ELARA & LUNA
EXCAVATION PLAN
TRACT 19308 & 19309 SD IMPROVEMENT

REV #0

DESIGN CALCULATIONS
March 4, 2025

PREPARED BY:
SCOTT F CANNON, PE

MZB ENGINEERING, INC

TEL:949.254.4792 engineering@mzbinc.com www.mzbinc.com

1192 Athlone Lane Corona, CA 92882

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PLANS FOR CONSTRUCTION ON

TRACT NO. 19308 & 19309

IN ORANGE COUNTY

-

ELARA & LUNA

-

EXCAVATION PLAN
REVISION 0

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LOCATION MAP

Underground Service Alert

Call: TOLL FREE
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TWO WORKING DAYS BEFORE YOU DIG

March 5, 2025

REGISTERED PROFESSIONAL ENGINEER
SCOTT T. CANNON
84327
Exp. 09-30-25
CIVIL
STATE OF CALIFORNIA

REV.	DATE	DESCRIPTION
0	3-3-25	RELEASED FOR CONSTRUCTION

DESIGN BY: SCANNON
DRAWN BY: SCANNON
SCALE: AS SHOWN

MZB
ENGINEERING INC.
1192 ATHLONE LANE
CORONA, CA 92882
(949) 254-4792

MZB ENGINEERING

SEWER & WATER IMPROVEMENT

COVER

PROJECT: TENTATIVE TRACT NO. 19308

CONTRACTOR: -

CONTRACT NO: -

SHEET NUMBER:
1
OF 4 SHEETS

Elara_Luna File

GENERAL NOTES:

1. ALL EXCAVATIONS SHALL BE CONSTRUCTED AND MAINTAINED IN ACCORDANCE WITH OSHA CFR 29, PART 1926, SUBPART P, AND CAL/OSHA SAFETY ORDERS TITLE 8, SECTION 1504, AND 1539–1547.

2. THE DESIGN OF THIS TEMPORARY EXCAVATION IS IN ACCORDANCE WITH OCTA CONTRACT C–5–3843 AND TP SECTION 13 GEOTECHNICAL AND 22.4.5 EXCAVATIONS AND TRENCHES.

3. THE DESIGN OF THIS EXCAVATION IS IN ACCORDANCE WITH THE 2018 CALTRANS STANDARD SPECIFICATIONS AND THE 2011 CT TRENCHING AND SHORING MANUAL

LOCATION AND PROTECTION OF EXISTING UTILITIES:

1. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES, OTHER OBSTACLES, DIMENSIONS, OFFSETS, ELEVATIONS AND CONDITIONS IN THE FIELD PRIOR TO STARTING ANY WORK. ALL EXISTING UTILITIES SHOWN ON THE CONTRACT PLANS WITHIN THE WORK ZONE SHALL BE POSITIVELY IDENTIFIED PRIOR TO STARTING WORK. THE CONTRACTOR IS RESPONSIBLE TO POTHOLE ALL UTILITIES (AS NEEDED) BEFORE SHORING WALL CONSTRUCTION IS TO BEGIN. THE ENGINEER SHALL BE NOTIFIED OF ANY DISCREPANCIES OR INCONSISTENCIES BEFORE PROCEEDING FURTHER WITH THE WORK.

SURVEYING AND GROUND ELEVATION INFORMATION:

1. EXISTING GROUND ELEVATIONS AND CONSEQUENTIAL ELEVATION HEIGHTS HAVE BEEN DETERMINED BASED ON TOPOGRAPHICAL INFORMATION PROVIDED BY THE PLANS AND OR ACTUAL FIELD DATA.

COMPETENT PERSONS:

1. A COMPETENT PERSON IS CAPABLE OF IDENTIFYING EXISTING AND PREDICTABLE HAZARDS IN THE SURROUNDINGS, OR WORKING CONDITIONS WHICH ARE UNSANITARY, HAZARDOUS, OR DANGEROUS TO EMPLOYEES AND WHO HAS AUTHORIZATION TO TAKE PROMPT CORRECTIVE MEASURES TO ELIMINATE THEM.

2. BEFORE COMMENCING ANY EXCAVATION, THE CONTRACTOR SHALL OBTAIN UNDERGROUND SERVICE ALERT (USA) INQUIRY I.D. NUMBER. A MINIMUM OF 3 DAYS SHALL BE ALLOWED AFTER THE I.D. NUMBER IS OBTAINED AND BEFORE THE EXCAVATION WORK IS STARTED TO NOTIFY UTILITY OWNERS. IF THE UTILITY OWNER IS THE CITY, A CONFIRMATION NUMBER INDICATING THE CITY HAS BEEN NOTIFIED SHALL BE OBTAINED BY USA AND/OR THE CONTRACTOR FROM THE APPROPRIATE CITY DEPARTMENT. THE I.D. NUMBER TOGETHER WITH THE DATE ACQUIRED SHALL BE REPORTED TO THE INSPECTOR WHEN CALLING FOR INSPECTION. USA I.D. NUMBERS WILL NOT BE GIVEN MORE THAN TEN (10) WORK DAYS BEFORE STARTING EXCAVATION WORK.

3. THE CONTRACTORS COMPETENT PERSON SHALL BE ON–SITE OBSERVING THE EXCAVATION PROCESS AND SHALL BE THE RESPONSIBLE PARTY IN THE DETERMINATION OF THE SOIL TYPE EXPOSED IN THE EXCAVATION WALLS. IF THE SOIL TYPE ENCOUNTERED IS DIFFERENT THAN THAT SPECIFIED ON THE PLANS, THE DESIGN ENGINEER MUST BE NOTIFIED.

4. THE COMPETENT PERSON SHALL INSPECT THE TRENCH OR EXCAVATION AT THE BEGINNING OF EACH SHIFT PRIOR TO WORKERS ENTERING THE TRENCH OR EXCAVATION AND/OR IF WEATHER HAS CHANGED OR EFFECTED THE WORK AREA.

ENVIRONMENTAL/SWPPP COMPLIANCE:

1. DESIGN OF EXCAVATIONS IS BASED ON ASSUMPTIONS THAT SOIL PROPERTIES AND GROUND CONDITIONS REMAIN CONSTANT THROUGH THE LIFE OF THE EXCAVATION. WATER CAN EFFECT THE STRENGTH OF SOILS AND GREAT CARE SHOULD BE TAKEN TO PREVENT CHANGES FROM EXISTING SOIL CONDITIONS. SLOPES MUST BE PROTECTED FROM EXCESSIVE SOIL SATURATION AND EROSION DURING CONSTRUCTION. WATER PONDING IN THE BASE OF EXCAVATIONS IS UNACCEPTABLE AND SHOULD BE DIVERTED OR REMOVED. PROPER SWPPP AND BMP MEASURES SHALL BE USED TO PREVENT ENVIRONMENTAL INDUCED SLOPE INSTABILITY.

CAL/OSHA REQUIREMENTS:

1. A CAL/OSHA EXCAVATION PERMIT MUST BE OBTAINED PRIOR TO ANY EXCAVATION.

2. A COPY OF THIS SHORING PLAN MUST BE AT THE JOB SITE DURING CONSTRUCTION.

3. INGRESS AND EGRESS TO THE EXCAVATION SHALL CONFORM TO ALL OSHA REQUIREMENTS INCLUDING: HANDRAILS, LADDER ACCESS AND FALL PROTECTION AS REQUIRED.

4. CONTINGENCY PLANS FOR EMERGENCY SITUATIONS SHALL BE ADDRESSED IN JHA.

CONSTRUCTION REQUIREMENTS:

1. CONTACT THE DESIGN ENGINEER IF EXCAVATION SHOWS SIGNS OF SLOUGHING, SWELLING OR PUMPING.

2. CAUTION SHALL BE TAKEN WHEN EXCAVATIONS ARE ADJACENT TO TRAFFIC AND THE TRAVELING PUBLIC.

CONTROLLING FIELD DIMENSIONS

1. THE FIELD SUPERINTENDENT WILL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING, FABRICATING, OR INSTALLING SHORING. UPON APPROVAL BY THE DESIGN ENGINEER DIMENSIONS OF THE SHORING WILL BE ADJUSTED TO FIT THE ACTUAL DIMENSIONS.

2. IF AT ANY POINT THE EXCAVATION EXCEEDS THE DEPTH SHOWN ON THE PLANS BY MORE THAN 1FT, NOTIFY THE DESIGN ENGINEER IMMEDIATELY.

ELARA

SOIL LAYER DESCRIPTIONS:

1. THE FOLLOWING SOIL DESCRIPTIONS ARE ASSUMED TO BE PRESENT DURING EXCAVATION. IF SOILS DIFFER FROM THOSE DESCRIBED BELOW, STOP THE EXCAVATION AND CONSULT WITH THE DESIGN ENGINEER.
   SOIL TYPES & DESCRIPTIONS:
   505.0' TO 477.0' – (SM) SILTY SANDSTONE

DESIGN PARAMETERS:

EXCAVATION SLOPE DESIGN BASED ON DH 6 & 12 OF THE INFORMATION PROVIDED IN THE REPORT OF GEOTECHNICAL STUDIES & REVIEW OF ROUGH GRADING PLANS, RMV PLANNING AREA 3, SUB–AREA 3.4, RANCHO MISSION VIEJO DATED JUNE 26, 2023.

SOIL PARAMETERS:
505.0' TO 477.0'
γ = 115 PCF
Φ = 19°
Su = 210 PSF

LUNA

SOIL LAYER DESCRIPTIONS:

1. THE FOLLOWING SOIL DESCRIPTIONS ARE ASSUMED TO BE PRESENT DURING EXCAVATION. IF SOILS DIFFER FROM THOSE DESCRIBED BELOW, STOP THE EXCAVATION AND CONSULT WITH THE DESIGN ENGINEER.
   SOIL TYPES & DESCRIPTIONS:
   505.0' TO 477.0' – (SM) SILTY SANDSTONE

DESIGN PARAMETERS:

EXCAVATION SLOPE DESIGN BASED ON DH 18, 19, & 26 OF THE INFORMATION PROVIDED IN THE REPORT OF GEOTECHNICAL STUDIES & REVIEW OF ROUGH GRADING PLANS, RMV PLANNING AREA 3, SUB–AREA 3.4, RANCHO MISSION VIEJO DATED JUNE 26, 2023.

SOIL PARAMETERS:
505.0' TO 477.0'
γ = 121 PCF
Φ = 19°
Su = 210 PSF

DESIGN SURCHARGE PARAMETERS:

1. IF K–RAIL IS LESS THAN 2FT FROM TOP OF SLOPE IT MUST BE PINNED. SEE 2015 CALTRANS STANDARD PLAN T3B.

2. K–RAIL MAY NOT BE PLACED CLOSER THAN 3" FROM TOP OF SLOPE. (200PSF).

3. SLOPES WERE DESIGNED WITH A HS20–44 TRAFFIC SURCHARGE (300PSF) PLACED 2FT FROM TOP OF SLOPE OR AS SHOWN IN THE SURCHARGE TABLE(S) IN THESE PLANS.

4. FOR SURCHARGE OFFSETS REFER TO "ASSUMED SURCHARGES & MIN. OFFSETS" TABLES ON SECTION VIEWS.

5. CRANES MUST USE PROPER CRANE MAT TO CREATE AN OUTRIGGER PRESSURE OF 2000PSF MAX.

6. IF HIGHER GROUND PRESSURE IS ANTICIPATED, CONSULT WITH THE DESIGN ENGINEER.

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Exp. 09-30-25
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STATE OF CALIFORNIA

NOTES

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SCALE: AS SHOWN

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CORONA, CA 92882
(949) 254–4792

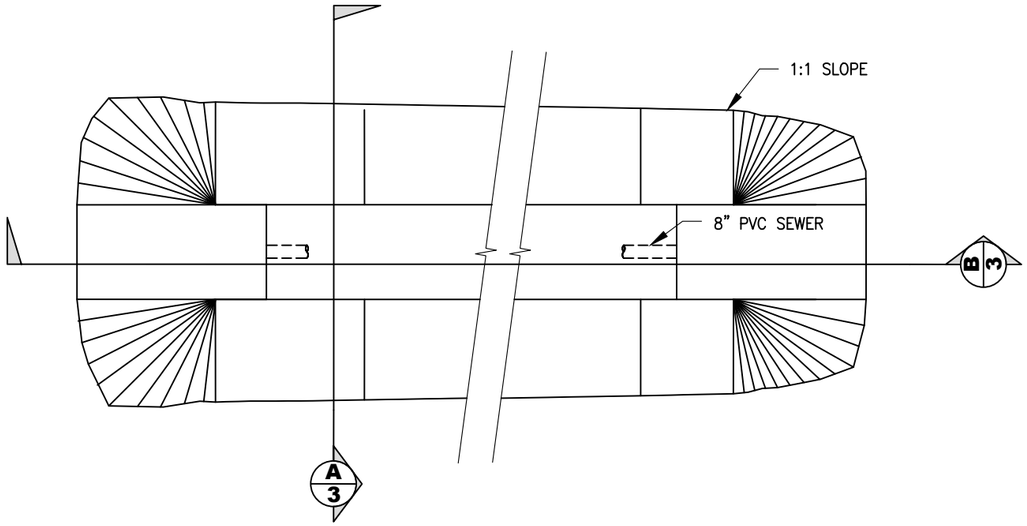
MZB ENGINEERING

SEWER & WATER IMPROVEMENT

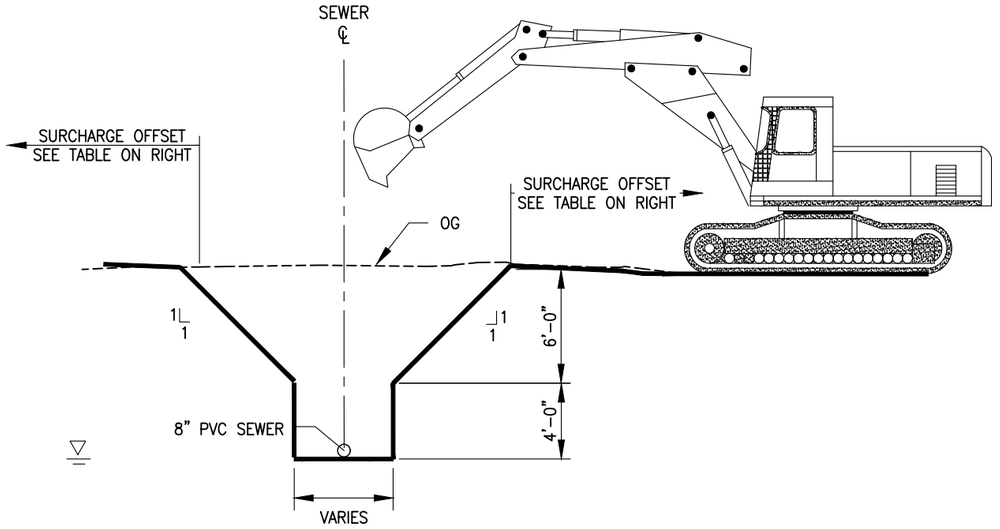
PROJECT: TENTATIVE TRACT NO. 19308
CONTRACTOR: -
CONTRACT NO: -

SHEET NUMBER:
2
OF 4 SHEETS

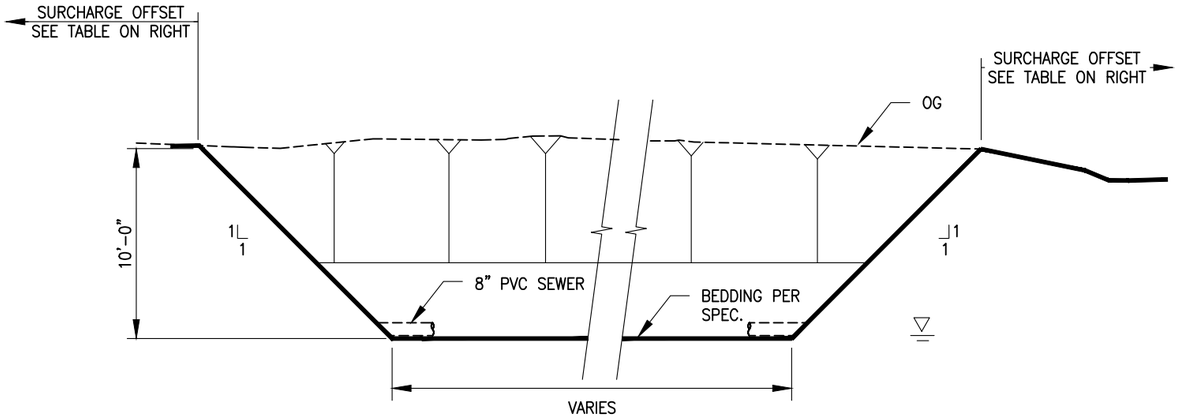
Elara_Luna File



SITE PLAN
SCALE: 1:8
ELARA



SECTION VIEW A
SCALE: 1:8
ELARA



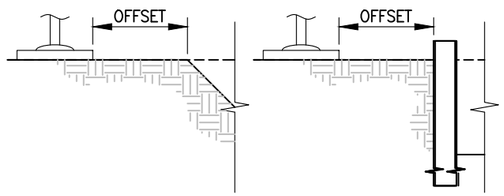
SECTION VIEW B
SCALE: 1:8
ELARA

ASSUMED MINIMUM OFFSETS	
SURCHARGE	OFFSET
HS 20-44 TRAFFIC	5 FT
CAT 330 EXCAVATOR	5 FT
3 CY LOADER	11 FT
K-RAIL	2 FT
CONCRETE TRUCK	15 FT
SPOIL PILE*	6 FT

*SPOIL PILE HT = 7 FT W/ 1:1 SLOPE

LEGEND

= BEDDING PER SPECIFICATIONS



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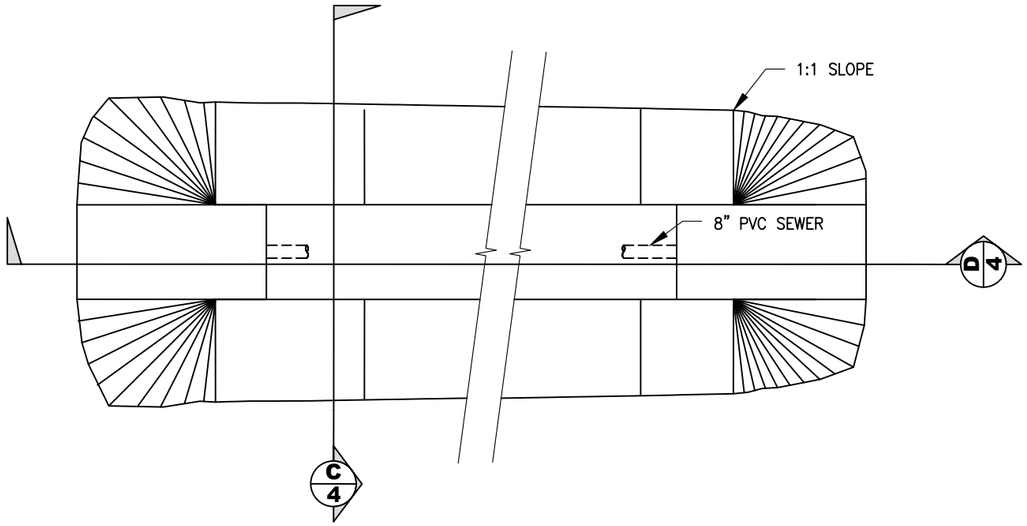
SEWER & WATER IMPROVEMENT

ELARA SECTION VIEW

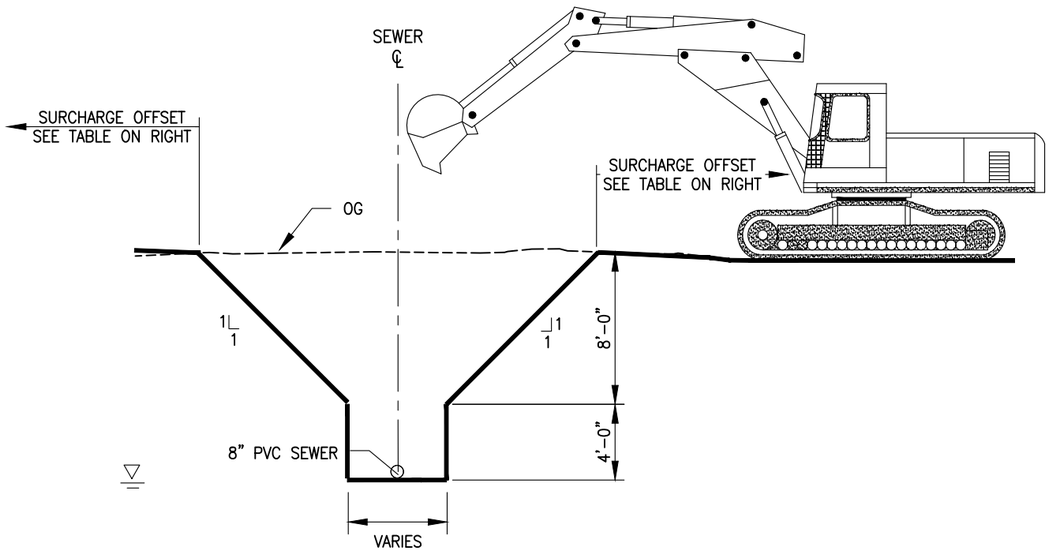
PROJECT: TENTATIVE TRACT NO. 19308
CONTRACT NO: -
CONTRACTOR: -

SHEET NUMBER: 3
OF 4 SHEETS

Elara_Luna File



SITE PLAN
SCALE: 1:8
LUNA



SECTION VIEW C
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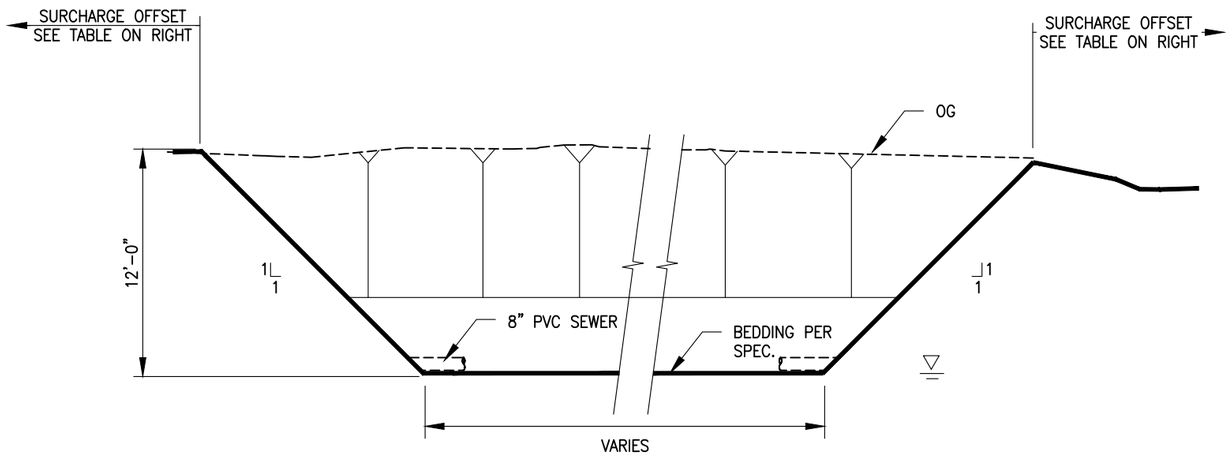
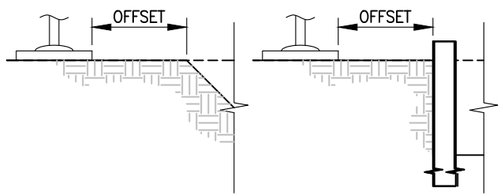
LUNA



SECTION VIEW D
SCALE: 1:8
LUNA

ASSUMED MINIMUM OFFSETS	
SURCHARGE	OFFSET
HS 20–44 TRAFFIC	5 FT
CAT 330 EXCAVATOR	8 FT
3 CY LOADER	15 FT
K–RAIL	2 FT
CONCRETE TRUCK	17 FT
SPOIL PILE*	8 FT

*SPOIL PILE HT = 7 FT W/ 1:1 SLOPE



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SEWER & WATER IMPROVEMENT

LUNA SECTION VIEW

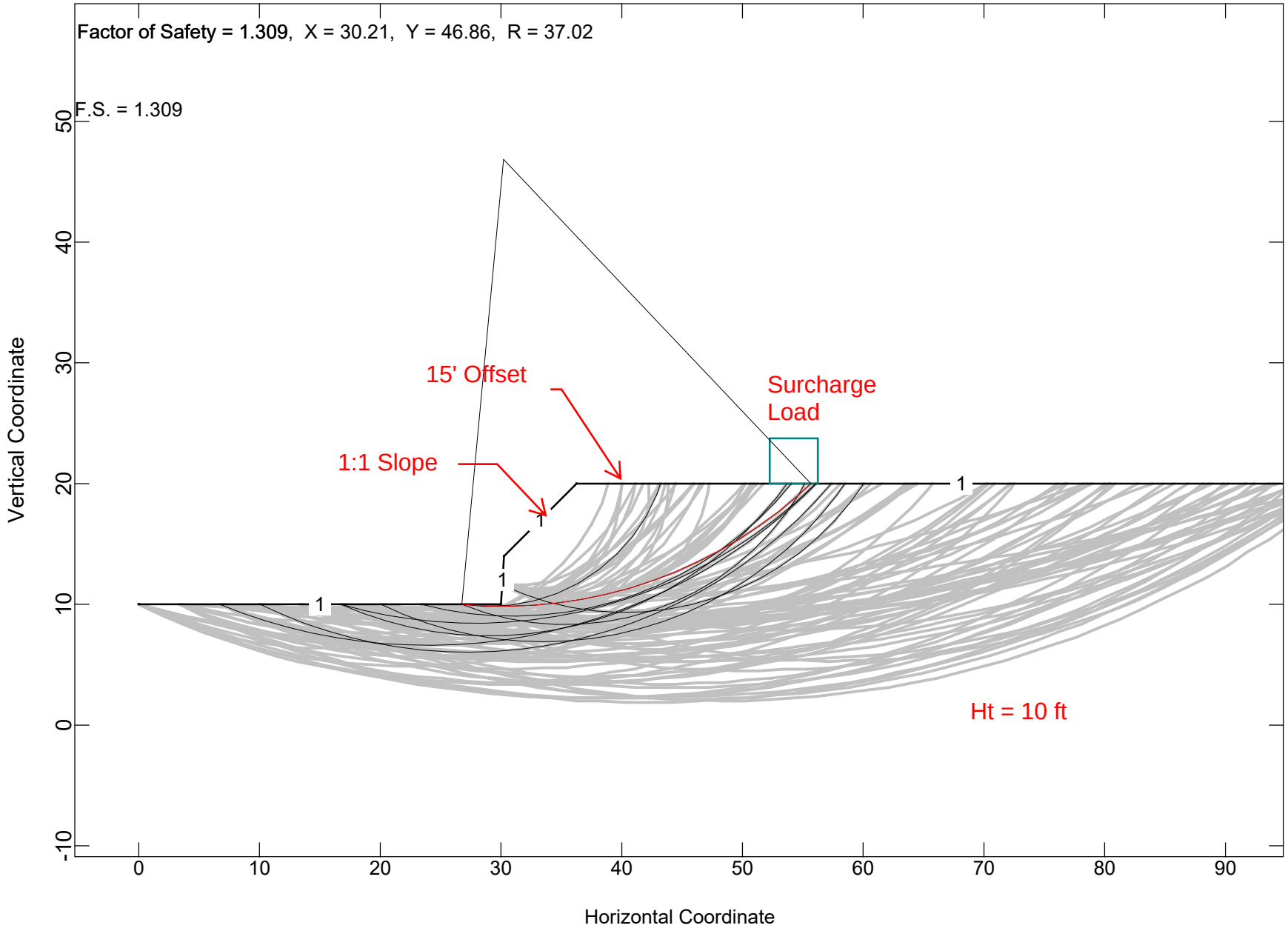
PROJECT: TENTATIVE TRACT NO. 19308
CONTRACTOR: -
CONTRACT NO: -

SHEET NUMBER: 4
OF 4 SHEETS

Elara_Luna File

Slope Stability Analysis

Elara
Concrete Truck Surcharge



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

                      STABLPro for Windows, Version 2015.4.5

                              Upgraded from:
                              FHWA-PCSTABLE

                       Serial Number :  357267753

                          --Slope Stability Analysis--
                         Simplified Janbu, Simplified Bishop
                           or Spencer Method of Slices

