

**Geotechnical Investigation
Osprey Ranch Development
Eden, Weber County, Utah**



January 3, 2022

Prepared by:



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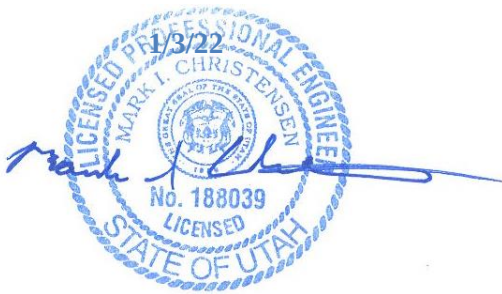
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**Geotechnical Investigation
Osprey Ranch Development
2050 Highway 150
Eden, Weber County, Utah
CG Project No.: 133-012**

Prepared by:



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January 3, 2022

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE OF WORK

This report presents the results of a geotechnical investigation that was performed for the proposed Osprey Ranch Development which is to be located at 2050 Highway 150 in Eden, Weber County, Utah. The general location of the project is indicated on the Project Vicinity Map, Plate 1. In general, the purposes of this investigation were to evaluate the subsurface conditions and the nature and engineering properties of the subsurface soils, and to provide recommendations for general site grading and for the design and construction of floor slabs, pavements, and foundations. This investigation included subsurface exploration, representative soil sampling, field and laboratory testing, engineering analysis, and preparation of this report. Prior to the completion of our report, the Geologic Hazards Evaluation for the development by Western Geologic, dated January 3, 2022, was reviewed to assist in our assessments.

The work performed for this report was authorized by Mr. John Lewis and was conducted in accordance with the Christensen Geotechnical proposal dated July 23, 2021.

1.2 PROJECT DESCRIPTION

Based on a concept plan provided to us by Lewis Homes, we understand that the proposed development is to consist of a 60-lot residential subdivision approximately 632 acres in size. The proposed structures within the development are to consist of single-family residences that are one to two stories in height that will include basements. The development will also include an access road, associated utilities, and landscaping. The footing loads for the proposed structures are anticipated to be on the order of 3 to 4 klf for walls and 150 psf for floors. If the actual structural loads are different from those anticipated, Christensen Geotechnical should be notified in order to reevaluate our recommendations.

2.0 METHODS OF STUDY

2.1 FIELD INVESTIGATION

The subsurface conditions at the site were explored by excavating 67 test pits to depths of 2 to 14 feet below the existing site grade. The approximate test pit locations are shown on the Exploration Location Map, Plate 2. The subsurface conditions as encountered in the test pits were recorded at the time of excavation and are presented on the attached Test Pit Logs, Plates 3 to 69. A key to the symbols and terms used on the Test Pit Logs may be found on Plate 70.

The test pit excavation was accomplished with a tracked excavator. Disturbed and undisturbed soil samples were collected from the test pit sidewalls at the time of excavation. The disturbed samples were collected and placed in bags and buckets. The undisturbed samples consisted of block samples which were placed in bags. The samples were visually classified in the field and portions of each sample were packaged and transported to our laboratory for testing. The classifications for the individual soil units are shown on the attached Test Pit Logs.

During the logging of the test pits, a Schmitt rebound hammer was used to estimate the compressive strength of the bedrock exposed within several of the test pits. The results of the rebound hammer testing are as follows:

Table No. 1: Schmitt Rebound Hammer Test Results

Test Pit	Depth (ft)	Compressive Strength (psf)
TP-2	6	260,000
TP-4	7	140,000
TP-14	2.5	260,000
TP-18	1	260,000
TP-28	5	315,000
TP-31	2.5	800,000
TP-36	2.5	340,000
TP-38	3.5	215,000
TP-49	2	575,000
TP-52	4	140,000
TP-58	3	215,000

2.2 LABORATORY TESTING

Of the soils collected during the field investigation, representative samples were selected for testing in the laboratory in order to evaluate the pertinent engineering properties. The laboratory testing included moisture content and density determinations, Atterberg limits evaluations, partial and full gradation analyses, swell tests, and direct shear tests. A summary of our laboratory testing is presented in the table below:

Table No. 2: Laboratory Test Results

Test Pit No.	Depth (ft.)	Dry Density (pcf)	Moisture Content (%)	Atterberg Limits		Silt/Clay (- #200)	% Swell	Direct Shear		Soil Type
				LL	PI			Friction Angle	Cohesion (psf)	
TP-3	4		3.2	59	33	62.1				CH
TP-4	3		16.6			74.0				CL
TP-5	3		12.9	34	17	53.8				CL
TP-6	6		8.3			33.7				GC
TP-7	3		24.1	54	34	77.6				CH
TP-8	6	107.5	18.1	49	28	91.3	3.5			CL
TP-9	4		11.2	35	16	77.8	1.7			CL
TP-10	2		6.3			40.7				GC
TP-11	3		24.2	45	25	82.7		31	90	CL
TP-12	3		28.9	74	38	64.6				MH
TP-13	7		7.6			38.6				GC
TP-15	6		27.0	54	27	82.7				CH
TP-16	2	89.6	26.9	82	44	95.2	5.3	28	70	MH
TP-17	2		14.3			76.7				CL
TP-19	4	74.3	28.9	62	25	85.3		29	125	MH
TP-20	6		9.9	49	26	72.8				CL
TP-21	4		25.2	58	23	58.4				MH
TP-22	2	98.7	19.7	72	48	88.6	5.9			CH
TP-23	3		20.5	63	25	93.9				MH
TP-24	3		25.3	47	10	76.5				ML
TP-25	4		11.7	38	20	78.2				CL
TP-26	3.5		11.3	55	34	77.5				CH
TP-27	3		22.4	45	14	59.2				ML
TP-28	2		7.4			50.2				CL

Table No. 2: Continued

Test Pit No.	Depth (ft.)	Dry Density (pcf)	Moisture Content (%)	Atterberg Limits		Silt/Clay (- #200)	% Swell	Direct Shear		Soil Type
				LL	PI			Friction Angle	Cohesion (psf)	
TP-29	3		6.0			34.6				GC
TP-30	4		9.8	47	28	83.8				CL
TP-31	1		0.7			12.3				GM
TP-32	3		8.4			51.6				CL
TP-33	4		19.6	54	26	85.7				CH
TP-34	4		8.5			40.7				SC
TP-35	3.5		10.1	39	22	48.2				SC
TP-37	2		3.4			25.6				GC
TP-39	2		14.0	63	41	86.7				CH
TP-40	2		12.0	42	22	88.6				CL
TP-41	2.5		10.2	34	16	81.8				CL
TP-42	3		13.0	46	26	83.8		34	80	CL
TP-43	3.5		13.9	59	36	59.7				CH
TP-44	3		21.1	49	18	85.4				ML
TP-45	4	73.4	36.6	71	24	83.8	2.8			MH
TP-46	3		7.6	53	33	72.1				CH
TP-47	4	81.4	25.3	58	22	81.5	1.4	31	100	MH
TP-48	3		16.2	63	38	74.6				CH
TP-51	4		28.6			48.4				GC
TP-53	2		16.0			70.7				CL
TP-54	3		14.1	48	23	87.9				CL
TP-55	2		13.7	39	20	93.5				CL
TP-56	3		7.2	33	14	58.0				CL
TP-57	3		16.1	56	36	90.3				CH
TP-59	3		18.6			69.6				CL
TP-60	2	86.6	31.0	85	56	97.0	1.4	22	95	CH
TP-61	1		0.6			14.2				GM
TP-62	2		15.9	47	26	89.8				CL
TP-63	2		9.7	62	42	88.5				CH
TP-64	3	107.3	13.0	74	50	83.2	5.4			CH
TP-65	1		9.9	62	42	85.1				CH
TP-66	2		10.7	36	19	84.1				CL
TP-67	6		3.9			12.9				GC

The results of our laboratory tests are also presented on the Test Pit Logs, Plates 3 through 69, and more detailed laboratory results are presented on the laboratory testing plates, Plates 71 through 89.

The samples will be retained in our laboratory for 30 days following the date of this report, at which time they will be disposed of unless a written request for additional holding time is received prior to the disposal date.

3.0 GENERAL SITE CONDITIONS

3.1 SURFACE CONDITIONS

At the time of our investigation, the subject site was undeveloped land located in the mountain foothills southeast of Eden, Utah. The property is located on generally northeast-facing slopes which vary in orientation and steepness. The elevation of the property varies from approximately 5,890 to 4,930 feet above sea level. The vegetation at the site generally consisted of pockets of dense trees and brush with common grasses and weeds.

3.2 SUBSURFACE CONDITIONS

3.2.1 Soils

Based on the 67 test pits that were completed for this investigation, the site is covered with 1 to 3½ feet of topsoil. Below the topsoil, 0 to more than 14 feet of soil cover tuffaceous siltstone, sandstone, and conglomerate bedrock. The soils above the bedrock generally consist of Lean CLAY (CL), Lean CLAY with sand and gravel (CL), Sandy Lean CLAY (CL), Fat CLAY (CH), Fat CLAY with sand (CH), Fat CLAY with sand (CH), Gravelly Fat CLAY (CH), Clayey GRAVEL with sand (GC), and Silty GRAVEL with sand (GM). The bedrock was encountered at depths of 1 to 9 feet below site grade. Bedrock was not encountered in test pits TP-5, TP-9, TP-50, and TP-58. Excavator refusal was encountered on bedrock or very dense soil in all test pits with the exception of test pits TP-8, TP-9, TP-15, and TP-20. This refusal was encountered at depths of 2 to 8 feet below existing site grade.

3.2.2 Groundwater

With the exception of Test Pit TP-11, groundwater was not encountered within our test pits at the time of excavation. Groundwater was encountered within TP-11 at a depth of 8½ feet below existing site grade. Even though groundwater was not encountered within any of the other test pits, we anticipate that a perch groundwater layer likely develops in wetter months at the soil/bedrock interface. It should be understood that groundwater is likely below its seasonal high and may fluctuate in response to seasonal changes, precipitation, and irrigation.

4.0 SEISMIC CONSIDERATIONS

4.1 SEISMIC DESIGN CRITERIA

The State of Utah and Utah municipalities have adopted the 2018 International Building Code (IBC) for seismic design. The IBC seismic design is based on seismic hazard maps which depict probabilistic ground motions and spectral response; the maps, ground motions, and spectral response having been developed by the United States Geological Survey (USGS). Seismic design values, including the design spectral response, may be calculated for a specific site using the web-based application by the Applied Technology Council (ATC), the project site's approximate latitude and longitude, and its Site Class. Based on our field exploration, it is our opinion that this location is best described as a Site Class C, which represents a "very dense soil and soft rock" profile. The spectral acceleration values obtained from the ATC's web-based application are shown below.

Table 3: IBC Seismic Response Spectrum Values

Site Location: 41.296973° N -111.839527° W	
Name	Response Spectral Value
S_s	0.984
S₁	0.352
S_{MS}	1.180
S_{M1}	0.528
S_{DS}	0.787
S_{D1}	0.352
PGA	0.437
PGA_M	0.524

4.2 LIQUEFACTION

Certain areas in the intermountain west possess a potential for liquefaction. Liquefaction is a phenomenon in which soils lose their intergranular strength due to an increase of pore pressures during a dynamic event such as an earthquake. The potential for liquefaction is based on several factors, including 1) the grain-size distribution of the soil, 2) the plasticity of the fine fraction of the soil (material passing the No. 200 sieve), 3) the relative density of the soils, 4) earthquake

strength (magnitude) and duration, 5) overburden pressures, and 6) the depth to groundwater. Due to the shallow bedrock at this site, we assess the liquefaction potential to be very low.

5.0 ENGINEERING ANALYSIS AND RECOMMENDATIONS

5.1 GENERAL CONCLUSIONS

Based on the results of our field and laboratory investigations, it is our opinion that the subject site is suitable for the proposed construction provided that the recommendations contained in this report are incorporated into the design and construction of the project.

5.2 EARTHWORK

5.2.1 General Site Preparation and Grading

Prior to the site grading operations, all vegetation, topsoil, undocumented fill soils, and loose or disturbed soils should be stripped (removed) from the building pad and flatwork concrete areas. Following the stripping operations, the exposed soils should be proof rolled to a firm, unyielding condition. Site grading may then be conducted to bring the site to design grade.

Based on the test pits excavated at the site, the site is covered with 1 to 3 feet of topsoil. This topsoil should be removed from below footings, concrete flatwork, and pavements. Where over-excavation is required, the excavation should extend at least 1 foot laterally for every foot of over-excavation. A Christensen Geotechnical representative should observe the site grading operations.

5.2.2 Soft Soil Stabilization

Once exposed through excavation, all subgrade soils should be proof rolled with a relatively large, wheeled vehicle to a firm, unyielding condition. Due to the fine-grained nature of the near-surface soil at the site, soft soils are likely to be encountered. Where encountered, these localized soft areas should be removed and replaced with granular structural fill. If soft areas extend more than 18 inches deep, or where large areas are encountered, stabilization may be considered. The use of stabilization should be approved by the geotechnical engineer, but would likely consist of over-excavating the area by at least 18 inches and then placing a geofabric (such as Mirafi RS280i) at the bottom of the excavation. Over this, a stabilizing fill, consisting of angular coarse gravel with cobbles, would be placed to the design subgrade.

5.2.3 Temporary Construction Excavations

Based on OSHA requirements and the soil conditions encountered during our field investigation, we anticipate that temporary construction excavations at the site that have vertical walls that

extend to depths of up to 5 feet may be occupied without shoring; however, where groundwater or fill soils are encountered, flatter slopes may be required. Excavations that extend to more than 5 feet in depth should be sloped or shored in accordance with OSHA regulations for a type C soil. The stability of construction excavations is the contractor's responsibility. If the stability of an excavation becomes questionable, the excavation should be evaluated immediately by qualified personnel.

5.2.4 Structural Fill and Compaction

All fill that is placed for the support of structures, concrete flatwork, and pavements should consist of structural fill. Due to their swell potential, the native clay soils and claystone bedrock should not be used as structural fill below structures, but may be used below the exterior flatwork concrete and roadways. The sandstone and conglomerate bedrock may also be used as structural fill below any exterior flatwork concrete and pavements if it is crushed to a maximum particle size of 4 inches. All structural fill placed below the proposed residences should consist of an imported material. Imported structural fill, if required, should consist of a relatively well-graded granular soil with a maximum particle size of 4 inches, with a maximum of 50 percent passing the No. 4 sieve and with 20 to 40 percent passing the No. 200 sieve. The liquid limit of the fines (material passing the No. 200 sieve) should not exceed 35 and the plasticity index should be less than 15. Additionally, all structural fill, whether native soils or imported material, should be free of topsoil, vegetation, frozen material, particles larger than 4 inches in diameter, and any other deleterious materials. Any imported materials should be approved by the geotechnical engineer prior to importing.

The structural fill should be placed in loose lifts that are a maximum of 8 inches thick. The moisture content should be within 3 percent of optimum and the fill should be compacted to at least 95 percent of the maximum density as determined by ASTM D 1557. Where the fill heights exceed 5 feet, the level of compaction should be increased to 98 percent.

5.2.5 Excavatability

As indicated earlier, with the exception of TP-5, TP-9, TP-50, and TP-58, bedrock was encountered within all of the Test Pits at depths of 1 to 9 feet. This bedrock was generally in a weak to moderately strong condition. We anticipate that the minimum equipment required for excavations within the bedrock will be the use of a heavy excavator with a ripper tooth or a hoe-ram. Prior to bidding, the contractor should be provided this report in order to be made aware of

the subsurface conditions so that they can assess the type of equipment that will be best suited for these conditions.

5.2.6 Permanent Cut and Fill Slopes

The existing slopes on the property should not be over-steepened by cutting or filling. We recommend that all non-retained cut and fill slopes be graded no steeper than a 3 to 1 (horizontal to vertical) grade. If steeper grades are required, additional slope stability assessments may be required.

5.3 FOUNDATIONS

Due to the presence of swelling soils, the foundations for the planned structures may consist of conventional continuous and/or spread footings established either entirely on undisturbed native gravel soil or entirely on sandstone bedrock. Where Fat CLAY (CH) or Elastic SILT (MH) soils are exposed or where claystone or siltstone bedrock are exposed, the soil or bedrock should be over-excavated to allow for the placement of at least 5 feet of structural fill below the footings. This amount of fill may be reduced if a swell potential test is performed at the site of a proposed structure and it indicates a low swell potential. Structures should not be located in areas identified as young landslide deposits (QMSY) on Plate 136. Where structures are to be located on older landslide deposits, these deposits should be completely removed from below the structure down to undeformed bedrock (see Section 5.9). The building pad may then be brought to finish grade with imported structural fill. The footings for the proposed structures should be a minimum of 20 inches and 30 inches wide for continuous and spot footings, respectively. The exterior footings should be established at a minimum of 30 inches below the lowest adjacent grade to provide frost protection and confinement. Interior footings that are not subject to frost should be embedded a minimum of 18 inches for confinement.

Continuous and spread footings that are established on undisturbed native gravel soils, sandstone bedrock, or on imported structural fill may be proportioned for a maximum net allowable bearing capacity of 2,500 psf. A one-third increase may be used for transient wind or seismic loads. All footing excavations should be observed by the geotechnical engineer prior to the construction of footings.

