STATE OF COLORADO

Scott - DNR, Eric <eric.scott@state.co.us>

Hunt Water TR2 request for additional information.

Andy Rodriguez <andy@civilresources.com> Wed, Nov 2, 2022 at 1:53 PM
To: "Scott - DNR, Eric" <eric.scott@state.co.us>

Eric,

See attached information.

- Updated slope stability (sorry this was not included in the original submittal).
- There will be no other infrastructure associated with the bore until mining is complete. For a future understanding I am assuming the owner will install a rundown channel into the finished reservoir once mining is finalized. I included a schematic of a potential reclaimed scenario which would be a riprap rundown. On the east side the miner plans to install a future pipeline.
- I need to go out and see the east side. It might be time to get an acreage reduction once the bore is complete.

Andy

[Quoted text hidden]

2 attachments

Stability Analysis report Hunt complete.pdf
1140K

RECLAMATION PLAN TR-2-112-22.pdf
498K

AFFECTED LANDS:

HUNT DAVID W & HUNT KAYLEEN J: VARIOUS BUILDINGS, PONDS & ACCESS ROADS
TOTAL PERMIT AREA: 139.2 ACRES

FLOODPLAIN INFO:

FLOODPLAIN INFO: SITE IS LOCATED OUTSIDE THE FLOODPLAIN

EXISTING VEGETATION:

AGRICULTURAL FARM LAND

APPLICANT:

HUNT WATER, LLC
17295 HIGHWAY 85
PLATTEVILLE, CO 80651

NOTE:

CIVIL RESOURCES, LLC. IS NOT RESPONSIBLE FOR SAFETY, IN, ON, OR ABOUT THE PROJECT SITE, NOR FOR COMPLIANCE BY THE APPROPRIATE PARTY OF ANY REGULATIONS THERETO.

THESE MAPS WERE PREPARED BY CIVIL RESOURCES, LLC. IN COOPERATION WITH BESTWAY CONCRETE. BESTWAY WILL KEEP THE DIVISION OF RECLAMATION MINING AND SAFETY INFORMED OF ANY CHANGES TO THE MINING OR RECLAMATION PLANS THROUGH ANNUAL REPORTS AND FILE TECHNICAL REVISIONS AND AMENDMENT APPLICATIONS AS NECESSARY THROUGHOUT THE LIFE OF THE MINE.

A:\Scanned Signatures\Arod.jpg

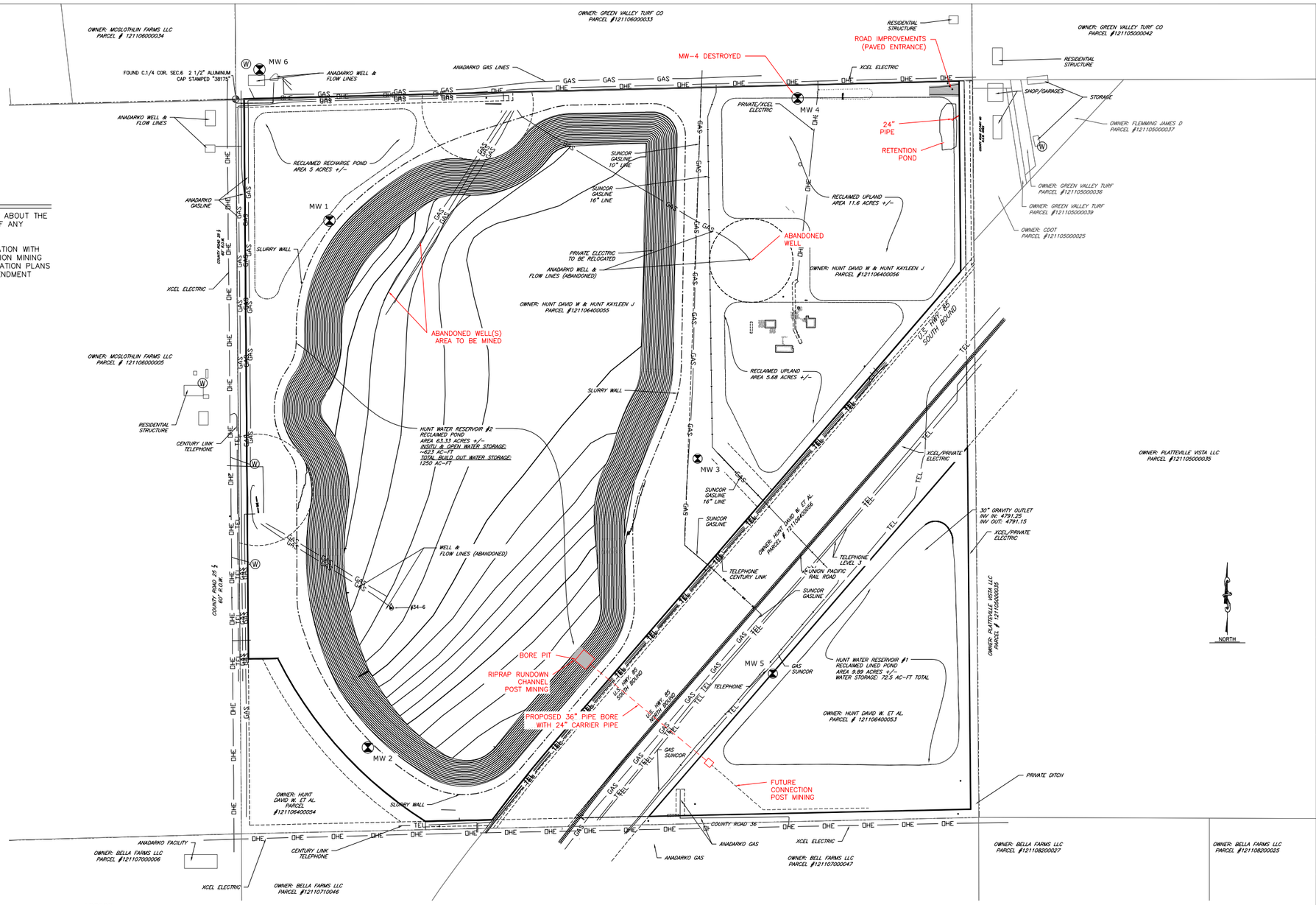
ANDREW R RODRIGUEZ, P.E.
CIVIL RESOURCES, LLC.

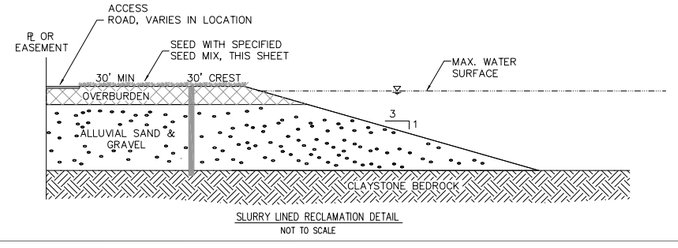
5/18/18
DATE

MAP LEGEND:

(M) DENOTES MEASURED BEARING AND/OR DISTANCE
(R) DENOTES RECORD BEARING AND/OR DISTANCE
SET 24" #5 REBAR & RED PLASTIC CAP "POINT LS38311"
SET NAIL & BRASS DISK "LS38311"
FOUND GOVERNMENT CORNER
FOUND CHISELED CROSS / CUT X
FOUND NAIL & DISK
FOUND IRON PIPE
FOUND REBAR
MONITORING WELL
BUILDING/STRUCTURE
SOIL TYPE
PERMIT BOUNDARY
SLURRY WALL
MINE HIGHWALL
SECTION LINE
RANGE LINE
BOUNDARY LINE
ADJACENT BOUNDARY LINE
EASEMENT LINE
FEMA DESIGNATION LINE
WATER LINE
STORM LINE
SANITARY LINE
IRRIGATION LINE
GAS LINE
ELECTRIC LINE (UNDERGROUND)
ELECTRIC LINE (OVERHEAD)
COMMUNICATION LINE
FIBER OPTIC LINE
MISCELLANEOUS/UNKNOWN LINE
PROPOSED MAJOR CONTOUR
PROPOSED MINOR CONTOUR

CROSS SECTION CALL OUT





SLURRY LINED RECLAMATION DETAIL
NOT TO SCALE

SEEDING SPEC FOR UPLAND AREAS:

COMMON NAME (VARIETY)	SCIENTIFIC NAME	LBS PLS/ACRE
SAND BLUESTEM	(CHAMP, CHET)	1
SAND LOVEGRASS	(BEND, NATIVE, NE27)	2.5
INDIAN RICEGRASS	(NEZPAR, RIMROCK)	3
PRAIRIE SANDREED	(GOSHEN)	0.75
GREEN NEEDLEGRASS	(LODORM)	1.5
LITTLE BLUESTEM	(BLAZE, CIMARRON, CAMPER)	0.75
YELLOW INDIANGRASS	(CHEYENNE, HOLT, SCOUT)	0.5
SWITCHGRASS	(BLACKWELL, NEBRASKA 28)	1.5
SAND DROPSEED		0.5
	TOTAL LBS PER ACRE:	12.0

8308 COLORADO BLVD. STE 200
FIRESTONE, CO 80504
303.833.1416
WWW.CIVILRESOURCES.COM

HUNT WATER, LLC
17295 HIGHWAY 85
PLATTEVILLE, CO 80651
970 534 0917
CONTACT: DHF

HUNT WATER, LLC GRAVEL MINE
WELD COUNTY, CO
RECLAMATION PLAN

REVISIONS

NO.	DESCRIPTION	DATE
1	AROD REDLINES	6/28/18
2	ADEQUACY-REVIEW	8/15/18
3	TECHNICAL REVISION - 02	07/29/22
4	TR-02	11-2-22

DESIGNED BY: ARR DATE: JULY 4, 2018
DRAWN BY: ARR SCALE: AS NOTED
CHECKED BY: ARR AS NOTED
JOB NO.: 105.012.001
DWG NAME: MINE-REC-PLAN 072922.DWG

RECLAMATION PLAN

SHEET: 4

October 7, 2022

Mr. David W. Hunt
Hunt Water, LLC
14460 Weld County Road 40
Platteville, CO 80651

Re: Stability Analysis for Technical Revision # 2; DRMS Permit Number M-2018-027; Hunt Water, LLC Gravel Mine

Dear Mr. Hunt:

This letter summarizes slope stability analyses performed to address minor changes in the mine slope and final reclaimed reservoir slopes at the main cell of the Hunt Water Gravel Mine located near the intersection of U.S. Highway 85 and State Highway 60 in Weld County, Colorado. The slope changes are proposed for incorporation into the DRMS permit as part of Technical Revision Number 2 (TR-2).

The stability analyses discussed herein were designed to address both the Mined Land Reclamation Board (MLRB) Construction Materials Rule 6, Section 4, Subsection 19, Exhibit S - Permanent Man-Made Structures (6.4.19, Exhibit S) and the final reclaimed use as a water storage reservoir.

The site is located between the towns of Platteville (to the south) and Gilcrest (to the northeast). More specifically, the site is within part of Section 6, Township 3 North, Range 66 West of the 6th Principal Meridian. The mine is in an area of irrigated agricultural land with common oil and gas wells and related infrastructure and is bound by Weld County Road (WCR) 36 on the south, WCR 25.5 on the west, agricultural land on the north, State Highway 60 on the east, and U.S. Highway 85 on the southwest.

PROPOSED SLOPE CHANGES

Currently the mine highwalls are mined at a slope no steeper than three (3) vertical to one (1) horizontal (3h:1v) at a distance of thirty (30) feet from the existing slurry wall. The slurry wall is the nearest structure to the top of the mine slope.

The miner proposes to move the mine limit to twenty (20) feet from the slurry wall and maintain the mine slope no steeper than 3h:1v to a maximum vertical depth of thirty (30) feet. Site overburden might be compacted into the resulting void in a manner that the final reclaimed reservoir will maintain the original reclaimed geometry. The stability in both configurations meets the DRMS criteria.

Based on the stability analyses herein, the changed mining and reclamation will result in a stable slurry wall and a stable reclaimed reservoir. Other known structures in the area will have higher Factors of Safety (FOS) as they are further from the highwall than the slurry wall.

GEOLOGY

The Site is located approximately 21 miles east of the eastern flank of the Rocky Mountain Front Range. Younger sedimentary strata dip eastward off the Pre-Cambrian igneous and metamorphic rocks that form the core of the Front Range into the Denver Structural Basin. The Denver Basin is an asymmetrical downwarp of sedimentary strata with a steeply dipping west limb and a gently dipping east limb.

Bedrock does not crop out at the site, however regional geologic mapping of the area (Colton, 1978) indicates the near surface bedrock at the site is most likely the Laramie Formation. Colton (1978) describes the Laramie as mostly

claystone, shale, sandy shale, and lenticular sandstone. The Lower Laramie is described as sandstone, sandy shale, and claystone with several coal beds. The regional mapping indicates the bedrock is overlain by the Broadway Alluvium. Colton (1978) describes the Broadway as sand and gravel deposited by the South Platte River and its tributaries that is terraced typically lying about 40 feet above major streams. Along the South Platte River, the Broadway is typically on the order of 35 feet thick but can range up to 125 feet thick.

GEOTECHNICAL CONDITIONS

Based on site investigations, the natural site stratigraphy generally consists of three main units: 1) Overburden generally consisting of near surface silty to clayey sand; 2) sand and gravel alluvial deposits that underlie the overburden and overlie the bedrock; 3) Bedrock usually consisting of claystone and sandstone that is commonly weathered in the top 1 to 2 feet and is commonly interbedded and interlaminated.

Overburden

The overburden is typically a silty sand that locally grades to a clayey sand that is non-plastic or of low plasticity typically ranging from 0 to 3.5 feet in thickness. This unit is usually slightly moist to moist, loose to medium dense with the top 6 to 8 inches containing significant organics. Of the overburden samples tested, the range of percent passing the No. 200 sieve ranged from 9.3% to 41.2% with an average of 24%. Atterberg Limits testing ranged from granular non-plastic to Liquid Limits of 29 and Plasticity Indices of 9. For samples that were not granular non-plastic, the average Liquid Limit was 23 and the average Plasticity Index was 6.

Sand & Gravel

The sand and gravel is present throughout the site locally occurring at the surface, but typically underlying the overburden and overlying the bedrock. This unit typically consists of slightly silty, fine to medium grained sand overlying a fine to coarse grained sand and/or gravelly sand. Local clayey sand was encountered along the east side of the site. Silty, fine-grained sands were also locally encountered directly overlying the bedrock. Where gravels were encountered, the size was typically ¼ to ½ inches. This unit is typically medium dense but locally dense, but is also locally very loose to loose, typically in siltier and clayey areas particularly below the water table. This deposit ranges in thickness from approximately 24 feet to 55 feet, averaging approximately 40 feet. The sands are relatively clean with fines content (silt and clay) generally ranging from 1.0 to 13.8 percent averaging 7.1 percent.

Bedrock

The bedrock encountered in the exploratory borings was generally weathered in the upper one to two feet typically became harder in unweathered zones. The bedrock consisted of claystone and sandstones that were commonly interbedded and interlaminated. Local lignite was also encountered. The average percent passing the minus No. 200 sieve ranges from 37.7% to 94.8% respectively with plasticity indices ranging from 34 to 54.

Groundwater

Groundwater was encountered in all of the borings at approximately 12 to 17 feet below ground surface. The groundwater levels will vary seasonally and will typically rise during the irrigation season and when recharge is applied. Groundwater is controlled with the existing, below grade slurry wall and by pumping down the water level on the interior of the slurry wall.

From a geotechnical standpoint, the sand and gravel forms the majority of the mine slopes. These soils are generally strong and stable, particularly when dewatered. Dry mining occurs in the main cell as the slurry wall controls the water level in the main cell.

STRUCTURES WITH 200 FEET OF DISTURBED AREAS

The known, permanent, man-made structures within 200 feet of the proposed mine areas that are not owned by Mr. Hunt are listed below:

- Mcglothlin, residence building
- Green Valley Turf, residence building
- Fleming, James, storage buildings
- CDOT, Storage & Garage buildings
- Various buildings owned by land owner
- Oil & Gas Facilities surrounding the site (Anadarko)
- WCR 25.5 & ROW (Weld County Public Works)
- Highway 85 (CDOT)
- Rail Road (Union Pacific)
- Suncor Gas Line
- Private Irrigation Appurtenances (owned by land owner)
- Overhead Power Line (North, South, East & West Boundary, XCEL)
- Power Line (Private)
- 34-6 Well Head (Kerr-McGee/Anadarko)
- 23-6 Well Head (Kerr-McGee/Anadarko)
- 33-6A Well Head (Kerr-McGee/Anadarko)
- 25-6 Well Head (Kerr-McGee/Anadarko)
- 24-6 (DIR) Well Head (Kerr-McGee/Anadarko)
- 43-6 (DIR) Well Head (Kerr-McGee/Anadarko)
- Telephone, west, south and by Hwy 85 (Century Link)
- Telephone/Fiber by Rail Road ROW, east side (Level 3 Communications)

MINE SLOPE STABILITY REQUIREMENTS

Division of Reclamation and Mining Safety (DRMS) staff drafted a policy regarding stability analyses of neighboring structures. The draft summarizes adequate factors of safety (FOS) for non-critical and critical structures. The structures around mine are, for the most part, considered critical structures. The FOS are for both static and seismic (from an earthquake) stability analyses. For generalized strength assumptions and critical structures, an FOS of 1.5 is considered sufficient for static conditions and an FOS of 1.3 is considered suitable for seismic conditions.

RECLAIMED RESERVOIR SLOPE STABILITY REQUIREMENTS

Currently there are no stability requirements for below grade reservoirs. The practice in the area is to use factors of safety (FOS) practiced by the State Engineer's Office (SEO), Dam Safety Branch (DSB) for jurisdictional, above-grade dams. The loading conditions and minimum DSB FOS requirements are summarized in the following table.

Loading Condition	DSB Minimum Factor of Safety
Empty Reservoir	1.5
Full Reservoir	1.5
Full Seismic	1.0
Empty Seismic	1.0
Rapid Drawdown	1.2

STABILITY ANALYSES

The stability of the slurry wall and the finished reclaimed reservoir slopes was evaluated at the maximum section at the site under the loading conditions described above. The Galena computer program was used for the analysis. The Simplified Bishop's Method of Analysis was used to find the critical failure surface by randomly searching 1,001 trial failure circles over the slope surface. Seismic loading was obtained from the U.S.G.S. Unified Hazard Tool. Review of the Hazard Tool indicated a maximum horizontal acceleration of 0.084g with a return period of 2,475 years for the site. The section profiles analyzed are described below.

- Maximum Section: This section is on the west side of the main cell and considers a tall highwall at a point where the mine limit is 20 or 30 feet from the existing slurry wall. This is the most critical section as it marks the point where a tall highwall (deepest bedrock) and closest structure (slurry wall) coincide. The profile consisted of 6-feet of overburden overlying 44-feet of sand and gravel, on top of 1-foot of weathered bedrock over unweathered bedrock. This section was analyzed under three (3) profile conditions as described below and shown in Attachment A.

    1. *Slurry Wall Stability Tall Highwall-* In this section, the proposed revised slope was drawn 20-feet from the existing slurry wall and sloped a vertical distance of 30 feet at a slope of 3h:1v. At the 30-foot depth, the slope is horizontal into the mine for a distance of 10-feet before sloping at 3h:1v to the top of bedrock. The failure circles are drawn from the slurry wall top to the bedrock and analyzed per the DRMS mine highwall structure stability requirements.

    2. *Slurry Wall Stability Shorter, Cut Highwall-* In this section, the revised slope was again drawn 20-feet from the existing slurry wall and sloped a vertical distance of 30 feet at a slope of 3h:1v. At the 30-foot depth, the slope is horizontal into the mine for a distance of 10-feet before sloping at 3h:1v to the top of bedrock. The failure circles are drawn from the slurry wall top to the 30-foot mine highwall depth that coincides with the revised slope. This profile was analyzed per the DRMS mine highwall structure stability requirements.

    3. *Reclaimed Reservoir Slope-* In this section, the revised slope cut described in profiles 1 and 2 above, is backfilled with compacted overburden resulting in a reclaimed slope of 3h:1v. Failure circles are drawn from the top of the slope to the bedrock and analyzed for the reclaimed reservoir stability loading conditions as described above.

MATERIAL PROPERTIES

The material index and engineering strengths used in this slope stability report are discussed below.

Overburden

The strength properties for the in-situ silty to clayey sand overburden were based on field testing data and on our engineering judgment; the following parameters have been used to model the overburden.

Unit Weight (pcf)	*Cohesion C' psf*	*Friction Angle Φ'°*
115	50	28

Alluvial Sand and Gravel

The sand and gravel is generally a fine to medium-grained sand overlying a fine to coarse grained sand that is typically medium dense and locally gravelly. The alluvial sand and gravel was modeled as follows:

Unit Weight (pcf)	*Cohesion C' psf*	*Friction Angle Φ'°*
125	0	35

Bedrock

Bedrock below the alluvium is claystone, sandstone and interlaminated to interbedded claystone and sandstone bedrock. Sandstone is typically stronger than claystone. Claystone is generally a weak bedrock. To be conservative,

we modeled the bedrock as claystone. For the claystone bedrock, two potential strength conditions were considered. These strength conditions are referred to as: 1) peak strength, and 2) residual strength.

Peak strength is the maximum shear strength the claystone bedrock exhibits. The shear strength is made up of both cohesion (diagenetic bonding) and internal friction. Under short-term conditions for unsheared claystone, peak strength governs behavior. If a sheared surface or sheared zone is present within claystone as a result of faulting, slippage between beds due to folding, past shrink-swell behavior, stress relief, weathering, or from a landslide, the cohesion along the sheared surface is reduced to zero, and the angle of internal friction is decreased, due to alignment of clay minerals parallel to the shear plane. Under these conditions a claystone exhibits its lowest strength known as residual strength. Residual strength bedrock occurs in discrete zones, parallel with the sheared surface or zone, whereas fully softened strength occurs over a broader area (not used in this modeling). Based on data from other recent projects and engineering judgment, the residual strength claystone was modeled in a one-foot thick layer overlying the peak strength bedrock as follows:

Unit Weight (pcf)	***Cohesion C' psf***	***Friction Angle Φ' °***
Peak = 115 Residual = 110	Peak = 150 Residual = 0	Peak = 24 Residual = 15

Soil-Bentonite Slurry Wall

The proposed slurry wall will consist of a mix of the overburden clayey to silty sand, alluvial sand, and imported bentonite. The resulting mix will produce a non-Newtonian fluid with some shear strength characteristics based on a reduced friction angle of the overlying overburden. Based on engineering judgment, we modeled the slurry wall as follows:

Unit Weight (pcf)	***Cohesion C' psf***	***Friction Angle Φ' °***
110	0	0

Compacted Overburden in Reclaimed Slope

The strength properties for the compacted silty to clayey sand overburden in the reclamation slope were based on field testing data and on our engineering judgment; the following parameters have been used to model the compacted overburden.

Unit Weight (pcf)	***Cohesion C' psf***	***Friction Angle Φ' °***
115	75	28

STABILITY ANALYSES RESULTS

The stability analyses assumed the mining and reclamation will be per proposed slope and reclamation changes outlined herein. The plan includes dry mining in the main cell as the water level is controlled by the existing slurry wall. The perimeter mine and reclamation slopes of the main cell will be no steeper than 3h:1v.

Setbacks listed in Table 1 (below) indicate the setback from the slurry wall to the proposed mining limits. All other structures are at a greater distance and will have greater FOS. Results of the reclaimed reservoir slopes are listed in Table 2.

TABLE 1 – DRMS SLOPE STABILITY RESULTS

Profile	Location	Critical Structure	Structure Setback From Mine Limit (ft)	Static Factor of Safety at Structure	Seismic Factor of Safety at Structure (0.084g hor)	DRMS FOS Requirement Static/Quake
1	Main Cell (maximum section, tall highwall)	Slurry Wall	20	1.92	1.45	1.5/1.3
2	Main Cell (maximum section, 30-foot depth)	Slurry Wall	20	2.23	1.73	1.5/1.3

TABLE 2 – RECLAIMED RESERVOIR SLOPE STABILITY RESULTS

Profile	Location	Loading Condition	Factor of Safety	DSB Minimum Factor of Safety
3	Main Cell (maximum reclamation slope)	Empty Reservoir	1.82	1.5
3	Main Cell (maximum reclamation slope)	Full Reservoir	2.05	1.5
3	Main Cell (maximum reclamation slope)	Empty Reservoir Seismic	1.40	1.0
3	Main Cell (maximum reclamation slope)	Full Reservoir Seismic	1.27	1.0
3	Main Cell (maximum reclamation slope)	Rapid Drawdown	1.20	1.2

CONCLUSIONS

Stability analyses performed above indicate the proposed mine limit slope changes discussed herein meet adequate FOS at the slurry wall per DRMS requirements. Known structures within 200 feet of the mine will have higher FOS as they are more distant than the slurry wall.

In addition, the stability analyses performed herein indicate the final reclaimed reservoir slopes will have adequate FOS based on the geotechnical practice performed in the area.

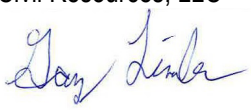
LIMITATIONS

Our review is based on regional geologic mapping, mining plans discussed herein, and in part borehole data by Civil Resources and others. Stability analyses were performed using typical strength parameters for the various strata in the critical sections. Should the mining plans change or subsurface conditions vary from those portrayed in this letter, we should be contacted in order to re-evaluate the potential affects on permanent man-made structures and the reservoir reclamation slopes. Note also that surcharge loads due to temporary material stockpiles and overburden berms were not considered in the analysis.

Please call with any questions or comments.

