

Varra Companies, Inc.

OFFICE OF SPECIAL PROJECTS

8120 Gage Street Frederick, Colorado 80516 Telephone (970) 353-8310 e-Mail: bljforester@msn.com

~~Friday 28 August 2020~~

Friday 20 November 2020

To: Peter Hays, E.P.S.
Colorado Office of Mined Land Reclamation (OMLR, or 'the Office')
Division of Reclamation Mining and Safety
1313 Sherman St., #215
Denver, CO 80203

From: Varra Companies, Inc.
Bradford Janes, Forester
Liaison – Interdisciplinary Affairs

Subject: TECHNICAL REVISION to OMLR for Permit M-2013-064 – Varra–
Coulson Resource Project – Status, Clarification, and Necessary Changes
to the GRADING PLAN and correlated Financial Warranty.

Legal Description: A parcel of land located in parts of W/2SW/4NE/4, and the
SE/4NE/4, and the NE/4NE/4; Section 10; all in Township 5 North;
Range 65 West; 6th P.M.; Weld County, Colorado

General Location: Actively South of the Cache la Poudre River – East of Fern Ave. –
North of 16th St.

Total Acres: 100.63±

This Technical Revision is intended to clarify planned grading and attending financial warranty considerations for Middle Field and South Field, for Permit M-2013-064, only. This Technical Revision clarifies, updates, and amends prior submittals and Annual Reports.

REVISION KEY – NOTE WELL: This EDIT of the Original Revision has the following Color Parameters:

BOLD BLACK – NO CHANGES – EMPHASIS ONLY

RED – LINED OUT – REMOVED OR EDITED

BLUE – EDIT OR RERVISION

CURRENT CONDITIONS/REVISIONS:

Middle Field (NO Changes):

1. Has conservatively a $2.5:1V \pm$ slope with apx. $15.00 \pm$ feet of vertical depth from the bottom of the soil profile until it hits the current floor.
2. Relocation of Greeley Irrigation Canal #3 will not occur, so the area planned for the reconstructed canal is being utilized for extraction and correlated reclamation as part of the finished basin or area of fill for Middle Field.

South Field (with implications for Middle Field) (NO Changes):

1. Has conservatively a $2.5H:1V \pm$ slope with an apx. $35-40 \pm$ feet of vertical depth to the current floor
2. The last remaining oil and gas facilities on the parcel have been abandoned and the area as previously buffered will now be extracted, consistent with the 2019–2020 OMLR Annual Report.
3. Aggregate extraction will eventually meet and expose the underlying geology. The unconsolidated underlying materials will be utilized for finished grading, and the perimeter slopes will rise from the basin bottom to near the extraction limits at the surface at $3H:1V$ or flatter. As grading is completed and finished slopes are compacted to meet the basin liner specifications established by the Colorado Division of Water Resources, the remainder of the finished slopes above the anticipated final water level of the basins will be re-soiled and vegetated as part of reclamation. Similarly, this method will also be employed at Middle Field, unless complete backfilling to the elevation of the original ground occurs instead.
4. Once extraction operations are reclaimed, the temporary access established as shown on the 2019–2020 OMLR Annual Report, may be removed, unless otherwise revised, and the affected lands reclaimed.
5. For continuity of extraction operations beyond the $8.55 \pm$ acres indicated in the 2019–20 OMLR Annual Report, it will become essential near that timeframe to clear the final area where the soil stockpile occurs. Correspondingly, gaining access to this location should incentivize finished grading and resoiling operations to the extent practical.
6. While the stockpiled soil is in excess of that required for reclamation, the necessary portion of the stockpile will be used over all affected lands lacking original soil and along the finished basin grades remaining above the anticipated static water level (groundwater levels) of the basin perimeters. Excess soil used for market may require relocation of the stockpile in whole or part to the extent necessary if this location is to be fully accessed for extraction. Relocation may occur within the permit location and existing areas

of extraction at Middle Field or South Field, or on the immediately adjacent lands of our approved Durham location, as part of this Revision.

OTHER REVISIONS/CORRECTIONS (NOTE: Slight variations from original measurements exist as reflected here below) **(REVISED IN REPLY TO ADEQUACY REVIEW #1:**

53.36±	Acres Extraction – South Field This Area now includes 0.45± acres of the Abandoned Oil & Gas Area shown in Red at South Field for the Area to be extracted as indicated in the 2019-20 OMLR Annual Report.
12.24±	Decreased by 0.68± Acres (11.56± Acres) - Extraction – Middle Field which now includes the 1.98± (now 1.806±) Acres designated for the Reconstructed segment of Canal #3 (now excludes 0.18± acres within the Poudre River 100± foot set-back area – AND increased setback from Canal #3).
65.60±	(now 64.92± Acres) Sub-total
10.75±	Acres Mineral Reserve – North Field – unchanged
76.35±	Sub-total Acres designated for Extraction
24.28±	Increased by 0.68± Acres (24.96± Acres) - Affected Lands beyond planned extraction limits (which includes temporary access of 0.24± Acres – and that portion of Canal #3, previously designated for extraction; as shown on the Exhibit C-2: Extraction Plan Map revision.
100.63±	TOTAL ACRES

The 24.96± acres of lands lying beyond the planned extraction limits for Middle and South Fields, may comprise planned or existing permanent access roads, areas of minor to no disturbance; including buffer areas, unaffected segments of Canal #3, and the Cache la Poudre River.

- Of the 64.92± acres of extractable area within Middle Field and South Field; 46.39± acres (or apx. ~~70.7~~ 71.5%) are actively under extraction since the permit issue date. Extraction will continue within these Fields as identified in the August 2020 OMLR Annual Report.
- Extraction depths may prove deeper than 40 feet, as depths of 40± feet only reveal trace amounts of weathered bedrock. Since depths could occur to 60± feet **or greater**, extraction will now cut at 3H:1V from the present floor near 40± feet to final anticipated depths; which remains consistent with the safety factor (where these slopes are to occur at 20± feet from the anticipated basin bottom).
- Further, the exiting 2.5H:1V± slopes above are shallower than the approved 1.25H:1V± provided for in the original application, as approved; providing

additional stability for these slopes until finish grading occurs. Slopes may still be extracted to 1.25H:1V± as part of concurrent finished grade to a depth of ~~40±~~ 60±feet (PER UPDATED STABILITY ANALYSIS REPORT, as included) from the approximate surface (original statement with emphasis – however, if slopes exceed 2.5H:1V, OR DEPTHS GREATER THAN 60 FEET – they may require additional financial warranty if not covered by finished grading within the constraints of the warranty established by this Revision).

- The previous rate of extraction has been so rapid leading into the year 2020, it shortened the anticipated life of the mine by nearly 12± years to date, or nearly 50± percent of the anticipated extraction timeline. (Please NOTE: This revision does not intend to shorten the Life of the Mine as originally stated, merely to report that the increased rate of extraction to date necessitated the changes provided under this Revision. This is intimated by the discovery and attainment of additional deposit volumes at deeper levels within the areas of extraction).
- The rate of extraction simply outpaced mining methods intended to maintain concurrency of finished slope establishment, essentially increasing the perimeter length of the unfinished margins of extraction. This correction to the grading plan adjusts the financial warranty to fully account for the entire perimeter length to depth at the Extraction Limits, where backfilling of the finished slopes and finished grading will ultimately occur.
- ~~Warranty cost estimate are updated here under necessary revisions to grading that have and will occur as determined by field examination and supplemental data and comparison with the warranty calculations provided at the time of the permit by the OMLR, support that the values determined and reflected here are reasonable.~~ The value of \$1.263/LCY from the original warranty is applied here for the final perimeter areas and volumes for Middle Field and South Field, respectively. NOTE: Volumes are based upon a 40± foot uniform depth with slopes of 2.5H:1V±. Slopes deeper than 40± depth will be at 3H:1V± or flatter.

The included Maps is enlarged at 1 inch = 100 feet to better reflect the measurements and locations of features utilized to determine fill volumes needed to bring the reclaimed basin slopes from the current mean extracted slopes of 2.5H:1V± to a 3H:1V± grade as determined for the completed perimeter area reflected on the revised Extraction Limits of South Field and Middle Field.

We believe interim existing perimeter slopes are stable under current active extraction, and are in the majority *effectively* 2.5H:1V± to 3H:1V±; and all are well above the 1.25H:1V± slopes allowed in the original approved permit when considering the interruption of extracted slopes by benching and pit access features. Still, the perimeter extent of the Extraction Limits is greater and warranty needs to reflect

costs anticipated for grading the final perimeter slopes to 3H:1V± from the 2.5H:1V± slopes evident over the location, as follows:

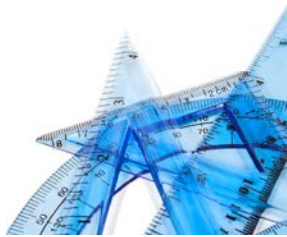
~~\$ 70,681.68±~~ The Operator consents to the OMLR estimated
\$ 137,199.00± Warranty Increase needed for the Revised Grading Plan.

-fin-

cc. Garrett C. Varra, Vice-President of Operations
Varra Companies, Inc.

Attachments:

- Updated [Exhibit C-2](#) Extraction (Grading) Plan Map.
- Updated [Exhibit F – Reclamation](#) Plan Map.
- [Updated AWES Stability Analysis Report of 9 November 2020](#)
- Proof of Placement with Weld County, Colorado – Clerk to the Board.



November 9, 2020

State of Colorado
Division of Reclamation, Mining and Safety
1313 Sherman Street, Rm 215
Denver, CO 80203
Attn: Mr. Peter Hays

RE: AWES Revised Coulson Slope Analysis

Dear Mr. Hays:

This letter and attachments are in response to a request by Varra Companies, Inc. (Varra), to conduct a revised slope stability analysis at the Coulson mine (Pit 121). Varra obtained representative soil samples at four locations depicted on Figure 1. The samples were obtained just above the mine floor (~40' below ground surface (bgs)) beneath any ravel deposits. The samples were composited for a single shear strength analysis. The samples were submitted to Engineering Analytics of Fort Collins, Colorado for direct shear testing. The data sheets from their analysis are presented as Attachment A. A summary of the geotechnical parameters used in our analysis are presented in Table 1.

Table 1 – Soil Strength Properties

Material	Wet Unit Weight (lbs/cu ft.)	Saturated Unit Weight (lbs/cu ft.)	Cohesive Intercept (PSF)	Friction Angle
Overburden Clay*	114	126	150	28
Sand, with gravel	116.5**	131**	0*	45.27**
Clay*	116	119	200	22

Note: * Unit weight and cohesion values (table values) reported by DRMS

** Unit weight and cohesion values reported by Engineering Analytics data

AWES, Inc., used PC Stable to predict mine slope safety factors. AWES ran a worst case scenario analysis using a slope of 1.25:1 at a mine depth of 60 feet bgs. The soil profile was made based on information provided from drilling logs generated in 2000 (Hanes Property report). These logs are provided as Attachment B. The soil profile from boring H-14 was used as it was one of the deepest borings and is near an extraction boundary.

