85	133.24	4647.62	151.16	4698.65	54.08	1.542
54	107.84	4664.72	131.02	4649.12	149.28	4701.27	55.25	1.542
55	113.40	4660.98	133.24	4647.62	148.75	4692.08	47.08	1.543
56	110.62	4662.85	131.02	4649.12	146.87	4694.69	48.25	1.543
57	107.84	4664.72	128.80	4650.62	145.00	4697.30	49.42	1.544
58	113.40	4660.98	135.47	4646.13	152.36	4695.04	51.75	1.544
59	110.62	4662.85	133.24	4647.62	150.48	4697.65	52.92	1.545
60	107.84	4664.72	131.02	4649.12	148.61	4700.26	54.08	1.545
61	105.07	4666.59	128.80	4650.62	146.73	4702.87	55.25	1.545
62	113.40	4660.98	133.24	4647.62	148.08	4691.08	45.92	1.546
63	110.62	4662.85	131.02	4649.12	146.20	4693.69	47.08	1.546
64	107.84	4664.72	128.80	4650.62	144.32	4696.30	48.25	1.547
65	113.40	4660.98	135.47	4646.13	151.68	4694.04	50.58	1.547
66	110.62	4662.85	133.24	4647.62	149.81	4696.65	51.75	1.547
67	107.84	4664.72	131.02	4649.12	147.93	4699.26	52.92	1.548
68	105.07	4666.59	128.80	4650.62	146.06	4701.87	54.08	1.548
69	113.40	4660.98	137.69	4644.63	155.29	4697.00	55.25	1.548
70	113.40	4660.98	133.24	4647.62	147.40	4690.08	44.75	1.549
71	110.62	4662.85	131.02	4649.12	145.52	4692.69	45.92	1.549
72	107.84	4664.72	128.80	4650.62	143.65	4695.30	47.08	1.550
73	113.40	4660.98	135.47	4646.13	151.01	4693.04	49.42	1.550
74	110.62	4662.85	133.24	4647.62	149.13	4695.65	50.58	1.550
75	107.84	4664.72	131.02	4649.12	147.26	4698.26	51.75	1.551
76	105.07	4666.59	128.80	4650.62	145.38	4700.87	52.92	1.551
77	113.40	4660.98	137.69	4644.63	154.62	4696.00	54.08	1.551
78	110.62	4662.85	135.47	4646.13	152.74	4698.61	55.25	1.551
79	110.62	4662.85	131.02	4649.12	144.85	4691.68	44.75	1.553
80	107.84	4664.72	128.80	4650.62	142.97	4694.29	45.92	1.553
81	113.40	4660.98	135.47	4646.13	150.33	4692.03	48.25	1.553
82	110.62	4662.85	133.24	4647.62	148.46	4694.64	49.42	1.554
83	107.84	4664.72	131.02	4649.12	146.58	4697.25	50.58	1.554
84	105.07	4666.59	128.80	4650.62	144.70	4699.86	51.75	1.554
85	113.40	4660.98	137.69	4644.63	153.94	4694.99	52.92	1.554
86	110.62	4662.85	135.47	4646.13	152.06	4697.60	54.08	1.554
87	107.84	4664.72	133.24	4647.62	150.19	4700.21	55.25	1.554
88	107.84	4664.72	128.80	4650.62	142.29	4693.28	44.75	1.557
89	113.40	4660.98	135.47	4646.13	149.65	4691.02	47.08	1.557
90	110.62	4662.85	133.24	4647.62	147.78	4693.63	48.25	1.557
91	107.84	4664.72	131.02	4649.12	145.90	4696.24	49.42	1.557
92	105.07	4666.59	128.80	4650.62	144.03	4698.85	50.58	1.557
93	113.40	4660.98	137.69	4644.63	153.26	4693.98	51.75	1.557
94	110.62	4662.85	135.47	4646.13	151.38	4696.59	52.92	1.557
95	107.84	4664.72	133.24	4647.62	149.51	4699.20	54.08	1.557
96	105.07	4666.59	131.02	4649.12	147.63	4701.81	55.25	1.557
97	102.29	4668.46	128.80	4650.62	145.08	4703.41	55.25	1.558
98	113.40	4660.98	139.91	4643.14	156.19	4695.93	55.25	1.561
99	105.07	4666.59	131.02	4649.12	146.95	4700.80	54.08	1.561

Critical Failure Surface (circle 1)

Intersects: XL: 113.40 YL: 4660.98 XR: 128.80 YR: 4650.62
Centre: XC: 151.51 YC: 4700.98 Radius: R: 55.25

Generated failure surface: (20 points)

113.40	4660.98	114.12	4660.31	114.85	4659.65	115.59	4659.01	116.34	4658.38
117.10	4657.76	117.87	4657.15	118.66	4656.56	119.45	4655.98	120.26	4655.42
121.07	4654.87	121.89	4654.34	122.73	4653.82	123.57	4653.32	124.42	4652.83
125.28	4652.36	126.15	4651.90	127.02	4651.45	127.91	4651.03	128.80	4650.62

Slice Geometry and Properties - Critical Failure Surface (circle 1, 38 slices)

Slice	X-S	Base							PoreWater	Normal	Test	
	X-Left	Area	Angle	Width	Length	Matl	Cohesion	Phi	Weight	Force	Stress	Factor
1	113.40	0.02	43.1	0.36	0.49	1	0.00	45.0	1.85	0.00	3.18	0.85
2	113.76	0.05	43.1	0.36	0.49	1	0.00	45.0	5.56	0.00	9.58	0.85
3	114.12	0.08	42.1	0.36	0.49	1	0.00	45.0	9.23	0.00	15.87	0.84
4	114.48	0.11	42.1	0.36	0.49	1	0.00	45.0	12.56	0.00	21.57	0.84
5	114.85	0.15	41.1	0.37	0.49	1	0.00	45.0	15.96	0.00	27.35	0.84
6	115.22	0.17	41.1	0.37	0.49	1	0.00	45.0	18.96	0.00	32.48	0.84
7	115.59	0.20	40.1	0.38	0.49	1	0.00	45.0	22.06	0.00	37.71	0.84
8	115.96	0.22	40.1	0.38	0.49	1	0.00	45.0	24.66	0.00	42.16	0.84
9	116.34	0.25	39.0	0.38	0.49	1	0.00	45.0	27.48	0.00	46.90	0.84
10	116.72	0.27	39.0	0.38	0.49	1	0.00	45.0	29.67	0.00	50.64	0.84
11	117.10	0.29	38.0	0.39	0.49	1	0.00	45.0	32.09	0.00	54.68	0.84
12	117.49	0.31	38.0	0.39	0.49	1	0.00	45.0	33.90	0.00	57.76	0.84
13	117.87	0.33	37.0	0.39	0.49	1	0.00	45.0	35.92	0.00	61.12	0.84
14	118.26	0.34	37.0	0.39	0.49	1	0.00	45.0	37.31	0.00	63.49	0.84
15	118.66	0.35	36.0	0.40	0.49	1	0.00	45.0	38.93	0.00	66.18	0.83
16	119.05	0.36	36.0	0.40	0.49	1	0.00	45.0	39.87	0.00	67.77	0.83
17	119.45	0.37	35.0	0.40	0.49	1	0.00	45.0	41.07	0.00	69.79	0.83
18	119.85	0.38	35.0	0.40	0.49	1	0.00	45.0	41.55	0.00	70.59	0.83
19	120.26	0.38	33.9	0.41	0.49	1	0.00	45.0	42.28	0.00	71.82	0.83
20	120.66	0.38	33.9	0.41	0.49	1	0.00	45.0	42.30	0.00	71.86	0.83
21	121.07	0.39	33.0	0.41	0.49	1	0.00	45.0	42.53	0.00	72.22	0.83
22	121.48	0.38	32.9	0.41	0.49	1	0.00	45.0	42.07	0.00	71.47	0.83
23	121.89	0.38	31.9	0.42	0.49	1	0.00	45.0	41.83	0.00	71.05	0.83
24	122.31	0.37	31.9	0.42	0.49	1	0.00	45.0	40.84	0.00	69.41	0.83
25	122.73	0.36	30.9	0.42	0.49	1	0.00	45.0	40.09	0.00	68.17	0.83
26	123.15	0.35	30.9	0.42	0.49	1	0.00	45.0	38.62	0.00	65.67	0.83
27	123.57	0.34	29.8	0.43	0.49	1	0.00	45.0	37.31	0.00	63.52	0.84
28	124.00	0.32	29.9	0.43	0.49	1	0.00	45.0	35.34	0.00	60.14	0.84
29	124.42	0.30	28.8	0.43	0.49	1	0.00	45.0	33.43	0.00	56.98	0.84
30	124.85	0.28	28.8	0.43	0.49	1	0.00	45.0	30.96	0.00	52.77	0.84
31	125.28	0.26	27.9	0.43	0.49	1	0.00	45.0	28.51	0.00	48.65	0.84
32	125.71	0.23	27.8	0.43	0.49	1	0.00	45.0	25.50	0.00	43.54	0.84
33	126.15	0.20	26.8	0.44	0.49	1	0.00	45.0	22.47	0.00	38.44	0.84
34	126.59	0.17	26.8	0.44	0.49	1	0.00	45.0	18.92	0.00	32.34	0.84
35	127.02	0.14	25.8	0.44	0.49	1	0.00	45.0	15.29	0.00	26.19	0.84
36	127.47	0.10	25.8	0.44	0.49	1	0.00	45.0	11.18	0.00	19.17	0.84
37	127.91	0.06	24.8	0.45	0.49	1	0.00	45.0	6.94	0.00	11.93	0.84
38	128.35	0.02	24.8	0.45	0.49	1	0.00	45.0	2.30	0.00	3.95	0.84

X-S Area: 9.70 Path Length: 18.65 X-S Weight: 1067.34

DATA: Analysis 2 - Mining Condition

Material Properties (4 materials)