Sincerely,

Civil Resources, LLC



Gary Linden, P.G.
Senior Engineering Geologist

Attachments: Galena Model Profiles and Output Files

J:\Hunt Farms-306\J2 stability\Report\Stability analysis report - huntwater.doc

Attachment A Stability Analyses

Unified Hazard Tool

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Conterminous U.S. 2014 (v4.0.x)

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

40.253

Time Horizon

Return period in years

2475

Longitude

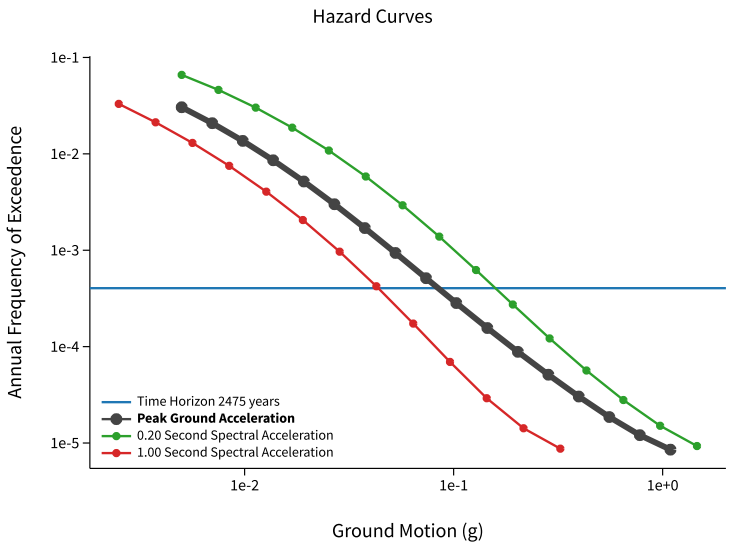
Decimal degrees, negative values for western longitudes

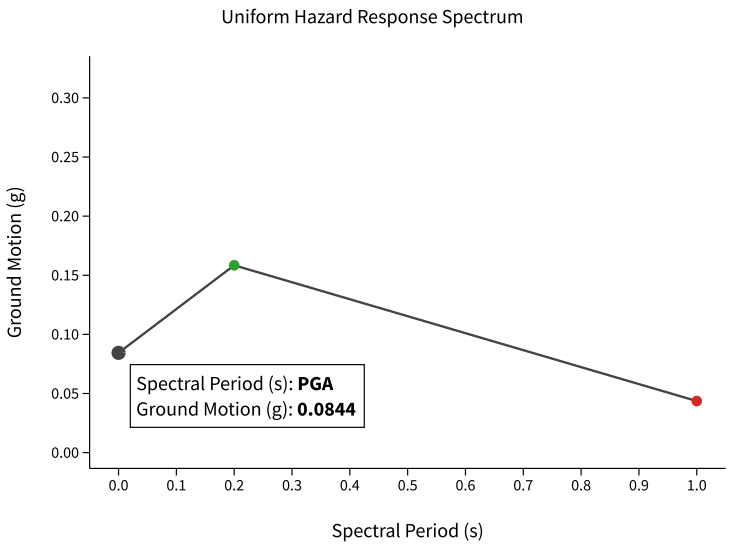
-104.812

Site Class

760 m/s (B/C boundary)

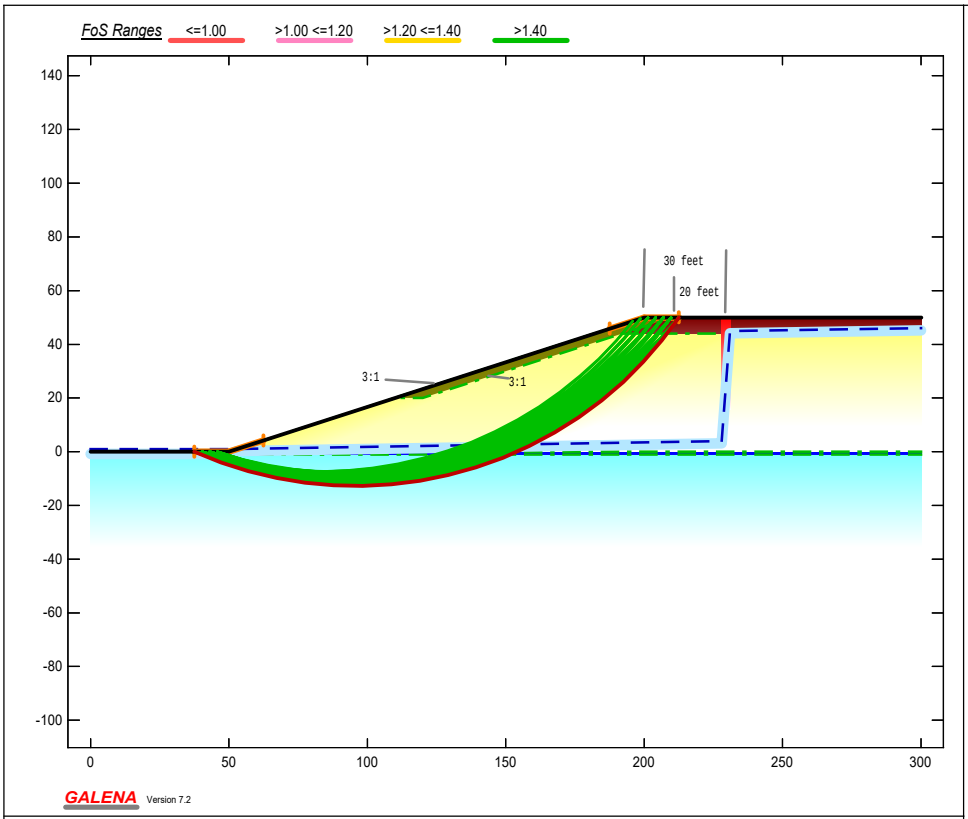
Hazard Curve





View Raw Data

Maximum Section Stability Analyses



Material Keys

1: overburden
2: sand and gravel
3: weathered claystone
4: claystone
5: compacted overburden
6: slurry wall

Analysis 1

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular

Results

Critical Factor of Safety: 1.82

Project Hunt/J2

OB in slope static empty

File: J:\Hunt Farms-306\J2 stability\20ft offset static empty.gmf

Edited: 14 Sep 2022 *Processed:*14 Sep 2022

Civil Resources

GALENA 7.2 Analysis Results Version: 7.2.1.03 Licensee: Civil Resources

---

Project: Hunt/J2
File: J:\Hunt Farms-306\J2 stability\20ft offset static empty.gmf
Processed: 14 Sep 2022 09:37:45

DATA: Analysis 1 - OB in slope static empty

Material Properties (6 materials)

Material: 1 (Mohr-Coulomb Isotropic) - overburden
Cohesion Phi UnitWeight Ru
50.00 28.0 115.00 Auto
Material: 2 (Mohr-Coulomb Isotropic) - sand and gravel
Cohesion Phi UnitWeight Ru
0.00 35.0 125.00 Auto
Material: 3 (Mohr-Coulomb Isotropic) - weathered claystone
Cohesion Phi UnitWeight Ru
0.00 15.0 110.00 Auto
Material: 4 (Mohr-Coulomb Isotropic) - claystone
Cohesion Phi UnitWeight Ru
150.00 24.0 115.00 Auto
Material: 5 (Mohr-Coulomb Isotropic) - compacted overburden
Cohesion Phi UnitWeight Ru
75.00 28.0 115.00 Auto
Material: 6 (Mohr-Coulomb Isotropic) - slurry wall
Cohesion Phi UnitWeight Ru
0.00 0.0 110.00 Auto

Water Properties

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

Material Profiles (6 profiles)

Profile: 1 (4 points) Material beneath: 1 - overburden
0.00 50.00 228.00 50.00 231.00 50.00 300.00 50.00
Profile: 2 (4 points) Material beneath: 2 - sand and gravel
0.00 44.00 228.00 44.00 231.00 44.00 300.00 44.00
Profile: 3 (4 points) Material beneath: 3 - weathered claystone
0.00 0.00 228.00 0.00 231.00 0.00 300.00 0.00
Profile: 4 (4 points) Material beneath: 4 - claystone
0.00 -1.00 228.00 -1.00 231.00 -1.00 300.00 -1.00
Profile: 5 (5 points) Material within: 5 - compacted overburden
200.00 50.00 110.00 20.00 120.00 20.00 210.00 50.00 200.00 50.00
Profile: 6 (2 points) Material beneath: 6 - slurry wall
228.00 50.00 231.00 50.00

Slope Surface (4 points)

0.00 0.00 50.00 0.00 200.00 50.00 300.00 50.00

Phreatic Surface (5 points)

0.00 1.00 50.00 1.00 228.00 4.00
231.00 45.00 300.00 46.00

Failure Surface

Initial circular surface for critical search defined by: XL,XR,R
Intersects: XL: 50.00 YL: 0.00 XR: 200.00 YR: 50.00
Centre: XC: 84.69 YC: 145.93 Radius: R: 150.00

Variable Restraints

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

- -

RESULTS: Analysis 1 - OB in slope static empty

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

Initial failure surface approximation - Factor of Safety: 1.989

Analysis Summary
===
There were: 1001 successful analyses from a total of 1001 trial failure surfaces

Critical (minimum) Factor of Safety: 1.82
===

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	
1	37.50	0.00	212.50	50.00	95.77	127.30	140.00	1.818	<-- Critical Surface
2	37.50	0.00	209.72	50.00	93.63	128.25	140.00	1.820	
3	37.50	0.00	212.50	50.00	94.97	130.09	142.22	1.825	
4	37.50	0.00	209.72	50.00	92.83	131.02	142.22	1.827	
5	37.50	0.00	206.94	50.00	91.48	129.17	140.00	1.828	
6	37.50	0.00	212.50	50.00	94.18	132.86	144.44	1.833	
7	37.50	0.00	209.72	50.00	92.04	133.75	144.44	1.833	
8	40.28	0.00	212.50	50.00	96.41	128.25	140.00	1.835	
9	37.50	0.00	206.94	50.00	90.68	131.91	142.22	1.836	
10	40.28	0.00	209.72	50.00	94.26	129.17	140.00	1.838	
11	37.50	0.00	204.17	50.00	89.32	130.06	140.00	1.838	

12	37.50	0.00	212.50	50.00	93.40	135.60	146.67	1.839
13	40.28	0.00	212.50	50.00	95.61	131.02	142.22	1.842
14	37.50	0.00	209.72	50.00	91.25	136.46	146.67	1.843
15	40.28	0.00	209.72	50.00	93.45	131.91	142.22	1.845
16	37.50	0.00	206.94	50.00	89.88	134.61	144.44	1.846
17	37.50	0.00	212.50	50.00	92.63	138.31	148.89	1.846
18	40.28	0.00	206.94	50.00	92.09	130.06	140.00	1.847
19	37.50	0.00	204.17	50.00	88.50	132.76	142.22	1.848
20	40.28	0.00	212.50	50.00	94.82	133.75	144.44	1.848
21	37.50	0.00	209.72	50.00	90.47	139.15	148.89	1.852
22	37.50	0.00	201.39	50.00	87.13	130.91	140.00	1.853
23	43.06	0.00	212.50	50.00	97.04	129.17	140.00	1.854
24	40.28	0.00	209.72	50.00	92.66	134.61	144.44	1.855
25	37.50	0.00	206.94	50.00	89.09	137.30	146.67	1.856
26	37.50	0.00	212.50	50.00	91.86	141.00	151.11	1.856
27	40.28	0.00	206.94	50.00	91.28	132.76	142.22	1.857
28	37.50	0.00	204.17	50.00	87.70	135.44	144.44	1.857
29	40.28	0.00	212.50	50.00	94.03	136.46	146.67	1.858
30	40.28	0.00	204.17	50.00	89.91	130.91	140.00	1.858
31	43.06	0.00	212.50	50.00	96.23	131.91	142.22	1.861
32	43.06	0.00	209.72	50.00	94.87	130.06	140.00	1.862
33	37.50	0.00	209.72	50.00	89.70	141.81	151.11	1.863
34	37.50	0.00	201.39	50.00	86.32	133.58	142.22	1.863
35	40.28	0.00	209.72	50.00	91.86	137.30	146.67	1.864
36	37.50	0.00	206.94	50.00	88.30	139.95	148.89	1.865
37	37.50	0.00	212.50	50.00	91.10	143.66	153.33	1.866
38	40.28	0.00	206.94	50.00	90.48	135.44	144.44	1.866
39	37.50	0.00	204.17	50.00	86.90	138.10	146.67	1.866
40	43.06	0.00	209.72	50.00	94.06	132.76	142.22	1.867
41	40.28	0.00	212.50	50.00	93.25	139.15	148.89	1.867
42	40.28	0.00	204.17	50.00	89.10	133.58	142.22	1.867

43	37.50	0.00	198.61	49.54	85.20	131.62	140.00	1.868
44	43.06	0.00	206.94	50.00	92.69	130.91	140.00	1.869
45	37.50	0.00	201.39	50.00	85.51	136.23	144.44	1.870
46	43.06	0.00	212.50	50.00	95.43	134.61	144.44	1.870
47	40.28	0.00	201.39	50.00	87.71	131.72	140.00	1.870
48	37.50	0.00	206.94	50.00	87.52	142.59	151.11	1.871
49	37.50	0.00	209.72	50.00	88.93	144.45	153.33	1.872
50	40.28	0.00	209.72	50.00	91.08	139.95	148.89	1.873
51	37.50	0.00	204.17	50.00	86.11	140.73	148.89	1.873
52	40.28	0.00	204.17	50.00	88.29	136.23	144.44	1.874
53	40.28	0.00	206.94	50.00	89.68	138.10	146.67	1.875
54	37.50	0.00	212.50	50.00	90.34	146.31	155.56	1.875
55	43.06	0.00	209.72	50.00	93.26	135.44	144.44	1.876
56	45.83	0.00	212.50	50.00	97.65	130.06	140.00	1.876
57	43.06	0.00	204.17	50.00	90.49	131.72	140.00	1.876
58	40.28	0.00	212.50	50.00	92.48	141.81	151.11	1.876
59	37.50	0.00	201.39	50.00	84.71	138.86	146.67	1.877
60	40.28	0.00	201.39	50.00	86.89	134.37	142.22	1.877
61	43.06	0.00	206.94	50.00	91.87	133.58	142.22	1.877
62	37.50	0.00	206.94	50.00	86.75	145.21	153.33	1.878
63	43.06	0.00	212.50	50.00	94.64	137.30	146.67	1.879
64	37.50	0.00	209.72	50.00	88.17	147.07	155.56	1.880
65	40.28	0.00	209.72	50.00	90.30	142.59	151.11	1.881
66	40.28	0.00	204.17	50.00	87.48	138.86	146.67	1.881
67	37.50	0.00	204.17	50.00	85.33	143.34	151.11	1.881
68	40.28	0.00	206.94	50.00	88.89	140.73	148.89	1.881
69	43.06	0.00	204.17	50.00	89.67	134.37	142.22	1.883
70	37.50	0.00	198.61	49.54	84.39	134.27	142.22	1.883
71	43.06	0.00	206.94	50.00	91.06	136.23	144.44	1.884
72	43.06	0.00	209.72	50.00	92.46	138.10	146.67	1.884
73	45.83	0.00	209.72	50.00	95.47	130.91	140.00	1.884

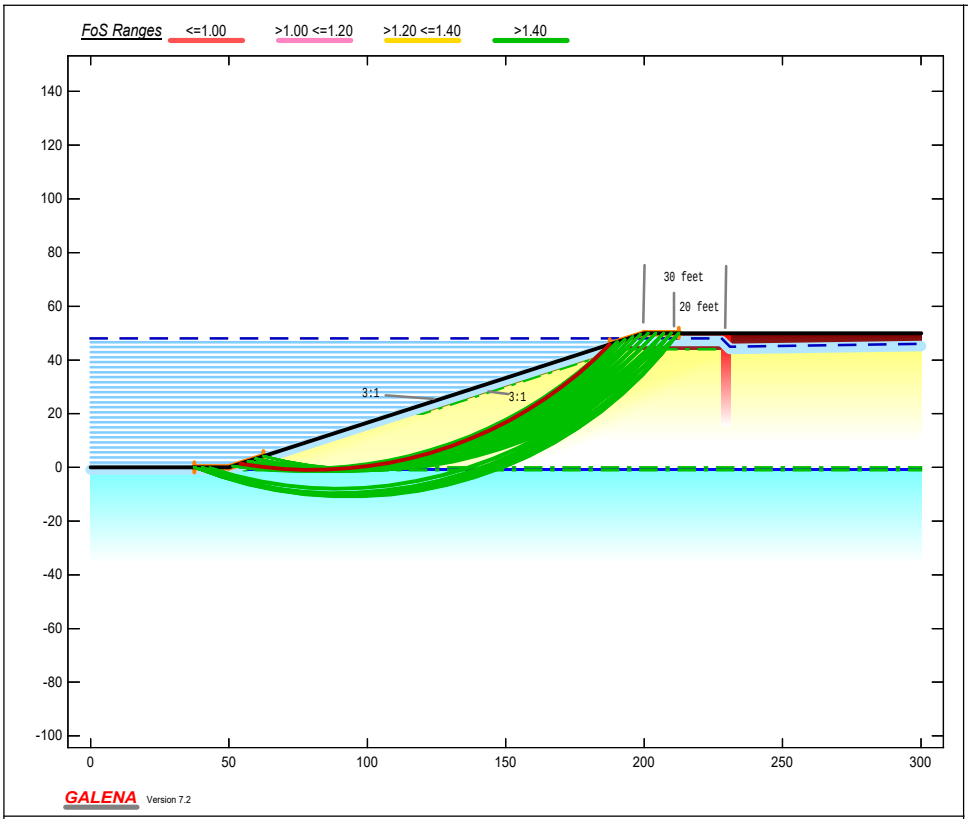
```
  74        45.83        0.00      212.50       50.00       96.84      132.76
142.22     1.884
  75        37.50        0.00      212.50       50.00       89.59      148.93
157.78     1.885
  76        40.28        0.00      198.61       49.54       85.77      132.40
140.00     1.885
  77        40.28        0.00      212.50       50.00       91.71      144.45
153.33     1.886
  78        37.50        0.00      206.94       50.00       85.98      147.81
155.56     1.886
  79        37.50        0.00      198.61       49.54       83.58      136.90
144.44     1.886
  80        40.28        0.00      209.72       50.00       89.53      145.21
153.33     1.887
  81        37.50        0.00      195.83       48.61       83.54      132.21
140.00     1.887
  82        37.50        0.00      209.72       50.00       87.42      149.67
157.78     1.888
  83        43.06        0.00      212.50       50.00       93.86      139.95
148.89     1.888
  84        45.83        0.00      206.94       50.00       93.27      131.72
140.00     1.888
  85        40.28        0.00      206.94       50.00       88.11      143.34
151.11     1.889
  86        40.28        0.00      201.39       50.00       86.08      136.99
144.44     1.889
  87        37.50        0.00      201.39       50.00       83.91      141.47
148.89     1.889
  88        43.06        0.00      201.39       50.00       88.28      132.50
140.00     1.890
  89        43.06        0.00      209.72       50.00       91.67      140.73
148.89     1.890
  90        43.06        0.00      206.94       50.00       90.26      138.86
146.67     1.891
  91        37.50        0.00      195.83       48.61       82.73      134.84
142.22     1.891
  92        40.28        0.00      204.17       50.00       86.69      141.47
148.89     1.892
  93        45.83        0.00      209.72       50.00       94.65      133.58
142.22     1.892
  94        37.50        0.00      204.17       50.00       84.55      145.94
153.33     1.892
  95        45.83        0.00      212.50       50.00       96.03      135.44
144.44     1.893
  96        37.50        0.00      212.50       50.00       88.85      151.54
160.00     1.893
  97        43.06        0.00      204.17       50.00       88.86      136.99
144.44     1.894
  98        40.28        0.00      212.50       50.00       90.95      147.07
155.56     1.894
  99        45.83        0.00      206.94       50.00       92.45      134.37
142.22     1.894

Critical Failure Surface (circle 1)
-----------------------
Intersects:  XL:      37.50      YL:       0.00      XR:     212.50      YR:
50.00
    Centre:  XC:      95.77      YC:     127.30                  Radius:  R:
140.00
Generated failure surface: (20 points)
     37.50      0.00           47.13     -3.98           57.04     -7.24
67.16     -9.75           77.43    -11.50
```

```
     87.81    -12.48           98.24    -12.68          108.65    -12.11
118.99    -10.77          129.19     -8.66
    139.22     -5.79          149.00     -2.19          158.49      2.13
167.63      7.14          176.37     12.83
    184.67     19.14          192.47     26.06          199.74     33.53
206.42     41.53          212.50     50.00

Slice Geometry and Properties - Critical Failure Surface (circle 1,  45 slices)
-----------------------------------------------------------
Slice                X-S     ------------------- Base --------------------
PoreWater      Normal    Test
        X-Left      Area    Angle    Width    Length  Matl   Cohesion    Phi
Weight      Force         Stress   Factor
  1       37.50      1.21   -22.5     2.42     2.62     3       0.00    15.0
133.02      244.97        118.94    1.15
  2       39.92      6.30   -22.5     3.61     3.90     4     150.00    24.0
706.32      668.93        305.92    1.20
  3       43.53     11.68   -22.5     3.61     3.90     4     150.00    24.0
1325.24     1032.33        486.30    1.20
  4       47.13     12.76   -18.2     2.87     3.02     4     150.00    24.0
1453.61     1026.67        619.23    1.14
  5       50.00     18.87   -18.2     3.16     3.33     4     150.00    24.0
2170.64     1343.10        775.18    1.14
  6       53.16     32.20   -18.2     3.88     4.08     4     150.00    24.0
3749.15     1958.46       1038.75    1.14
  7       57.04     55.93   -13.9     5.06     5.21     4     150.00    24.0
6568.54     2936.36       1367.59    1.10
  8       62.10     70.82   -13.9     5.06     5.21     4     150.00    24.0
8365.12     3372.21       1740.25    1.10
  9       67.16     86.13    -9.7     5.14     5.21     4     150.00    24.0
10217.35    3746.50       2058.17    1.06
 10       72.30     99.43    -9.7     5.14     5.21     4     150.00    24.0
11834.58    4059.20       2383.96    1.06
 11       77.43    112.89    -5.4     5.19     5.21     4     150.00    24.0
13475.47    4309.42       2646.49    1.03
 12       82.62    124.41    -5.4     5.19     5.21     4     150.00    24.0
14889.98    4497.21       2924.66    1.03
 13       87.81    135.51    -1.1     5.21     5.21     4     150.00    24.0
16260.12    4622.04       3132.37    1.01
 14       93.03    145.10    -1.1     5.21     5.21     4     150.00    24.0
17453.18    4683.90       3362.34    1.01
 15       98.24    153.47     3.1     5.20     5.21     4     150.00    24.0
18504.90    4682.62       3515.61    0.99
 16      103.44    161.01     3.1     5.20     5.21     4     150.00    24.0
19462.61    4618.21       3697.01    0.99
 17      108.65     43.02     7.4     1.35     1.36     4     150.00    24.0
5208.54     1193.91       3747.19    0.98
 18      110.00    145.52     7.4     4.49     4.53     4     150.00    24.0
17610.93    3870.59       3814.95    0.98
 19      114.49    149.62     7.4     4.49     4.53     4     150.00    24.0
18082.76    3726.81       3915.76    0.98
 20      118.99     34.33    11.7     1.01     1.04     4     150.00    24.0
4145.44      829.78       3910.45    0.97
 21      120.00    157.14    11.7     4.60     4.69     4     150.00    24.0
19002.96    3603.06       3955.03    0.97
 22      124.60    159.82    11.7     4.60     4.69     4     150.00    24.0
19381.28    3347.41       4030.73    0.97
 23      129.19    176.29    15.9     5.01     5.21     4     150.00    24.0
21446.64    3355.78       4019.17    0.97
 24      134.21    177.49    15.9     5.01     5.21     4     150.00    24.0
21667.97    2917.45       4054.94    0.97
 25      139.22    173.39    20.2     4.89     5.21     4     150.00    24.0
21246.97    2418.77       3994.76    0.98
```

```
 26      144.11    172.56    20.2     4.89     5.21     4     150.00    24.0
21230.89     1859.76      3982.86    0.98
 27      149.00     91.53    24.5     2.61     2.87     4     150.00    24.0
11299.97      767.75      3883.76    0.99
 28      151.62     76.29    24.5     2.20     2.41     3       0.00    15.0
9446.95      486.55      4043.54    1.03
 29      153.81    160.57    24.5     4.68     5.14     2       0.00    35.0
19915.63      553.02      3637.40    0.93
 30      158.49     44.50    28.7     1.31     1.50     2       0.00    35.0
5518.23       32.62      3473.73    0.94
 31      159.80    130.44    28.7     3.91     4.46     2       0.00    35.0
16174.70        0.00      3411.88    0.94
 32      163.72    127.14    28.7     3.91     4.46     2       0.00    35.0
15762.64        0.00      3324.95    0.94
 33      167.63    137.13    33.0     4.37     5.21     2       0.00    35.0
16995.97        0.00      3110.00    0.95
 34      172.00    131.09    33.0     4.37     5.21     2       0.00    35.0
16240.21        0.00      2971.71    0.95
 35      176.37    158.10    37.3     5.63     7.07     2       0.00    35.0
19575.20        0.00      2689.74    0.97
 36      182.00     70.21    37.3     2.67     3.35     5      75.00    28.0
8150.81        0.00      2473.44    1.03
 37      184.67     96.24    41.6     3.90     5.21     5      75.00    28.0
11137.35        0.00      2238.21    1.06
 38      188.57     87.82    41.6     3.90     5.21     5      75.00    28.0
10118.91        0.00      2030.89    1.06
 39      192.47     73.28    45.8     3.63     5.21     2       0.00    35.0
9011.04        0.00      1776.35    1.03
 40      196.10     64.10    45.8     3.63     5.21     2       0.00    35.0
7819.39        0.00      1541.43    1.03
 41      199.74     48.39    50.1     3.34     5.21     2       0.00    35.0
5848.56        0.00      1197.33    1.07
 42      203.08     35.02    50.1     3.34     5.21     2       0.00    35.0
4177.00        0.00       855.13    1.07
 43      206.42     12.83    54.4     1.77     3.04     2       0.00    35.0
1497.04        0.00       549.40    1.12
 44      208.20      8.55    54.4     1.80     3.09     1      50.00    28.0
983.38        0.00       360.19    1.22
 45      210.00      4.36    54.4     2.50     4.29     1      50.00    28.0
501.12        0.00       115.13    1.22
                --------                  -------                          -------
---
     X-S Area:    4174.50    Path Length:    198.08              X-S Weight:
505768.31
```



Material Keys

1: overburden
2: sand and gravel
3: weathered claystone
4: claystone
5: compacted overburden
6: slurry wall

Analysis 1

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular

Results

Critical Factor of Safety: 2.05

Project Hunt/J2

OB in slope static full reservoir

File: J:\Hunt Farms-306\J2 stability\20ft offset static full.gmf

Edited: 14 Sep 2022 *Processed:*14 Sep 2022

Civil Resources

GALENA 7.2 Analysis Results Version: 7.2.1.03 Licensee: Civil Resources

---

Project: Hunt/J2
File: J:\Hunt Farms-306\J2 stability\20ft offset static full.gmf
Processed: 14 Sep 2022 09:42:54

DATA: Analysis 1 - OB in slope static full reservoir

Material Properties (6 materials)

Material: 1 (Mohr-Coulomb Isotropic) - overburden
Cohesion Phi UnitWeight Ru
50.00 28.0 115.00 Auto
Material: 2 (Mohr-Coulomb Isotropic) - sand and gravel
Cohesion Phi UnitWeight Ru
0.00 35.0 125.00 Auto
Material: 3 (Mohr-Coulomb Isotropic) - weathered claystone
Cohesion Phi UnitWeight Ru
0.00 15.0 110.00 Auto
Material: 4 (Mohr-Coulomb Isotropic) - claystone
Cohesion Phi UnitWeight Ru
150.00 24.0 115.00 Auto
Material: 5 (Mohr-Coulomb Isotropic) - compacted overburden
Cohesion Phi UnitWeight Ru
75.00 28.0 115.00 Auto
Material: 6 (Mohr-Coulomb Isotropic) - slurry wall
Cohesion Phi UnitWeight Ru
0.00 0.0 110.00 Auto

Water Properties

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

Material Profiles (6 profiles)

Profile: 1 (4 points) Material beneath: 1 - overburden
0.00 50.00 228.00 50.00 231.00 50.00 300.00 50.00
Profile: 2 (4 points) Material beneath: 2 - sand and gravel
0.00 44.00 228.00 44.00 231.00 44.00 300.00 44.00
Profile: 3 (4 points) Material beneath: 3 - weathered claystone
0.00 0.00 228.00 0.00 231.00 0.00 300.00 0.00
Profile: 4 (4 points) Material beneath: 4 - claystone
0.00 -1.00 228.00 -1.00 231.00 -1.00 300.00 -1.00
Profile: 5 (5 points) Material within: 5 - compacted overburden
200.00 50.00 110.00 20.00 120.00 20.00 210.00 50.00 200.00 50.00
Profile: 6 (2 points) Material beneath: 6 - slurry wall
228.00 50.00 231.00 50.00

Slope Surface (4 points)

0.00 0.00 50.00 0.00 200.00 50.00 300.00 50.00

Phreatic Surface (4 points)

0.00 48.00 228.00 48.00 231.00 45.00
300.00 46.00

Failure Surface

Initial circular surface for critical search defined by: XL,XR,R

Intersects: XL: 50.00 YL: 0.00 XR: 200.00 YR: 50.00

Centre: XC: 84.69 YC: 145.93 Radius: R: 150.00

Variable Restraints

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

- -

RESULTS: Analysis 1 - OB in slope static full reservoir

Bishop Simplified Method of Analysis - Circular Failure Surface

----

Critical Failure Surface Search using Multiple Circle Generation Techniques

Initial failure surface approximation - Factor of Safety: 2.232

Analysis Summary

================

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

Critical (minimum) Factor of Safety: 2.05

==

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	
1	54.17	1.39	187.50	45.83	80.12	145.74	146.67	2.048	<-- Critical Surface
2	54.17	1.39	190.28	46.76	80.96	147.85	148.89	2.051	
3	54.17	1.39	193.06	47.69	81.01	152.36	153.33	2.056	
4	56.94	2.31	204.17	50.00	88.97	154.54	155.56	2.061	
5	54.17	1.39	198.61	49.54	81.89	158.97	160.00	2.063	
6	54.17	1.39	190.28	46.76	80.16	150.25	151.11	2.066	
7	54.17	1.39	195.83	48.61	81.05	156.86	157.78	2.073	
8	56.94	2.31	193.06	47.69	86.98	139.05	140.00	2.073	
9	56.94	2.31	201.39	50.00	88.23	150.15	151.11	2.073	
10	56.94	2.31	198.61	49.54	87.86	145.69	146.67	2.075	
11	54.17	1.39	187.50	45.83	79.32	148.14	148.89	2.075	