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


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     Las Vegas, NV, USA

     Path to file locations      :
D:\Dropbox\Korpi_Cannon_Engineering\Projects\KC-0119 - MZB Engineering\Design\Excav
- Shoring\2.0 Elara_Luna\Elara\Design\
     Name of input data file     : Concrete Truck - Vert.sl4d
     Name of output file         : Concrete Truck - Vert.sl4o
     Name of plot output file    : Concrete Truck - Vert.sl4p

     --------------------------------------------------------------------------
                           Time and Date of Analysis
     --------------------------------------------------------------------------

               Date:  March 04, 2025     Time:  05:47:38




1
          PROBLEM DESCRIPTION   New Slope




          BOUNDARY COORDINATES

              4 Top   Boundaries
              4 Total Boundaries
```

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	0.00	10.00	30.00	10.00	1
2	30.00	10.00	30.25	14.00	1
3	30.25	14.00	36.25	20.00	1
4	36.25	20.00	100.00	20.00	1

1

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	115.0	115.0	210.0	19.0	0.00	0.0	0

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left ft.	X-Right ft.	Intensity psf	Deflection (deg)
1	52.25	56.25	3361.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 0.00 ft.

and X = 30.10 ft.

Each Surface Terminates Between X = 36.00 ft.
and X = 100.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

2.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -25.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.75	9.87
3	30.75	9.84
4	32.75	9.93
5	34.74	10.12
6	36.72	10.42
7	38.68	10.82
8	40.61	11.33
9	42.51	11.94
10	44.38	12.66
11	46.21	13.48
12	47.99	14.39
13	49.72	15.40
14	51.39	16.50
15	52.99	17.68

16	54.54	18.96
17	55.67	20.00

Circle Center At X = 30.2 ; Y = 46.9 and Radius, 37.0

*** 1.309 ***

Individual data on the 20 slices

Slice No.	Width Ft	Weight Lbs	Water Force Top Lbs	Water Force Bot Lbs	Tie Force Norm Lbs	Tie Force Tan Lbs	Earthquake Force Hor Lbs	Earthquake Force Ver Lbs	Surcharge Load Lbs
1	2.0	0.15E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.2	0.20E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	0.2	0.62E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	0.5	0.25E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	2.0	0.13E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	2.0	0.17E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	1.5	0.16E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	0.5	0.52E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	2.0	0.21E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	1.9	0.20E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	1.9	0.18E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	1.9	0.17E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	1.8	0.15E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	1.8	0.12E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	1.7	0.10E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	1.7	0.78E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	0.9	0.32E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	0.7	0.22E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.25E+04
19	1.5	0.30E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.52E+04
20	1.1	0.68E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.38E+04

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.64	9.33
3	30.57	8.82

4	32.55	8.49
5	34.54	8.33
6	36.54	8.35
7	38.53	8.55
8	40.50	8.91
9	42.42	9.45
10	44.29	10.16
11	46.10	11.03
12	47.81	12.05
13	49.43	13.23
14	50.95	14.53
15	52.34	15.97
16	53.60	17.52
17	54.72	19.18
18	55.17	20.00

Circle Center At X = 35.3 ; Y = 31.0 and Radius, 22.7

*** 1.366 ***

1

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	18.66	9.50
3	20.62	9.09
4	22.59	8.78
5	24.58	8.57
6	26.58	8.46
7	28.58	8.45
8	30.58	8.53
9	32.57	8.72
10	34.55	9.00
11	36.51	9.39
12	38.45	9.87
13	40.37	10.44
14	42.25	11.11
15	44.10	11.87
16	45.91	12.73
17	47.67	13.67
18	49.39	14.70
19	51.05	15.81
20	52.66	17.00

21	54.20	18.28
22	55.68	19.62
23	56.05	20.00

Circle Center At X = 27.8 ; Y = 48.7 and Radius, 40.3

*** 1.404 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	20.07	10.00
2	21.89	9.18
3	23.77	8.48
4	25.68	7.91
5	27.63	7.47
6	29.61	7.15
7	31.60	6.96
8	33.60	6.90
9	35.60	6.98
10	37.59	7.19
11	39.56	7.52
12	41.50	7.99
13	43.41	8.58
14	45.28	9.29
15	47.10	10.13
16	48.86	11.08
17	50.55	12.14
18	52.17	13.32
19	53.71	14.60
20	55.16	15.97
21	56.52	17.44
22	57.77	19.00
23	58.48	20.00

Circle Center At X = 33.5 ; Y = 37.4 and Radius, 30.5

*** 1.454 ***

1

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.36	9.56
3	27.34	9.25
4	29.33	9.07
5	31.33	9.02
6	33.33	9.12
7	35.31	9.34
8	37.28	9.70
9	39.22	10.19
10	41.12	10.81
11	42.98	11.55
12	44.78	12.42
13	46.52	13.40
14	48.19	14.51
15	49.78	15.72
16	51.29	17.03
17	52.70	18.45
18	54.02	19.95
19	54.06	20.00

Circle Center At X = 31.0 ; Y = 38.8 and Radius, 29.8

*** 1.530 ***

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	10.03	10.00
2	11.85	9.17
3	13.72	8.44
4	15.61	7.80
5	17.54	7.26
6	19.49	6.81
7	21.46	6.47
8	23.44	6.23
9	25.44	6.08
10	27.44	6.04
11	29.43	6.10
12	31.43	6.26

13	33.41	6.53
14	35.38	6.89
15	37.32	7.35
16	39.24	7.91
17	41.13	8.56
18	42.99	9.31
19	44.80	10.16
20	46.57	11.09
21	48.29	12.12
22	49.95	13.22
23	51.56	14.42
24	53.10	15.69
25	54.58	17.04
26	55.99	18.46
27	57.32	19.95
28	57.36	20.00

Circle Center At X = 27.3 ; Y = 45.5 and Radius, 39.4

*** 1.535 ***

1

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	6.69	10.00
2	8.56	9.28
3	10.45	8.65
4	12.38	8.10
5	14.32	7.63
6	16.29	7.26
7	18.26	6.96
8	20.25	6.76
9	22.25	6.64
10	24.25	6.61
11	26.25	6.67
12	28.24	6.82
13	30.23	7.05
14	32.20	7.37
15	34.16	7.78
16	36.10	8.27
17	38.01	8.85
18	39.90	9.51
19	41.76	10.26

20	43.58	11.08
21	45.36	11.98
22	47.11	12.97
23	48.80	14.02
24	50.45	15.16
25	52.05	16.36
26	53.60	17.63
27	55.08	18.97
28	56.13	20.00

Circle Center At X = 23.9 ; Y = 52.1 and Radius, 45.5

*** 1.580 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	18.58	9.25
3	20.48	8.63
4	22.41	8.13
5	24.38	7.75
6	26.36	7.51
7	28.36	7.40
8	30.36	7.42
9	32.36	7.58
10	34.33	7.86
11	36.29	8.27
12	38.22	8.81
13	40.10	9.48
14	41.94	10.27
15	43.72	11.17
16	45.44	12.20
17	47.09	13.33
18	48.66	14.57
19	50.15	15.91
20	51.54	17.34
21	52.84	18.87
22	53.68	20.00

Circle Center At X = 29.0 ; Y = 37.8 and Radius, 30.4

*** 1.710 ***

1

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.75	9.83
3	30.75	9.92
4	32.71	10.28
5	34.62	10.90
6	36.42	11.76
7	38.09	12.86
8	39.60	14.17
9	40.93	15.67
10	42.04	17.33
11	42.92	19.12
12	43.22	20.00

Circle Center At X = 29.0 ; Y = 24.8 and Radius, 15.0

*** 1.736 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61
2	31.94	10.83
3	33.84	10.21
4	35.79	9.75
5	37.77	9.46
6	39.77	9.33
7	41.77	9.38
8	43.75	9.59
9	45.72	9.97
10	47.64	10.51
11	49.51	11.22
12	51.32	12.08
13	53.05	13.08
14	54.68	14.23

```
   15         56.22       15.52
   16         57.64       16.93
   17         58.93       18.45
   18         60.04       20.00

Circle Center At X =   40.2 ; Y =   33.0  and Radius,   23.7


      ***     1.794   ***



1

                Y            A     X     I     S            F     T


               0.00     12.50     25.00     37.50     50.00     62.50

X       0.00 +-------*-+---------+---------+---------+---------+
             -      ..
             -      ..
             -     ..7
             -    ..7.
             -    ..76
       12.50 +   ..76.
             -   ..66.
             -   ..6.3
             -  ..6783
             -  ..6.34
             -  ..6.35
A      25.00 + ...6435
             - ...6431
             - ...642*0
             - ...64210 *
             - ...6421..
             - ....4219...   *
X      37.50 + ....421.9... .
             - ....4231.9.....
             - ....46231..99..
             - .....4231....99
             - .....46231.....
             - ......44231....
I      50.00 + .......04215...
             - ........046115./1
             - .........044212
             - ..........0.4611/
             - ............044
             - ........... ..0
S      62.50 +  ........... ..
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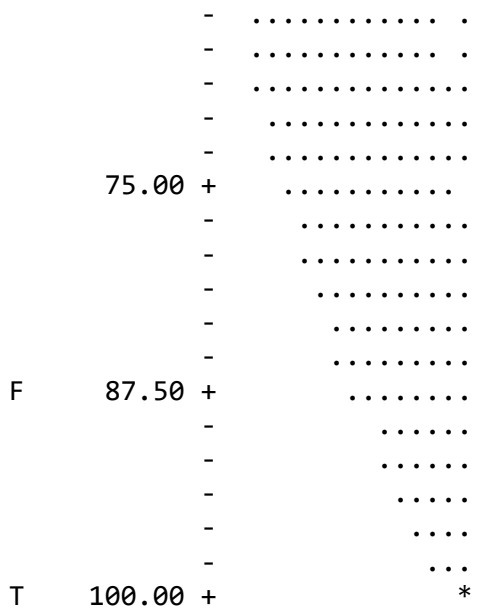
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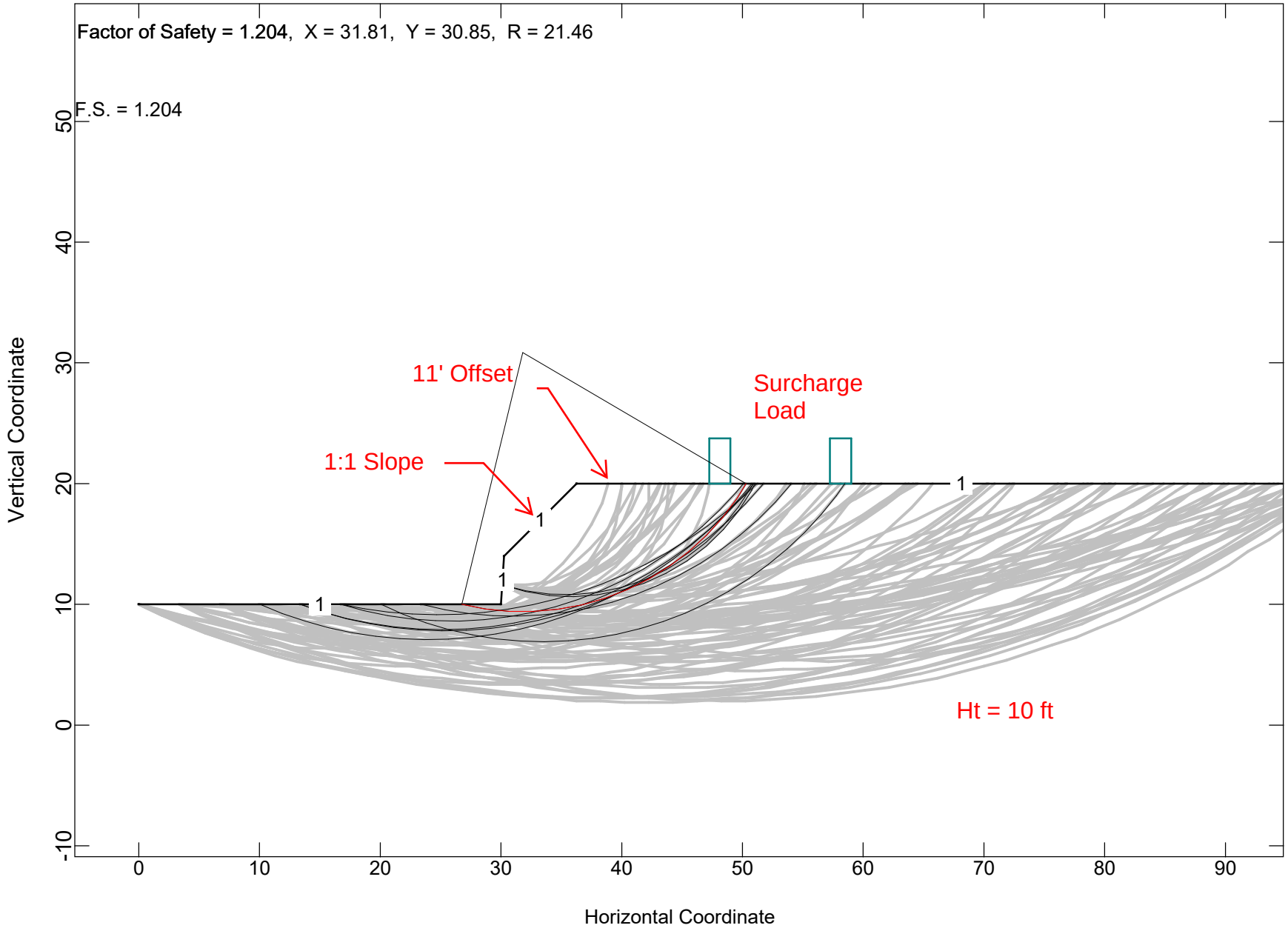

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                     STABLPro for Windows, Version 2015.4.5

                            Upgraded from:
                            FHWA-PCSTABLE

                      Serial Number :  357267753

                         --Slope Stability Analysis--
                       Simplified Janbu, Simplified Bishop
                         or Spencer Method of Slices

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     ----------------------------------------------------------------------------
                          Time and Date of Analysis
     ----------------------------------------------------------------------------

               Date:  March 04, 2025     Time:  05:52:02




1
          PROBLEM DESCRIPTION   New Slope




          BOUNDARY COORDINATES

              4 Top   Boundaries
              4 Total Boundaries
```

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	0.00	10.00	30.00	10.00	1
2	30.00	10.00	30.25	14.00	1
3	30.25	14.00	36.25	20.00	1
4	36.25	20.00	100.00	20.00	1

1

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	115.0	115.0	210.0	19.0	0.00	0.0	0

1

BOUNDARY LOAD(S)

2 Load(s) Specified

Load No.	X-Left ft.	X-Right ft.	Intensity psf	Deflection (deg)
1	47.25	49.00	4700.0	0.0
2	57.25	59.00	4700.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced

Along The Ground Surface Between X = 0.00 ft.
and X = 30.10 ft.

Each Surface Terminates Between X = 36.00 ft.
and X = 100.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

2.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -25.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.72	9.62
3	30.71	9.42
4	32.71	9.42
5	34.70	9.59
6	36.67	9.95
7	38.59	10.50
8	40.46	11.22
9	42.25	12.11
10	43.95	13.16
11	45.54	14.37
12	47.02	15.72
13	48.36	17.20
14	49.56	18.80

15 50.30 20.00

Circle Center At X = 31.8 ; Y = 30.9 and Radius, 21.5

*** 1.204 ***

Individual data on the 19 slices

Slice No.	Width Ft	Weight Lbs	Water Force Top Lbs	Water Force Bot Lbs	Tie Force Norm Lbs	Tie Force Tan Lbs	Earthquake Force Hor Lbs	Earthquake Force Ver Lbs	Surcharge Load Lbs
1	2.0	0.43E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.3	0.65E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	0.2	0.72E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	0.5	0.25E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	2.0	0.14E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	2.0	0.18E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	1.5	0.17E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	0.4	0.49E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	1.9	0.22E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	1.9	0.20E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	1.8	0.17E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	1.7	0.14E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	1.6	0.11E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	1.5	0.84E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	0.2	0.11E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	1.1	0.44E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.52E+04
17	0.6	0.17E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.30E+04
18	0.6	0.10E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	0.7	0.51E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61
2	32.04	11.12
3	34.02	10.85
4	36.02	10.81
5	38.01	11.00

6	39.97	11.41
7	41.87	12.03
8	43.69	12.87
9	45.39	13.91
10	46.98	15.14
11	48.41	16.53
12	49.67	18.08
13	50.76	19.76
14	50.87	20.00

Circle Center At X = 35.4 ; Y = 28.5 and Radius, 17.7

*** 1.365 ***

1

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	18.65	9.47
3	20.61	9.07
4	22.59	8.79
5	24.59	8.64
6	26.59	8.62
7	28.58	8.73
8	30.57	8.96
9	32.54	9.32
10	34.48	9.80
11	36.38	10.41
12	38.25	11.13
13	40.06	11.98
14	41.82	12.94
15	43.51	14.00
16	45.13	15.18
17	46.67	16.45
18	48.12	17.82
19	49.49	19.29
20	50.08	20.00

Circle Center At X = 25.9 ; Y = 39.9 and Radius, 31.3

*** 1.385 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61
2	32.02	11.06
3	34.00	10.73
4	35.99	10.64
5	37.99	10.78
6	39.95	11.16
7	41.86	11.76
8	43.69	12.58
9	45.40	13.60
10	46.99	14.82
11	48.42	16.21
12	49.69	17.77
13	50.76	19.46
14	51.02	20.00

Circle Center At X = 35.8 ; Y = 27.8 and Radius, 17.1

*** 1.398 ***

1

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	18.69	9.63
3	20.67	9.36
4	22.66	9.20
5	24.66	9.14
6	26.66	9.19
7	28.66	9.34
8	30.64	9.61
9	32.60	9.97
10	34.55	10.44
11	36.47	11.01
12	38.35	11.68
13	40.19	12.46

14	42.00	13.32
15	43.75	14.29
16	45.45	15.34
17	47.09	16.48
18	48.67	17.71
19	50.18	19.02
20	51.20	20.00

Circle Center At X = 24.7 ; Y = 46.9 and Radius, 37.7

*** 1.507 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	13.38	10.00
2	15.27	9.36
3	17.20	8.84
4	19.16	8.43
5	21.14	8.14
6	23.13	7.96
7	25.13	7.91
8	27.13	7.97
9	29.12	8.15
10	31.10	8.45
11	33.06	8.86
12	34.99	9.39
13	36.88	10.04
14	38.73	10.79
15	40.54	11.65
16	42.29	12.62
17	43.98	13.69
18	45.60	14.86
19	47.15	16.12
20	48.62	17.47
21	50.01	18.91
22	50.95	20.00

Circle Center At X = 25.1 ; Y = 41.7 and Radius, 33.7

*** 1.512 ***

1

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	20.07	10.00
2	21.89	9.18
3	23.77	8.48
4	25.68	7.91
5	27.63	7.47
6	29.61	7.15
7	31.60	6.96
8	33.60	6.90
9	35.60	6.98
10	37.59	7.19
11	39.56	7.52
12	41.50	7.99
13	43.41	8.58
14	45.28	9.29
15	47.10	10.13
16	48.86	11.08
17	50.55	12.14
18	52.17	13.32
19	53.71	14.60
20	55.16	15.97
21	56.52	17.44
22	57.77	19.00
23	58.48	20.00

Circle Center At X = 33.5 ; Y = 37.4 and Radius, 30.5

*** 1.522 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.36	9.56
3	27.34	9.25
4	29.33	9.07
5	31.33	9.02

6	33.33	9.12
7	35.31	9.34
8	37.28	9.70
9	39.22	10.19
10	41.12	10.81
11	42.98	11.55
12	44.78	12.42
13	46.52	13.40
14	48.19	14.51
15	49.78	15.72
16	51.29	17.03
17	52.70	18.45
18	54.02	19.95
19	54.06	20.00

Circle Center At X = 31.0 ; Y = 38.8 and Radius, 29.8

*** 1.544 ***

1

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	13.38	10.00
2	15.27	9.35
3	17.20	8.82
4	19.15	8.40
5	21.13	8.09
6	23.12	7.89
7	25.12	7.82
8	27.12	7.86
9	29.11	8.01
10	31.09	8.28
11	33.06	8.66
12	34.99	9.16
13	36.90	9.77
14	38.77	10.49
15	40.59	11.32
16	42.36	12.24
17	44.07	13.28
18	45.72	14.40
19	47.31	15.63
20	48.81	16.94
21	50.25	18.34

22	51.59	19.81
23	51.74	20.00

Circle Center At X = 25.5 ; Y = 42.3 and Radius, 34.5

*** 1.558 ***

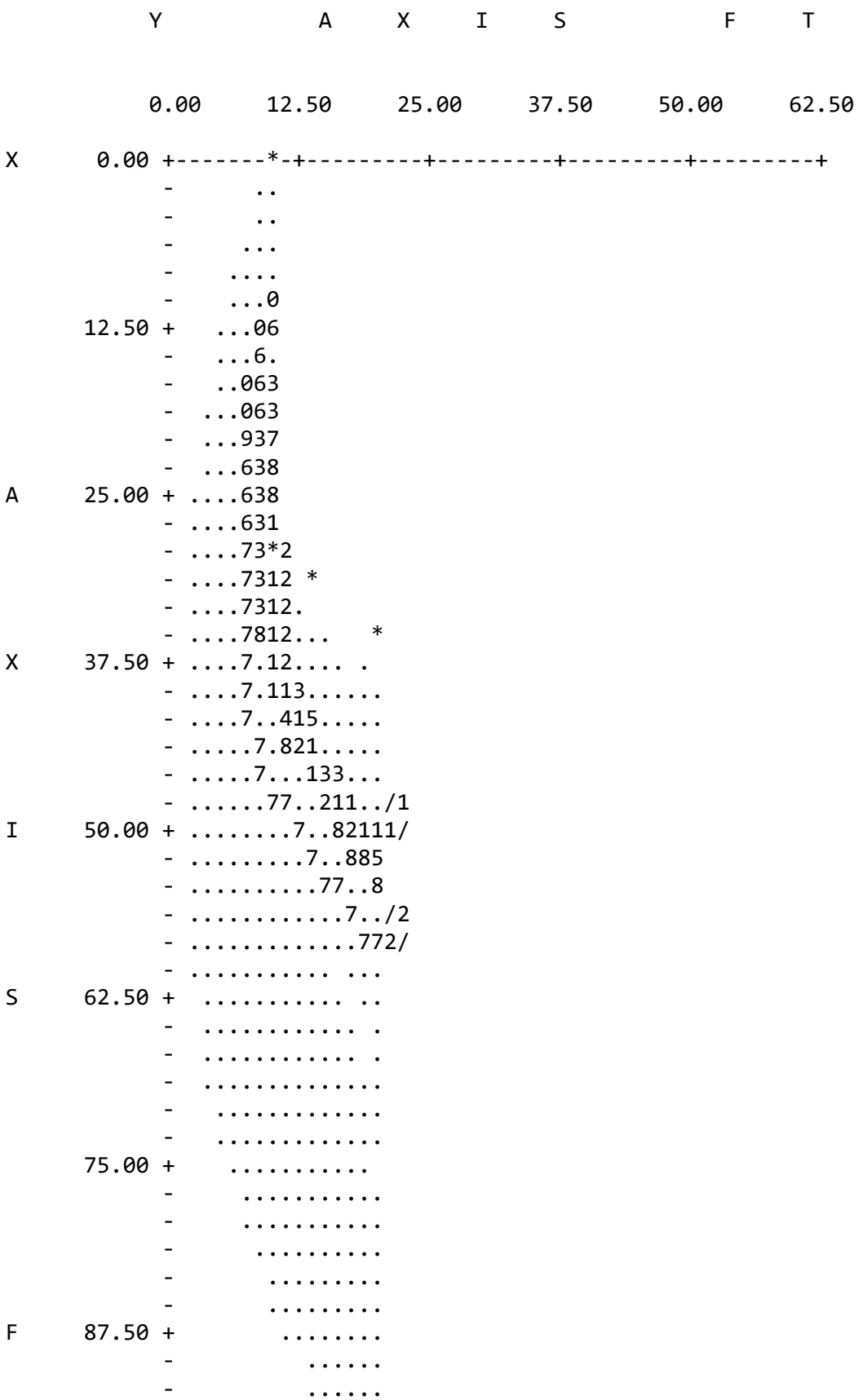
Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	10.03	10.00
2	11.89	9.25
3	13.78	8.60
4	15.71	8.07
5	17.66	7.65
6	19.64	7.35
7	21.63	7.16
8	23.63	7.08
9	25.63	7.12
10	27.62	7.28
11	29.60	7.56
12	31.57	7.94
13	33.50	8.45
14	35.41	9.06
15	37.27	9.78
16	39.09	10.61
17	40.86	11.54
18	42.57	12.58
19	44.22	13.71
20	45.80	14.94
21	47.31	16.25
22	48.73	17.65
23	50.08	19.13
24	50.78	20.00

Circle Center At X = 23.9 ; Y = 41.5 and Radius, 34.4

*** 1.584 ***

1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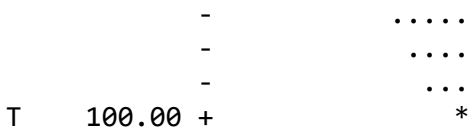
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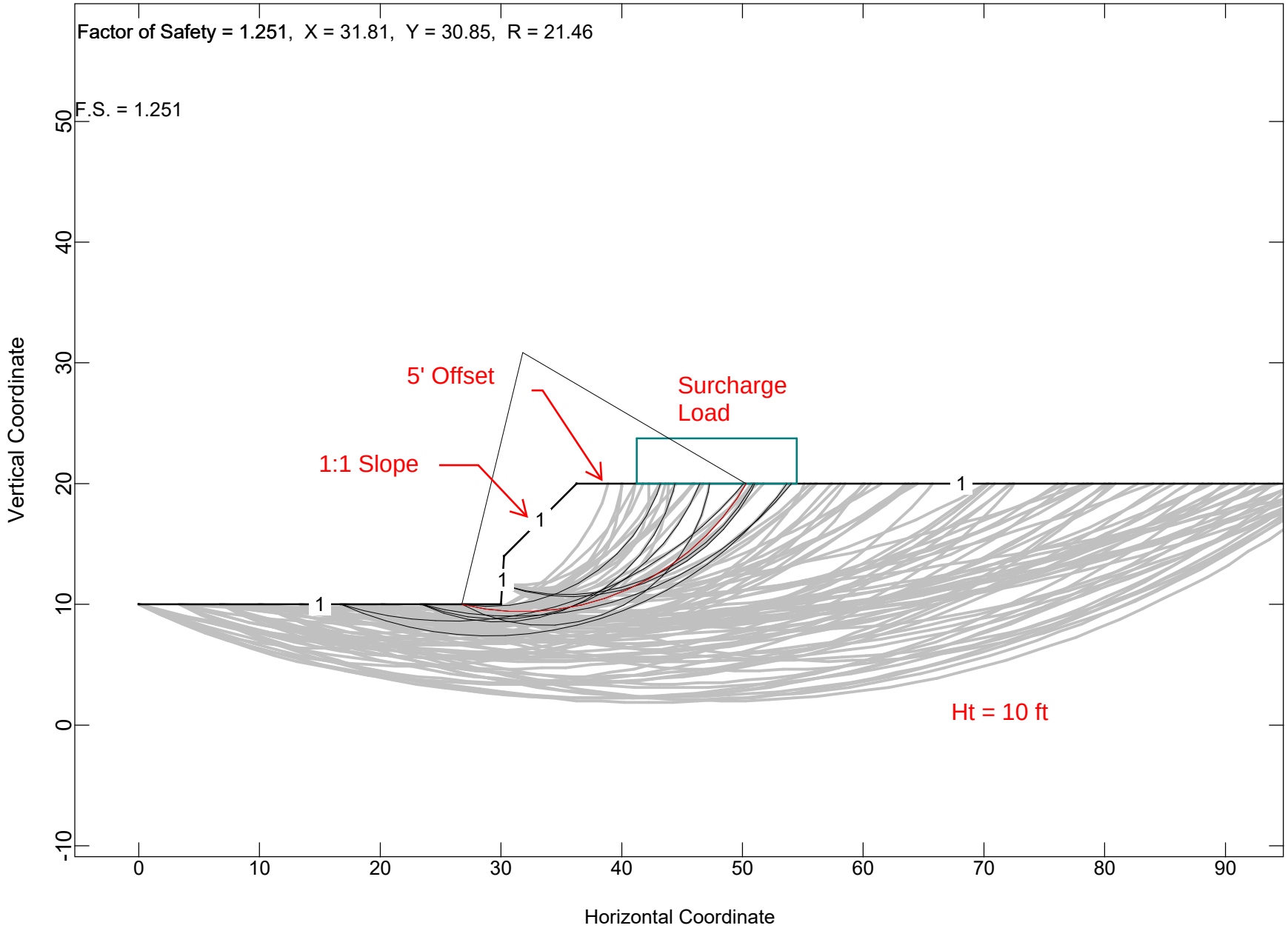

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                     STABLPro for Windows, Version 2015.4.5

                            Upgraded from:
                            FHWA-PCSTABLE

                      Serial Number :  357267753

                         --Slope Stability Analysis--
                       Simplified Janbu, Simplified Bishop
                         or Spencer Method of Slices

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     Name of output file         : Excavator - Vert.sl4o
     Name of plot output file    : Excavator - Vert.sl4p

     ----------------------------------------------------------------------------
                          Time and Date of Analysis
     ----------------------------------------------------------------------------

               Date:  March 04, 2025     Time:  05:58:18




1
          PROBLEM DESCRIPTION   New Slope




          BOUNDARY COORDINATES

              4 Top   Boundaries
              4 Total Boundaries
```

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	0.00	10.00	30.00	10.00	1
2	30.00	10.00	30.25	14.00	1
3	30.25	14.00	36.25	20.00	1
4	36.25	20.00	100.00	20.00	1

1

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	115.0	115.0	210.0	19.0	0.00	0.0	0

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left ft.	X-Right ft.	Intensity psf	Deflection (deg)
1	41.25	54.50	1031.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 0.00 ft.

and X = 30.10 ft.