Material: 1 (Mohr-Coulomb Isotropic) - Sand and gravel, mixed grain size
Cohesion Phi UnitWeight Ru
0.00 45.0 110.00 Auto
Material: 2 (Mohr-Coulomb Isotropic) - OB - loose sand, mixed grain size
Cohesion Phi UnitWeight Ru
0.00 34.0 99.00 Auto
Material: 3 (Mohr-Coulomb Isotropic) - Bedrock - claystone
Cohesion Phi UnitWeight Ru
20000.00 25.0 110.00 Auto
Material: 4 (Mohr-Coulomb Isotropic) - Slurry Wall
Cohesion Phi UnitWeight Ru
Unsaturated: 0.00 0.0 112.00 Auto
Saturated: 0.00 0.0 115.00 Auto

Water Properties

Unit weight of water: 62.400 Unit weight of water/medium above ground: 0.000

Material Profiles (4 profiles)

Profile: 1 (2 points) Material beneath: 2 - OB - loose sand, mixed grain size
0.00 4670.00 300.00 4670.00
Profile: 2 (2 points) Material beneath: 1 - Sand and gravel, mixed grain size
0.00 4667.00 300.00 4667.00
Profile: 3 (2 points) Material beneath: 3 - Bedrock - claystone
0.00 4633.00 300.00 4633.00
Profile: 4 (5 points) Material within: 4 - Slurry Wall
85.00 4670.00 90.00 4670.00 90.00 4630.00 85.00 4630.00 85.00 4670.00

Slope Surface (4 points)

1.00 4670.00 100.00 4670.00 152.00 4635.00 300.00 4635.00

Phreatic Surface (2 points)

0.00 4665.00 85.00 4665.00

Piezometric Surfaces (1 surface)

Failure Surface (Critical, from previous analysis)

Initial circular surface for critical search defined by: XL,XR,R
Intersects: XL: 113.40 YL: 4660.98 XR: 128.80 YR: 4650.62
Centre: XC: 151.51 YC: 4700.98 Radius: R: 55.25

Earthquake Force

Pseudo-static earthquake (seismic) coefficient: 0.050

Variable Restraints

Parameter descriptor: XL XR R
Range of variation: 25.00 20.00 10.50
Trial positions within range: 10 10 10

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RESULTS: Analysis 2 - Mining Condition

Bishop Simplified Method of Analysis - Circular Failure Surface

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Critical Failure Surface Search using Multiple Circle Generation Techniques

Factor of Safety for initial failure surface approximation: 1.359

There were: 881 successful analyses from a total of 1001 trial surfaces
120 analyses terminated due to unacceptable geometry

Critical (minimum) Factor of Safety: 1.34

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	
1	120.34	4656.31	123.24	4654.35	153.61	4702.59	57.00	1.336	<-- Critical Surface
2	120.34	4656.31	123.24	4654.35	154.26	4703.56	58.17	1.336	
3	120.34	4656.31	123.24	4654.35	155.56	4705.50	60.50	1.337	
4	120.34	4656.31	123.24	4654.35	152.96	4701.62	55.83	1.337	
5	120.34	4656.31	123.24	4654.35	154.91	4704.53	59.33	1.337	
6	120.34	4656.31	123.24	4654.35	150.35	4697.75	51.17	1.337	
7	120.34	4656.31	123.24	4654.35	152.31	4700.66	54.67	1.337	
8	117.57	4658.18	121.02	4655.85	153.05	4707.17	60.50	1.337	
9	120.34	4656.31	123.24	4654.35	151.00	4698.72	52.33	1.337	
10	120.34	4656.31	123.24	4654.35	151.65	4699.69	53.50	1.337	
11	117.57	4658.18	121.02	4655.85	152.40	4706.21	59.33	1.337	
12	120.34	4656.31	123.24	4654.35	149.70	4696.78	50.00	1.337	
13	117.57	4658.18	121.02	4655.85	150.45	4703.30	55.83	1.337	
14	117.57	4658.18	121.02	4655.85	149.80	4702.33	54.67	1.337	
15	117.57	4658.18	121.02	4655.85	151.75	4705.24	58.17	1.337	
16	117.57	4658.18	121.02	4655.85	151.10	4704.27	57.00	1.337	
17	117.57	4658.18	121.02	4655.85	149.14	4701.36	53.50	1.337	
18	125.90	4652.57	129.91	4649.87	161.01	4700.40	59.33	1.337	
19	125.90	4652.57	129.91	4649.87	161.66	4701.37	60.50	1.337	
20	117.57	4658.18	121.02	4655.85	147.19	4698.46	50.00	1.337	
21	114.79	4660.05	118.80	4657.35	150.55	4708.85	60.50	1.337	
22	117.57	4658.18	121.02	4655.85	148.49	4700.40	52.33	1.337	
23	114.79	4660.05	118.80	4657.35	149.90	4707.88	59.33	1.337	
24	114.79	4660.05	118.80	4657.35	149.24	4706.91	58.17	1.337	
25	125.90	4652.57	129.91	4649.87	160.36	4699.43	58.17	1.337	
26	125.90	4652.57	129.91	4649.87	159.70	4698.46	57.00	1.337	
27	114.79	4660.05	118.80	4657.35	148.59	4705.94	57.00	1.337	
28	117.57	4658.18	121.02	4655.85	147.84	4699.43	51.17	1.337	
29	114.79	4660.05	118.80	4657.35	147.29	4704.00	54.67	1.337	
30	125.90	4652.57	129.91	4649.87	158.40	4696.52	54.67	1.337	
31	114.79	4660.05	118.80	4657.35	147.94	4704.97	55.83	1.337	
32	125.90	4652.57	129.91	4649.87	159.05	4697.49	55.83	1.337	
33	125.90	4652.57	129.91	4649.87	157.75	4695.56	53.50	1.338	
34	123.12	4654.44	127.69	4651.36	159.15	4703.04	60.50	1.338	
35	114.79	4660.05	118.80	4657.35	146.64	4703.03	53.50	1.338	
36	123.12	4654.44	127.69	4651.36	158.50	4702.07	59.33	1.338	
37	125.90	4652.57	129.91	4649.87	156.44	4693.62	51.17	1.338	
38	125.90	4652.57	129.91	4649.87	157.10	4694.59	52.33	1.338	
39	123.12	4654.44	127.69	4651.36	157.85	4701.10	58.17	1.338	
40	114.79	4660.05	118.80	4657.35	145.98	4702.07	52.33	1.338	
41	114.79	4660.05	118.80	4657.35	145.33	4701.10	51.17	1.338	
42	114.79	4660.05	118.80	4657.35	144.68	4700.13	50.00	1.338	
43	123.12	4654.44	127.69	4651.36	157.20	4700.13	57.00	1.338	
44	125.90	4652.57	129.91	4649.87	155.79	4692.65	50.00	1.338	
45	123.12	4654.44	127.69	4651.36	156.54	4699.16	55.83	1.338	
46	123.12	4654.44	127.69	4651.36	155.89	4698.19	54.67	1.338	
47	120.34	4656.31	125.47	4652.86	156.64	4704.71	60.50	1.338	
48	123.12	4654.44	127.69	4651.36	155.24	4697.22	53.50	1.338	

49	120.34	4656.31	125.47	4652.86	155.99	4703.74	59.33	1.338
50	123.12	4654.44	127.69	4651.36	154.59	4696.25	52.33	1.338
51	120.34	4656.31	125.47	4652.86	155.34	4702.77	58.17	1.338
52	123.12	4654.44	127.69	4651.36	153.93	4695.29	51.17	1.338
53	120.34	4656.31	125.47	4652.86	154.69	4701.80	57.00	1.338
54	120.34	4656.31	125.47	4652.86	154.03	4700.83	55.83	1.338
55	123.12	4654.44	127.69	4651.36	153.28	4694.32	50.00	1.338
56	117.57	4658.18	123.24	4654.35	154.13	4706.37	60.50	1.338
57	117.57	4658.18	123.24	4654.35	153.48	4705.40	59.33	1.338
58	120.34	4656.31	125.47	4652.86	152.73	4698.89	53.50	1.338
59	120.34	4656.31	125.47	4652.86	153.38	4699.86	54.67	1.339
60	120.34	4656.31	125.47	4652.86	152.08	4697.92	52.33	1.339
61	117.57	4658.18	123.24	4654.35	152.83	4704.44	58.17	1.339
62	117.57	4658.18	123.24	4654.35	152.18	4703.47	57.00	1.339
63	120.34	4656.31	125.47	4652.86	151.42	4696.95	51.17	1.339
64	117.57	4658.18	123.24	4654.35	151.52	4702.50	55.83	1.339
65	114.79	4660.05	121.02	4655.85	151.62	4708.04	60.50	1.339
66	120.34	4656.31	125.47	4652.86	150.77	4695.98	50.00	1.339
67	125.90	4652.57	132.13	4648.37	162.73	4700.56	60.50	1.339
68	117.57	4658.18	123.24	4654.35	150.87	4701.53	54.67	1.339
69	114.79	4660.05	121.02	4655.85	150.97	4707.07	59.33	1.339
70	117.57	4658.18	123.24	4654.35	150.22	4700.56	53.50	1.339
71	125.90	4652.57	132.13	4648.37	162.08	4699.59	59.33	1.339
72	100.90	4669.39	118.80	4657.35	143.09	4712.76	60.50	1.339
73	114.79	4660.05	121.02	4655.85	150.32	4706.10	58.17	1.339
74	125.90	4652.57	132.13	4648.37	161.43	4698.62	58.17	1.339
75	117.57	4658.18	123.24	4654.35	149.57	4699.59	52.33	1.339
76	114.79	4660.05	121.02	4655.85	149.66	4705.13	57.00	1.339
77	125.90	4652.57	132.13	4648.37	160.78	4697.65	57.00	1.339
78	117.57	4658.18	123.24	4654.35	148.91	4698.62	51.17	1.339
79	125.90	4652.57	132.13	4648.37	160.12	4696.68	55.83	1.339
80	123.12	4654.44	129.91	4649.87	160.22	4702.23	60.50	1.340
81	114.79	4660.05	121.02	4655.85	149.01	4704.16	55.83	1.340
82	112.01	4661.92	118.80	4657.35	149.11	4709.71	60.50	1.340
83	117.57	4658.18	123.24	4654.35	148.26	4697.65	50.00	1.340
84	125.90	4652.57	132.13	4648.37	159.47	4695.71	54.67	1.340
85	114.79	4660.05	121.02	4655.85	148.36	4703.19	54.67	1.340
86	112.01	4661.92	118.80	4657.35	148.46	4708.74	59.33	1.340
87	123.12	4654.44	129.91	4649.87	159.57	4701.26	59.33	1.340
88	125.90	4652.57	132.13	4648.37	158.82	4694.74	53.50	1.340
89	112.01	4661.92	118.80	4657.35	147.80	4707.77	58.17	1.340
90	123.12	4654.44	129.91	4649.87	158.91	4700.29	58.17	1.340
91	114.79	4660.05	121.02	4655.85	147.70	4702.22	53.50	1.340
92	112.01	4661.92	118.80	4657.35	147.15	4706.80	57.00	1.340
93	123.12	4654.44	129.91	4649.87	158.26	4699.32	57.00	1.340
94	125.90	4652.57	132.13	4648.37	158.16	4693.77	52.33	1.340
95	114.79	4660.05	121.02	4655.85	147.05	4701.25	52.33	1.340
96	114.79	4660.05	121.02	4655.85	146.40	4700.28	51.17	1.340
97	112.01	4661.92	118.80	4657.35	146.50	4705.83	55.83	1.340
98	123.12	4654.44	129.91	4649.87	157.61	4698.35	55.83	1.340
99	120.34	4656.31	127.69	4651.36	157.71	4703.89	60.50	1.340