12	59.72	3.24	209.72	50.00	95.53	152.33	153.33	2.083
13	54.17	1.39	193.06	47.69	80.21	154.75	155.56	2.083
14	59.72	3.24	206.94	50.00	94.80	147.94	148.89	2.085
15	56.94	2.31	204.17	50.00	88.19	156.97	157.78	2.093
16	56.94	2.31	206.94	50.00	89.74	158.92	160.00	2.096
17	59.72	3.24	204.17	50.00	94.10	143.54	144.44	2.096
18	59.72	3.24	201.39	50.00	93.42	139.12	140.00	2.098
19	54.17	1.39	195.83	48.61	80.25	159.25	160.00	2.098
20	54.17	1.39	190.28	46.76	79.37	152.64	153.33	2.099
21	56.94	2.31	195.83	48.61	87.01	143.60	144.44	2.099
22	54.17	1.39	187.50	45.83	78.53	150.52	151.11	2.107
23	62.50	4.17	209.72	50.00	100.59	141.19	142.22	2.110
24	56.94	2.31	195.83	48.61	87.83	141.14	142.22	2.111
25	54.17	1.39	193.06	47.69	79.41	157.13	157.78	2.111
26	56.94	2.31	201.39	50.00	87.43	152.59	153.33	2.112
27	62.50	4.17	212.50	50.00	101.28	145.61	146.67	2.115
28	54.17	1.39	187.50	45.83	80.93	143.33	144.44	2.115
29	56.94	2.31	198.61	49.54	87.04	148.13	148.89	2.116
30	56.94	2.31	193.06	47.69	86.17	141.50	142.22	2.117
31	59.72	3.24	212.50	50.00	96.29	156.72	157.78	2.119
32	59.72	3.24	212.50	50.00	95.54	159.18	160.00	2.125
33	56.94	2.31	204.17	50.00	87.40	159.39	160.00	2.126
34	59.72	3.24	209.72	50.00	94.77	154.80	155.56	2.127
35	54.17	1.39	190.28	46.76	78.57	155.02	155.56	2.129
36	54.17	1.39	195.83	48.61	81.85	154.46	155.56	2.131
37	56.94	2.31	190.28	46.76	85.32	139.41	140.00	2.133
38	59.72	3.24	206.94	50.00	94.02	150.41	151.11	2.136
39	54.17	1.39	193.06	47.69	81.81	149.95	151.11	2.139
40	56.94	2.31	195.83	48.61	86.20	146.03	146.67	2.139
41	51.39	0.46	187.50	45.83	74.22	158.83	160.00	2.141
42	54.17	1.39	190.28	46.76	81.77	145.43	146.67	2.144

43	56.94	2.31	201.39	50.00	86.63	155.01	155.56	2.145
44	54.17	1.39	187.50	45.83	77.74	152.90	153.33	2.148
45	59.72	3.24	204.17	50.00	93.29	146.01	146.67	2.148
46	54.17	1.39	193.06	47.69	78.62	159.51	160.00	2.149
47	56.94	2.31	198.61	49.54	86.23	150.56	151.11	2.152
48	54.17	1.39	198.61	49.54	82.69	156.57	157.78	2.153
49	56.94	2.31	201.39	50.00	89.04	147.70	148.89	2.154
50	62.50	4.17	209.72	50.00	99.80	143.71	144.44	2.156
51	56.94	2.31	204.17	50.00	89.76	152.09	153.33	2.158
52	56.94	2.31	193.06	47.69	85.35	143.94	144.44	2.159
53	59.72	3.24	201.39	50.00	92.60	141.61	142.22	2.160
54	59.72	3.24	204.17	50.00	94.90	141.04	142.22	2.160
55	62.50	4.17	212.50	50.00	100.52	148.12	148.89	2.162
56	62.50	4.17	206.94	50.00	99.12	139.29	140.00	2.163
57	54.17	1.39	187.50	45.83	81.73	140.91	142.22	2.163
58	54.17	1.39	195.83	48.61	82.65	152.05	153.33	2.165
59	54.17	1.39	190.28	46.76	77.78	157.39	157.78	2.166
60	51.39	0.46	187.50	45.83	75.01	156.46	157.78	2.166
61	59.72	3.24	206.94	50.00	95.59	145.45	146.67	2.168
62	56.94	2.31	198.61	49.54	88.68	143.23	144.44	2.171
63	54.17	1.39	201.39	50.00	83.89	158.60	160.00	2.172
64	56.94	2.31	206.94	50.00	90.51	156.48	157.78	2.176
65	59.72	3.24	209.72	50.00	96.31	149.86	151.11	2.178
66	54.17	1.39	193.06	47.69	82.61	147.54	148.89	2.178
67	59.72	3.24	209.72	50.00	94.00	157.25	157.78	2.179
68	51.39	0.46	187.50	45.83	75.80	154.09	155.56	2.180
69	51.39	0.46	190.28	46.76	75.84	158.58	160.00	2.181
70	54.17	1.39	187.50	45.83	76.95	155.27	155.56	2.182
71	54.17	1.39	198.61	49.54	83.49	154.16	155.56	2.183
72	54.17	1.39	190.28	46.76	82.58	143.01	144.44	2.183
73	56.94	2.31	195.83	48.61	85.39	148.46	148.89	2.184

74	56.94	2.31	204.17	50.00	90.56	149.64	151.11	2.187
75	56.94	2.31	190.28	46.76	84.51	141.84	142.22	2.187
76	56.94	2.31	206.94	50.00	91.29	154.03	155.56	2.188
77	59.72	3.24	206.94	50.00	93.24	152.87	153.33	2.189
78	54.17	1.39	187.50	45.83	82.54	138.48	140.00	2.190
79	37.50	0.00	212.50	50.00	92.63	138.31	148.89	2.193
80	56.94	2.31	201.39	50.00	89.85	145.24	146.67	2.194
81	56.94	2.31	209.72	50.00	92.05	158.42	160.00	2.194
82	37.50	0.00	212.50	50.00	91.86	141.00	151.11	2.194
83	37.50	0.00	206.94	50.00	90.68	131.91	142.22	2.194
84	40.28	0.00	209.72	50.00	94.26	129.17	140.00	2.195
85	37.50	0.00	212.50	50.00	93.40	135.60	146.67	2.195
86	37.50	0.00	209.72	50.00	92.04	133.75	144.44	2.195
87	40.28	0.00	212.50	50.00	94.82	133.75	144.44	2.195
88	37.50	0.00	206.94	50.00	89.88	134.61	144.44	2.195
89	37.50	0.00	212.50	50.00	91.10	143.66	153.33	2.196
90	40.28	0.00	206.94	50.00	88.11	143.34	151.11	2.196
91	51.39	0.46	190.28	46.76	76.63	156.21	157.78	2.196
92	40.28	0.00	212.50	50.00	94.03	136.46	146.67	2.196
93	37.50	0.00	209.72	50.00	91.25	136.46	146.67	2.196
94	37.50	0.00	206.94	50.00	91.48	129.17	140.00	2.196
95	43.06	0.00	206.94	50.00	90.26	138.86	146.67	2.196
96	59.72	3.24	212.50	50.00	97.05	154.25	155.56	2.196
97	40.28	0.00	206.94	50.00	88.89	140.73	148.89	2.196
98	37.50	0.00	206.94	50.00	89.09	137.30	146.67	2.196
99	40.28	0.00	206.94	50.00	92.09	130.06	140.00	2.196

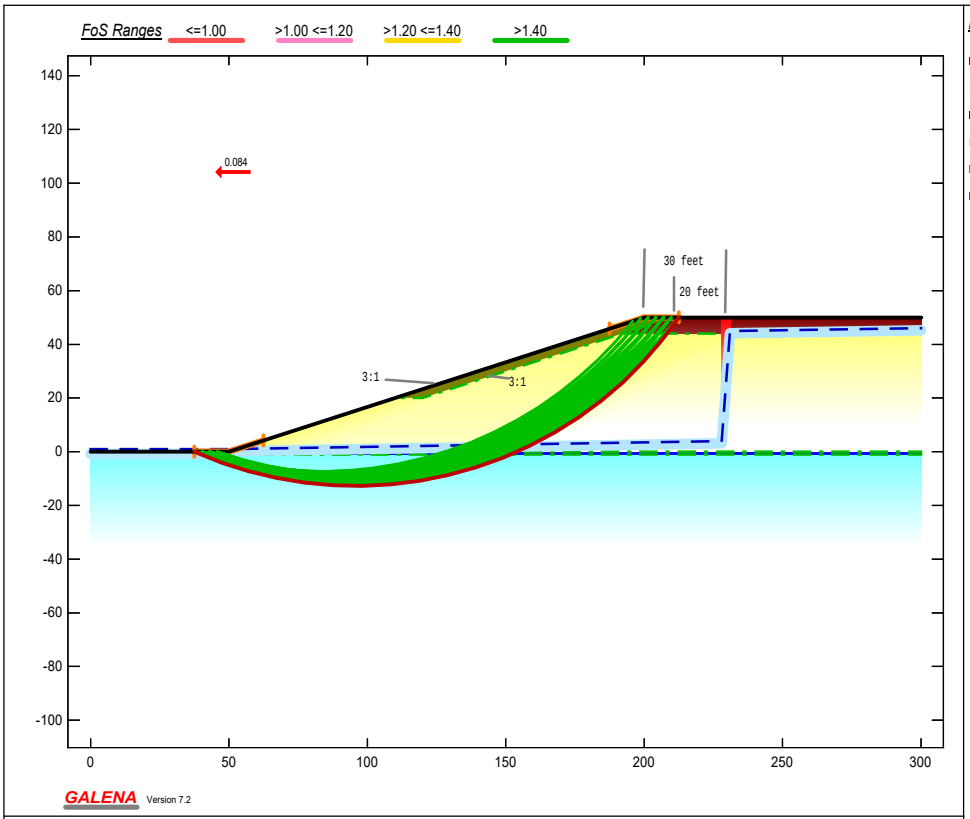
Critical Failure Surface (circle 1)

Intersects: XL: 54.17 YL: 1.39 XR: 187.50 YR: 45.83
Centre: XC: 80.12 YC: 145.74 Radius: R: 146.67
Generated failure surface: (20 points)
54.17 1.39 61.79 0.22 69.47 -0.54 77.17 -0.90 84.89 -0.85

```
     92.59     -0.40          100.25      0.46          107.86      1.72
115.39      3.38          122.83      5.43
    130.15      7.87          137.33     10.69          144.35     13.88
151.19     17.44          157.84     21.35
    164.27     25.61          170.47     30.20          176.42     35.11
182.10     40.33          187.50     45.83

Slice Geometry and Properties - Critical Failure Surface (circle 1,  42 slices)
-----------------------------------------------------------
Slice                X-S     ------------------- Base --------------------
PoreWater      Normal    Test
        X-Left      Area    Angle    Width    Length  Matl   Cohesion    Phi
Weight      Force         Stress   Factor
  1       54.17      3.53    -8.7     3.81     3.86     2       0.00    35.0
441.59    11287.29      2987.91    1.07
  2       57.98     10.60    -8.7     3.81     3.86     2       0.00    35.0
1324.78    11427.47      3146.67    1.07
  3       61.79      9.45    -5.7     2.25     2.26     2       0.00    35.0
1181.59     6767.92      3260.00    1.04
  4       64.05     14.28    -5.7     2.71     2.72     3       0.00    15.0
1779.70     8182.43      3335.69    1.02
  5       66.76     17.46    -5.7     2.71     2.72     3       0.00    15.0
2166.20     8228.19      3422.80    1.02
  6       69.47     29.89    -2.7     3.85     3.86     3       0.00    15.0
3700.23    11702.57      3513.61    1.01
  7       73.32     35.53    -2.7     3.85     3.86     3       0.00    15.0
4394.46    11745.62      3614.23    1.01
  8       77.17     40.82     0.4     3.86     3.86     3       0.00    15.0
5051.43    11764.32      3699.22    1.00
  9       81.03     45.69     0.4     3.86     3.86     3       0.00    15.0
5661.03    11758.56      3777.01    1.00
 10       84.89     50.07     3.4     3.85     3.86     3       0.00    15.0
6216.50    11728.47      3838.10    0.99
 11       88.74     54.14     3.4     3.85     3.86     3       0.00    15.0
6738.15    11673.93      3892.99    0.99
 12       92.59     53.05     6.4     3.54     3.56     3       0.00    15.0
6620.84    10715.25      3929.04    0.99
 13       96.13     65.30     6.4     4.12     4.15     2       0.00    35.0
8162.83    12371.61      3935.40    0.97
 14      100.25     63.19     9.4     3.80     3.86     2       0.00    35.0
7899.14    11364.66      3930.79    0.96
 15      104.06     65.62     9.4     3.80     3.86     2       0.00    35.0
8202.95    11213.14      3929.36    0.96
 16      107.86     37.85    12.4     2.14     2.19     2       0.00    35.0
4730.87     6294.84      3902.95    0.95
 17      110.00     48.44    12.4     2.70     2.76     2       0.00    35.0
6042.56     7841.68      3881.53    0.95
 18      112.70     49.26    12.4     2.70     2.76     2       0.00    35.0
6121.34     7739.46      3853.94    0.95
 19      115.39     42.58    15.4     2.30     2.39     2       0.00    35.0
5272.22     6605.58      3802.18    0.95
 20      117.70     42.88    15.4     2.30     2.39     2       0.00    35.0
5292.67     6510.85      3763.10    0.95
 21      120.00     53.09    15.4     2.83     2.93     2       0.00    35.0
6541.80     7867.08      3723.85    0.95
 22      122.83     68.96    18.4     3.66     3.86     2       0.00    35.0
8497.83    10098.20      3647.62    0.95
 23      126.49     68.96    18.4     3.66     3.86     2       0.00    35.0
8497.80     9804.71      3571.51    0.95
 24      130.15     67.27    21.4     3.59     3.86     2       0.00    35.0
8289.20     9488.28      3465.09    0.95
 25      133.74     66.50    21.4     3.59     3.86     2       0.00    35.0
8193.33     9148.90      3365.31    0.95
```

```
 26      137.33     63.91    24.5     3.51     3.86     2       0.00    35.0
7872.22     8787.06      3235.89    0.95
 27      140.84     62.42    24.5     3.51     3.86     2       0.00    35.0
7684.91     8402.73      3113.11    0.95
 28      144.35     59.01    27.5     3.42     3.86     2       0.00    35.0
7262.60     7996.45      2961.80    0.96
 29      147.77     56.83    27.5     3.42     3.86     2       0.00    35.0
6989.36     7568.24      2816.81    0.96
 30      151.19     52.72    30.5     3.32     3.86     2       0.00    35.0
6479.60     7118.70      2644.76    0.97
 31      154.51     49.90    30.5     3.32     3.86     2       0.00    35.0
6126.92     6647.80      2478.42    0.97
 32      157.84     45.22    33.5     3.22     3.86     2       0.00    35.0
5545.69     6156.12      2286.92    0.98
 33      161.05     41.82    33.5     3.22     3.86     2       0.00    35.0
5120.89     5643.86      2100.14    0.98
 34      164.27     36.72    36.5     3.10     3.86     2       0.00    35.0
4486.50     5111.62      1890.58    0.99
 35      167.37     32.81    36.5     3.10     3.86     2       0.00    35.0
3997.64     4559.32      1684.35    0.99
 36      170.47     27.43    39.5     2.97     3.86     2       0.00    35.0
3329.95     3987.85      1458.29    1.01
 37      173.44     23.08    39.5     2.97     3.86     2       0.00    35.0
2785.90     3397.10      1233.68    1.01
 38      176.42     17.34    42.5     2.79     3.79     2       0.00    35.0
2074.74     2744.67       994.94    1.03
 39      179.21     12.79    42.5     2.79     3.79     2       0.00    35.0
1505.35     2138.84       757.32    1.03
 40      182.00      2.29    45.1     0.64     0.91     5      75.00    28.0
283.57      423.42       609.39    1.12
 41      182.64      6.99    45.6     3.06     4.37     2       0.00    35.0
851.04     1515.54       447.54    1.06
 42      185.70      1.11    45.6     1.80     2.57     5      75.00    28.0
127.58      494.06       188.53    1.13
                --------                  -------                          -------
---
     X-S Area:    1696.82    Path Length:    146.55              X-S Weight:
209545.53
```



Project Hunt/J2
OB in slope seismic empty

File: J:\Hunt Farms-306\J2 stability\20ft offset seismic empty.gmf

Material Keys

1: overburden
2: sand and gravel
3: weathered claystone
4: claystone
5: compacted overburden
6: slurry wall

Analysis 1

Multiple Stability Analysis
Method: Bishop Simplified
Surface: Circular

Results

Critical Factor of Safety: 1.40

Edited: 14 Sep 2022 *Processed:*14 Sep 2022

Civil Resources

GALENA 7.2 Analysis Results Version: 7.2.1.03 Licensee: Civil Resources

---

Project: Hunt/J2
File: J:\Hunt Farms-306\J2 stability\20ft offset seismic empty.gmf
Processed: 14 Sep 2022 09:35:53

DATA: Analysis 1 - OB in slope seismic empty

Material Properties (6 materials)

Material: 1 (Mohr-Coulomb Isotropic) - overburden
Cohesion Phi UnitWeight Ru
50.00 28.0 115.00 Auto
Material: 2 (Mohr-Coulomb Isotropic) - sand and gravel
Cohesion Phi UnitWeight Ru
0.00 35.0 125.00 Auto
Material: 3 (Mohr-Coulomb Isotropic) - weathered claystone
Cohesion Phi UnitWeight Ru
0.00 15.0 110.00 Auto
Material: 4 (Mohr-Coulomb Isotropic) - claystone
Cohesion Phi UnitWeight Ru
150.00 24.0 115.00 Auto
Material: 5 (Mohr-Coulomb Isotropic) - compacted overburden
Cohesion Phi UnitWeight Ru
75.00 28.0 115.00 Auto
Material: 6 (Mohr-Coulomb Isotropic) - slurry wall
Cohesion Phi UnitWeight Ru
0.00 0.0 110.00 Auto

Water Properties

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

Material Profiles (6 profiles)

Profile: 1 (4 points) Material beneath: 1 - overburden
0.00 50.00 228.00 50.00 231.00 50.00 300.00 50.00
Profile: 2 (4 points) Material beneath: 2 - sand and gravel
0.00 44.00 228.00 44.00 231.00 44.00 300.00 44.00
Profile: 3 (4 points) Material beneath: 3 - weathered claystone
0.00 0.00 228.00 0.00 231.00 0.00 300.00 0.00
Profile: 4 (4 points) Material beneath: 4 - claystone
0.00 -1.00 228.00 -1.00 231.00 -1.00 300.00 -1.00
Profile: 5 (5 points) Material within: 5 - compacted overburden
200.00 50.00 110.00 20.00 120.00 20.00 210.00 50.00 200.00 50.00
Profile: 6 (2 points) Material beneath: 6 - slurry wall
228.00 50.00 231.00 50.00

Slope Surface (4 points)

0.00 0.00 50.00 0.00 200.00 50.00 300.00 50.00

Phreatic Surface (5 points)

0.00 1.00 50.00 1.00 228.00 4.00
231.00 45.00 300.00 46.00

Failure Surface

Initial circular surface for critical search defined by: XL,XR,R
Intersects: XL: 50.00 YL: 0.00 XR: 200.00 YR: 50.00
Centre: XC: 84.69 YC: 145.93 Radius: R: 150.00

Earthquake Force

Pseudo-static earthquake (seismic) coefficient: 0.084

Variable Restraints

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

- -

RESULTS: Analysis 1 - OB in slope seismic empty

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

Initial failure surface approximation - Factor of Safety: 1.541

Analysis Summary
===
There were: 1001 successful analyses from a total of 1001 trial failure surfaces

Critical (minimum) Factor of Safety: 1.40
===

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	
1	37.50	0.00	212.50	50.00	95.77	127.30	140.00	1.401	<-- Critical Surface
2	37.50	0.00	209.72	50.00	93.63	128.25	140.00	1.404	
3	37.50	0.00	212.50	50.00	94.97	130.09	142.22	1.407	
4	37.50	0.00	209.72	50.00	92.83	131.02	142.22	1.410	
5	37.50	0.00	206.94	50.00	91.48	129.17	140.00	1.412	
6	37.50	0.00	212.50	50.00	94.18	132.86	144.44	1.413	
7	37.50	0.00	209.72	50.00	92.04	133.75	144.44	1.414	
8	40.28	0.00	212.50	50.00	96.41	128.25	140.00	1.415	
9	37.50	0.00	212.50	50.00	93.40	135.60	146.67	1.417	

10	37.50	0.00	206.94	50.00	90.68	131.91
142.22	1.418					
11	40.28	0.00	209.72	50.00	94.26	129.17
140.00	1.419					
12	37.50	0.00	204.17	50.00	89.32	130.06
140.00	1.420					
13	40.28	0.00	212.50	50.00	95.61	131.02
142.22	1.421					
14	37.50	0.00	209.72	50.00	91.25	136.46
146.67	1.422					
15	37.50	0.00	212.50	50.00	92.63	138.31
148.89	1.422					
16	40.28	0.00	209.72	50.00	93.45	131.91
142.22	1.425					
17	40.28	0.00	212.50	50.00	94.82	133.75
144.44	1.425					
18	37.50	0.00	206.94	50.00	89.88	134.61
144.44	1.425					
19	40.28	0.00	206.94	50.00	92.09	130.06
140.00	1.428					
20	37.50	0.00	204.17	50.00	88.50	132.76
142.22	1.428					
21	37.50	0.00	209.72	50.00	90.47	139.15
148.89	1.429					
22	37.50	0.00	212.50	50.00	91.86	141.00
151.11	1.430					
23	43.06	0.00	212.50	50.00	97.04	129.17
140.00	1.431					
24	40.28	0.00	209.72	50.00	92.66	134.61
144.44	1.432					
25	40.28	0.00	212.50	50.00	94.03	136.46
146.67	1.432					
26	37.50	0.00	201.39	50.00	87.13	130.91
140.00	1.433					
27	37.50	0.00	206.94	50.00	89.09	137.30
146.67	1.433					
28	40.28	0.00	206.94	50.00	91.28	132.76
142.22	1.435					
29	37.50	0.00	204.17	50.00	87.70	135.44
144.44	1.435					
30	43.06	0.00	212.50	50.00	96.23	131.91
142.22	1.436					
31	37.50	0.00	209.72	50.00	89.70	141.81
151.11	1.437					
32	40.28	0.00	204.17	50.00	89.91	130.91
140.00	1.437					
33	37.50	0.00	212.50	50.00	91.10	143.66
153.33	1.437					
34	43.06	0.00	209.72	50.00	94.87	130.06
140.00	1.438					
35	40.28	0.00	209.72	50.00	91.86	137.30
146.67	1.439					
36	40.28	0.00	212.50	50.00	93.25	139.15
148.89	1.440					
37	37.50	0.00	206.94	50.00	88.30	139.95
148.89	1.440					
38	37.50	0.00	201.39	50.00	86.32	133.58
142.22	1.440					
39	40.28	0.00	206.94	50.00	90.48	135.44
144.44	1.442					
40	43.06	0.00	209.72	50.00	94.06	132.76
142.22	1.442					

41	37.50	0.00	204.17	50.00	86.90	138.10	146.67	1.442
42	43.06	0.00	212.50	50.00	95.43	134.61	144.44	1.443
43	40.28	0.00	204.17	50.00	89.10	133.58	142.22	1.444
44	37.50	0.00	209.72	50.00	88.93	144.45	153.33	1.444
45	37.50	0.00	198.61	49.54	85.20	131.62	140.00	1.445
46	37.50	0.00	212.50	50.00	90.34	146.31	155.56	1.445
47	37.50	0.00	206.94	50.00	87.52	142.59	151.11	1.445
48	43.06	0.00	206.94	50.00	92.69	130.91	140.00	1.445
49	40.28	0.00	209.72	50.00	91.08	139.95	148.89	1.446
50	37.50	0.00	201.39	50.00	85.51	136.23	144.44	1.446
51	40.28	0.00	212.50	50.00	92.48	141.81	151.11	1.447
52	40.28	0.00	201.39	50.00	87.71	131.72	140.00	1.447
53	37.50	0.00	204.17	50.00	86.11	140.73	148.89	1.448
54	45.83	0.00	212.50	50.00	97.65	130.06	140.00	1.448
55	40.28	0.00	206.94	50.00	89.68	138.10	146.67	1.449
56	43.06	0.00	209.72	50.00	93.26	135.44	144.44	1.449
57	40.28	0.00	204.17	50.00	88.29	136.23	144.44	1.449
58	43.06	0.00	212.50	50.00	94.64	137.30	146.67	1.450
59	37.50	0.00	206.94	50.00	86.75	145.21	153.33	1.450
60	37.50	0.00	209.72	50.00	88.17	147.07	155.56	1.451
61	37.50	0.00	201.39	50.00	84.71	138.86	146.67	1.451
62	43.06	0.00	206.94	50.00	91.87	133.58	142.22	1.452
63	40.28	0.00	209.72	50.00	90.30	142.59	151.11	1.452
64	43.06	0.00	204.17	50.00	90.49	131.72	140.00	1.452
65	37.50	0.00	212.50	50.00	89.59	148.93	157.78	1.452
66	40.28	0.00	201.39	50.00	86.89	134.37	142.22	1.453
67	37.50	0.00	204.17	50.00	85.33	143.34	151.11	1.454
68	40.28	0.00	212.50	50.00	91.71	144.45	153.33	1.454
69	40.28	0.00	206.94	50.00	88.89	140.73	148.89	1.454
70	45.83	0.00	212.50	50.00	96.84	132.76	142.22	1.454
71	40.28	0.00	204.17	50.00	87.48	138.86	146.67	1.455

72	43.06	0.00	209.72	50.00	92.46	138.10	146.67	1.455
73	37.50	0.00	198.61	49.54	84.39	134.27	142.22	1.456
74	45.83	0.00	209.72	50.00	95.47	130.91	140.00	1.456
75	37.50	0.00	209.72	50.00	87.42	149.67	157.78	1.456
76	37.50	0.00	206.94	50.00	85.98	147.81	155.56	1.456
77	43.06	0.00	206.94	50.00	91.06	136.23	144.44	1.456
78	43.06	0.00	212.50	50.00	93.86	139.95	148.89	1.457
79	40.28	0.00	209.72	50.00	89.53	145.21	153.33	1.457
80	43.06	0.00	204.17	50.00	89.67	134.37	142.22	1.457
81	37.50	0.00	198.61	49.54	83.58	136.90	144.44	1.458
82	37.50	0.00	212.50	50.00	88.85	151.54	160.00	1.459
83	40.28	0.00	198.61	49.54	85.77	132.40	140.00	1.459
84	37.50	0.00	195.83	48.61	83.54	132.21	140.00	1.459
85	40.28	0.00	206.94	50.00	88.11	143.34	151.11	1.459
86	40.28	0.00	212.50	50.00	90.95	147.07	155.56	1.460
87	43.06	0.00	209.72	50.00	91.67	140.73	148.89	1.460
88	37.50	0.00	201.39	50.00	83.91	141.47	148.89	1.460
89	45.83	0.00	206.94	50.00	93.27	131.72	140.00	1.461
90	45.83	0.00	212.50	50.00	96.03	135.44	144.44	1.461
91	40.28	0.00	201.39	50.00	86.08	136.99	144.44	1.461
92	43.06	0.00	206.94	50.00	90.26	138.86	146.67	1.462
93	37.50	0.00	195.83	48.61	82.73	134.84	142.22	1.462
94	37.50	0.00	209.72	50.00	86.66	152.26	160.00	1.462
95	45.83	0.00	209.72	50.00	94.65	133.58	142.22	1.462
96	37.50	0.00	204.17	50.00	84.55	145.94	153.33	1.463
97	43.06	0.00	212.50	50.00	93.08	142.59	151.11	1.463
98	40.28	0.00	209.72	50.00	88.76	147.81	155.56	1.463
99	40.28	0.00	204.17	50.00	86.69	141.47	148.89	1.463