Each Surface Terminates Between X = 36.00 ft.
and X = 100.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

2.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -25.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.72	9.62
3	30.71	9.42
4	32.71	9.42
5	34.70	9.59
6	36.67	9.95
7	38.59	10.50
8	40.46	11.22
9	42.25	12.11
10	43.95	13.16
11	45.54	14.37
12	47.02	15.72
13	48.36	17.20
14	49.56	18.80
15	50.30	20.00

Circle Center At X = 31.8 ; Y = 30.9 and Radius, 21.5

*** 1.251 ***

Individual data on the 18 slices

Slice No.	Width Ft	Weight Lbs	Water Force Top Lbs	Water Force Bot Lbs	Tie Force Norm Lbs	Tie Force Tan Lbs	Earthquake Force Hor Lbs	Earthquake Force Ver Lbs	Surcharge Load Lbs
1	2.0	0.43E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.3	0.65E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	0.2	0.72E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	0.5	0.25E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	2.0	0.14E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	2.0	0.18E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	1.5	0.17E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	0.4	0.49E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	1.9	0.22E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	1.9	0.20E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	0.8	0.78E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	1.0	0.94E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.10E+04
13	1.7	0.14E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.18E+04
14	1.6	0.11E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.16E+04
15	1.5	0.84E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.15E+04
16	1.3	0.55E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.14E+04
17	1.2	0.28E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.12E+04
18	0.7	0.51E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.76E+03

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.31	9.38
3	27.27	8.98
4	29.26	8.79
5	31.26	8.83
6	33.25	9.10
7	35.19	9.58

8	37.06	10.28
9	38.84	11.19
10	40.52	12.28
11	42.05	13.56
12	43.44	15.00
13	44.66	16.59
14	45.69	18.31
15	46.46	20.00

Circle Center At X = 29.9 ; Y = 26.6 and Radius, 17.9

*** 1.290 ***

1

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.75	9.83
3	30.75	9.92
4	32.71	10.28
5	34.62	10.90
6	36.42	11.76
7	38.09	12.86
8	39.60	14.17
9	40.93	15.67
10	42.04	17.33
11	42.92	19.12
12	43.22	20.00

Circle Center At X = 29.0 ; Y = 24.8 and Radius, 15.0

*** 1.346 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00

2	25.36	9.56
3	27.34	9.25
4	29.33	9.07
5	31.33	9.02
6	33.33	9.12
7	35.31	9.34
8	37.28	9.70
9	39.22	10.19
10	41.12	10.81
11	42.98	11.55
12	44.78	12.42
13	46.52	13.40
14	48.19	14.51
15	49.78	15.72
16	51.29	17.03
17	52.70	18.45
18	54.02	19.95
19	54.06	20.00

Circle Center At X = 31.0 ; Y = 38.8 and Radius, 29.8

*** 1.360 ***

1

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.57	9.16
3	30.49	8.59
4	32.47	8.30
5	34.47	8.29
6	36.45	8.57
7	38.37	9.13
8	40.19	9.96
9	41.87	11.03
10	43.38	12.34
11	44.69	13.86
12	45.77	15.54
13	46.60	17.36
14	47.16	19.28
15	47.26	20.00

Circle Center At X = 33.5 ; Y = 22.2 and Radius, 14.0

*** 1.367 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.27	9.26
3	27.21	8.78
4	29.20	8.55
5	31.20	8.60
6	33.17	8.91
7	35.09	9.48
8	36.91	10.30
9	38.61	11.35
10	40.16	12.63
11	41.52	14.09
12	42.67	15.73
13	43.59	17.50
14	44.27	19.38
15	44.41	20.00

Circle Center At X = 29.9 ; Y = 23.5 and Radius, 15.0

*** 1.392 ***

1

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	18.65	9.47
3	20.61	9.07
4	22.59	8.79
5	24.59	8.64
6	26.59	8.62
7	28.58	8.73
8	30.57	8.96

9	32.54	9.32
10	34.48	9.80
11	36.38	10.41
12	38.25	11.13
13	40.06	11.98
14	41.82	12.94
15	43.51	14.00
16	45.13	15.18
17	46.67	16.45
18	48.12	17.82
19	49.49	19.29
20	50.08	20.00

Circle Center At X = 25.9 ; Y = 39.9 and Radius, 31.3

*** 1.415 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61
2	32.04	11.12
3	34.02	10.85
4	36.02	10.81
5	38.01	11.00
6	39.97	11.41
7	41.87	12.03
8	43.69	12.87
9	45.39	13.91
10	46.98	15.14
11	48.41	16.53
12	49.67	18.08
13	50.76	19.76
14	50.87	20.00

Circle Center At X = 35.4 ; Y = 28.5 and Radius, 17.7

*** 1.416 ***

1

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	18.58	9.25
3	20.48	8.63
4	22.41	8.13
5	24.38	7.75
6	26.36	7.51
7	28.36	7.40
8	30.36	7.42
9	32.36	7.58
10	34.33	7.86
11	36.29	8.27
12	38.22	8.81
13	40.10	9.48
14	41.94	10.27
15	43.72	11.17
16	45.44	12.20
17	47.09	13.33
18	48.66	14.57
19	50.15	15.91
20	51.54	17.34
21	52.84	18.87
22	53.68	20.00

Circle Center At X = 29.0 ; Y = 37.8 and Radius, 30.4

*** 1.420 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61
2	32.02	11.06
3	34.00	10.73
4	35.99	10.64
5	37.99	10.78
6	39.95	11.16
7	41.86	11.76
8	43.69	12.58
9	45.40	13.60

```
   10         46.99       14.82
   11         48.42       16.21
   12         49.69       17.77
   13         50.76       19.46
   14         51.02       20.00

Circle Center At X =   35.8 ; Y =   27.8  and Radius,   17.1


      ***     1.442   ***



1

                Y            A     X     I     S            F     T


                0.00     12.50     25.00     37.50     50.00     62.50

X      0.00 +-------*-+---------+---------+---------+---------+
             -      ..
             -      ..
             -     ...
             -    ....
             -    ....
       12.50 +   .....
             -   .....
             -   ....7
             -  ....97
             -  ....7.
             -  ....72
A      25.00 + ....962
             - ....921
             - ....92*8
             - ....9218 *
             - ....9218.
             - .....413...   *
X      37.50 + .....5173... .
             - ......1123.....
             - ......9412.33../1
             - .......44122633
             - ........9157522
             - .........941155
I      50.00 + ...........4811
             - ............44.
             - ..............41/
             - ..............
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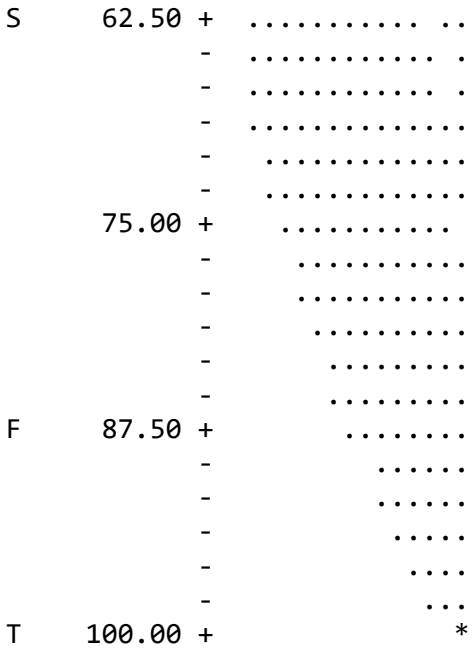
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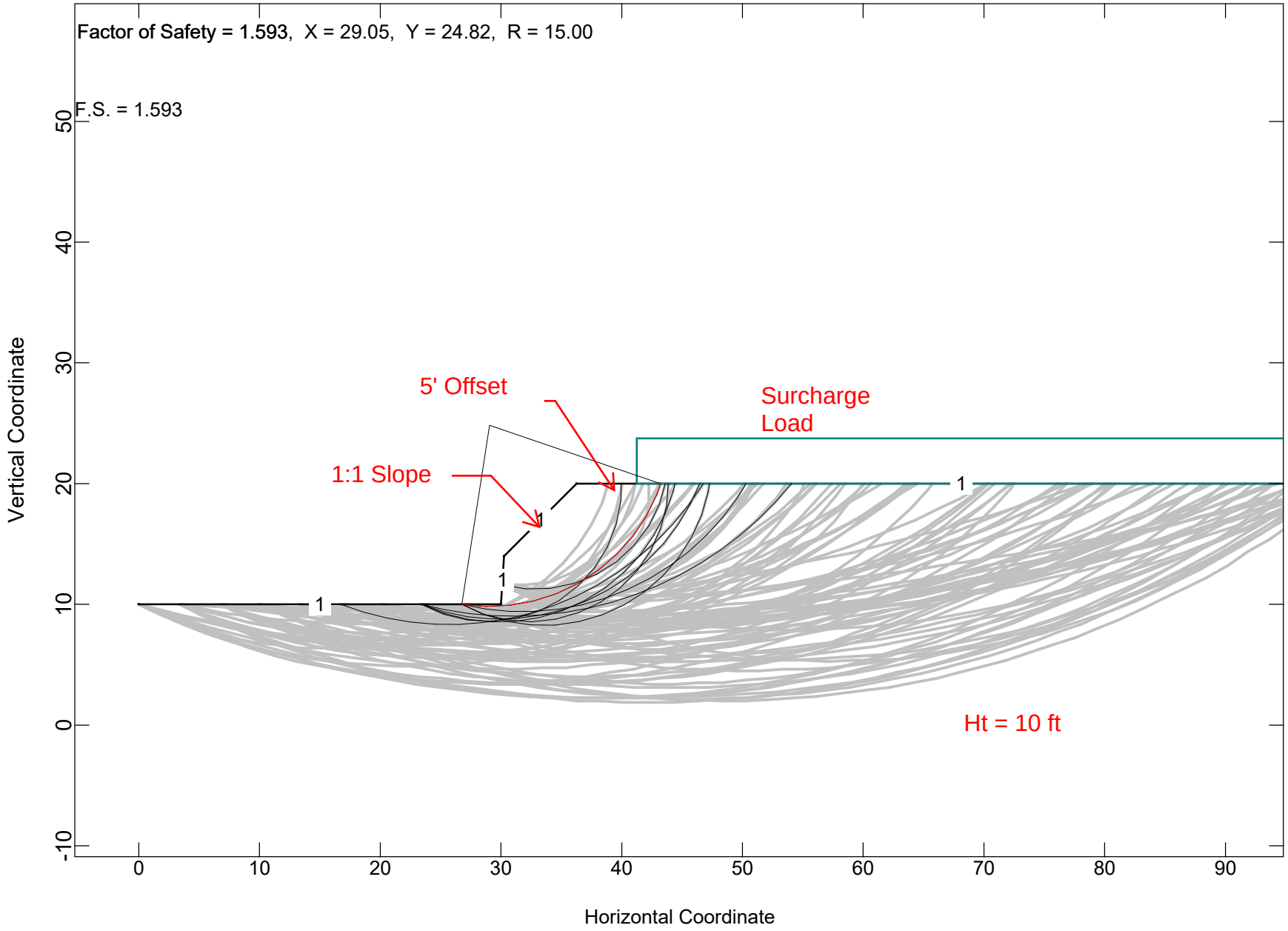

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                      STABLPro for Windows, Version 2015.4.5

                              Upgraded from:
                              FHWA-PCSTABLE

                       Serial Number :  357267753

                          --Slope Stability Analysis--
                         Simplified Janbu, Simplified Bishop
                           or Spencer Method of Slices

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


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     Las Vegas, NV, USA

     Path to file locations      :
D:\Dropbox\Korpi_Cannon_Engineering\Projects\KC-0119 - MZB Engineering\Design\Excav
- Shoring\2.0 Elara_Luna\Elara\Design\
     Name of input data file     : Traffic - Vert.sl4d
     Name of output file         : Traffic - Vert.sl4o
     Name of plot output file    : Traffic - Vert.sl4p

     --------------------------------------------------------------------------
                           Time and Date of Analysis
     --------------------------------------------------------------------------

               Date:  March 04, 2025     Time:  06:01:32




1
          PROBLEM DESCRIPTION   New Slope




          BOUNDARY COORDINATES

              4 Top   Boundaries
              4 Total Boundaries
```

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	0.00	10.00	30.00	10.00	1
2	30.00	10.00	30.25	14.00	1
3	30.25	14.00	36.25	20.00	1
4	36.25	20.00	100.00	20.00	1

1

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	115.0	115.0	210.0	19.0	0.00	0.0	0

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left ft.	X-Right ft.	Intensity psf	Deflection (deg)
1	41.25	100.00	300.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 0.00 ft.

and X = 30.10 ft.

Each Surface Terminates Between X = 36.00 ft.
and X = 100.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

2.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -25.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.75	9.83
3	30.75	9.92
4	32.71	10.28
5	34.62	10.90
6	36.42	11.76
7	38.09	12.86
8	39.60	14.17
9	40.93	15.67
10	42.04	17.33
11	42.92	19.12
12	43.22	20.00

Circle Center At X = 29.0 ; Y = 24.8 and Radius, 15.0

*** 1.593 ***

Individual data on the 15 slices

Slice No.	Width Ft	Weight Lbs	Water Force Top Lbs	Water Force Bot Lbs	Tie Force Norm Lbs	Tie Force Tan Lbs	Earthquake Force Hor Lbs	Earthquake Force Ver Lbs	Surcharge Load Lbs
1	2.0	0.20E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.3	0.21E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	0.2	0.61E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	0.5	0.25E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	2.0	0.12E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	1.9	0.15E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	1.6	0.15E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	0.2	0.16E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	1.7	0.15E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	1.5	0.11E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	1.3	0.77E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	0.3	0.15E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	0.8	0.30E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.24E+03
14	0.9	0.18E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.26E+03
15	0.3	0.15E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.88E+02

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.31	9.38
3	27.27	8.98
4	29.26	8.79
5	31.26	8.83
6	33.25	9.10
7	35.19	9.58
8	37.06	10.28
9	38.84	11.19
10	40.52	12.28
11	42.05	13.56
12	43.44	15.00
13	44.66	16.59

14	45.69	18.31
15	46.46	20.00

Circle Center At X = 29.9 ; Y = 26.6 and Radius, 17.9

*** 1.671 ***

1

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.27	9.26
3	27.21	8.78
4	29.20	8.55
5	31.20	8.60
6	33.17	8.91
7	35.09	9.48
8	36.91	10.30
9	38.61	11.35
10	40.16	12.63
11	41.52	14.09
12	42.67	15.73
13	43.59	17.50
14	44.27	19.38
15	44.41	20.00

Circle Center At X = 29.9 ; Y = 23.5 and Radius, 15.0

*** 1.699 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.72	9.62
3	30.71	9.42
4	32.71	9.42

5	34.70	9.59
6	36.67	9.95
7	38.59	10.50
8	40.46	11.22
9	42.25	12.11
10	43.95	13.16
11	45.54	14.37
12	47.02	15.72
13	48.36	17.20
14	49.56	18.80
15	50.30	20.00

Circle Center At X = 31.8 ; Y = 30.9 and Radius, 21.5

*** 1.711 ***

1

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.58	9.19
3	30.52	8.70
4	32.52	8.56
5	34.51	8.77
6	36.43	9.31
7	38.23	10.18
8	39.86	11.35
9	41.26	12.78
10	42.38	14.43
11	43.21	16.25
12	43.71	18.19
13	43.86	20.00

Circle Center At X = 32.3 ; Y = 20.1 and Radius, 11.5

*** 1.781 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.57	9.16
3	30.49	8.59
4	32.47	8.30
5	34.47	8.29
6	36.45	8.57
7	38.37	9.13
8	40.19	9.96
9	41.87	11.03
10	43.38	12.34
11	44.69	13.86
12	45.77	15.54
13	46.60	17.36
14	47.16	19.28
15	47.26	20.00

Circle Center At X = 33.5 ; Y = 22.2 and Radius, 14.0

*** 1.814 ***

1

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.24	9.19
3	27.18	8.71
4	29.18	8.59
5	31.16	8.83
6	33.07	9.42
7	34.85	10.35
8	36.43	11.57
9	37.77	13.06
10	38.82	14.76
11	39.54	16.62
12	39.93	18.59
13	39.95	20.00

Circle Center At X = 28.8 ; Y = 19.7 and Radius, 11.1

*** 1.836 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.36	9.56
3	27.34	9.25
4	29.33	9.07
5	31.33	9.02
6	33.33	9.12
7	35.31	9.34
8	37.28	9.70
9	39.22	10.19
10	41.12	10.81
11	42.98	11.55
12	44.78	12.42
13	46.52	13.40
14	48.19	14.51
15	49.78	15.72
16	51.29	17.03
17	52.70	18.45
18	54.02	19.95
19	54.06	20.00

Circle Center At X = 31.0 ; Y = 38.8 and Radius, 29.8

*** 1.868 ***

1

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	18.62	9.35
3	20.55	8.86
4	22.53	8.53
5	24.52	8.35
6	26.52	8.34

7	28.51	8.49
8	30.49	8.80
9	32.43	9.26
10	34.34	9.88
11	36.18	10.65
12	37.96	11.57
13	39.66	12.63
14	41.26	13.82
15	42.77	15.13
16	44.17	16.57
17	45.44	18.11
18	46.59	19.74
19	46.74	20.00

Circle Center At X = 25.7 ; Y = 33.2 and Radius, 24.8

*** 1.879 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61
2	32.07	11.29
3	34.07	11.33
4	36.03	11.73
5	37.89	12.48
6	39.58	13.55
7	41.04	14.91
8	42.24	16.51
9	43.13	18.30
10	43.61	20.00

Circle Center At X = 32.9 ; Y = 22.3 and Radius, 11.0

*** 1.888 ***

1

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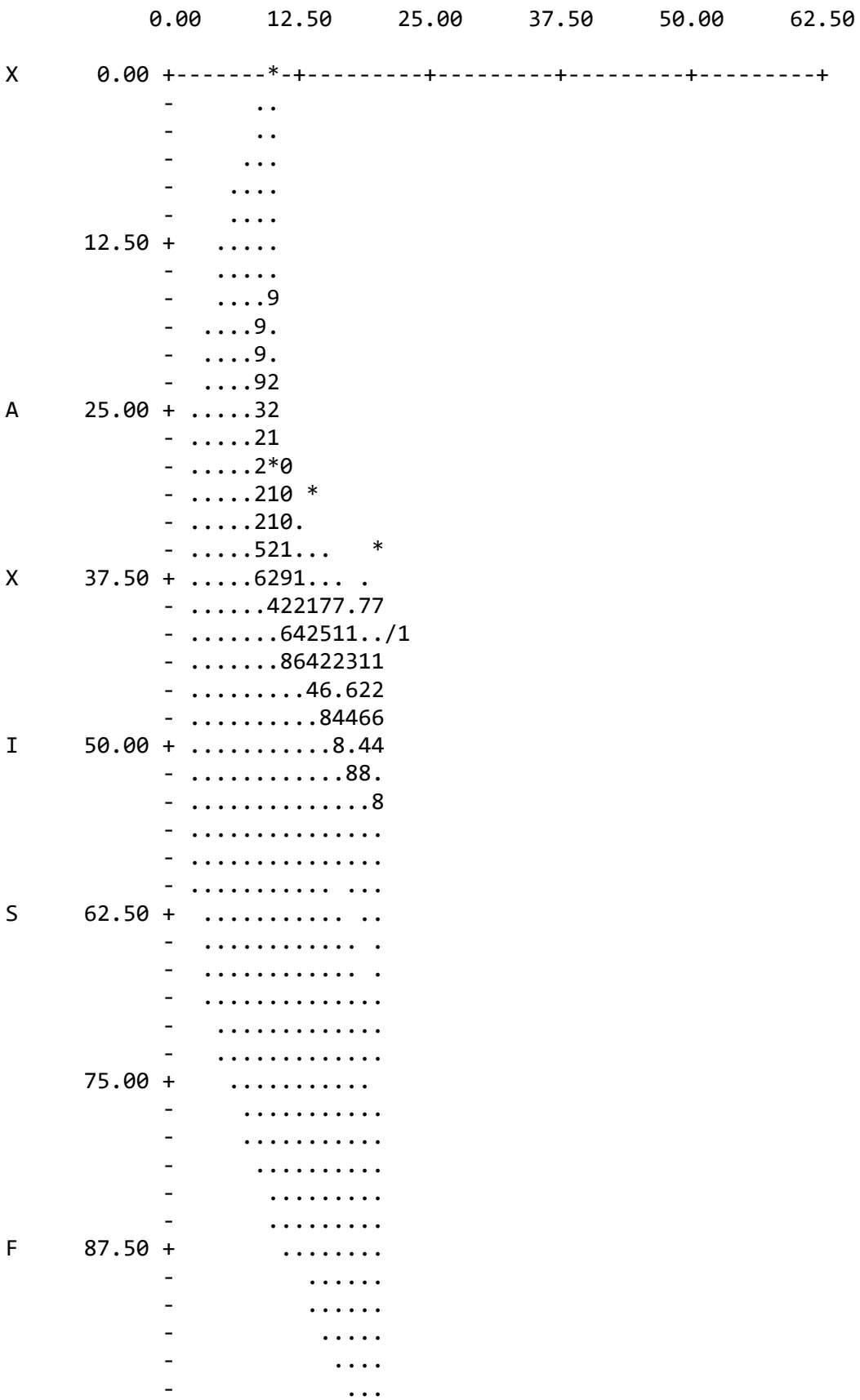
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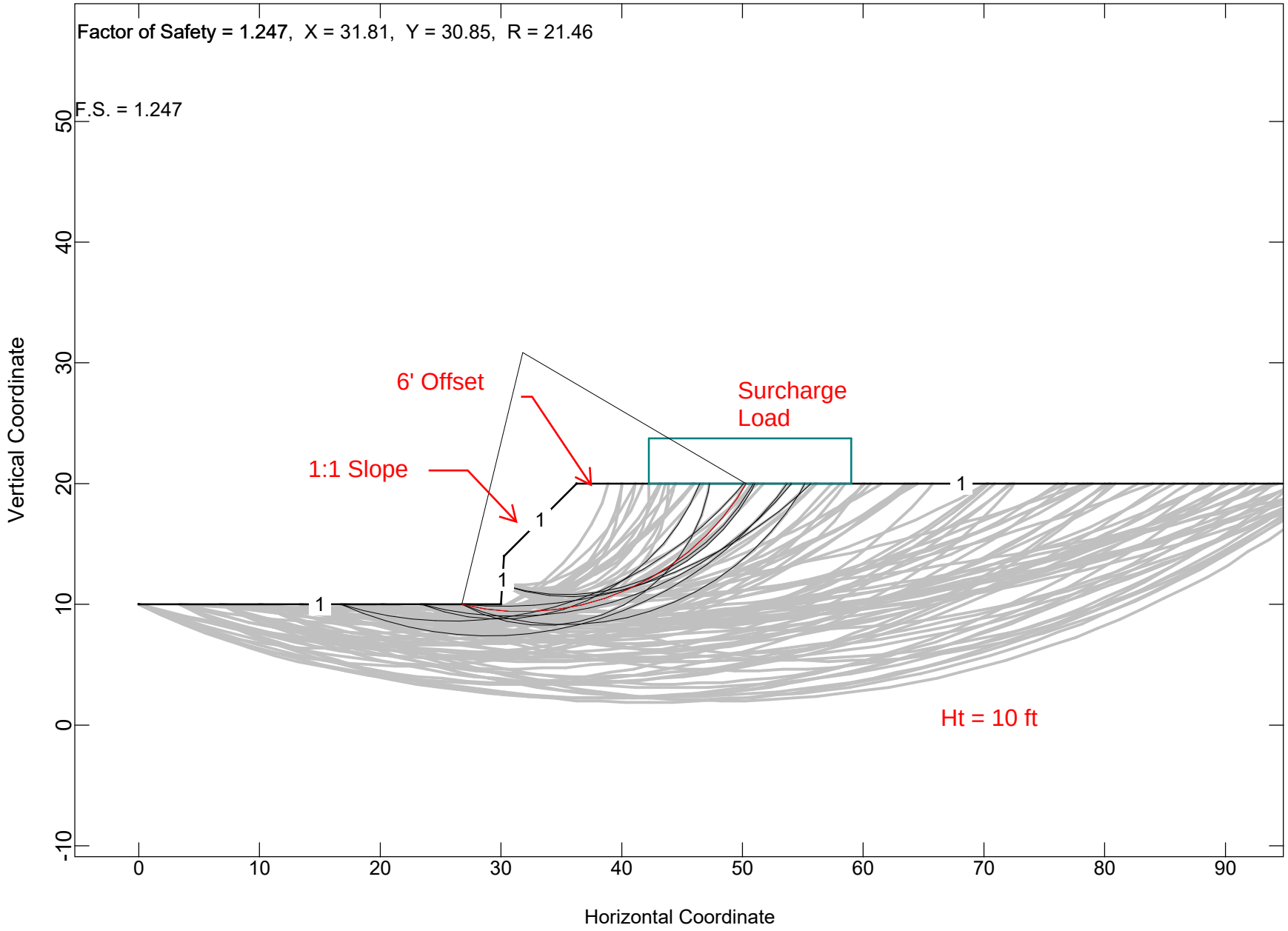