5.4 ESTIMATED SETTLEMENT

If the foundations are designed and constructed in accordance with the recommendations presented in this report, there is a low risk that total settlement will exceed 1 inch and a low risk that differential settlement will exceed ½ inch for a 30-foot span.

5.5 LATERAL EARTH PRESSURES

Buried structures, such as basement walls, should be designed to resist the lateral loads imposed by the soils retained. The lateral earth pressures on the below-grade walls and the distribution of those pressures will depend upon the type of structure, hydrostatic pressures, in-situ soils, backfill, and tolerable movements. Basement and retaining walls are usually designed with triangular stress distributions, which are based on an equivalent fluid pressure and calculated from lateral earth pressure coefficients. If soils similar to the native soils are used to backfill the basement walls, then the walls may be designed using the following ultimate values:

Table No. 4: Lateral Earth Pressures

Condition	Lateral Pressure Coefficient	Equivalent Fluid Density (pcf)
Active Static	0.36	42
Active Seismic	0.16	19
At-Rest	0.53	61
Passive Static	2.77	319
Passive Seismic	-0.34	-39

We recommend that walls which are allowed little or no wall movement be designed using “at rest” conditions. Walls that are allowed to rotate at least 0.4 percent of the wall height may be designed with “active” pressures. The coefficients and densities that are presented above assume a level backfill with no buildup of hydrostatic pressures. If anticipated, hydrostatic pressures and any surcharge loads should be added to the presented values. If sloping backfill is present, we recommend that the geotechnical engineer be consulted to provide more appropriate lateral pressure parameters once the design geometry is established.

The seismic active and passive earth pressure coefficients provided in the table above are based on the Mononobe-Okabe method and only account for the dynamic horizontal force produced by a seismic event. The resulting dynamic pressure should therefore be added to the static pressure to determine the total pressure on the wall. The dynamic pressure distribution can be represented

as an inverted triangle, with stress decreasing with depth, and the resultant force acting approximately 0.6 times the height of the retaining wall, measured upward from the bottom of the wall.

Lateral building loads will be resisted by frictional resistance between the footings and the foundation soils and by passive pressure developed by backfill against the wall. For footings on native soils, we recommend that an ultimate coefficient of friction of 0.35 be used. If passive resistance is used in conjunction with frictional resistance, the passive resistance should be reduced by $\frac{1}{2}$. The passive earth pressure from soils subject to frost or heave should usually be neglected in design.

The coefficients and equivalent fluid densities presented above are ultimate values and should be used with an appropriate factor of safety against overturning and sliding. A value of 1.5 is typically used.

5.6 CONCRETE SLAB-ON-GRADE CONSTRUCTION

The laboratory testing that was completed for this investigation indicates that the native clay soils, silt soils, claystone bedrock, and siltstone bedrock at the site have a high swell potential with changes in moisture. Concrete slabs, including basement floor slabs and exterior flatwork, have a high risk of movement when placed on these soils due to their light loading. To reduce the risk of expansion and slab movement, we recommend placing at least 5 feet of imported structural fill below any concrete slabs where clay, silt, claystone, or siltstone are encountered. The amount of structural fill placed below slabs may be reduced if a swell potential test performed at the site of the structure indicates a lower swell potential. Where clay soils, silt soils, claystone bedrock are not present, we recommend that concrete slabs-on-grade be constructed over at least 4 inches of compacted gravel to help distribute floor loads, break the rise of capillary water, and to aid in the curing process. The gravel should consist of free-draining gravel compacted to a firm, unyielding condition. To help control normal shrinkage and stress cracking, the floor slab should have adequate reinforcement for the anticipated floor loads with the reinforcement continuous through the interior joints. In addition, we recommend adequate crack control joints to control crack propagation. Prior to the construction of slabs-on-grade, the site grading recommendations presented in Section 5.2.1 should be followed.

5.7 MOISTURE PROTECTION AND SURFACE DRAINAGE

Any wetting of the foundation soils will likely cause some degree of volume change within the soil and should be prevented both during and after construction. We recommend that the following precautions be taken at this site:

1. The ground surface should be graded to drain away from the structures in all directions, with a minimum fall of 8 inches in the first 10 feet.
2. Roof runoff should be collected in rain gutters with downspouts that are designed to discharge well outside of the backfill limits.
3. Sprinkler heads should be aimed away from and placed at least 12 inches from foundation walls.
4. There should be adequate compaction of backfill around foundation walls, to a minimum of 90% density (ASTM D 1557). Water consolidation methods should not be used.

5.8 SUBSURFACE DRAINAGE

Due to the high risk of perch groundwater at the subject site, we recommend that all basement and retaining walls incorporate a foundation drain. The foundations drain should consist of a 4-inch-diameter slotted pipe placed at or below the bottom of footings and encased in at least 12 inches of free-draining gravel. The gravel should be extended up the foundation wall to within 2 feet of the final ground surface, and a filter fabric, such as Mirafi 140N, should separate the gravel from the native soils. The pipe should be graded to drain to the land drains, a storm drain or another free-gravity outfall unless provisions for pumped sumps are made. The gravel which is to extend up the foundation wall may be replaced by a fabricated drain panel such as Mirafi G200N or equivalent.

5.9 SLOPE STABILITY

As recommended in the Geologic Hazards Evaluation by Western Geologic, the stability of the slopes at the site were assessed using the Slide computer program and the modified Bishop's method of slices. Eight profiles were used to assess the slopes. The locations of the profiles are shown on Plate 2 and are based on the cross sections presented in the Western Geologic report. For our analyses, we assumed that the top 5 feet of the bedrock was highly weathered and saturated. The strength of this highly weathered portion of the bedrock that was used in our analyses was based on either the six direct shear tests or on our experience with similar soils. The strength of the remaining, less weathered bedrock was based on Schmitt rebound hammer testing that was performed in our test pits at the time of excavation. As indicated in Section 2.1, the results of these tests indicated compressive strength values of 140,000 to 800,000 psf. For our

analyses, we reduced these strength values to 28,000 psf (cohesion value of 14,000 psf). The strength value of the near-surface late Pleistocene to Holocene mass wasting colluvium soil was based on either the Stark method (Stark et al., 2005), which indicated residual strengths of 12 to 23 degrees, or on a back-calculated strength (where the strength produces a static factor of safety of 1).

The profiles were assessed under static and pseudo static conditions. The pseudo static condition is used to assess the slope during a seismic event. As indicated in Section 4.1, the peak ground acceleration at this site is estimated to be 0.524g. As is common practice, half of this value was used in our pseudo static assessments. Minimum factors of safety of 1.5 and 1.0 for static and seismic conditions, respectively, were considered acceptable. Our analyses indicate that Profiles C, D, G, J, L, N, P, and R have safety factors greater than 1.5 and 1.0 for the respective static and pseudo static conditions. Our analyses of profiles A, B, E, F, H, I, K, M, O, and Q indicate that the slopes at these locations are statically either marginally stable (has a static factor of safety greater than 1.0 but less than 1.5) or unstable under static or pseudo static conditions (has a static safety factor less than 1.0). These analyses indicate that these low factors of safety occur on the steeper slopes and within the landslide deposits. Further analyses show that these marginally stable and unstable profiles have static and pseudo static safety factors greater than 1.5 and 1.0 outside of the steeper areas and either outside of the landslide deposits or where the landslide deposits are removed and replaced with a gravel structural fill. Note that the steeper areas are considered areas with slopes that are greater than 20 percent.

Based on the results of our stability assessments, it is our opinion that much of the site is stable; however, areas where the slopes are greater than 20 percent and areas with landslide deposits pose a high risk of slope failure. Due to the high risk in these areas, we recommend that no structures be constructed on slopes that are steeper than 30 percent. We also recommend that any proposed structure site with an average slope that is greater than 20 percent (average grade over a 50-foot span) have a site-specific geological assessment and geotechnical investigation. We further recommend that no structures be constructed in areas identified as a young landslide (Qmsy) on Plate 136. If construction is to occur within older landslide deposits, all of the landslide deposits should be removed from below structures and roadways and replaced with gravel structural fill. The gravel fill should extend down to non-deformed bedrock and extend at least 20 feet beyond the edge of the structures. The structural fill should be a gravel material with a strength value consisting of an angle of internal friction of at least 36 degrees. A qualified engineer or geologist should observe the building excavation prior to placement of the gravel fill to assess whether the landslide deposits have been removed. If landslide deposits extend more

than 10 feet below the ground's surface, the engineer may recommend that the gravel needs to extend more than 20 feet laterally beyond the edge of the structure or that other measures are required. It should be understood that this process will only reduce the risk of slope failure within the area that the gravel is placed. A high risk of slope failure will still be present in the landslide deposits around the gravel pad.

The slope stability analysis presented above is based on the assumption that no significant cuts or fills will occur during the development of the site. Significant changes to the site grade, such as the steepening of slopes with cuts or fills, may adversely affect the stability of the slopes and increase the risk of slope failures. If cuts or fills over 5 feet are planned in areas mapped as landslide deposits by Western Geologic, additional slope stability assessments may be necessary and Christensen Geotechnical should be contacted to provide the additional assessments. The results of our slope stability assessments may be found on Plates 90 through 135.

5.10 PAVEMENT DESIGN

Pavement sections for roadways within the proposed development were assessed using the PAS computer program (prepared by the American Concrete Pavement Association) and an assumed CBR value of 3 percent. No traffic information was available at the time this report was prepared; Christensen Geotechnical has therefore assumed a traffic load for the roadways based on our experience with similar projects. We have assumed that traffic will consist of 300 passenger cars per day, 4 medium trucks per day and 4 heavy trucks per day. We have further assumed no increase in traffic over the life of the pavement. Based on this information, we recommend a pavement section consisting of 3 inches of asphalt over 14 inches of untreated base. As an alternative, a pavement section of 3 inches of asphalt, 6 inches of untreated base, and 9 inches of granular borrow may be used. The asphalt should consist of a high-stability plant mix and should be compacted to at least 96 percent of the Marshall maximum density. The untreated base should meet the material requirements for Weber County or UDOT. The granular borrow should meet the recommendations for imported structural fill as presented in Section 5.2.4 of this report. The untreated base and granular borrow should be compacted to at least 95 percent of the maximum dry density as determined by ASTM D 1557.

6.0 LIMITATIONS

The recommendations contained in this report are based on limited field exploration, laboratory testing, and our understanding of the proposed construction. The subsurface data used in this report was obtained from the explorations that were made specifically for this investigation. It is possible that variations in the soil and groundwater conditions could exist between and beyond the points explored. The nature and extent of variations may not be evident until construction occurs. If any conditions are encountered at this site that are different from those described in this report, Christensen Geotechnical should be immediately notified so that we may make any necessary revisions to the recommendations contained in this report. In addition, if the scope of the proposed construction changes from that described in this report, Christensen Geotechnical should be notified.

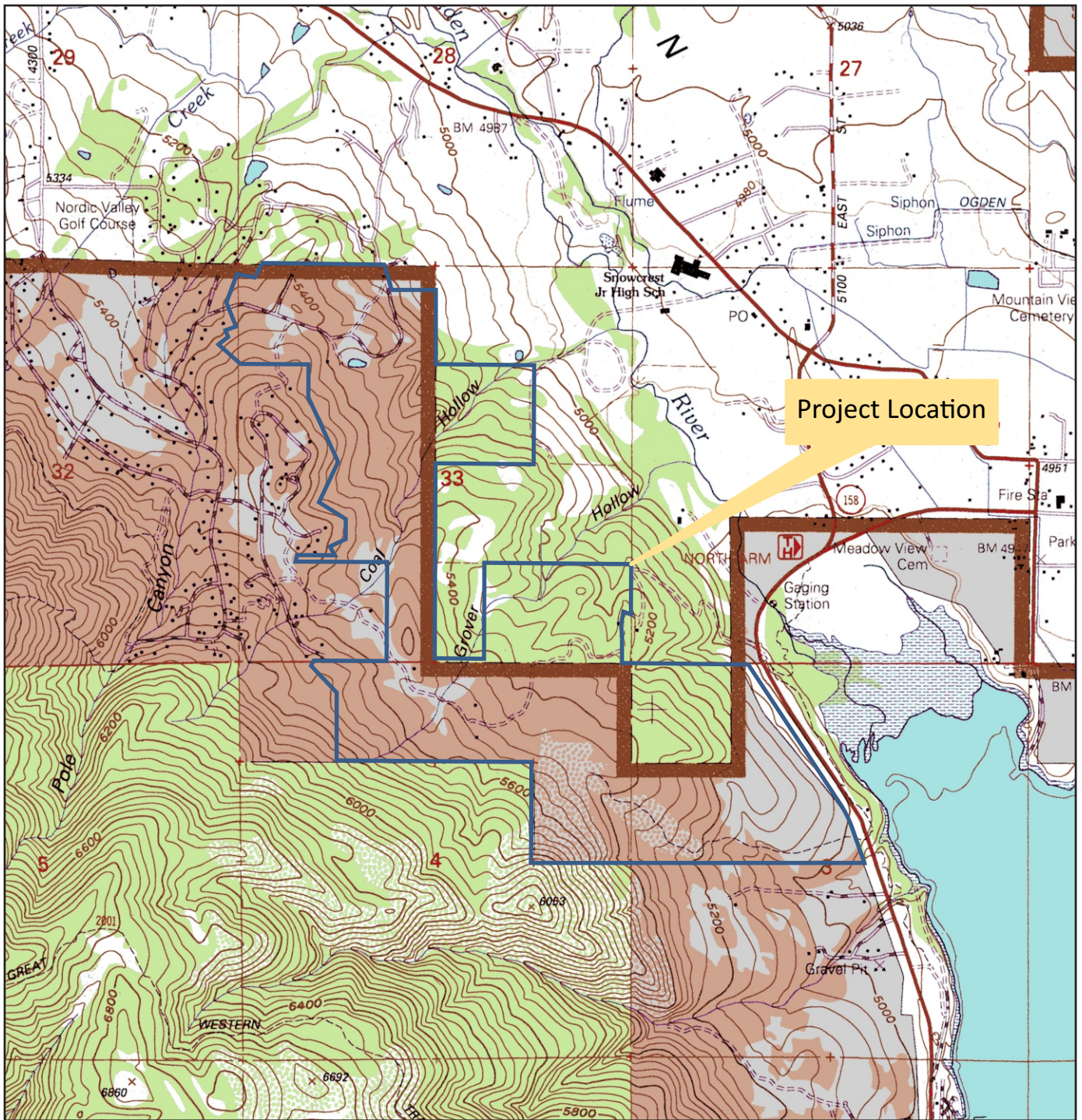
This report was prepared in accordance with the generally accepted standard of practice at the time the report was written. No other warranty, expressed or implied, is made.

It is the client's responsibility to see that all parties to the project, including the designer, contractor, subcontractors, etc., are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk.

The recommendations presented within this report are based on the assumption that an adequate program of tests and observations will be followed during construction to verify compliance with our recommendations. We also assume that we will review the project plans and specifications to verify that our conclusions and recommendations are incorporated and remain appropriate (based on the actual design).

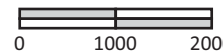
7.0 REFERENCES

- Black, Bill, January 3, 2022, “Geologic Hazards Evaluation, Proposed Osprey Ranch Development, 2050 Highway 150, Eden, Weber County, Utah,” Western Geologic, consultant’s unpublished report.
- Stark, Timothy D., Choi, Hangseok, and McCone, Sean, 2005, “Drained Shear Strength Parameters of Analysis of Landslides,” ASCE, Journal of Geotechnical and Environmental Engineering, May 2005, pages 575-588.