Critical Failure Surface (circle 1)

Intersects: XL: 120.34 YL: 4656.31 XR: 123.24 YR: 4654.35

Centre: XC: 153.61 YC: 4702.59 Radius: R: 57.00

Generated failure surface: (20 points)

120.34	4656.31	120.49	4656.20	120.64	4656.09	120.79	4655.99	120.95	4655.88
121.10	4655.78	121.25	4655.67	121.40	4655.57	121.55	4655.46	121.70	4655.36
121.86	4655.26	122.01	4655.15	122.16	4655.05	122.32	4654.95	122.47	4654.85
122.62	4654.75	122.78	4654.65	122.93	4654.55	123.09	4654.45	123.24	4654.35

Slice Geometry and Properties - Critical Failure Surface (circle 1, 38 slices)

Slice	X-S	Base						PoreWater	Normal	Test	
	X-Left	Area	Angle	Width	Length	Matl	Cohesion	Phi	Weight	Force	Stress	Factor
1	120.34	0.00	35.4	0.07	0.09	1	0.00	45.0	0.01	0.00	0.11	0.80
2	120.42	0.00	35.7	0.07	0.09	1	0.00	45.0	0.04	0.00	0.31	0.80
3	120.49	0.00	35.4	0.07	0.09	1	0.00	45.0	0.06	0.00	0.56	0.80
4	120.57	0.00	35.6	0.07	0.09	1	0.00	45.0	0.09	0.00	0.77	0.80
5	120.64	0.00	35.1	0.08	0.09	1	0.00	45.0	0.11	0.00	0.95	0.80
6	120.72	0.00	35.3	0.08	0.09	1	0.00	45.0	0.13	0.00	1.16	0.80
7	120.79	0.00	35.2	0.08	0.09	1	0.00	45.0	0.15	0.00	1.30	0.80
8	120.87	0.00	35.0	0.08	0.09	1	0.00	45.0	0.17	0.00	1.48	0.80
9	120.95	0.00	34.9	0.08	0.09	1	0.00	45.0	0.19	0.00	1.62	0.80
10	121.02	0.00	34.7	0.08	0.09	1	0.00	45.0	0.20	0.00	1.73	0.80
11	121.10	0.00	34.6	0.08	0.09	1	0.00	45.0	0.22	0.00	1.88	0.80
12	121.17	0.00	34.9	0.08	0.09	1	0.00	45.0	0.23	0.00	1.98	0.80
13	121.25	0.00	34.3	0.08	0.09	1	0.00	45.0	0.24	0.00	2.06	0.80
14	121.32	0.00	34.6	0.08	0.09	1	0.00	45.0	0.25	0.00	2.16	0.80
15	121.40	0.00	34.5	0.08	0.09	1	0.00	45.0	0.25	0.00	2.20	0.80
16	121.47	0.00	34.3	0.08	0.09	1	0.00	45.0	0.26	0.00	2.28	0.80
17	121.55	0.00	34.2	0.08	0.09	1	0.00	45.0	0.27	0.00	2.31	0.80
18	121.63	0.00	33.9	0.08	0.09	1	0.00	45.0	0.27	0.00	2.32	0.80
19	121.70	0.00	33.9	0.08	0.09	1	0.00	45.0	0.27	0.00	2.36	0.80
20	121.78	0.00	34.1	0.08	0.09	1	0.00	45.0	0.27	0.00	2.35	0.80
21	121.86	0.00	33.6	0.08	0.09	1	0.00	45.0	0.27	0.00	2.37	0.80
22	121.93	0.00	33.8	0.08	0.09	1	0.00	45.0	0.27	0.00	2.33	0.80
23	122.01	0.00	33.5	0.08	0.09	1	0.00	45.0	0.26	0.00	2.30	0.80
24	122.09	0.00	33.5	0.08	0.09	1	0.00	45.0	0.26	0.00	2.23	0.80
25	122.16	0.00	33.5	0.08	0.09	1	0.00	45.0	0.25	0.00	2.16	0.80
26	122.24	0.00	33.5	0.08	0.09	1	0.00	45.0	0.24	0.00	2.08	0.80
27	122.32	0.00	33.2	0.08	0.09	1	0.00	45.0	0.23	0.00	1.98	0.80
28	122.39	0.00	33.2	0.08	0.09	1	0.00	45.0	0.22	0.00	1.88	0.80
29	122.47	0.00	33.1	0.08	0.09	1	0.00	45.0	0.21	0.00	1.80	0.80
30	122.55	0.00	33.1	0.08	0.09	1	0.00	45.0	0.19	0.00	1.66	0.80
31	122.62	0.00	32.8	0.08	0.09	1	0.00	45.0	0.17	0.00	1.52	0.80
32	122.70	0.00	32.8	0.08	0.09	1	0.00	45.0	0.16	0.00	1.38	0.80
33	122.78	0.00	32.5	0.08	0.09	1	0.00	45.0	0.14	0.00	1.20	0.80
34	122.86	0.00	32.7	0.08	0.09	1	0.00	45.0	0.11	0.00	0.98	0.80
35	122.93	0.00	32.7	0.08	0.09	1	0.00	45.0	0.09	0.00	0.80	0.80
36	123.01	0.00	32.4	0.08	0.09	1	0.00	45.0	0.07	0.00	0.58	0.80
37	123.09	0.00	32.4	0.08	0.09	1	0.00	45.0	0.04	0.00	0.36	0.80
38	123.17	0.00	32.1	0.08	0.09	1	0.00	45.0	0.02	0.00	0.15	0.80

X-S Area: 0.06 Path Length: 3.50 X-S Weight: 6.85

DATA: Analysis 3 - Reclaimed Condition

Material Properties (4 materials)

Material: 1 (Mohr-Coulomb Isotropic) - Sand and gravel, mixed grain size

Cohesion	Phi	UnitWeight	Ru
0.00	45.0	110.00	Auto

Material: 2 (Mohr-Coulomb Isotropic) - OB - loose sand, mixed grain size

Cohesion	Phi	UnitWeight	Ru
0.00	34.0	99.00	Auto

Material: 3 (Mohr-Coulomb Isotropic) - Bedrock - claystone

Cohesion	Phi	UnitWeight	Ru
20000.00	25.0	110.00	Auto

Material: 4 (Mohr-Coulomb Isotropic) - Slurry Wall

	Cohesion	Phi	UnitWeight	Ru
Unsaturated:	0.00	0.0	112.00	Auto
Saturated:	0.00	0.0	115.00	Auto

Water Properties

Unit weight of water: 62.400 Unit weight of water/medium above ground: 0.000

Material Profiles (4 profiles)

Profile: 1 (2 points) Material beneath: 2 - OB - loose sand, mixed grain size
0.00 4670.00 300.00 4670.00
Profile: 2 (2 points) Material beneath: 1 - Sand and gravel, mixed grain size
0.00 4667.00 300.00 4667.00
Profile: 3 (2 points) Material beneath: 3 - Bedrock - claystone
0.00 4633.00 300.00 4633.00
Profile: 4 (5 points) Material within: 4 - Slurry Wall
85.00 4670.00 90.00 4670.00 90.00 4630.00 85.00 4630.00 85.00 4670.00

Slope Surface (4 points)

1.00 4670.00 100.00 4670.00 205.00 4635.00 300.00 4635.00

Phreatic Surface (2 points)

0.00 4665.00 85.00 4665.00

Piezometric Surfaces (1 surface)

Failure Surface

Initial circular surface for critical search defined by: XL,XR,R
Intersects: XL: 100.10 YL: 4669.97 XR: 149.10 YR: 4653.63
Centre: XC: 146.87 YC: 4728.60 Radius: R: 75.00

Variable Restraints

Parameter descriptor:	XL	XR	R
Range of variation:	25.00	25.00	20.00
Trial positions within range:	20	20	10

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RESULTS: Analysis 3 - Reclaimed Condition