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                     STABLPro for Windows, Version 2015.4.5

                            Upgraded from:
                            FHWA-PCSTABLE

                      Serial Number :  357267753

                         --Slope Stability Analysis--
                       Simplified Janbu, Simplified Bishop
                         or Spencer Method of Slices

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


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     Las Vegas, NV, USA

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                          Time and Date of Analysis
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               Date:  March 04, 2025     Time:  06:25:40




1
          PROBLEM DESCRIPTION   New Slope




          BOUNDARY COORDINATES

              4 Top   Boundaries
              4 Total Boundaries
```

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	0.00	10.00	30.00	10.00	1
2	30.00	10.00	30.25	14.00	1
3	30.25	14.00	36.25	20.00	1
4	36.25	20.00	100.00	20.00	1

1

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	115.0	115.0	210.0	19.0	0.00	0.0	0

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left ft.	X-Right ft.	Intensity psf	Deflection (deg)
1	42.25	59.00	1100.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 0.00 ft.

and X = 30.10 ft.

Each Surface Terminates Between X = 36.00 ft.
and X = 100.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

2.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -25.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.72	9.62
3	30.71	9.42
4	32.71	9.42
5	34.70	9.59
6	36.67	9.95
7	38.59	10.50
8	40.46	11.22
9	42.25	12.11
10	43.95	13.16
11	45.54	14.37
12	47.02	15.72
13	48.36	17.20
14	49.56	18.80
15	50.30	20.00

Circle Center At X = 31.8 ; Y = 30.9 and Radius, 21.5

*** 1.247 ***

Individual data on the 17 slices

Slice No.	Width Ft	Weight Lbs	Water Force Top Lbs	Water Force Bot Lbs	Tie Force Norm Lbs	Tie Force Tan Lbs	Earthquake Force Hor Lbs	Earthquake Force Ver Lbs	Surcharge Load Lbs
1	2.0	0.43E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.3	0.65E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	0.2	0.72E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	0.5	0.25E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	2.0	0.14E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	2.0	0.18E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	1.5	0.17E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	0.4	0.49E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	1.9	0.22E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	1.9	0.20E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	1.8	0.17E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	1.7	0.14E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.19E+04
13	1.6	0.11E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.18E+04
14	1.5	0.84E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.16E+04
15	1.3	0.55E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.15E+04
16	1.2	0.28E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.13E+04
17	0.7	0.51E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.81E+03

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.31	9.38
3	27.27	8.98
4	29.26	8.79
5	31.26	8.83
6	33.25	9.10
7	35.19	9.58
8	37.06	10.28

9	38.84	11.19
10	40.52	12.28
11	42.05	13.56
12	43.44	15.00
13	44.66	16.59
14	45.69	18.31
15	46.46	20.00

Circle Center At X = 29.9 ; Y = 26.6 and Radius, 17.9

*** 1.330 ***

1

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.36	9.56
3	27.34	9.25
4	29.33	9.07
5	31.33	9.02
6	33.33	9.12
7	35.31	9.34
8	37.28	9.70
9	39.22	10.19
10	41.12	10.81
11	42.98	11.55
12	44.78	12.42
13	46.52	13.40
14	48.19	14.51
15	49.78	15.72
16	51.29	17.03
17	52.70	18.45
18	54.02	19.95
19	54.06	20.00

Circle Center At X = 31.0 ; Y = 38.8 and Radius, 29.8

*** 1.346 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.75	9.87
3	30.75	9.84
4	32.75	9.93
5	34.74	10.12
6	36.72	10.42
7	38.68	10.82
8	40.61	11.33
9	42.51	11.94
10	44.38	12.66
11	46.21	13.48
12	47.99	14.39
13	49.72	15.40
14	51.39	16.50
15	52.99	17.68
16	54.54	18.96
17	55.67	20.00

Circle Center At X = 30.2 ; Y = 46.9 and Radius, 37.0

*** 1.376 ***

1

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.57	9.16
3	30.49	8.59
4	32.47	8.30
5	34.47	8.29
6	36.45	8.57
7	38.37	9.13
8	40.19	9.96
9	41.87	11.03
10	43.38	12.34
11	44.69	13.86
12	45.77	15.54
13	46.60	17.36

14	47.16	19.28
15	47.26	20.00

Circle Center At X = 33.5 ; Y = 22.2 and Radius, 14.0

*** 1.394 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.64	9.33
3	30.57	8.82
4	32.55	8.49
5	34.54	8.33
6	36.54	8.35
7	38.53	8.55
8	40.50	8.91
9	42.42	9.45
10	44.29	10.16
11	46.10	11.03
12	47.81	12.05
13	49.43	13.23
14	50.95	14.53
15	52.34	15.97
16	53.60	17.52
17	54.72	19.18
18	55.17	20.00

Circle Center At X = 35.3 ; Y = 31.0 and Radius, 22.7

*** 1.400 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61

2	32.04	11.12
3	34.02	10.85
4	36.02	10.81
5	38.01	11.00
6	39.97	11.41
7	41.87	12.03
8	43.69	12.87
9	45.39	13.91
10	46.98	15.14
11	48.41	16.53
12	49.67	18.08
13	50.76	19.76
14	50.87	20.00

Circle Center At X = 35.4 ; Y = 28.5 and Radius, 17.7

*** 1.401 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	18.58	9.25
3	20.48	8.63
4	22.41	8.13
5	24.38	7.75
6	26.36	7.51
7	28.36	7.40
8	30.36	7.42
9	32.36	7.58
10	34.33	7.86
11	36.29	8.27
12	38.22	8.81
13	40.10	9.48
14	41.94	10.27
15	43.72	11.17
16	45.44	12.20
17	47.09	13.33
18	48.66	14.57
19	50.15	15.91
20	51.54	17.34
21	52.84	18.87
22	53.68	20.00

Circle Center At X = 29.0 ; Y = 37.8 and Radius, 30.4

*** 1.409 ***

1

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	18.65	9.47
3	20.61	9.07
4	22.59	8.79
5	24.59	8.64
6	26.59	8.62
7	28.58	8.73
8	30.57	8.96
9	32.54	9.32
10	34.48	9.80
11	36.38	10.41
12	38.25	11.13
13	40.06	11.98
14	41.82	12.94
15	43.51	14.00
16	45.13	15.18
17	46.67	16.45
18	48.12	17.82
19	49.49	19.29
20	50.08	20.00

Circle Center At X = 25.9 ; Y = 39.9 and Radius, 31.3

*** 1.424 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61
2	32.02	11.06

```
     3         34.00       10.73
     4         35.99       10.64
     5         37.99       10.78
     6         39.95       11.16
     7         41.86       11.76
     8         43.69       12.58
     9         45.40       13.60
    10         46.99       14.82
    11         48.42       16.21
    12         49.69       17.77
    13         50.76       19.46
    14         51.02       20.00

Circle Center At X =   35.8 ; Y =   27.8  and Radius,   17.1


       ***     1.424   ***



1

                Y           A     X     I     S           F     T


               0.00     12.50     25.00     37.50     50.00     62.50

X       0.00 +-------*-+---------+---------+---------+---------+
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             -      ..
             -     ...
             -    ....
             -    ....
       12.50 +   .....
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             -   ....8
             -  ....89
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             -  ....82
A      25.00 + ....892
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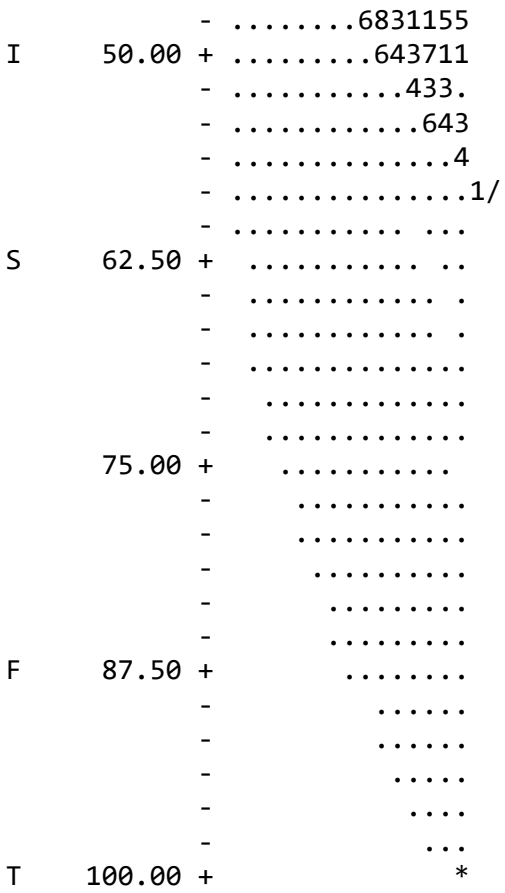
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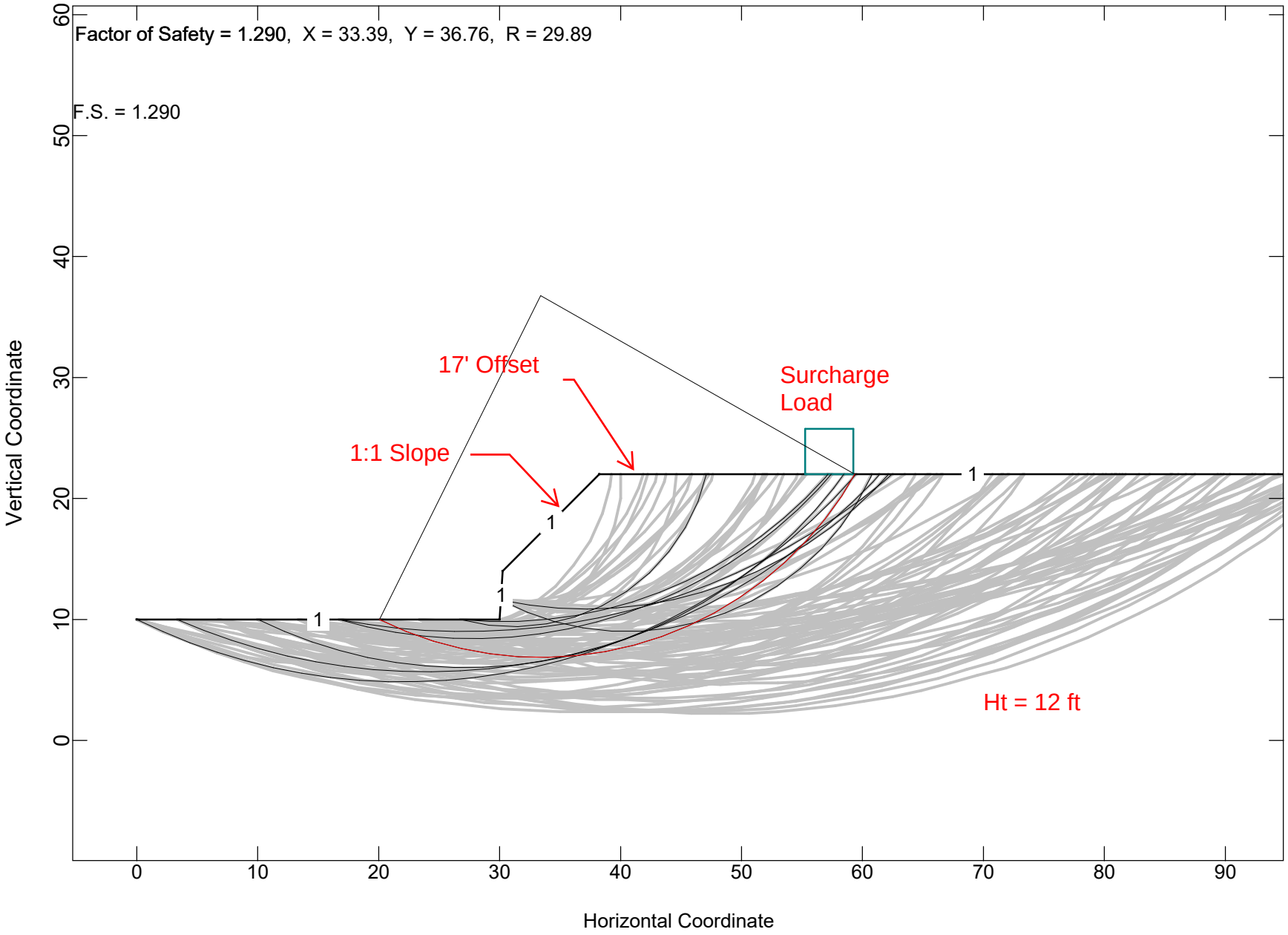
Luna
Concrete Truck Surcharge



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                     STABLPro for Windows, Version 2015.4.5

                            Upgraded from:
                            FHWA-PCSTABLE

                      Serial Number :  357267753

                         --Slope Stability Analysis--
                       Simplified Janbu, Simplified Bishop
                         or Spencer Method of Slices

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     Las Vegas, NV, USA

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               Date:  March 04, 2025     Time:  06:07:34




1
          PROBLEM DESCRIPTION   New Slope




          BOUNDARY COORDINATES

              4 Top   Boundaries
              4 Total Boundaries
```

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	0.00	10.00	30.00	10.00	1
2	30.00	10.00	30.25	14.00	1
3	30.25	14.00	38.25	22.00	1
4	38.25	22.00	100.00	22.00	1

1

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	115.0	115.0	210.0	19.0	0.00	0.0	0

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left ft.	X-Right ft.	Intensity psf	Deflection (deg)
1	55.25	59.25	3361.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 0.00 ft.

and X = 30.10 ft.

Each Surface Terminates Between X = 36.00 ft.
and X = 100.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

2.40 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -25.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	20.07	10.00
2	22.26	9.02
3	24.52	8.21
4	26.84	7.60
5	29.20	7.16
6	31.59	6.92
7	33.99	6.87
8	36.38	7.02
9	38.76	7.36
10	41.10	7.88
11	43.39	8.59
12	45.62	9.49
13	47.77	10.56
14	49.82	11.79
15	51.77	13.19

16	53.60	14.74
17	55.31	16.44
18	56.87	18.26
19	58.27	20.20
20	59.37	22.00

Circle Center At X = 33.4 ; Y = 36.8 and Radius, 29.9

*** 1.290 ***

Individual data on the 24 slices

Slice No.	Width Ft	Weight Lbs	Water Force Top Lbs	Water Force Bot Lbs	Tie Force Norm Lbs	Tie Force Tan Lbs	Earthquake Force Hor Lbs	Earthquake Force Ver Lbs	Surcharge Load Lbs
1	2.2	0.12E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	2.3	0.36E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	2.3	0.56E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	2.4	0.71E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	0.8	0.27E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	0.2	0.14E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	1.3	0.12E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	2.4	0.27E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	2.4	0.33E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	1.9	0.30E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	0.5	0.86E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	2.3	0.39E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	2.3	0.36E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	2.2	0.33E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	2.1	0.30E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	2.1	0.26E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	2.0	0.21E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	1.8	0.17E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	1.6	0.12E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	0.1	0.36E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.19E+03
21	1.6	0.83E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.52E+04
22	1.4	0.45E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.47E+04
23	1.0	0.11E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.33E+04
24	0.1	0.13E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	29.15	9.84
3	31.55	9.84
4	33.95	10.01
5	36.32	10.33
6	38.67	10.81
7	40.99	11.46
8	43.25	12.25
9	45.46	13.19
10	47.60	14.29
11	49.65	15.52
12	51.63	16.89
13	53.50	18.38
14	55.27	20.00
15	56.93	21.74
16	57.15	22.00

Circle Center At X = 30.3 ; Y = 45.5 and Radius, 35.7

*** 1.407 ***

1

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	10.03	10.00
2	12.22	9.01
3	14.46	8.15
4	16.75	7.44
5	19.08	6.87
6	21.45	6.44
7	23.83	6.16
8	26.23	6.03
9	28.63	6.05
10	31.02	6.21
11	33.40	6.53
12	35.75	6.99
13	38.08	7.60
14	40.36	8.34
15	42.59	9.23

16	44.76	10.26
17	46.86	11.42
18	48.88	12.70
19	50.83	14.11
20	52.68	15.64
21	54.43	17.27
22	56.08	19.02
23	57.62	20.86
24	58.46	22.00

Circle Center At X = 27.1 ; Y = 44.7 and Radius, 38.7

*** 1.474 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	19.05	9.40
3	21.40	8.93
4	23.78	8.62
5	26.17	8.45
6	28.57	8.42
7	30.97	8.55
8	33.36	8.82
9	35.72	9.23
10	38.05	9.79
11	40.35	10.49
12	42.60	11.33
13	44.79	12.31
14	46.92	13.41
15	48.98	14.65
16	50.95	16.01
17	52.85	17.49
18	54.64	19.08
19	56.34	20.77
20	57.43	22.00

Circle Center At X = 27.8 ; Y = 47.6 and Radius, 39.2

*** 1.496 ***

1

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61
2	32.46	11.19
3	34.85	10.94
4	37.25	10.86
5	39.65	10.96
6	42.03	11.22
7	44.39	11.65
8	46.72	12.25
9	48.99	13.01
10	51.21	13.94
11	53.35	15.01
12	55.42	16.24
13	57.39	17.61
14	59.26	19.12
15	61.01	20.75
16	62.17	22.00

Circle Center At X = 37.1 ; Y = 44.6 and Radius, 33.8

*** 1.524 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61
2	32.28	10.60
3	34.55	9.83
4	36.89	9.31
5	39.28	9.04
6	41.68	9.04
7	44.07	9.29
8	46.41	9.79
9	48.69	10.55
10	50.87	11.54
11	52.94	12.77
12	54.86	14.21

13	56.61	15.85
14	58.18	17.67
15	59.54	19.64
16	60.68	21.75
17	60.78	22.00

Circle Center At X = 40.5 ; Y = 31.3 and Radius, 22.3

*** 1.528 ***

1

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	19.09	9.60
3	21.47	9.30
4	23.86	9.10
5	26.26	9.01
6	28.66	9.03
7	31.06	9.15
8	33.45	9.37
9	35.82	9.71
10	38.18	10.14
11	40.52	10.68
12	42.84	11.32
13	45.12	12.06
14	47.37	12.90
15	49.57	13.84
16	51.74	14.88
17	53.86	16.01
18	55.92	17.23
19	57.93	18.54
20	59.88	19.94
21	61.77	21.42
22	62.45	22.00

Circle Center At X = 27.1 ; Y = 63.6 and Radius, 54.6

*** 1.548 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	0.00	10.00
2	2.18	8.99
3	4.40	8.08
4	6.66	7.28
5	8.96	6.59
6	11.29	6.02
7	13.65	5.56
8	16.02	5.21
9	18.41	4.98
10	20.81	4.86
11	23.21	4.86
12	25.60	4.98
13	27.99	5.21
14	30.37	5.56
15	32.72	6.03
16	35.05	6.60
17	37.35	7.29
18	39.61	8.09
19	41.83	9.00
20	44.01	10.01
21	46.13	11.13
22	48.20	12.35
23	50.20	13.67
24	52.14	15.09
25	54.01	16.60
26	55.80	18.19
27	57.52	19.87
28	59.14	21.64
29	59.45	22.00

Circle Center At X = 22.0 ; Y = 54.4 and Radius, 49.5

*** 1.616 ***

1

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.

1	3.34	10.00
2	5.56	9.09
3	7.82	8.28
4	10.12	7.58
5	12.44	6.98
6	14.80	6.50
7	17.17	6.13
8	19.55	5.86
9	21.95	5.71
10	24.35	5.68
11	26.75	5.75
12	29.14	5.94
13	31.52	6.24
14	33.88	6.65
15	36.23	7.17
16	38.54	7.80
17	40.83	8.53
18	43.07	9.38
19	45.28	10.33
20	47.44	11.38
21	49.54	12.53
22	51.59	13.77
23	53.58	15.11
24	55.51	16.55
25	57.36	18.07
26	59.15	19.68
27	60.85	21.37
28	61.43	22.00

Circle Center At X = 23.9 ; Y = 56.9 and Radius, 51.2

*** 1.633 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	29.11	9.53
3	31.51	9.41
4	33.90	9.63
5	36.23	10.21
6	38.45	11.12
7	40.51	12.34
8	42.38	13.85

```
    9         44.00       15.62
   10         45.35       17.60
   11         46.40       19.76
   12         47.10       22.00

Circle Center At X =   31.1 ; Y =   25.8  and Radius,   16.4


      ***     1.641   ***



1

                Y            A     X     I     S            F     T


               0.00     12.50     25.00     37.50     50.00     62.50

X       0.00 +-------*-+---------+---------+---------+---------+
             -      8.
             -     8.9
             -     89.
             -    8.9.
             -    89.3
       12.50 +    .93.
             -   89.3.
             -   893.4
             -  .83..4
             -  .83.41
             -  .83.1.
A      25.00 + ..89.1.
             - ..83142
             - ...314*5
             - ..83142  *
             - ...1.425
             - ...81425...
X      37.50 + ....3645.... .  *
             - ....13420........
             - ....13.2.0.......
             - .....1352.0......
             - ......1352. 0.0..
             - ......1932...  .0
I      50.00 + .......15324....
             - ........61732....
             - .........61732...
             - ...........171222/1
             - ............551311/
             -  ..............656
S      62.50 +  ..............75
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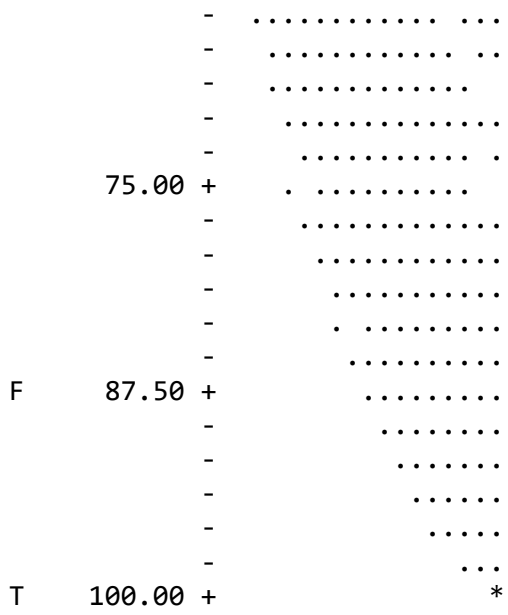
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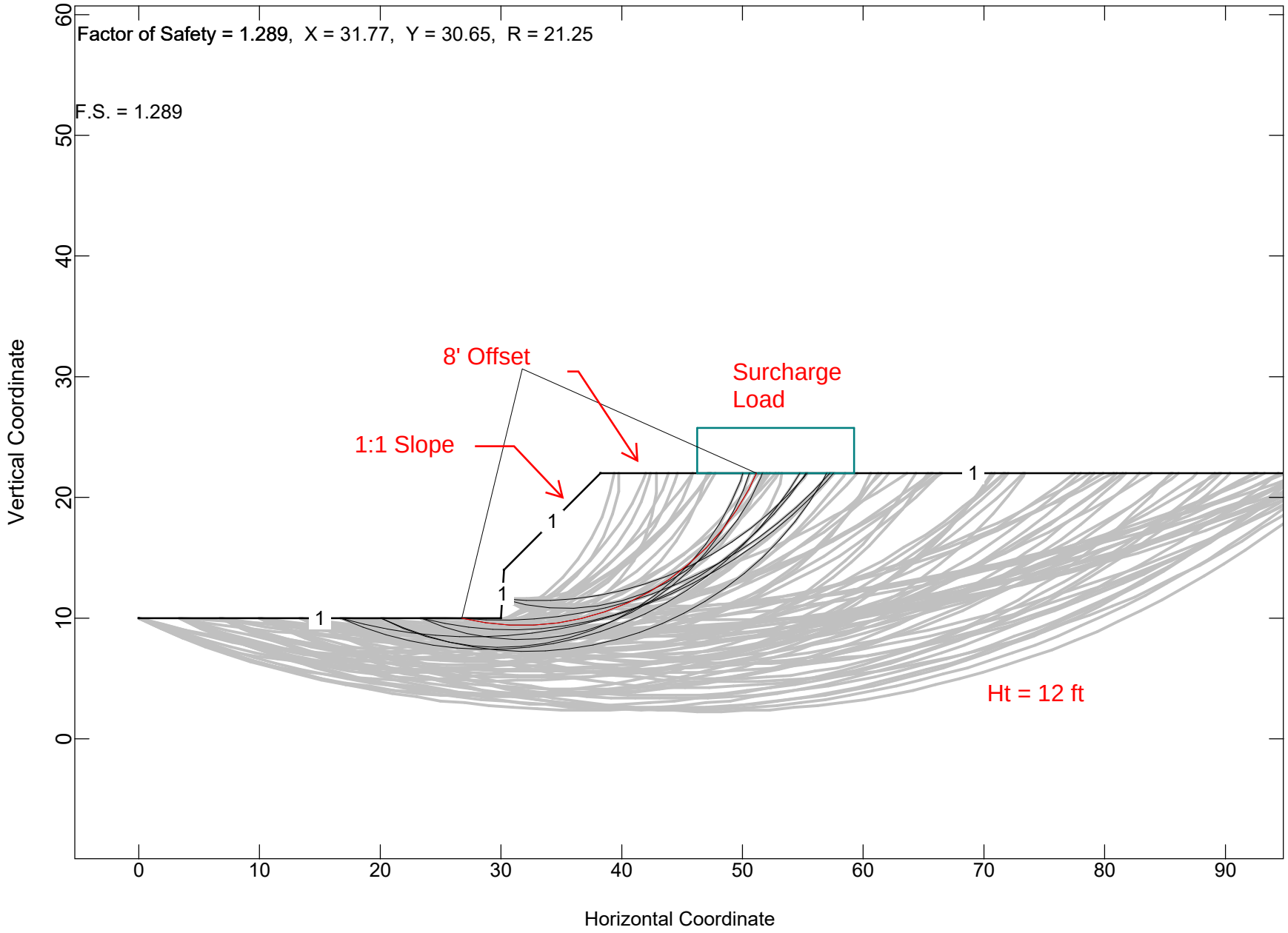
Excavator Surcharge



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                     STABLPro for Windows, Version 2015.4.5