The worst case analysis indicates a safety factor of 1.354 at a mine depth of 60 feet bgs – this analysis also included a water table parameter with the slope of the water table being estimated based on a Theis solution. The PC-Stable data sheets are presented as Attachment C.

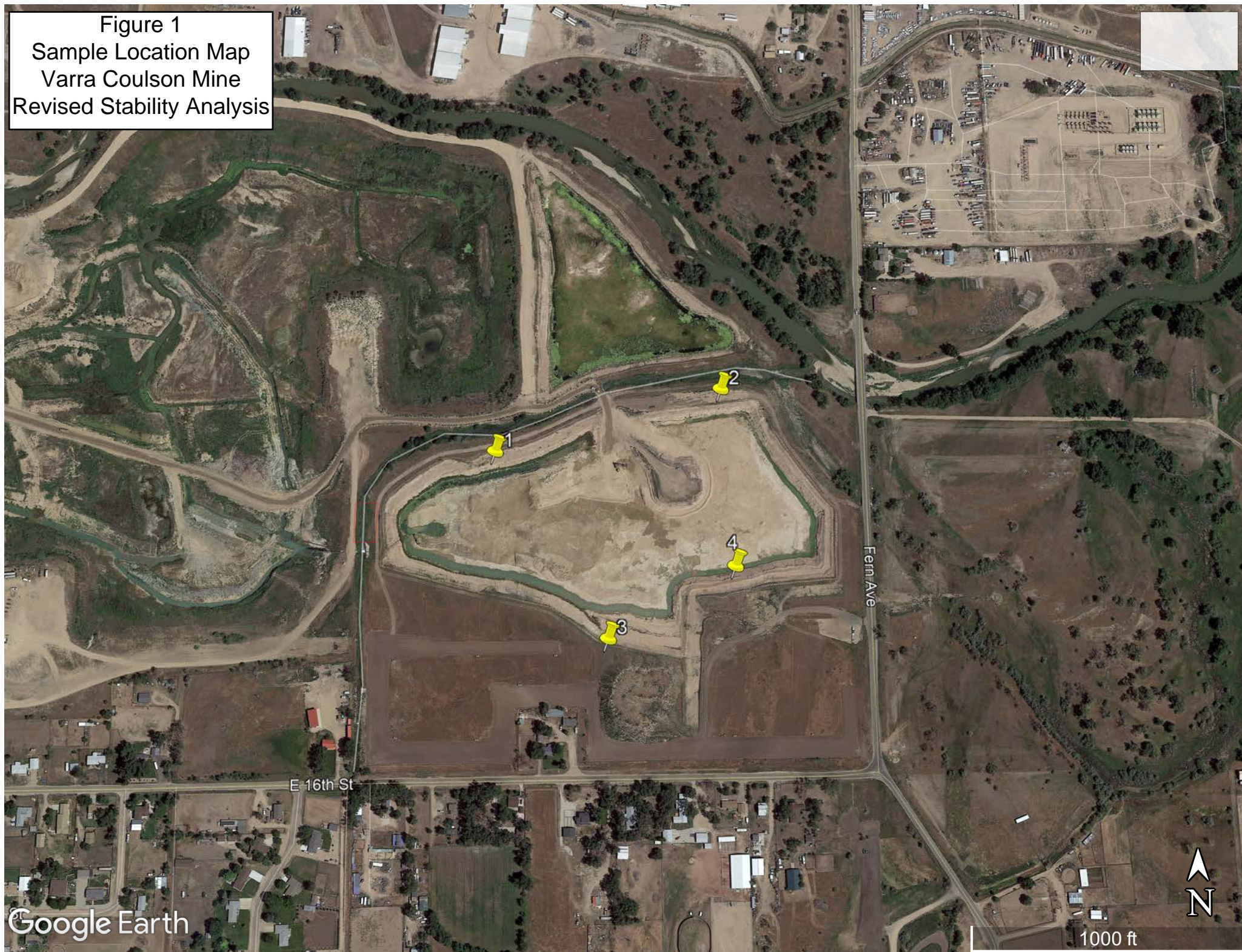
If you have any questions regarding this letter or attachments, please contact me at 970-590-3807.

Sincerely,
AWES, LLC

A handwritten signature in black ink, appearing to read 'Joby Adams', with a stylized, cursive script.

Joby L. Adams, P.G.
Principal/Hydrogeologist

Figure 1
Sample Location Map
Varra Coulson Mine
Revised Stability Analysis



ATTACHMENT A

DIRECT SHEAR TESTING RESULTS



October 19, 2020
Project No. 111077

Joby Adams
AWES, LLC
4809 Four Star Ct.
Fort Collins, CO 80524

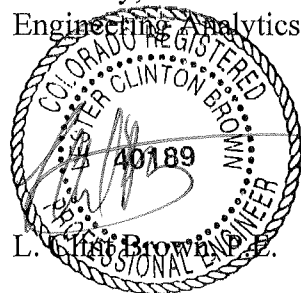
Dear Mr. Adams,

Enclosed are copies of the test results indicated below for the Varra – Coulson Pit Project.

- ☐ Proctor Density Curve-Maximum Density and Optimum Moisture
- ☐ Sieve Analysis
- ☐ Concrete Test Reports
- ☐ Masonry Test Reports
- ☐ Field Density/Moisture Reports
- ☐ Temperature Monitoring Graph
- ☒ Direct Shear Test

If you have any questions, please contact our office.

Sincerely,
Engineering Analytics, Inc.



L. Clinton Brown, P.E.

SUMMARY OF LABORATORY TEST RESULTS

JOB NAME: Varra - Coulson Pit JOB NUMBER: 111077 DATE: 10/19/2020

	Sample Type	Moisture (%)	Pinhole Dispersion	Atterberg Limits (LL / PL / PI)	Percent Passing No. 200 (%)	Grain Size Analysis	Remolded Density	**Direct Shear (ASTM D3080)		Flexwall Permeability (cm/sec)
								Φ (deg)	C (psf)	
5% Strain	BKT						116.5 @ 4.8	45.27	5.79	
10% Strain	BKT						116.5 @ 4.8	48.74	5.71	
Max Strain	BKT						116.5 @ 4.8	48.68	46.30	

** Estimated friction angle Direct Shear Confining Pressures: 1000, 2000, 4000psf (1) = See Attached

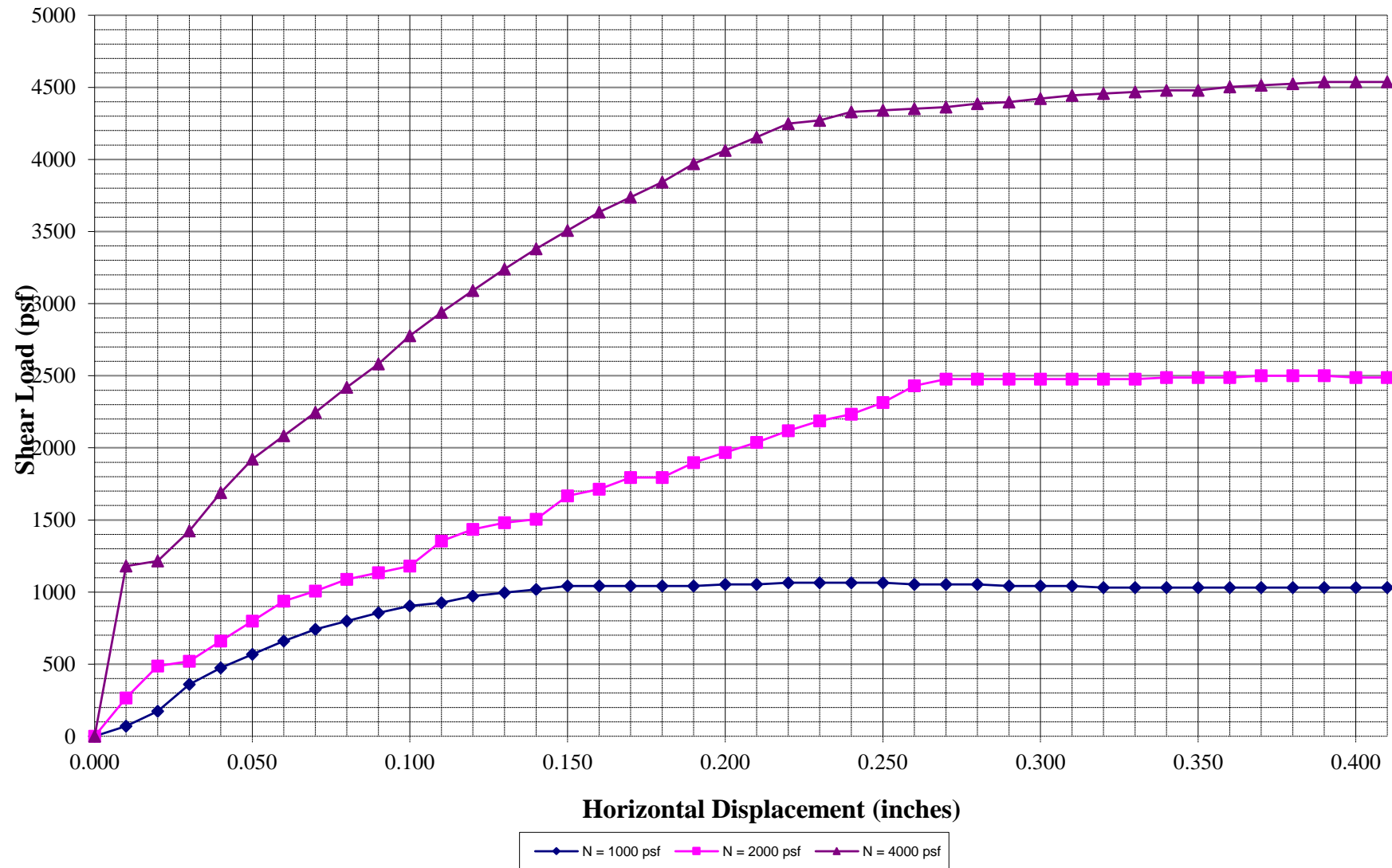
ENGINEERING ANALYTICS							
CONSOLIDATED DRAINED DIRECT SHEAR TEST							
		Varra - Coulson Pit					
Sample Data:							
Bulk Unit Weight (pcf):	122.1		NORMAL	PEAK	SHEAR LOAD	SHEAR LOAD	
Dry Unit Weight (pcf):	116.5		LOAD	SHEAR	AT 5%	AT 10%	
moisture content (%):	4.8		(psf)	LOAD	STRAIN	STRAIN	
sample mass (grams):	426.0			(psf)	(psf)	(psf)	
sample diameter (inch):	3.98						
sample height (inch):	1.12		1000.0	1065	1053	1030	
sample area (sq inch):	12.44		2000.0	2500	1968	2489	
shear rate (inch per min.):	0.002500		4000.0	4537	4063	4537	
NORMAL	SHEAR	SHEAR	HORIZ	HORIZ		HORIZ	SHEAR
LOAD	LOAD	LOAD	DIAL	DISP		DISP	LOAD
(psf)	(lbs)	(psf)	0.001(inch)	(inch)		(inch)	(psf)
1,000	0	0	560	0.000		0.000	0
1,000	6	69	570	0.010		0.010	69
1,000	15	174	580	0.020		0.020	174
1,000	31	359	590	0.030		0.030	359
1,000	41	475	600	0.040		0.040	475
1,000	49	567	610	0.050		0.050	567
1,000	57	660	620	0.060		0.060	660
1,000	64	741	630	0.070		0.070	741
1,000	69	799	640	0.080		0.080	799
1,000	74	857	650	0.090		0.090	857
1,000	78	903	660	0.100		0.100	903
1,000	80	926	670	0.110		0.110	926
1,000	84	972	680	0.120		0.120	972
1,000	86	995	690	0.130		0.130	995
1,000	88	1019	700	0.140		0.140	1019
1,000	90	1042	710	0.150		0.150	1042
1,000	90	1042	720	0.160		0.160	1042
1,000	90	1042	730	0.170		0.170	1042
1,000	90	1042	740	0.180		0.180	1042
1,000	90	1042	750	0.190		0.190	1042
1,000	91	1053	760	0.200		0.200	1053
1,000	91	1053	770	0.210		0.210	1053
1,000	92	1065	780	0.220		0.220	1065
1,000	92	1065	790	0.230		0.230	1065
1,000	92	1065	800	0.240		0.240	1065
1,000	92	1065	810	0.250		0.250	1065
1,000	91	1053	820	0.260		0.260	1053
1,000	91	1053	830	0.270		0.270	1053
1,000	91	1053	840	0.280		0.280	1053
1,000	90	1042	850	0.290		0.290	1042
1,000	90	1042	860	0.300		0.300	1042
1,000	90	1042	870	0.310		0.310	1042
1,000	89	1030	880	0.320		0.320	1030
1,000	89	1030	890	0.330		0.330	1030
1,000	89	1030	900	0.340		0.340	1030
1,000	89	1030	910	0.350		0.350	1030
1,000	89	1030	920	0.360		0.360	1030
1,000	89	1030	930	0.370		0.370	1030
1,000	89	1030	940	0.380		0.380	1030
1,000	89	1030	950	0.390		0.390	1030
1,000	89	1030	960	0.400		0.400	1030
1,000	89	1030	970	0.410		0.410	1030