Bishop Simplified Method of Analysis - Circular Failure Surface
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Critical Failure Surface Search using Multiple Circle Generation Techniques

Factor of Safety for initial failure surface approximation: 3.163

There were: 4001 successful analyses from a total of 4001 trial surfaces

Critical (minimum) Factor of Safety: 3.03

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	
1	112.60	4665.80	136.60	4657.80	151.18	4741.54	85.00	3.030	<-- Critical Surface

2	112.60	4665.80	136.60	4657.80	150.47	4739.41	82.78	3.032
3	112.60	4665.80	137.92	4657.36	151.80	4741.22	85.00	3.033
4	111.28	4666.24	136.60	4657.80	150.49	4741.66	85.00	3.033
5	112.60	4665.80	136.60	4657.80	149.76	4737.27	80.56	3.033
6	100.76	4669.75	136.60	4657.80	144.89	4742.40	85.00	3.034
7	112.60	4665.80	137.92	4657.36	151.09	4739.08	82.78	3.035
8	111.28	4666.24	136.60	4657.80	149.78	4739.52	82.78	3.035
9	112.60	4665.80	136.60	4657.80	149.05	4735.14	78.33	3.035
10	99.44	4670.00	136.60	4657.80	143.83	4742.49	85.00	3.036
11	102.07	4669.31	136.60	4657.80	145.59	4742.32	85.00	3.036
12	109.97	4666.68	136.60	4657.80	149.80	4741.77	85.00	3.037
13	111.28	4666.24	137.92	4657.36	151.11	4741.33	85.00	3.037
14	112.60	4665.80	139.23	4656.92	152.43	4740.89	85.00	3.037
15	111.28	4666.24	136.60	4657.80	149.07	4737.39	80.56	3.037
16	112.60	4665.80	137.92	4657.36	150.38	4736.95	80.56	3.037
17	112.60	4665.80	136.60	4657.80	148.33	4733.00	76.11	3.038
18	100.76	4669.75	136.60	4657.80	144.17	4740.23	82.78	3.039
19	112.60	4665.80	139.23	4656.92	151.71	4738.75	82.78	3.039
20	111.28	4666.24	137.92	4657.36	150.40	4739.19	82.78	3.039
21	109.97	4666.68	136.60	4657.80	149.08	4739.63	82.78	3.039
22	111.28	4666.24	136.60	4657.80	148.35	4735.25	78.33	3.039
23	112.60	4665.80	137.92	4657.36	149.67	4734.81	78.33	3.039
24	112.60	4665.80	136.60	4657.80	147.62	4730.86	73.89	3.040
25	108.65	4667.12	136.60	4657.80	149.10	4741.88	85.00	3.041
26	109.97	4666.68	137.92	4657.36	150.42	4741.44	85.00	3.041
27	111.28	4666.24	139.23	4656.92	151.73	4741.00	85.00	3.041
28	102.07	4669.31	136.60	4657.80	144.87	4740.16	82.78	3.041
29	104.71	4668.43	136.60	4657.80	147.00	4742.16	85.00	3.041
30	112.60	4665.80	140.55	4656.48	153.05	4740.56	85.00	3.041
31	103.39	4668.87	136.60	4657.80	146.30	4742.24	85.00	3.041
32	112.60	4665.80	139.23	4656.92	151.00	4736.61	80.56	3.041
33	111.28	4666.24	137.92	4657.36	149.68	4737.05	80.56	3.041
34	109.97	4666.68	136.60	4657.80	148.37	4737.49	80.56	3.041
35	99.44	4670.00	136.60	4657.80	143.11	4740.32	82.78	3.042
36	112.60	4665.80	137.92	4657.36	148.95	4732.67	76.11	3.042
37	111.28	4666.24	136.60	4657.80	147.64	4733.11	76.11	3.042
38	106.02	4667.99	136.60	4657.80	147.70	4742.07	85.00	3.042
39	112.60	4665.80	136.60	4657.80	146.91	4728.72	71.67	3.042
40	107.34	4667.55	136.60	4657.80	148.40	4741.98	85.00	3.042
41	108.65	4667.12	136.60	4657.80	148.39	4739.73	82.78	3.043
42	111.28	4666.24	139.23	4656.92	151.02	4738.86	82.78	3.043
43	109.97	4666.68	137.92	4657.36	149.70	4739.30	82.78	3.043
44	112.60	4665.80	140.55	4656.48	152.33	4738.42	82.78	3.043
45	100.76	4669.75	137.92	4657.36	145.49	4742.02	85.00	3.043
46	112.60	4665.80	139.23	4656.92	150.29	4734.47	78.33	3.044
47	109.97	4666.68	136.60	4657.80	147.66	4735.35	78.33	3.044
48	111.28	4666.24	137.92	4657.36	148.97	4734.91	78.33	3.044
49	103.39	4668.87	136.60	4657.80	145.58	4740.09	82.78	3.044
50	112.60	4665.80	137.92	4657.36	148.24	4730.53	73.89	3.044
51	104.71	4668.43	136.60	4657.80	146.28	4740.01	82.78	3.044
52	111.28	4666.24	136.60	4657.80	146.92	4730.96	73.89	3.044
53	100.76	4669.75	136.60	4657.80	143.44	4738.06	80.56	3.044
54	102.07	4669.31	137.92	4657.36	146.20	4741.96	85.00	3.045
55	108.65	4667.12	137.92	4657.36	149.72	4741.54	85.00	3.045
56	111.28	4666.24	140.55	4656.48	152.35	4740.66	85.00	3.045
57	109.97	4666.68	139.23	4656.92	151.03	4741.10	85.00	3.045
58	112.60	4665.80	141.86	4656.05	153.66	4740.22	85.00	3.045
59	107.34	4667.55	136.60	4657.80	147.69	4739.83	82.78	3.045
60	112.60	4665.80	136.60	4657.80	146.19	4726.58	69.44	3.045
61	106.02	4667.99	136.60	4657.80	146.99	4739.92	82.78	3.045
62	108.65	4667.12	136.60	4657.80	147.67	4737.59	80.56	3.045
63	109.97	4666.68	137.92	4657.36	148.99	4737.15	80.56	3.045

64	111.28	4666.24	139.23	4656.92	150.30	4736.71	80.56	3.046
65	112.60	4665.80	140.55	4656.48	151.62	4736.28	80.56	3.046
66	102.07	4669.31	136.60	4657.80	144.15	4738.00	80.56	3.046
67	103.39	4668.87	137.92	4657.36	146.91	4741.88	85.00	3.046
68	99.44	4670.00	137.92	4657.36	144.44	4742.11	85.00	3.046
69	112.60	4665.80	139.23	4656.92	149.57	4732.33	76.11	3.046
70	111.28	4666.24	137.92	4657.36	148.26	4732.77	76.11	3.046
71	109.97	4666.68	136.60	4657.80	146.94	4733.21	76.11	3.046
72	107.34	4667.55	137.92	4657.36	149.02	4741.63	85.00	3.047
73	104.71	4668.43	137.92	4657.36	147.61	4741.81	85.00	3.047
74	111.28	4666.24	136.60	4657.80	146.21	4728.82	71.67	3.047
75	112.60	4665.80	137.92	4657.36	147.52	4728.38	71.67	3.047
76	108.65	4667.12	137.92	4657.36	149.00	4739.39	82.78	3.047
77	111.28	4666.24	140.55	4656.48	151.63	4738.52	82.78	3.047
78	109.97	4666.68	139.23	4656.92	150.32	4738.96	82.78	3.047
79	112.60	4665.80	141.86	4656.05	152.95	4738.08	82.78	3.047
80	106.02	4667.99	137.92	4657.36	148.32	4741.72	85.00	3.048
81	107.34	4667.55	136.60	4657.80	146.97	4737.69	80.56	3.048
82	103.39	4668.87	136.60	4657.80	144.86	4737.93	80.56	3.048
83	104.71	4668.43	136.60	4657.80	145.57	4737.85	80.56	3.048
84	99.44	4670.00	136.60	4657.80	142.40	4738.15	80.56	3.048
85	108.65	4667.12	136.60	4657.80	146.96	4735.45	78.33	3.048
86	111.28	4666.24	139.23	4656.92	149.59	4734.57	78.33	3.048
87	109.97	4666.68	137.92	4657.36	148.27	4735.01	78.33	3.048
88	112.60	4665.80	140.55	4656.48	150.90	4734.13	78.33	3.048
89	112.60	4665.80	136.60	4657.80	145.48	4724.43	67.22	3.048
90	106.02	4667.99	136.60	4657.80	146.27	4737.77	80.56	3.048
91	100.76	4669.75	137.92	4657.36	144.77	4739.85	82.78	3.049
92	108.65	4667.12	139.23	4656.92	150.33	4741.19	85.00	3.049
93	112.60	4665.80	143.18	4655.61	154.28	4739.88	85.00	3.049
94	109.97	4666.68	140.55	4656.48	151.65	4740.76	85.00	3.049
95	111.28	4666.24	141.86	4656.05	152.97	4740.32	85.00	3.049
96	111.28	4666.24	137.92	4657.36	147.54	4730.62	73.89	3.049
97	109.97	4666.68	136.60	4657.80	146.23	4731.06	73.89	3.049
98	112.60	4665.80	139.23	4656.92	148.86	4730.18	73.89	3.049
99	102.07	4669.31	137.92	4657.36	145.48	4739.79	82.78	3.049

Critical Failure Surface (circle 1)

Intersects: XL: 112.60 YL: 4665.80 XR: 136.60 YR: 4657.80

Centre: XC: 151.18 YC: 4741.54 Radius: R: 85.00

Generated failure surface: (20 points)

112.60	4665.80	113.80	4665.20	115.00	4664.62	116.21	4664.06	117.44	4663.52
118.67	4663.00	119.91	4662.50	121.15	4662.02	122.41	4661.56	123.67	4661.12
124.94	4660.69	126.21	4660.29	127.49	4659.91	128.78	4659.55	130.07	4659.20
131.37	4658.88	132.67	4658.58	133.97	4658.30	135.29	4658.04	136.60	4657.80