                            Upgraded from:
                            FHWA-PCSTABLE

                      Serial Number :  357267753

                         --Slope Stability Analysis--
                       Simplified Janbu, Simplified Bishop
                         or Spencer Method of Slices

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


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     Path to file locations      :
D:\Dropbox\Korpi_Cannon_Engineering\Projects\KC-0119 - MZB Engineering\Design\Excav
- Shoring\2.0 Elara_Luna\Luna\Design\
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     Name of output file         : Excavator - Vert.sl4o
     Name of plot output file    : Excavator - Vert.sl4p

     ----------------------------------------------------------------------------
                          Time and Date of Analysis
     ----------------------------------------------------------------------------

               Date:  March 04, 2025     Time:  06:10:48




1
          PROBLEM DESCRIPTION   New Slope




          BOUNDARY COORDINATES

              4 Top   Boundaries
              4 Total Boundaries
```

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	0.00	10.00	30.00	10.00	1
2	30.00	10.00	30.25	14.00	1
3	30.25	14.00	38.25	22.00	1
4	38.25	22.00	100.00	22.00	1

1

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	115.0	115.0	210.0	19.0	0.00	0.0	0

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left ft.	X-Right ft.	Intensity psf	Deflection (deg)
1	46.25	59.25	1031.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 0.00 ft.

and X = 30.10 ft.

Each Surface Terminates Between X = 36.00 ft.
and X = 100.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

2.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -25.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.72	9.62
3	30.71	9.43
4	32.71	9.42
5	34.70	9.60
6	36.67	9.97
7	38.59	10.52
8	40.45	11.26
9	42.24	12.16
10	43.93	13.22
11	45.51	14.44
12	46.98	15.81
13	48.30	17.30
14	49.48	18.92
15	50.51	20.64

16 51.16 22.00

Circle Center At X = 31.8 ; Y = 30.6 and Radius, 21.2

*** 1.289 ***

Individual data on the 19 slices

Slice No.	Width Ft	Weight Lbs	Water Force Top Lbs	Water Force Bot Lbs	Tie Force Norm Lbs	Tie Force Tan Lbs	Earthquake Force Hor Lbs	Earthquake Force Ver Lbs	Surcharge Load Lbs
1	2.0	0.43E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.3	0.65E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	0.2	0.72E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	0.5	0.25E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	2.0	0.14E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	2.0	0.18E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	2.0	0.22E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	1.6	0.20E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	0.3	0.45E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	1.9	0.24E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	1.8	0.21E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	1.7	0.18E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	1.6	0.15E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	0.7	0.61E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	0.7	0.54E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.75E+03
16	1.3	0.83E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.14E+04
17	1.2	0.53E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.12E+04
18	1.0	0.26E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.11E+04
19	0.6	0.51E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.67E+03

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.75	9.87
3	30.75	9.85
4	32.75	9.93
5	34.74	10.13

6	36.72	10.44
7	38.67	10.85
8	40.60	11.38
9	42.50	12.01
10	44.36	12.74
11	46.18	13.57
12	47.95	14.51
13	49.66	15.54
14	51.32	16.66
15	52.91	17.87
16	54.43	19.17
17	55.88	20.55
18	57.24	22.00

Circle Center At X = 30.2 ; Y = 46.1 and Radius, 36.2

*** 1.300 ***

1

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.36	9.56
3	27.34	9.25
4	29.33	9.07
5	31.33	9.04
6	33.33	9.13
7	35.31	9.37
8	37.28	9.73
9	39.22	10.24
10	41.11	10.87
11	42.96	11.63
12	44.76	12.51
13	46.49	13.51
14	48.15	14.63
15	49.72	15.86
16	51.21	17.20
17	52.61	18.63
18	53.91	20.15
19	55.09	21.76
20	55.25	22.00

Circle Center At X = 30.9 ; Y = 38.4 and Radius, 29.4

*** 1.303 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61
2	32.10	11.47
3	34.10	11.46
4	36.09	11.60
5	38.07	11.88
6	40.03	12.29
7	41.95	12.84
8	43.83	13.52
9	45.66	14.33
10	47.43	15.26
11	49.13	16.32
12	50.75	17.49
13	52.28	18.77
14	53.73	20.16
15	55.07	21.64
16	55.35	22.00

Circle Center At X = 33.1 ; Y = 40.2 and Radius, 28.7

*** 1.355 ***

1

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	20.07	10.00
2	21.90	9.20
3	23.79	8.54
4	25.72	8.01
5	27.68	7.62
6	29.66	7.37
7	31.66	7.26

8	33.66	7.29
9	35.65	7.46
10	37.63	7.78
11	39.57	8.23
12	41.49	8.82
13	43.35	9.55
14	45.16	10.40
15	46.90	11.38
16	48.57	12.48
17	50.16	13.70
18	51.65	15.03
19	53.05	16.46
20	54.34	17.99
21	55.53	19.60
22	56.59	21.29
23	56.97	22.00

Circle Center At X = 32.2 ; Y = 35.4 and Radius, 28.2

*** 1.368 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.27	9.27
3	27.20	8.73
4	29.17	8.38
5	31.16	8.24
6	33.16	8.29
7	35.15	8.54
8	37.09	9.00
9	38.99	9.64
10	40.81	10.47
11	42.53	11.48
12	44.15	12.66
13	45.64	13.99
14	46.99	15.46
15	48.19	17.07
16	49.22	18.78
17	50.07	20.59
18	50.57	22.00

Circle Center At X = 31.6 ; Y = 28.2 and Radius, 19.9

*** 1.374 ***

1

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	18.58	9.25
3	20.48	8.63
4	22.41	8.13
5	24.38	7.76
6	26.37	7.53
7	28.36	7.42
8	30.36	7.45
9	32.36	7.61
10	34.34	7.90
11	36.29	8.33
12	38.21	8.88
13	40.09	9.56
14	41.93	10.36
15	43.70	11.28
16	45.41	12.32
17	47.05	13.46
18	48.61	14.72
19	50.08	16.07
20	51.46	17.52
21	52.74	19.06
22	53.91	20.68
23	54.74	22.00

Circle Center At X = 28.9 ; Y = 37.6 and Radius, 30.1

*** 1.385 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.

1	16.72	10.00
2	18.66	9.50
3	20.62	9.09
4	22.59	8.78
5	24.58	8.58
6	26.58	8.47
7	28.58	8.47
8	30.58	8.56
9	32.57	8.76
10	34.55	9.05
11	36.51	9.45
12	38.44	9.94
13	40.36	10.53
14	42.23	11.22
15	44.08	12.00
16	45.88	12.87
17	47.63	13.83
18	49.33	14.88
19	50.98	16.01
20	52.57	17.23
21	54.10	18.52
22	55.55	19.89
23	56.94	21.33
24	57.53	22.00

Circle Center At X = 27.7 ; Y = 48.1 and Radius, 39.7

*** 1.410 ***

1

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	20.07	10.00
2	21.88	9.16
3	23.77	8.49
4	25.71	8.01
5	27.68	7.70
6	29.68	7.59
7	31.68	7.66
8	33.66	7.92
9	35.61	8.36
10	37.51	8.99
11	39.35	9.79

12	41.09	10.76
13	42.74	11.89
14	44.28	13.17
15	45.69	14.59
16	46.96	16.13
17	48.08	17.79
18	49.05	19.54
19	49.84	21.38
20	50.04	22.00

Circle Center At X = 29.9 ; Y = 28.9 and Radius, 21.3

*** 1.434 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61
2	32.04	11.12
3	34.02	10.85
4	36.02	10.82
5	38.01	11.01
6	39.97	11.43
7	41.86	12.06
8	43.67	12.92
9	45.38	13.97
10	46.95	15.20
11	48.37	16.61
12	49.61	18.18
13	50.68	19.87
14	51.54	21.68
15	51.65	22.00

Circle Center At X = 35.3 ; Y = 28.3 and Radius, 17.5

*** 1.436 ***

1

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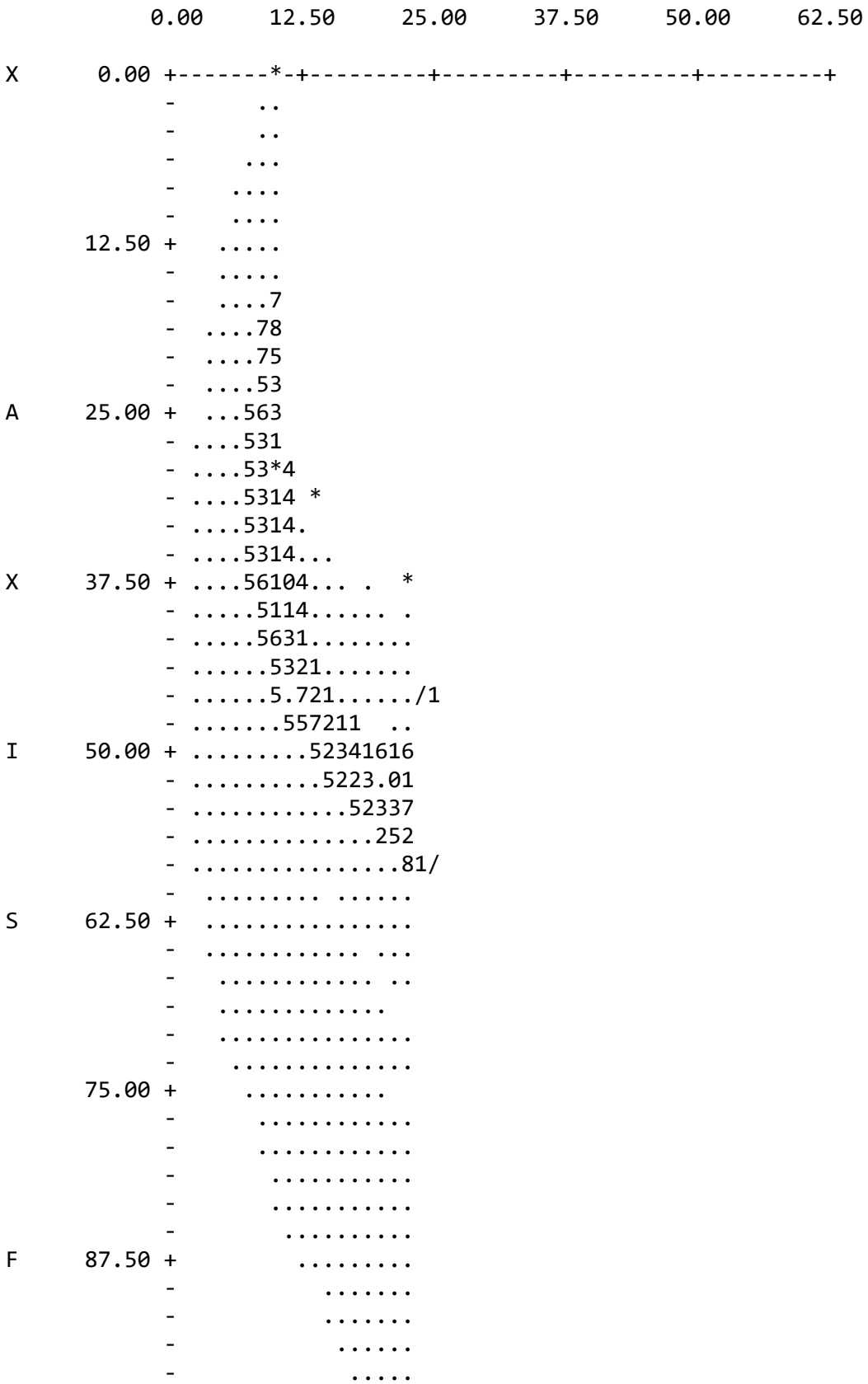
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Luna
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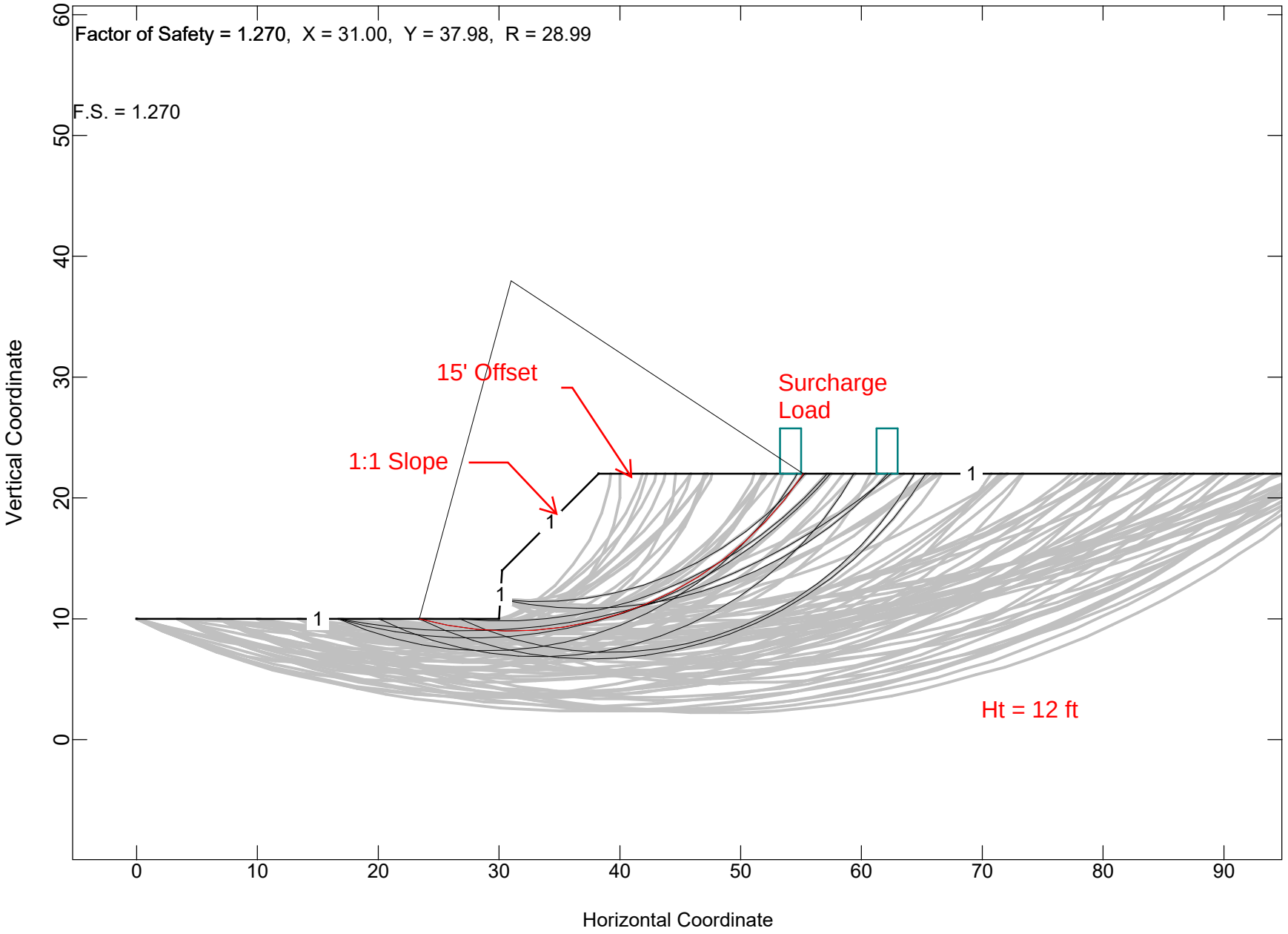

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                     STABLPro for Windows, Version 2015.4.5

                            Upgraded from:
                            FHWA-PCSTABLE

                      Serial Number :  357267753

                         --Slope Stability Analysis--
                       Simplified Janbu, Simplified Bishop
                         or Spencer Method of Slices

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


     This program is licensed to :

     Korpi Cannon Engineering PLLC
     Las Vegas, NV, USA

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               Date:  March 04, 2025     Time:  06:13:58




1
          PROBLEM DESCRIPTION   New Slope




          BOUNDARY COORDINATES

              4 Top   Boundaries
              4 Total Boundaries
```

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	0.00	10.00	30.00	10.00	1
2	30.00	10.00	30.25	14.00	1
3	30.25	14.00	38.25	22.00	1
4	38.25	22.00	100.00	22.00	1

1

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	115.0	115.0	210.0	19.0	0.00	0.0	0

1

BOUNDARY LOAD(S)

2 Load(s) Specified

Load No.	X-Left ft.	X-Right ft.	Intensity psf	Deflection (deg)
1	53.25	55.00	4700.0	0.0
2	61.25	63.00	4700.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced

Along The Ground Surface Between X = 0.00 ft.
and X = 30.10 ft.

Each Surface Terminates Between X = 36.00 ft.
and X = 100.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

2.40 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -25.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.75	9.47
3	28.13	9.13
4	30.52	8.99
5	32.92	9.05
6	35.31	9.31
7	37.67	9.77
8	39.98	10.42
9	42.23	11.25
10	44.40	12.27
11	46.48	13.47
12	48.45	14.83
13	50.31	16.36
14	52.03	18.03

15	53.61	19.84
16	55.03	21.77
17	55.17	22.00

Circle Center At X = 31.0 ; Y = 38.0 and Radius, 29.0

*** 1.270 ***

Individual data on the 21 slices

Slice No.	Width Ft	Weight Lbs	Water Force Top Lbs	Water Force Bot Lbs	Tie Force Norm Lbs	Tie Force Tan Lbs	Earthquake Force Hor Lbs	Earthquake Force Ver Lbs	Surcharge Load Lbs
1	2.3	0.72E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	2.4	0.19E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	1.9	0.20E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	0.2	0.86E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	0.3	0.16E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	2.4	0.18E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	2.4	0.24E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	2.4	0.29E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	0.6	0.80E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	1.7	0.23E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	2.2	0.29E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	2.2	0.26E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	2.1	0.22E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	2.0	0.18E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	1.9	0.14E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	1.7	0.95E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	1.2	0.46E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	0.4	0.97E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.17E+04
19	1.4	0.19E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.65E+04
20	0.0	0.89E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	0.1	0.19E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61

2	32.49	11.44
3	34.89	11.47
4	37.28	11.71
5	39.64	12.15
6	41.96	12.79
7	44.21	13.62
8	46.38	14.64
9	48.46	15.84
10	50.43	17.21
11	52.27	18.75
12	53.98	20.43
13	55.32	22.00

Circle Center At X = 33.3 ; Y = 39.7 and Radius, 28.3

*** 1.303 ***

1

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	29.15	9.84
3	31.55	9.84
4	33.95	10.01
5	36.32	10.33
6	38.67	10.81
7	40.99	11.46
8	43.25	12.25
9	45.46	13.19
10	47.60	14.29
11	49.65	15.52
12	51.63	16.89
13	53.50	18.38
14	55.27	20.00
15	56.93	21.74
16	57.15	22.00

Circle Center At X = 30.3 ; Y = 45.5 and Radius, 35.7

*** 1.353 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	18.95	9.10
3	21.24	8.38
4	23.58	7.85
5	25.95	7.51
6	28.35	7.36
7	30.75	7.41
8	33.14	7.64
9	35.50	8.07
10	37.82	8.69
11	40.08	9.49
12	42.27	10.47
13	44.38	11.62
14	46.38	12.94
15	48.28	14.41
16	50.04	16.04
17	51.68	17.80
18	53.16	19.68
19	54.49	21.68
20	54.67	22.00

Circle Center At X = 29.0 ; Y = 37.2 and Radius, 29.8

*** 1.420 ***

1

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	19.05	9.40
3	21.40	8.93
4	23.78	8.62
5	26.17	8.45
6	28.57	8.42
7	30.97	8.55
8	33.36	8.82

9	35.72	9.23
10	38.05	9.79
11	40.35	10.49
12	42.60	11.33
13	44.79	12.31
14	46.92	13.41
15	48.98	14.65
16	50.95	16.01
17	52.85	17.49
18	54.64	19.08
19	56.34	20.77
20	57.43	22.00

Circle Center At X = 27.8 ; Y = 47.6 and Radius, 39.2

*** 1.489 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	28.97	9.07
3	31.25	8.32
4	33.58	7.76
5	35.95	7.40
6	38.35	7.24
7	40.75	7.27
8	43.14	7.51
9	45.50	7.94
10	47.82	8.56
11	50.07	9.37
12	52.26	10.37
13	54.35	11.55
14	56.34	12.89
15	58.21	14.40
16	59.94	16.05
17	61.54	17.85
18	62.98	19.76
19	64.26	21.80
20	64.37	22.00

Circle Center At X = 39.1 ; Y = 36.2 and Radius, 29.0

*** 1.514 ***

1

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	19.09	9.60
3	21.47	9.30
4	23.86	9.10
5	26.26	9.01
6	28.66	9.03
7	31.06	9.15
8	33.45	9.37
9	35.82	9.71
10	38.18	10.14
11	40.52	10.68
12	42.84	11.32
13	45.12	12.06
14	47.37	12.90
15	49.57	13.84
16	51.74	14.88
17	53.86	16.01
18	55.92	17.23
19	57.93	18.54
20	59.88	19.94
21	61.77	21.42
22	62.45	22.00

Circle Center At X = 27.1 ; Y = 63.6 and Radius, 54.6

*** 1.535 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.60	9.02
3	27.86	8.21

4	30.18	7.57
5	32.53	7.10
6	34.91	6.80
7	37.31	6.68
8	39.71	6.74
9	42.10	6.98
10	44.46	7.39
11	46.79	7.97
12	49.07	8.72
13	51.28	9.64
14	53.43	10.72
15	55.48	11.96
16	57.44	13.34
17	59.30	14.87
18	61.03	16.53
19	62.64	18.31
20	64.12	20.20
21	65.31	22.00

Circle Center At X = 37.7 ; Y = 39.2 and Radius, 32.5

*** 1.535 ***

1

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	20.07	10.00
2	22.26	9.02
3	24.52	8.21
4	26.84	7.60
5	29.20	7.16
6	31.59	6.92
7	33.99	6.87
8	36.38	7.02
9	38.76	7.36
10	41.10	7.88
11	43.39	8.59
12	45.62	9.49
13	47.77	10.56
14	49.82	11.79
15	51.77	13.19
16	53.60	14.74
17	55.31	16.44

18	56.87	18.26
19	58.27	20.20
20	59.37	22.00

Circle Center At X = 33.4 ; Y = 36.8 and Radius, 29.9

*** 1.560 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61
2	32.46	11.19
3	34.85	10.94
4	37.25	10.86
5	39.65	10.96
6	42.03	11.22
7	44.39	11.65
8	46.72	12.25
9	48.99	13.01
10	51.21	13.94
11	53.35	15.01
12	55.42	16.24
13	57.39	17.61
14	59.26	19.12
15	61.01	20.75
16	62.17	22.00

Circle Center At X = 37.1 ; Y = 44.6 and Radius, 33.8

*** 1.583 ***

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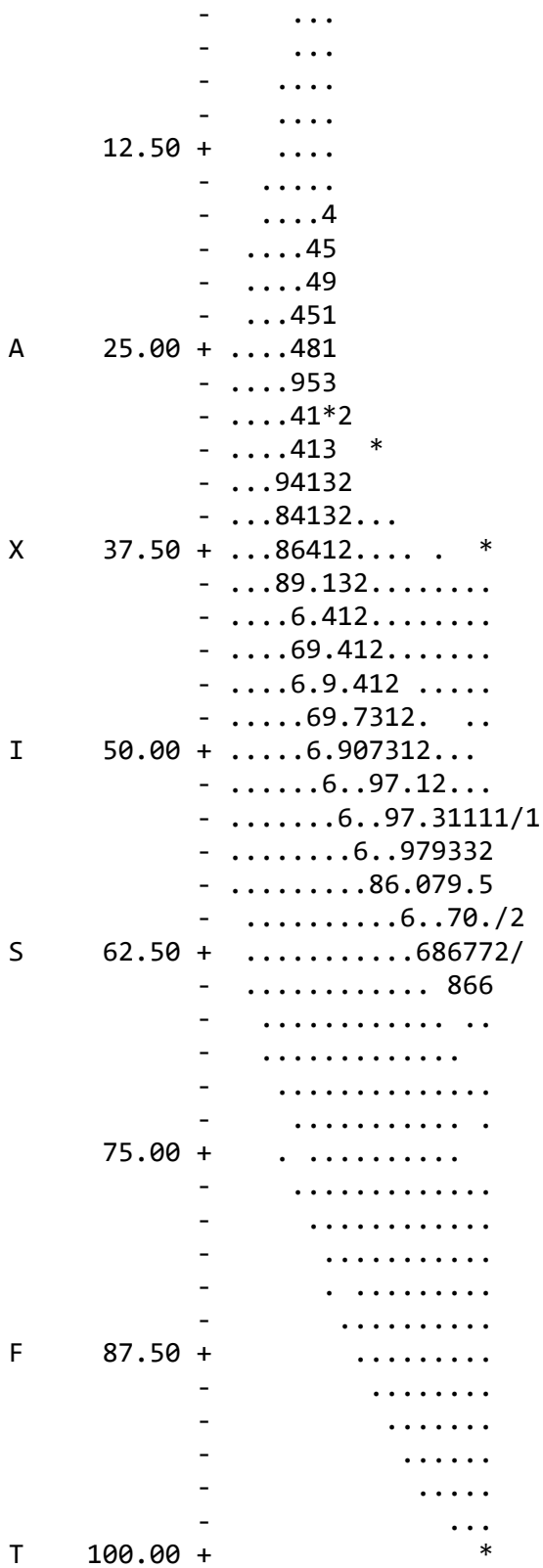
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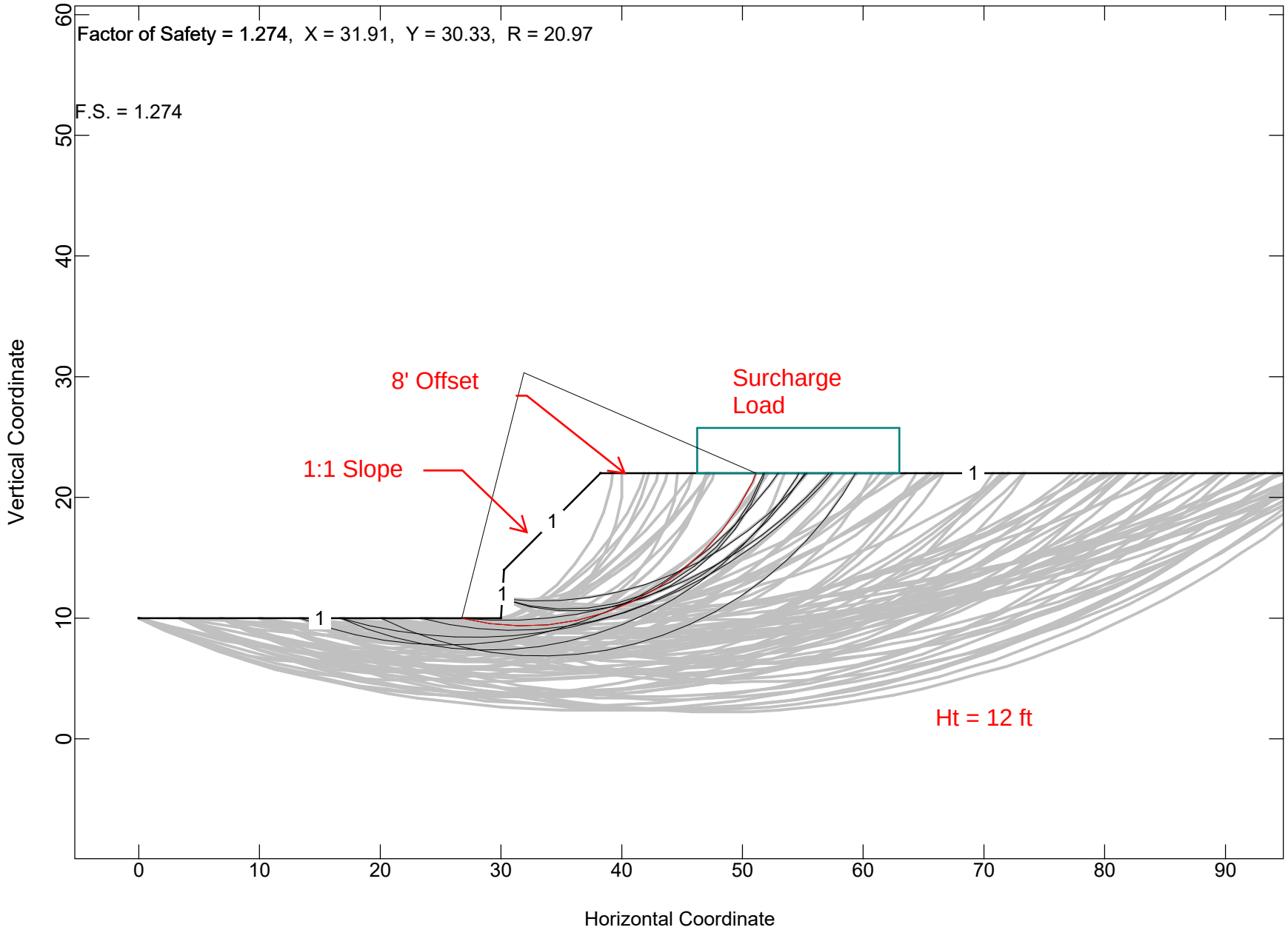
Luna
Spoils Pile Surcharge