ENGINEERING ANALYTICS							
CONSOLIDATED DRAINED DIRECT SHEAR TEST							
Varra - Coulson Pit							
NORMAL	SHEAR	SHEAR	HORIZ	HORIZ		HORIZ	SHEAR
LOAD	LOAD	LOAD	DIAL	DISP		DISP	LOAD
(psf)	(lbs)	(psf)	0.001(inch)	(inch)		(inch)	(psf)
2,000	0	0	560	0.000		0.000	0
2,000	23	266	570	0.010		0.010	266
2,000	42	486	580	0.020		0.020	486
2,000	45	521	590	0.030		0.030	521
2,000	57	660	600	0.040		0.040	660
2,000	69	799	610	0.050		0.050	799
2,000	81	938	620	0.060		0.060	938
2,000	87	1007	630	0.070		0.070	1007
2,000	94	1088	640	0.080		0.080	1088
2,000	98	1134	650	0.090		0.090	1134
2,000	102	1181	660	0.100		0.100	1181
2,000	117	1354	670	0.110		0.110	1354
2,000	124	1435	680	0.120		0.120	1435
2,000	128	1482	690	0.130		0.130	1482
2,000	130	1505	700	0.140		0.140	1505
2,000	144	1667	710	0.150		0.150	1667
2,000	148	1713	720	0.160		0.160	1713
2,000	155	1794	730	0.170		0.170	1794
2,000	155	1794	740	0.180		0.180	1794
2,000	164	1898	750	0.190		0.190	1898
2,000	170	1968	760	0.200		0.200	1968
2,000	176	2037	770	0.210		0.210	2037
2,000	183	2118	780	0.220		0.220	2118
2,000	189	2188	790	0.230		0.230	2188
2,000	193	2234	800	0.240		0.240	2234
2,000	200	2315	810	0.250		0.250	2315
2,000	210	2431	820	0.260		0.260	2431
2,000	214	2477	830	0.270		0.270	2477
2,000	214	2477	840	0.280		0.280	2477
2,000	214	2477	850	0.290		0.290	2477
2,000	214	2477	860	0.300		0.300	2477
2,000	214	2477	870	0.310		0.310	2477
2,000	214	2477	880	0.320		0.320	2477
2,000	214	2477	890	0.330		0.330	2477
2,000	215	2489	900	0.340		0.340	2489
2,000	215	2489	910	0.350		0.350	2489
2,000	215	2489	920	0.360		0.360	2489
2,000	216	2500	930	0.370		0.370	2500
2,000	216	2500	940	0.380		0.380	2500
2,000	216	2500	950	0.390		0.390	2500
2,000	215	2489	960	0.400		0.400	2489
2,000	215	2489	970	0.410		0.410	2489

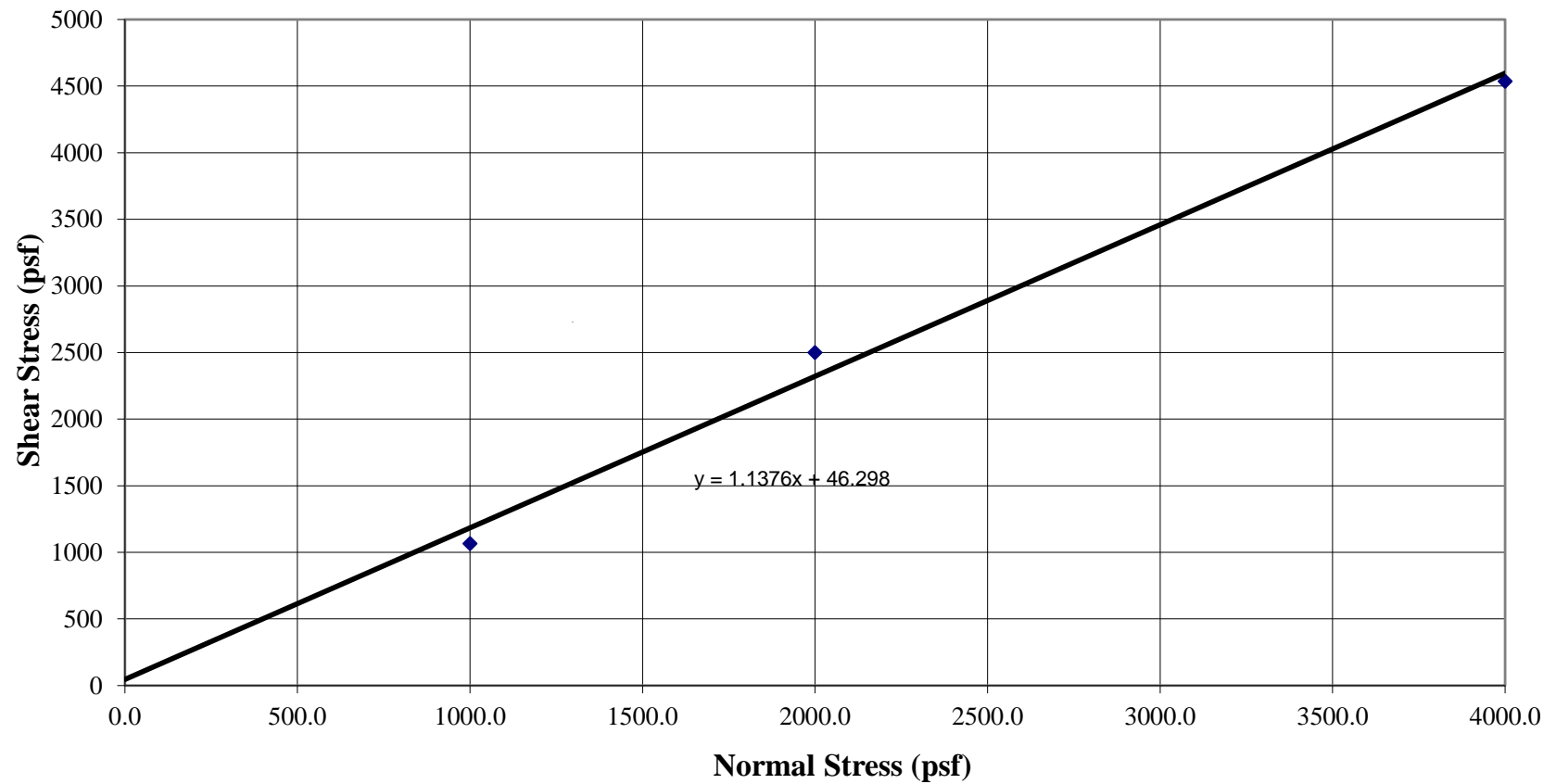
ENGINEERING ANALYTICS							
CONSOLIDATED DRAINED DIRECT SHEAR TEST							
		Varra - Coulson Pit					
NORMAL	SHEAR	SHEAR	HORIZ	HORIZ		HORIZ	SHEAR
LOAD	LOAD	LOAD	DIAL	DISP		DISP	LOAD
(psf)	(lbs)	(psf)	0.001(inch)	(inch)		(inch)	(psf)
4,000	0	0	560	0.000		0.000	0
4,000	102	1181	570	0.010		0.010	1181
4,000	105	1215	580	0.020		0.020	1215
4,000	123	1424	590	0.030		0.030	1424
4,000	146	1690	600	0.040		0.040	1690
4,000	166	1921	610	0.050		0.050	1921
4,000	180	2083	620	0.060		0.060	2083
4,000	194	2245	630	0.070		0.070	2245
4,000	209	2419	640	0.080		0.080	2419
4,000	223	2581	650	0.090		0.090	2581
4,000	240	2778	660	0.100		0.100	2778
4,000	254	2940	670	0.110		0.110	2940
4,000	267	3090	680	0.120		0.120	3090
4,000	280	3241	690	0.130		0.130	3241
4,000	292	3380	700	0.140		0.140	3380
4,000	303	3507	710	0.150		0.150	3507
4,000	314	3634	720	0.160		0.160	3634
4,000	323	3739	730	0.170		0.170	3739
4,000	332	3843	740	0.180		0.180	3843
4,000	343	3970	750	0.190		0.190	3970
4,000	351	4063	760	0.200		0.200	4063
4,000	359	4155	770	0.210		0.210	4155
4,000	367	4248	780	0.220		0.220	4248
4,000	369	4271	790	0.230		0.230	4271
4,000	374	4329	800	0.240		0.240	4329
4,000	375	4340	810	0.250		0.250	4340
4,000	376	4352	820	0.260		0.260	4352
4,000	377	4364	830	0.270		0.270	4364
4,000	379	4387	840	0.280		0.280	4387
4,000	380	4398	850	0.290		0.290	4398
4,000	382	4422	860	0.300		0.300	4422
4,000	384	4445	870	0.310		0.310	4445
4,000	385	4456	880	0.320		0.320	4456
4,000	386	4468	890	0.330		0.330	4468
4,000	387	4479	900	0.340		0.340	4479
4,000	387	4479	910	0.350		0.350	4479
4,000	389	4503	920	0.360		0.360	4503
4,000	390	4514	930	0.370		0.370	4514
4,000	391	4526	940	0.380		0.380	4526
4,000	392	4537	950	0.390		0.390	4537
4,000	392	4537	960	0.400		0.400	4537
4,000	392	4537	970	0.410		0.410	4537