Base: U.S. Geological Survey topographic map, Huntsville quadrangle

 Approximate Project Boundary



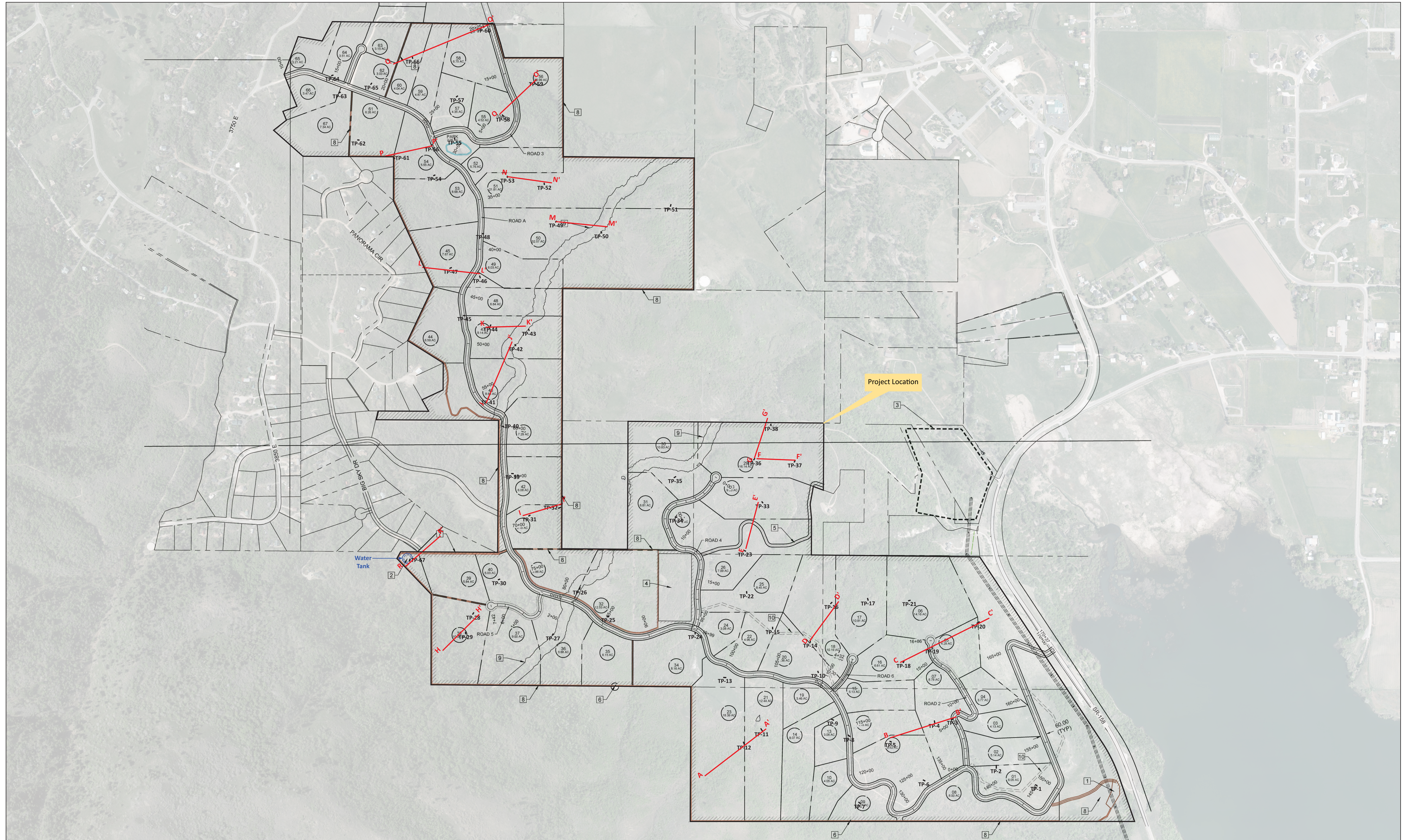
Scale 1 inch equals 2,000 feet (1:24,000)



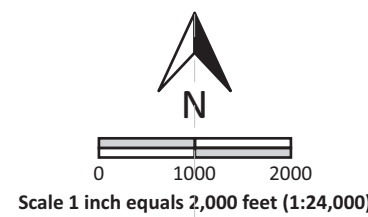
Lewis Homes
Osprey Ranch Development
Eden, Weber County, Utah,
Project No. 133-012

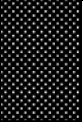
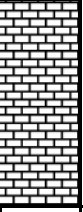
Vicinity Map

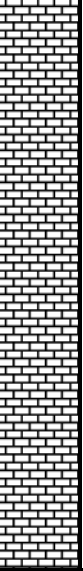
Plate
1

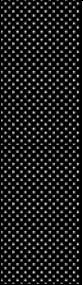


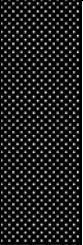
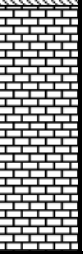
Base: Utah Geographic Resource Center high resolution orthophoto. Site plan from Gardner Engineering preliminary plan sheet SP1 dated 06-22-2021.



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							Sheet 1 of 1			
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
					Sandstone Bedrock - weak, weathered, gray-green					
					- moderately strong below 3 feet					
5					Refusal at 4 feet on bedrock					
10										
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012				Plate 3	

Date	Started: 7/18/2021		TEST PIT LOG		Logged By: M Christensen		Test Pit No.			
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								Sheet 1 of 1		
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
					Siltstone to Sandstone Bedrock - weak, weathered, light brown					
5					- moderately strong and gray-green below 5 feet					
										
					Refusal at 8 feet on bedrock					
10										
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 4		

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Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown - moist below 1 foot					
				CH	Gravelly Fat CLAY - stiff, slightly moist, brown		3.2	62.1	59	33
					Conglomerate Bedrock - moderately strong, weathered, brown					
					Refusal at 7 feet on bedrock					
5										
10										
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 5		

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Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
				CL	Lean CLAY with sand - stiff, moist, brown		16.6	74.0		
5					Siltstone Bedrock - weak, weathered, highly fractured, light brown to red-brown					
					Refusal at 8 feet on bedrock					
10										
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 6		

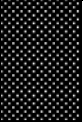
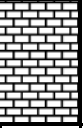
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							Sheet 1 of 1			
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
				GC	Clayey GRAVEL with sand - medium dense, moist, brown					
				CL	Sandy Lean CLAY - stiff, moist, brown					
					- very stiff below 4 feet		12.9	53.8	34	17
5					Refusal at 4 feet on hard soils					
10										
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 7		

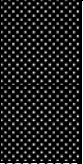
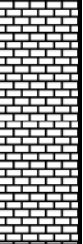
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Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
					Lean CLAY with gravel - stiff, moist, brown					
					Conglomerate Bedrock - weak, highly weathered, brown					
5					- moderately strong and weathered below 7 feet		8.3	33.7		
					Refusal at 8 feet on bedrock					
10										
15										
 Bulk/Bag Sample  Undisturbed Sample  Stabilized Groundwater  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 8		

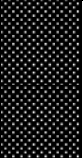
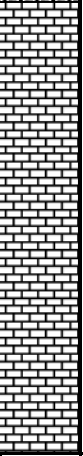
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Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
5					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
				CH	Fat CLAY with sand - stiff, moist, gray-green		24.1	77.6	54	34
					Conglomerate Bedrock - moderately strong, weathered, brown					
10					Refusal at 6 feet on bedrock					
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 9		

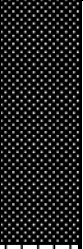
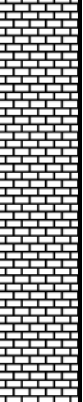
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						Sheet 1 of 1				
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
				CL	Lean CLAY - stiff, moist, brown					
				GC	Clayey GRAVEL with sand - medium dense, moist, brown					
5					Lean CLAY - very stiff, moist, brown					
				CL		107.5	18.1	91.3	49	28
					Conglomerate Bedrock - weak, completely weathered, brown					
10					Bottom of test pit at 10 feet					
15										
Bulk/Bag Sample Undisturbed Sample Stabilized Groundwater Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 10		

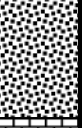
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Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown - moist below 1 foot					
5				CL	Lean CLAY with sand - very stiff, moist, brown		11.2	77.8	35	16
				GC	Clayey GRAVEL with sand - very dense, moist, brown					
10					Bottom of test pit at 9 feet					
15										
Bulk/Bag Sample Undisturbed Sample Stabilized Groundwater Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 11		

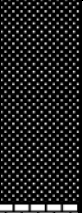
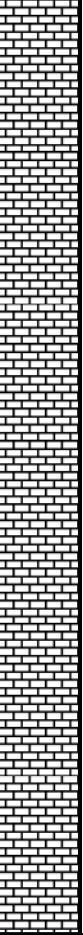
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							Sheet 1 of 1			
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown - moist below 1 foot					
					Conglomerate Bedrock - weak, completely weathered, brown - moderately strong and weathered below 2½ feet		6.3	40.7		
5					Refusal at 3 feet on bedrock					
10										
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 12		

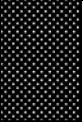
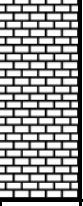
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						Sheet 1 of 1				
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown					
					Lean CLAY with sand - stiff, moist, brown					
5				CL	- gray-brown below 3 feet		24.2	82.7	45	25
					Sandstone Bedrock - weathered, strong, gray-green					
					- wet below 8½ feet					
10					Refusal at 9 feet					
15										
 Bulk/Bag Sample  Undisturbed Sample  Stabilized Groundwater  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 13		

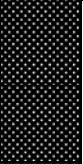
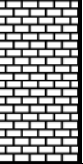
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Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown					
				GC	Clayey GRAVEL with sand - medium dense, moist, brown					
5					Siltstone to Sandstone Bedrock - weak, completely weathered, gray-green		28.9	64.6	74	38
					- moderately strong and weathered below 6½ feet					
10					Refusal at 8½ feet					
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 14		

Date	Started: 7/20/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
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Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown					
5					Conglomerate Bedrock - weak, completely weathered weathered, brown - moderately strong and weathered below 6 feet		7.6	38.6		
10					Refusal at 8 feet					
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 15		

Date	Started: 7/20/2021		TEST PIT LOG		Logged By: M Christensen		Test Pit No.			
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Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
				GC	Clayey GRAVEL with sand - medium dense, moist, brown					
					Siltstone to Sandstone Bedrock - strong, weathered, gray-green					
5					Refusal at 3½ feet					
10										
15										
 Bulk/Bag Sample  Undisturbed Sample  Stabilized Groundwater  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012				Plate 16	

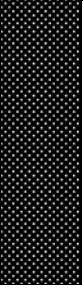
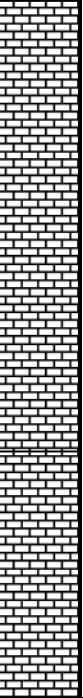
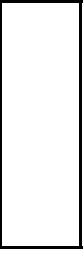
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						Sheet 1 of 1				
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown - moist below 1 foot					
5					Claystone Bedrock - weak, completely weathered, gray-green					
10							27.0	82.7	54	27
15					Bottom of test pit at 14 feet					
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
						Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012		Plate 17		

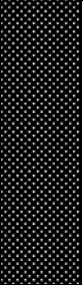
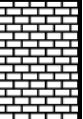
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	Completed: 7/20/2021		Equipment: Trackhoe		TP-16					
	Backfilled: ---		Location: See Plate 2							
						Sheet 1 of 1				
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY with sand - slightly moist, dark brown - moist below 1 foot					
					Claystone to Siltstone Bedrock - weak, completely weathered, gray-green - moderately strong and weathered below 3½ feet	89.6	26.9	95.2	82	44
5					Refusal at 4 feet					
10										
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
						Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012		Plate 18		

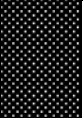
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	Completed: 7/21/2021		Equipment: Trackhoe		TP-17					
	Backfilled: ---		Location: See Plate 2							
						Sheet 1 of 1				
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY with sand - slightly moist, dark brown - moist below 1 foot					
					Claystone to Siltstone Bedrock - weak, completely weathered, gray-green - moderately strong and weathered below 3½ feet		14.3	76.7		
5					Refusal at 4 feet					
10										
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 19		

Date	Started: 7/21/2021		TEST PIT LOG		Logged By: M Christensen		Test Pit No.				
	Completed: 7/21/2021				Equipment: Trackhoe		TP-18				
	Backfilled: ---				Location: See Plate 2						
							Sheet 1 of 1				
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index	
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown						
					Sandstone Bedrock - strong, slightly weathered, light gray-green						
5					Refusal at 2 feet						
10											
15											
 Bulk/Bag Sample  Undisturbed Sample  Stabilized Groundwater  Groundwater At Time of Excavation											
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012				Plate 20		

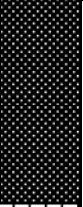
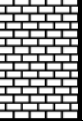
Date	Started: 7/21/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/21/2021		Equipment: Trackhoe		TP-19					
	Backfilled: ---		Location: See Plate 2		Sheet 1 of 1					
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown					
					- moist below 2 feet					
5					Siltstone to Claystone Bedrock - weak, completely weathered, brown	74.3	28.9	85.3	62	25
10					Refusal at 6 feet					
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 21		

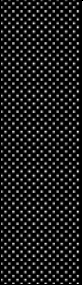
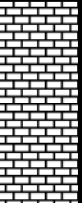
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	Completed: 7/21/2021		Equipment: Trackhoe		TP-20					
	Backfilled: ---		Location: See Plate 2							
						Sheet 1 of 1				
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown					
					- moist below 2 feet					
5					Claystone Bedrock - weak, completely weathered, gray-green					
							9.9	72.8	49	26
10					Sandstone Bedrock - weak, completely weathered, gray-green					
15					Bottom of test pit at 12 feet					
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
						Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012		Plate 22		

Date	Started: 7/21/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/21/2021		Equipment: Trackhoe		TP-21					
	Backfilled: ---		Location: See Plate 2							
						Sheet 1 of 1				
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown - moist below 2 feet					
5					Siltstone to Claystone Bedrock - weak, completely weathered, gray-green		25.2	58.4	58	23
15					Refusal at 5 feet on bedrock					
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 23		

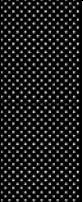
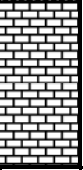
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	Completed: 7/21/2021		Equipment: Trackhoe		TP-22					
	Backfilled: ---		Location: See Plate 2							
						Sheet 1 of 1				
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown					
				CH	Fat CLAY - very stiff, moist, brown	98.7	19.7	88.6	72	48
					Siltstone to Claystone Bedrock - moderately strong, weathered, light gray-green					
5					Refusal at 4½ feet on bedrock					
10										
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 24		

Date	Started: 7/21/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/21/2021		Equipment: Trackhoe		TP-23					
	Backfilled: ---		Location: See Plate 2		Sheet 1 of 1					
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown					
					- moist below 2 feet					
					Siltstone to Claystone Bedrock - weak, weathered, gray green		20.5	93.9	63	25
5					- moderately strong below 3½ feet					
10					Refusal at 4 feet on bedrock					
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 25		

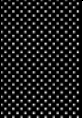
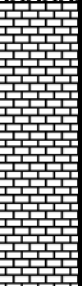
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	Completed: 7/21/2021		Equipment: Trackhoe		TP-24					
	Backfilled: ---		Location: See Plate 2							
						Sheet 1 of 1				
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown					
					- moist below 2 feet Siltstone to Claystone Bedrock - weak, weathered, gray-green - moderately strong below 3½ feet		25.3	76.5	47	10
5					Refusal at 4 feet on bedrock					
10										
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 26		

Date	Started: 7/21/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/21/2021		Equipment: Trackhoe		TP-25					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown					
5					Siltstone to Claystone Bedrock - weak, weathered, gray green - brown below 5 feet		11.7	78.2	38	20
10					Refusal at 6 feet on bedrock					
15										
 Bulk/Bag Sample  Undisturbed Sample  Stabilized Groundwater  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 27		

Date	Started: 7/21/2021		TEST PIT LOG		Logged By: M Christensen		Test Pit No.			
	Completed: 7/21/2021				Equipment: Trackhoe		TP-26			
	Backfilled: ---				Location: See Plate 2					
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown					
					Siltstone to Claystone Bedrock - moderately strong, weathered, gray-green		11.3	77.5	55	34
5					Refusal at 4½ feet on bedrock					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 28		

Date	Started: 7/21/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/21/2021		Equipment: Trackhoe		TP-27					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
					Siltstone to Claystone Bedrock - weak, completely weathered, gray-green - moderately strong and weathered below 4 feet		22.4	59.2	45	14
5					Refusal at 4½ feet on bedrock					
10										
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 29		

Date	Started: 7/22/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/22/2021		Equipment: Trackhoe		TP-28					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown					
					Sandy Lean CLAY - very stiff, moist, brown					
	X			CL			7.4	50.2		
5					Siltstone to Claystone Bedrock - weak, completely weathered, gray-green - moderately strong and weathered below 5 feet					
					Refusal at 6 feet on bedrock					
10										
15										
 Bulk/Bag Sample  Undisturbed Sample  Stabilized Groundwater  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 30		

Date	Started: 7/22/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/22/2021		Equipment: Trackhoe		TP-29					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
5					Topsoil; Lean CLAY - slightly moist, dark brown					
				GC	Clayey GRAVEL with sand - medium dense, moist, brown					
					Conglomerate Bedrock - weak, weathered, brown		6.0	34.6		
10					Refusal at 6 feet on bedrock					
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 31		

Date	Started: 7/22/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/22/2021		Equipment: Trackhoe		TP-30					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown					
					Clayey GRAVEL with sand - medium dense, moist, brown					
					Claystone Bedrock - weak, weathered, brown		9.8	83.8	47	28
5					Refusal at 5½ feet on bedrock					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☒ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 32		

Date	Started: 7/22/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/22/2021		Equipment: Trackhoe		TP-31					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown					
					Conglomerate Bedrock - weak, completely weathered, brown		0.7	12.3		
					Sandstone Bedrock - strong, fractured, brown					
					Refusal at 3 feet on bedrock					
5										
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 33		

Date	Started: 7/22/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/22/2021		Equipment: Trackhoe		TP-32					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown					
				GC	Clayey GRAVEL with sand - medium dense, moist, brown					
					Conglomerate Bedrock - moderately strong, weathered, brown		8.4	51.6		
5					Refusal at 4 feet on bedrock					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☒ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012		Plate 34			

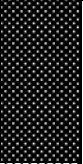
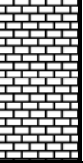
Date	Started: 7/22/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/22/2021		Equipment: Trackhoe		TP-33					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown					
					Lean CLAY - very stiff, moist, gray-green					
				CL						
					Claystone Bedrock - moderately strong, weathered, gray-green		19.6	85.7	54	26
5					Refusal at 5 feet on bedrock					

Date	Started: 7/22/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/22/2021		Equipment: Trackhoe		TP-34					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown					
					Lean CLAY with sand - stiff, moist, brown					
				CL	Conglomerate Bedrock - moderately strong, weathered, brown		8.5	40.7		
5					Refusal at 5 feet on bedrock					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ▼ Stabilized Groundwater ≡ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 36		