Slice Geometry and Properties - Critical Failure Surface (circle 1, 38 slices)

Slice	X-S	---------- Base ----------						PoreWater	Normal	Test	
	X-Left	Area	Angle	Width	Length	Matl	Cohesion	Phi	Weight	Force	Stress	Factor
1	112.60	0.03	26.6	0.60	0.67	1	0.00	45.0	3.28	0.00	4.70	0.96
2	113.20	0.09	26.5	0.60	0.67	1	0.00	45.0	9.79	0.00	14.07	0.96
3	113.80	0.15	25.6	0.60	0.67	1	0.00	45.0	16.11	0.00	23.09	0.96
4	114.40	0.20	25.6	0.60	0.67	1	0.00	45.0	21.94	0.00	31.44	0.96
5	115.00	0.25	24.8	0.61	0.67	1	0.00	45.0	27.67	0.00	39.58	0.96
6	115.61	0.30	24.8	0.61	0.67	1	0.00	45.0	32.79	0.00	46.90	0.96
7	116.21	0.34	23.8	0.61	0.67	1	0.00	45.0	37.88	0.00	54.10	0.95
8	116.83	0.38	23.8	0.61	0.67	1	0.00	45.0	42.32	0.00	60.42	0.95
9	117.44	0.43	22.9	0.62	0.67	1	0.00	45.0	46.77	0.00	66.69	0.95
10	118.05	0.46	23.0	0.62	0.67	1	0.00	45.0	50.47	0.00	71.95	0.95
11	118.67	0.49	22.1	0.62	0.67	1	0.00	45.0	54.23	0.00	77.22	0.95

12	119.29	0.52	22.0	0.62	0.67	1	0.00	45.0	57.22	0.00	81.50	0.95
13	119.91	0.55	21.1	0.62	0.67	1	0.00	45.0	60.26	0.00	85.75	0.95
14	120.53	0.57	21.2	0.62	0.67	1	0.00	45.0	62.53	0.00	88.97	0.95
15	121.15	0.59	20.3	0.63	0.67	1	0.00	45.0	64.82	0.00	92.17	0.95
16	121.78	0.60	20.2	0.63	0.67	1	0.00	45.0	66.34	0.00	94.34	0.95
17	122.41	0.62	19.3	0.63	0.67	1	0.00	45.0	67.87	0.00	96.47	0.95
18	123.04	0.62	19.3	0.63	0.67	1	0.00	45.0	68.61	0.00	97.53	0.95
19	123.67	0.63	18.4	0.63	0.67	1	0.00	45.0	69.39	0.00	98.61	0.95
20	124.30	0.63	18.4	0.63	0.67	1	0.00	45.0	69.39	0.00	98.63	0.95
21	124.94	0.63	17.6	0.64	0.67	1	0.00	45.0	69.34	0.00	98.53	0.95
22	125.57	0.62	17.5	0.64	0.67	1	0.00	45.0	68.58	0.00	97.48	0.95
23	126.21	0.62	16.6	0.64	0.67	1	0.00	45.0	67.75	0.00	96.33	0.95
24	126.85	0.60	16.6	0.64	0.67	1	0.00	45.0	66.16	0.00	94.06	0.95
25	127.49	0.59	15.7	0.64	0.67	1	0.00	45.0	64.53	0.00	91.80	0.95
26	128.13	0.57	15.8	0.64	0.67	1	0.00	45.0	62.18	0.00	88.44	0.95
27	128.78	0.54	14.8	0.65	0.67	1	0.00	45.0	59.71	0.00	85.01	0.95
28	129.42	0.51	14.8	0.65	0.67	1	0.00	45.0	56.55	0.00	80.52	0.95
29	130.07	0.48	13.9	0.65	0.67	1	0.00	45.0	53.23	0.00	75.87	0.95
30	130.72	0.45	14.0	0.65	0.67	1	0.00	45.0	49.26	0.00	70.19	0.95
31	131.37	0.41	13.0	0.65	0.67	1	0.00	45.0	45.07	0.00	64.31	0.95
32	132.02	0.37	13.0	0.65	0.67	1	0.00	45.0	40.35	0.00	57.59	0.95
33	132.67	0.32	12.1	0.65	0.67	1	0.00	45.0	35.34	0.00	50.50	0.96
34	133.32	0.27	12.1	0.65	0.67	1	0.00	45.0	29.76	0.00	42.54	0.96
35	133.97	0.22	11.2	0.66	0.67	1	0.00	45.0	23.87	0.00	34.18	0.96
36	134.63	0.16	11.2	0.66	0.67	1	0.00	45.0	17.53	0.00	25.10	0.96
37	135.29	0.10	10.3	0.66	0.67	1	0.00	45.0	10.80	0.00	15.50	0.96
38	135.94	0.03	10.4	0.66	0.67	1	0.00	45.0	3.60	0.00	5.17	0.96

X-S Area: 15.94 Path Length: 25.39 X-S Weight: 1753.30

DATA: Analysis 4 - Reclaimed Condition

Material Properties (4 materials)

Material: 1 (Mohr-Coulomb Isotropic) - Sand and gravel, mixed grain size
Cohesion Phi UnitWeight Ru
0.00 45.0 110.00 Auto
Material: 2 (Mohr-Coulomb Isotropic) - OB - loose sand, mixed grain size
Cohesion Phi UnitWeight Ru
0.00 34.0 99.00 Auto
Material: 3 (Mohr-Coulomb Isotropic) - Bedrock - claystone
Cohesion Phi UnitWeight Ru
20000.00 25.0 110.00 Auto
Material: 4 (Mohr-Coulomb Isotropic) - Slurry Wall
Cohesion Phi UnitWeight Ru
Unsaturated: 0.00 0.0 112.00 Auto
Saturated: 0.00 0.0 115.00 Auto

Water Properties

Unit weight of water: 62.400 Unit weight of water/medium above ground: 0.000

Material Profiles (4 profiles)

Profile: 1 (2 points) Material beneath: 2 - OB - loose sand, mixed grain size
0.00 4670.00 300.00 4670.00
Profile: 2 (2 points) Material beneath: 1 - Sand and gravel, mixed grain size
0.00 4667.00 300.00 4667.00

Profile: 3 (2 points) Material beneath: 3 - Bedrock - claystone
0.00 4633.00 300.00 4633.00
Profile: 4 (5 points) Material within: 4 - Slurry Wall
85.00 4670.00 90.00 4670.00 90.00 4630.00 85.00 4630.00 85.00 4670.00

Slope Surface (4 points)

1.00 4670.00 100.00 4670.00 205.00 4635.00 300.00 4635.00

Phreatic Surface (2 points)

0.00 4665.00 85.00 4665.00

Piezometric Surfaces (1 surface)

Failure Surface (Critical, from previous analysis)

Initial circular surface for critical search defined by: XL,XR,R
Intersects: XL: 112.60 YL: 4665.80 XR: 136.60 YR: 4657.80
Centre: XC: 151.18 YC: 4741.54 Radius: R: 85.00

Earthquake Force

Pseudo-static earthquake (seismic) coefficient: 0.050

Variable Restraints

Parameter descriptor:	XL	XR	R
Range of variation:	25.00	25.00	20.00
Trial positions within range:	20	20	10

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RESULTS: Analysis 4 - Reclaimed Condition

Bishop Simplified Method of Analysis - Circular Failure Surface
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Critical Failure Surface Search using Multiple Circle Generation Techniques

Factor of Safety for initial failure surface approximation: 2.592

There were: 3896 successful analyses from a total of 4001 trial surfaces
105 analyses terminated due to unacceptable geometry

Critical (minimum) Factor of Safety: 2.45

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	
1	100.10	4669.97	124.10	4661.97	141.87	4755.29	95.00	2.447	<-- Critical Surface
2	100.10	4669.97	124.10	4661.97	141.16	4753.16	92.78	2.450	
3	100.10	4669.97	124.10	4661.97	140.46	4751.03	90.56	2.454	
4	100.10	4669.97	124.10	4661.97	139.75	4748.90	88.33	2.457	
5	100.10	4669.97	124.10	4661.97	139.04	4746.77	86.11	2.461	
6	100.10	4669.97	124.10	4661.97	138.32	4744.64	83.89	2.464	
7	101.42	4669.53	124.10	4661.97	142.56	4755.16	95.00	2.468	
8	100.10	4669.97	124.10	4661.97	137.61	4742.51	81.67	2.468	
9	100.10	4669.97	125.42	4661.53	142.50	4754.98	95.00	2.469	
10	101.42	4669.53	124.10	4661.97	141.85	4753.03	92.78	2.471	
11	100.10	4669.97	125.42	4661.53	141.79	4752.85	92.78	2.472	