Direct Shear Test ASTM D3080

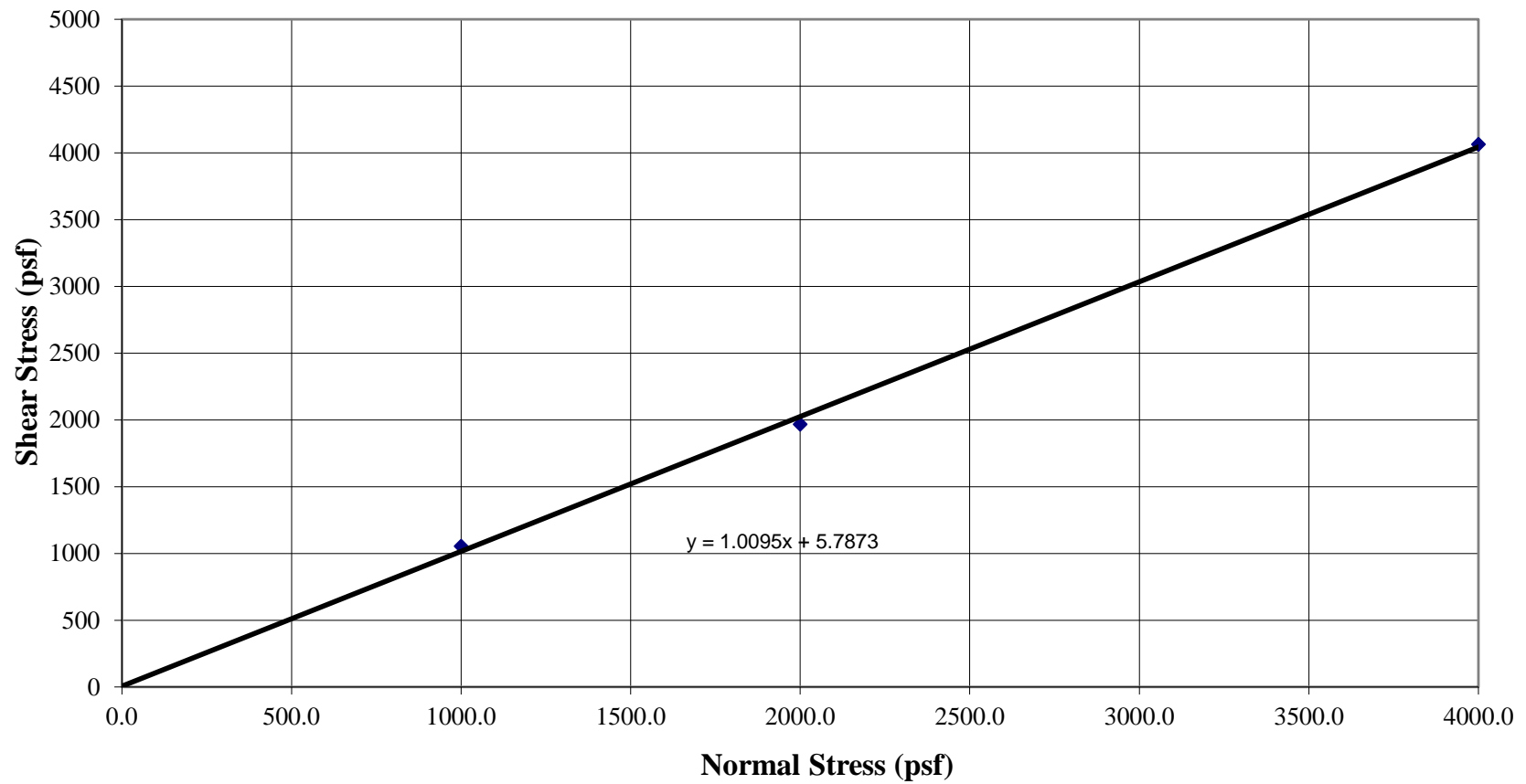
Varra - Coulson Pit



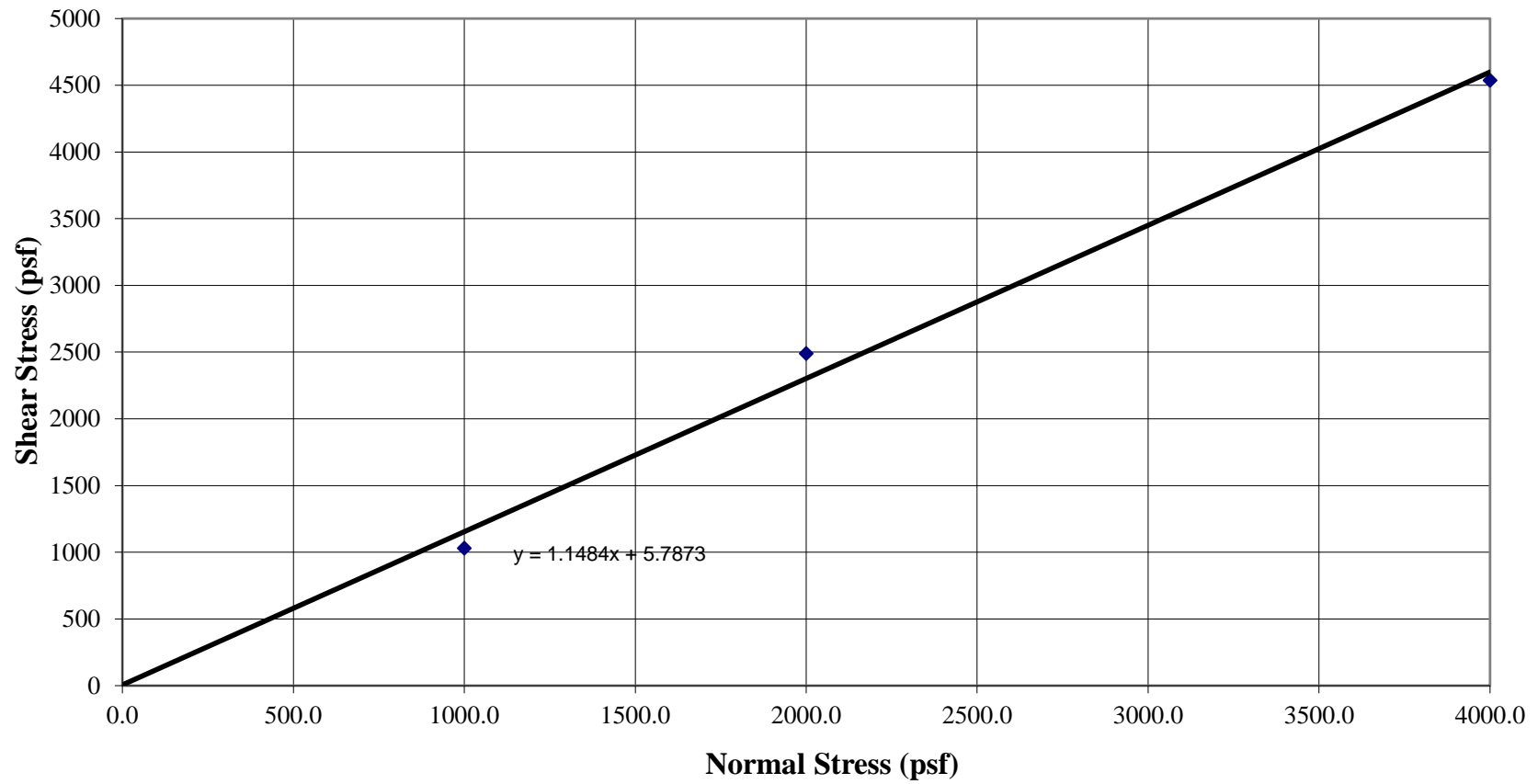
Direct Shear Test ASTM D3080
Varra - Coulson Pit
Max Stress



Direct Shear Test ASTM D3080
Varra - Coulson Pit
5% Strain



Direct Shear Test ASTM D3080
Varra - Coulson Pit
10% Strain



ATTACHMENT B

BORING LOGS

HANES PROPERTY

PRELIMINARY ANALYSIS

Prepared For:

Kauffman & Son, Inc.
808 South County Road 9E
Loveland, Colorado 80537

Prepared By:



TuttleApplegate, Inc.

Consultants for Land, Mineral and Water
11990 Grant Street, Suite 304, Denver, CO 80233
TELEPHONE: (303) 452-6611 FAX: (303) 452-2759

April 2000
TA Job #00-153

RESERVE CALCULATIONS

Preliminary reserve calculations on the Hanes property were obtained using the following assumptions:

- The limit of mining was set back from the east and south property boundary by 50 feet, from the top of the ditch by 35 feet and from the river by 100 feet.
- The area would be mined using 2H:1V slopes around the perimeter.
- The existing ground elevation is an average of 4615 feet.
- Based on the limited site visit, we did not exclude any area due to wetlands.
- We used 1.5 tons per cubic yard to calculate the "gross" sand and gravel tonnage.
- To account for unmarketable fines, the gross tons are reduced by 8% to obtain the "saleable" product.
- Four acres were reserved for the current property owners house and limited corrals for horses and cattle.
- Approximate locations of tree buffers were determined from the site visit and an aerial photo
- The approximate location of a gas well and associated storage tank was determined from the site visit and an aerial photo.

Mining Cell Area – 60 acres

Overburden Volume – 247,300 cubic yards

Mining Volume - 3,285,300 cubic yards

Mining Volume – 4,927,950 tons (gross)

Saleable Volume – 4,533,700 tons

It is possible that gravel reserves are deeper in this area than the bore logs indicate. This area is known to have clay lenses and potential reserves at 60 to 70 feet. Holes H-7 and H-14 passed through clay lenses and are at opposite sides of the property. Re-drilling at a couple of locations may be prudent to verify this.

SITE ACCESS

This site is bounded on two sides by two-lane asphalt roads. This area is unincorporated Weld County, but is very close to town. It is unknown at this time who is responsible for the road maintenance, Greeley or Weld County.