Date	Started: 7/22/2021		TEST PIT LOG		Logged By: M Christensen		Test Pit No.			
	Completed: 7/22/2021				Equipment: Trackhoe		TP-35			
	Backfilled: ---				Location: See Plate 2					
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown					
				CL	Lean CLAY with sand - stiff, moist, brown					
					Conglomerate Bedrock - moderately strong, weathered, gray-green		10.1	48.2	39	22
5					Refusal at 4½ feet on bedrock					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☒ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 37		

Date	Started: 7/23/2021		TEST PIT LOG		Logged By: M Christensen		Test Pit No.	
	Completed: 7/23/2021				Equipment: Trackhoe		TP-36	
	Backfilled: ---				Location: See Plate 2			
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown			
					Sandstone Bedrock - strong, slightly weathered, fractured, light gray			
5					Refusal at 3½ feet on bedrock			
10								
15								
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation								
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012		Plate 38	

Date	Started: 7/23/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/23/2021		Equipment: Trackhoe		TP-37					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
				GC	Clayey Gravel with sand - very dense, slightly moist, brown		3.4	25.6		
5					Refusal at 3 feet on dense soils					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 39		

Date	Started: 7/23/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/23/2021		Equipment: Trackhoe		TP-38					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY - slightly moist, dark brown - moist below 1 foot					
				CL	Lean CLAY with sand - very stiff, moist, light gray					
					Sandstone Bedrock - strong, slightly weathered, fractured, light gray					
5					Refusal at 4½ feet on bedrock					
10										
15										
 Bulk/Bag Sample  Undisturbed Sample  Stabilized Groundwater  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 40		

Date	Started: 7/23/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/23/2021		Equipment: Trackhoe		TP-39					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
					Fat CLAY - very stiff, moist, brown					
				CH			14.0	86.7	63	41
					Sandstone Bedrock - strong, weathered, brown					
5					Refusal at 4 feet on bedrock					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 41		

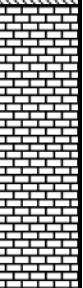
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	Completed: 7/23/2021		Equipment: Trackhoe		TP-40					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
					Lean CLAY - stiff, moist, brown					
				CL			12.0	88.6	42	22
					Conglomerate Bedrock - weak, completely weathered, brown					
5					- moderately strong and weathered below 5 feet					
					Refusal at 7 feet on bedrock					
10										
15										
 Bulk/Bag Sample  Undisturbed Sample  Stabilized Groundwater  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 42		

Date	Started: 7/23/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/23/2021		Equipment: Trackhoe		TP-41					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
					Lean CLAY with sand - stiff, moist, brown					
				CL						
							10.2	81.8	34	16
					Claystone Bedrock - moderately strong, weathered					
					Refusal at 3½ feet on bedrock					
5										
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☒ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 43		

Date	Started: 7/23/2021		TEST PIT LOG		Logged By: M Christensen		Test Pit No.			
	Completed: 7/23/2021				Equipment: Trackhoe		TP-42			
	Backfilled: ---				Location: See Plate 2					
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
					Claystone Bedrock - moderately strong, weathered, brown		13.0	83.8	46	26
5					Refusal at 5 feet on bedrock					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 44		

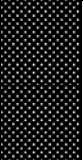
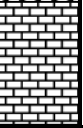
Date	Started: 7/23/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/23/2021		Equipment: Trackhoe		TP-43					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY with sand - slightly moist, dark brown					
					Lean CLAY with sand - stiff, moist, brown					
				CL						
					Conglomerate Bedrock - moderately strong, weathered, brown		13.9	59.7	59	36
5					Refusal at 4½ feet on bedrock					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 45		

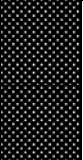
Date	Started: 7/28/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/28/2021		Equipment: Trackhoe		TP-44					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY with sand - slightly moist, dark brown					
					Conglomerate Bedrock - weak, completely weathered, brown					
					Siltstone Bedrock - moderately strong, weathered, light brown		21.1	85.4	49	18
5					Refusal at 4 feet on bedrock					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 46		

Date	Started: 7/26/2021		TEST PIT LOG		Logged By: M Christensen		Test Pit No.			
	Completed: 7/26/2021				Equipment: Trackhoe		TP-45			
	Backfilled: ---				Location: See Plate 2					
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY with sand - slightly moist, dark brown					
				CL	Lean CLAY - very stiff, moist, brown					
					Siltstone to Claystone Bedrock - weak, completely weathered, brown					
5					- moderately strong and weathered below 5 feet	73.4	36.6	83.8	71	24
					Refusal at 5½ feet on bedrock					
10										
15										
 Bulk/Bag Sample  Undisturbed Sample  Stabilized Groundwater  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 47		

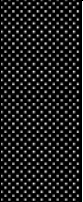
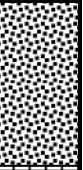
Date	Started: 7/26/2021		TEST PIT LOG		Logged By: M Christensen		Test Pit No.			
	Completed: 7/26/2021				Equipment: Trackhoe		TP-46			
	Backfilled: ---				Location: See Plate 2					
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
					Fat CLAY with sand - very stiff, slightly moist, brown					
				CH						
							7.6	72.1	53	33
					Claystone Bedrock - moderately strong, weathered, brown					
5					Refusal at 4½ feet on bedrock					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 48		

Date	Started: 7/26/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/26/2021		Equipment: Trackhoe		TP-47					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY with sand - slightly moist, dark brown					
				CL	Lean CLAY with sand - very stiff, slightly moist, brown					
					Siltstone to Claystone Bedrock - weak, completely weathered, light brown	81.4	25.3	81.5	58	22
	5				- moderately strong and weathered below 4½ feet					
					Refusal at 5 feet on bedrock					
10										
15										
 Bulk/Bag Sample  Undisturbed Sample  Stabilized Groundwater  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 49		

Date	Started: 7/26/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/26/2021		Equipment: Trackhoe		TP-48					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown - moist below 1 foot					
				CH	Fat CLAY with sand - very stiff, moist, brown		16.2	74.6	63	38
5					Siltstone to Claystone Bedrock - weak, completely weathered, light brown - moderately strong and weathered below 5 feet					
					Refusal at 5½ feet on bedrock					
10										
15										
 Bulk/Bag Sample  Undisturbed Sample  Stabilized Groundwater  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 50		

Date	Started: 7/26/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/26/2021		Equipment: Trackhoe		TP-49					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown - moist below 1 foot					
					Siltstone Bedrock - strong, slightly weathered, light gray-green					
5					Refusal at 3 feet on bedrock					
10										
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 51		

Date	Started: 7/26/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/26/2021		Equipment: Trackhoe		TP-50					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown - moist below 1 foot					
					Lean CLAY with sand - very stiff, moist, brown					
5				CL	- hard, slightly moist, and gray-green below 4 feet					
					Refusal at 5 feet on very stiff soil					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 52		

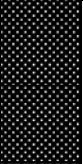
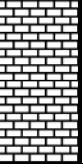
Date	Started: 7/26/2021		TEST PIT LOG		Logged By: M Christensen		Test Pit No.			
	Completed: 7/26/2021				Equipment: Trackhoe		TP-51			
	Backfilled: ---				Location: See Plate 2					
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY with sand - slightly moist, dark brown					
				GC	Clayey GRAVEL with sand - medium dense, moist, brown					
					- dense, slightly moist, and gray-green below 4 feet		28.6	48.4		
5					Siltstone Bedrock - strong, weathered, gray-green					
					Refusal at 5 feet on bedrock					
10										
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 53		

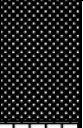
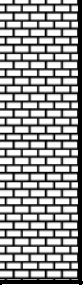
Date	Started: 7/28/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/28/2021		Equipment: Trackhoe		TP-52					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY with sand - slightly moist, dark brown					
					- moist below 2 feet					
					Lean CLAY with sand - stiff, moist, brown					
				CL	Siltstone Bedrock - moderately strong, weathered, brown					
5					Refusal at 4½ feet on bedrock					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 54		

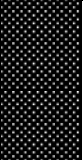
Date	Started: 7/28/2021		TEST PIT LOG		Logged By: M Christensen		Test Pit No.			
	Completed: 7/28/2021				Equipment: Trackhoe		TP-53			
	Backfilled: ---				Location: See Plate 2					
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY with sand - slightly moist, dark brown					
					Claystone Bedrock - strong, fractured, light gray		16.0	70.7		
					Refusal at 2½ feet on bedrock					
5										
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 55		

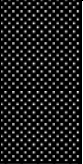
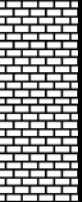
Date	Started: 7/28/2021		TEST PIT LOG		Logged By: M Christensen		Test Pit No.			
	Completed: 7/28/2021				Equipment: Trackhoe		TP-54			
	Backfilled: ---				Location: See Plate 2					
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY with sand - slightly moist, dark brown					
					Claystone Bedrock - weak, completely weathered, dark brown		14.1	87.9	48	23
					- moderately strong and weathered below 4 feet					
5					Refusal at 4½ feet on bedrock					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 56		

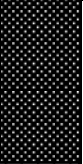
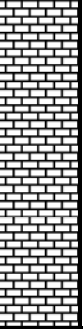
Date	Started: 7/28/2021		TEST PIT LOG		Logged By: M Christensen		Test Pit No.			
	Completed: 7/28/2021				Equipment: Trackhoe		TP-55			
	Backfilled: ---				Location: See Plate 2					
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY with sand - slightly moist, dark brown					
					Claystone Bedrock - moderately strong, weathered, brown		13.7	93.5	39	20
5					Refusal at 3 feet on bedrock					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 57		

Date	Started: 7/28/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/28/2021		Equipment: Trackhoe		TP-56					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY with sand - slightly moist, dark brown					
					Claystone Bedrock - weak, completely weathered, brown					
					- moderately strong and weathered below 3½ feet		7.2	58.0	33	14
5					Refusal at 4 feet on bedrock					
10										
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 58		

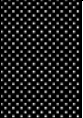
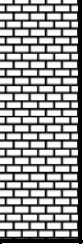
Date	Started: 7/28/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/28/2021		Equipment: Trackhoe		TP-57					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY with sand - slightly moist, dark brown					
					Claystone Bedrock - weak, completely weathered, brown					
							16.1	90.3	56	36
					Conglomerate Bedrock - moderately strong, weathered, brown					
5					Refusal at 5 feet on bedrock					
10										
15										
 Bulk/Bag Sample  Undisturbed Sample  Stabilized Groundwater  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 59		

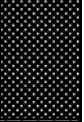
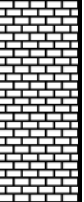
Date	Started: 7/28/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/28/2021		Equipment: Trackhoe		TP-58					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY with sand - slightly moist, dark brown					
				CL	Sandy Lean CLAY - very stiff, moist, light gray					
5					Refusal at 4 feet on very stiff soil					
10										
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 60		

Date	Started: 7/28/2021		TEST PIT LOG		Logged By: M Christensen		Test Pit No.			
	Completed: 7/28/2021				Equipment: Trackhoe		TP-59			
	Backfilled: ---				Location: See Plate 2					
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Lean CLAY with sand - slightly moist, dark brown					
					Claystone Bedrock - weak, completely weathered, brown - moderately strong, weathered, and gray-green below 3 feet		18.6	69.6		
5					Refusal at 4½ feet on bedrock					
10										
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 61		

Date	Started: 7/28/2021		TEST PIT LOG	Logged By: M Christensen		Test Pit No.				
	Completed: 7/28/2021			Equipment: Trackhoe		TP-60				
	Backfilled: ---			Location: See Plate 2						
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown - moist below 1 foot					
					Claystone Bedrock - weak, completely weathered, gray-green	86.6	31.0	97.0	85	56
					Conglomerate Bedrock - weak, completely weathered, brown					
5					Sandstone Bedrock - weak, completely weathered, brown					
					Refusal at 6 feet on bedrock					
10										
15										
 Bulk/Bag Sample  Stabilized Groundwater  Undisturbed Sample  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 62		

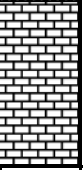
Date	Started: 7/29/2021		TEST PIT LOG	Logged By: M Christensen		Test Pit No.				
	Completed: 7/29/2021			Equipment: Trackhoe		TP-61				
	Backfilled: ---			Location: See Plate 2						
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
				GM	Silty GRAVEL with sand - medium dense, moist, brown		0.6	14.2		
					Conglomerate Bedrock -moderately strong, weathered, brown					
5					Refusal at 3½ feet on bedrock					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 63		

Date	Started: 7/29/2021		TEST PIT LOG		Logged By: M Christensen		Test Pit No.			
	Completed: 7/29/2021				Equipment: Trackhoe		TP-62			
	Backfilled: ---				Location: See Plate 2					
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
					Claystone Bedrock - weak, completely weathered, brown - moderately strong and weathered below 3 feet		15.9	89.8	47	26
5					Refusal at 4½ feet on bedrock					
10										
15										
 Bulk/Bag Sample  Undisturbed Sample  Stabilized Groundwater  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 64		

Date	Started: 7/29/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/29/2021		Equipment: Trackhoe		TP-63					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
					Claystone Bedrock - weak, completely weathered, brown - moderately strong and weathered below 3 feet		9.7	88.5	62	42
5					Refusal at 4 feet on bedrock					
10										
15										
☒ Bulk/Bag Sample ☒ Stabilized Groundwater ☐ Undisturbed Sample ☐ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 65		

Date	Started: 7/29/2021	TEST PIT LOG	Logged By: M Christensen		Test Pit No.					
	Completed: 7/29/2021		Equipment: Trackhoe		TP-64					
	Backfilled: ---		Location: See Plate 2							
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
				GC	Clayey GRAVEL with sand - medium dense, moist, brown					
					Claystone Bedrock - weak, completely weathered, gray-green	107.3	13.0	83.2	74	50
5					Refusal at 4½ feet on bedrock					
10										
15										
 Bulk/Bag Sample  Undisturbed Sample  Stabilized Groundwater  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 66		

Date	Started: 7/29/2021		TEST PIT LOG	Logged By: M Christensen		Test Pit No.				
	Completed: 7/29/2021			Equipment: Trackhoe		TP-65				
	Backfilled: ---			Location: See Plate 2						
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
					Fat CLAY - very stiff, moist, brown		9.9	85.1	62	42
					Claystone Bedrock - weak, completely weathered, brown					
5					Refusal at 4 feet on bedrock					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☒ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 67		

Date	Started: 7/29/2021		TEST PIT LOG		Logged By: M Christensen		Test Pit No.			
	Completed: 7/29/2021				Equipment: Trackhoe		TP-66			
	Backfilled: ---				Location: See Plate 2					
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
					Claystone Bedrock - weak, completely weathered, brown					
					- moderately strong and weathered below 2½ feet		10.7	84.1	36	19
5					Refusal at 3 feet on bedrock					
10										
15										
 Bulk/Bag Sample  Undisturbed Sample  Stabilized Groundwater  Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 68		

Date	Started: 7/29/2021		TEST PIT LOG		Logged By: M Christensen		Test Pit No.			
	Completed: 7/29/2021				Equipment: Trackhoe		TP-67			
	Backfilled: ---				Location: See Plate 2					
Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
					Topsoil; Clayey GRAVEL with sand - slightly moist, dark brown					
					Clayey GRAVEL with sand - medium dense, moist, brown					
					Conglomerate Bedrock - moderately strong to strong, weathered to slightly weathered, brown					
5										
							3.9	12.9		
					Refusal at 7½ feet on bedrock					
10										
15										
☒ Bulk/Bag Sample ☐ Undisturbed Sample ☒ Stabilized Groundwater ☒ Groundwater At Time of Excavation										
					Lewis Homes Osprey Ranch Development Eden, Utah Project No.: 133-012			Plate 69		

RELATIVE DENSITY – COURSE GRAINED SOILS

Relative Density	SPT (blows/ft.)	3 In OD California Sampler (blows/ft.)	Relative Density (%)	Field Test
Very Loose	<4	<5	0 – 15	Easily penetrated with a ½ inch steel rod pushed by hand
Loose	4 – 10	5 – 15	15 – 35	Difficult to penetrate with a ½ inch steel rod pushed by hand
Medium Dense	10 – 30	15 – 40	35 – 65	Easily penetrated 1-foot with a steel rod driven by a 5 pound hammer
Dense	30 – 50	40 – 70	65 – 85	Difficult to penetrate 1-foot with a steel rod driven by a 5 pound hammer
Very Dese	>50	>70	85 - 100	Penetrate only a few inches with a steel rod driven by a 5 pound hammer

CONSISTENCY – FINE GRAINED SOILS

Consistency	SPT (blows/ft)	Torvane Undrained Shear Strength (tsf)	Pocket Penetrometer Undrained Shear Strength (tsf)	Field Test
Very Soft	<2	<0.125	<0.25	Easily penetrated several inches with thumb
Soft	2 – 14	0.125 – 0.25	0.25 – 0.5	Easily penetrated one inch with thumb
Medium Stiff	4 – 8	0.25 – 0.5	0.5 – 1.0	Penetrated over ½ inch by thumb with moderate effort. Molded by strong finger pressure
Stiff	8 – 15	0.5 – 1.0	1.0 – 2.0	Indented ½ inch by thumb with great effort
Very Stiff	15 – 30	1.0 – 2.0	2.0 – 4.0	Readily indented with thumbnail
Hard	>30	>2.0	>4.0	Indented with difficulty with thumbnail