Critical Failure Surface (circle 1)

Intersects: XL: 37.50 YL: 0.00 XR: 212.50 YR: 50.00

Centre: XC: 95.77 YC: 127.30 Radius: R: 140.00

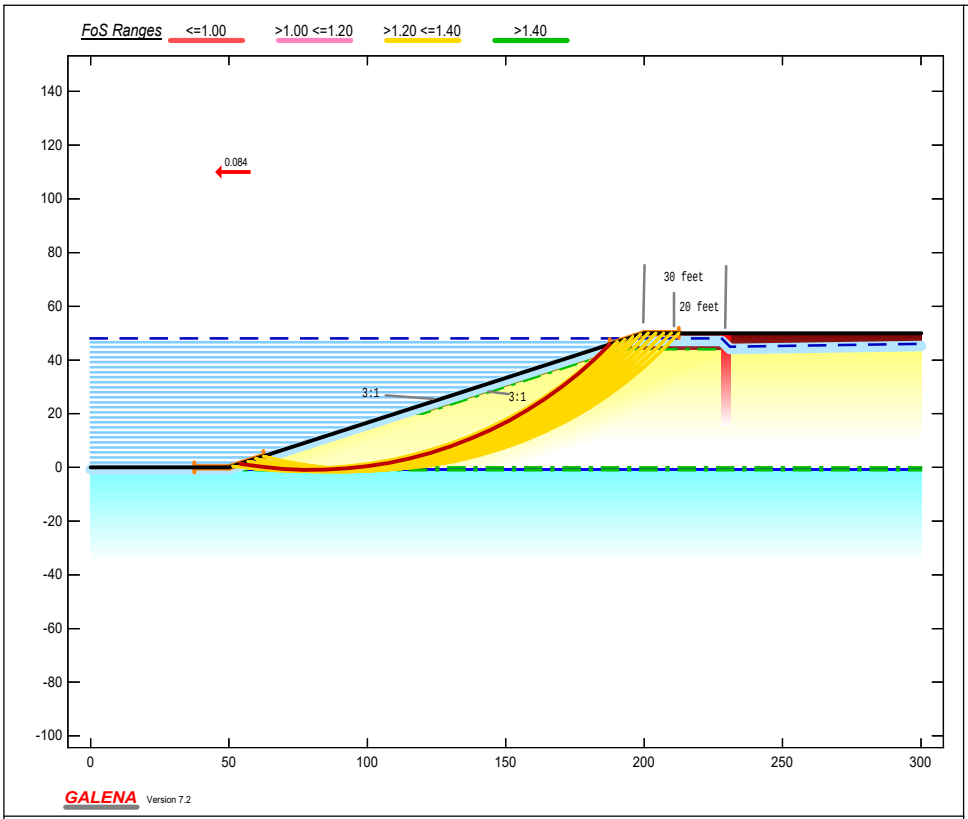
Generated failure surface: (20 points)

37.50	0.00	47.13	-3.98	57.04	-7.24	67.16	-9.75	77.43	-11.50
87.81	-12.48	98.24	-12.68	108.65	-12.11	118.99	-10.77	129.19	-8.66
139.22	-5.79	149.00	-2.19	158.49	2.13	167.63	7.14	176.37	12.83
184.67	19.14	192.47	26.06	199.74	33.53	206.42	41.53	212.50	50.00

Slice Geometry and Properties - Critical Failure Surface (circle 1, 45 slices)

Slice	X-S	---------- Base ----------						PoreWater	Normal	Test
	X-Left	Area	Angle	Width	Length	Matl	Cohesion	Phi	Weight	Force	Stress	Factor
1	37.50	1.21	-22.5	2.42	2.62	3	0.00	15.0	133.02	244.97	119.44	1.18
2	39.92	6.30	-22.5	3.61	3.90	4	150.00	24.0	706.32	668.93	322.26	1.25
3	43.53	11.68	-22.5	3.61	3.90	4	150.00	24.0	1325.24	1032.33	505.67	1.25
4	47.13	12.76	-18.2	2.87	3.02	4	150.00	24.0	1453.61	1026.67	635.68	1.18
5	50.00	18.87	-18.2	3.16	3.33	4	150.00	24.0	2170.64	1343.10	794.11	1.18
6	53.16	32.20	-18.2	3.88	4.08	4	150.00	24.0	3749.15	1958.46	1062.70	1.18
7	57.04	55.93	-13.9	5.06	5.21	4	150.00	24.0	6568.54	2936.36	1389.97	1.12
8	62.10	70.82	-13.9	5.06	5.21	4	150.00	24.0	8365.12	3372.21	1768.29	1.12
9	67.16	86.13	-9.7	5.14	5.21	4	150.00	24.0	10217.35	3746.50	2080.14	1.07
10	72.30	99.43	-9.7	5.14	5.21	4	150.00	24.0	11834.58	4059.20	2409.41	1.07
11	77.43	112.89	-5.4	5.19	5.21	4	150.00	24.0	13475.47	4309.42	2661.78	1.04
12	82.62	124.41	-5.4	5.19	5.21	4	150.00	24.0	14889.98	4497.21	2941.66	1.04
13	87.81	135.51	-1.1	5.21	5.21	4	150.00	24.0	16260.12	4622.04	3136.09	1.01
14	93.03	145.10	-1.1	5.21	5.21	4	150.00	24.0	17453.18	4683.90	3366.37	1.01
15	98.24	153.47	3.1	5.20	5.21	4	150.00	24.0	18504.90	4682.62	3504.00	0.98
16	103.44	161.01	3.1	5.20	5.21	4	150.00	24.0	19462.61	4618.21	3684.64	0.98
17	108.65	43.02	7.4	1.35	1.36	4	150.00	24.0	5208.54	1193.91	3718.00	0.97
18	110.00	145.52	7.4	4.49	4.53	4	150.00	24.0	17610.93	3870.59	3784.96	0.97
19	114.49	149.62	7.4	4.49	4.53	4	150.00	24.0	18082.76	3726.81	3884.56	0.97
20	118.99	34.33	11.7	1.01	1.04	4	150.00	24.0	4145.44	829.78	3861.77	0.96
21	120.00	157.14	11.7	4.60	4.69	4	150.00	24.0	19002.96	3603.06	3905.26	0.96
22	124.60	159.82	11.7	4.60	4.69	4	150.00	24.0	19381.28	3347.41	3979.12	0.96
23	129.19	176.29	15.9	5.01	5.21	4	150.00	24.0	21446.64	3355.78	3948.36	0.95

```
 24      134.21    177.49    15.9     5.01     5.21     4     150.00    24.0
21667.97     2917.45      3981.84    0.95
 25      139.22    173.39    20.2     4.89     5.21     4     150.00    24.0
21246.97     2418.77      3901.93    0.95
 26      144.11    172.56    20.2     4.89     5.21     4     150.00    24.0
21230.89     1859.76      3887.74    0.95
 27      149.00     91.53    24.5     2.61     2.87     4     150.00    24.0
11299.97      767.75      3769.25    0.96
 28      151.62     76.29    24.5     2.20     2.41     3       0.00    15.0
9446.95      486.55      3973.02    1.01
 29      153.81    160.57    24.5     4.68     5.14     2       0.00    35.0
19915.63      553.02      3487.45    0.90
 30      158.49     44.50    28.7     1.31     1.50     2       0.00    35.0
5518.23       32.62      3303.52    0.90
 31      159.80    130.44    28.7     3.91     4.46     2       0.00    35.0
16174.70        0.00      3243.65    0.90
 32      163.72    127.14    28.7     3.91     4.46     2       0.00    35.0
15762.64        0.00      3161.00    0.90
 33      167.63    137.13    33.0     4.37     5.21     2       0.00    35.0
16995.97        0.00      2935.29    0.90
 34      172.00    131.09    33.0     4.37     5.21     2       0.00    35.0
16240.21        0.00      2804.77    0.90
 35      176.37    158.10    37.3     5.63     7.07     2       0.00    35.0
19575.20        0.00      2519.85    0.91
 36      182.00     70.21    37.3     2.67     3.35     5      75.00    28.0
8150.81        0.00      2339.13    0.98
 37      184.67     96.24    41.6     3.90     5.21     5      75.00    28.0
11137.35        0.00      2100.98    1.00
 38      188.57     87.82    41.6     3.90     5.21     5      75.00    28.0
10118.91        0.00      1905.61    1.00
 39      192.47     73.28    45.8     3.63     5.21     2       0.00    35.0
9011.04        0.00      1638.10    0.95
 40      196.10     64.10    45.8     3.63     5.21     2       0.00    35.0
7819.39        0.00      1421.47    0.95
 41      199.74     48.39    50.1     3.34     5.21     2       0.00    35.0
5848.56        0.00      1094.71    0.98
 42      203.08     35.02    50.1     3.34     5.21     2       0.00    35.0
4177.00        0.00       781.84    0.98
 43      206.42     12.83    54.4     1.77     3.04     2       0.00    35.0
1497.04        0.00       497.70    1.01
 44      208.20      8.55    54.4     1.80     3.09     1      50.00    28.0
983.38        0.00       324.17    1.12
 45      210.00      4.36    54.4     2.50     4.29     1      50.00    28.0
501.12        0.00        98.55    1.12
                --------                  -------                          -------
---
     X-S Area:    4174.50    Path Length:    198.08              X-S Weight:
505768.31
```



Project Hunt/J2
OB in slope seismic full reservoir

File: J:\Hunt Farms-306\J2 stability\20ft offset seismic full.gmf

Material Keys

1: overburden
2: sand and gravel
3: weathered claystone
4: claystone
5: compacted overburden
6: slurry wall

Analysis 1

Multiple Stability Analysis
Method: Bishop Simplified
Surface: Circular

Results

Critical Factor of Safety: 1.27

Edited: 14 Sep 2022 *Processed:*14 Sep 2022

Civil Resources

GALENA 7.2 Analysis Results Version: 7.2.1.03 Licensee: Civil Resources

---

Project: Hunt/J2
File: J:\Hunt Farms-306\J2 stability\20ft offset seismic full.gmf
Processed: 14 Sep 2022 09:45:04

DATA: Analysis 1 - OB in slope seismic full reservoir

Material Properties (6 materials)

Material: 1 (Mohr-Coulomb Isotropic) - overburden
Cohesion Phi UnitWeight Ru
50.00 28.0 115.00 Auto
Material: 2 (Mohr-Coulomb Isotropic) - sand and gravel
Cohesion Phi UnitWeight Ru
0.00 35.0 125.00 Auto
Material: 3 (Mohr-Coulomb Isotropic) - weathered claystone
Cohesion Phi UnitWeight Ru
0.00 15.0 110.00 Auto
Material: 4 (Mohr-Coulomb Isotropic) - claystone
Cohesion Phi UnitWeight Ru
150.00 24.0 115.00 Auto
Material: 5 (Mohr-Coulomb Isotropic) - compacted overburden
Cohesion Phi UnitWeight Ru
75.00 28.0 115.00 Auto
Material: 6 (Mohr-Coulomb Isotropic) - slurry wall
Cohesion Phi UnitWeight Ru
0.00 0.0 110.00 Auto

Water Properties

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

Material Profiles (6 profiles)

Profile: 1 (4 points) Material beneath: 1 - overburden
0.00 50.00 228.00 50.00 231.00 50.00 300.00 50.00
Profile: 2 (4 points) Material beneath: 2 - sand and gravel
0.00 44.00 228.00 44.00 231.00 44.00 300.00 44.00
Profile: 3 (4 points) Material beneath: 3 - weathered claystone
0.00 0.00 228.00 0.00 231.00 0.00 300.00 0.00
Profile: 4 (4 points) Material beneath: 4 - claystone
0.00 -1.00 228.00 -1.00 231.00 -1.00 300.00 -1.00
Profile: 5 (5 points) Material within: 5 - compacted overburden
200.00 50.00 110.00 20.00 120.00 20.00 210.00 50.00 200.00 50.00
Profile: 6 (2 points) Material beneath: 6 - slurry wall
228.00 50.00 231.00 50.00

Slope Surface (4 points)

0.00 0.00 50.00 0.00 200.00 50.00 300.00 50.00

Phreatic Surface (4 points)

0.00	48.00	228.00	48.00	231.00	45.00
300.00	46.00				

Failure Surface

Initial circular surface for critical search defined by: XL,XR,R
Intersects: XL: 50.00 YL: 0.00 XR: 200.00 YR: 50.00
Centre: XC: 84.69 YC: 145.93 Radius: R: 150.00

Earthquake Force

Pseudo-static earthquake (seismic) coefficient: 0.084

Variable Restraints

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

- -

RESULTS: Analysis 1 - OB in slope seismic full reservoir

Bishop Simplified Method of Analysis - Circular Failure Surface
----

Critical Failure Surface Search using Multiple Circle Generation Techniques

Initial failure surface approximation - Factor of Safety: 1.406

Analysis Summary
================

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

Critical (minimum) Factor of Safety: 1.27
==

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	
1	54.17	1.39	187.50	45.83	80.12	145.74	146.67	1.269	<-- Critical Surface
2	54.17	1.39	190.28	46.76	80.96	147.85	148.89	1.271	
3	54.17	1.39	193.06	47.69	81.01	152.36	153.33	1.275	
4	54.17	1.39	198.61	49.54	81.89	158.97	160.00	1.280	
5	56.94	2.31	204.17	50.00	88.97	154.54	155.56	1.281	
6	54.17	1.39	190.28	46.76	80.16	150.25	151.11	1.281	
7	54.17	1.39	195.83	48.61	81.05	156.86	157.78	1.286	
8	56.94	2.31	193.06	47.69	86.98	139.05	140.00	1.286	
9	56.94	2.31	198.61	49.54	87.86	145.69	146.67	1.287	

10	54.17	1.39	187.50	45.83	79.32	148.14	148.89	1.288
11	56.94	2.31	201.39	50.00	88.23	150.15	151.11	1.288
12	54.17	1.39	193.06	47.69	80.21	154.75	155.56	1.293
13	59.72	3.24	209.72	50.00	95.53	152.33	153.33	1.295
14	59.72	3.24	206.94	50.00	94.80	147.94	148.89	1.298
15	54.17	1.39	195.83	48.61	80.25	159.25	160.00	1.303
16	56.94	2.31	204.17	50.00	88.19	156.97	157.78	1.303
17	56.94	2.31	195.83	48.61	87.01	143.60	144.44	1.304
18	54.17	1.39	190.28	46.76	79.37	152.64	153.33	1.304
19	59.72	3.24	204.17	50.00	94.10	143.54	144.44	1.305
20	59.72	3.24	201.39	50.00	93.42	139.12	140.00	1.305
21	56.94	2.31	206.94	50.00	89.74	158.92	160.00	1.306
22	54.17	1.39	187.50	45.83	78.53	150.52	151.11	1.309
23	56.94	2.31	195.83	48.61	87.83	141.14	142.22	1.312
24	54.17	1.39	193.06	47.69	79.41	157.13	157.78	1.312
25	62.50	4.17	209.72	50.00	100.59	141.19	142.22	1.313
26	62.50	4.17	212.50	50.00	101.28	145.61	146.67	1.314
27	56.94	2.31	201.39	50.00	87.43	152.59	153.33	1.315
28	56.94	2.31	198.61	49.54	87.04	148.13	148.89	1.316
29	56.94	2.31	193.06	47.69	86.17	141.50	142.22	1.316
30	59.72	3.24	212.50	50.00	96.29	156.72	157.78	1.316
31	54.17	1.39	187.50	45.83	80.93	143.33	144.44	1.316
32	59.72	3.24	212.50	50.00	95.54	159.18	160.00	1.320
33	54.17	1.39	190.28	46.76	78.57	155.02	155.56	1.325
34	59.72	3.24	209.72	50.00	94.77	154.80	155.56	1.325
35	56.94	2.31	204.17	50.00	87.40	159.39	160.00	1.326
36	54.17	1.39	195.83	48.61	81.85	154.46	155.56	1.327
37	56.94	2.31	190.28	46.76	85.32	139.41	140.00	1.327
38	56.94	2.31	195.83	48.61	86.20	146.03	146.67	1.331
39	59.72	3.24	206.94	50.00	94.02	150.41	151.11	1.333
40	54.17	1.39	193.06	47.69	81.81	149.95	151.11	1.333

41	51.39	0.46	187.50	45.83	74.22	158.83	160.00	1.335
42	54.17	1.39	190.28	46.76	81.77	145.43	146.67	1.337
43	54.17	1.39	187.50	45.83	77.74	152.90	153.33	1.337
44	56.94	2.31	201.39	50.00	86.63	155.01	155.56	1.338
45	54.17	1.39	193.06	47.69	78.62	159.51	160.00	1.338
46	56.94	2.31	198.61	49.54	86.23	150.56	151.11	1.340
47	59.72	3.24	204.17	50.00	93.29	146.01	146.67	1.341
48	54.17	1.39	198.61	49.54	82.69	156.57	157.78	1.343
49	62.50	4.17	209.72	50.00	99.80	143.71	144.44	1.344
50	62.50	4.17	212.50	50.00	100.52	148.12	148.89	1.345
51	56.94	2.31	193.06	47.69	85.35	143.94	144.44	1.345
52	56.94	2.31	201.39	50.00	89.04	147.70	148.89	1.345
53	59.72	3.24	201.39	50.00	92.60	141.61	142.22	1.348
54	54.17	1.39	190.28	46.76	77.78	157.39	157.78	1.349
55	56.94	2.31	204.17	50.00	89.76	152.09	153.33	1.350
56	59.72	3.24	204.17	50.00	94.90	141.04	142.22	1.350
57	54.17	1.39	187.50	45.83	81.73	140.91	142.22	1.350
58	62.50	4.17	206.94	50.00	99.12	139.29	140.00	1.350
59	54.17	1.39	195.83	48.61	82.65	152.05	153.33	1.350
60	51.39	0.46	187.50	45.83	75.01	156.46	157.78	1.353
61	56.94	2.31	198.61	49.54	88.68	143.23	144.44	1.354
62	59.72	3.24	206.94	50.00	95.59	145.45	146.67	1.355
63	54.17	1.39	201.39	50.00	83.89	158.60	160.00	1.359
64	54.17	1.39	193.06	47.69	82.61	147.54	148.89	1.360
65	54.17	1.39	187.50	45.83	76.95	155.27	155.56	1.361
66	59.72	3.24	209.72	50.00	96.31	149.86	151.11	1.361
67	59.72	3.24	209.72	50.00	94.00	157.25	157.78	1.361
68	56.94	2.31	206.94	50.00	90.51	156.48	157.78	1.362
69	56.94	2.31	195.83	48.61	85.39	148.46	148.89	1.362
70	51.39	0.46	187.50	45.83	75.80	154.09	155.56	1.363
71	51.39	0.46	190.28	46.76	75.84	158.58	160.00	1.364

72	56.94	2.31	190.28	46.76	84.51	141.84	142.22	1.364
73	54.17	1.39	198.61	49.54	83.49	154.16	155.56	1.364
74	54.17	1.39	190.28	46.76	82.58	143.01	144.44	1.364
75	59.72	3.24	206.94	50.00	93.24	152.87	153.33	1.369
76	54.17	1.39	187.50	45.83	82.54	138.48	140.00	1.369
77	56.94	2.31	204.17	50.00	90.56	149.64	151.11	1.369
78	59.72	3.24	212.50	50.00	97.05	154.25	155.56	1.370
79	56.94	2.31	206.94	50.00	91.29	154.03	155.56	1.370
80	56.94	2.31	201.39	50.00	89.85	145.24	146.67	1.373
81	56.94	2.31	195.83	48.61	88.65	138.68	140.00	1.373
82	56.94	2.31	209.72	50.00	92.05	158.42	160.00	1.373
83	54.17	1.39	195.83	48.61	83.46	149.63	151.11	1.374
84	54.17	1.39	190.28	46.76	77.00	159.75	160.00	1.374
85	51.39	0.46	190.28	46.76	76.63	156.21	157.78	1.374
86	54.17	1.39	201.39	50.00	84.69	156.19	157.78	1.378
87	59.72	3.24	204.17	50.00	92.50	148.48	148.89	1.378
88	56.94	2.31	201.39	50.00	85.83	157.43	157.78	1.378
89	54.17	1.39	193.06	47.69	83.42	145.11	146.67	1.379
90	56.94	2.31	198.61	49.54	89.50	140.76	142.22	1.379
91	51.39	0.46	187.50	45.83	76.59	151.71	153.33	1.380
92	56.94	2.31	198.61	49.54	85.43	152.98	153.33	1.381
93	56.94	2.31	204.17	50.00	91.36	147.17	148.89	1.382
94	54.17	1.39	190.28	46.76	83.39	140.58	142.22	1.382
95	54.17	1.39	204.17	50.00	86.24	158.14	160.00	1.382
96	56.94	2.31	206.94	50.00	92.08	151.57	153.33	1.382
97	59.72	3.24	206.94	50.00	96.38	142.96	144.44	1.382
98	54.17	1.39	198.61	49.54	84.30	151.73	153.33	1.383
99	59.72	3.24	204.17	50.00	95.72	138.53	140.00	1.383

Critical Failure Surface (circle 1)

Intersects: XL: 54.17 YL: 1.39 XR: 187.50 YR: 45.83

Centre: XC: 80.12 YC: 145.74 Radius: R: 146.67

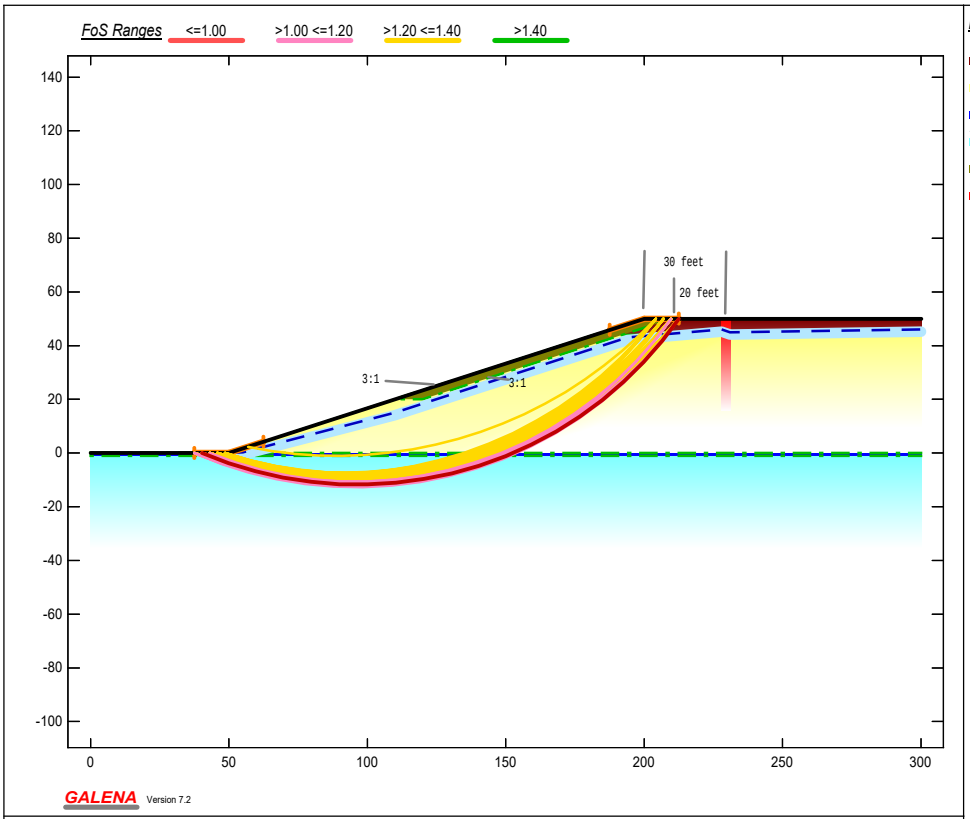
Generated failure surface: (20 points)

54.17	1.39	61.79	0.22	69.47	-0.54	77.17	-0.90
84.89	-0.85	92.59	-0.40	100.25	0.46	107.86	1.72
115.39	3.38	122.83	5.43	130.15	7.87	137.33	10.69
144.35	13.88	151.19	17.44	157.84	21.35	164.27	25.61
170.47	30.20	176.42	35.11	182.10	40.33	187.50	45.83

Slice Geometry and Properties - Critical Failure Surface (circle 1, 42 slices)

Slice	X-S	Base						PoreWater	Normal	Test
	X-Left	Area	Angle	Width	Length	Matl	Cohesion	Phi	Weight	Force	Stress	Factor
1	54.17	3.53	-8.7	3.81	3.86	2	0.00	35.0	441.59	11287.29	2990.06	1.10
2	57.98	10.60	-8.7	3.81	3.86	2	0.00	35.0	1324.78	11427.47	3153.10	1.10
3	61.79	9.45	-5.7	2.25	2.26	2	0.00	35.0	1181.59	6767.92	3266.00	1.06
4	64.05	14.28	-5.7	2.71	2.72	3	0.00	15.0	1779.70	8182.43	3338.40	1.03
5	66.76	17.46	-5.7	2.71	2.72	3	0.00	15.0	2166.20	8228.19	3426.08	1.03
6	69.47	29.89	-2.7	3.85	3.86	3	0.00	15.0	3700.23	11702.57	3515.42	1.01
7	73.32	35.53	-2.7	3.85	3.86	3	0.00	15.0	4394.46	11745.62	3616.38	1.01
8	77.17	40.82	0.4	3.86	3.86	3	0.00	15.0	5051.43	11764.32	3698.90	1.00
9	81.03	45.69	0.4	3.86	3.86	3	0.00	15.0	5661.03	11758.56	3776.65	1.00
10	84.89	50.07	3.4	3.85	3.86	3	0.00	15.0	6216.50	11728.47	3834.38	0.99
11	88.74	54.14	3.4	3.85	3.86	3	0.00	15.0	6738.15	11673.93	3888.94	0.99
12	92.59	53.05	6.4	3.54	3.56	3	0.00	15.0	6620.84	10715.25	3920.95	0.98
13	96.13	65.30	6.4	4.12	4.15	2	0.00	35.0	8162.83	12371.61	3914.29	0.95
14	100.25	63.19	9.4	3.80	3.86	2	0.00	35.0	7899.14	11364.66	3899.47	0.93
15	104.06	65.62	9.4	3.80	3.86	2	0.00	35.0	8202.95	11213.14	3896.83	0.93
16	107.86	37.85	12.4	2.14	2.19	2	0.00	35.0	4730.87	6294.84	3860.54	0.91
17	110.00	48.44	12.4	2.70	2.76	2	0.00	35.0	6042.56	7841.68	3838.63	0.91
18	112.70	49.26	12.4	2.70	2.76	2	0.00	35.0	6121.34	7739.46	3810.65	0.91
19	115.39	42.58	15.4	2.30	2.39	2	0.00	35.0	5272.22	6605.58	3750.03	0.90
20	117.70	42.88	15.4	2.30	2.39	2	0.00	35.0	5292.67	6510.85	3710.92	0.90
21	120.00	53.09	15.4	2.83	2.93	2	0.00	35.0	6541.80	7867.08	3671.42	0.90
22	122.83	68.96	18.4	3.66	3.86	2	0.00	35.0	8497.83	10098.20	3586.78	0.89
23	126.49	68.96	18.4	3.66	3.86	2	0.00	35.0	8497.80	9804.71	3510.68	0.89

```
 24      130.15     67.27    21.4     3.59     3.86     2       0.00    35.0
8289.20     9488.28      3396.98    0.88
 25      133.74     66.50    21.4     3.59     3.86     2       0.00    35.0
8193.33     9148.90      3297.99    0.88
 26      137.33     63.91    24.5     3.51     3.86     2       0.00    35.0
7872.22     8787.06      3162.80    0.88
 27      140.84     62.42    24.5     3.51     3.86     2       0.00    35.0
7684.91     8402.73      3041.78    0.88
 28      144.35     59.01    27.5     3.42     3.86     2       0.00    35.0
7262.60     7996.45      2886.44    0.88
 29      147.77     56.83    27.5     3.42     3.86     2       0.00    35.0
6989.36     7568.24      2744.33    0.88
 30      151.19     52.72    30.5     3.32     3.86     2       0.00    35.0
6479.60     7118.70      2570.22    0.88
 31      154.51     49.90    30.5     3.32     3.86     2       0.00    35.0
6126.92     6647.80      2408.01    0.88
 32      157.84     45.22    33.5     3.22     3.86     2       0.00    35.0
5545.69     6156.12      2216.62    0.88
 33      161.05     41.82    33.5     3.22     3.86     2       0.00    35.0
5120.89     5643.86      2035.33    0.88
 34      164.27     36.72    36.5     3.10     3.86     2       0.00    35.0
4486.50     5111.62      1828.21    0.88
 35      167.37     32.81    36.5     3.10     3.86     2       0.00    35.0
3997.64     4559.32      1628.94    0.88
 36      170.47     27.43    39.5     2.97     3.86     2       0.00    35.0
3329.95     3987.85      1407.79    0.89
 37      173.44     23.08    39.5     2.97     3.86     2       0.00    35.0
2785.90     3397.10      1191.68    0.89
 38      176.42     17.34    42.5     2.79     3.79     2       0.00    35.0
2074.74     2744.67       960.32    0.90
 39      179.21     12.79    42.5     2.79     3.79     2       0.00    35.0
1505.35     2138.84       732.65    0.90
 40      182.00      2.29    45.1     0.64     0.91     5      75.00    28.0
283.57      423.42       577.20    1.00
 41      182.64      6.99    45.6     3.06     4.37     2       0.00    35.0
851.04     1515.54       433.76    0.91
 42      185.70      1.11    45.6     1.80     2.57     5      75.00    28.0
127.58      494.06       172.91    1.00
                --------                  -------                          -------
---
     X-S Area:    1696.82    Path Length:    146.55              X-S Weight:
209545.53
```