12	100.10	4669.97	124.10	4661.97	136.90	4740.37	79.44	2.473
13	101.42	4669.53	124.10	4661.97	141.14	4750.90	90.56	2.474
14	101.42	4669.53	124.10	4661.97	140.43	4748.78	88.33	2.476
15	100.10	4669.97	124.10	4661.97	136.19	4738.24	77.22	2.477
16	100.10	4669.97	125.42	4661.53	141.08	4750.72	90.56	2.478
17	100.10	4669.97	125.42	4661.53	140.37	4748.59	88.33	2.479
18	101.42	4669.53	124.10	4661.97	139.72	4746.65	86.11	2.479
19	100.10	4669.97	124.10	4661.97	135.48	4736.10	75.00	2.482
20	100.10	4669.97	125.42	4661.53	139.66	4746.45	86.11	2.482
21	101.42	4669.53	124.10	4661.97	139.01	4744.52	83.89	2.483
22	100.10	4669.97	125.42	4661.53	138.95	4744.32	83.89	2.486
23	101.42	4669.53	124.10	4661.97	138.30	4742.39	81.67	2.486
24	101.42	4669.53	125.42	4661.53	143.19	4754.85	95.00	2.487
25	100.10	4669.97	126.73	4661.09	143.13	4754.66	95.00	2.487
26	101.42	4669.53	125.42	4661.53	142.48	4752.72	92.78	2.490
27	101.42	4669.53	124.10	4661.97	137.59	4740.26	79.44	2.490
28	100.10	4669.97	125.42	4661.53	138.24	4742.18	81.67	2.490
29	102.73	4669.09	124.10	4661.97	143.24	4755.02	95.00	2.490
30	100.10	4669.97	126.73	4661.09	142.42	4752.53	92.78	2.490
31	101.42	4669.53	125.42	4661.53	141.77	4750.59	90.56	2.492
32	102.73	4669.09	124.10	4661.97	142.54	4752.89	92.78	2.492
33	101.42	4669.53	124.10	4661.97	136.88	4738.12	77.22	2.493
34	100.10	4669.97	126.73	4661.09	141.71	4750.40	90.56	2.494
35	100.10	4669.97	125.42	4661.53	137.52	4740.04	79.44	2.494
36	102.73	4669.09	124.10	4661.97	141.83	4750.77	90.56	2.494
37	101.42	4669.53	125.42	4661.53	141.06	4748.46	88.33	2.495
38	102.73	4669.09	124.10	4661.97	141.12	4748.65	88.33	2.497
39	100.10	4669.97	126.73	4661.09	141.00	4748.26	88.33	2.497
40	101.42	4669.53	124.10	4661.97	136.17	4735.99	75.00	2.497
41	101.42	4669.53	125.42	4661.53	140.35	4746.33	86.11	2.498
42	100.10	4669.97	125.42	4661.53	136.81	4737.90	77.22	2.499
43	102.73	4669.09	124.10	4661.97	140.41	4746.52	86.11	2.499
44	100.10	4669.97	126.73	4661.09	140.28	4746.13	86.11	2.501
45	101.42	4669.53	125.42	4661.53	139.64	4744.20	83.89	2.501
46	102.73	4669.09	124.10	4661.97	139.70	4744.39	83.89	2.502
47	101.42	4669.53	126.73	4661.09	143.82	4754.54	95.00	2.503
48	100.10	4669.97	128.05	4660.65	143.75	4754.34	95.00	2.503
49	100.10	4669.97	125.42	4661.53	136.10	4735.76	75.00	2.504
50	100.10	4669.97	126.73	4661.09	139.57	4743.99	83.89	2.504
51	102.73	4669.09	124.10	4661.97	138.99	4742.26	81.67	2.505
52	101.42	4669.53	125.42	4661.53	138.93	4742.07	81.67	2.505
53	101.42	4669.53	126.73	4661.09	143.11	4752.41	92.78	2.506
54	100.10	4669.97	128.05	4660.65	143.04	4752.21	92.78	2.507
55	102.73	4669.09	124.10	4661.97	138.28	4740.13	79.44	2.508
56	102.73	4669.09	125.42	4661.53	143.88	4754.72	95.00	2.508
57	101.42	4669.53	125.42	4661.53	138.22	4739.93	79.44	2.508
58	101.42	4669.53	126.73	4661.09	142.40	4750.28	90.56	2.508
59	100.10	4669.97	126.73	4661.09	138.86	4741.85	81.67	2.509
60	102.73	4669.09	125.42	4661.53	143.17	4752.59	92.78	2.509
61	100.10	4669.97	128.05	4660.65	142.33	4750.07	90.56	2.510
62	102.73	4669.09	125.42	4661.53	142.46	4750.46	90.56	2.511
63	102.73	4669.09	124.10	4661.97	137.57	4738.00	77.22	2.511
64	101.42	4669.53	126.73	4661.09	141.69	4748.15	88.33	2.512
65	101.42	4669.53	125.42	4661.53	137.51	4737.80	77.22	2.512
66	100.10	4669.97	126.73	4661.09	138.14	4739.71	79.44	2.513
67	104.05	4668.65	124.10	4661.97	143.93	4754.87	95.00	2.513
68	102.73	4669.09	125.42	4661.53	141.75	4748.34	88.33	2.513
69	100.10	4669.97	128.05	4660.65	141.62	4747.94	88.33	2.513
70	102.73	4669.09	124.10	4661.97	136.86	4735.87	75.00	2.514
71	101.42	4669.53	126.73	4661.09	140.98	4746.01	86.11	2.515
72	104.05	4668.65	124.10	4661.97	143.22	4752.75	92.78	2.515
73	102.73	4669.09	125.42	4661.53	141.04	4746.21	86.11	2.515

74	104.05	4668.65	124.10	4661.97	142.51	4750.63	90.56	2.516
75	101.42	4669.53	125.42	4661.53	136.79	4735.66	75.00	2.516
76	100.10	4669.97	128.05	4660.65	140.90	4745.80	86.11	2.517
77	100.10	4669.97	126.73	4661.09	137.43	4737.57	77.22	2.517
78	101.42	4669.53	126.73	4661.09	140.26	4743.88	83.89	2.518
79	100.10	4669.97	129.36	4660.21	144.37	4754.02	95.00	2.518
80	101.42	4669.53	128.05	4660.65	144.44	4754.23	95.00	2.518
81	102.73	4669.09	125.42	4661.53	140.33	4744.08	83.89	2.518
82	104.05	4668.65	124.10	4661.97	141.81	4748.51	88.33	2.518
83	102.73	4669.09	126.73	4661.09	144.51	4754.41	95.00	2.520
84	101.42	4669.53	128.05	4660.65	143.73	4752.09	92.78	2.520
85	104.05	4668.65	124.10	4661.97	141.10	4746.38	86.11	2.520
86	100.10	4669.97	128.05	4660.65	140.19	4743.66	83.89	2.521
87	102.73	4669.09	125.42	4661.53	139.62	4741.95	81.67	2.521
88	100.10	4669.97	129.36	4660.21	143.66	4751.88	92.78	2.521
89	101.42	4669.53	126.73	4661.09	139.55	4741.74	81.67	2.521
90	102.73	4669.09	126.73	4661.09	143.80	4752.28	92.78	2.522
91	104.05	4668.65	124.10	4661.97	140.39	4744.26	83.89	2.522
92	100.10	4669.97	126.73	4661.09	136.71	4735.42	75.00	2.522
93	101.42	4669.53	128.05	4660.65	143.02	4749.96	90.56	2.523
94	102.73	4669.09	125.42	4661.53	138.91	4739.82	79.44	2.524
95	102.73	4669.09	126.73	4661.09	143.09	4750.16	90.56	2.524
96	100.10	4669.97	129.36	4660.21	142.95	4749.74	90.56	2.524
97	104.05	4668.65	124.10	4661.97	139.68	4742.13	81.67	2.524
98	100.10	4669.97	128.05	4660.65	139.48	4741.51	81.67	2.525
99	101.42	4669.53	126.73	4661.09	138.84	4739.61	79.44	2.525

Critical Failure Surface (circle 1)

Intersects: XL: 100.10 YL: 4669.97 XR: 124.10 YR: 4661.97

Centre: XC: 141.87 YC: 4755.29 Radius: R: 95.00

Generated failure surface: (20 points)

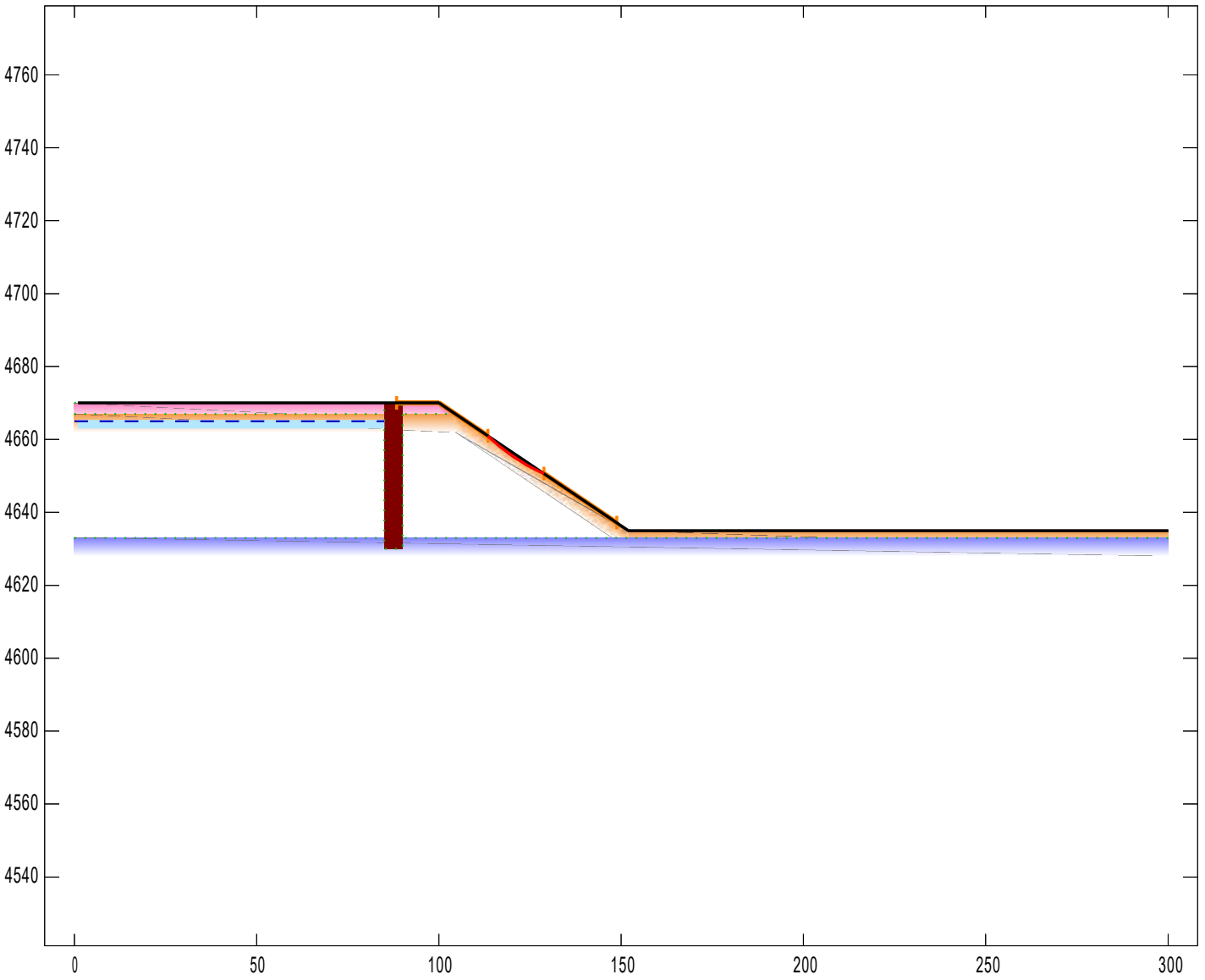
100.10	4669.97	101.30	4669.39	102.51	4668.83	103.73	4668.28	104.96	4667.75
106.20	4667.24	107.44	4666.75	108.68	4666.28	109.94	4665.82	111.20	4665.38
112.47	4664.96	113.74	4664.55	115.02	4664.16	116.30	4663.80	117.59	4663.45
118.88	4663.11	120.18	4662.80	121.48	4662.50	122.79	4662.23	124.10	4661.97