CEMENTATION

Weakly	Crumbles or breaks with handling or little finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumble or break with finger pressure

MOISTURE

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible water, usually below water table

GRAIN SIZE

Description	Sieve Size	Grain Size (in)	Approximate Size
Boulders	>12"	>12"	Larger than basketball
Cobbles	3" – 12"	3" – 12"	Fist to basketball
Gravel	Coarse	3/4" - 3"	Thumb to fist
	Fine	#4 – 3"	Pea to thumb
Sand	Coarse	#10 - #4	Rock salt to pea
	Medium	#40 - #10	Sugar to rock salt
	Fine	#200 - #40	Flour to sugar
Silt/Clay	<#200	<0.0029	Flour sized or smaller

STRATIFICATION

Occasional	One or less per foot of thickness
Frequent	More than one per foot of thickness

MODIFIERS

Trace	<5%
Some	5-12%
With	>12%

STRATIFICATION

Seam	1/16 to 1/2 inch
Layer	1/2 to 12 inch

NOTES

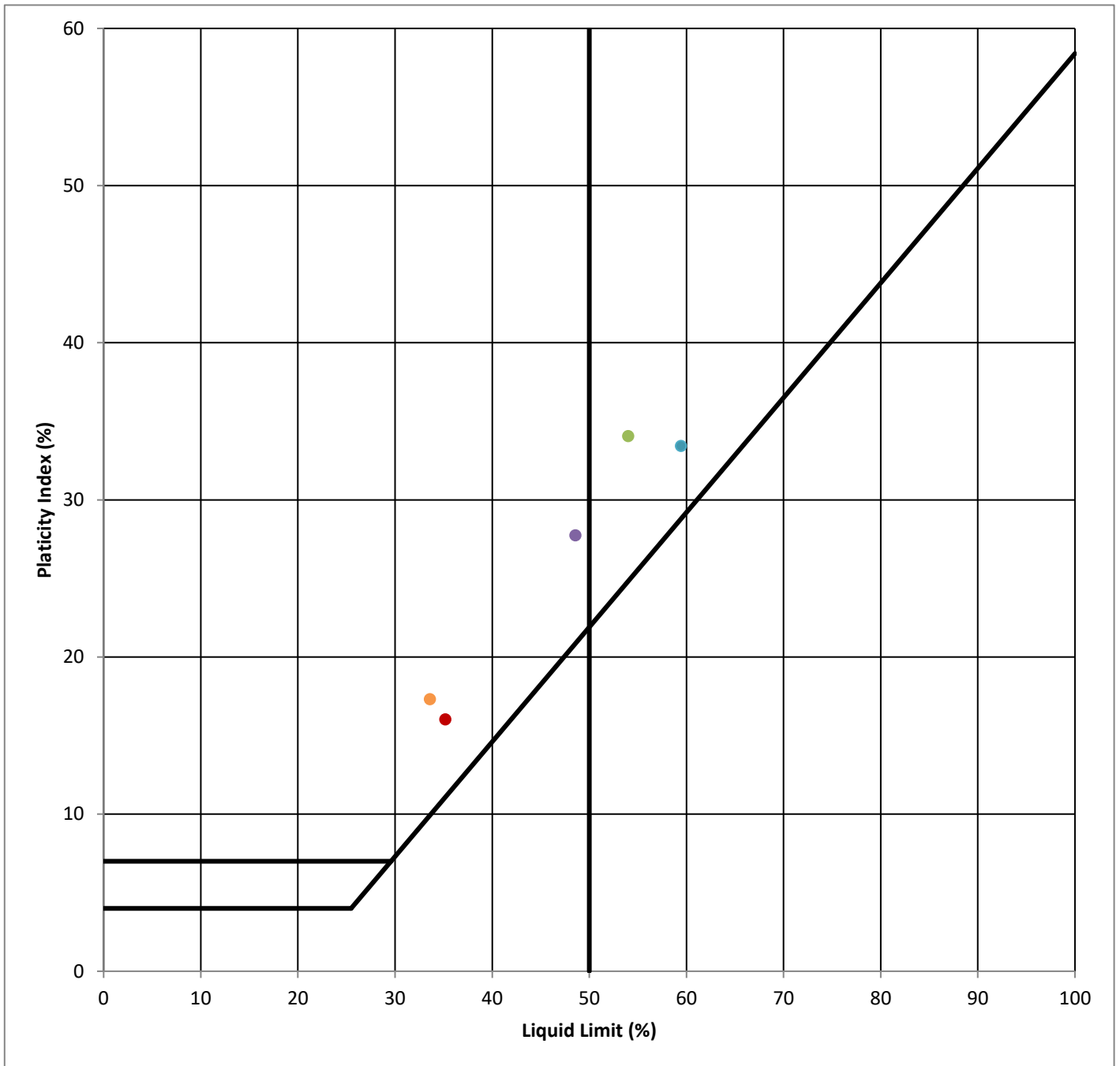
- The logs are subject to the limitations and conclusions presented in the report.
- Lines separating strata represent approximate boundaries only. Actual transitions may be gradual.
- Logs represent the soil conditions at the points explored at the time of our investigation.
- Soils classifications shown on logs are based on visual methods . Actual designations (based on laboratory testing)may vary.



Soil Terms Key

Plate
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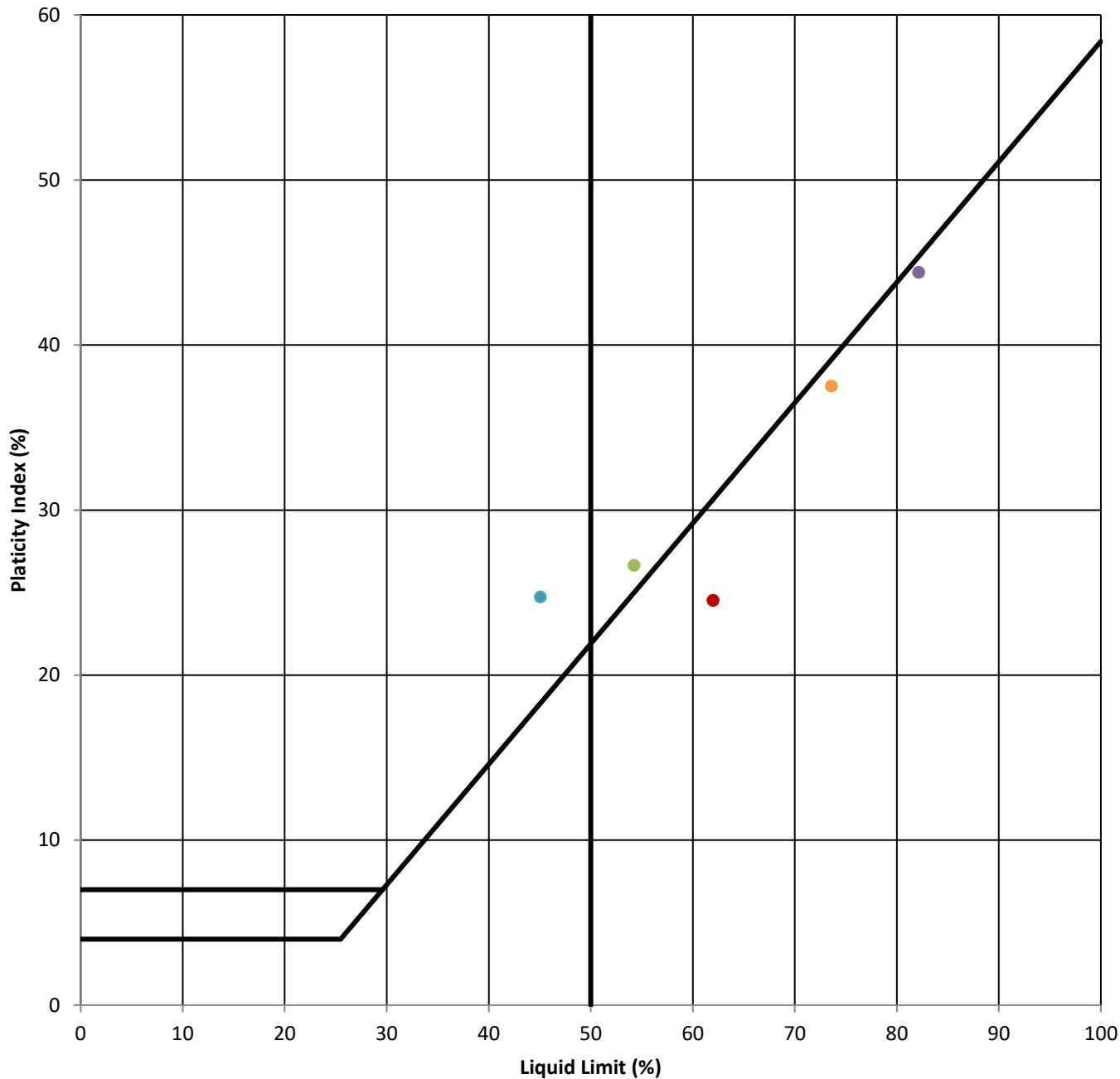
Atterberg Limits



Location	Depth (ft)		Classification	Liquid Limit	PI
TP-3	4	●	Gravelly Fat CLAY	59	33
TP-5	3	●	Sandy Lean CLAY	34	17
TP-7	3	●	Fat CLAY with sand	54	34
TP-8	6	●	Lean CLAY	49	28
TP-9	4	●	Lean CLAY with sand	35	16

	Lewis Homes Osprey Ranch Developmet Eden, Utah Project No.: 133-012	Plate 71
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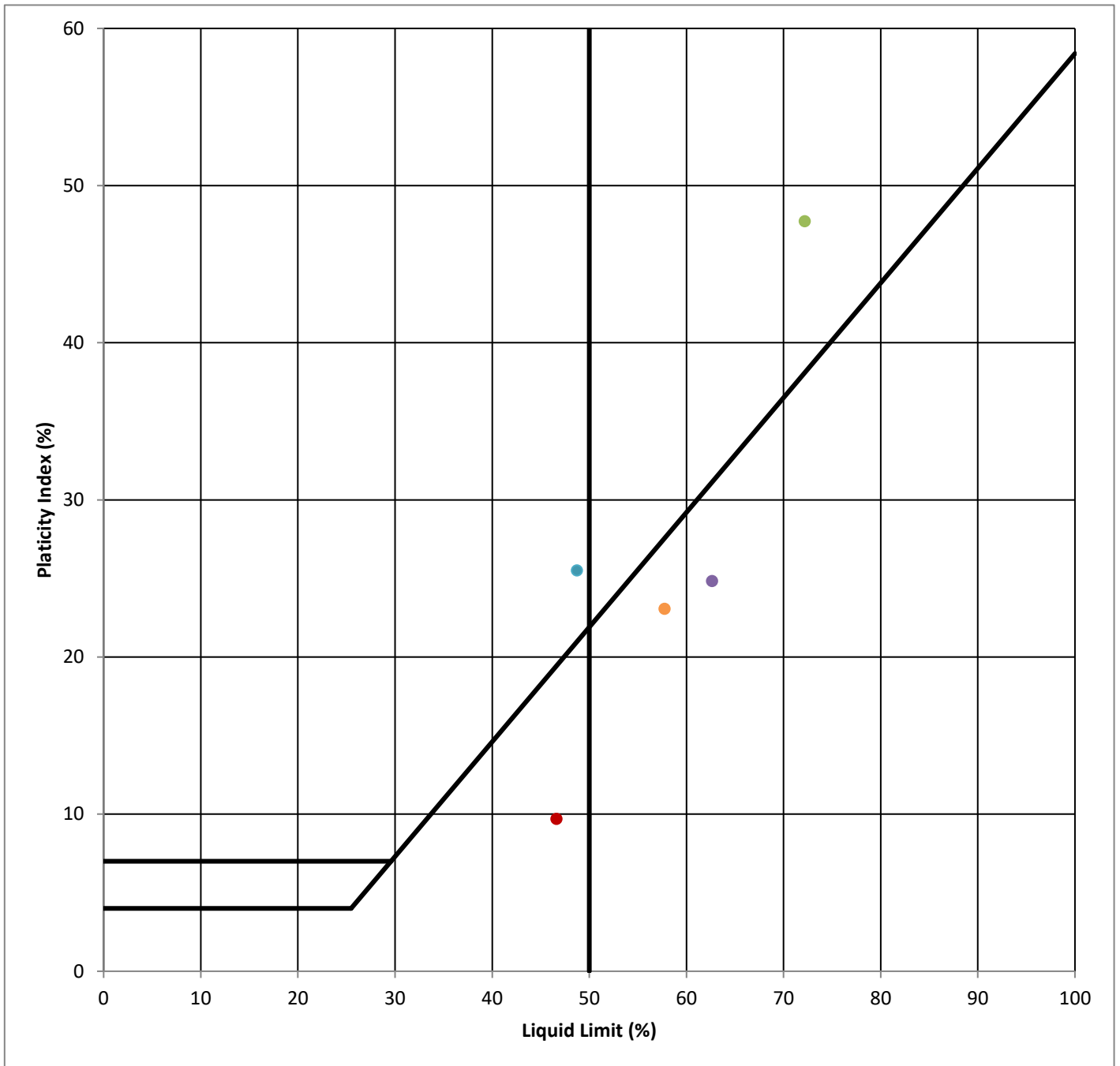
Atterberg Limits



Location	Depth (ft)		Classification	Liquid Limit	PI
TP-11	3	●	Lean CLAY with sand	45	25
TP-12	3	●	Bedrock (Sandy Elastic SILT)	74	38
TP-15	6	●	Bedrock (Fat CLAY with sand)	54	27
TP-16	2	●	Bedrock (Elastic SILT)	82	44
TP-19	4	●	Bedrock (Elastic SILT)	62	25

 Christensen Geotechnical	Lewis Homes Osprey Ranch Developmet Eden, Utah Project No.: 133-012	Plate 72
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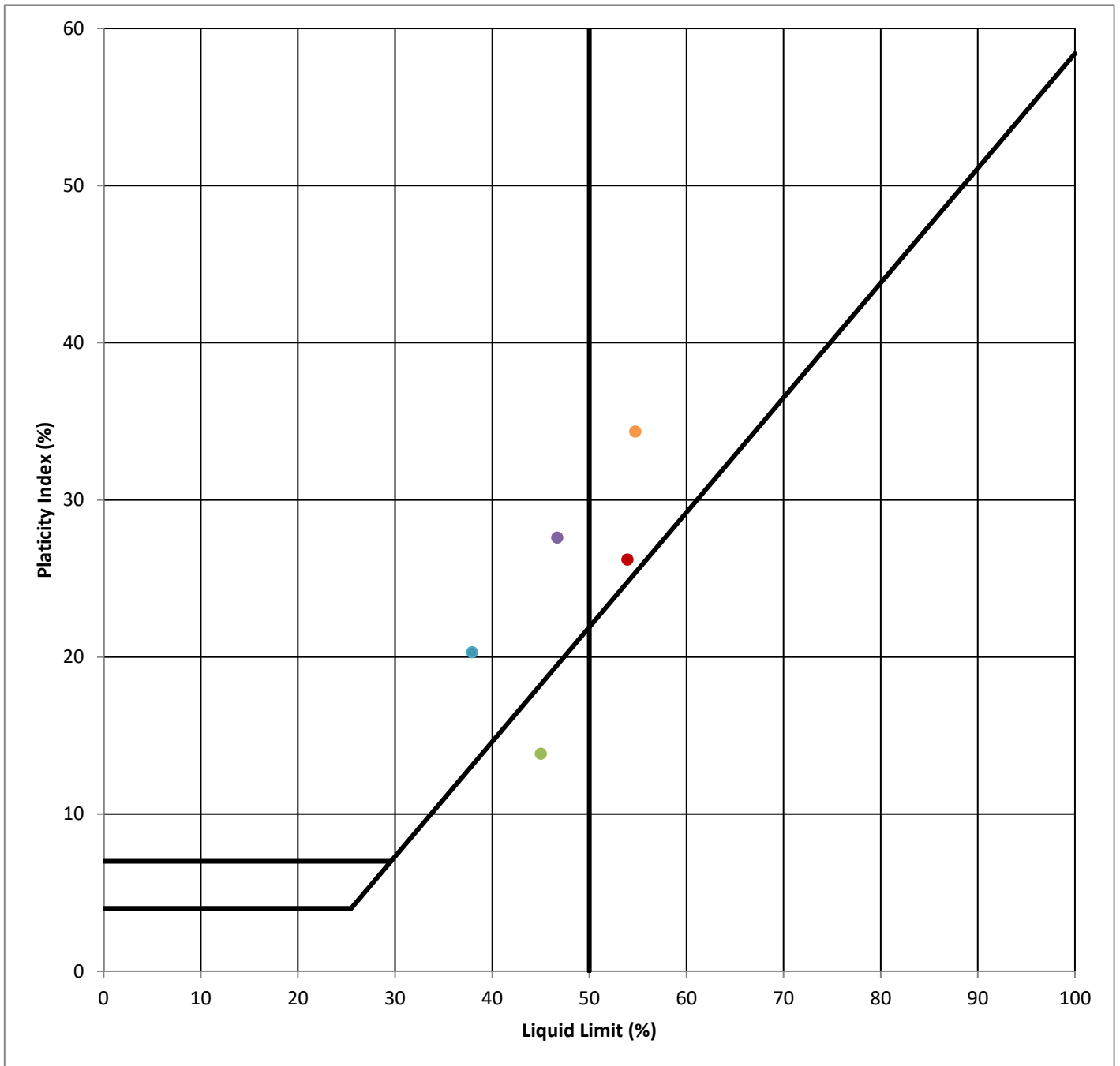
Atterberg Limits