Material Keys

1: overburden
2: sand and gravel
3: weathered claystone
4: claystone
5: compacted overburden
6: slurry wall

Analysis 1

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular

Results

Critical Factor of Safety: 1.20

Project Hunt/J2

OB in slope rapid drawdown

File: J:\Hunt Farms-306\J2 stability\20ftoffsetrapiddrawdown.gmf

Edited: 14 Sep 2022 *Processed:*14 Sep 2022

Civil Resources

GALENA 7.2 Analysis Results Version: 7.2.1.03 Licensee: Civil Resources

---

Project: Hunt/J2
File: J:\Hunt Farms-306\J2 stability\20ftoffsetrapiddrawdown.gmf
Processed: 14 Sep 2022 09:17:02

DATA: Analysis 1 - OB in slope rapid drawdown

Material Properties (6 materials)

Material: 1 (Mohr-Coulomb Isotropic) - overburden
Cohesion Phi UnitWeight Ru
50.00 28.0 115.00 Auto
Material: 2 (Mohr-Coulomb Isotropic) - sand and gravel
Cohesion Phi UnitWeight Ru
0.00 35.0 125.00 Auto
Material: 3 (Mohr-Coulomb Isotropic) - weathered claystone
Cohesion Phi UnitWeight Ru
0.00 15.0 110.00 Auto
Material: 4 (Mohr-Coulomb Isotropic) - claystone
Cohesion Phi UnitWeight Ru
150.00 24.0 115.00 Auto
Material: 5 (Mohr-Coulomb Isotropic) - compacted overburden
Cohesion Phi UnitWeight Ru
75.00 28.0 115.00 Auto
Material: 6 (Mohr-Coulomb Isotropic) - slurry wall
Cohesion Phi UnitWeight Ru
0.00 0.0 110.00 Auto

Water Properties

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

Material Profiles (6 profiles)

Profile: 1 (4 points) Material beneath: 1 - overburden
0.00 50.00 228.00 50.00 231.00 50.00 300.00 50.00
Profile: 2 (4 points) Material beneath: 2 - sand and gravel
0.00 44.00 228.00 44.00 231.00 44.00 300.00 44.00
Profile: 3 (4 points) Material beneath: 3 - weathered claystone
0.00 0.00 228.00 0.00 231.00 0.00 300.00 0.00
Profile: 4 (4 points) Material beneath: 4 - claystone
0.00 -1.00 228.00 -1.00 231.00 -1.00 300.00 -1.00
Profile: 5 (5 points) Material within: 5 - compacted overburden
200.00 50.00 110.00 20.00 120.00 20.00 210.00 50.00 200.00 50.00
Profile: 6 (2 points) Material beneath: 6 - slurry wall
228.00 50.00 231.00 50.00

Slope Surface (4 points)

0.00 0.00 50.00 0.00 200.00 50.00 300.00 50.00

Phreatic Surface (7 points)

50.00 0.00 55.00 0.25 110.00 15.00
194.00 43.00 228.00 46.00
231.00 45.00 300.00 46.00

Failure Surface

Initial circular surface for critical search defined by: XL,XR,R
Intersects: XL: 50.00 YL: 0.00 XR: 200.00 YR: 50.00
Centre: XC: 84.69 YC: 145.93 Radius: R: 150.00

Variable Restraints

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

- -

RESULTS: Analysis 1 - OB in slope rapid drawdown

Bishop Simplified Method of Analysis - Circular Failure Surface
----

Critical Failure Surface Search using Multiple Circle Generation Techniques

Initial failure surface approximation - Factor of Safety: 1.277

Analysis Summary
================

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

Critical (minimum) Factor of Safety: 1.20
==

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	
1	40.28	0.00	212.50	50.00	96.41	128.25	140.00	1.197	<-- Critical Surface
2	37.50	0.00	212.50	50.00	95.77	127.30	140.00	1.197	
3	37.50	0.00	209.72	50.00	93.63	128.25	140.00	1.198	
4	37.50	0.00	212.50	50.00	94.97	130.09	142.22	1.199	
5	40.28	0.00	212.50	50.00	95.61	131.02	142.22	1.199	
6	40.28	0.00	212.50	50.00	94.82	133.75	144.44	1.200	
7	40.28	0.00	209.72	50.00	94.26	129.17	140.00	1.200	
8	43.06	0.00	212.50	50.00	97.04	129.17	140.00	1.200	
9	37.50	0.00	209.72	50.00	92.83	131.02	142.22	1.200	
10	37.50	0.00	212.50	50.00	94.18	132.86	144.44	1.201	

11	40.28	0.00	209.72	50.00	93.45	131.91	142.22	1.201
12	37.50	0.00	209.72	50.00	92.04	133.75	144.44	1.201
13	37.50	0.00	212.50	50.00	93.40	135.60	146.67	1.201
14	43.06	0.00	212.50	50.00	96.23	131.91	142.22	1.202
15	40.28	0.00	212.50	50.00	94.03	136.46	146.67	1.203
16	37.50	0.00	212.50	50.00	92.63	138.31	148.89	1.203
17	37.50	0.00	206.94	50.00	91.48	129.17	140.00	1.203
18	43.06	0.00	209.72	50.00	94.87	130.06	140.00	1.204
19	40.28	0.00	209.72	50.00	92.66	134.61	144.44	1.205
20	40.28	0.00	206.94	50.00	92.09	130.06	140.00	1.205
21	37.50	0.00	209.72	50.00	91.25	136.46	146.67	1.205
22	43.06	0.00	212.50	50.00	95.43	134.61	144.44	1.205
23	45.83	0.00	212.50	50.00	97.65	130.06	140.00	1.205
24	37.50	0.00	206.94	50.00	90.68	131.91	142.22	1.206
25	40.28	0.00	212.50	50.00	93.25	139.15	148.89	1.207
26	43.06	0.00	209.72	50.00	94.06	132.76	142.22	1.207
27	37.50	0.00	212.50	50.00	91.86	141.00	151.11	1.207
28	40.28	0.00	209.72	50.00	91.86	137.30	146.67	1.208
29	43.06	0.00	212.50	50.00	94.64	137.30	146.67	1.208
30	45.83	0.00	212.50	50.00	96.84	132.76	142.22	1.208
31	37.50	0.00	209.72	50.00	90.47	139.15	148.89	1.209
32	40.28	0.00	206.94	50.00	91.28	132.76	142.22	1.209
33	43.06	0.00	209.72	50.00	93.26	135.44	144.44	1.210
34	37.50	0.00	206.94	50.00	89.88	134.61	144.44	1.210
35	43.06	0.00	206.94	50.00	92.69	130.91	140.00	1.210
36	45.83	0.00	209.72	50.00	95.47	130.91	140.00	1.210
37	40.28	0.00	212.50	50.00	92.48	141.81	151.11	1.211
38	37.50	0.00	212.50	50.00	91.10	143.66	153.33	1.211
39	37.50	0.00	204.17	50.00	89.32	130.06	140.00	1.211
40	45.83	0.00	212.50	50.00	96.03	135.44	144.44	1.212
41	43.06	0.00	212.50	50.00	93.86	139.95	148.89	1.212

42	40.28	0.00	209.72	50.00	91.08	139.95	148.89	1.212
43	40.28	0.00	206.94	50.00	90.48	135.44	144.44	1.212
44	43.06	0.00	209.72	50.00	92.46	138.10	146.67	1.213
45	37.50	0.00	209.72	50.00	89.70	141.81	151.11	1.213
46	45.83	0.00	209.72	50.00	94.65	133.58	142.22	1.213
47	43.06	0.00	206.94	50.00	91.87	133.58	142.22	1.213
48	37.50	0.00	206.94	50.00	89.09	137.30	146.67	1.214
49	48.61	0.00	212.50	50.00	98.25	130.91	140.00	1.214
50	40.28	0.00	204.17	50.00	89.91	130.91	140.00	1.214
51	40.28	0.00	212.50	50.00	91.71	144.45	153.33	1.214
52	45.83	0.00	212.50	50.00	95.24	138.10	146.67	1.214
53	45.83	0.00	206.94	50.00	93.27	131.72	140.00	1.215
54	43.06	0.00	209.72	50.00	91.67	140.73	148.89	1.215
55	43.06	0.00	212.50	50.00	93.08	142.59	151.11	1.215
56	45.83	0.00	209.72	50.00	93.84	136.23	144.44	1.215
57	37.50	0.00	212.50	50.00	90.34	146.31	155.56	1.215
58	40.28	0.00	209.72	50.00	90.30	142.59	151.11	1.215
59	37.50	0.00	204.17	50.00	88.50	132.76	142.22	1.215
60	43.06	0.00	206.94	50.00	91.06	136.23	144.44	1.215
61	40.28	0.00	206.94	50.00	89.68	138.10	146.67	1.216
62	45.83	0.00	212.50	50.00	94.45	140.73	148.89	1.216
63	48.61	0.00	212.50	50.00	97.43	133.58	142.22	1.216
64	45.83	0.00	206.94	50.00	92.45	134.37	142.22	1.217
65	48.61	0.00	209.72	50.00	96.05	131.72	140.00	1.217
66	37.50	0.00	209.72	50.00	88.93	144.45	153.33	1.217
67	43.06	0.00	204.17	50.00	90.49	131.72	140.00	1.217
68	45.83	0.00	209.72	50.00	93.04	138.86	146.67	1.217
69	43.06	0.00	212.50	50.00	92.31	145.21	153.33	1.217
70	40.28	0.00	209.72	50.00	89.53	145.21	153.33	1.218
71	40.28	0.00	204.17	50.00	89.10	133.58	142.22	1.218
72	43.06	0.00	209.72	50.00	90.89	143.34	151.11	1.218

73	48.61	0.00	212.50	50.00	96.62	136.23	144.44 1.218
74	37.50	0.00	206.94	50.00	88.30	139.95	148.89 1.218
75	40.28	0.00	212.50	50.00	90.95	147.07	155.56 1.218
76	43.06	0.00	206.94	50.00	90.26	138.86	146.67 1.218
77	48.61	0.00	209.72	50.00	95.23	134.37	142.22 1.218
78	40.28	0.00	206.94	50.00	88.89	140.73	148.89 1.219
79	45.83	0.00	212.50	50.00	93.66	143.34	151.11 1.219
80	37.50	0.00	212.50	50.00	89.59	148.93	157.78 1.219
81	43.06	0.00	204.17	50.00	89.67	134.37	142.22 1.219
82	37.50	0.00	204.17	50.00	87.70	135.44	144.44 1.220
83	48.61	0.00	212.50	50.00	95.82	138.86	146.67 1.220
84	40.28	0.00	204.17	50.00	88.29	136.23	144.44 1.220
85	43.06	0.00	212.50	50.00	91.54	147.81	155.56 1.220
86	40.28	0.00	212.50	50.00	90.19	149.67	157.78 1.220
87	37.50	0.00	209.72	50.00	88.17	147.07	155.56 1.221
88	37.50	0.00	206.94	50.00	87.52	142.59	151.11 1.221
89	56.94	2.31	204.17	50.00	88.97	154.54	155.56 1.221
90	40.28	0.00	209.72	50.00	88.76	147.81	155.56 1.221
91	45.83	0.00	209.72	50.00	92.24	141.47	148.89 1.221
92	45.83	0.00	206.94	50.00	91.63	136.99	144.44 1.221
93	40.28	0.00	206.94	50.00	88.11	143.34	151.11 1.222
94	48.61	0.00	206.94	50.00	93.83	132.50	140.00 1.222
95	45.83	0.00	204.17	50.00	91.05	132.50	140.00 1.223
96	48.61	0.00	209.72	50.00	94.41	136.99	144.44 1.223
97	43.06	0.00	209.72	50.00	90.11	145.94	153.33 1.223
98	37.50	0.00	212.50	50.00	88.85	151.54	160.00 1.223
99	40.28	0.00	204.17	50.00	87.48	138.86	146.67 1.223

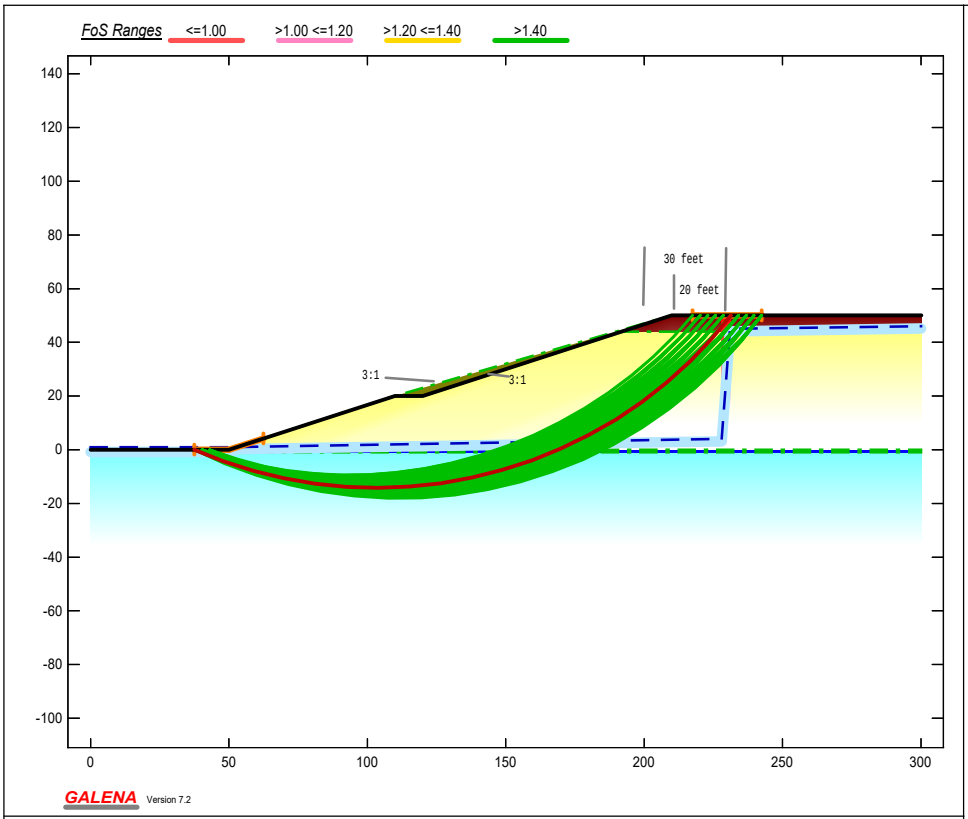
Critical Failure Surface (circle 1)

Intersects: XL: 40.28 YL: 0.00 XR: 212.50 YR: 50.00
Centre: XC: 96.41 YC: 128.25 Radius: R: 140.00
Generated failure surface: (20 points)

```
     40.28      0.00           49.80     -3.76           59.58     -6.81
69.55     -9.15           79.67    -10.74
     89.87    -11.59          100.12    -11.70          110.34    -11.05
120.48     -9.66          130.50     -7.53
    140.34     -4.68          149.94     -1.11          159.25      3.15
168.23      8.08          176.82     13.65
    184.99     19.83          192.67     26.60          199.85     33.91
206.47     41.72          212.50     50.00

Slice Geometry and Properties - Critical Failure Surface (circle 1,  42 slices)
-----------------------------------------------------------
Slice                X-S     ------------------- Base ---------------------
PoreWater      Normal    Test
        X-Left      Area    Angle    Width    Length  Matl   Cohesion    Phi
Weight      Force         Stress   Factor
  1       40.28      1.27   -21.5     2.53     2.72     3       0.00    15.0
139.33        0.00         60.33    1.18
  2       42.81      5.91   -21.5     3.50     3.76     4     150.00    24.0
662.12        0.00        279.95    1.26
  3       46.31     10.74   -21.5     3.50     3.76     4     150.00    24.0
1217.12        0.00        466.00    1.26
  4       49.80     27.92   -17.3     5.20     5.44     4     150.00    24.0
3226.12     1593.90        708.33    1.19
  5       55.00     39.06   -17.3     4.58     4.80     4     150.00    24.0
4580.36     2084.76       1118.84    1.19
  6       59.58     56.95   -13.2     4.99     5.12     4     150.00    24.0
6725.26     3049.72       1452.56    1.12
  7       64.57     71.05   -13.2     4.99     5.12     4     150.00    24.0
8429.66     3849.48       1812.05    1.12
  8       69.55     85.51    -9.0     5.06     5.12     4     150.00    24.0
10180.82     4593.60       2103.27    1.08
  9       74.61     98.08    -9.0     5.06     5.12     4     150.00    24.0
11711.06     5282.04       2416.28    1.08
 10       79.67    110.71    -4.8     5.10     5.12     4     150.00    24.0
13254.14     5912.95       2654.36    1.04
 11       84.77    121.56    -4.8     5.10     5.12     4     150.00    24.0
14589.22     6486.39       2920.77    1.04
 12       89.87    131.93    -0.6     5.12     5.12     4     150.00    24.0
15870.63     7000.83       3107.23    1.00
 13       95.00    140.94    -0.6     5.12     5.12     4     150.00    24.0
16993.68     7456.21       3327.04    1.00
 14      100.12    143.67     3.6     4.94     4.95     4     150.00    24.0
17363.34     7586.95       3460.22    0.98
 15      105.06    150.27     3.6     4.94     4.95     4     150.00    24.0
18203.68     7900.08       3627.81    0.98
 16      110.00    157.95     7.5     5.00     5.04     4     150.00    24.0
19138.82     8367.88       3710.43    0.96
 17      115.00    162.85     7.8     5.00     5.05     4     150.00    24.0
19703.08     8682.44       3816.56    0.96
 18      120.00    175.46    11.6     5.25     5.36     4     150.00    24.0
21247.53     9504.94       3861.06    0.95
 19      125.25    178.79    12.0     5.25     5.37     4     150.00    24.0
21722.52     9730.71       3941.99    0.95
 20      130.50    169.53    16.2     4.92     5.12     4     150.00    24.0
20667.03     9417.60       3939.32    0.94
 21      135.42    170.57    16.2     4.92     5.12     4     150.00    24.0
20867.19     9485.16       3977.36    0.94
 22      140.34    166.56    20.4     4.80     5.12     4     150.00    24.0
20453.93     9489.61       3927.78    0.94
 23      145.14    165.68    20.4     4.80     5.12     4     150.00    24.0
20429.44     9431.00       3921.92    0.94
 24      149.94     83.23    24.6     2.43     2.67     3       0.00    15.0
10302.41     4877.58       4018.06    1.00
```

```
 25      152.37    116.74    24.6     3.44     3.79     2       0.00    35.0
14477.66     6828.93      3698.41    0.87
 26      155.81    115.27    24.6     3.44     3.79     2       0.00    35.0
14294.04     6728.12      3650.71    0.87
 27      159.25    147.16    28.8     4.49     5.12     2       0.00    35.0
18245.84     8878.15      3498.07    0.86
 28      163.74    142.82    28.8     4.49     5.12     2       0.00    35.0
17702.64     8568.83      3391.80    0.86
 29      168.23    131.72    33.0     4.30     5.12     2       0.00    35.0
16321.40     8197.92      3194.23    0.86
 30      172.53    125.90    33.0     4.30     5.12     2       0.00    35.0
15594.31     7765.35      3048.33    0.86
 31      176.82    142.52    37.2     5.18     6.50     2       0.00    35.0
17642.30     9130.96      2792.66    0.87
 32      182.00     77.01    37.2     2.99     3.75     5      75.00    28.0
8940.88     4860.40      2531.80    0.94
 33      184.99     92.69    41.3     3.84     5.12     5      75.00    28.0
10724.95     6106.53      2301.18    0.96
 34      188.83     84.62    41.3     3.84     5.12     5      75.00    28.0
9746.74     5435.13      2081.40    0.96
 35      192.67     27.18    45.5     1.33     1.89     2       0.00    35.0
3347.09     1830.69      1943.49    0.89
 36      194.00     55.70    45.5     2.92     4.17     2       0.00    35.0
6831.21     3566.08      1782.67    0.89
 37      196.92     49.84    45.5     2.92     4.17     2       0.00    35.0
6069.95     2857.16      1556.14    0.89
 38      199.85     46.80    49.7     3.31     5.12     2       0.00    35.0
5651.17     2492.34      1208.68    0.92
 39      203.16     33.87    49.7     3.31     5.12     2       0.00    35.0
4034.54     1337.21       827.64    0.92
 40      206.47     11.85    53.9     1.66     2.82     2       0.00    35.0
1381.08      230.67       498.12    0.94
 41      208.13      8.83    53.9     1.87     3.18     1      50.00    28.0
1015.15       0.00       301.27    1.05
 42      210.00      4.29    53.9     2.50     4.25     1      50.00    28.0
493.19        0.00       86.94    1.05
                --------                  -------                          -------
---
     X-S Area:    4040.94    Path Length:    194.59              X-S Weight:
490192.59
```



Material Keys

1: overburden
2: sand and gravel
3: weathered claystone
4: claystone
5: compacted overburden
6: slurry wall

Analysis 1

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular

Results

Critical Factor of Safety: 1.92

Project Hunt/J2

Mine slope static slurry wall stability empty

File: J:\Hunt Farms-306\J2 stability\sw stability 20ft offset static empty.gmf

Edited: 14 Sep 2022 *Processed:*14 Sep 2022

Civil Resources

GALENA 7.2 Analysis Results Version: 7.2.1.03 Licensee: Civil Resources

---

Project: Hunt/J2
File: J:\Hunt Farms-306\J2 stability\sw stability 20ft offset static empty.gmf
Processed: 14 Sep 2022 11:22:50

DATA: Analysis 1 - Mine slope static slurry wall stability empty

Material Properties (6 materials)

Material: 1 (Mohr-Coulomb Isotropic) - overburden
Cohesion Phi UnitWeight Ru
50.00 28.0 115.00 Auto
Material: 2 (Mohr-Coulomb Isotropic) - sand and gravel
Cohesion Phi UnitWeight Ru
0.00 35.0 125.00 Auto
Material: 3 (Mohr-Coulomb Isotropic) - weathered claystone
Cohesion Phi UnitWeight Ru
0.00 15.0 110.00 Auto
Material: 4 (Mohr-Coulomb Isotropic) - claystone
Cohesion Phi UnitWeight Ru
150.00 24.0 115.00 Auto
Material: 5 (Mohr-Coulomb Isotropic) - compacted overburden
Cohesion Phi UnitWeight Ru
75.00 28.0 115.00 Auto
Material: 6 (Mohr-Coulomb Isotropic) - slurry wall
Cohesion Phi UnitWeight Ru
0.00 0.0 110.00 Auto

Water Properties

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

Material Profiles (6 profiles)

Profile: 1 (4 points) Material beneath: 1 - overburden
0.00 50.00 228.00 50.00 231.00 50.00 300.00 50.00
Profile: 2 (4 points) Material beneath: 2 - sand and gravel
0.00 44.00 228.00 44.00 231.00 44.00 300.00 44.00
Profile: 3 (4 points) Material beneath: 3 - weathered claystone
0.00 0.00 228.00 0.00 231.00 0.00 300.00 0.00
Profile: 4 (4 points) Material beneath: 4 - claystone
0.00 -1.00 228.00 -1.00 231.00 -1.00 300.00 -1.00
Profile: 5 (5 points) Material within: 5 - compacted overburden
200.00 50.00 110.00 20.00 120.00 20.00 210.00 50.00 200.00 50.00
Profile: 6 (2 points) Material beneath: 6 - slurry wall
228.00 50.00 231.00 50.00

Slope Surface (6 points)

0.00 0.00 50.00 0.00 110.00 20.00 120.00 20.00 210.00 50.00 300.00 50.00

Phreatic Surface (5 points)

0.00 1.00 50.00 1.00 228.00 4.00
231.00 45.00 300.00 46.00

Failure Surface

Initial circular surface for critical search defined by: XL,XR,R
Intersects: XL: 50.00 YL: 0.00 XR: 230.00 YR: 50.00
Centre: XC: 101.98 YC: 161.86 Radius: R: 170.00

Variable Restraints

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

- -

RESULTS: Analysis 1 - Mine slope static slurry wall stability empty

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

Initial failure surface approximation - Factor of Safety: 2.064

Analysis Summary
===
There were: 1001 successful analyses from a total of 1001 trial failure surfaces

Critical (minimum) Factor of Safety: 1.92
===

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	
1	37.50	0.00	231.39	50.00	103.28	145.85	160.00	1.922	<-- Critical Surface
2	37.50	0.00	231.39	50.00	102.57	148.60	162.22	1.930	
3	37.50	0.00	234.17	50.00	105.35	144.90	160.00	1.930	
4	37.50	0.00	239.72	50.00	109.46	142.91	160.00	1.932	
5	37.50	0.00	239.72	50.00	108.76	145.73	162.22	1.934	
6	37.50	0.00	234.17	50.00	104.65	147.67	162.22	1.934	
7	37.50	0.00	225.83	50.00	99.10	147.67	160.00	1.935	
8	37.50	0.00	228.61	50.00	101.20	146.77	160.00	1.937	
9	37.50	0.00	231.39	50.00	101.87	151.32	164.44	1.937	
10	37.50	0.00	236.94	50.00	107.41	143.92	160.00	1.941	

11	37.50	0.00	234.17	50.00	103.95	150.42	164.44	1.942
12	37.50	0.00	225.83	50.00	98.38	150.36	162.22	1.943
13	37.50	0.00	236.94	50.00	106.71	146.72	162.22	1.943
14	37.50	0.00	236.94	50.00	106.01	149.49	164.44	1.944
15	37.50	0.00	228.61	50.00	100.48	149.50	162.22	1.944
16	37.50	0.00	231.39	50.00	101.17	154.03	166.67	1.945
17	40.28	0.00	231.39	50.00	103.97	146.77	160.00	1.945
18	37.50	0.00	220.28	50.00	94.87	149.36	160.00	1.945
19	37.50	0.00	242.50	50.00	110.11	147.55	164.44	1.946
20	37.50	0.00	242.50	50.00	111.50	141.86	160.00	1.946
21	37.50	0.00	223.06	50.00	96.99	148.53	160.00	1.946
22	37.50	0.00	242.50	50.00	110.80	144.72	162.22	1.946
23	37.50	0.00	242.50	50.00	108.75	153.12	168.89	1.947
24	40.28	0.00	239.72	50.00	110.19	143.92	160.00	1.948
25	37.50	0.00	242.50	50.00	109.43	150.35	166.67	1.948
26	37.50	0.00	234.17	50.00	103.25	153.15	166.67	1.949
27	37.50	0.00	225.83	50.00	97.67	153.04	164.44	1.950
28	40.28	0.00	234.17	50.00	106.06	145.85	160.00	1.950
29	37.50	0.00	228.61	50.00	99.78	152.20	164.44	1.952
30	37.50	0.00	223.06	50.00	96.27	151.20	162.22	1.952
31	40.28	0.00	231.39	50.00	103.26	149.50	162.22	1.952
32	37.50	0.00	220.28	50.00	94.14	152.01	162.22	1.955
33	40.28	0.00	236.94	50.00	108.13	144.90	160.00	1.955
34	40.28	0.00	236.94	50.00	107.42	147.67	162.22	1.956
35	37.50	0.00	225.83	50.00	96.97	155.70	166.67	1.956
36	40.28	0.00	225.83	50.00	99.77	148.53	160.00	1.956
37	37.50	0.00	239.72	50.00	108.07	148.53	164.44	1.957
38	40.28	0.00	234.17	50.00	105.35	148.60	162.22	1.957
39	37.50	0.00	234.17	50.00	102.57	155.85	168.89	1.957
40	37.50	0.00	223.06	50.00	95.56	153.86	164.44	1.959
41	40.28	0.00	228.61	50.00	101.88	147.67	160.00	1.959