Potential haul routes could be either directly west on 16th Street to SH 85, north on Fern Avenue to Highway 263 then west to SH 85, or south on Fern to pick up SH 34 back to SH 85. Using 16th to the west may be a concern as there are numerous residential properties between this site and the highway. Additional truck traffic could be a major concern. It is not known if the bridge currently existing over the river on Fern Ave. is sufficiently rated to allow hauling of material in that direction.

COUNTY CONCERNS

As this site is so very close to the limits of the City of Greeley, any concerns over additional truck traffic, haul routes, noise and dust impacts to local residents will be carefully considered. At this time we do not know of any local concerns that could potentially stop the project. A trail easement may be required on the area adjacent to the river as there is an existing Master Plan for the Poudre River Trail Project.

OTHER CONCERNS

As this site is bounded on the north by the Poudre River and has what seems to be an old meander of the river in the north portion, the area should be examined for potential habitat for the Preble's Meadow Jumping Mouse and any potential Orchid habitat. Based on our site visit, there does not appear to be wetlands on the property, but this should be verified by a qualified individual.

WATER ISSUES

Attached is a memo from Steve Nguyen, outlining alternatives for end uses of the site. Richard Raines of our office is researching existing water rights for this site and compiling information on the potential requirements for augmentation. His information will be forwarded as soon as it is available.



TuttleApplegate, Inc.

Consultants for Land, Mineral and Water Development

Memorandum

Date: 4-5-00

TA Job # 00-153

To: Pam Acre

From: Steve Nguyen *SN*

Subject: Hanes Property

The Hanes Property is located in Section 10, Township 5 N, Range 65 W, east of Greeley near the confluence of the Cache la Poudre and the South Platte Rivers. Due to the location near the confluence, the gravel deposits are much deeper with bedrock estimated at 60-80 feet. Prior to the purchase of this property, there are different end land uses that should be considered.

The intent of this letter is to provide a brief understanding of the various end land use alternatives. No evaluation was performed for this site specifically, but the estimates given are based on past experiences and knowledge of the area. The estimates are merely provided to help understand the potential values and costs associated with each alternative, but are limited by the fact that a detailed evaluation has not been completed for this particular site.

There are three end land uses that can be considered with a gravel pit:

Alternative A – The gravel pit will be backfilled. This end land use alternative requires no augmentation of evaporative losses.

Alternative B – The gravel pit will be left unlined. This end land use alternative requires augmentation of evaporative losses.

Alternative C – The gravel pit will be developed into lined storage. This end land use alternative requires creating water storage by lining the gravel pit to segregate the lake from the surrounding groundwater system.

Alternative A - Backfill

This is a potential end land use to eliminate any augmentation responsibility. Because the gravel deposits are so deep, however, there most likely is not enough overburden to backfill the entire pit.

Alternative B - Augmentation

Gravel pit augmentation requires replacements to the river due to evaporation from the unlined lake surface in both the summer and the winter months. Typically, ditch water is used for summer augmentation. This ditch water must be senior and thus have a reliable delivery each year. Winter augmentation can be provided through a lease for temporary replacement, but lined storage is generally needed for long-term winter augmentation. Winter augmentation includes water that is needed for replacement of evaporative losses and water that is required to maintain historic return flows. Evaporative loss for this area is approximately 2.9 acre-feet/acre exposed annually. Return flow obligations are approximately 20% of the total irrigation requirement.

For this area, the approximate acquisition cost of senior ditch water that can be used for summer augmentation is approximately \$2000-\$2500 per acre-foot consumptive use. Winter storage for augmentation and maintaining historic return flows is estimated at \$1000-\$1500 per acre-foot. Note that if the property has senior water rights attached to it, such as Greeley Canal No. 3, then this water can be used for augmentation and the cost of purchasing new water would decrease or be eliminated. However, a change of use would be required on the existing water rights to allow them to be used for augmentation.

With this end land use alternative, there is potential value in selling the property as open space or for development. An estimated value for open space is \$5000 per acre.

Weld County zoning ordinances require that any development be located outside the 100-year floodplain. Due to the site being located next to the river, development of this property may not be an option. An estimated range for development value is \$20,000-\$50,000 per acre.

Alternative C - Lined Storage

There are several factors that influence the value of lined storage: competition in the area, location on the river, and location in relation to filling structures. Having the Greeley Canal No. 3 as a potential filling structure adds value to creating storage at this site. In addition, the location of the Hanes Property on the river has exchange potential for several municipalities and may add to the competition for the site.

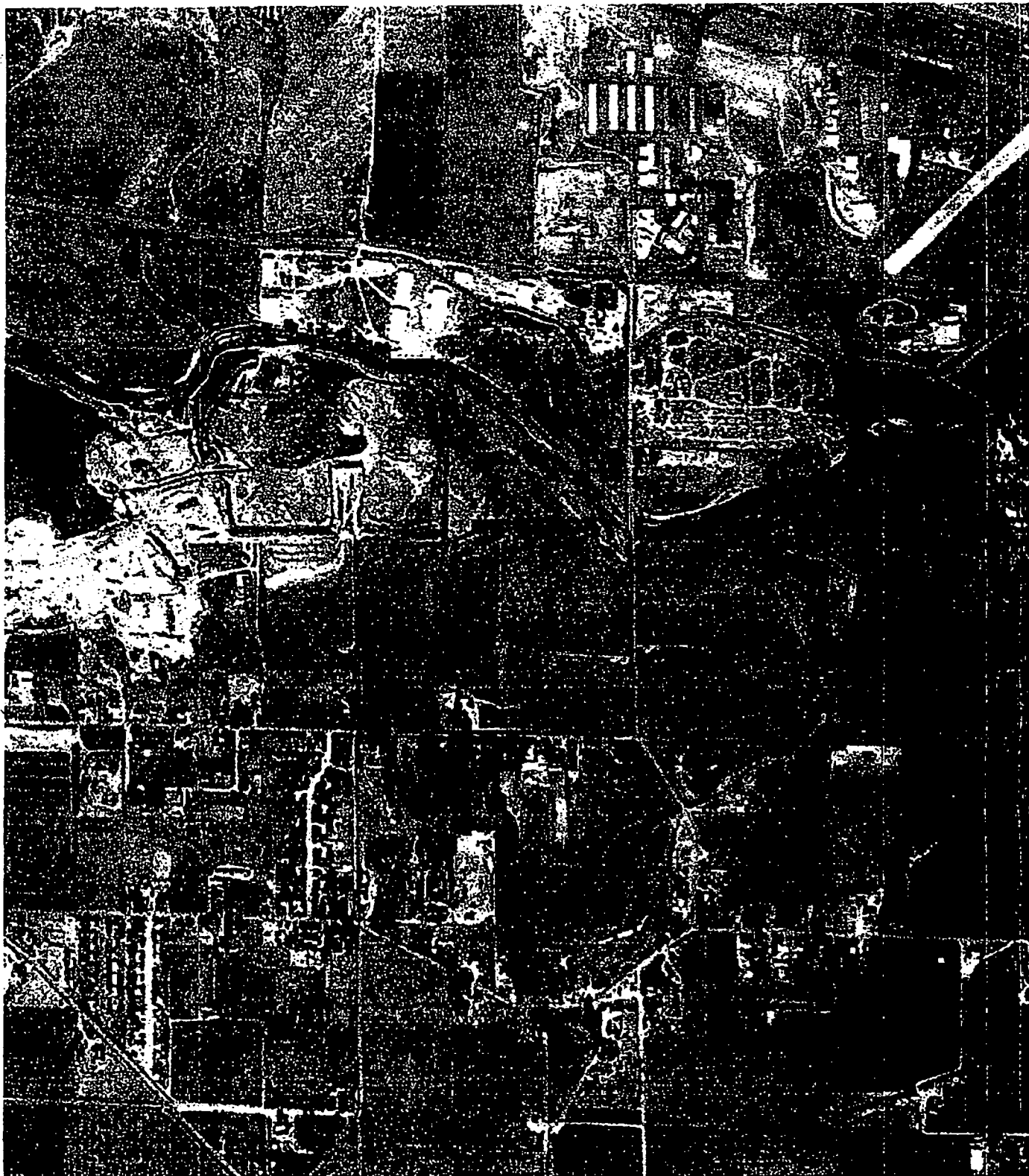
There are costs associated with lining a gravel pit for storage. The two most common methods of lining are a compacted clay liner and a slurry wall. Slurry walls are typically more expensive. If there are not sufficient on-site clays, however, using a compacted clay liner also becomes very expensive.

In almost all cases, the value of storage once a gravel pit is lined far exceeds the cost for the actual liner. Gravel pit storage values have a large range, depending on the factors listed above. Past sales have been from approximately \$1000-\$2600 per acre-foot of storage. Due to the location of this site, the value is most likely on the lower end of this range. Even with the "low end" value, the value of lined storage at this site may exceed the cost to line.

It is difficult to evaluate what the true potential is for this site with only a brief analysis. There is potential value of this site as lined storage, but a detailed evaluation would need to be completed to develop a full understanding of this particular site.

I hope the information provided will assist you in the understanding of the possible end land uses. The numbers given should help you see the potential value of lined storage as an alternative and the approximate cost of augmentation if the pit is left unlined. If it is determined that this site will be purchased, it may be beneficial to meet with the City of Greeley to discuss, up front, their potential interest in lined storage at this location. Todd Williams would be the contact at the City of Greeley Water Department.

If you have any questions, please do not hesitate to call.