Location	Depth (ft)		Classification	Liquid Limit	PI
TP-20	6	●	Bedrock (Lean CLAY with sand)	49	26
TP-21	4	●	Bedrock (Sandy Elastic SILT)	58	23
TP-22	2	●	Fat CLAY	72	48
TP-23	3	●	Bedrock (Elastic SILT)	63	25
TP-24	3	●	Bedrock (SILT with sand)	47	10

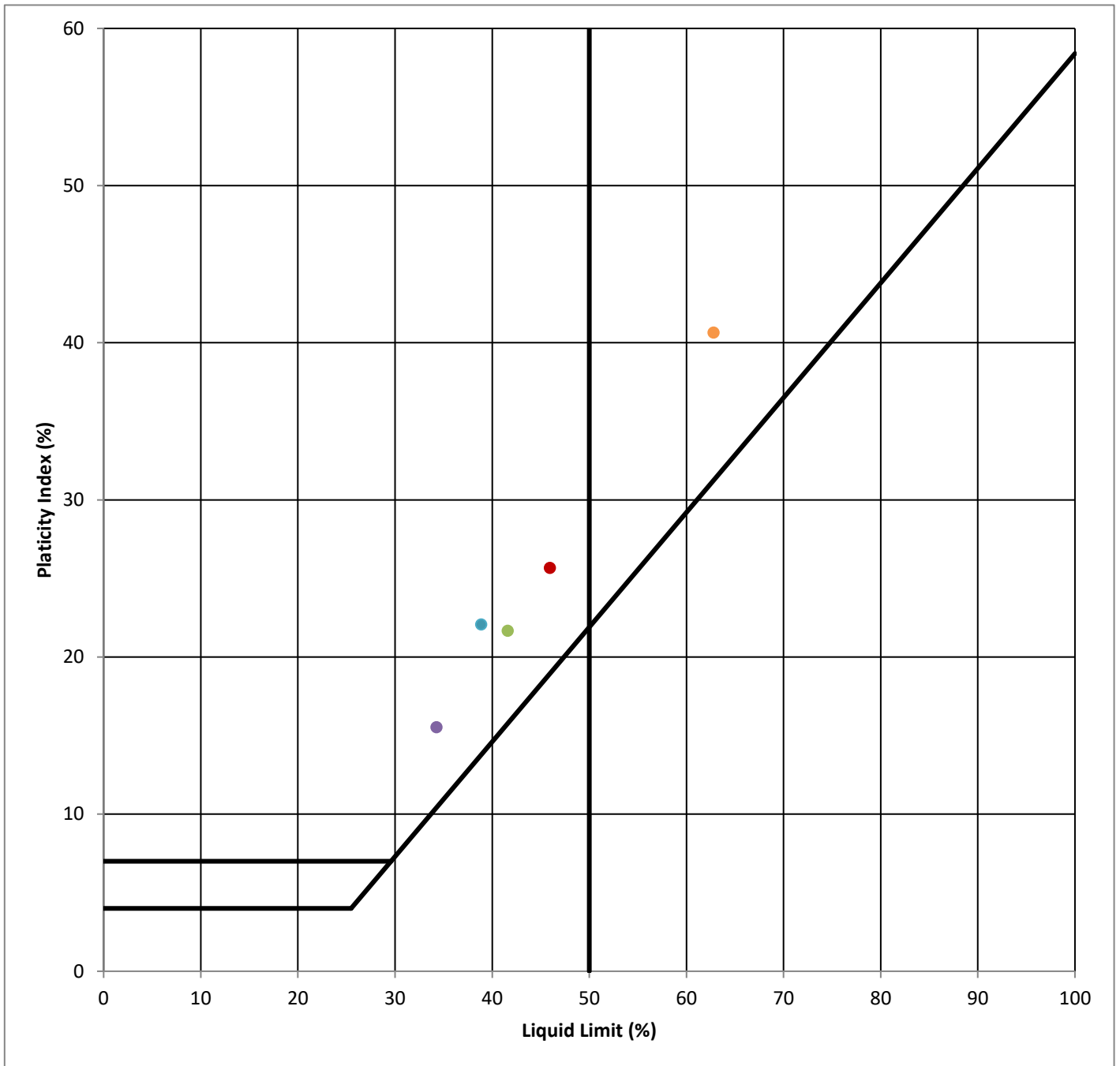
	Lewis Homes Osprey Ranch Developmet Eden, Utah Project No.: 133-012	Plate 73
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Atterberg Limits



Location	Depth (ft)		Classification	Liquid Limit	PI
TP-25	4	●	Bedrock (Lean CLAY with sand)	38	20
TP-26	3.5	●	Bedrock (Fat CLAY with sand)	55	34
TP-27	3	●	Bedrock (Sandy SILT)	45	14
TP-30	4	●	Bedrock (Lean CLAY with sand)	47	28
TP-33	4	●	Bedrock (Fat CLAY)	54	26

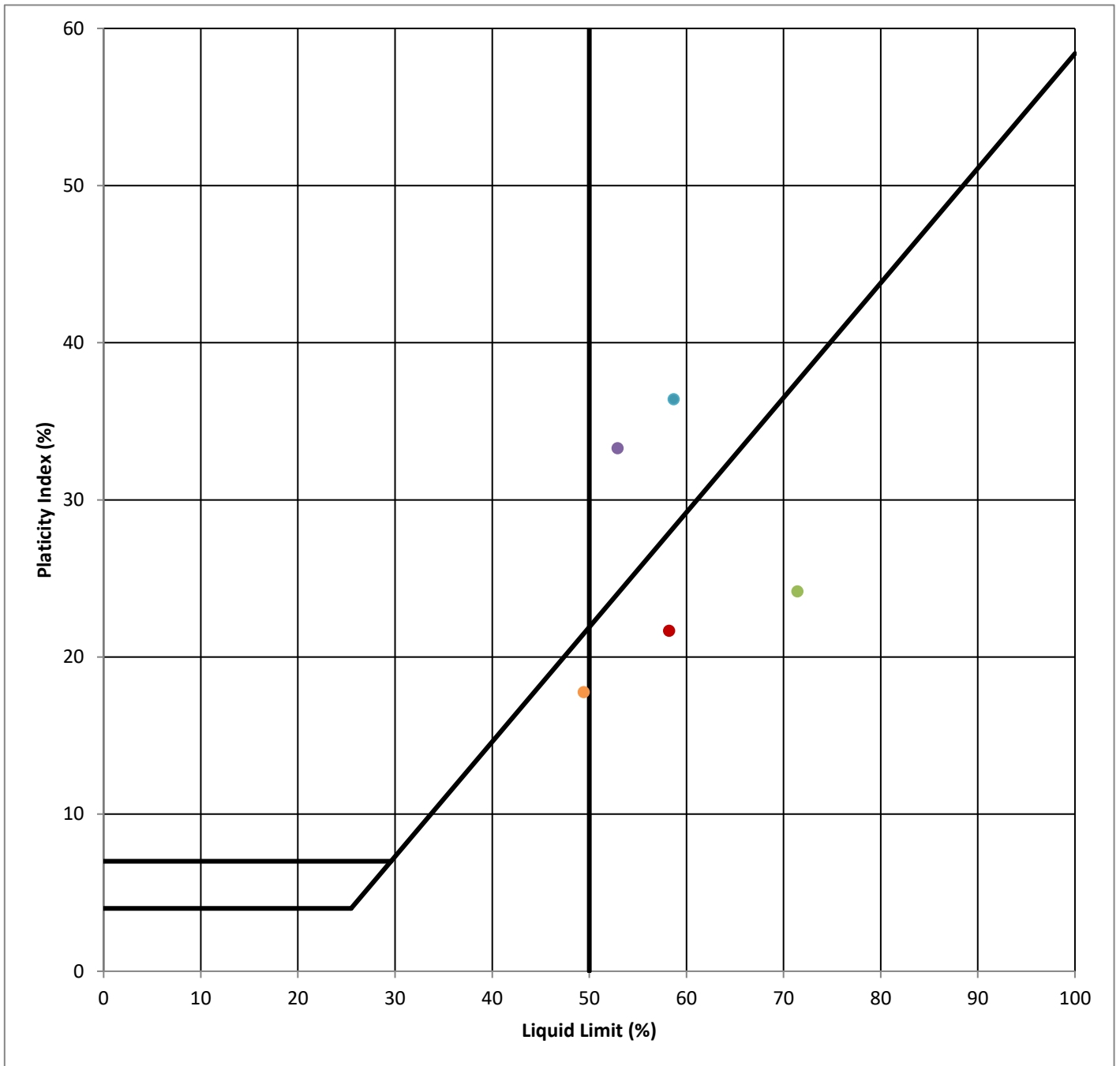
Atterberg Limits



Location	Depth (ft)		Classification	Liquid Limit	PI
TP-35	3.5	●	Bedrock (Clayey SAND)	39	22
TP-39	2	●	Fat CLAY	63	41
TP-40	2	●	Lean CLAY	42	22
TP-41	2.5	●	Lean CLAY with sand	34	16
TP-42	3	●	Bedrock (Lean CLAY with sand)	46	26

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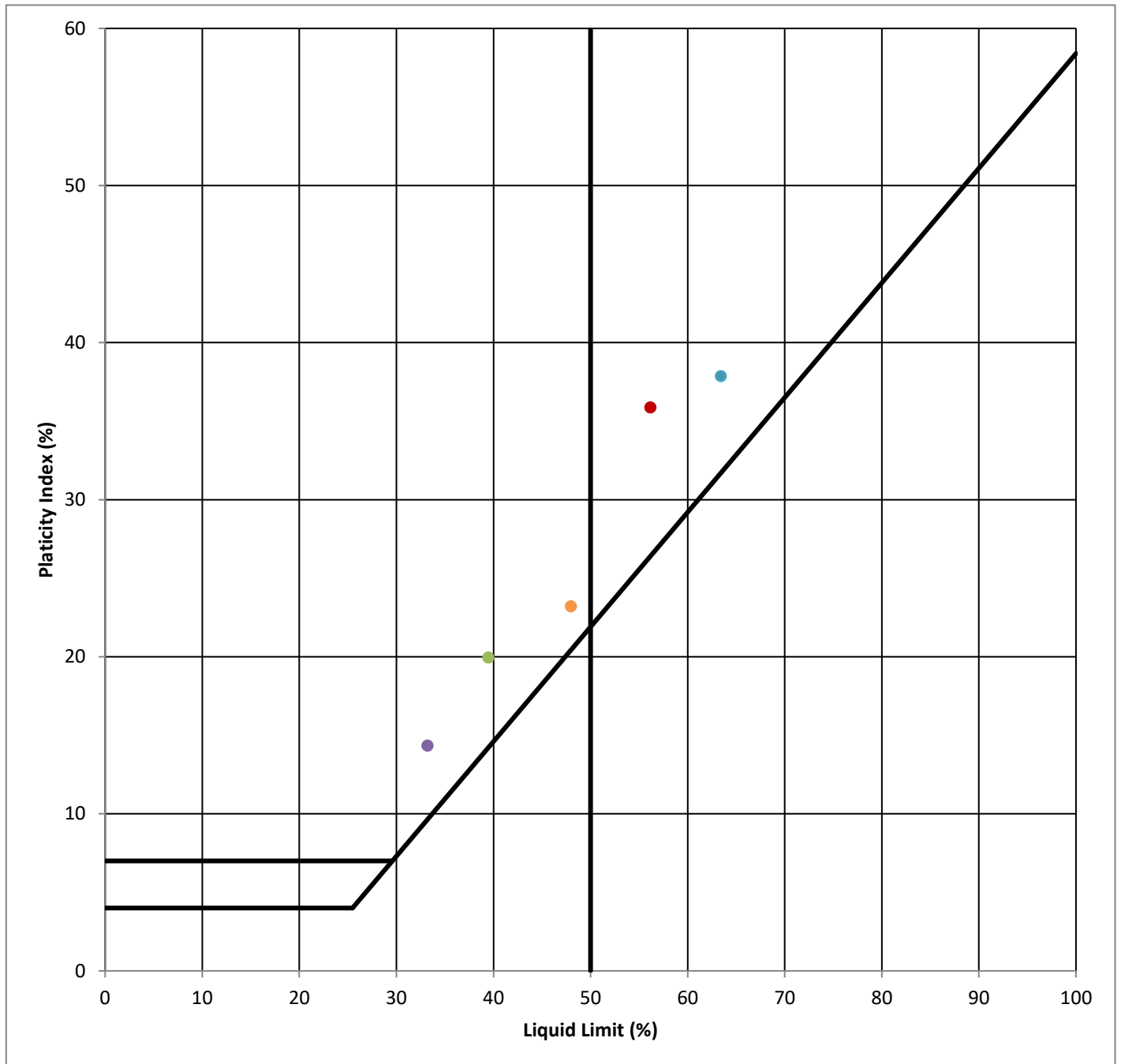
Atterberg Limits



Location	Depth (ft)		Classification	Liquid Limit	PI
TP-43	3.5		Bedrock (Fat CLAY with gravel)	59	36
TP-44	3		Bedrock (SILT)	49	18
TP-45	4		Elastic SILT with sand	71	24
TP-46	3		Fat CLAY with sand	53	33
TP-47	4		Bedrock (Elastic SILT with sand)	58	22

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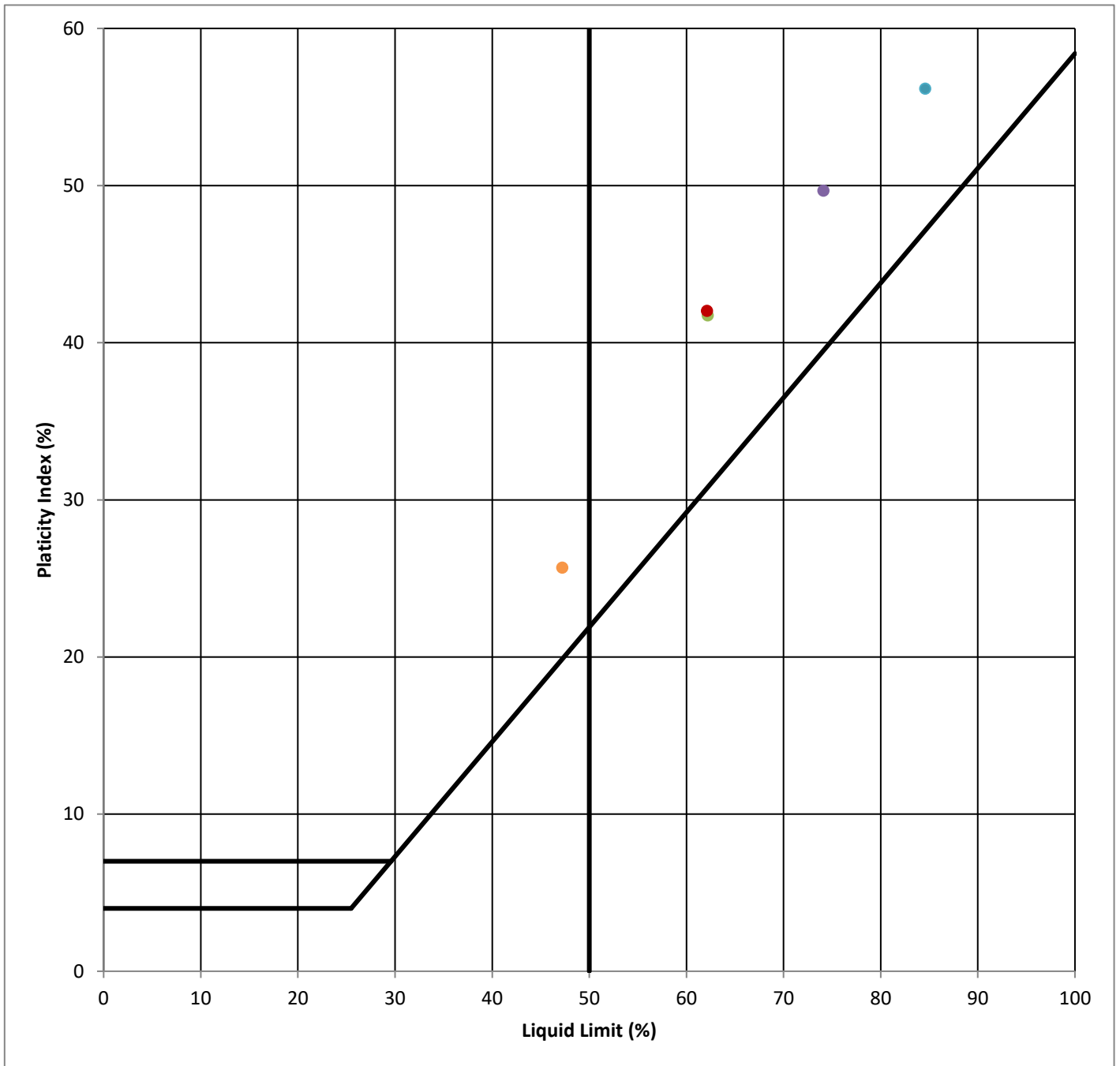
Atterberg Limits