42	37.50	0.00	236.94	50.00	105.32	152.24	
166.67	1.959						
43	37.50	0.00	239.72	50.00	107.38	151.31	
166.67	1.959						
44	40.28	0.00	242.50	50.00	111.54	145.73	
162.22	1.959						
45	37.50	0.00	228.61	50.00	99.08	154.87	
166.67	1.960						
46	40.28	0.00	231.39	50.00	102.56	152.20	
164.44	1.960						
47	40.28	0.00	236.94	50.00	106.72	150.42	
164.44	1.960						
48	40.28	0.00	242.50	50.00	112.24	142.91	
160.00	1.961						
49	37.50	0.00	217.50	50.00	92.73	150.16	
160.00	1.961						
50	40.28	0.00	242.50	50.00	110.84	148.53	
164.44	1.962						
51	40.28	0.00	225.83	50.00	99.05	151.20	
162.22	1.962						
52	37.50	0.00	225.83	50.00	96.27	158.33	
168.89	1.962						
53	37.50	0.00	239.72	50.00	106.03	156.79	
171.11	1.963						
54	40.28	0.00	223.06	50.00	97.65	149.36	
160.00	1.964						
55	37.50	0.00	220.28	50.00	93.42	154.64	
164.44	1.964						
56	40.28	0.00	234.17	50.00	104.65	151.32	
164.44	1.964						
57	37.50	0.00	234.17	50.00	101.88	158.54	
171.11	1.965						
58	37.50	0.00	231.39	50.00	100.48	156.71	
168.89	1.966						
59	40.28	0.00	228.61	50.00	101.16	150.36	
162.22	1.966						
60	37.50	0.00	228.61	50.00	98.38	157.53	
168.89	1.967						
61	37.50	0.00	236.94	50.00	104.64	154.97	
168.89	1.967						
62	40.28	0.00	231.39	50.00	101.85	154.87	
166.67	1.967						
63	37.50	0.00	239.72	50.00	105.36	159.50	
173.33	1.968						
64	40.28	0.00	225.83	50.00	98.33	153.86	
164.44	1.968						
65	37.50	0.00	231.39	50.00	99.79	159.37	
171.11	1.968						
66	40.28	0.00	220.28	50.00	95.51	150.16	
160.00	1.969						
67	37.50	0.00	223.06	50.00	94.85	156.49	
166.67	1.969						
68	43.06	0.00	231.39	50.00	104.66	147.67	
160.00	1.969						
69	37.50	0.00	239.72	50.00	106.70	154.06	
168.89	1.969						
70	40.28	0.00	239.72	50.00	109.49	146.72	
162.22	1.970						
71	37.50	0.00	217.50	50.00	92.00	152.79	
162.22	1.971						
72	37.50	0.00	234.17	50.00	100.53	163.85	
175.56	1.971						

73	37.50	0.00	234.17	50.00	101.21	161.20	173.33	1.971
74	40.28	0.00	234.17	50.00	103.95	154.03	166.67	1.971
75	40.28	0.00	239.72	50.00	108.79	149.49	164.44	1.971
76	37.50	0.00	242.50	50.00	107.41	158.61	173.33	1.971
77	43.06	0.00	236.94	50.00	108.83	145.85	160.00	1.972
78	37.50	0.00	225.83	50.00	95.57	160.96	171.11	1.972
79	37.50	0.00	239.72	50.00	104.69	162.19	175.56	1.973
80	40.28	0.00	223.06	50.00	96.92	152.01	162.22	1.973
81	37.50	0.00	228.61	50.00	97.69	160.18	171.11	1.973
82	40.28	0.00	239.72	50.00	108.10	152.24	166.67	1.973
83	37.50	0.00	220.28	50.00	92.71	157.26	166.67	1.973
84	40.28	0.00	228.61	50.00	100.45	153.04	164.44	1.973
85	40.28	0.00	231.39	50.00	101.16	157.53	168.89	1.974
86	40.28	0.00	242.50	50.00	110.16	151.31	166.67	1.974
87	37.50	0.00	242.50	50.00	108.08	155.88	171.11	1.974
88	37.50	0.00	236.94	50.00	103.96	157.68	171.11	1.975
89	43.06	0.00	242.50	50.00	112.97	143.92	160.00	1.975
90	43.06	0.00	234.17	50.00	106.75	146.77	160.00	1.975
91	43.06	0.00	236.94	50.00	108.13	148.60	162.22	1.975
92	43.06	0.00	225.83	50.00	100.42	149.36	160.00	1.976
93	43.06	0.00	231.39	50.00	103.94	150.36	162.22	1.976
94	43.06	0.00	242.50	50.00	112.26	146.72	162.22	1.977
95	40.28	0.00	225.83	50.00	97.62	156.49	166.67	1.977
96	40.28	0.00	239.72	50.00	107.42	154.97	168.89	1.977
97	40.28	0.00	220.28	50.00	94.78	152.79	162.22	1.978
98	40.28	0.00	242.50	50.00	108.80	156.79	171.11	1.978
99	37.50	0.00	223.06	50.00	94.14	159.11	168.89	1.978

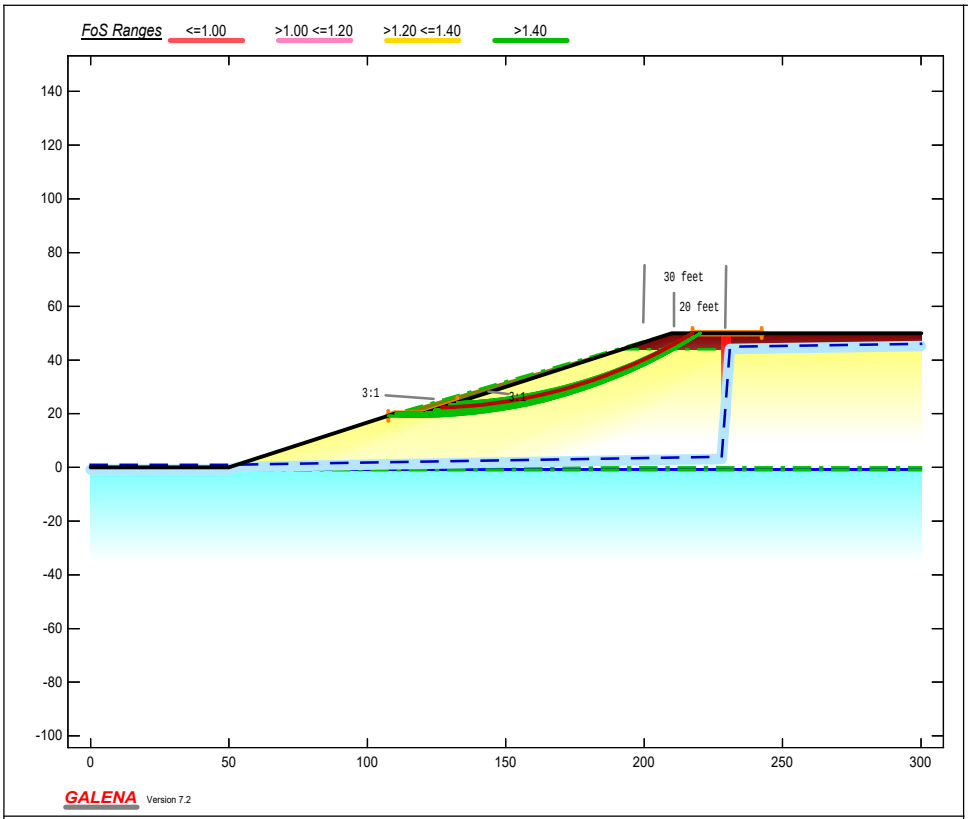
Critical Failure Surface (circle 1)

Intersects: XL: 37.50 YL: 0.00 XR: 231.39 YR: 50.00
Centre: XC: 103.28 YC: 145.85 Radius: R: 160.00
Generated failure surface: (20 points)

```
     37.50      0.00           48.04     -4.31           58.85     -7.86
69.90    -10.63           81.11    -12.60
     92.43    -13.78          103.81    -14.15          115.18    -13.70
126.50    -12.45          137.70    -10.40
    148.72     -7.56          159.51     -3.94          170.02      0.44
180.19      5.55          189.97     11.38
    199.32     17.88          208.17     25.03          216.50     32.80
224.25     41.13          231.39     50.00

Slice Geometry and Properties - Critical Failure Surface (circle 1,  46 slices)
-----------------------------------------------------------
Slice                X-S     ------------------- Base ---------------------
PoreWater      Normal    Test
        X-Left      Area    Angle    Width    Length  Matl   Cohesion    Phi
Weight      Force         Stress   Factor
  1       37.50      1.22   -22.2     2.45     2.64     3       0.00    15.0
134.53      247.34        118.84    1.15
  2       39.95      7.39   -22.2     4.05     4.37     4     150.00    24.0
829.78      771.01        312.28    1.19
  3       43.99     14.08   -22.2     4.05     4.37     4     150.00    24.0
1599.30     1222.11        511.59    1.19
  4       48.04      9.09   -18.2     1.96     2.07     4     150.00    24.0
1035.20      725.65        637.15    1.14
  5       50.00     18.95   -18.2     3.16     3.33     4     150.00    24.0
2179.82     1348.06        774.73    1.14
  6       53.16     50.82   -18.2     5.69     5.99     4     150.00    24.0
5929.78     3000.37       1113.48    1.14
  7       58.85     68.57   -14.1     5.52     5.69     4     150.00    24.0
8071.53     3460.85       1535.46    1.09
  8       64.38     86.37   -14.1     5.52     5.69     4     150.00    24.0
10220.78     3985.76       1943.09    1.09
  9       69.90    104.74   -10.0     5.61     5.69     4     150.00    24.0
12441.66     4440.63       2295.25    1.06
 10       75.50    120.76   -10.0     5.61     5.69     4     150.00    24.0
14388.26     4825.38       2654.44    1.06
 11       81.11    137.06    -5.9     5.66     5.69     4     150.00    24.0
16374.33     5139.04       2949.54    1.03
 12       86.77    151.07    -5.9     5.66     5.69     4     150.00    24.0
18092.52     5381.68       3259.45    1.03
 13       92.43    164.76    -1.8     5.69     5.69     4     150.00    24.0
19778.01     5552.68       3497.92    1.01
 14       98.12    176.60    -1.8     5.69     5.69     4     150.00    24.0
21246.71     5651.98       3757.90    1.01
 15      103.81    204.30     2.2     6.19     6.20     4     150.00    24.0
24637.94     6180.90       3949.29    0.99
 16      110.00    175.21     2.2     5.18     5.19     4     150.00    24.0
21160.13     5133.17       4051.85    0.99
 17      115.18    161.06     6.3     4.82     4.85     4     150.00    24.0
19461.43     4710.32       3955.30    0.98
 18      120.00    108.95     6.3     3.25     3.27     4     150.00    24.0
13180.58     3100.18       3970.74    0.98
 19      123.25    111.30     6.3     3.25     3.27     4     150.00    24.0
13486.29     3038.12       4062.01    0.98
 20      126.50    196.18    10.4     5.60     5.69     4     150.00    24.0
23825.58     5070.76       4104.80    0.98
 21      132.10    200.88    10.4     5.60     5.69     4     150.00    24.0
24471.22     4739.92       4213.05    0.98
 22      137.70    201.22    14.5     5.51     5.69     4     150.00    24.0
24590.48     4338.55       4234.05    0.97
 23      143.21    203.51    14.5     5.51     5.69     4     150.00    24.0
24955.32     3866.72       4291.84    0.97
 24      148.72    200.36    18.5     5.40     5.69     4     150.00    24.0
24658.49     3325.60       4257.72    0.98
```

```
 25      154.12    200.30    18.5     5.40     5.69     4     150.00    24.0
24748.96     2715.16      4265.54    0.98
 26      159.51    130.41    22.6     3.53     3.82     4     150.00    24.0
16170.75     1450.05      4183.74    0.99
 27      163.04    129.37    22.6     3.53     3.82     4     150.00    24.0
16093.02     1113.70      4155.92    0.99
 28      166.57     87.43    22.6     2.40     2.60     3       0.00    15.0
10911.34      565.49      4307.81    1.02
 29      168.97     38.16    22.6     1.05     1.14     2       0.00    35.0
4769.55      198.70      3960.33    0.94
 30      170.02    190.34    26.7     5.32     5.95     2       0.00    35.0
23792.54      480.11      3793.08    0.95
 31      175.34    169.43    26.7     4.85     5.43     2       0.00    35.0
21179.24        0.00      3689.56    0.95
 32      180.19    165.65    30.8     4.89     5.69     5      75.00    28.0
19050.15        0.00      3324.36    1.00
 33      185.08    159.38    30.8     4.89     5.69     5      75.00    28.0
18329.21        0.00      3197.81    1.00
 34      189.97     64.02    34.8     2.03     2.47     5      75.00    28.0
7362.52        0.00      3022.44    1.02
 35      192.00    111.74    34.8     3.66     4.46     2       0.00    35.0
13944.77        0.00      3041.15    0.97
 36      195.66    106.88    34.8     3.66     4.46     2       0.00    35.0
13293.29        0.00      2899.07    0.97
 37      199.32    121.81    38.9     4.43     5.69     2       0.00    35.0
15085.56        0.00      2632.25    0.99
 38      203.74    112.51    38.9     4.43     5.69     2       0.00    35.0
13857.69        0.00      2418.00    0.99
 39      208.17     43.53    43.0     1.83     2.50     2       0.00    35.0
5337.67        0.00      2178.95    1.02
 40      210.00     70.64    43.0     3.25     4.44     2       0.00    35.0
8635.64        0.00      1984.24    1.02
 41      213.25     60.80    43.0     3.25     4.44     2       0.00    35.0
7405.51        0.00      1701.59    1.02
 42      216.50     58.60    47.1     3.88     5.69     2       0.00    35.0
7092.70        0.00      1314.77    1.06
 43      220.37     42.45    47.1     3.88     5.69     2       0.00    35.0
5073.13        0.00       940.41    1.06
 44      224.25     17.16    51.2     2.31     3.68     2       0.00    35.0
2006.27        0.00       598.42    1.10
 45      226.56      7.36    51.2     1.44     2.30     1      50.00    28.0
846.81        0.00       412.85    1.19
 46      228.00      7.13    51.2     3.39     5.40     6       0.00     0.0
784.41        0.00       231.47    1.59
                --------                  -------                          -------
---
     X-S Area:    4969.60    Path Length:    216.29              X-S Weight:
602520.44
```



Material Keys

1: overburden
2: sand and gravel
3: weathered claystone
4: claystone
5: compacted overburden
6: slurry wall

Analysis 1

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular

Results

Critical Factor of Safety: 2.23

Project Hunt/J2

Mine slope static slurry wall stability empty in mined area only

File: J:\Hunt Farms-306\J2 stability\sw stability higher 20ft offset static empty.gmf

Edited: 14 Sep 2022 *Processed:*14 Sep 2022

Civil Resources

GALENA 7.2 Analysis Results Version: 7.2.1.03 Licensee: Civil Resources

---

Project: Hunt/J2
File: J:\Hunt Farms-306\J2 stability\sw stability higher 20ft offset static empty.gmf
Processed: 14 Sep 2022 12:07:31

DATA: Analysis 1 - Mine slope static slurry wall stability empty in mined area only

Material Properties (6 materials)

Material: 1 (Mohr-Coulomb Isotropic) - overburden
Cohesion Phi UnitWeight Ru
50.00 28.0 115.00 Auto
Material: 2 (Mohr-Coulomb Isotropic) - sand and gravel
Cohesion Phi UnitWeight Ru
0.00 35.0 125.00 Auto
Material: 3 (Mohr-Coulomb Isotropic) - weathered claystone
Cohesion Phi UnitWeight Ru
0.00 15.0 110.00 Auto
Material: 4 (Mohr-Coulomb Isotropic) - claystone
Cohesion Phi UnitWeight Ru
150.00 24.0 115.00 Auto
Material: 5 (Mohr-Coulomb Isotropic) - compacted overburden
Cohesion Phi UnitWeight Ru
75.00 28.0 115.00 Auto
Material: 6 (Mohr-Coulomb Isotropic) - slurry wall
Cohesion Phi UnitWeight Ru
0.00 0.0 110.00 Auto

Water Properties

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

Material Profiles (6 profiles)

Profile: 1 (4 points) Material beneath: 1 - overburden
0.00 50.00 228.00 50.00 231.00 50.00 300.00 50.00
Profile: 2 (4 points) Material beneath: 2 - sand and gravel
0.00 44.00 228.00 44.00 231.00 44.00 300.00 44.00
Profile: 3 (4 points) Material beneath: 3 - weathered claystone
0.00 0.00 228.00 0.00 231.00 0.00 300.00 0.00
Profile: 4 (4 points) Material beneath: 4 - claystone
0.00 -1.00 228.00 -1.00 231.00 -1.00 300.00 -1.00
Profile: 5 (5 points) Material within: 5 - compacted overburden
200.00 50.00 110.00 20.00 120.00 20.00 210.00 50.00 200.00 50.00
Profile: 6 (2 points) Material beneath: 6 - slurry wall
228.00 50.00 231.00 50.00

Slope Surface (6 points)

0.00 0.00 50.00 0.00 110.00 20.00 120.00 20.00 210.00 50.00

```
    300.00       50.00

Phreatic Surface (5 points)
---------------
      0.00        1.00          50.00        1.00         228.00        4.00
231.00       45.00         300.00       46.00

Failure Surface
---------------
Initial circular surface for critical search defined by: XL,XR,R
  Intersects:  XL:     120.00      YL:      20.00      XR:     230.00      YR:
50.00
      Centre:  XC:     132.86      YC:     189.51                  Radius:  R:
170.00

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

-  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
--  --  --  --  --  --  --  --  --  --  --  -

RESULTS: Analysis  1 - Mine slope static slurry wall stability empty in mined area
only

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

Initial failure surface approximation - Factor of Safety:   2.488

Analysis Summary
================
There were:  991 successful analyses from a total of 1001 trial failure surfaces
             10 analyses terminated due to unacceptable geometry

Critical (minimum) Factor of Safety:  2.23
==========================================

Results Summary - Lowest 99 Factor of Safety circles
----------------------------------------------------
Circle    X-Left      Y-Left     X-Right     Y-Right     X-Centre    Y-Centre
Radius      FoS
   1       126.94       22.31      217.50       50.00      121.45      202.23
180.00     2.234   <-- Critical Surface
   2       126.94       22.31      217.50       50.00      122.12      200.03
177.78     2.235
   3       121.39       20.46      217.50       50.00      118.67      200.44
180.00     2.236
   4       113.06       20.00      217.50       50.00      117.90      199.93
180.00     2.236
   5       132.50       24.17      217.50       50.00      124.28      203.98
180.00     2.236
   6       126.94       22.31      217.50       50.00      122.80      197.82
175.56     2.237
   7       132.50       24.17      217.50       50.00      124.94      201.78
177.78     2.237
   8       121.39       20.46      217.50       50.00      119.35      198.23
177.78     2.237
   9       113.06       20.00      217.50       50.00      118.55      197.69
177.78     2.238
```

10	124.17	21.39	217.50	50.00	120.05	201.34
180.00	2.238					
11	132.50	24.17	217.50	50.00	125.61	199.59
175.56	2.238					
12	129.72	23.24	217.50	50.00	122.86	203.11
180.00	2.238					
13	126.94	22.31	217.50	50.00	123.47	195.61
173.33	2.238					
14	121.39	20.46	217.50	50.00	120.03	196.01
175.56	2.239					
15	132.50	24.17	217.50	50.00	126.28	197.39
173.33	2.239					
16	129.72	23.24	217.50	50.00	123.53	200.91
177.78	2.240					
17	124.17	21.39	217.50	50.00	120.73	199.13
177.78	2.240					
18	126.94	22.31	217.50	50.00	124.15	193.40
171.11	2.240					
19	113.06	20.00	217.50	50.00	119.19	195.45
175.56	2.240					
20	132.50	24.17	217.50	50.00	126.95	195.19
171.11	2.241					
21	129.72	23.24	217.50	50.00	124.20	198.71
175.56	2.241					
22	121.39	20.46	217.50	50.00	120.71	193.79
173.33	2.241					
23	124.17	21.39	217.50	50.00	121.41	196.92
175.56	2.242					
24	126.94	22.31	217.50	50.00	124.82	191.19
168.89	2.242					
25	132.50	24.17	217.50	50.00	127.62	192.98
168.89	2.242					
26	115.83	20.00	217.50	50.00	119.30	195.52
175.56	2.242					
27	129.72	23.24	217.50	50.00	124.87	196.51
173.33	2.242					
28	113.06	20.00	217.50	50.00	119.84	193.20
173.33	2.243					
29	121.39	20.46	217.50	50.00	121.40	191.57
171.11	2.243					
30	132.50	24.17	217.50	50.00	128.29	190.78
166.67	2.243					
31	124.17	21.39	217.50	50.00	122.09	194.71
173.33	2.243					
32	126.94	22.31	217.50	50.00	125.50	188.98
166.67	2.244					
33	129.72	23.24	217.50	50.00	125.54	194.30
171.11	2.244					
34	115.83	20.00	217.50	50.00	119.96	193.28
173.33	2.244					
35	132.50	24.17	217.50	50.00	128.96	188.57
164.44	2.245					
36	110.28	20.00	217.50	50.00	117.77	199.84
180.00	2.245					
37	124.17	21.39	217.50	50.00	122.77	192.49
171.11	2.245					
38	118.61	20.00	217.50	50.00	122.06	186.63
166.67	2.245					
39	121.39	20.46	217.50	50.00	122.08	189.35
168.89	2.245					
40	129.72	23.24	217.50	50.00	126.21	192.09
168.89	2.245					

41	126.94	22.31	217.50	50.00	126.18	186.76	164.44
2.246							
42	113.06	20.00	217.50	50.00	120.48	190.95	171.11
2.246							
43	132.50	24.17	217.50	50.00	129.63	186.36	162.22
2.246							
44	115.83	20.00	217.50	50.00	120.62	191.04	171.11
2.247							
45	129.72	23.24	217.50	50.00	126.89	189.88	166.67
2.247							
46	124.17	21.39	217.50	50.00	123.45	190.28	168.89
2.247							
47	110.28	20.00	217.50	50.00	118.40	197.59	177.78
2.248							
48	126.94	22.31	217.50	50.00	126.86	184.54	162.22
2.248							
49	121.39	20.46	217.50	50.00	122.76	187.12	166.67
2.248							
50	118.61	20.00	217.50	50.00	122.73	184.39	164.44
2.248							
51	132.50	24.17	217.50	50.00	130.30	184.15	160.00
2.248							
52	113.06	20.00	217.50	50.00	121.13	188.70	168.89
2.249							
53	129.72	23.24	217.50	50.00	127.56	187.67	164.44
2.249							
54	115.83	20.00	217.50	50.00	121.28	188.80	168.89
2.249							
55	124.17	21.39	217.50	50.00	124.13	188.06	166.67
2.249							
56	126.94	22.31	217.50	50.00	127.54	182.31	160.00
2.250							
57	121.39	20.46	217.50	50.00	123.45	184.89	164.44
2.250							
58	118.61	20.00	217.50	50.00	123.41	182.15	162.22
2.250							
59	110.28	20.00	217.50	50.00	119.03	195.34	175.56
2.251							
60	129.72	23.24	217.50	50.00	128.24	185.46	162.22
2.251							
61	124.17	21.39	217.50	50.00	124.81	185.83	164.44
2.252							
62	115.83	20.00	217.50	50.00	121.95	186.55	166.67
2.252							
63	113.06	20.00	217.50	50.00	121.78	186.44	166.67
2.252							
64	121.39	20.46	217.50	50.00	124.14	182.66	162.22
2.253							
65	118.61	20.00	217.50	50.00	124.10	179.91	160.00
2.253							
66	110.28	20.00	217.50	50.00	119.66	193.08	173.33
2.253							
67	129.72	23.24	217.50	50.00	128.91	183.24	160.00
2.254							
68	124.17	21.39	217.50	50.00	125.49	183.61	162.22
2.254							
69	115.83	20.00	217.50	50.00	122.61	184.30	164.44
2.254							
70	110.28	20.00	217.50	50.00	121.56	186.28	166.67
2.255							
71	113.06	20.00	217.50	50.00	122.43	184.18	164.44
2.255							

72	121.39	20.46	217.50	50.00	124.82	180.43	160.00	2.255
73	124.17	21.39	217.50	50.00	126.17	181.38	160.00	2.257
74	110.28	20.00	217.50	50.00	120.29	190.82	171.11	2.257
75	115.83	20.00	217.50	50.00	123.27	182.05	162.22	2.258
76	110.28	20.00	217.50	50.00	122.20	184.01	164.44	2.258
77	113.06	20.00	217.50	50.00	123.08	181.91	162.22	2.258
78	110.28	20.00	217.50	50.00	120.93	188.55	168.89	2.260
79	115.83	20.00	217.50	50.00	123.94	179.79	160.00	2.261
80	113.06	20.00	217.50	50.00	123.73	179.64	160.00	2.261
81	110.28	20.00	217.50	50.00	122.83	181.74	162.22	2.262
82	110.28	20.00	217.50	50.00	123.47	179.46	160.00	2.265
83	121.39	20.46	220.28	50.00	121.48	200.46	180.00	2.276
84	121.39	20.46	220.28	50.00	122.14	198.24	177.78	2.278
85	115.83	20.00	220.28	50.00	120.68	199.93	180.00	2.278
86	107.50	19.17	217.50	50.00	116.43	198.95	180.00	2.280
87	121.39	20.46	220.28	50.00	122.81	196.01	175.56	2.280
88	115.83	20.00	220.28	50.00	121.32	197.69	177.78	2.280
89	124.17	21.39	220.28	50.00	122.90	201.38	180.00	2.280
90	115.83	20.00	220.28	50.00	121.97	195.45	175.56	2.282
91	121.39	20.46	220.28	50.00	123.48	193.78	173.33	2.282
92	124.17	21.39	220.28	50.00	123.56	199.17	177.78	2.282
93	107.50	19.17	217.50	50.00	117.06	196.69	177.78	2.282
94	124.17	21.39	220.28	50.00	124.22	196.94	175.56	2.284
95	129.72	23.24	220.28	50.00	125.78	203.20	180.00	2.284
96	115.83	20.00	220.28	50.00	122.61	193.20	173.33	2.284
97	121.39	20.46	220.28	50.00	124.14	191.55	171.11	2.284
98	129.72	23.24	220.28	50.00	126.43	200.99	177.78	2.285
99	107.50	19.17	217.50	50.00	117.70	194.43	175.56	2.285

Critical Failure Surface (circle 1)

Intersects: XL: 126.94 YL: 22.31 XR: 217.50 YR: 50.00

Centre: XC: 121.45 YC: 202.23 Radius: R: 180.00

Generated failure surface: (20 points)