Slice Geometry and Properties - Critical Failure Surface (circle 1, 39 slices)

Slice	X-S	Base						PoreWater	Normal	Test	
	X-Left	Area	Angle	Width	Length	Matl	Cohesion	Phi	Weight	Force	Stress	Factor
1	100.10	0.03	25.7	0.60	0.67	2	0.00	34.0	2.62	0.00	3.84	0.98
2	100.70	0.08	25.7	0.60	0.67	2	0.00	34.0	7.94	0.00	11.65	0.98
3	101.30	0.13	24.9	0.61	0.67	2	0.00	34.0	13.00	0.00	19.03	0.98
4	101.91	0.18	24.9	0.61	0.67	2	0.00	34.0	17.77	0.00	26.02	0.98
5	102.51	0.23	24.1	0.61	0.67	2	0.00	34.0	22.34	0.00	32.62	0.98
6	103.12	0.27	24.1	0.61	0.67	2	0.00	34.0	26.52	0.00	38.73	0.98
7	103.73	0.31	23.3	0.61	0.67	2	0.00	34.0	30.57	0.00	44.56	0.97
8	104.35	0.35	23.3	0.61	0.67	2	0.00	34.0	34.19	0.00	49.83	0.97
9	104.96	0.38	22.4	0.62	0.67	2	0.00	34.0	37.70	0.00	54.86	0.97
10	105.58	0.41	22.5	0.62	0.67	2	0.00	34.0	40.72	0.00	59.23	0.97
11	106.20	0.44	21.7	0.61	0.66	2	0.00	34.0	43.16	0.00	63.44	0.97
12	106.81	0.47	21.7	0.63	0.68	1	0.00	45.0	47.55	0.00	65.14	0.93
13	107.44	0.49	20.9	0.62	0.67	1	0.00	45.0	51.03	0.00	70.76	0.93
14	108.06	0.51	20.8	0.62	0.67	1	0.00	45.0	54.50	0.00	75.60	0.93
15	108.68	0.26	20.1	0.32	0.34	1	0.00	45.0	28.80	0.00	79.42	0.93
16	109.00	0.40	20.1	0.47	0.50	1	0.00	45.0	43.75	0.00	81.09	0.93
17	109.47	0.40	20.1	0.47	0.50	1	0.00	45.0	44.50	0.00	82.49	0.93
18	109.94	0.55	19.3	0.63	0.67	1	0.00	45.0	60.65	0.00	84.18	0.93
19	110.57	0.56	19.2	0.63	0.67	1	0.00	45.0	61.32	0.00	85.14	0.93
20	111.20	0.56	18.4	0.63	0.67	1	0.00	45.0	61.96	0.00	86.09	0.93
21	111.83	0.56	18.5	0.63	0.67	1	0.00	45.0	61.99	0.00	86.12	0.93

22	112.47	0.56	17.6	0.64	0.67	1	0.00	45.0	61.90	0.00	86.10	0.93
23	113.10	0.56	17.6	0.64	0.67	1	0.00	45.0	61.22	0.00	85.14	0.93
24	113.74	0.55	16.8	0.64	0.67	1	0.00	45.0	60.42	0.00	84.13	0.93
25	114.38	0.54	16.8	0.64	0.67	1	0.00	45.0	59.04	0.00	82.22	0.93
26	115.02	0.52	16.0	0.64	0.67	1	0.00	45.0	57.53	0.00	80.24	0.93
27	115.66	0.50	16.0	0.64	0.67	1	0.00	45.0	55.46	0.00	77.36	0.93
28	116.30	0.48	15.2	0.64	0.67	1	0.00	45.0	53.22	0.00	74.34	0.93
29	116.95	0.46	15.2	0.64	0.67	1	0.00	45.0	50.39	0.00	70.38	0.93
30	117.59	0.43	14.4	0.65	0.67	1	0.00	45.0	47.42	0.00	66.36	0.93
31	118.24	0.40	14.4	0.65	0.67	1	0.00	45.0	43.94	0.00	61.48	0.93
32	118.88	0.37	13.6	0.65	0.67	1	0.00	45.0	40.19	0.00	56.37	0.94
33	119.53	0.33	13.6	0.65	0.67	1	0.00	45.0	35.94	0.00	50.39	0.94
34	120.18	0.29	12.8	0.65	0.67	1	0.00	45.0	31.51	0.00	44.28	0.94
35	120.83	0.24	12.8	0.65	0.67	1	0.00	45.0	26.51	0.00	37.25	0.94
36	121.48	0.19	12.0	0.65	0.67	1	0.00	45.0	21.29	0.00	30.00	0.94
37	122.14	0.14	12.0	0.65	0.67	1	0.00	45.0	15.61	0.00	21.99	0.94
38	122.79	0.09	11.2	0.66	0.67	1	0.00	45.0	9.57	0.00	13.52	0.94
39	123.44	0.03	11.2	0.66	0.67	1	0.00	45.0	3.20	0.00	4.52	0.94

X-S Area: 14.24 Path Length: 25.37 X-S Weight: 1526.96



GALENA Version 7.1

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Material Keys

1: Sand and gravel, mixed grain size
2: OB - loose sand, mixed grain size
3: Bedrock - claystone
4: Slurry Wall

Analysis 1

Multiple Stability Analysis
Method: Bishop Simplified
Surface: Circular

Results

Critical Factor of Safety: 1.51

Edited: 21 Mar 2025
Processed: 21 Mar 2025

Project Evans Pit
Mining Condition

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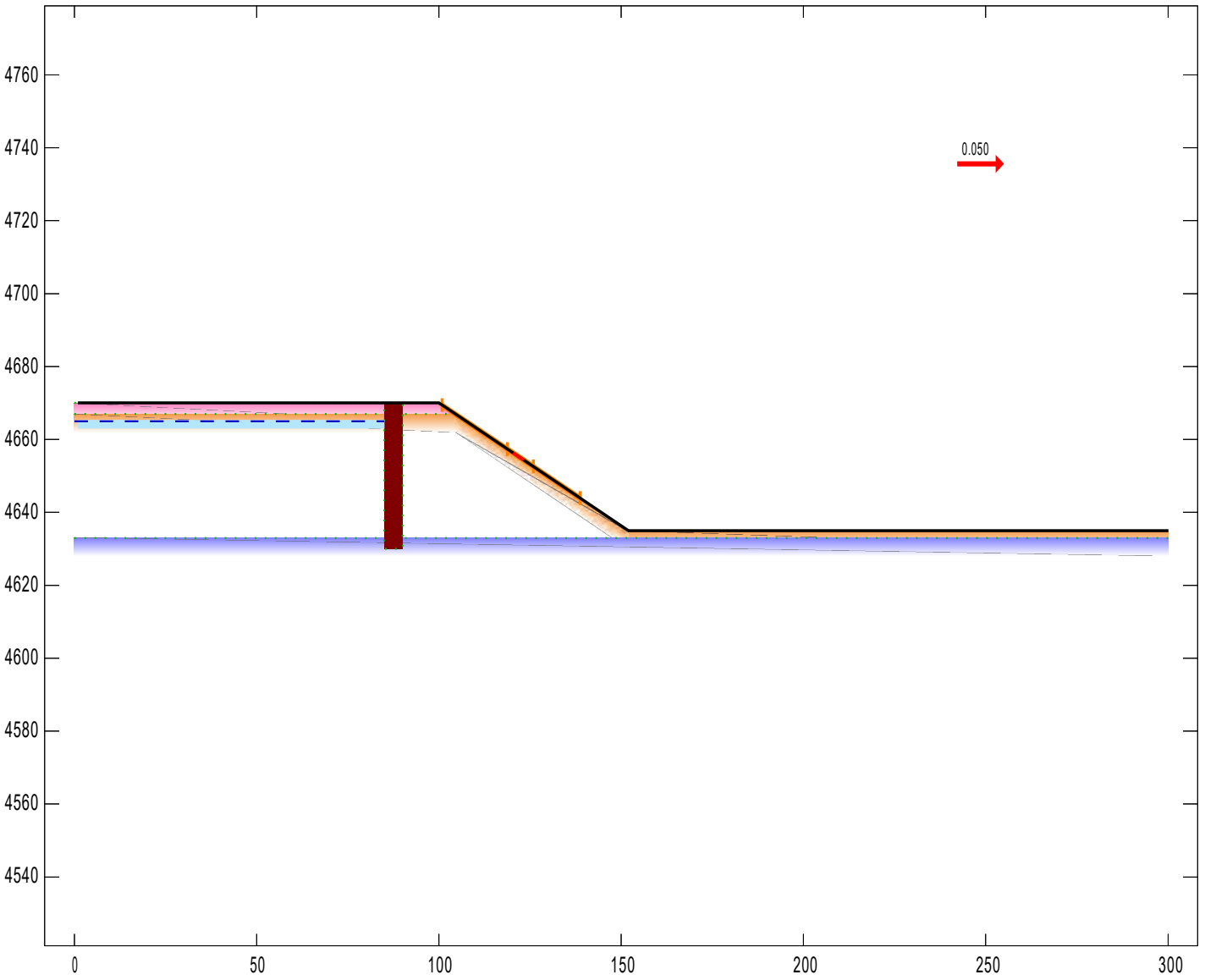