Location	Depth (ft)		Classification	Liquid Limit	PI
TP-48	3	●	Fat CLAY with sand	63	38
TP-54	3	●	Bedrock (Lean CLAY)	48	23
TP-55	2	●	Bedrock (Lean CLAY)	39	20
TP-56	3	●	Bedrock (Gravelly Lean CLAY)	33	14
TP-57	3	●	Bedrock (Fat CLAY)	56	36

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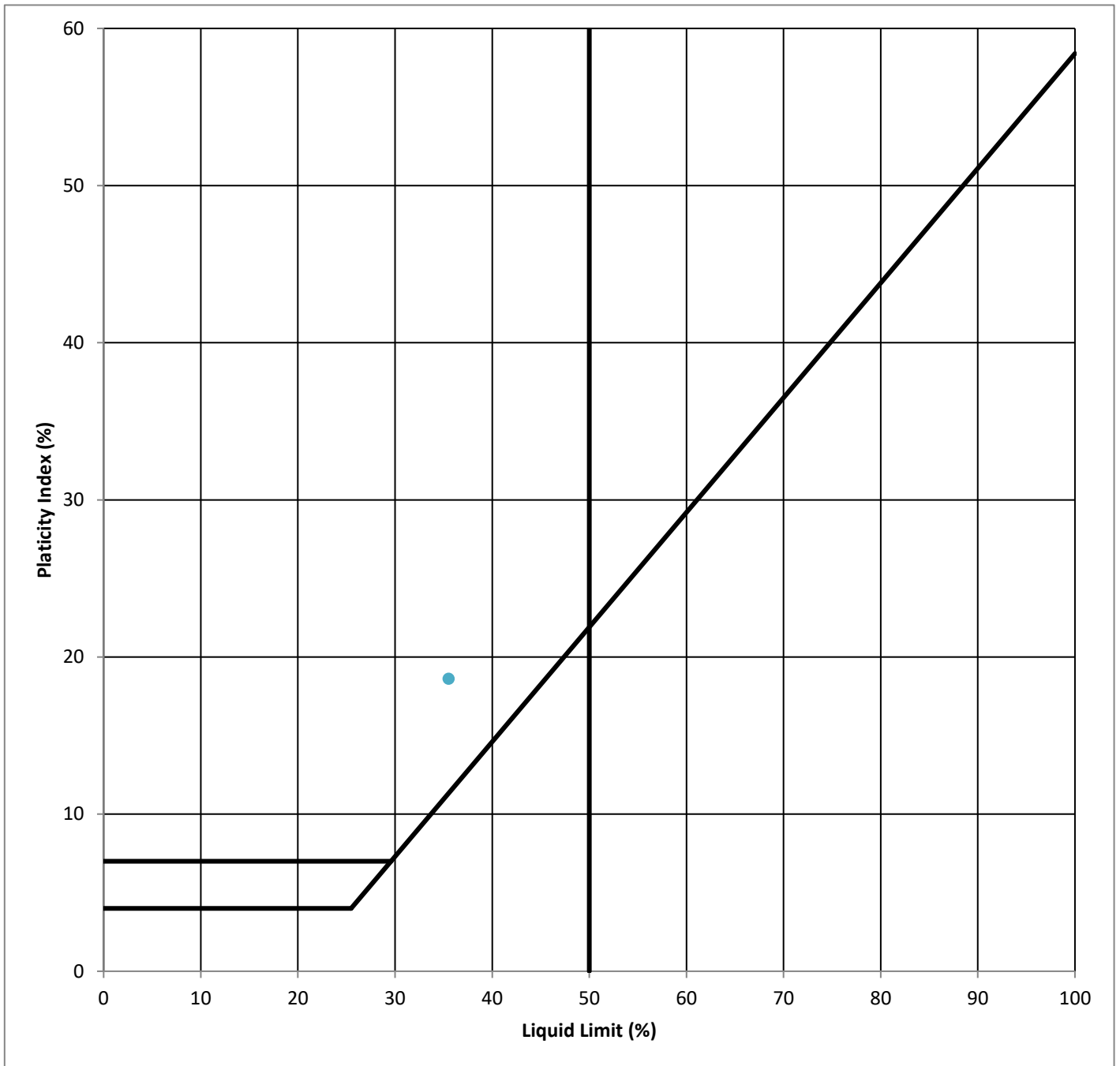
Atterberg Limits



Location	Depth (ft)		Classification	Liquid Limit	PI
TP-60	2	●	Bedrock (Fat CLAY)	85	56
TP-62	2	●	Bedrock (Lean CLAY)	47	26
TP-63	2	●	Bedrock (Fat CLAY)	62	42
TP-64	3	●	Bedrock (Fat CLAY with sand)	74	50
TP-65	1	●	Fat CLAY	62	42

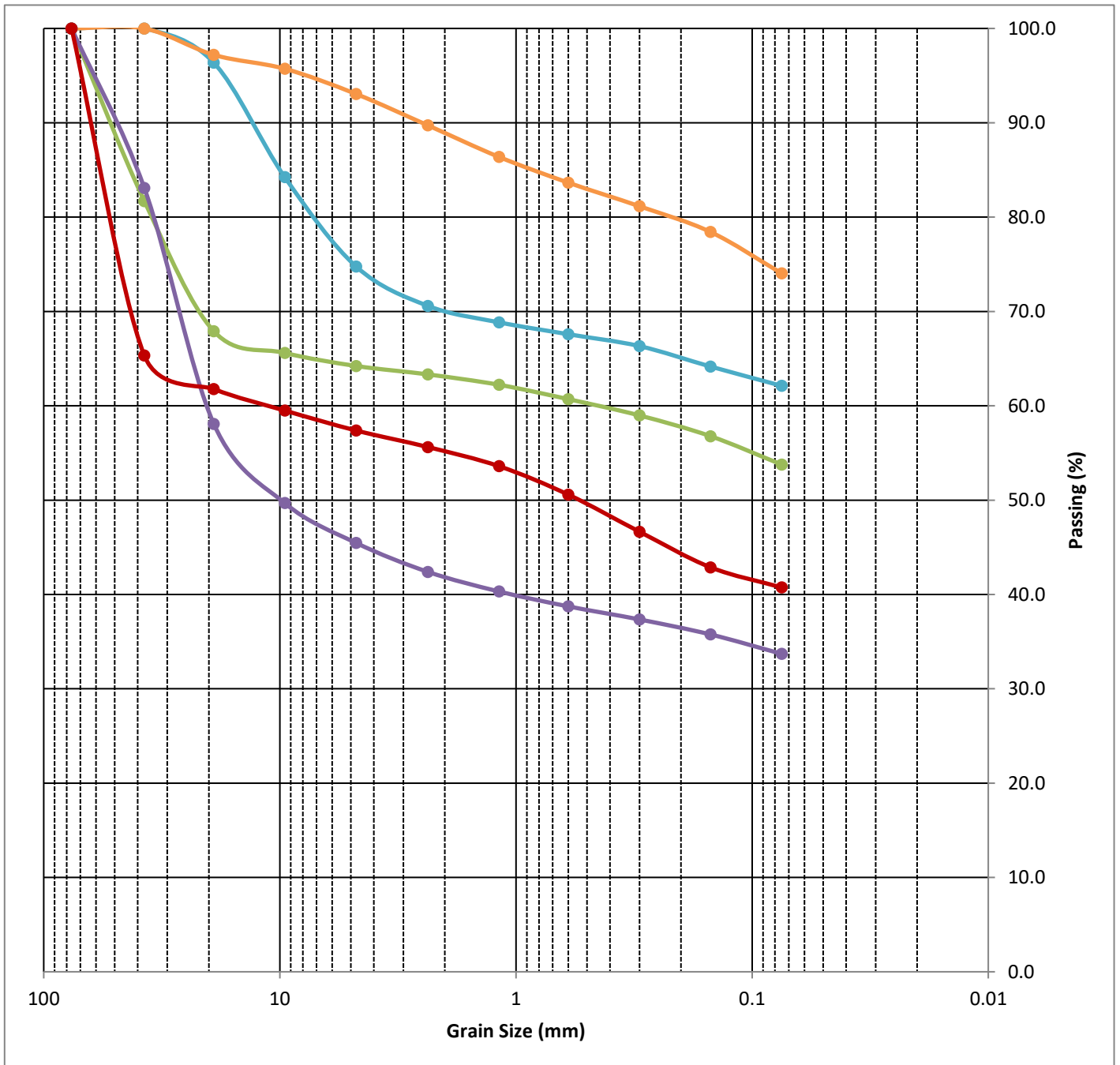
	Lewis Homes Osprey Ranch Developmet Eden, Utah Project No.: 133-012	Plate 78
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Atterberg Limits



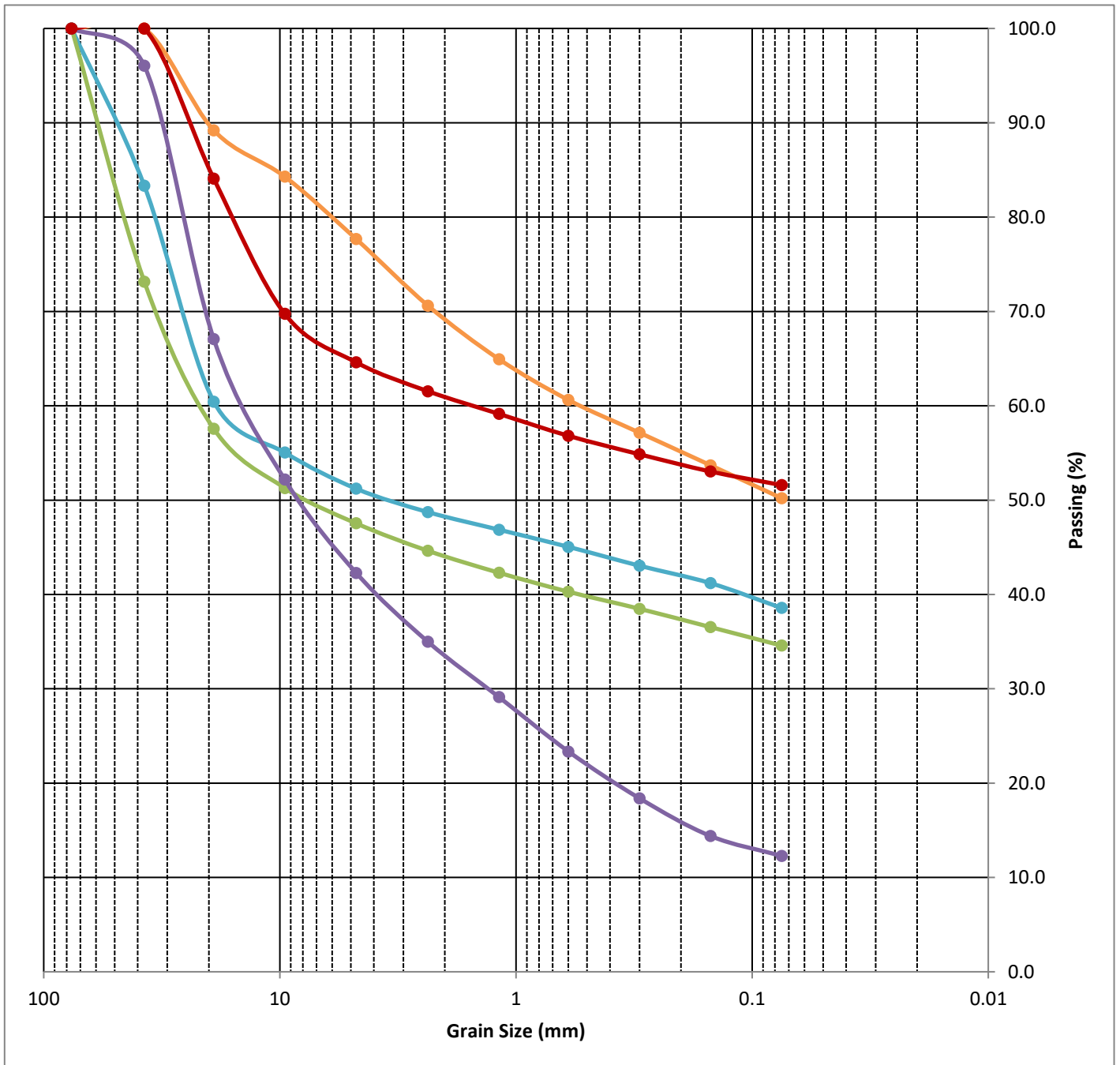
Location	Depth (ft)		Classification	Liquid Limit	PI
TP-66	2	•	Bedrock (Lean CLAY with sand)	36	19

Grain Size Distribution



Location	Depth		Classification	% Gravel	% Sand	% Silt and Clay
TP-3	4	●	Gravelly Fat CLAY	25.2	12.6	62.1
TP-4	3	●	Lean CLAY with sand	7.0	19.0	74.0
TP-5	3	●	Sandy Lean CLAY	35.8	10.4	53.8
TP-6	6	●	Bedrock (Clayey Gravel with sand)	54.5	11.8	33.7
TP-10	2	●	Bedrock (Clayey Gravel with sand)	42.6	16.6	40.7

Grain Size Distribution



Location	Depth		Classification	% Gravel	% Sand	% Silt and Clay
TP-13	7	●	Bedrock (Clayey Gravel with sand)	48.8	12.6	38.6
TP-28	2	●	Sandy Lean CLAY	22.3	27.5	50.2
TP-29	3	●	Bedrock (Clayey Gravel with sand)	52.5	13.0	34.6
TP-31	1	●	Bedrock (Silty GRAVEL with sand)	57.7	30.0	12.3
TP-32	3	●	Bedrock (Gravelly Lean CLAY)	35.4	13.0	51.6

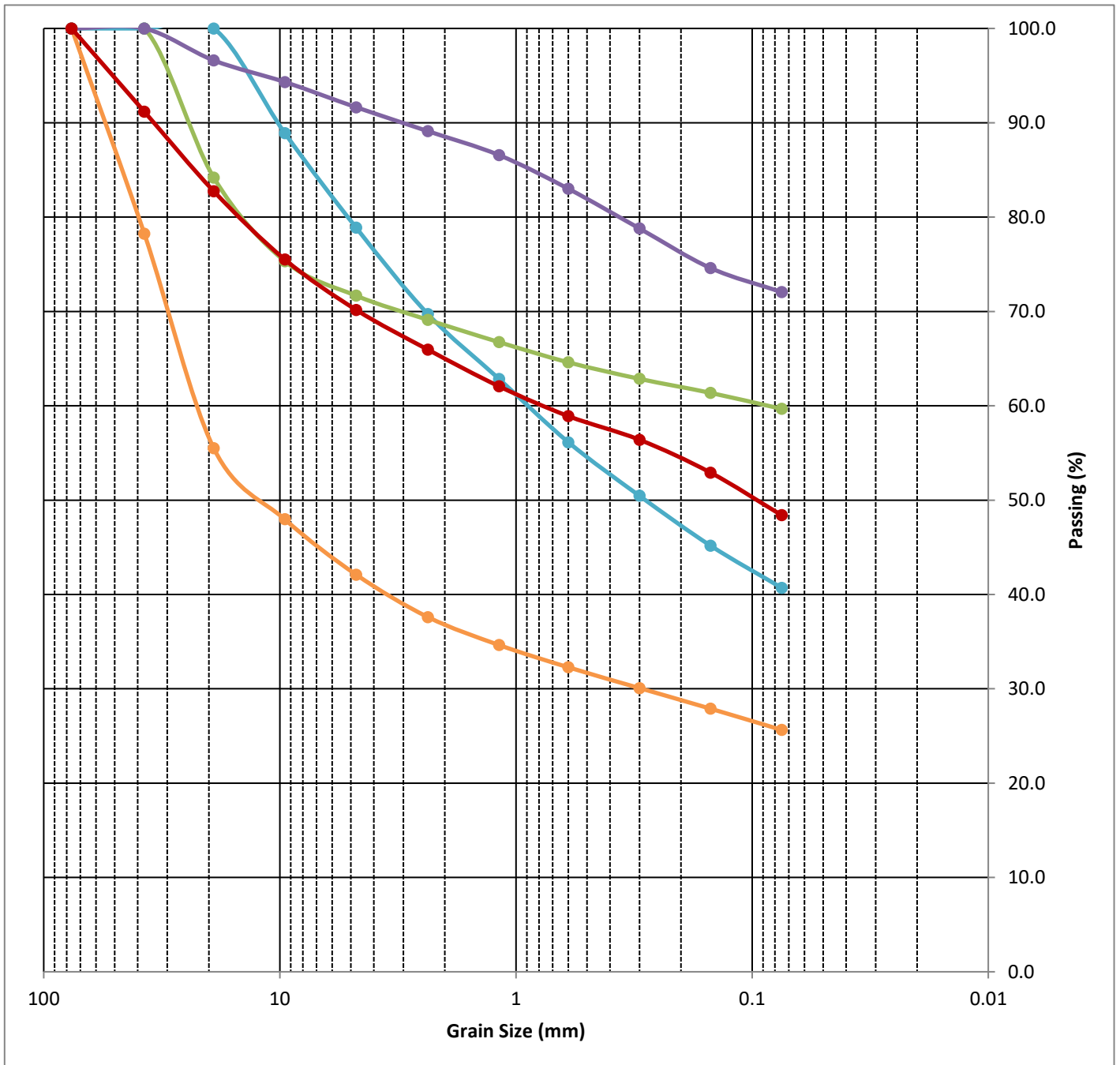


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Plate

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Grain Size Distribution



Location	Depth		Classification	% Gravel	% Sand	% Silt and Clay
TP-34	4	●	Bedrock (Clayey SAND with gravel)	21.1	38.2	40.7
TP-37	2	●	Clayey GRAVEL with sand	57.9	16.5	25.6
TP-43	3.5	●	Bedrock (Fat CLAY with gravel)	28.3	12.0	59.7
TP-46	3	●	Fat CLAY with sand	8.4	19.6	72.1
TP-51	4	●	Clayey GRAVEL with sand	29.8	21.8	48.4