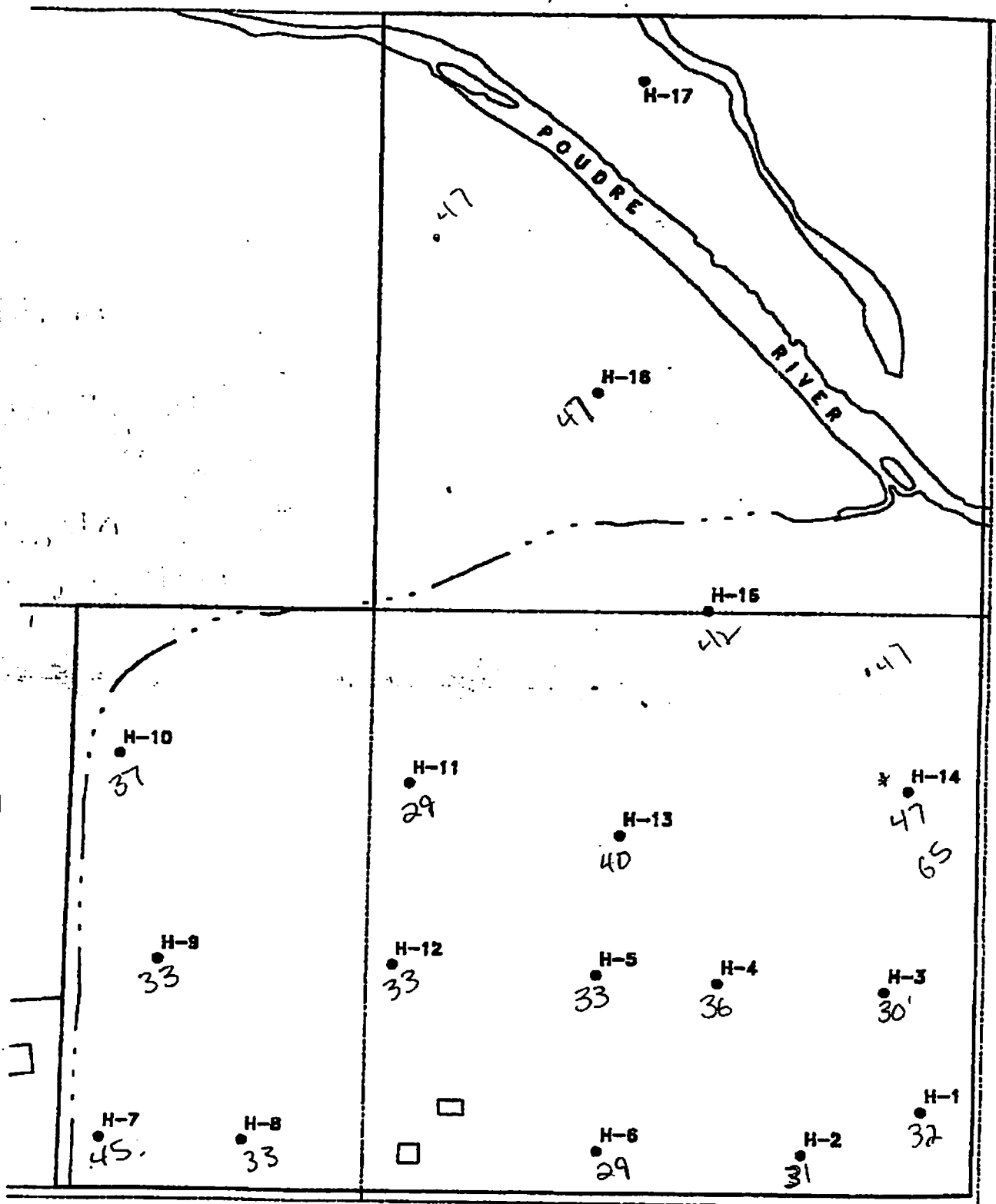
Date: 4/3/00
 Job No: 00-153
 Drawn: LPS
 Design:
 Checked: PTA
 File: Vicinity-map.DWG
 Scale: 1"=4,000'

HANES PROPERTY
KAUFFMAN & SON, INC.



TuttleApplegate, Inc.
 Consultants for Land, Minerals, and Water

11999 Glen Street - Suite 304
 Denver, Co. 80233
 (303) 452-4611 Fax: (303) 452-2759
 WWW: www.tuttleapplegate.com



PREPARED FOR:	TITLE:
PREPARED BY:	DATE: AS SHOWN
	DRAWING NO.:

MANAGE PROPERTY

HANES PROPERTY Lithologic Logs

HOLE H-1

0'-0" to 2'-0" Overburden/TopSoil; dark brown
2'-0" to 20'-0" Sand & Gravel; tan, medium to coarse grained, gravel to 2"
20'-0" to 32'-0" As Above; fine to medium grained, Gravel to 1"
32'-0" to 40'-0" Clay; gray
TD
Composite sample taken from 2' to 32'

HOLE H-2

0'-0" to 3'-0" Overburden/TopSoil; dark brown
3'-0" to 6'-0" Sand; tan, fine grained, H2O at 3 ft.
6'-0" to 15'-0" Sand & Gravel; fine to medium grained, gravel to 1"
15'-0" to 31'-0" As Above; medium to coarse grained, gravel to 3"
31'-0" to 40'-0" Clay; gray
TD
Composite sample taken from 3' to 31'

HOLE H-3

0'-0" to 1'-0" Overburden/TopSoil; dark brown
1'-0" to 7'-0" Sand & Gravel; fine to medium grained, gravel to 3"
7'-0" to 30'-0" As Above; medium to coarse grained, gravel to 2"
30'-0" to 35'-0" Clay; gray
TD
Composite sample taken from 1' to 30'

HOLE H-4

0'-0" to 3'-0" Overburden/TopSoil; black
3'-0" to 4'-0" Silt; tan, very fine grained
4'-0" to 16'-0" Sand; fine to medium grained
16'-0" to 36'-0" Sand & Gravel; coarse grained, gravel to 3"
36'-0" to 40'-0" Clay; gray
TD
Composite sample taken from 4' to 36'

HOLE H-5

0'-0" to 2'-0" Overburden/TopSoil; black
2'-0" to 13'-0" Sand & Gravel; coarse grained, abundant gravel to 3"
13'-0" to 20'-0" Sand; coarse grained, trace gravel to 1"
20'-0" to 33'-0" Sand & Gravel; coarse grained, gravel to 3", one 5 " cobble
33'-0" to 40'-0" Clay; gray
TD
Composite sample taken from 2' to 33'

HOLE H-6

0'-0" to 2'-0" Overburden/TopSoil; black
2'-0" to 10'-0" Sand & Gravel; medium grained, gravel to 2", H2O at 6 ft.
10'-0" to 17'-0" As Above; medium grained, gravel to 1"
17'-0" to 29'-0" As Above; medium grained, gravel to 2"
29'-0" to 40'-0" Clay; gray
TD
Composite sample taken from 2' to 29'

HOLE H-7

0'-0" to 1'-0"	Overburden/TopSoil; black
1'-0" to 6'-0"	Sand; fine grained
6'-0" to 20'-0"	Sand & Gravel; medium to coarse grained, minor gravel to 1"
20'-0" to 45'-0"	As Above
45'-0" to 53'-0"	Clay; brown to gray
53'-0" to 56'-0"	Silt/Sand & Gravel; gray fine grained, gravel to 3"
56'-0" to 60'-0"	Clay; gray

TD
Composite sample taken from 6' to 45'

HOLE H-8

0'-0" to 1'-0"	Overburden/TopSoil; dark brown
1'-0" to 6'-0"	Sand; fine grained
6'-0" to 16'-0"	Sand & Gravel; medium to coarse grained, gravel to 2"
16'-0" to 33'-0"	Sand; coarse grained, trace gravel to 1"
33'-0" to 40'-0"	Clay; brown
40'-0" to 45'-0"	Clay; gray

TD
Composite sample taken from 6' to 33'

HOLE H-9

0'-0" to 2'-0"	Overburden/TopSoil; dark brown
2'-0" to 7'-0"	Sand & Gravel; coarse grained, gravel to 2"
7'-0" to 15'-0"	As Above; gravel to 3"
15'-0" to 28'-0"	Sand; coarse grained, trace pea gravel
28'-0" to 33'-0"	Sand & Gravel; medium to coarse grained, gravel to 3"

33'-0" to 40'-0" Clay; brown

TD

Composite sample taken from 2' to 33'

HOLE H-10

0'-0" to 3'-0" Overburden/TopSoil; dark brown

3'-0" to 5'-0" Silt; tan, very fine grained

5'-0" to 11'-0" Clay; black, some grit and trace of gravel to 2"

11'-0" to 23'-0" Sand & Gravel; medium to coarse grained, gravel to 1"

23'-0" to 37'-0" As Above; gravel to 3", several 4" cobbles

37'-0" to 44'-0" Clay; brown

TD

Composite sample taken from 11' to 37'

HOLE H-11

0'-0" to 5'-0" Overburden/TopSoil; dark brown

5'-0" to 12'-0" Sand & Gravel; medium grained, gravel to 2"

12'-0" to 13'-0" Clay; brown

13'-0" to 20'-0" Sand & Gravel; medium to coarse grained, gravel to 3"

20'-0" to 29'-0" As Above; abundant gravel to 3"

29'-0" to 35'-0" Clay; brown

TD

Composite sample taken from 5' to 29'

HOLE H-12

0'-0" to 4'-0" Overburden/TopSoil; dark brown

4'-0" to 6'-0" Sand; medium to coarse grained

6'-0" to 8'-0" Clay; gray, H2O at 6 ft.

8'-0" to 10'-0" Sand & Gravel; coarse grained, gravel to 2"

10'-0" to 15'-0" Sand; coarse grained, trace pea gravel

15'-0" to 20'-0" Sand & Gravel; coarse grained, gravel to 3"

20'-0" to 33'-0" As Above; abundant gravel to 3"

33'-0" to 40'-0" Clay; brown to gray

TD

Composite sample taken from 4' to 33'

HOLE H-13

0'-0" to 2'-0" Overburden/TopSoil; black

2'-0" to 13'-0" Sand & Gravel; medium to coarse grained, gravel to 1"

13'-0" to 20'-0" As Above; abundant gravel to 3"

20'-0" to 30'-0" As Above; gravel to 2"

30'-0" to 40'-0" As Above; abundant gravel to 3", several 5" cobbles

40'-0" to 50'-0" Clay; brown to gray

TD

Composite sample taken from 2' to 40'

HOLE H-14 ✕

0'-0" to 3'-0" Overburden/TopSoil; black

3'-0" to 6'-0" Sand; medium

6'-0" to 20'-0" Sand & Gravel; fine to medium grained, gravel to 2"

20'-0" to 25'-0" As Above; coarse grained, gravel to 2"

25'-0" to 40'-0" As Above; abundant gravel to 3", several 4" cobbles

40'-0" to 47'-0" As Above; no cobbles

47'-0" to 50'-0" Clay; gray

50'-0" to 65'-0" Silt/Sand and Gravel; dirty fine to medium grained, gravel to 2"

65'-0" to 70'-0" Clay; gray

TD

Composite sample taken from 6' to 47' and 50' to 65'

HOLE H-15

0'-0" to 3'-0" Overburden/TopSoil; dark brown
3'-0" to 10'-0" Sand; fine grained
10'-0" to 27'-0" Sand & Gravel; medium grained, gravel to 1"
27'-0" to 42'-0" Silt/Sand; very fine grained, trace pea gravel
42'-0" to 75'-0" Clay; brown to gray
TD
No Composite sample taken

HOLE H-16

0'-0" to 2'-0" Overburden/TopSoil; dark brown
2'-0" to 5'-0" Silt/Sand; very fine grained
5'-0" to 10'-0" Sand & Gravel; medium to coarse grained, gravel to 1"
10'-0" to 20'-0" As Above; gravel to 3"
20'-0" to 41'-0" As Above; abundant gravel to 3"
41'-0" to ⁴⁷~~50~~'-0" As Above; no cobbles
47'-0" to 50'-0" Clay; gray
TD
Composite sample taken from 5' to 41'

HOLE H-17

0'-0" to 3'-0" Sand; fine grained
3'-0" to 15'-0" Sand & Gravel; medium to coarse grained, gravel to 1"
15'-0" to 18'-0" Sand; coarse grained
18'-0" to 19'-0" Clay; brown
19'-0" to 23'-0" Sand; coarse grained, trace pea gravel