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                     STABLPro for Windows, Version 2015.4.5

                            Upgraded from:
                            FHWA-PCSTABLE

                      Serial Number :  357267753

                         --Slope Stability Analysis--
                       Simplified Janbu, Simplified Bishop
                         or Spencer Method of Slices

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


     This program is licensed to :

     Korpi Cannon Engineering PLLC
     Las Vegas, NV, USA

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1
          PROBLEM DESCRIPTION   New Slope




          BOUNDARY COORDINATES

              4 Top   Boundaries
              4 Total Boundaries
```

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	0.00	10.00	30.00	10.00	1
2	30.00	10.00	30.25	14.00	1
3	30.25	14.00	38.25	22.00	1
4	38.25	22.00	100.00	22.00	1

1

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	115.0	115.0	210.0	19.0	0.00	0.0	0

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left ft.	X-Right ft.	Intensity psf	Deflection (deg)
1	46.25	63.00	1100.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 0.00 ft.

and X = 30.10 ft.

Each Surface Terminates Between X = 36.00 ft.
and X = 100.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

2.40 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -25.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	29.11	9.54
3	31.51	9.36
4	33.90	9.45
5	36.28	9.82
6	38.59	10.45
7	40.82	11.34
8	42.93	12.48
9	44.90	13.86
10	46.69	15.45
11	48.30	17.24
12	49.68	19.20
13	50.84	21.30
14	51.13	22.00

Circle Center At X = 31.9 ; Y = 30.3 and Radius, 21.0

*** 1.274 ***

Individual data on the 17 slices

Slice No.	Width Ft	Weight Lbs	Water Force Top Lbs	Water Force Bot Lbs	Tie Force Norm Lbs	Tie Force Tan Lbs	Earthquake Force Hor Lbs	Earthquake Force Ver Lbs	Surcharge Load Lbs
1	2.4	0.62E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	0.9	0.50E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	0.2	0.73E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	1.3	0.75E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	2.4	0.19E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	2.4	0.25E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	2.0	0.25E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	0.3	0.45E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	2.2	0.28E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	2.1	0.24E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	2.0	0.20E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	1.4	0.12E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	0.4	0.34E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.49E+03
14	1.6	0.10E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.18E+04
15	1.4	0.60E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.15E+04
16	1.2	0.23E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.13E+04
17	0.3	0.12E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.32E+03

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	29.15	9.84
3	31.55	9.84
4	33.95	10.01
5	36.32	10.33
6	38.67	10.81
7	40.99	11.46
8	43.25	12.25
9	45.46	13.19

10	47.60	14.29
11	49.65	15.52
12	51.63	16.89
13	53.50	18.38
14	55.27	20.00
15	56.93	21.74
16	57.15	22.00

Circle Center At X = 30.3 ; Y = 45.5 and Radius, 35.7

*** 1.275 ***

1

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.75	9.47
3	28.13	9.13
4	30.52	8.99
5	32.92	9.05
6	35.31	9.31
7	37.67	9.77
8	39.98	10.42
9	42.23	11.25
10	44.40	12.27
11	46.48	13.47
12	48.45	14.83
13	50.31	16.36
14	52.03	18.03
15	53.61	19.84
16	55.03	21.77
17	55.17	22.00

Circle Center At X = 31.0 ; Y = 38.0 and Radius, 29.0

*** 1.279 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61
2	32.49	11.44
3	34.89	11.47
4	37.28	11.71
5	39.64	12.15
6	41.96	12.79
7	44.21	13.62
8	46.38	14.64
9	48.46	15.84
10	50.43	17.21
11	52.27	18.75
12	53.98	20.43
13	55.32	22.00

Circle Center At X = 33.3 ; Y = 39.7 and Radius, 28.3

*** 1.327 ***

1

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	18.95	9.10
3	21.24	8.38
4	23.58	7.85
5	25.95	7.51
6	28.35	7.36
7	30.75	7.41
8	33.14	7.64
9	35.50	8.07
10	37.82	8.69
11	40.08	9.49
12	42.27	10.47
13	44.38	11.62
14	46.38	12.94
15	48.28	14.41
16	50.04	16.04
17	51.68	17.80
18	53.16	19.68
19	54.49	21.68

20	54.67	22.00

Circle Center At X = 29.0 ; Y = 37.2 and Radius, 29.8

*** 1.361 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	20.07	10.00
2	22.26	9.02
3	24.52	8.21
4	26.84	7.60
5	29.20	7.16
6	31.59	6.92
7	33.99	6.87
8	36.38	7.02
9	38.76	7.36
10	41.10	7.88
11	43.39	8.59
12	45.62	9.49
13	47.77	10.56
14	49.82	11.79
15	51.77	13.19
16	53.60	14.74
17	55.31	16.44
18	56.87	18.26
19	58.27	20.20
20	59.37	22.00

Circle Center At X = 33.4 ; Y = 36.8 and Radius, 29.9

*** 1.377 ***

1

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.

1	16.72	10.00
2	19.05	9.40
3	21.40	8.93
4	23.78	8.62
5	26.17	8.45
6	28.57	8.42
7	30.97	8.55
8	33.36	8.82
9	35.72	9.23
10	38.05	9.79
11	40.35	10.49
12	42.60	11.33
13	44.79	12.31
14	46.92	13.41
15	48.98	14.65
16	50.95	16.01
17	52.85	17.49
18	54.64	19.08
19	56.34	20.77
20	57.43	22.00

Circle Center At X = 27.8 ; Y = 47.6 and Radius, 39.2

*** 1.383 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61
2	32.43	11.02
3	34.81	10.76
4	37.21	10.83
5	39.58	11.24
6	41.87	11.96
7	44.03	12.99
8	46.03	14.32
9	47.84	15.90
10	49.40	17.72
11	50.70	19.74
12	51.70	21.92
13	51.73	22.00

Circle Center At X = 35.5 ; Y = 28.1 and Radius, 17.3

*** 1.412 ***

1

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61
2	32.41	10.95
3	34.79	10.62
4	37.19	10.63
5	39.56	10.99
6	41.86	11.68
7	44.04	12.69
8	46.05	13.99
9	47.86	15.57
10	49.42	17.39
11	50.71	19.42
12	51.70	21.60
13	51.82	22.00

Circle Center At X = 35.9 ; Y = 27.4 and Radius, 16.9

*** 1.439 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	13.38	10.00
2	15.65	9.22
3	17.97	8.61
4	20.33	8.17
5	22.71	7.89
6	25.11	7.78
7	27.51	7.85
8	29.90	8.08
9	32.26	8.48
10	34.60	9.05
11	36.88	9.78

```
   12         39.11       10.68
   13         41.27       11.72
   14         43.35       12.92
   15         45.33       14.27
   16         47.22       15.75
   17         49.00       17.36
   18         50.66       19.10
   19         52.19       20.94
   20         52.95       22.00

Circle Center At X =   25.4 ; Y =   41.6  and Radius,   33.8


      ***     1.447   ***



1

            Y            A     X     I     S            F     T


            0.00     12.50     25.00     37.50     50.00     62.50

X      0.00 +-------*-+---------+---------+---------+---------+
            -      ..
            -     ...
            -     ...
            -    ....
            -    ....
      12.50 +    ...0
            -   .....
            -   ...05
            -  ....57
            -  ....56
            -  ...563
A     25.00 + ....563
            - ....671
            - ....53*4
            - ....512  *
            - ...65314
            - ....5314...
X     37.50 + .....534.... .  *
            - ....6.124........
            - ....6.514........
            - .....6.514.......
            - ......6.511 ...../1
            - ......6..2341  ..
I     50.00 + .......6..234181
            - .........6..24.91
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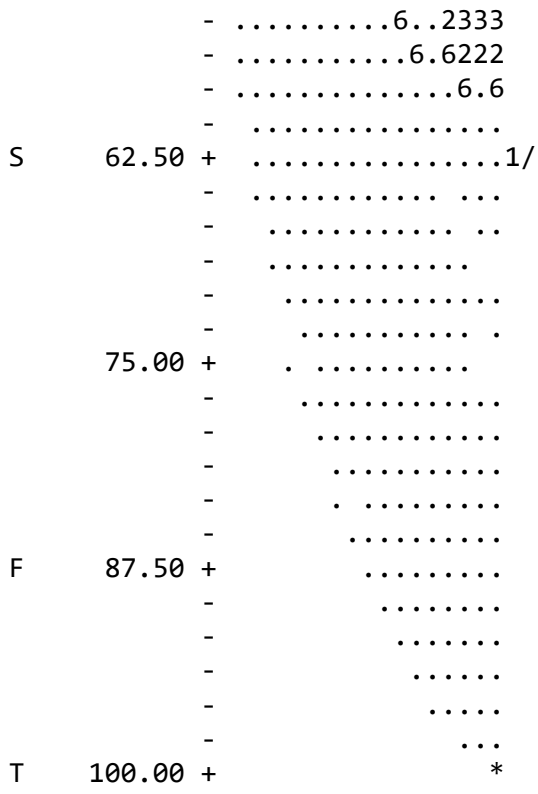
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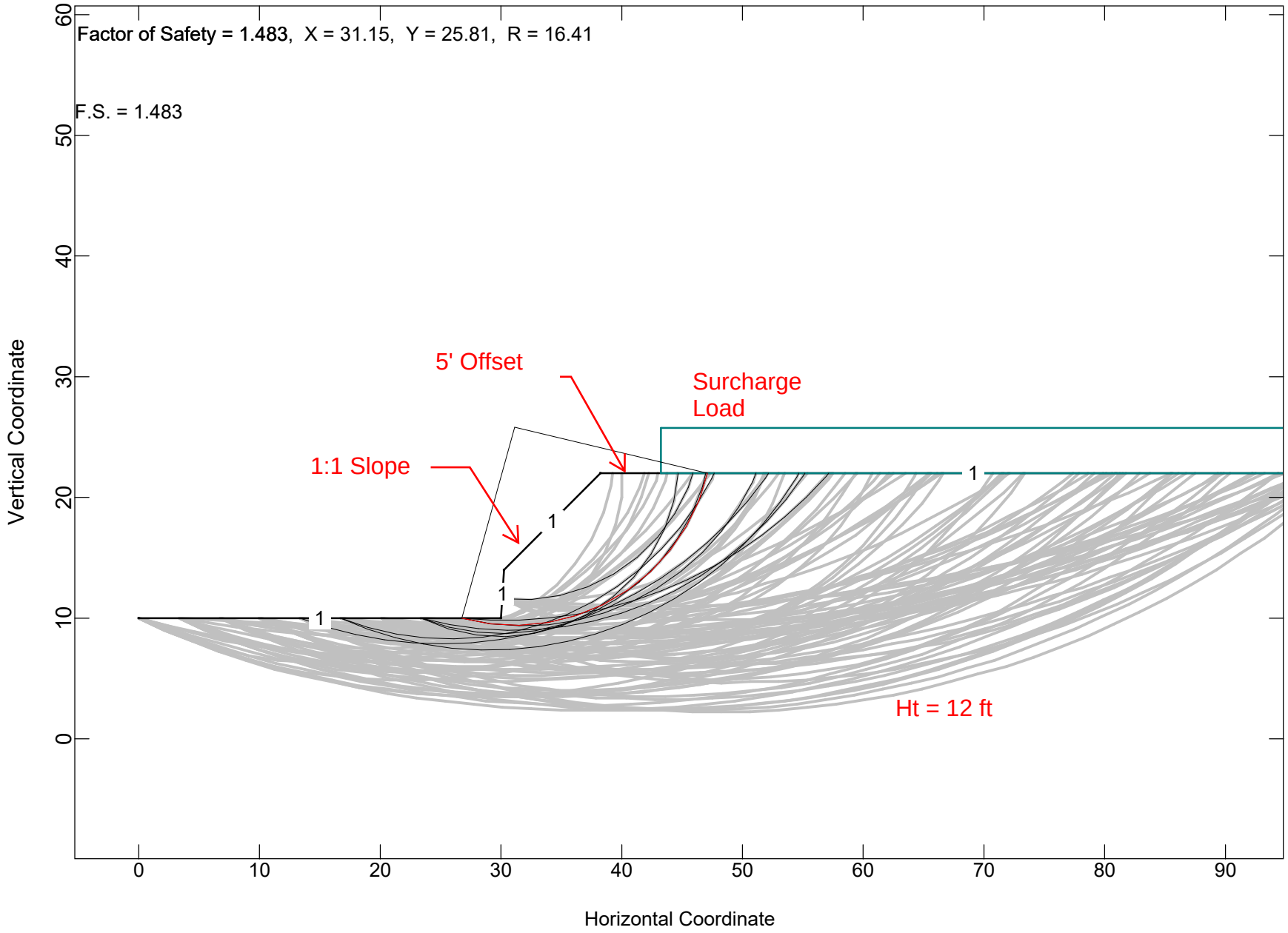

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                     STABLPro for Windows, Version 2015.4.5

                            Upgraded from:
                            FHWA-PCSTABLE

                      Serial Number :  357267753

                         --Slope Stability Analysis--
                       Simplified Janbu, Simplified Bishop
                         or Spencer Method of Slices

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


     This program is licensed to :

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     Path to file locations      :
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- Shoring\2.0 Elara_Luna\Luna\Design\
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     Name of output file         : Traffic - Vert.sl4o
     Name of plot output file    : Traffic - Vert.sl4p

     ----------------------------------------------------------------------------
                           Time and Date of Analysis
     ----------------------------------------------------------------------------