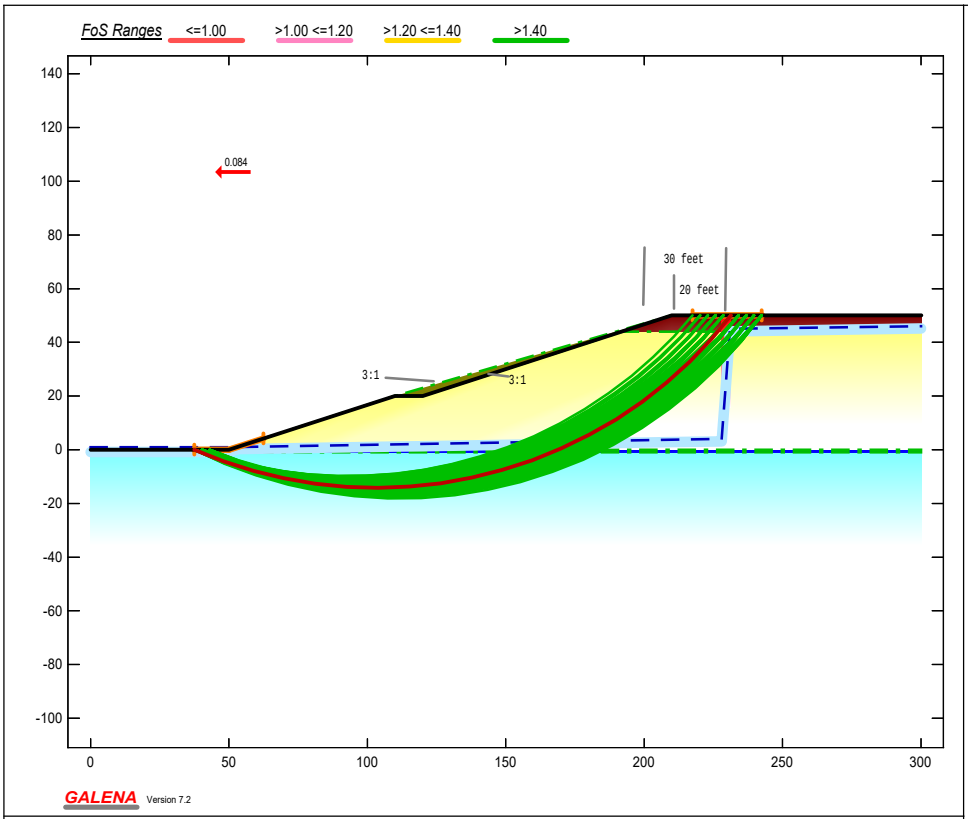
126.94	22.31	131.98	22.54	137.01	22.90	142.03	23.41	147.03	24.06
152.01	24.84	156.97	25.77	161.90	26.83	166.80	28.04	171.66	29.38
176.48	30.85	181.26	32.46	185.99	34.20	190.68	36.08	195.30	38.08
199.87	40.21	204.38	42.47	208.82	44.86	213.20	47.37	217.50	50.00

Slice Geometry and Properties - Critical Failure Surface (circle 1, 40 slices)

Slice	X-S	Base							
PoreWater	Normal	Test							
	X-Left	Area	Angle	Width	Length	Matl	Cohesion	Phi	
Weight	Force	Stress	Factor						
1	126.94	0.92	2.6	2.52	2.52	2	0.00	35.0	
114.52	0.00	44.84	0.99						
2	129.46	2.75	2.6	2.52	2.52	2	0.00	35.0	
343.55	0.00	134.50	0.99						
3	131.98	4.48	4.2	2.51	2.52	2	0.00	35.0	
560.35	0.00	217.85	0.98						
4	134.50	6.13	4.2	2.51	2.52	2	0.00	35.0	
766.42	0.00	297.97	0.98						
5	137.01	7.67	5.8	2.51	2.52	2	0.00	35.0	
958.76	0.00	370.45	0.97						
6	139.52	9.13	5.8	2.51	2.52	2	0.00	35.0	
1141.60	0.00	441.09	0.97						
7	142.03	10.47	7.4	2.50	2.52	2	0.00	35.0	
1308.79	0.00	502.99	0.97						
8	144.53	11.75	7.4	2.50	2.52	2	0.00	35.0	
1468.28	0.00	564.28	0.97						
9	147.03	12.88	9.0	2.49	2.52	2	0.00	35.0	
1609.84	0.00	615.87	0.96						
10	149.52	13.97	9.0	2.49	2.52	2	0.00	35.0	
1745.87	0.00	667.91	0.96						
11	152.01	14.89	10.6	2.48	2.52	2	0.00	35.0	
1861.40	0.00	709.45	0.96						
12	154.49	15.79	10.6	2.48	2.52	2	0.00	35.0	
1973.96	0.00	752.35	0.96						
13	156.97	16.51	12.2	2.46	2.52	2	0.00	35.0	
2063.40	0.00	784.12	0.96						
14	159.43	17.22	12.2	2.46	2.52	2	0.00	35.0	
2152.58	0.00	818.00	0.96						
15	161.90	17.73	13.8	2.45	2.52	2	0.00	35.0	
2215.99	0.00	840.27	0.96						
16	164.35	18.26	13.8	2.45	2.52	2	0.00	35.0	
2281.88	0.00	865.26	0.96						
17	166.80	18.56	15.4	2.43	2.52	2	0.00	35.0	
2319.40	0.00	878.28	0.95						
18	169.23	18.90	15.4	2.43	2.52	2	0.00	35.0	
2362.22	0.00	894.50	0.95						
19	171.66	18.99	17.0	2.41	2.52	2	0.00	35.0	
2374.36	0.00	898.57	0.95						
20	174.07	19.16	17.0	2.41	2.52	2	0.00	35.0	
2394.41	0.00	906.16	0.95						
21	176.48	19.05	18.6	2.39	2.52	2	0.00	35.0	
2381.79	0.00	901.54	0.95						
22	178.87	19.04	18.6	2.39	2.52	2	0.00	35.0	
2379.42	0.00	900.65	0.95						
23	181.26	18.74	20.2	2.37	2.52	5	75.00	28.0	
2155.26	0.00	826.09	0.98						

24	183.63	18.55	20.2	2.37	2.52	5	75.00	28.0
2132.84	0.00	817.38	0.98					
25	185.99	18.07	21.8	2.34	2.52	5	75.00	28.0
2077.83	0.00	798.14	0.98					
26	188.33	17.70	21.8	2.34	2.52	5	75.00	28.0
2035.64	0.00	781.68	0.98					
27	190.68	9.82	23.4	1.32	1.44	5	75.00	28.0
1129.79	0.00	760.07	0.99					
28	192.00	12.00	23.4	1.65	1.80	2	0.00	35.0
1495.96	0.00	797.54	0.96					
29	193.65	11.73	23.4	1.65	1.80	2	0.00	35.0
1452.83	0.00	774.55	0.96					
30	195.30	15.69	25.0	2.28	2.52	2	0.00	35.0
1927.85	0.00	736.07	0.96					
31	197.59	15.00	25.0	2.28	2.52	2	0.00	35.0
1823.33	0.00	696.15	0.96					
32	199.87	14.02	26.6	2.25	2.52	2	0.00	35.0
1685.32	0.00	646.15	0.97					
33	202.13	13.17	26.6	2.25	2.52	2	0.00	35.0
1561.63	0.00	598.72	0.97					
34	204.38	15.25	28.2	2.84	3.23	2	0.00	35.0
1774.91	0.00	534.50	0.97					
35	207.22	7.86	28.2	1.60	1.82	1	50.00	28.0
904.00	0.00	490.13	1.01					
36	208.82	5.42	29.8	1.18	1.36	1	50.00	28.0
623.34	0.00	454.84	1.01					
37	210.00	6.41	29.8	1.60	1.84	1	50.00	28.0
736.74	0.00	394.13	1.01					
38	211.60	4.94	29.8	1.60	1.84	1	50.00	28.0
568.09	0.00	301.32	1.01					
39	213.20	4.24	31.4	2.15	2.52	1	50.00	28.0
488.13	0.00	186.14	1.02					
40	215.35	1.41	31.4	2.15	2.52	1	50.00	28.0
162.71	0.00	54.08	1.02					

X-S Area: 504.26 Path Length: 95.82 X-S Weight: 61515.02



Material Keys

1: overburden
2: sand and gravel
3: weathered claystone
4: claystone
5: compacted overburden
6: slurry wall

Analysis 1

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular

Results

Critical Factor of Safety: 1.45

Project Hunt/J2

Mine slope seismic slurry wall stability empty

File: J:\Hunt Farms-306\J2 stability\sw stability 20ft offset seismic empty.gmf

Edited: 6 Oct 2022 *Processed:*6 Oct 2022

Civil Resources

GALENA 7.2 Analysis Results Version: 7.2.1.03 Licensee: Civil Resources

---

Project: Hunt/J2
File: J:\Hunt Farms-306\J2 stability\sw stability 20ft offset seismic empty.gmf
Processed: 06 Oct 2022 13:37:01

DATA: Analysis 1 - Mine slope seismic slurry wall stability empty

Material Properties (6 materials)

Material: 1 (Mohr-Coulomb Isotropic) - overburden
Cohesion Phi UnitWeight Ru
50.00 28.0 115.00 Auto
Material: 2 (Mohr-Coulomb Isotropic) - sand and gravel
Cohesion Phi UnitWeight Ru
0.00 35.0 125.00 Auto
Material: 3 (Mohr-Coulomb Isotropic) - weathered claystone
Cohesion Phi UnitWeight Ru
0.00 15.0 110.00 Auto
Material: 4 (Mohr-Coulomb Isotropic) - claystone
Cohesion Phi UnitWeight Ru
150.00 24.0 115.00 Auto
Material: 5 (Mohr-Coulomb Isotropic) - compacted overburden
Cohesion Phi UnitWeight Ru
75.00 28.0 115.00 Auto
Material: 6 (Mohr-Coulomb Isotropic) - slurry wall
Cohesion Phi UnitWeight Ru
0.00 0.0 110.00 Auto

Water Properties

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

Material Profiles (6 profiles)

Profile: 1 (4 points) Material beneath: 1 - overburden
0.00 50.00 228.00 50.00 231.00 50.00 300.00 50.00
Profile: 2 (4 points) Material beneath: 2 - sand and gravel
0.00 44.00 228.00 44.00 231.00 44.00 300.00 44.00
Profile: 3 (4 points) Material beneath: 3 - weathered claystone
0.00 0.00 228.00 0.00 231.00 0.00 300.00 0.00
Profile: 4 (4 points) Material beneath: 4 - claystone
0.00 -1.00 228.00 -1.00 231.00 -1.00 300.00 -1.00
Profile: 5 (5 points) Material within: 5 - compacted overburden
200.00 50.00 110.00 20.00 120.00 20.00 210.00 50.00 200.00 50.00
Profile: 6 (2 points) Material beneath: 6 - slurry wall
228.00 50.00 231.00 50.00

Slope Surface (6 points)

0.00 0.00 50.00 0.00 110.00 20.00 120.00 20.00 210.00 50.00 300.00 50.00

Phreatic Surface (5 points)

0.00 1.00 50.00 1.00 228.00 4.00
231.00 45.00 300.00 46.00

Failure Surface

Initial circular surface for critical search defined by: XL,XR,R
Intersects: XL: 50.00 YL: 0.00 XR: 230.00 YR:
50.00
Centre: XC: 101.98 YC: 161.86 Radius: R:
170.00

Earthquake Force

Pseudo-static earthquake (seismic) coefficient: 0.084

Variable Restraints

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

- --
-- -- -- -- -- -- -- -- -- -- -- -

RESULTS: Analysis 1 - Mine slope seismic slurry wall stability empty

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

Initial failure surface approximation - Factor of Safety: 1.561

Analysis Summary
===
There were: 1001 successful analyses from a total of 1001 trial failure surfaces

Critical (minimum) Factor of Safety: 1.45
===

Results Summary - Lowest 99 Factor of Safety circles

Circle	X-Left	Y-Left	X-Right	Y-Right	X-Centre	Y-Centre	Radius	FoS	
1	37.50	0.00	231.39	50.00	103.28	145.85	160.00	1.452	<-- Critical Surface
2	37.50	0.00	239.72	50.00	109.46	142.91	160.00	1.453	
3	37.50	0.00	239.72	50.00	108.76	145.73	162.22	1.454	
4	37.50	0.00	234.17	50.00	105.35	144.90	160.00	1.456	
5	37.50	0.00	231.39	50.00	102.57	148.60	162.22	1.457	
6	37.50	0.00	234.17	50.00	104.65	147.67	162.22	1.459	
7	37.50	0.00	242.50	50.00	110.11	147.55	164.44	1.460	
8	37.50	0.00	242.50	50.00	108.75	153.12	168.89	1.460	

9	37.50	0.00	242.50	50.00	110.80	144.72
162.22	1.461					
10	37.50	0.00	242.50	50.00	111.50	141.86
160.00	1.461					
11	37.50	0.00	242.50	50.00	109.43	150.35
166.67	1.461					
12	37.50	0.00	236.94	50.00	107.41	143.92
160.00	1.462					
13	37.50	0.00	231.39	50.00	101.87	151.32
164.44	1.463					
14	37.50	0.00	236.94	50.00	106.71	146.72
162.22	1.463					
15	37.50	0.00	236.94	50.00	106.01	149.49
164.44	1.464					
16	37.50	0.00	234.17	50.00	103.95	150.42
164.44	1.464					
17	40.28	0.00	239.72	50.00	110.19	143.92
160.00	1.465					
18	37.50	0.00	228.61	50.00	101.20	146.77
160.00	1.465					
19	37.50	0.00	225.83	50.00	99.10	147.67
160.00	1.466					
20	37.50	0.00	231.39	50.00	101.17	154.03
166.67	1.469					
21	40.28	0.00	231.39	50.00	103.97	146.77
160.00	1.470					
22	37.50	0.00	234.17	50.00	103.25	153.15
166.67	1.470					
23	37.50	0.00	228.61	50.00	100.48	149.50
162.22	1.471					
24	40.28	0.00	242.50	50.00	111.54	145.73
162.22	1.471					
25	37.50	0.00	239.72	50.00	108.07	148.53
164.44	1.471					
26	37.50	0.00	225.83	50.00	98.38	150.36
162.22	1.471					
27	40.28	0.00	234.17	50.00	106.06	145.85
160.00	1.472					
28	40.28	0.00	242.50	50.00	112.24	142.91
160.00	1.472					
29	40.28	0.00	242.50	50.00	110.84	148.53
164.44	1.472					
30	37.50	0.00	239.72	50.00	107.38	151.31
166.67	1.473					
31	40.28	0.00	236.94	50.00	108.13	144.90
160.00	1.473					
32	40.28	0.00	236.94	50.00	107.42	147.67
162.22	1.473					
33	37.50	0.00	236.94	50.00	105.32	152.24
166.67	1.475					
34	37.50	0.00	239.72	50.00	106.03	156.79
171.11	1.475					
35	40.28	0.00	231.39	50.00	103.26	149.50
162.22	1.475					
36	37.50	0.00	234.17	50.00	102.57	155.85
168.89	1.476					
37	40.28	0.00	236.94	50.00	106.72	150.42
164.44	1.476					
38	37.50	0.00	223.06	50.00	96.99	148.53
160.00	1.476					
39	37.50	0.00	220.28	50.00	94.87	149.36
160.00	1.476					

40	37.50	0.00	228.61	50.00	99.78	152.20	164.44	1.477
41	37.50	0.00	225.83	50.00	97.67	153.04	164.44	1.477
42	40.28	0.00	234.17	50.00	105.35	148.60	162.22	1.477
43	37.50	0.00	242.50	50.00	107.41	158.61	173.33	1.478
44	37.50	0.00	239.72	50.00	105.36	159.50	173.33	1.478
45	37.50	0.00	239.72	50.00	106.70	154.06	168.89	1.480
46	37.50	0.00	236.94	50.00	104.64	154.97	168.89	1.480
47	37.50	0.00	223.06	50.00	96.27	151.20	162.22	1.480
48	40.28	0.00	231.39	50.00	102.56	152.20	164.44	1.481
49	37.50	0.00	242.50	50.00	108.08	155.88	171.11	1.481
50	37.50	0.00	225.83	50.00	96.97	155.70	166.67	1.481
51	37.50	0.00	234.17	50.00	101.88	158.54	171.11	1.482
52	40.28	0.00	242.50	50.00	110.16	151.31	166.67	1.482
53	37.50	0.00	239.72	50.00	104.69	162.19	175.56	1.482
54	40.28	0.00	234.17	50.00	104.65	151.32	164.44	1.482
55	40.28	0.00	239.72	50.00	109.49	146.72	162.22	1.482
56	40.28	0.00	239.72	50.00	108.79	149.49	164.44	1.482
57	37.50	0.00	228.61	50.00	99.08	154.87	166.67	1.482
58	40.28	0.00	225.83	50.00	99.77	148.53	160.00	1.483
59	40.28	0.00	228.61	50.00	101.88	147.67	160.00	1.483
60	43.06	0.00	242.50	50.00	112.97	143.92	160.00	1.483
61	40.28	0.00	239.72	50.00	108.10	152.24	166.67	1.483
62	37.50	0.00	220.28	50.00	94.14	152.01	162.22	1.484
63	40.28	0.00	242.50	50.00	108.80	156.79	171.11	1.484
64	43.06	0.00	242.50	50.00	112.26	146.72	162.22	1.484
65	37.50	0.00	242.50	50.00	106.75	161.32	175.56	1.484
66	37.50	0.00	231.39	50.00	100.48	156.71	168.89	1.485
67	37.50	0.00	223.06	50.00	95.56	153.86	164.44	1.485
68	43.06	0.00	236.94	50.00	108.83	145.85	160.00	1.485
69	37.50	0.00	234.17	50.00	100.53	163.85	175.56	1.486
70	37.50	0.00	234.17	50.00	101.21	161.20	173.33	1.486

71	37.50	0.00	225.83	50.00	96.27	158.33	168.89	1.486
72	37.50	0.00	236.94	50.00	103.96	157.68	171.11	1.486
73	40.28	0.00	239.72	50.00	107.42	154.97	168.89	1.486
74	40.28	0.00	231.39	50.00	101.85	154.87	166.67	1.486
75	37.50	0.00	231.39	50.00	99.79	159.37	171.11	1.487
76	40.28	0.00	225.83	50.00	99.05	151.20	162.22	1.487
77	40.28	0.00	234.17	50.00	103.95	154.03	166.67	1.487
78	37.50	0.00	228.61	50.00	98.38	157.53	168.89	1.488
79	40.28	0.00	242.50	50.00	109.48	154.06	168.89	1.488
80	37.50	0.00	242.50	50.00	106.09	164.01	177.78	1.488
81	43.06	0.00	236.94	50.00	108.13	148.60	162.22	1.488
82	40.28	0.00	228.61	50.00	101.16	150.36	162.22	1.488
83	43.06	0.00	231.39	50.00	104.66	147.67	160.00	1.488
84	40.28	0.00	239.72	50.00	106.74	157.68	171.11	1.489
85	40.28	0.00	223.06	50.00	97.65	149.36	160.00	1.490
86	37.50	0.00	217.50	50.00	92.73	150.16	160.00	1.490
87	40.28	0.00	236.94	50.00	105.34	155.85	168.89	1.490
88	37.50	0.00	220.28	50.00	93.42	154.64	164.44	1.491
89	43.06	0.00	234.17	50.00	106.75	146.77	160.00	1.491
90	40.28	0.00	225.83	50.00	98.33	153.86	164.44	1.491
91	37.50	0.00	242.50	50.00	105.44	166.68	180.00	1.491
92	40.28	0.00	231.39	50.00	101.16	157.53	168.89	1.491
93	37.50	0.00	236.94	50.00	103.29	160.36	173.33	1.492
94	37.50	0.00	228.61	50.00	97.69	160.18	171.11	1.492
95	43.06	0.00	242.50	50.00	111.57	149.49	164.44	1.492
96	40.28	0.00	234.17	50.00	103.26	156.71	168.89	1.492
97	43.06	0.00	239.72	50.00	110.91	144.90	160.00	1.493
98	37.50	0.00	223.06	50.00	94.85	156.49	166.67	1.493
99	43.06	0.00	239.72	50.00	110.20	147.67	162.22	1.493

Critical Failure Surface (circle 1)

Intersects: XL: 37.50 YL: 0.00 XR: 231.39 YR: 50.00

Centre: XC: 103.28 YC: 145.85 Radius: R: 160.00

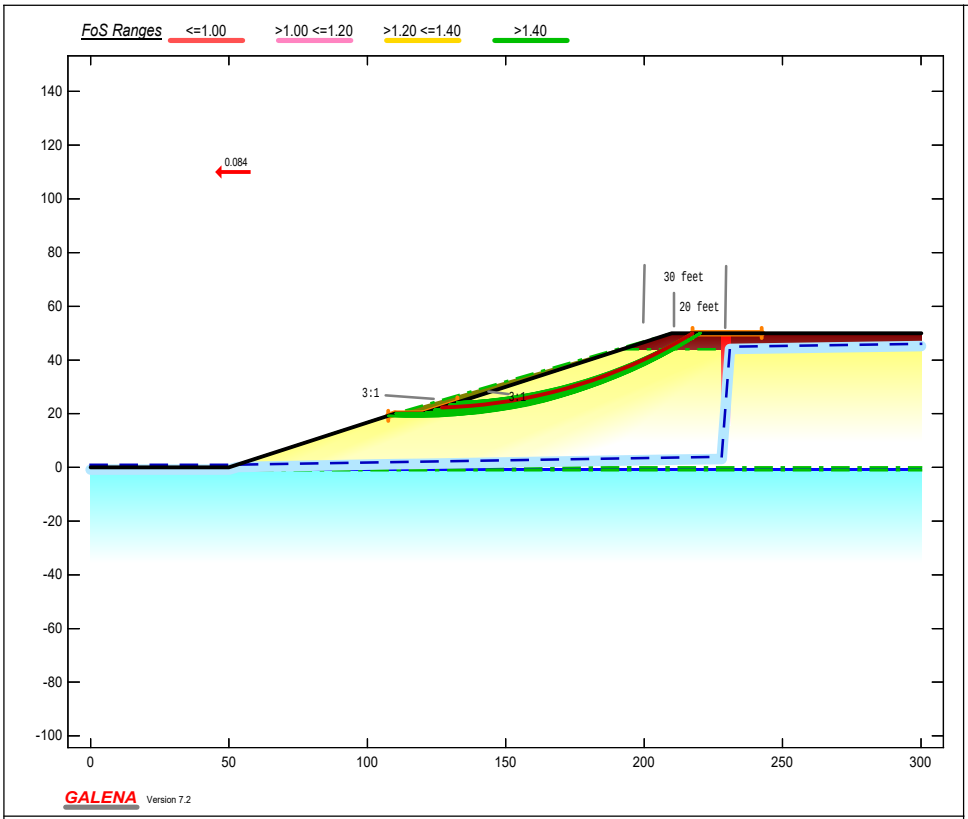
Generated failure surface: (20 points)

37.50 0.00 48.04 -4.31 58.85 -7.86
69.90 -10.63 81.11 -12.60
92.43 -13.78 103.81 -14.15 115.18 -13.70
126.50 -12.45 137.70 -10.40
148.72 -7.56 159.51 -3.94 170.02 0.44
180.19 5.55 189.97 11.38
199.32 17.88 208.17 25.03 216.50 32.80
224.25 41.13 231.39 50.00

Slice Geometry and Properties - Critical Failure Surface (circle 1, 46 slices)

Slice	X-S	Base						PoreWater	Normal	Test
	X-Left	Area	Angle	Width	Length	Matl	Cohesion	Phi	Weight	Force	Stress	Factor
1	37.50	1.22	-22.2	2.45	2.64	3	0.00	15.0	134.53	247.34	119.34	1.17
2	39.95	7.39	-22.2	4.05	4.37	4	150.00	24.0	829.78	771.01	328.85	1.24
3	43.99	14.08	-22.2	4.05	4.37	4	150.00	24.0	1599.30	1222.11	531.53	1.24
4	48.04	9.09	-18.2	1.96	2.07	4	150.00	24.0	1035.20	725.65	654.18	1.17
5	50.00	18.95	-18.2	3.16	3.33	4	150.00	24.0	2179.82	1348.06	794.04	1.17
6	53.16	50.82	-18.2	5.69	5.99	4	150.00	24.0	5929.78	3000.37	1139.45	1.17
7	58.85	68.57	-14.1	5.52	5.69	4	150.00	24.0	8071.53	3460.85	1561.23	1.12
8	64.38	86.37	-14.1	5.52	5.69	4	150.00	24.0	10220.78	3985.76	1975.28	1.12
9	69.90	104.74	-10.0	5.61	5.69	4	150.00	24.0	12441.66	4440.63	2321.15	1.07
10	75.50	120.76	-10.0	5.61	5.69	4	150.00	24.0	14388.26	4825.38	2684.42	1.07
11	81.11	137.06	-5.9	5.66	5.69	4	150.00	24.0	16374.33	5139.04	2968.71	1.04
12	86.77	151.07	-5.9	5.66	5.69	4	150.00	24.0	18092.52	5381.68	3280.77	1.04
13	92.43	164.76	-1.8	5.69	5.69	4	150.00	24.0	19778.01	5552.68	3504.91	1.01
14	98.12	176.60	-1.8	5.69	5.69	4	150.00	24.0	21246.71	5651.98	3765.48	1.01
15	103.81	204.30	2.2	6.19	6.20	4	150.00	24.0	24637.94	6180.90	3939.80	0.99
16	110.00	175.21	2.2	5.18	5.19	4	150.00	24.0	21160.13	5133.17	4042.04	0.99
17	115.18	161.06	6.3	4.82	4.85	4	150.00	24.0	19461.43	4710.32	3928.69	0.97
18	120.00	108.95	6.3	3.25	3.27	4	150.00	24.0	13180.58	3100.18	3943.82	0.97
19	123.25	111.30	6.3	3.25	3.27	4	150.00	24.0	13486.29	3038.12	4034.20	0.97
20	126.50	196.18	10.4	5.60	5.69	4	150.00	24.0	23825.58	5070.76	4058.60	0.96
21	132.10	200.88	10.4	5.60	5.69	4	150.00	24.0	24471.22	4739.92	4164.69	0.96
22	137.70	201.22	14.5	5.51	5.69	4	150.00	24.0	24590.48	4338.55	4165.79	0.96

```
 23      143.21    203.51    14.5     5.51     5.69     4     150.00    24.0
24955.32     3866.72      4221.06    0.96
 24      148.72    200.36    18.5     5.40     5.69     4     150.00    24.0
24658.49     3325.60      4166.28    0.96
 25      154.12    200.30    18.5     5.40     5.69     4     150.00    24.0
24748.96     2715.16      4171.47    0.96
 26      159.51    130.41    22.6     3.53     3.82     4     150.00    24.0
16170.75     1450.05      4069.03    0.96
 27      163.04    129.37    22.6     3.53     3.82     4     150.00    24.0
16093.02     1113.70      4039.54    0.96
 28      166.57     87.43    22.6     2.40     2.60     3       0.00    15.0
10911.34      565.49      4236.40    1.01
 29      168.97     38.16    22.6     1.05     1.14     2       0.00    35.0
4769.55      198.70      3805.45    0.90
 30      170.02    190.34    26.7     5.32     5.95     2       0.00    35.0
23792.54      480.11      3615.90    0.90
 31      175.34    169.43    26.7     4.85     5.43     2       0.00    35.0
21179.24        0.00      3513.47    0.90
 32      180.19    165.65    30.8     4.89     5.69     5      75.00    28.0
19050.15        0.00      3172.65    0.96
 33      185.08    159.38    30.8     4.89     5.69     5      75.00    28.0
18329.21        0.00      3051.64    0.96
 34      189.97     64.02    34.8     2.03     2.47     5      75.00    28.0
7362.52         0.00      2865.26    0.97
 35      192.00    111.74    34.8     3.66     4.46     2       0.00    35.0
13944.77        0.00      2854.19    0.91
 36      195.66    106.88    34.8     3.66     4.46     2       0.00    35.0
13293.29        0.00      2720.85    0.91
 37      199.32    121.81    38.9     4.43     5.69     2       0.00    35.0
15085.56        0.00      2451.80    0.93
 38      203.74    112.51    38.9     4.43     5.69     2       0.00    35.0
13857.69        0.00      2252.24    0.93
 39      208.17     43.53    43.0     1.83     2.50     2       0.00    35.0
5337.67         0.00      2013.64    0.94
 40      210.00     70.64    43.0     3.25     4.44     2       0.00    35.0
8635.64         0.00      1833.70    0.94
 41      213.25     60.80    43.0     3.25     4.44     2       0.00    35.0
7405.51         0.00      1572.49    0.94
 42      216.50     58.60    47.1     3.88     5.69     2       0.00    35.0
7092.70         0.00      1204.96    0.97
 43      220.37     42.45    47.1     3.88     5.69     2       0.00    35.0
5073.13         0.00       861.87    0.97
 44      224.25     17.16    51.2     2.31     3.68     2       0.00    35.0
2006.27         0.00       543.60    1.00
 45      226.56      7.36    51.2     1.44     2.30     1      50.00    28.0
846.81          0.00       374.10    1.10
 46      228.00      7.13    51.2     3.39     5.40     6       0.00     0.0
784.41          0.00       231.47    1.59
                --------                    -------                          -------
---
     X-S Area:    4969.60    Path Length:    216.29              X-S Weight:
602520.44
```