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Material Keys

1: Sand and gravel, mixed grain size
2: OB - loose sand, mixed grain size
3: Bedrock - claystone
4: Slurry Wall

Analysis 2

Multiple Stability Analysis
Method: Bishop Simplified
Surface: Circular (Critical Seed)

Results

Critical Factor of Safety: 1.34

Edited: 21 Mar 2025
Processed: 21 Mar 2025

Project Evans Pit
Mining Condition

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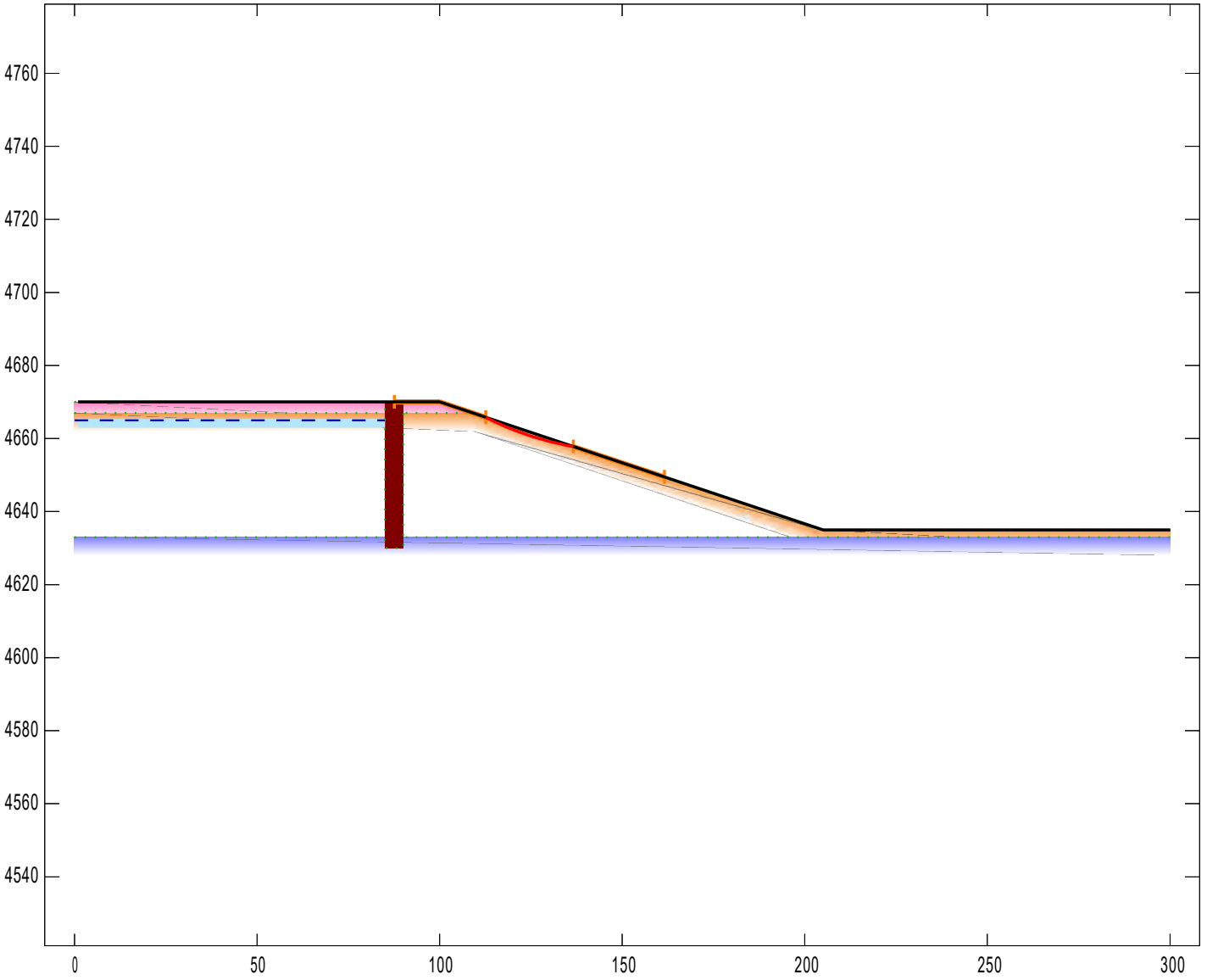

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Material Keys

1: Sand and gravel, mixed grain size

2: OB - loose sand, mixed grain size

3: Bedrock - claystone

4: Slurry Wall

Analysis 3

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular

Results

Critical Factor of Safety: 3.03

Edited: 21 Mar 2025

Processed: 21 Mar 2025

Project Evans Pit
Reclaimed Condition

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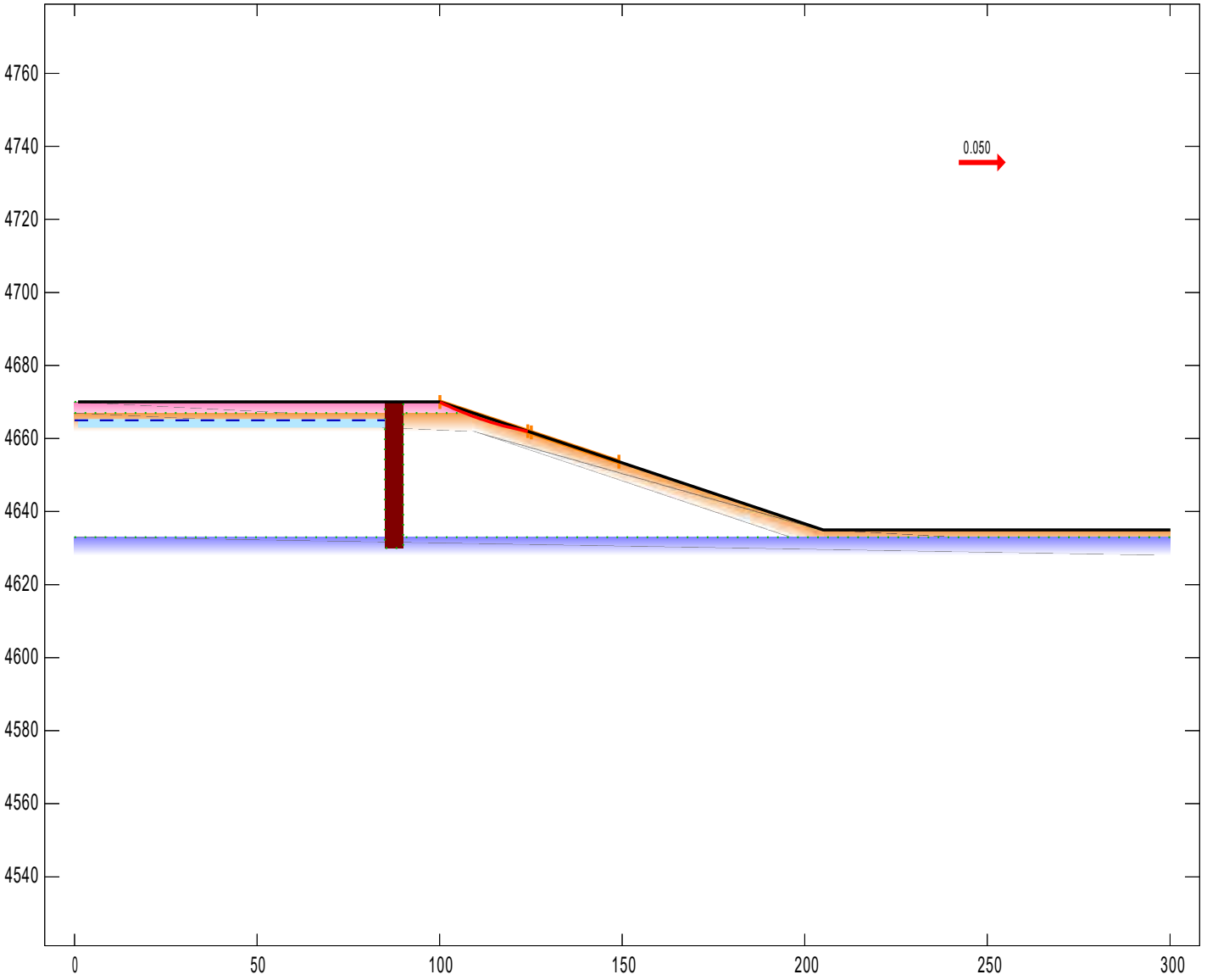

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Material Keys

1: Sand and gravel, mixed grain size

2: OB - loose sand, mixed grain size

3: Bedrock - claystone

4: Slurry Wall

Analysis 4

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular (Critical Seed)

Results

Critical Factor of Safety: 2.45

Edited: 21 Mar 2025

Processed: 21 Mar 2025

Project Evans Pit
Reclaimed Condition

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