               Date:  March 04, 2025     Time:  06:21:45




1
          PROBLEM DESCRIPTION   New Slope




          BOUNDARY COORDINATES

              4 Top   Boundaries
              4 Total Boundaries
```

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	0.00	10.00	30.00	10.00	1
2	30.00	10.00	30.25	14.00	1
3	30.25	14.00	38.25	22.00	1
4	38.25	22.00	100.00	22.00	1

1

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	115.0	115.0	210.0	19.0	0.00	0.0	0

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left ft.	X-Right ft.	Intensity psf	Deflection (deg)
1	43.25	100.00	300.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 0.00 ft.

and X = 30.10 ft.

Each Surface Terminates Between X = 36.00 ft.
and X = 100.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

2.40 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -25.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	29.11	9.53
3	31.51	9.41
4	33.90	9.63
5	36.23	10.21
6	38.45	11.12
7	40.51	12.34
8	42.38	13.85
9	44.00	15.62
10	45.35	17.60
11	46.40	19.76
12	47.10	22.00

Circle Center At X = 31.1 ; Y = 25.8 and Radius, 16.4

*** 1.483 ***

Individual data on the 15 slices

Slice No.	Width Ft	Weight Lbs	Water Force Top Lbs	Water Force Bot Lbs	Tie Force Norm Lbs	Tie Force Tan Lbs	Earthquake Force Hor Lbs	Earthquake Force Ver Lbs	Surcharge Load Lbs
1	2.4	0.64E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	0.9	0.51E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	0.2	0.73E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	1.3	0.75E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	2.4	0.19E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	2.3	0.24E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	2.0	0.24E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	0.2	0.25E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	2.1	0.24E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	1.9	0.19E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	0.9	0.77E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	0.8	0.59E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.23E+03
13	1.3	0.84E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.40E+03
14	1.0	0.40E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.31E+03
15	0.7	0.91E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.21E+03

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	29.11	9.54
3	31.51	9.36
4	33.90	9.45
5	36.28	9.82
6	38.59	10.45
7	40.82	11.34
8	42.93	12.48
9	44.90	13.86
10	46.69	15.45
11	48.30	17.24
12	49.68	19.20
13	50.84	21.30

14	51.13	22.00

Circle Center At X = 31.9 ; Y = 30.3 and Radius, 21.0

*** 1.522 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.69	9.26
3	28.06	8.83
4	30.45	8.73
5	32.84	8.96
6	35.18	9.51
7	37.42	10.37
8	39.52	11.54
9	41.44	12.98
10	43.14	14.66
11	44.60	16.57
12	45.79	18.65
13	46.68	20.88
14	46.96	22.00

Circle Center At X = 30.0 ; Y = 26.3 and Radius, 17.5

*** 1.528 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	30.10	11.61
2	32.50	11.56
3	34.88	11.89
4	37.17	12.59
5	39.32	13.65
6	41.28	15.05

7	42.99	16.73
8	44.41	18.67
9	45.50	20.80
10	45.89	22.00

Circle Center At X = 31.6 ; Y = 26.6 and Radius, 15.0

*** 1.555 ***

1

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.64	9.11
3	27.99	8.60
4	30.38	8.47
5	32.77	8.73
6	35.08	9.38
7	37.26	10.39
8	39.24	11.74
9	40.98	13.39
10	42.43	15.30
11	43.55	17.43
12	44.31	19.70
13	44.69	22.00

Circle Center At X = 30.0 ; Y = 23.2 and Radius, 14.8

*** 1.596 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	23.41	10.00
2	25.75	9.47
3	28.13	9.13
4	30.52	8.99

5	32.92	9.05
6	35.31	9.31
7	37.67	9.77
8	39.98	10.42
9	42.23	11.25
10	44.40	12.27
11	46.48	13.47
12	48.45	14.83
13	50.31	16.36
14	52.03	18.03
15	53.61	19.84
16	55.03	21.77
17	55.17	22.00

Circle Center At X = 31.0 ; Y = 38.0 and Radius, 29.0

*** 1.633 ***

1

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	26.76	10.00
2	29.15	9.84
3	31.55	9.84
4	33.95	10.01
5	36.32	10.33
6	38.67	10.81
7	40.99	11.46
8	43.25	12.25
9	45.46	13.19
10	47.60	14.29
11	49.65	15.52
12	51.63	16.89
13	53.50	18.38
14	55.27	20.00
15	56.93	21.74
16	57.15	22.00

Circle Center At X = 30.3 ; Y = 45.5 and Radius, 35.7

*** 1.661 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	18.99	9.23
3	21.33	8.68
4	23.71	8.36
5	26.11	8.28
6	28.50	8.44
7	30.87	8.83
8	33.19	9.45
9	35.44	10.29
10	37.59	11.35
11	39.63	12.62
12	41.53	14.08
13	43.28	15.72
14	44.86	17.53
15	46.26	19.48
16	47.46	21.56
17	47.65	22.00

Circle Center At X = 25.7 ; Y = 32.7 and Radius, 24.4

*** 1.687 ***

1

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	16.72	10.00
2	18.95	9.10
3	21.24	8.38
4	23.58	7.85
5	25.95	7.51
6	28.35	7.36
7	30.75	7.41
8	33.14	7.64
9	35.50	8.07
10	37.82	8.69

11	40.08	9.49
12	42.27	10.47
13	44.38	11.62
14	46.38	12.94
15	48.28	14.41
16	50.04	16.04
17	51.68	17.80
18	53.16	19.68
19	54.49	21.68
20	54.67	22.00

Circle Center At X = 29.0 ; Y = 37.2 and Radius, 29.8

*** 1.697 ***

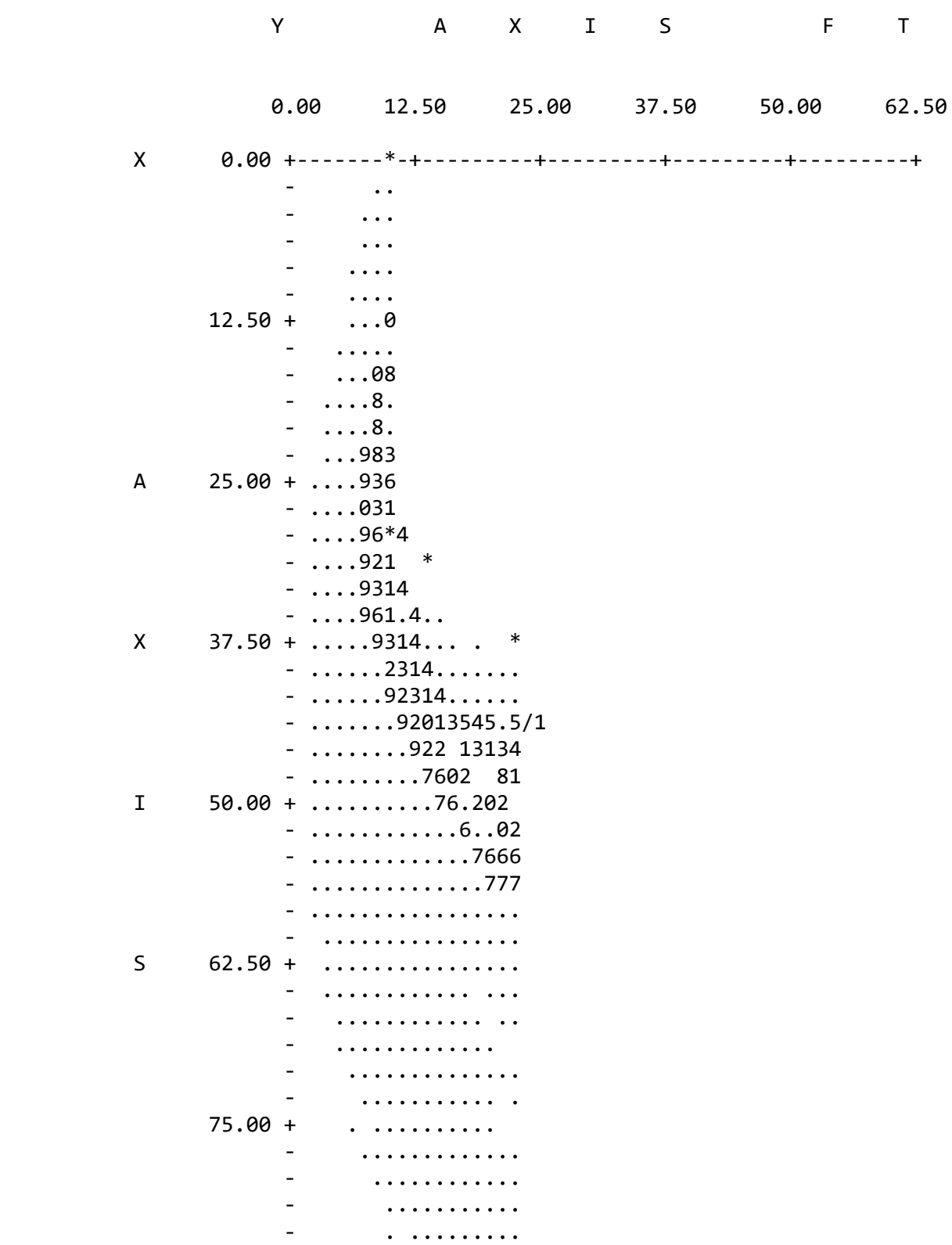
Failure Surface Specified By 20 Coordinate Points

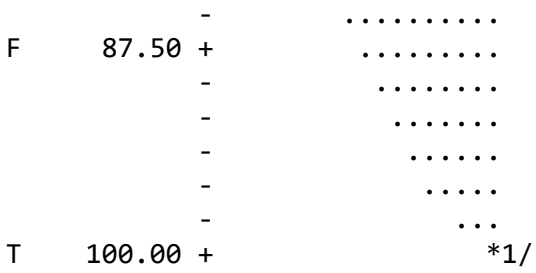
Point No.	X-Surf ft.	Y-Surf ft.
1	13.38	10.00
2	15.65	9.23
3	17.98	8.64
4	20.34	8.21
5	22.73	7.95
6	25.12	7.87
7	27.52	7.96
8	29.91	8.23
9	32.27	8.66
10	34.59	9.27
11	36.86	10.04
12	39.07	10.98
13	41.21	12.08
14	43.26	13.32
15	45.21	14.71
16	47.06	16.24
17	48.80	17.90
18	50.41	19.68
19	51.88	21.57
20	52.17	22.00

Circle Center At X = 25.1 ; Y = 41.0 and Radius, 33.1

*** 1.759 ***

1


Y A X I S F T
0.00 12.50 25.00 37.50 50.00 62.50
X 0.00
12.50
A 25.00
X 37.50
I 50.00
S 62.50
75.00


-
F 87.50 +
-
-
-
-
-
T 100.00 +
*1/

Reference Documents

Design Shear Strength Parameters

Material	Proposed Shear Strength Parameters							
	Static			Pseudo-static			Post-Earthquake	
	Phi (degrees)	Cohesion (psf)	Strength Type	Phi (degrees)	Cohesion (psf)	Strength Type	Liquefied Condition	Strength Type
Engineered Fill (Qafc)	29	310	Peak Strength	29	310	Peak Strength	Not Applicable	Not Applicable
Reinforced Soil Backfill (for MSE Wall)	31	0	Peak Strength	31	0	Peak Strength	Not Applicable	Not Applicable
Slopewash (Qsw)	30	450	Peak Strength	30	450	Peak Strength	S_r/σ'_v=0.05 to 0.35	CPT and SPT data correlations
Santiago Formation, Across Bedding (Tsa)	38	530	Peak Strength	38	530	Peak Strength	Not Applicable	Not Applicable
Santiago Formation, Along Bedding (Tsa)	19	210	Residual Strength (Lower Bound)	23	210	Residual Strength (Best-Fit Line)	Not Applicable	Not Applicable

ENGINEERS & GEOLOGISTS

Geotechnical Review of
Production Precise Grading Plan,
Lots 1 through 54 and 60 through 82, Tract No. 19309,
AQ42 Site, Planning Area 3.4,
Rienda Development, Rancho Mission Viejo,
County of Orange, California

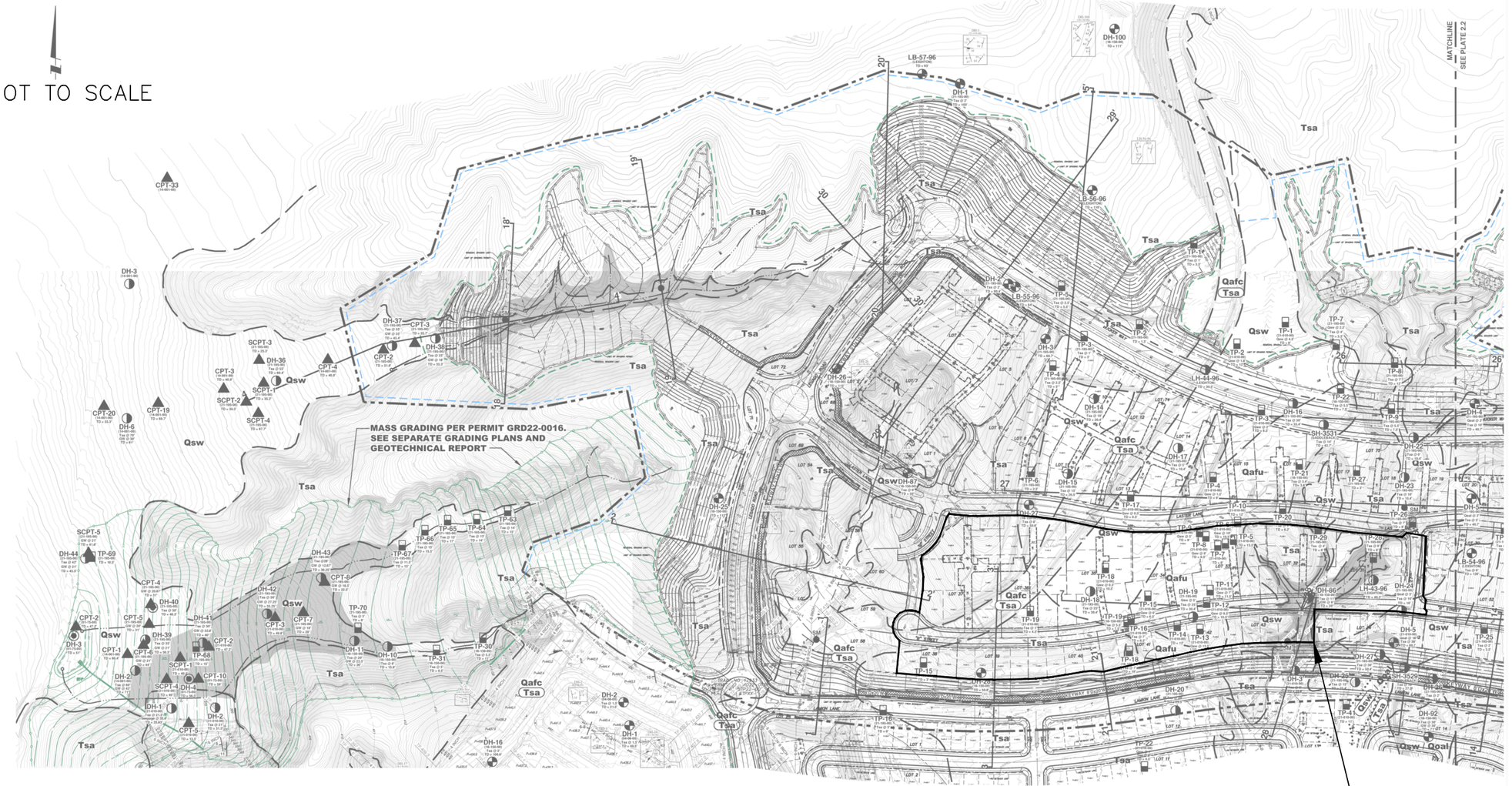
Prepared For

PULTE GROUP

June 24, 2024

GMU Project No. 23-185-00

NOT TO SCALE



GEOTECHNICAL LEGEND

Qafc	ENGINEERED ARTIFICIAL FILL
Qafu	UNDOCUMENTED FILL
Qsw	SLOPEWASH
Qtr	TERRACE DEPOSITS
Tsa	SANTIAGO FORMATION, CIRCLED WHERE BURIED
	TYPICAL BEDDING, DASHED WHERE APPROXIMATE
	TYPICAL CONTACT BED, DASHED WHERE APPROXIMATE
	TYPICAL FAULT, DASHED WHERE APPROXIMATE
	TYPICAL JOINT, DASHED WHERE APPROXIMATE
	GEOLOGIC CONTACT
	BURIED GEOLOGIC CONTACT
	EXISTING PERFORATED SUBDRAIN WITH TOP OF ELEVATION (TP)
	PROPOSED PERFORATED SUBDRAINS
	GEOTECHNICAL SECTION

DH-5	BUCKET AUGER DRILL HOLE BY GMU GEOTECHNICAL, INC.
DH-5	BUCKET AUGER DRILL HOLE BY GMU GEOTECHNICAL, INC.; PROJECT NO. 21-010-00
DH-100	BUCKET AUGER DRILL HOLE BY GMU GEOTECHNICAL, INC.; PROJECT NO. 18-150-00
LB-57-96	BUCKET AUGER DRILL HOLE BY LEIGHTON
DH-38	ROTARY WASH / HOLLOW STEM DRILL HOLE BY GMU GEOTECHNICAL, INC.
DH-86	ROTARY WASH / HOLLOW STEM DRILL HOLE BY GMU GEOTECHNICAL, INC.; PROJECT NO. 18-150-00
DH-6	ROTARY WASH / HOLLOW STEM DRILL HOLE BY GMU GEOTECHNICAL, INC.; PROJECT NO. 14-001-00
H-1	ROTARY WASH / HOLLOW STEM DRILL HOLE BY GMU GEOTECHNICAL, INC.; PROJECT NO. 03-13-00
LH-44-96	HOLLOW STEM AUGER DRILL HOLE BY LEIGHTON
SH-3531	HOLLOW STEM AUGER DRILL HOLE BY SADDLEBACK CONSTRUCTORS

SCPT-4	CONE PENETRATION TEST (CPT) BY GMU GEOTECHNICAL, INC.
CPT-33	CONE PENETRATION TEST (CPT) BY GMU GEOTECHNICAL, INC.; PROJECT NO. 14-001-00
TP-29	TEST PIT BY GMU GEOTECHNICAL, INC.
TP-41	TEST PIT BY GMU GEOTECHNICAL, INC.; PROJECT NO. 21-010-00
TP-77	TEST PIT BY GMU GEOTECHNICAL, INC.; PROJECT NO. 18-150-00
SM	PROPOSED SETTLEMENT MONUMENT
	PRELIMINARY OPEN SPACE DEDICATION LINE
	REMEDIAL GRADING LIMIT LINE
	93% COMPACTION AREAS
	REPORT LIMITS

GEOTECHNICAL MAP

GMU ENGINEERS & GEOLOGISTS

Date:	June 24, 2024
Project No.:	23-185-00
Plate	2

DRAWING: q:\2023\23-185-00\dwg\2318500_aq42_3.4_plate 2_geo map production.dwg PLOTTED: 6/14/2024 1:36 PM BY: Joseph Huynh

Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
Project Number: 21-195-00

Log of Drill Hole DH-18

Sheet 1 of 2

Date(s) Drilled	**12/6/21**	Logged By	**RA**	Checked By	**DW**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**30.4 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8"**	Approx. Surface Elevation, ft MSL	**504.0**
Groundwater Depth [Elevation], feet	**N/A []**	Sampling Method(s)	**Open drive sampler with 6-inch sleeve, bulk**	Drill Hole Backfill	**Native**
Remarks				Driving Method and Drop	**140 lb donut hammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			SLOPE WASH/OLDER ALLUVIUM (Qsw/Qoal) Subround gravel up to 1-inch in diameter, trace roots up to 0.25-inch in diameter, pinhole porosity		CLAYEY SAND (SC); brown, dry to damp, medium dense, fine- to coarse-grained sand						
500											
	5		Slight increase in clay abundance, increase in moisture		CLAYEY SAND (SC); yellowish brown, damp, medium dense, fine- to coarse-grained sand		10 10 12	140	13	127	
495											
	10		Slightly increases in moisture		CLAYEY SAND (SC); yellowish brown, damp, medium dense, fine- to coarse-grained sand		11 17 27	140	11	134	
490											
	15				CLAYEY SAND (SC); yellowish brown to pale yellowish brown , damp, medium dense, fine- to coarse-grained sand		11 16.25	140	14	120	
485											

DH_REV3 21-195-00.GPJ GMULAB.GPJ 1/31/22

Drill Hole DH-18

Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
Project Number: 21-195-00

Log of Drill Hole DH-18

Sheet 2 of 2

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			SANTIAGO FORMATION (Tsa)		CLAYEY SAND (SC); yellowish brown, damp, medium dense, fine- to coarse-grained sand		16 25 43	140	10	116	
480											
	25		**SANTIAGO FORMATION (Tsa)** Slightly weathered, massive, moderately cemented, friable, slightly oxidized sand grains		SILTY SANDSTONE; pale yellowish white, dry, moderately hard, fine- to coarse-grained sand, few fine gravel		50/5"	140	7	103	
475											
	30		Slighty to moderately oxidized sand grains, friable, massive, moderately cemented		SILTY SANDSTONE; pale yellowish white, dry, moderately hard, fine- to coarse-grained sand Total Depth = 30.42' No Groundwater		50/5"	140	7	97	

DH_REV3 21-195-00.GPJ GMULAB.GPJ 1/31/22

Drill Hole DH-18

Project: RMV PA-3.3/3.4 **Project Location: Rancho Mission Viejo** **Project Number: 21-195-00**	**Log of Drill Hole DH-19** Sheet 1 of 2

Date(s) Drilled	**12/6/21**	Logged By	**RA**	Checked By	**DW**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**30.4 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8"**	Approx. Surface Elevation, ft MSL	**477.0**
Groundwater Depth [Elevation], feet	**N/A []**	Sampling Method(s)	**Open drive sampler with 6-inch sleeve, bulk**	Drill Hole Backfill	**Native**
Remarks				Driving Method and Drop	**140 lb donut hammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
475	0		**UNDOCUMENTED FILL (Qafc)** Trash debris-plastic, soda bottle caps, top soil, some roots up to 0.25-inch in diameter, abundance of trash debris up to ~35%		TOP SOIL TO CLAYEY SAND (SC); dark brown to dark gray, damp to moist, loose to medium dense, fine- to coarse-grained sand						
	5		**SLOPE WASH/OLDER ALLUVIUM (Qsw/Qoal)** Slight decrease in moisture, pinhole porosity		CLAYEY SAND (SC); dark brown, damp, medium dense, fine- to coarse-grained sand, few fine gravel		40 13 10	140	23	92	
470											
	10		Slight increase in moisture		CLAYEY SAND (SC); dark brown, damp, medium dense, fine- to coarse-grained sand		12 14 22	140	10	127	
465											
	15				CLAYEY SAND (SC); dark brown to light brown, damp, medium dense, fine- to coarse-grained sand		12 15 20	140	11	125	
460											

DH_REV3 21-195-00.GPJ GMULAB.GPJ 1/31/22

Drill Hole DH-19

Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
Project Number: 21-195-00

Log of Drill Hole DH-19

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Increase in moisture, slightly oxidized sand grains		SILTY SAND (SM); pale gray, damp to moist, medium dense, fine- to coarse-grained sand, some fine gravel		13 17 17	140	11	121	
455											
	25		**SANTIAGO FORMATION (Tsa)** Slight decrease in moisture, massive, friable, slightly weathered, slightly oxidized sand grains		SILTY SANDSTONE; pale yellowish white, dry to damp, moderately hard, fine- to coarse-grained sand		11 40 50/2"	140	12	125	
450											
	30		Slight decrease in oxidized sand grains, massive, friable, slight decrease in moisture		SILTY SANDSTONE; pale yellowish white, dry, moderately hard, fine- to coarse-grained sand Total Depth = 30.42' No Groundwater		50/5"	140	7	102	

DH_REV3 21-195-00.GPJ GMULAB.GPJ 1/31/22

Drill Hole DH-19

Project: RMV PA-3.3/3.4 **Project Location: Rancho Mission Viejo** **Project Number: 21-195-00**	**Log of Drill Hole DH-24** Sheet 1 of 1

Date(s) Drilled	**12/7/21**	Logged By	**RA**	Checked By	**DW**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**16.0 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8"**	Approx. Surface Elevation, ft MSL	**466.0**
Groundwater Depth [Elevation], feet	**N/A []**	Sampling Method(s)	**Open drive sampler with 6-inch sleeve, bulk**	Drill Hole Backfill	**Native**
Remarks				Driving Method and Drop	**140 lb donut hammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
465			**SLOPE WASH (Qsw)** Subround gravel, trace roots up to 1/2-inch thick, pinhole porosity		SILTY SAND with SOME CLAY (SM), pale brown, dry to damp, loose to medium dense, fine- to coarse-grained sand, trace gravel						
	5		**OLDER ALLUVIUM (Qoal)** Slightly weathered, gradationally increased in coarse-grained sand abundance, pinhole porosity		CLAYEY SAND (SC), pale yellowish brown to brown, damp, medium dense, to dense, fine- to coarse-grained sand		25 50/6"	140	5	130	
460											
	10		**SANTIAGO FORMATION (Tsa)** Massive, moderately weathered, friable, slightly oxidized sand grains, moderately cemented		SILTY SANDSTONE, pale yellowish brown, dry to damp, moderately hard to hard, fine- to coarse-grained sand		32 37 50	140	6	135	
455											
	15		Massive, slightly weathered, friable, moderately cemented		SILTY SANDSTONE, pale grayish white, dry, moderately hard to hard, fine- to coarse-grained sand		30 50/6"	140	7	128	
450					Total Depth = 16' No Groundwater						

DH_REV3 21-195-00.GPJ GMULAB.GPJ 1/31/22

Drill Hole DH-24

Project: PA-3.2
Project Location: Rancho Mission Viejo, CA
Project Number: 21-010-00

Log of Test Pit TP- 5

Sheet 1 of 2

Date(s) Excavated	**3/24/2021**	Logged By	**DW**	Checked By	**KMF**
Excavation Equipment	**Backhoe**	Excavation Contractor	**JES**	Total Depth of Test Pit	**13.5 feet**
Sampling Method(s)				Approx. Surface Elevation, ft MSL	**484.0**
Groundwater Depth [Elevation], feet	**NA []**	Test Pit Dimensions	**Width: 2.5 ft; Length: 10 ft; Depth: 13.5 ft**		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: MAXIMUM DENSITY, pcf	TEST DATA: ADDITIONAL TESTS
	ARTIFICIAL FILL, UNDOCUMENTED (Qafu)	POTTING SOIL								
	Trash debris throughout - plastic bags, plant information cards, platic pots, organics									
2			482	2						
4			480	4						
6			478	6						
8			476	8						

TP_REV1 21-010-00.GPJ GM&U.GDT 1/5/22

Project: Rancho Mission Viejo Planning Area
Project Location: Rancho Mission Viejo, CA
Project Number: 18-150-00

Log of Drill Hole DH-28

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			cont. to be **SANTIAGO FORMATION (Tsa)** Sandstone; massive, no discernible bedding		Gradation to fine to medium grained sand, reduced gray color SILTY SANDSTONE (SM); gray to yellowish gray, damp, moderately hard, fine grained sand, some medium grained sand		5/6"	4800	6	114	
			Gradational increase in grain size, some 0.2-0.4" diameter oxidation patches, gravel <1" in diameter Numerous slightly oxidized grains		Sand becomes fine to coarse grained, trace gravel Rare 3" cobbles						
460	25										
			Slight increase in oxidation of grains		Dominantly medium to coarse grained, grayish white mottled with orange Becomes damp to moist						
455	30		Massive, numerous pinhole oxidation patches, some faint patches of brownish white sandstone approximately 0.03" in diameter				10/6"	3350	4	118	
			Few patches of oxidized igneous gravel 1-2" in diameter, trace patch of brownish white sandstone 1" in diameter (possible concretion)		Increased abundance of coarse grained sand Becomes grayish white, fine to coarse grained sand						
450	35										
			Continues to be massive, no discernible bedding		Zone of highly oxidized coarse grained sand Increased abundance of coarse grained sand, trace fine grained gravel						
445	40				Becomes dominantly medium to coarse grained sand		7/7"	3350	6	117	
			1.5' thick zone of sandy siltstone rip-up clasts with oxidized rims 2-3" in diameter		Numerous gravel and cobble						
			Numerous oxidized grains		SILTY SANDSTONE (SM); grayish white mottled with orange, damp, moderately hard, fine to coarse grained sand						
			2-3' thick zone of brownish white weathered								

DH_REV3 18-150-00.GPJ GMULAB.GPJ 1/5/22

Drill Hole DH-28

Project: Rancho Mission Viejo Planning Area
Project Location: Rancho Mission Viejo, CA
Project Number: 18-150-00

Log of Drill Hole DH-28

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			sandstone; numerous 1-10" diameter siltstone fragments cont. to be **SANTIAGO FORMATION (Tsa)** Sandstone; massive, no discernible bedding		Continues to be SILTY SANDSTONE (SM); yellow mottled with orange, damp, moderately hard, fine to coarse grained sand Becomes brownish yellow, some clay						
435	50		Pinhole oxidation patches, approximately 1" diameter fine grained sand patches (possible concretions)		Becomes yellowish white mottled with orange		12/7"	3350	5	121	
					Total Depth = 50.58' No Groundwater No Caving						

DH_REV3 18-150-00.GPJ GMULAB.GPJ 1/5/22

Drill Hole DH-28

Project: Rancho Mission Viejo Planning Area
Project Location: Rancho Mission Viejo, CA
Project Number: 18-150-00

Log of Drill Hole DH-86

Sheet 1 of 2

Date(s) Drilled	**1/25/19**	Logged By	**DW**	Checked By	**KMF**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**20.4 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8"**	Approx. Surface Elevation, ft MSL	**433.0**
Groundwater Depth [Elevation], feet	**15.0 [418.0]**	Sampling Method(s)	**Open drive sampler with 6-inch sleeve and bulk**	Drill Hole Backfill	**Native**
Remarks	**TD = 20.4', GW = 15'**			Driving Method and Drop	**140 lb hammer, 30" drop**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
430			**ARTIFICIAL FILL (Qafc)** Fill used to construct the drilling pad		SILTY SAND (SM); light brown, moist, dense, fine to coarse grained sand						
	5		**SLOPEWASH (Qsw)** Some rootlets		SILTY SAND to WELL GRADED SAND (SM/SW); brownish yellow, very moist/saturated, fine to coarse grained sand		3 4 4	140			
425			Sub-rounded gravel <2"		SILTY SAND (SM); tan, dry to damp, hard, fine grained sand						
	10				POORLY GRADED SAND (SP); yellowish brown and grey, wet, dense, medium to coarse grained sand, some gravel		21 50/5"	140			
420			**SANTIAGO FORMATION (Tsa)** Massive, some siltstone clasts, abundant oxidation		SILTY SANDSTONE (SM); yellow with orange staining, damp, moderately hard, fine to coarse grained sand						
	15		Groundwater		SANDY SILTSTONE (ML); purple grey, moist, moderately hard, fine grained sand ▽		50/5"	140			
415					SILTY SANDSTONE (SM); grayish yellow with orange staining, damp, moderately hard, fine to coarse grained sand						

DH_REV3 18-150-00.GPJ GMULAB.GPJ 1/5/22

Drill Hole DH-86

Project: Rancho Mission Viejo Planning Area
Project Location: Rancho Mission Viejo, CA
Project Number: 18-150-00

Log of Drill Hole DH-86

Sheet 2 of 2

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA			TEST DATA		
						SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			cont. to be **SANTIAGO FORMATION (Tsa)**		SILTY SANDSTONE (SM); grayish white, damp, moderately hard, fine to coarse grained sand		50/5"	140			
			Oxidation patches								
					Total Depth = 20.4' Groundwater at 15'						

DH_REV3 18-150-00.GPJ GMULAB.GPJ 1/5/22

GMU

Drill Hole DH-86

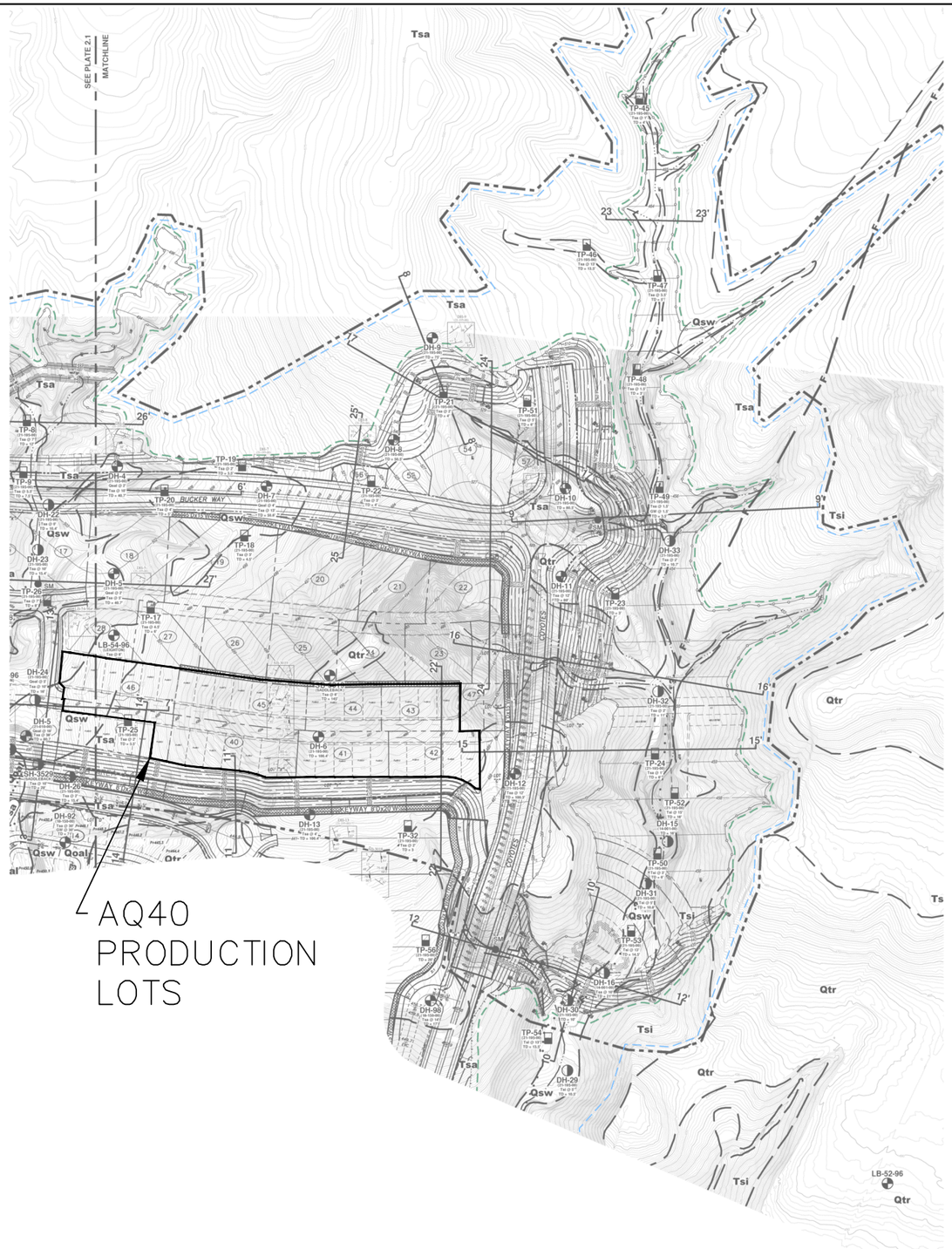
Geotechnical Review of
Production Precise Grading Plan,
Lots 1 through 39, "K", "L" & "C-J", Tract No. 19308,
AQ40 Site, Planning Area 3.4,
Rienda Development, Rancho Mission Viejo,
County of Orange, California

Prepared For

PULTE GROUP

June 24, 2024

GMU Project No. 23-184-00



NOT TO SCALE

GEOTECHNICAL LEGEND

Qafc	ENGINEERED ARTIFICIAL FILL
Qafu	UNDOCUMENTED FILL
Qsw	SLOPEWASH, CIRCLED WHERE BURIED
Qtr	TERRACE DEPOSITS, CIRCLED WHERE BURIED
Tsa	SANTIAGO FORMATION
Tsi	SILVERADO FORMATION
	TYPICAL BEDDING, DASHED WHERE APPROXIMATE
	TYPICAL CONTACT BED, DASHED WHERE APPROXIMATE
	TYPICAL FAULT, DASHED WHERE APPROXIMATE
	TYPICAL JOINT, DASHED WHERE APPROXIMATE
	GEOLOGIC CONTACT
	BURIED GEOLOGIC CONTACT
F	FAULT LINE
F	FAULT LINE
	PROPOSED PERFORATED SUBDRAIN
1 1'	GEOTECHNICAL SECTION
DH-13	BUCKET AUGER DRILL HOLE BY GMU GEOTECHNICAL, INC.
DH-5	BUCKET AUGER DRILL HOLE BY GMU GEOTECHNICAL, INC.; PROJECT NO. 21-010-00
DH-105	BUCKET AUGER DRILL HOLE BY GMU GEOTECHNICAL, INC.; PROJECT NO. 18-150-00
DH-55	BUCKET AUGER DRILL HOLE BY GMU GEOTECHNICAL, INC.; PROJECT NO. 14-044-01
LB-57-96	BUCKET AUGER DRILL HOLE BY LEIGHTON
SB-3019	BUCKET AUGER DRILL HOLE BY SADDLEBACK CONSTRUCTORS
DH-35	ROTARY WASH / HOLLOW STEM DRILL HOLE BY GMU GEOTECHNICAL, INC.
DH-35	HOLLOW STEM DRILL HOLE BY GMU GEOTECHNICAL, INC.; PROJECT NO. 21-010-00
DH-61	HOLLOW STEM DRILL HOLE BY GMU GEOTECHNICAL, INC.; PROJECT NO. 18-150-00
DH-16	HOLLOW STEM DRILL HOLE BY GMU GEOTECHNICAL, INC.; PROJECT NO. 14-001-00
LH-3531	HOLLOW STEM AUGER DRILL HOLE BY LEIGHTON
TP-56	TEST PIT BY GMU GEOTECHNICAL, INC.
TP-42	TEST PIT BY GMU GEOTECHNICAL, INC.; PROJECT NO. 21-010-00
TP-77	TEST PIT BY GMU GEOTECHNICAL, INC.; PROJECT NO. 18-150-00
SM	PROPOSED SETTLEMENT MONUMENT
	PRELIMINARY OPEN SPACE DEDICATION LINE
	REMEDIAL GRADING LIMIT LINE
	93% COMPACTION AREAS
	REPORT LIMITS

GEOTECHNICAL MAP

GMU ENGINEERS & GEOLOGISTS

Date:	June 24, 2024	Plate 2
Project No.:	23-184-00	

DRAWING: g:\2023\23-184-00\dwg\2318400_aq40_3.4_plate 2_geo map production.dwg PLOTTED: 6/14/2024 1:24 PM BY: Joseph Huynh

Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
Project Number: 21-195-00

Log of Drill Hole DH- 6

Date(s) Drilled	**11/16/21**	Logged By	**RA/DW**	Checked By	**DW**
Drilling Method	**Bucket Auger**	Drilling Contractor	**Dave's Drilling**	Total Depth of Drill Hole	**100.4 feet**
Drill Rig Type	**EZ Bore**	Diameter(s) of Hole, inches	**30"**	Approx. Surface Elevation, ft MSL	**592.0**
Groundwater Depth [Elevation], feet	**N/A []**	Sampling Method(s)	**Open drive sampler with 6-inch sleeve, bulk**	Drill Hole Backfill	**Native**
Remarks				Driving Method and Drop	**Kelly**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			SANTIAGO FORMATION (Tsa)		SANDY SILTSTONE; olive with brownish red staining, dry to damp, moderately hard, fine- to medium-grained sand, with some coarse-grained sand						
590			Massive, no discernible bedding, mottled brownish red, gradationally fine-to medium-grained sand, slightly fractured, slightly oxidized grains, fracture infilled with unknown white powdery mineral, some roots observed								
			Subhorizontal irregular undulating discontinuous joints with oxidized sand grains								
			Gradational increase in fine-grained sand, hard to pick, massive		SILTY SANDSTONE; olive, dry to damp, moderately hard, fine- to coarse-grained sand						
	5		Gradational contact, moderately weathered, slightly oxidized sand grains at contact								
			Gradational increase in coarse-grained sand abundance								
			Few siltstone rip-up clasts up to 3-inches in diameter								
585			Approximately 3-inch zone of slightly oxidized siltstone rip-up clasts up to 4-inches in diameter		SILTY SANDSTONE; pale yellowish brown, dry to damp, moderately hard, fine- to coarse-grained sand, trace cobble						
			Subround cobbles up to 4-inches in diameter, moderately cemented, slightly oxidized sand grains, massive, no discernible bedding								
	10				Becomes pale yellowish brown		10/6"	4500	7	125	
					Becomes brownish yellow						
580			Decrease in oxidized sand grains, gradational color change, trace quartzite clasts up to 1/2-inch in diameter								
	15		Gradational increase in fine-to medium-grained sand abundance, decrease in coarse-grained sand abundance, subround gravel up to 1/2-inch in diameter		SILTY SANDSTONE; brownish yellow, dry to damp, moderately hard, fine- to medium-grained sand, some coarse-grained sand, trace gravel						
575			Zone of granitic and quartzite clasts up to 4-inches in diameter								
			Subround cobbles up to 5-inches in diameter		Some cobble						

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Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
Project Number: 21-195-00

Log of Drill Hole DH- 6

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			SANTIAGO FORMATION (Tsa) Moderately cemented, slightly oxidized sand grains, subround gravel up to 1/2-inch in diameter, trace granitic clasts up to 2-inches in diameter, massive, no discernible bedding		SILTY SANDSTONE; brownish yellow, dry, moderately hard, fine- to coarse-grained sand, few gravel		10/6"	4500	6	124	
570											
			Subround cobbles up to 5-inches in diameter, gradational color change		Becomes pale yellowish white, fine- to coarse-grained sand, few cobbles						
	25		Increase in slightly oxidized sand grain abundance								