23'-0" to 34'-0" Sand & Gravel; coarse grained, gravel to 3"

34'-0" to 40'-0" Clay; brown to gray

TD

Composite sample taken from 0' to 34'

All holes logged by CL Coppage

ATTACHMENT C

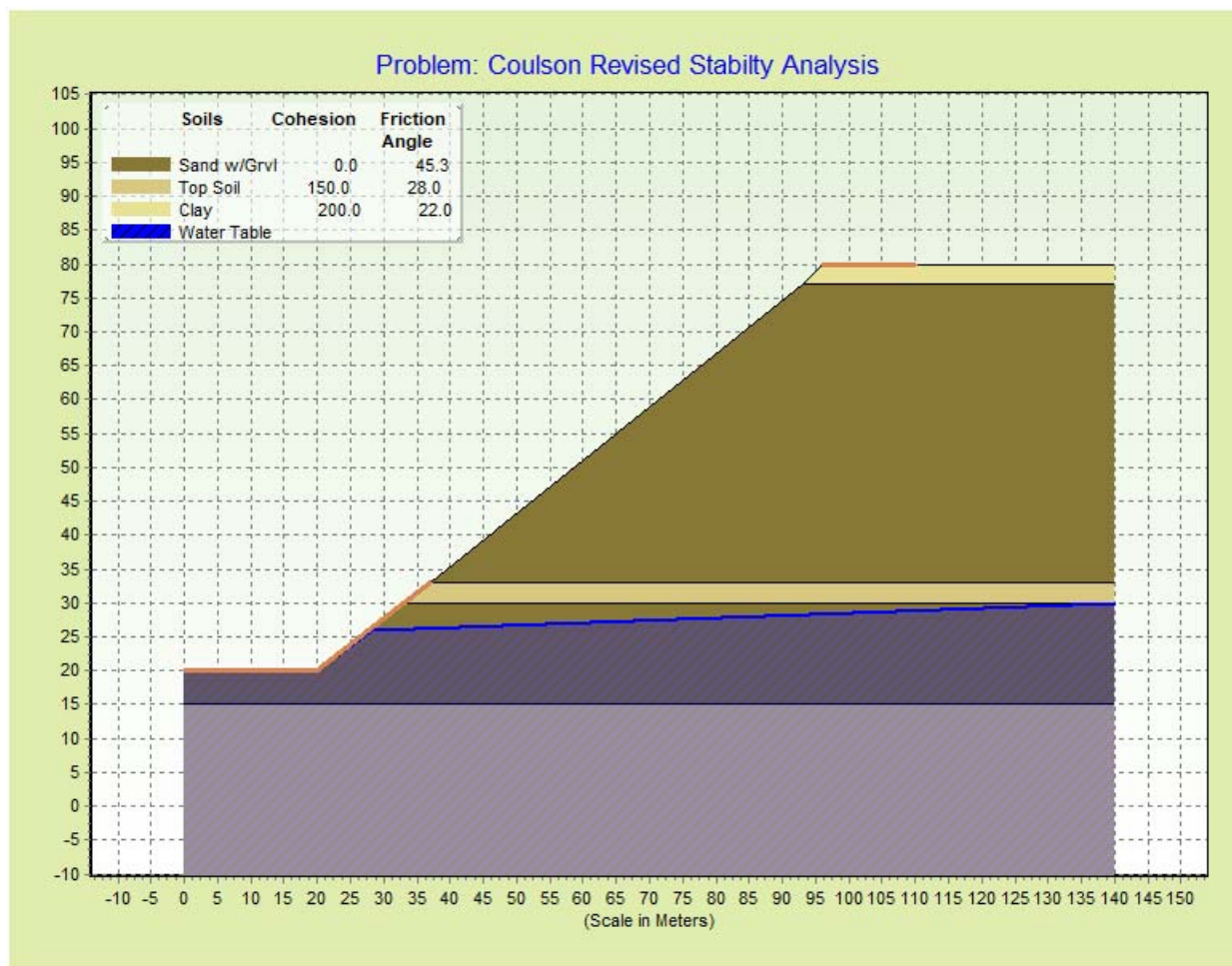
PC-STABLE RESULTS



STABL for Windows 3.0 - Results

Name: Coulson Revised Stability Analysis

DATA SUMMARY



Profile Data

Segment Number	Left Extreme X	Left Extreme Y	Right Extreme X	Right Extreme Y	Soil Under Segment
1	0	20	20	20	1
2	20	20	33	30	1
3	33	30	37	33	2
4	37	33	93	77	1
5	93	77	96	80	3
6	96	80	140	80	3
7	93	77	140	77	1
8	37	33	140	33	2
9	33	30	140	30	1
10	0	15	140	15	2

STABL for Windows 3.0 - Results
Name: Coulson Revised Stability Analysis

Soil Properties

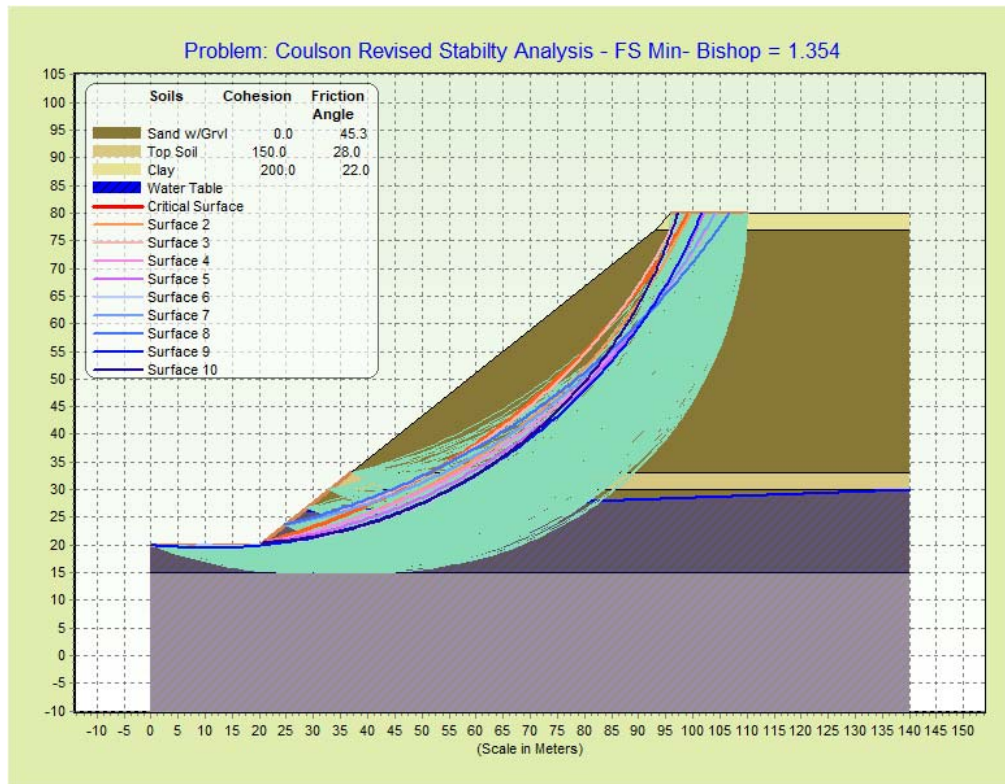
Soil Number	Wet Unit Weight	Saturated Unit Weight	Cohesive Intercept	Friction Angle	Ru	Pressure Head	Water Table	Soil Name
1	116.5	131	0	45.27	0	0	1	Sand w/Grvl
2	114	126	150	28	0	0	1	Top Soil
3	116	119	200	22	0	0	1	Clay