Material Keys

1: overburden
2: sand and gravel
3: weathered claystone
4: claystone
5: compacted overburden
6: slurry wall

Analysis 1

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular

Results

Critical Factor of Safety: 1.73

Project Hunt/J2

Mine slope seismic slurry wall stability empty in mined area only

File: J:\Hunt Farms-306\J2 stability\sw stability higher 20ft offset seismic empty.gmf

Edited: 6 Oct 2022 *Processed:*6 Oct 2022

Civil Resources

GALENA 7.2 Analysis Results Version: 7.2.1.03 Licensee: Civil Resources

Project: Hunt/J2
File: J:\Hunt Farms-306\J2 stability\sw stability higher 20ft offset seismic empty.gmf
Processed: 06 Oct 2022 13:21:08

DATA: Analysis 1 - Mine slope seismic slurry wall stability empty in mined area only

Material Properties (6 materials)

Material: 1 (Mohr-Coulomb Isotropic) - overburden

Cohesion	Phi	UnitWeight	Ru
50.00	28.0	115.00	Auto

Material: 2 (Mohr-Coulomb Isotropic) - sand and gravel

Cohesion	Phi	UnitWeight	Ru
0.00	35.0	125.00	Auto

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

Cohesion	Phi	UnitWeight	Ru
0.00	15.0	110.00	Auto

Material: 4 (Mohr-Coulomb Isotropic) - claystone

Cohesion	Phi	UnitWeight	Ru
150.00	24.0	115.00	Auto

Material: 5 (Mohr-Coulomb Isotropic) - compacted overburden

Cohesion	Phi	UnitWeight	Ru
75.00	28.0	115.00	Auto

Material: 6 (Mohr-Coulomb Isotropic) - slurry wall

Cohesion	Phi	UnitWeight	Ru
0.00	0.0	110.00	Auto

Water Properties

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

Material Profiles (6 profiles)

Profile: 1 (4 points)	Material beneath: 1 - overburden								
0.00	50.00	228.00	50.00	231.00	50.00	300.00	50.00		
Profile: 2 (4 points)	Material beneath: 2 - sand and gravel								
0.00	44.00	228.00	44.00	231.00	44.00	300.00	44.00		
Profile: 3 (4 points)	Material beneath: 3 - weathered claystone								
0.00	0.00	228.00	0.00	231.00	0.00	300.00	0.00		
Profile: 4 (4 points)	Material beneath: 4 - claystone								
0.00	-1.00	228.00	-1.00	231.00	-1.00	300.00	-1.00		
Profile: 5 (5 points)	Material within: 5 - compacted overburden								
200.00	50.00	110.00	20.00	120.00	20.00	210.00	50.00	200.00	50.00
Profile: 6 (2 points)	Material beneath: 6 - slurry wall								
228.00	50.00	231.00	50.00						

Slope Surface (6 points)

0.00	0.00	50.00	0.00	110.00	20.00	120.00	20.00	210.00	50.00

```
    300.00       50.00

Phreatic Surface (5 points)
---------------
      0.00        1.00          50.00        1.00         228.00        4.00
231.00       45.00         300.00       46.00

Failure Surface
---------------
Initial circular surface for critical search defined by: XL,XR,R
  Intersects:  XL:     120.00      YL:      20.00      XR:     230.00      YR:
50.00
      Centre:  XC:     132.86      YC:     189.51                  Radius:  R:
170.00

Earthquake Force
----------------
Pseudo-static earthquake (seismic) coefficient:  0.084

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

-  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
--  --  --  --  --  --  --  --  --  --  --  -

RESULTS: Analysis  1 - Mine slope seismic slurry wall stability empty in mined area
only

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

Initial failure surface approximation - Factor of Safety:   1.892

Analysis Summary
================
There were:  991 successful analyses from a total of 1001 trial failure surfaces
             10 analyses terminated due to unacceptable geometry

Critical (minimum) Factor of Safety:  1.73
==========================================

Results Summary - Lowest 99 Factor of Safety circles
----------------------------------------------------
Circle    X-Left      Y-Left     X-Right     Y-Right     X-Centre    Y-Centre
Radius      FoS
   1       126.94       22.31      217.50       50.00      121.45      202.23
180.00     1.727   <-- Critical Surface
   2       132.50       24.17      217.50       50.00      124.28      203.98
180.00     1.727
   3       126.94       22.31      217.50       50.00      122.12      200.03
177.78     1.728
   4       132.50       24.17      217.50       50.00      124.94      201.78
177.78     1.728
   5       132.50       24.17      217.50       50.00      125.61      199.59
175.56     1.729
   6       126.94       22.31      217.50       50.00      122.80      197.82
175.56     1.729
   7       121.39       20.46      217.50       50.00      118.67      200.44
180.00     1.729
```

8	129.72	23.24	217.50	50.00	122.86	203.11
180.00	1.729					
9	113.06	20.00	217.50	50.00	117.90	199.93
180.00	1.730					
10	132.50	24.17	217.50	50.00	126.28	197.39
173.33	1.730					
11	126.94	22.31	217.50	50.00	123.47	195.61
173.33	1.730					
12	129.72	23.24	217.50	50.00	123.53	200.91
177.78	1.730					
13	124.17	21.39	217.50	50.00	120.05	201.34
180.00	1.731					
14	121.39	20.46	217.50	50.00	119.35	198.23
177.78	1.731					
15	132.50	24.17	217.50	50.00	126.95	195.19
171.11	1.731					
16	113.06	20.00	217.50	50.00	118.55	197.69
177.78	1.731					
17	129.72	23.24	217.50	50.00	124.20	198.71
175.56	1.731					
18	126.94	22.31	217.50	50.00	124.15	193.40
171.11	1.732					
19	132.50	24.17	217.50	50.00	127.62	192.98
168.89	1.732					
20	124.17	21.39	217.50	50.00	120.73	199.13
177.78	1.732					
21	121.39	20.46	217.50	50.00	120.03	196.01
175.56	1.732					
22	129.72	23.24	217.50	50.00	124.87	196.51
173.33	1.733					
23	132.50	24.17	217.50	50.00	128.29	190.78
166.67	1.733					
24	126.94	22.31	217.50	50.00	124.82	191.19
168.89	1.733					
25	113.06	20.00	217.50	50.00	119.19	195.45
175.56	1.733					
26	124.17	21.39	217.50	50.00	121.41	196.92
175.56	1.733					
27	121.39	20.46	217.50	50.00	120.71	193.79
173.33	1.734					
28	129.72	23.24	217.50	50.00	125.54	194.30
171.11	1.734					
29	132.50	24.17	217.50	50.00	128.96	188.57
164.44	1.734					
30	126.94	22.31	217.50	50.00	125.50	188.98
166.67	1.735					
31	124.17	21.39	217.50	50.00	122.09	194.71
173.33	1.735					
32	115.83	20.00	217.50	50.00	119.30	195.52
175.56	1.735					
33	113.06	20.00	217.50	50.00	119.84	193.20
173.33	1.735					
34	129.72	23.24	217.50	50.00	126.21	192.09
168.89	1.735					
35	121.39	20.46	217.50	50.00	121.40	191.57
171.11	1.735					
36	132.50	24.17	217.50	50.00	129.63	186.36
162.22	1.735					
37	126.94	22.31	217.50	50.00	126.18	186.76
164.44	1.736					
38	110.28	20.00	217.50	50.00	117.77	199.84
180.00	1.736					

39	124.17	21.39	217.50	50.00	122.77	192.49	171.11	1.736
40	129.72	23.24	217.50	50.00	126.89	189.88	166.67	1.736
41	115.83	20.00	217.50	50.00	119.96	193.28	173.33	1.737
42	132.50	24.17	217.50	50.00	130.30	184.15	160.00	1.737
43	121.39	20.46	217.50	50.00	122.08	189.35	168.89	1.737
44	118.61	20.00	217.50	50.00	122.06	186.63	166.67	1.738
45	113.06	20.00	217.50	50.00	120.48	190.95	171.11	1.738
46	126.94	22.31	217.50	50.00	126.86	184.54	162.22	1.738
47	124.17	21.39	217.50	50.00	123.45	190.28	168.89	1.738
48	129.72	23.24	217.50	50.00	127.56	187.67	164.44	1.738
49	110.28	20.00	217.50	50.00	118.40	197.59	177.78	1.738
50	115.83	20.00	217.50	50.00	120.62	191.04	171.11	1.738
51	121.39	20.46	217.50	50.00	122.76	187.12	166.67	1.739
52	129.72	23.24	217.50	50.00	128.24	185.46	162.22	1.739
53	118.61	20.00	217.50	50.00	122.73	184.39	164.44	1.740
54	126.94	22.31	217.50	50.00	127.54	182.31	160.00	1.740
55	124.17	21.39	217.50	50.00	124.13	188.06	166.67	1.740
56	113.06	20.00	217.50	50.00	121.13	188.70	168.89	1.740
57	115.83	20.00	217.50	50.00	121.28	188.80	168.89	1.740
58	110.28	20.00	217.50	50.00	119.03	195.34	175.56	1.741
59	121.39	20.46	217.50	50.00	123.45	184.89	164.44	1.741
60	124.17	21.39	217.50	50.00	124.81	185.83	164.44	1.741
61	118.61	20.00	217.50	50.00	123.41	182.15	162.22	1.742
62	129.72	23.24	217.50	50.00	128.91	183.24	160.00	1.742
63	113.06	20.00	217.50	50.00	121.78	186.44	166.67	1.742
64	115.83	20.00	217.50	50.00	121.95	186.55	166.67	1.742
65	110.28	20.00	217.50	50.00	119.66	193.08	173.33	1.743
66	121.39	20.46	217.50	50.00	124.14	182.66	162.22	1.743
67	124.17	21.39	217.50	50.00	125.49	183.61	162.22	1.743
68	110.28	20.00	217.50	50.00	121.56	186.28	166.67	1.744
69	118.61	20.00	217.50	50.00	124.10	179.91	160.00	1.744

70	115.83	20.00	217.50	50.00	122.61	184.30	164.44	1.745
71	113.06	20.00	217.50	50.00	122.43	184.18	164.44	1.745
72	121.39	20.46	217.50	50.00	124.82	180.43	160.00	1.745
73	124.17	21.39	217.50	50.00	126.17	181.38	160.00	1.745
74	110.28	20.00	217.50	50.00	120.29	190.82	171.11	1.746
75	110.28	20.00	217.50	50.00	122.20	184.01	164.44	1.746
76	113.06	20.00	217.50	50.00	123.08	181.91	162.22	1.747
77	115.83	20.00	217.50	50.00	123.27	182.05	162.22	1.747
78	110.28	20.00	217.50	50.00	120.93	188.55	168.89	1.748
79	110.28	20.00	217.50	50.00	122.83	181.74	162.22	1.749
80	115.83	20.00	217.50	50.00	123.94	179.79	160.00	1.750
81	113.06	20.00	217.50	50.00	123.73	179.64	160.00	1.750
82	110.28	20.00	217.50	50.00	123.47	179.46	160.00	1.752
83	121.39	20.46	220.28	50.00	121.48	200.46	180.00	1.754
84	121.39	20.46	220.28	50.00	122.14	198.24	177.78	1.756
85	115.83	20.00	220.28	50.00	120.68	199.93	180.00	1.756
86	124.17	21.39	220.28	50.00	122.90	201.38	180.00	1.757
87	129.72	23.24	220.28	50.00	125.78	203.20	180.00	1.757
88	121.39	20.46	220.28	50.00	122.81	196.01	175.56	1.758
89	124.17	21.39	220.28	50.00	123.56	199.17	177.78	1.758
90	115.83	20.00	220.28	50.00	121.32	197.69	177.78	1.758
91	129.72	23.24	220.28	50.00	126.43	200.99	177.78	1.759
92	107.50	19.17	217.50	50.00	116.43	198.95	180.00	1.759
93	121.39	20.46	220.28	50.00	123.48	193.78	173.33	1.759
94	124.17	21.39	220.28	50.00	124.22	196.94	175.56	1.760
95	115.83	20.00	220.28	50.00	121.97	195.45	175.56	1.760
96	129.72	23.24	220.28	50.00	127.08	198.78	175.56	1.760
97	126.94	22.31	220.28	50.00	124.33	202.30	180.00	1.760
98	107.50	19.17	217.50	50.00	117.06	196.69	177.78	1.761
99	129.72	23.24	220.28	50.00	127.74	196.56	173.33	1.761

Critical Failure Surface (circle 1)

Intersects: XL: 126.94 YL: 22.31 XR: 217.50 YR: 50.00
Centre: XC: 121.45 YC: 202.23 Radius: R: 180.00
Generated failure surface: (20 points)

126.94	22.31	131.98	22.54	137.01	22.90
142.03	23.41	147.03	24.06		
152.01	24.84	156.97	25.77	161.90	26.83
166.80	28.04	171.66	29.38		
176.48	30.85	181.26	32.46	185.99	34.20
190.68	36.08	195.30	38.08		
199.87	40.21	204.38	42.47	208.82	44.86
213.20	47.37	217.50	50.00		

Slice Geometry and Properties - Critical Failure Surface (circle 1, 40 slices)

Slice	X-S	Base							
	X-Left	Area	Angle	Width	Length	Matl	Cohesion	Phi	PoreWater Weight
1	126.94	0.92	2.6	2.52	2.52	2	0.00	35.0	114.52
2	129.46	2.75	2.6	2.52	2.52	2	0.00	35.0	343.55
3	131.98	4.48	4.2	2.51	2.52	2	0.00	35.0	560.35
4	134.50	6.13	4.2	2.51	2.52	2	0.00	35.0	766.42
5	137.01	7.67	5.8	2.51	2.52	2	0.00	35.0	958.76
6	139.52	9.13	5.8	2.51	2.52	2	0.00	35.0	1141.60
7	142.03	10.47	7.4	2.50	2.52	2	0.00	35.0	1308.79
8	144.53	11.75	7.4	2.50	2.52	2	0.00	35.0	1468.28
9	147.03	12.88	9.0	2.49	2.52	2	0.00	35.0	1609.84
10	149.52	13.97	9.0	2.49	2.52	2	0.00	35.0	1745.87
11	152.01	14.89	10.6	2.48	2.52	2	0.00	35.0	1861.40
12	154.49	15.79	10.6	2.48	2.52	2	0.00	35.0	1973.96
13	156.97	16.51	12.2	2.46	2.52	2	0.00	35.0	2063.40
14	159.43	17.22	12.2	2.46	2.52	2	0.00	35.0	2152.58
15	161.90	17.73	13.8	2.45	2.52	2	0.00	35.0	2215.99
16	164.35	18.26	13.8	2.45	2.52	2	0.00	35.0	2281.88
17	166.80	18.56	15.4	2.43	2.52	2	0.00	35.0	2319.40
18	169.23	18.90	15.4	2.43	2.52	2	0.00	35.0	2362.22
19	171.66	18.99	17.0	2.41	2.52	2	0.00	35.0	2374.36
20	174.07	19.16	17.0	2.41	2.52	2	0.00	35.0	2394.41
21	176.48	19.05	18.6	2.39	2.52	2	0.00	35.0	2381.79

Normal Force	Test Stress	Factor
0.00	44.65	0.98
0.00	133.96	0.98
0.00	216.43	0.97
0.00	296.03	0.97
0.00	367.14	0.97
0.00	437.16	0.97
0.00	497.30	0.96
0.00	557.90	0.96
0.00	607.45	0.95
0.00	658.78	0.95
0.00	698.11	0.95
0.00	740.32	0.95
0.00	769.78	0.94
0.00	803.05	0.94
0.00	823.00	0.94
0.00	847.47	0.94
0.00	858.25	0.93
0.00	874.10	0.93
0.00	876.06	0.93
0.00	883.46	0.93
0.00	876.95	0.93

```
 22      178.87     19.04    18.6     2.39     2.52     2       0.00    35.0
2379.42        0.00       876.08    0.93
 23      181.26     18.74    20.2     2.37     2.52     5      75.00    28.0
2155.26        0.00       803.73    0.96
 24      183.63     18.55    20.2     2.37     2.52     5      75.00    28.0
2132.84        0.00       795.22    0.96
 25      185.99     18.07    21.8     2.34     2.52     5      75.00    28.0
2077.83        0.00       774.73    0.96
 26      188.33     17.70    21.8     2.34     2.52     5      75.00    28.0
2035.64        0.00       758.69    0.96
 27      190.68      9.82    23.4     1.32     1.44     5      75.00    28.0
1129.79        0.00       735.99    0.96
 28      192.00     12.00    23.4     1.65     1.80     2       0.00    35.0
1495.96        0.00       770.48    0.93
 29      193.65     11.73    23.4     1.65     1.80     2       0.00    35.0
1452.83        0.00       748.27    0.93
 30      195.30     15.69    25.0     2.28     2.52     2       0.00    35.0
1927.85        0.00       709.46    0.93
 31      197.59     15.00    25.0     2.28     2.52     2       0.00    35.0
1823.33        0.00       670.99    0.93
 32      199.87     14.02    26.6     2.25     2.52     2       0.00    35.0
1685.32        0.00       621.35    0.93
 33      202.13     13.17    26.6     2.25     2.52     2       0.00    35.0
1561.63        0.00       575.75    0.93
 34      204.38     15.25    28.2     2.84     3.23     2       0.00    35.0
1774.91        0.00       512.79    0.93
 35      207.22      7.86    28.2     1.60     1.82     1      50.00    28.0
904.00         0.00       471.30    0.97
 36      208.82      5.42    29.8     1.18     1.36     1      50.00    28.0
623.34         0.00       436.13    0.98
 37      210.00      6.41    29.8     1.60     1.84     1      50.00    28.0
736.74         0.00       377.49    0.98
 38      211.60      4.94    29.8     1.60     1.84     1      50.00    28.0
568.09         0.00       287.84    0.98
 39      213.20      4.24    31.4     2.15     2.52     1      50.00    28.0
488.13         0.00       176.06    0.99
 40      215.35      1.41    31.4     2.15     2.52     1      50.00    28.0
162.71         0.00        48.75    0.99
                 --------                  -------                          -------
---
     X-S Area:     504.26    Path Length:     95.82              X-S Weight:
61515.02
```

AFFECTED LANDS:

HUNT DAVID W & HUNT KAYLEEN J: VARIOUS BUILDINGS, PONDS & ACCESS ROADS
TOTAL PERMIT AREA: 139.2 ACRES

FLOODPLAIN INFO:

FLOODPLAIN INFO: SITE IS LOCATED OUTSIDE THE FLOODPLAIN

EXISTING VEGETATION:

AGRICULTURAL FARM LAND

APPLICANT:

HUNT WATER, LLC
17295 HIGHWAY 85
PLATTEVILLE, CO 80651

NOTE:

CIVIL RESOURCES, LLC. IS NOT RESPONSIBLE FOR SAFETY, IN, ON, OR ABOUT THE PROJECT SITE, NOR FOR COMPLIANCE BY THE APPROPRIATE PARTY OF ANY REGULATIONS THERETO.

THESE MAPS WERE PREPARED BY CIVIL RESOURCES, LLC. IN COOPERATION WITH BESTWAY CONCRETE. BESTWAY WILL KEEP THE DIVISION OF RECLAMATION MINING AND SAFETY INFORMED OF ANY CHANGES TO THE MINING OR RECLAMATION PLANS THROUGH ANNUAL REPORTS AND FILE TECHNICAL REVISIONS AND AMENDMENT APPLICATIONS AS NECESSARY THROUGHOUT THE LIFE OF THE MINE.

A:\Scanned Signatures\Arod.jpg

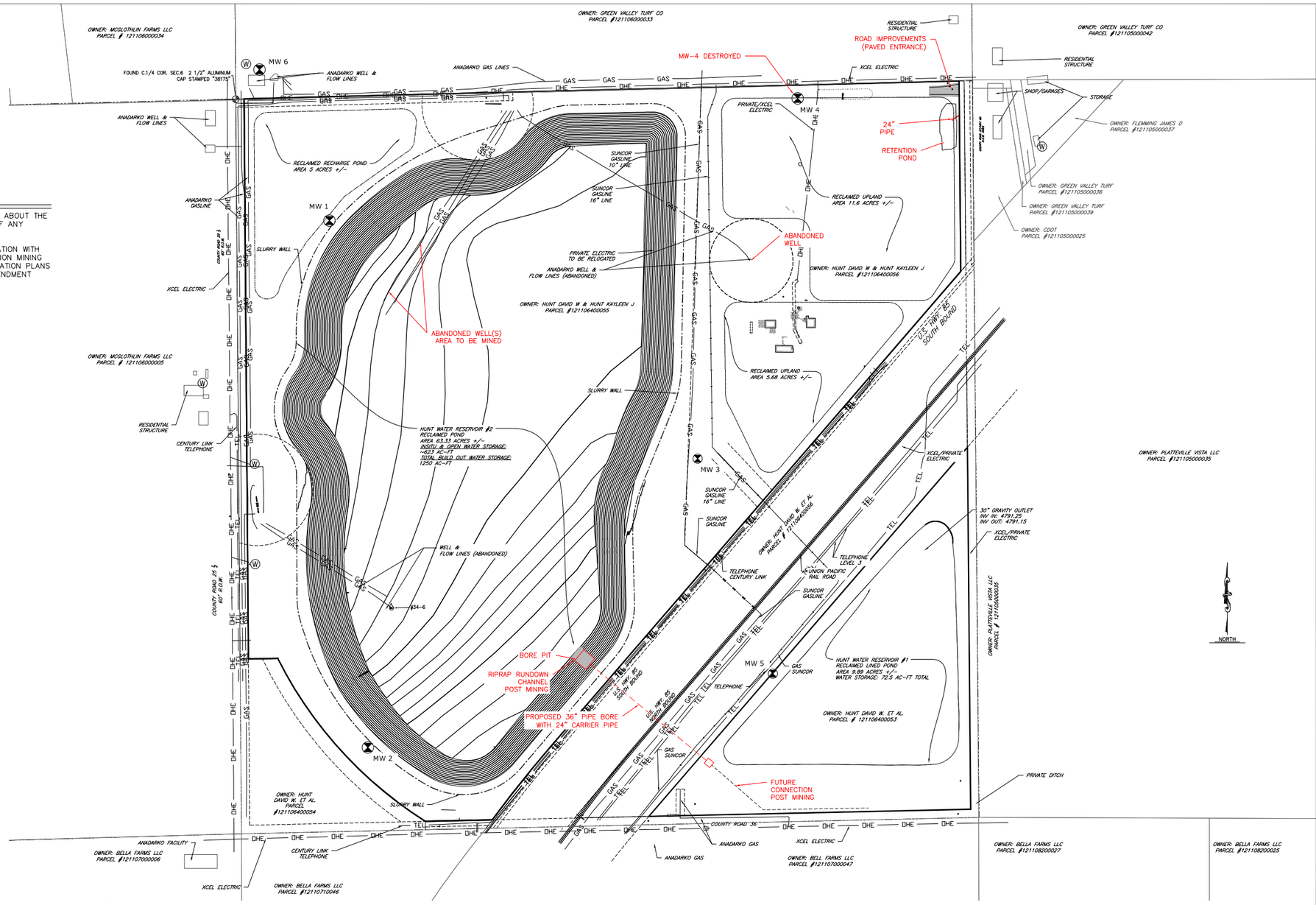
ANDREW R RODRIGUEZ, P.E.
CIVIL RESOURCES, LLC.

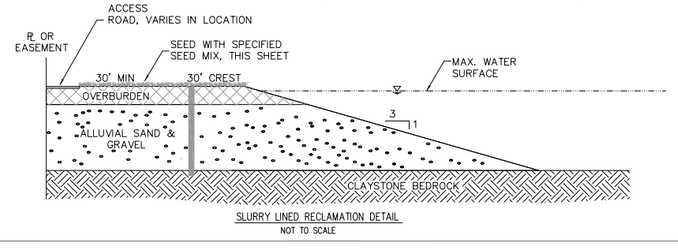
5/18/18
DATE

MAP LEGEND:

(M) DENOTES MEASURED BEARING AND/OR DISTANCE
(R) DENOTES RECORD BEARING AND/OR DISTANCE
SET 24" #5 REBAR & RED PLASTIC CAP "POINT LS38311"
SET NAIL & BRASS DISK "LS38311"
FOUND GOVERNMENT CORNER
FOUND CHISELED CROSS / CUT X
FOUND NAIL & DISK
FOUND IRON PIPE
FOUND REBAR
MONITORING WELL
BUILDING/STRUCTURE
SOIL TYPE
PERMIT BOUNDARY
SLURRY WALL
MINE HIGHWALL
SECTION LINE
RANGE LINE
BOUNDARY LINE
ADJACENT BOUNDARY LINE
EASEMENT LINE
FEMA DESIGNATION LINE
WATER LINE
STORM LINE
SANITARY LINE
IRRIGATION LINE
GAS LINE
ELECTRIC LINE (UNDERGROUND)
ELECTRIC LINE (OVERHEAD)
COMMUNICATION LINE
FIBER OPTIC LINE
MISCELLANEOUS/UNKNOWN LINE
PROPOSED MAJOR CONTOUR
PROPOSED MINOR CONTOUR

CROSS SECTION CALL OUT





SLURRY LINED RECLAMATION DETAIL
NOT TO SCALE

SEEDING SPEC FOR UPLAND AREAS:

COMMON NAME (VARIETY)	SCIENTIFIC NAME	LBS PLS/ACRE
SAND BLUESTEM	(CHAMP, CHET)	1
SAND LOVEGRASS	(BEND, NATIVE, NE27)	2.5
INDIAN RICEGRASS	(NEZPAR, RIMROCK)	3
PRAIRIE SANDREED	(GOSHEN)	0.75
GREEN NEEDLEGRASS	(LODORM)	1.5
LITTLE BLUESTEM	(BLAZE, CIMARRON, CAMPER)	0.75
YELLOW INDIANGRASS	(CHEYENNE, HOLT, SCOUT)	0.5
SWITCHGRASS	(BLACKWELL, NEBRASKA 28)	1.5
SAND DROPSEED		0.5
	TOTAL LBS PER ACRE:	12.0

8308 COLORADO BLVD. STE 200
FIRESTONE, CO 80504
303.833.1416
WWW.CIVILRESOURCES.COM

HUNT WATER, LLC
17295 HIGHWAY 85
PLATTEVILLE, CO 80651
970 534 0917
CONTACT: DHF

HUNT WATER, LLC GRAVEL MINE
WELD COUNTY, CO
RECLAMATION PLAN

REVISIONS

NO.	DESCRIPTION	DATE
1	AROD REDLINES	6/28/18
2	ADEQUACY-REVIEW	8/15/18
3	TECHNICAL REVISION - 02	07/29/22
4	TR-02	11-2-22

DESIGNED BY: ARR DATE: JULY 4, 2018
DRAWN BY: ARR SCALE: AS NOTED
CHECKED BY: ARR AS NOTED
JOB NO.: 105.012.001
DWG NAME: MINE-REC-PLAN 072922.DWG

RECLAMATION PLAN

SHEET: 4