565			Subround cobbles up to 4-inches in diameter, gradational increase in fine-grained sand abundance		Trace cobble						
	30		Massive, no discernible bedding		SILTY SANDSTONE; pale yellowish white, dry, moderately hard, fine- to coarse-grained sand, trace gravel		15/6"	3700	5	123	
560			Subround gravel up to 2-inches in diameter		Trace gravel						
	35										
555			Some siltstone rip-up clasts up to 8-inches in diameter, increase in slightly oxidized sand grain abundance, irregular, polished pressure surfaces Trace granitic clasts up to 6-inches in diameter, few siltstone rip-up clasts up to 4-inches in diameter								
			Moderately defined subhorizontal irregular undulating slightly oxidized bed of silty sand	B: ~N5°E, 8°NW							
	40				SILTY SANDSTONE; pale yellowish white, dry, moderately hard, fine- to coarse-grained sand		15/8"	3700	6	120	
550			Gradational color change, increase in fine-grained sand abundance, decrease in coarse-grained sand abundance, trace granitic clasts up to 1-inch in diameter, trace highly oxidized subround gravel up to 1/2-inch in diameter Zone of faint, subhorizontal, irregular, undulating, lenses of oxidized sand grains	B: ~N45°W, 25°SW	Becomes pale grayish white						

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Drill Hole DH- 6

Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
Project Number: 21-195-00

Log of Drill Hole DH- 6

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			SANTIAGO FORMATION (Tsa) Moderately cemented, slightly oxidized sand grains, slight increase in moisture		SILTY SANDSTONE; pale grayish white, dry to damp, moderately hard, fine- to coarse-grained sand						
545			Increase oxidized sand grain abundance, increase in coarse-grained sand								
			Trace quartzite clasts up to 1-inch in diameter								
	50		Massive, no discernible bedding		SILTY SANDSTONE; pale grayish white to brownish staining, dry, moderately hard, fine- to coarse-grained sand	■	10/6"	3700	7	115	
540			Subround gravel up to 1-inch in diameter		Few gravel						
			Slow drilling, increase in coarse-grained sand abundance		Becomes yellowish brown						
	55		Massive, no discernible bedding, moderately cemented, friable, slight increase in moisture								
535			High abundance of coarse-grained sand, approximately 1' thick zone of silty claystone rip-up clasts Massive, no discernible bedding								
	60		Gradational increase in fine-grained sand abundance		SILTY SANDSTONE; yellowish brown, dry, moderately hard, fine- to coarse-grained sand	■	15/6"	2500	6	110	
530											
	65		Approximately 1.5' thick zone of siltstone rip-up clasts encased in moderately oxidized sand grains, trace quartzite clasts up to 3-inches in diameter		Becomes pale yellowish white						
525											

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Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
Project Number: 21-195-00

Log of Drill Hole DH- 6

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			SANTIAGO FORMATION (Tsa) Massive, no discernible bedding		SILTY SANDSTONE; pale yellowish white, dry to damp, moderately hard, fine- to coarse-grained sand		15/8"	2500	7	108	
			Increase in slightly oxidized sand grains								
520											
	75		Gradational increase in fine-grained sand abundance, slight increase in moisture								
515					Becomes pale grayish white						
			Subround gravel up to 1/2-inch in diameter, gradational increase in coarse-grained sand abundance, decrease in fine-grained sand abundance		Trace gravel						
	80		Approximately 3' thick zone of moderately oxidized, clast supporting, sandy siltstone rip-up clasts, soft pockets up to 3-inches in diameter		SILTY SANDSTONE; pale grayish white, dry to damp, moderately hard to hard, fine- to coarse-grained sand, trace cobbles		35/6"	1000	8	107	
510			Subround cobbles up to 4-inches in diameter, gradational color change		Becomes yellowish brown						
			Slightly oxidized sand grains continue, slight increase in moisture								
	85		Massive, no discernible bedding								
505			Trace quartzite clasts up to 3-inches in diameter								
	90				SILTY SANDSTONE; pale yellowish brown, dry to damp, moderately hard to hard, fine- to coarse-grained sand, trace gravel		40/5"	1000	6	108	
			Subround gravel up to 2-inches in diameter								
500			Moderately oxidized sand grains								

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Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
Project Number: 21-195-00

Log of Drill Hole DH- 6

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
495			**SANTIAGO FORMATION (Tsa)**		Becomes damp to moist						
	100				SILTY SANDSTONE; pale yellowish brown with white staining, damp to moist, moderately hard to hard, fine- to coarse-grained sand		40/5"	1000	7	114	
					Total Depth = 100.42' No Groundwater No Caving						

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Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
Project Number: 21-195-00

Log of Drill Hole DH-12

Sheet 1 of 5

Date(s) Drilled	**12/1/21**	Logged By	**RA/DW**	Checked By	**DW**
Drilling Method	**Bucket Auger**	Drilling Contractor	**Dave's Drilling**	Total Depth of Drill Hole	**100.3 feet**
Drill Rig Type	**EZ Bore**	Diameter(s) of Hole, inches	**30"**	Approx. Surface Elevation, ft MSL	**527.0**
Groundwater Depth [Elevation], feet	**N/A []**	Sampling Method(s)	**Open drive sampler with 6-inch sleeve, bulk**	Drill Hole Backfill	**Native**
Remarks				Driving Method and Drop	**Kelly**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
525			**TERRACE DEPOSITS (Qtr)** Hard drilling due to rock abundance, switched to auger, subround cobbles up to 12-inches in diameter, subround gravel up to 2-inches in diameter, subround boulders up to 18-inches in diameter, some roots up to 0.25-inch thick, clayey sand matrix Gravel abundance 12%, cobble abundance 12%, ped surfaces around clasts Decomposed granitic clasts		SILTY SAND with SOME CLAY (SM); yellowish brown, dry, medium dense, fine- to coarse-grained sand, numerous gravel and cobbles, trace boulders						
	5		Increase in clay abundance, decrease in cobble abundance, increase in moisture, slightly cemented, subround cobbles up to 12-inches in diameter, subround boulders up to 19-inches in diameter, some bedrock fragments Pockets of fine-to medium-grained sand		CLAYEY SAND (SC); reddish brown to yellowish gray, damp to moist, dense, fine- to coarse-grained sand, numerous gravel, some cobbles, trace boulders Becomes medium dense to dense						
520			Fine gravel within sandy clay matrix with some reddish staining, continue to observe subround cobbles up to 12-inches in diameter Decrease abundance of cobbles, increase in gravel								
	10		Becomes clast supported, moderately weathered, decomposing granitic clasts Few claystone rip-up clasts up to 6-inches in diameter		CLAYEY SAND (SC); brown, damp to moist, medium dense to dense, fine- to coarse-grained sand, some gravel and cobbles		6/12"	4500	4	131	DS
515					SILTY SAND (SM); pale yellowish white, damp, dense, fine- to coarse-grained sand, some gravel and cobbles						
			SANTIAGO FORMATION (Tsa) Well defined subhorizontal contact with silty sandstone, massive, moderately to well cemented, highly weathered, friable, easy to pick, trace fine gravel, subround cobbles up to 6-inches in diameter		SILTY SANDSTONE; grayish white, damp, moderately hard, fine- to coarse-grained sand, few gravel,some cobbles						
	15		Slight increase in coarse-grained sand and gravel abundance Subround cobbles up to 6-inches in diameter Dominantly medium- to coarse-grained sand, few gravel up to 2-inches in diameter								
510			Poorly defined contact with fine- to coarse-grained silty sandstone, increase in gravel abundance, western wall contains sandy siltstone rip-up clasts up to 30-inches in diameter Subround gravel up to 1-inch in diameter,	B: ~N50°E, 12°NW							

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Drill Hole DH-12

Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
Project Number: 21-195-00

Log of Drill Hole DH-12

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			subround cobbles up to 6-inches in diameter		SILTY SANDSTONE; pale yellowish white, dry, moderately hard, fine- to coarse-grained sand, some gravel and cobble		6/5"	4500	6	116	
			SANTIAGO FORMATION (Tsa)								
505			Massive, no discernible bedding, fresh, moderately cemented, subround gravel up to 1-inch in diameter								
			Gradationally becomes coarse-grained sand, faint olive coloring								
			Trace siltstone rip-up clasts up to 1-inch in diameter		Becomes yellowish brown with faint olive						
	25		Gradationally becomes dominantly medium-grained sand, few siltstone rip-up clasts up to 2-inches in diameter								
			Massive, no discernible bedding, fresh, moderately cemented, slightly oxidized sand grains, increase in fine- to medium-grained sand, decrease in coarse-grained sand		Becomes pale yellowish white						
500			Approximately 1.6' thick zone of sandy siltstone rip-up clasts								
	30				SILTY SANDSTONE; pale yellowish white, dry, moderately hard, fine- to coarse-grained sand		15/6"	3700	5	114	
			Massive, no discernible bedding, moderately cemented								
495			Gradational increase in coarse-grained sand abundance , becomes pale yellowish brown		Becomes pale yellowish brown						
					Few fine gravel						
	35		Slight increase in moisture, massive, no discernible bedding, moderately cemented, slightly oxidized sand grains		Becomes dry to damp						
			Discontinuous lens of silty sand and siltstone rip-up clasts, extending to 38.5'	B: ~N20°W, 16°SW							
490											
			slightly defined highly scoured contact with sandy siltstone, massive, no discernible bedding, few fine gravel at contact		CLAYEY SILTSTONE; pale bluish green, dry to damp, moderately hard to hard, fine- to medium-grained sand						
	40						12/12"	3700	12	123	PS, AL, DS
485											
			Highly scoured contact with silty sandstone, moderately friable, massive, no discernible bedding		SILTY SANDSTONE; pale yellowish brown, dry to damp, moderately hard, fine- to coarse-grained sand, few fine gravel						

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Drill Hole DH-12

Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
Project Number: 21-195-00

Log of Drill Hole DH-12

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			SANTIAGO FORMATION (Tsa)								
			Gradationally becomes dominantly fine-grained		SANDY SILTSTONE; pale grayish freen to bluish green, dry to damp, moderately hard, fine- to medium-grained sand, some coarse-grained sand						
480			Well defined subhorizontal slightly undulating contact with sandy siltstone, trace pseudo concretions up to 5-inches in diameter at contact, slight increase in moisture, hard to pick								
					Becomes dominantly greenish blue						
	50		Increase in clay abundance, massive, no discernible bedding, moderately to well cemented, hard		CLAYEY SILTSTONE; bluish green, dry to damp, moderately hard to hard, fine- to medium-grained sand		10/10"	3700	12	124	DS
475			Gradational color change		Becomes olive						
					Some coarse-grained sand, few fine gravel						
			Gradational contact with silty sandstone, moderately cemented, slightly oxidized sand grains, numerous siltstone rip-up clasts up to 5-inches in diameter, few granitic and quartzite clasts up to 6-inches in diameter		SILTY SANDSTONE; pale yellowish brown, dry to damp, moderately hard to hard, fine- to coarse-grained sand Becomes dominantly medium- to coarse-grained sand						
	55										
					Becomes grayish white						
470											
	60		Massive, no discernible bedding, moderately cemented, friable		SILTY SANDSTONE; grayish white, dry to damp, moderately hard to hard, fine- to medium-grained sand		20/6"	2500	5	113	
465			Subround gravel up to 1-inch in diameter		Few gravel, trace fine gravel						
			Pseudo concretion of yellow sandstone up to 4-inches in diameter								
	65										
			Increase in slightly oxidized sand grains, slight increase in moisture		Faint yellow staining, few coarse-grained sand						
460											
					Becomes fine- to coarse-grained sand, some fine gravel						
			Trace claystone rip-up clasts up to 2-inches								

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Drill Hole DH-12

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			in diameter **SANTIAGO FORMATION (Tsa)** Slow drilling, massive, no discernible bedding, moderately cemented		SILTY SANDSTONE; pale yellowish white, dry to damp, moderately hard, fine- to coarse-grained sand	■	20/6"	2500	7	108	
455			Subround gravel up to 1/2-inch in diameter, slightly oxidized sand grains								
	75		Zone of coarse-grained sand and subround gravel up to 3-inches in diameter, top of zone contains an oxidized continuous lens	B: N75°W, 5°SW							
450			Slow drilling								
			Slight increase in oxidized sand grain abundance								
	80		Hard to pick, moderately to well cemented, massive, no discernible bedding		SILTY SANDSTONE; pale yellowish white, dry to damp, hard, fine- to coarse-grained sand	■	40/5"	1000	6	101	
445			Gradational increase in coarse-grained sand abundance		Becomes pale yellowish brown						
	85										
440			Massive, no discernible bedding moderately cemented, decrease in oxidized sand grains								
			Trace siltstone rip-up clasts up to 3-inches in diameter								
	90				SILTY SANDSTONE; pale yellowish brown, dry, moderately hard to hard, fine- to coarse-grained sand, few gravel	■	35/4"	1000	5	103	
			Subround to subangular gravel up to 1-inches in diameter								
435											
			Gradational grain size change		Becomes fine- to medium-grained sand						

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Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
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Log of Drill Hole DH-12

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
430			**SANTIAGO FORMATION (Tsa)** Massive, no discernible bedding, moderately to well cemented, slightly oxidized sand grains Trace granitic clasts up to 6-inches								
	100				SILTY SANDSTONE; pale yellowish white, dry, moderately hard to hard, fine- to coarse-grained sand Total Depth = 100.32' No Groundwater No Caving	■	40/4"	1000	6	105	

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Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
Project Number: 21-195-00

Log of Drill Hole DH-13

Date(s) Drilled	**12/2/21**	Logged By	**RA/DW**	Checked By	**DW**
Drilling Method	**Bucket Auger**	Drilling Contractor	**Dave's Drilling**	Total Depth of Drill Hole	**100.4 feet**
Drill Rig Type	**EZ Bore**	Diameter(s) of Hole, inches	**30"**	Approx. Surface Elevation, ft MSL	**545.0**
Groundwater Depth [Elevation], feet	**N/A []**	Sampling Method(s)	**Open drive sampler with 6-inch sleeve, bulk**	Drill Hole Backfill	**Native**
Remarks				Driving Method and Drop	**Kelly**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf) Subround to subangular gravel up 3-inches in diameter, subround to subangular cobbles up to 7-inches in diameter		SILTY SAND with SOME CLAY (SM); pale yellowish brown, dry to damp, medium dense to dense, fine- to coarse-grained sand, some gravel, numerous cobbles						
			SLOPE WASH (Qsw) Subangular gravel up to 1-inch in diameter, increase in moisture Decomposing granitic clast		SANDY CLAY (SC); brownish red, damp, medium dense to dense, fine- to coarse-grained sand, with some gravel						
540	5		**SANTIAGO FORMATION (Tsa)** Faint subhorizontal scoured contact with silty sandstone, highly weathered, moderately cemented, no discernible bedding, subround to subangular gravel up to 4-inches in diameter Several subhorizontal discontinuous irregular joints infilled with clay, several subvertical infilled joints on south eastern wall, slight increase in moisture Subhorizontal irregular joints infilled with clay		SILTY SANDSTONE; pale yellowish white, dry, moderately hard, fine- to coarse-grained sand, few gravel Becomes damp						
535	10		Massive, no discernible bedding, moderately cemented, gradational increase in coarse-grained sand abundance		SILTY SANDSTONE; yellowish brown, dry to damp, moderately hard, fine- to coarse-grained sand		10/6"	4500	5	128	
			Blips of dark brown sand Gradational decrease in coarse-grained sand abundance, increase in fine- to medium-grained sand abundance, increase in oxidized sand grains		SILTY SANDSTONE; pale yellowish green, damp, moderately hard to hard, fine- to medium-grained sand						
530	15		Gradational increase in coarse-grained sand abundance Subround to subangular gravel up to 2-inches in diameter Approximately 1.5' thick zone of siltstone rip-up clasts, friable, easy to pick								

DH_REV3 21-195-00.GPJ GMULAB.GPJ 1/31/22

Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
Project Number: 21-195-00

Log of Drill Hole DH-13

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
520	25		**SANTIAGO FORMATION (Tsa)** Faint subhorizontal slightly scoured slightly oxidized contact with sandy siltstone	C: N20°W, 4°NE	SANDY SILTSTONE; pale bluish green, damp to moist, moderately hard, fine- to medium-grained sand	■	10/8"	4500	10	127	
			Slightly oxidized gradational contact with silty sandstone, massive, no discernible bedding, easy to pick, moderately cemented gradational increase in coarse-grained sand abundance		SILTY SANDSTONE; grayish white, dry to damp, moderately hard, fine- to coarse-grained sand						
515	30				SILTY SANDSTONE; pale grayish white, dry to damp, moderately hard, fine- to coarse-grained sand	■	15/6"	3700	2	133	DS
			Trace granitic clasts up to 1-inch in diameter, slightly oxidized sand grains								
			Subround to subangular gravel up to 1-inch in diameter								
510	35		Massive, no discernible bedding, slight increase in moisture		Becomes damp						
505	40		**SANTIAGO FORMATION (Tsa)** Massive, no discernible bedding, moderately to well cemented, biotite abundance ~5%, subround gravel up to 1-inch in diameter		SILTY SANDSTONE; pale grayish white, damp, moderately hard to hard, fine- to coarse-grained sand, trace gravel	■	15/6"	3700	7	119	
			Subhorizontal slightly scoured moderately oxidized contact with silty claystone, clay zone contains discontinuous irregular pressure shears, scour dip ranges from 5° to 25° to the north		CLAYEY SILTSTONE; bluish green, very moist to wet, moderately hard, some fine- to medium-grained sand						

Drill Hole DH-13

Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
Project Number: 21-195-00

Log of Drill Hole DH-13

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Perched water at contact Massive, no discernible bedding, well cemented, mottled reddish brown, hard Subvertical stepped joint infilled with unknown yellow mineral		CLAYEY SILTSTONE; bluish green, damp, hard, fine- to medium-grained sand						
					Becomes pale grayish green				10		PS, CP, EI, FC, DS(R)
495	50		Gradational contact with silty sandstone, easy to pick, massive, no discernible bedding		SILTY SANDSTON; grayish white, dry to damp, moderately hard, fine- to coarse-grained sand		15/6"	3700	6	128	
			Slighty oxidized sand grains, moderately cemented								
			Decrease in coarse-grained sand								
490	55		Gradational increase in fine-to medium-grained sand abundance, decrease in coarse-grained sand abundance, massive, no discernible bedding Trace moderately oxidized gravel up to 1-inch in diameter Minor bedrock seeps, no flow observed								
485	60		Trace granitic clasts up to 6-inches in diameter, zone of poorly cemented silty clay Highly scoured distinct irregular contact with silty claystone to clayey siltstone bed, basal contact of bed is with a subvertical, continuous shear infilled with clay and oxidized sand grains, observed perched water at shear plane	S: N10°W, 45°NE	SILTY CLAYSTONE to SANDY SILTSTONE; pale grayish green to bluish green, moist to very moist, moderately hard to hard, fine- to medium-grained sand		8/12"	2500	15	109	
			Shear contacts with silty sandstone, massive, no discernible bedding, slightly oxidized sand grains		SILTY SANDSTONE; pale yellowish white, dry to damp, moderately hard, fine- to coarse-grained sand						
480	65		Faint subvertical continuous lens of oxidized sand grains at bottom of shear zone	S: N8W°, 45NE°							
			Trace highly oxidized pseudo concretions up to 12-inches in diameter								

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Drill Hole DH-13

Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
Project Number: 21-195-00

Log of Drill Hole DH-13

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			SANTIAGO FORMATION (Tsa) Approximately 2' thick zone of claystone rip-up clasts up to 10-inches in diameter, granitic clasts up to 8-inches in diameter, trace quartzite clasts up to 8-inches in diameter, increase in oxidized sand grains		SILTY SANDSTONE; yellowish brown to white staining, dry, moderately hard, fine- to coarse-grained sand		20/6"	2500	6	120	
			Trace siltstone rip-up clasts up to 2-inches in diameter								
470	75		Approximately 1' thick zone of siltstone rip-up clasts, trace granitic and quartzite clasts up to 7-inches in diameter Slow drilling, highly scoured oxidized gradational contact between fine- to coarse-grained sand to fine- to medium-grained sand		Becomes fine- to medium-grained sand						
465	80		Massive, no discernible bedding, moderately to well cemented, friable, easy to pick		SILTY SANDSTONE; pale yellowish brown, dry, moderately hard to hard, fine- to coarse-grained sand		35/4"	1000	6	114	
			Slightly oxidized sand grains, trace granitic clasts up to 3-inches in diameter, trace quartzite clasts up to 3-inches in diameter								
460	85		Trace granitic and quartzite clasts up to 3-inches in diameter								
455	90		Massive, no discernible bedding, moderately cemented, friable		SILTY SANDSTONE; pale yellowish brown, dry, moderately hard to hard, fine- to coarse-grained sand		30/6"	1000	7	116	
			Subvertical continuous lens of oxidized sand grains Slight increase in moisture		Becomes damp to moist						

Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
Project Number: 21-195-00

Log of Drill Hole DH-13

Sheet 5 of 5

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA			TEST DATA		
						SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			SANTIAGO FORMATION (Tsa) Trace granitic clasts up to 2-inches in diameter, slightly oxidized sand grains								
445	100		Massive, no discernible bedding, moderately cemented		SILTY SANDSTONE; pale greenish white, damp, hard, fine- to coarse-grained sand		35/5"	1000	8	114	
					Total Depth = 100.42' No Groundwater No Caving						

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Drill Hole DH-13

Project: RMV PA-3.3/3.4 **Project Location: Rancho Mission Viejo** **Project Number: 21-195-00**	**Log of Drill Hole DH-24** Sheet 1 of 1

Date(s) Drilled	**12/7/21**	Logged By	**RA**	Checked By	**DW**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**16.0 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8"**	Approx. Surface Elevation, ft MSL	**466.0**
Groundwater Depth [Elevation], feet	**N/A []**	Sampling Method(s)	**Open drive sampler with 6-inch sleeve, bulk**	Drill Hole Backfill	**Native**
Remarks				Driving Method and Drop	**140 lb donut hammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
465			**SLOPE WASH (Qsw)** Subround gravel, trace roots up to 1/2-inch thick, pinhole porosity		SILTY SAND with SOME CLAY (SM), pale brown, dry to damp, loose to medium dense, fine- to coarse-grained sand, trace gravel						
	5		**OLDER ALLUVIUM (Qoal)** Slightly weathered, gradationally increased in coarse-grained sand abundance, pinhole porosity		CLAYEY SAND (SC), pale yellowish brown to brown, damp, medium dense, to dense, fine- to coarse-grained sand		25 50/6"	140	5	130	
460											
	10		**SANTIAGO FORMATION (Tsa)** Massive, moderately weathered, friable, slightly oxidized sand grains, moderately cemented		SILTY SANDSTONE, pale yellowish brown, dry to damp, moderately hard to hard, fine- to coarse-grained sand		32 37 50	140	6	135	
455											
	15		Massive, slightly weathered, friable, moderately cemented		SILTY SANDSTONE, pale grayish white, dry, moderately hard to hard, fine- to coarse-grained sand		30 50/6"	140	7	128	
450					Total Depth = 16' No Groundwater						

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Drill Hole DH-24

Project: RMV PA-3.3/3.4
Project Location: Rancho Mission Viejo
Project Number: 21-195-00

Log of Drill Hole DH-26

Sheet 1 of 1

Date(s) Drilled	**12/7/21**	Logged By	**RA**	Checked By	**DW**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling**	Total Depth of Drill Hole	**15.4 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**8"**	Approx. Surface Elevation, ft MSL	**481.0**
Groundwater Depth [Elevation], feet	**N/A []**	Sampling Method(s)	**Open drive sampler with 6-inch sleeve, bulk**	Drill Hole Backfill	**Native**
Remarks				Driving Method and Drop	**140 lb donut hammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
480			**SLOPE WASH (Qsw)** Subround gravel up to 1-inch in diameter, some pinhole porosity		SILTY SAND with SOME CLAY (SM), pale brown, dry, medium dense, fine-to coarse-grained sand, few gravel						
			SANTIAGO FORMATION (Tsa) Massive, slightly to moderately weathered, slightly oxidized sand grains, few fine gravel		SILTY SANDSTONE, pale yellowish white, dry, moderately hard, fine- to coarse-grained sand						
	5				SILTY SANDSTONE, pale yellowish white, dry, moderately hard, fine- to coarse-grained sand		13 30 38	140	5	130	
475											
	10		Slightly to moderately cemented, slightly oxidized sand grains, trace siltstone rip-up clasts, friable		SILTY SANDSTONE, pale yellowish white to grayish white, dry to damp, moderately hard, fine- to coarse-grained sand		30 40 50/5"	140	7	135	
470											
	15		Fresh, massive, slightly oxidized sand grains		SILTY SANDSTONE, pale yellowish white, dry, moderately hard to hard, fine- to coarse-grained sand, few fine gravel Total Depth = 15.42' No Groundwater		50/5"	140	7	118	

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Drill Hole DH-26