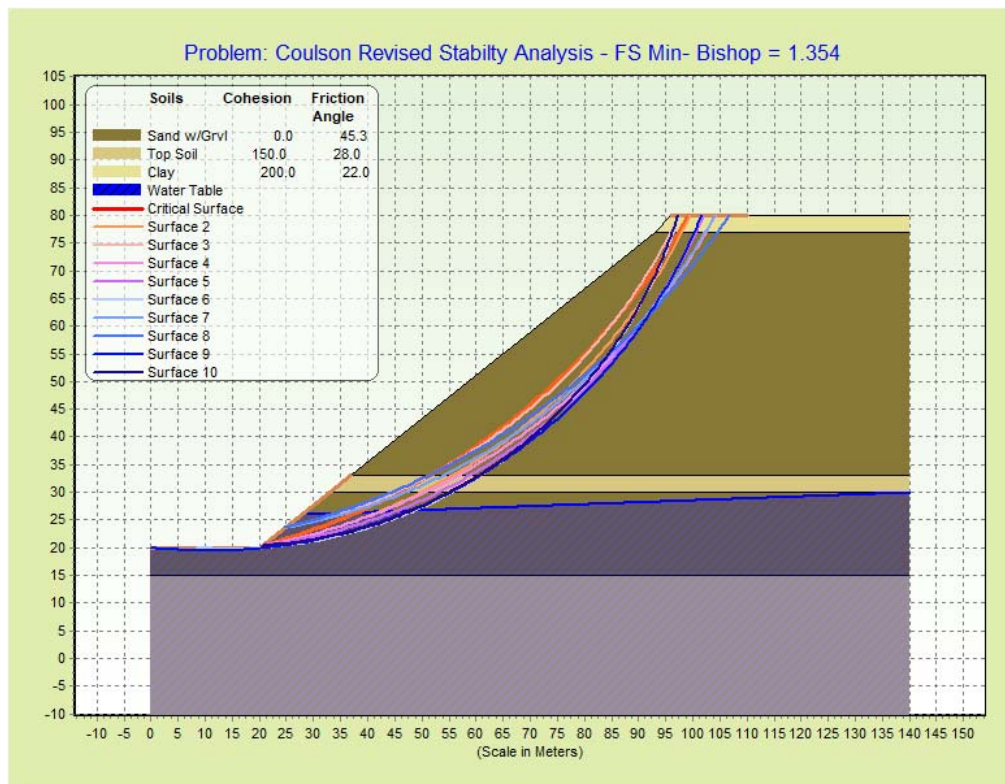
STABL for Windows 3.0 - Results

Name: Coulson Revised Stability Analysis

===== All Surfaces Generated =====



===== 10 Most Critical Surfaces =====

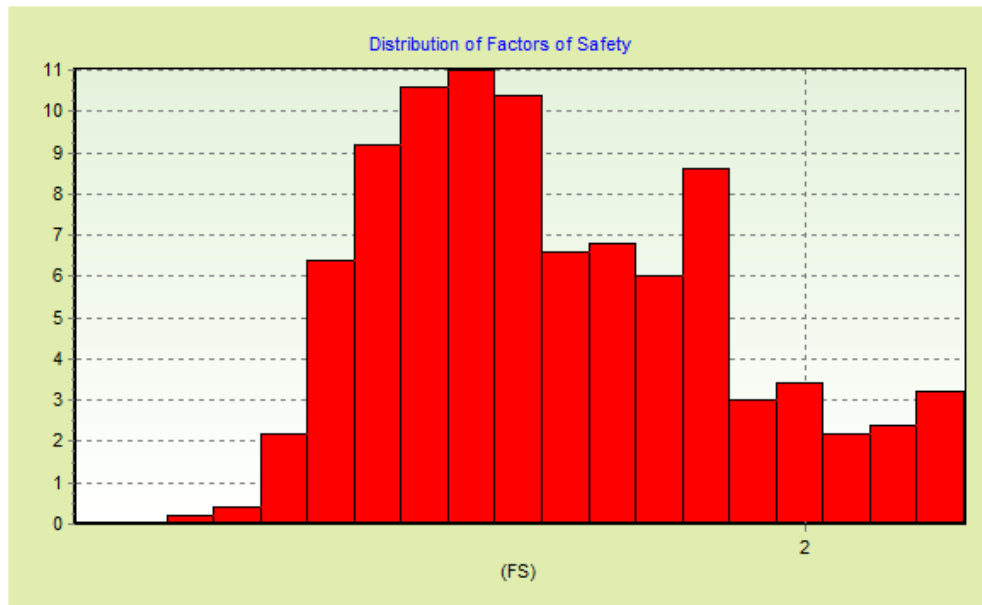




STABL for Windows 3.0 - Results

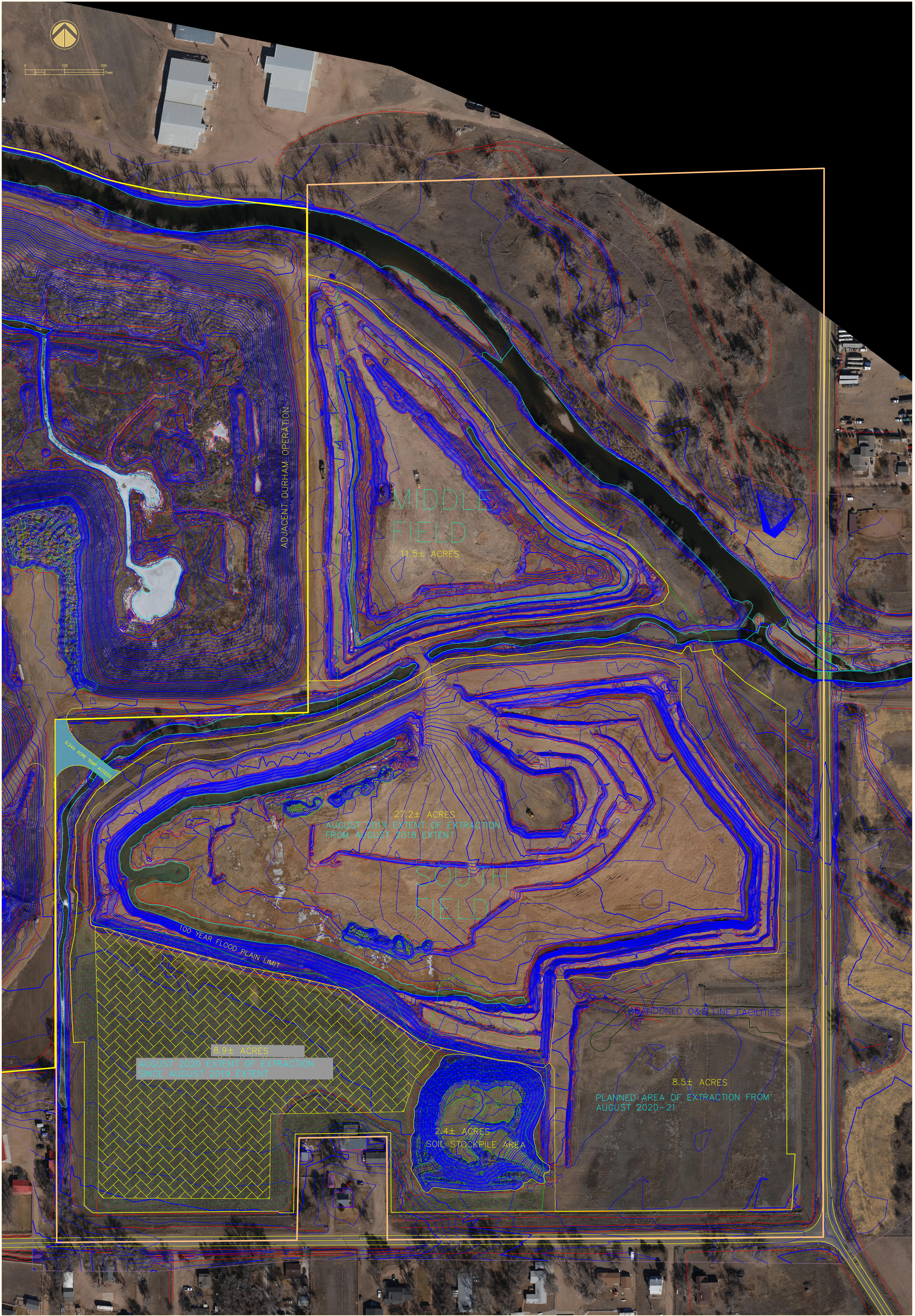
Name: Coulson Revised Stability Analysis

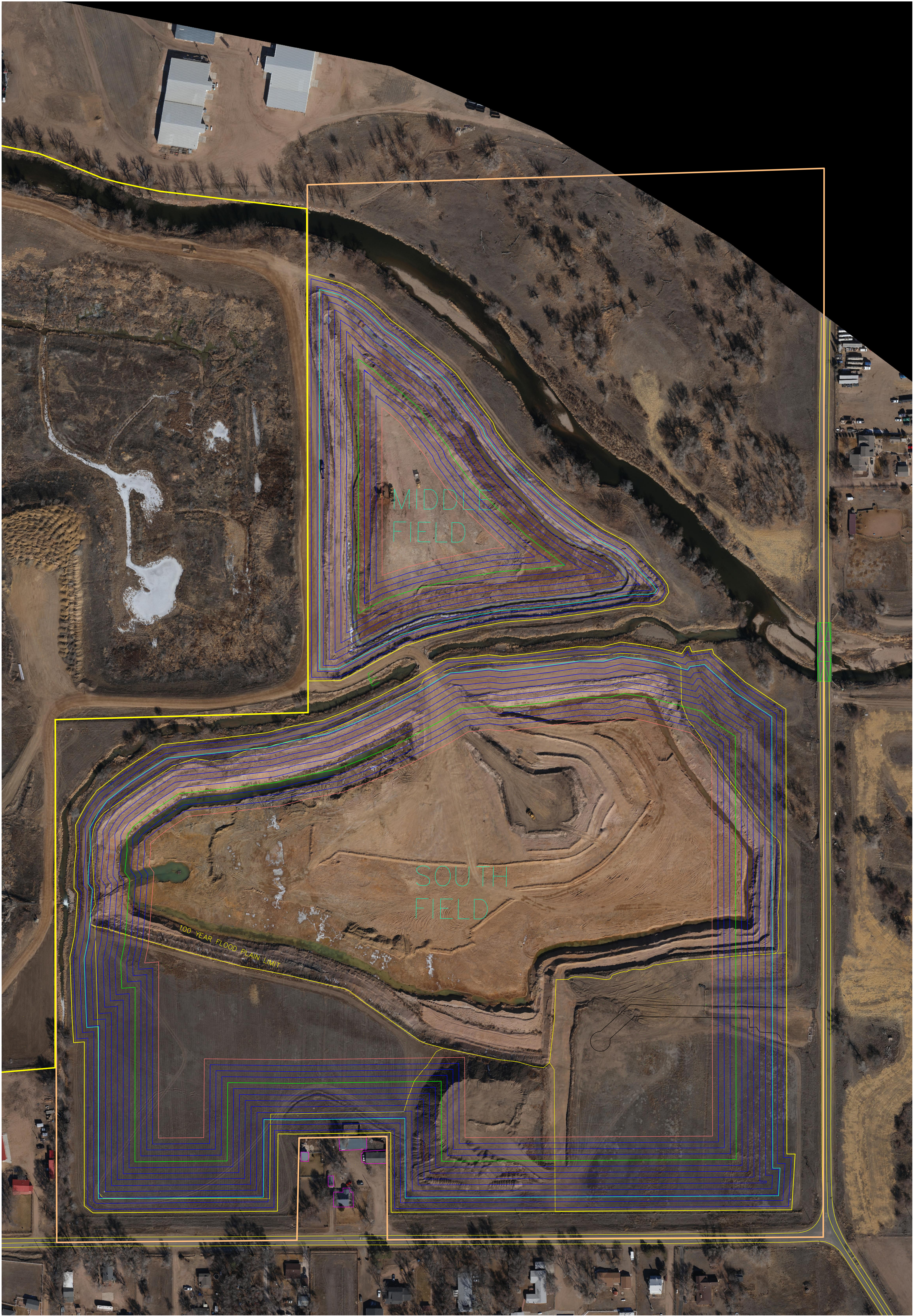
===== Factor of Safety Histogram =====



===== Factors of Safety of 10 Most Critical Surfaces =====

Surface Number	Factor of Safety
1	1.354
2	1.396
3	1.409
4	1.427
5	1.442
6	1.459
7	1.461
8	1.462
9	1.462
10	1.465





Varra Companies, Inc.

Office of Special Projects

1431 East 16th Street Greeley, Colorado 80631 Telephone (970) 353-8310 Fax (970) 353-4047

Monday 23 November 2020

Weld County Clerk to the Board
1150 O Street
Greeley, Colorado 80632

Subject: Varra Companies, Inc. – Parcel 122 – Technical Revision to a Regular Impact (112) –
Permit Application M-2015-033 – Parcel 122 - Resource Development Project.

Materials submitted to the Colorado Division of Reclamation Mining and Safety (CRMS) – Office
of Mined Land Reclamation (OMLR) for placement for public review.

- Correspondence of 20 November 2020 from Varra Companies, Inc. to the Colorado Office
of Mined Land Reclamation, with attending attachments.

Attachments:

- Updated **Exhibit C-2** Extraction (Grading) Plan Map.
- Updated **Exhibit F – Reclamation** Plan Map.
- Updated **AWES Stability Analysis Report of 9 November 2020**
- Proof of Placement with Weld County, Colorado – Clerk to the Board.

Your signature and/or OFFICIAL STAMP, and DATE of RECEIPT, below acknowledges THE
DIGITAL and/or PAPER receipt of the above referenced material, as attached. The Attachments
should be added to the above referenced Application or Revision, as originally submitted with this
Proof to the Weld County Clerk to the Board, and subsequently made accessible at Weld County for
public review.

RECEIVED

stamp

NOV 23 2020

**WELD COUNTY
COMMISSIONERS**

Received On _____, 2020

By: _____

Office of the Weld County Clerk to the Board of County Commissioners