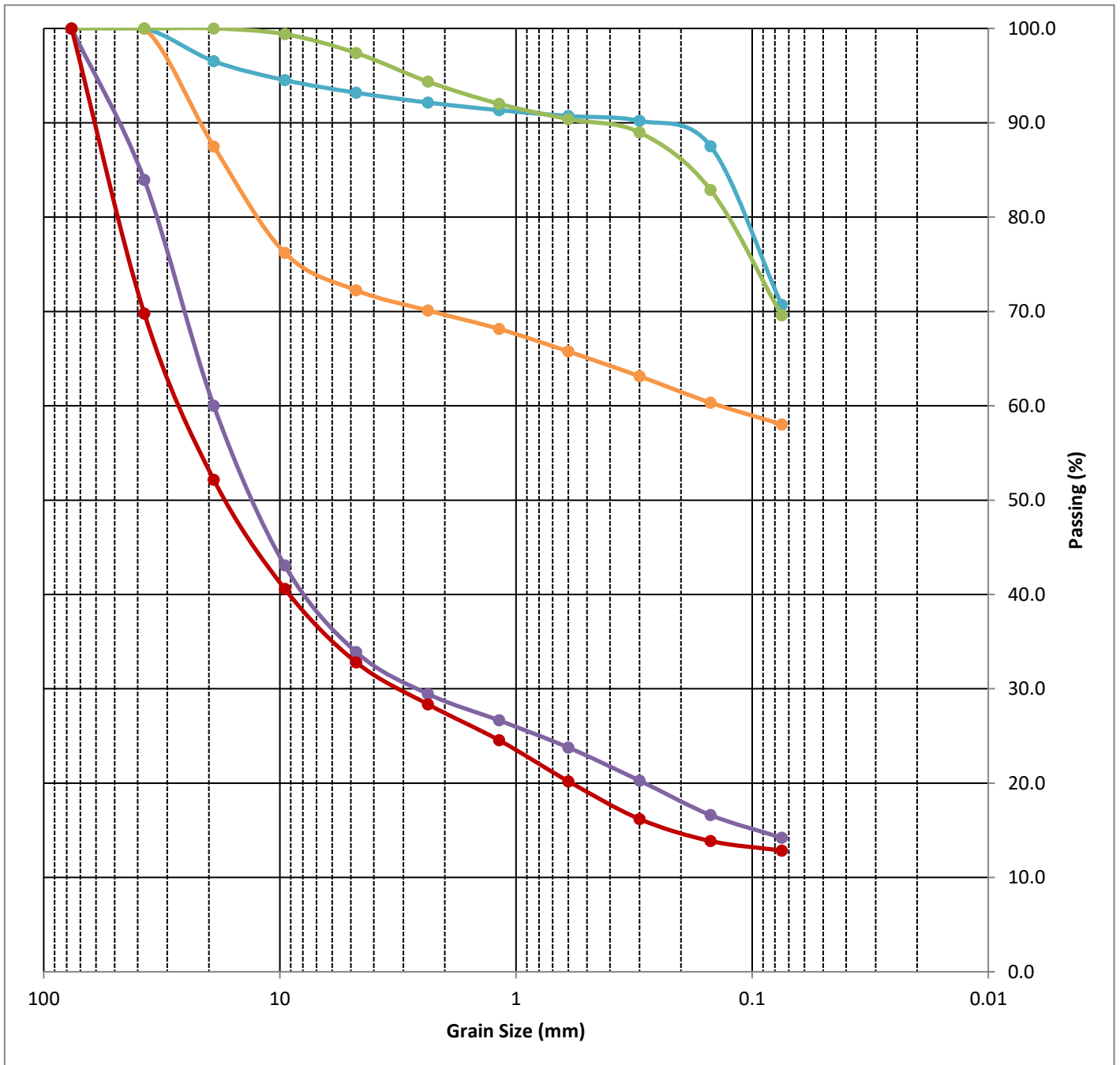


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Plate

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Grain Size Distribution



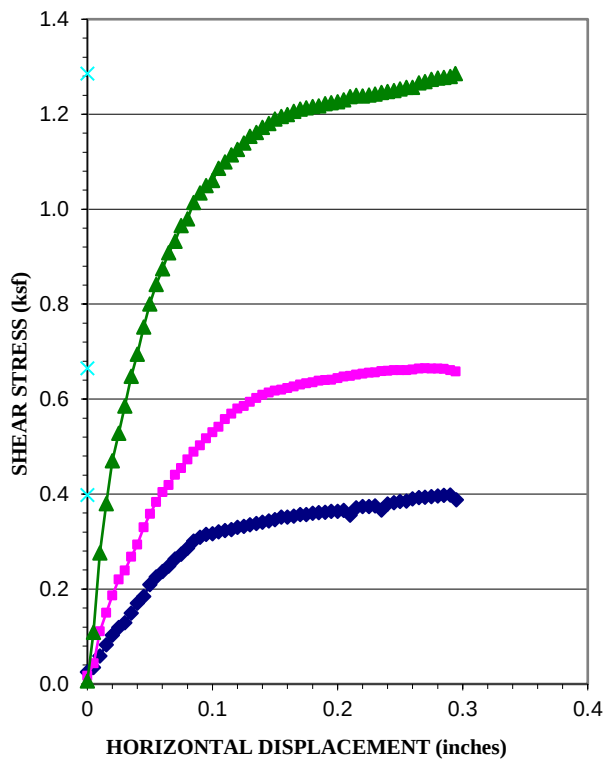
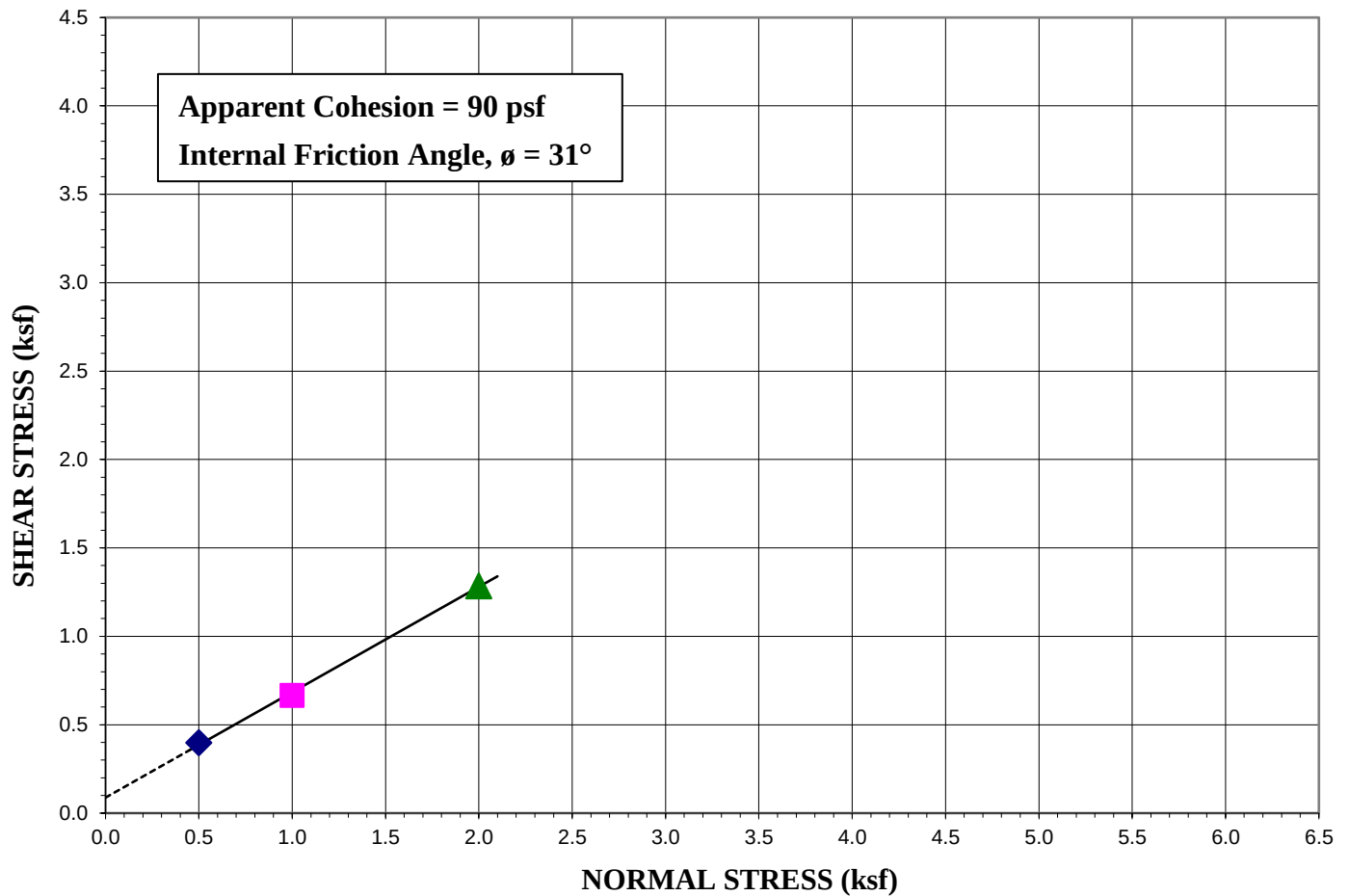
Location	Depth		Classification	% Gravel	% Sand	% Silt and Clay
TP-53	2	●	Bedrock (Lean CLAY with sand)	6.8	22.5	70.7
TP-56	3	●	Bedrock (Gravelly Lean CLAY)	27.8	14.2	58.0
TP-59	3	●	Bedrock (Lean CLAY with sand)	2.6	27.8	69.6
TP-61	1	●	Silty GRAVEL with sand	66.1	19.7	14.2
TP-67	6	●	Bedrock (Clayey GRAVEL with sand)	67.2	20.0	12.9



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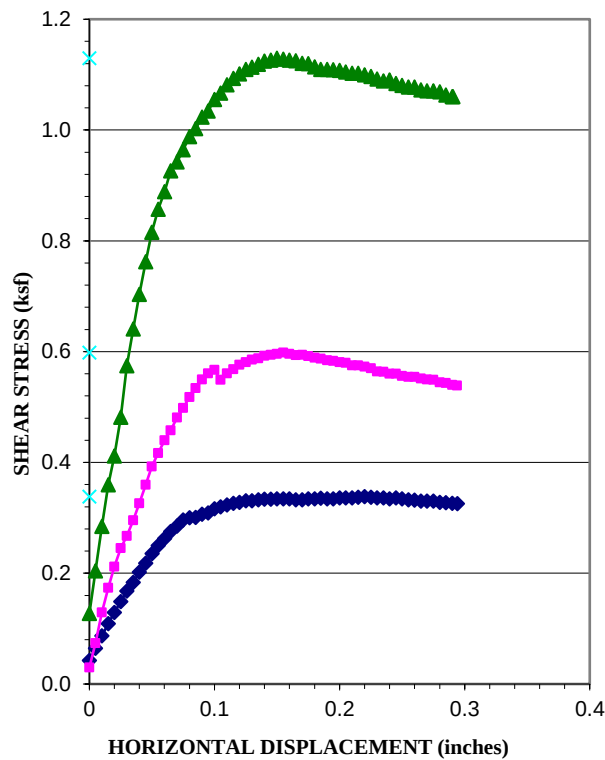
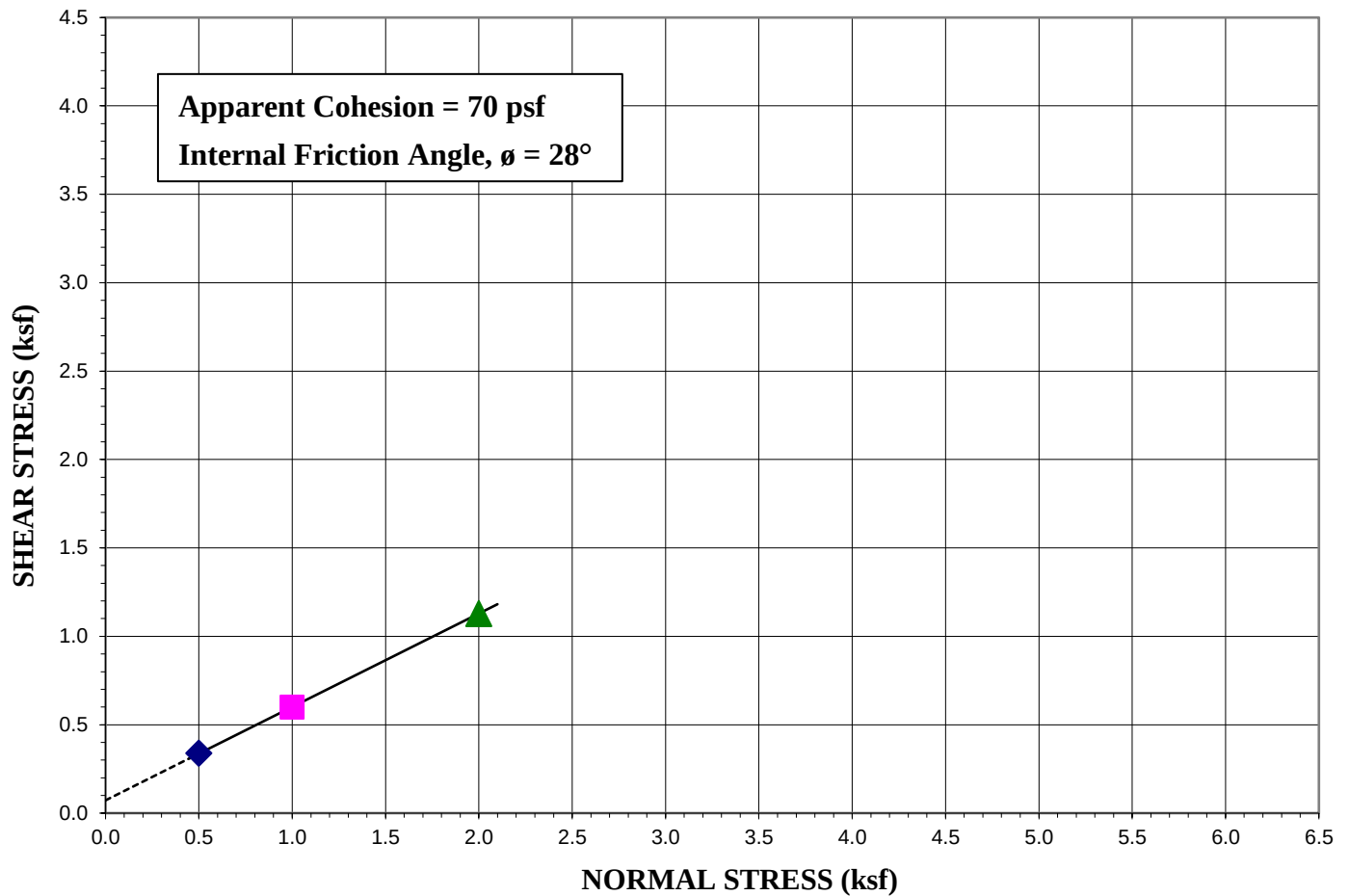
Plate

83



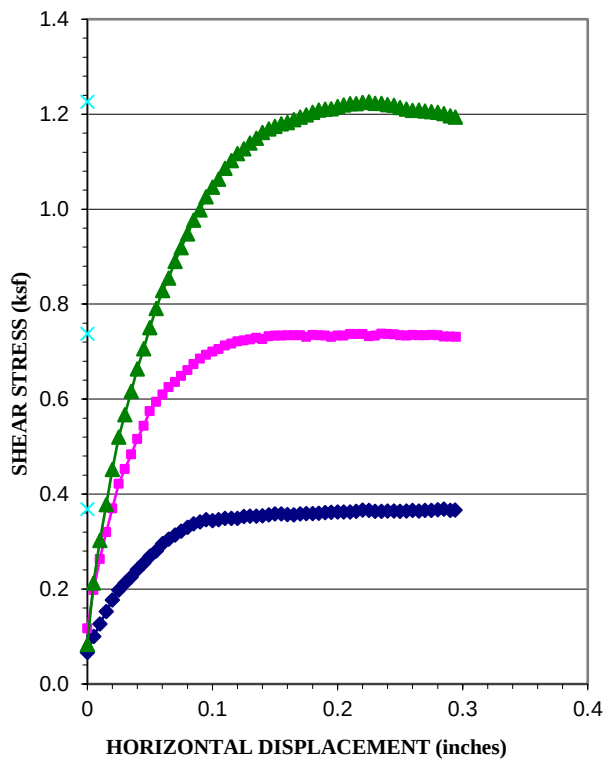
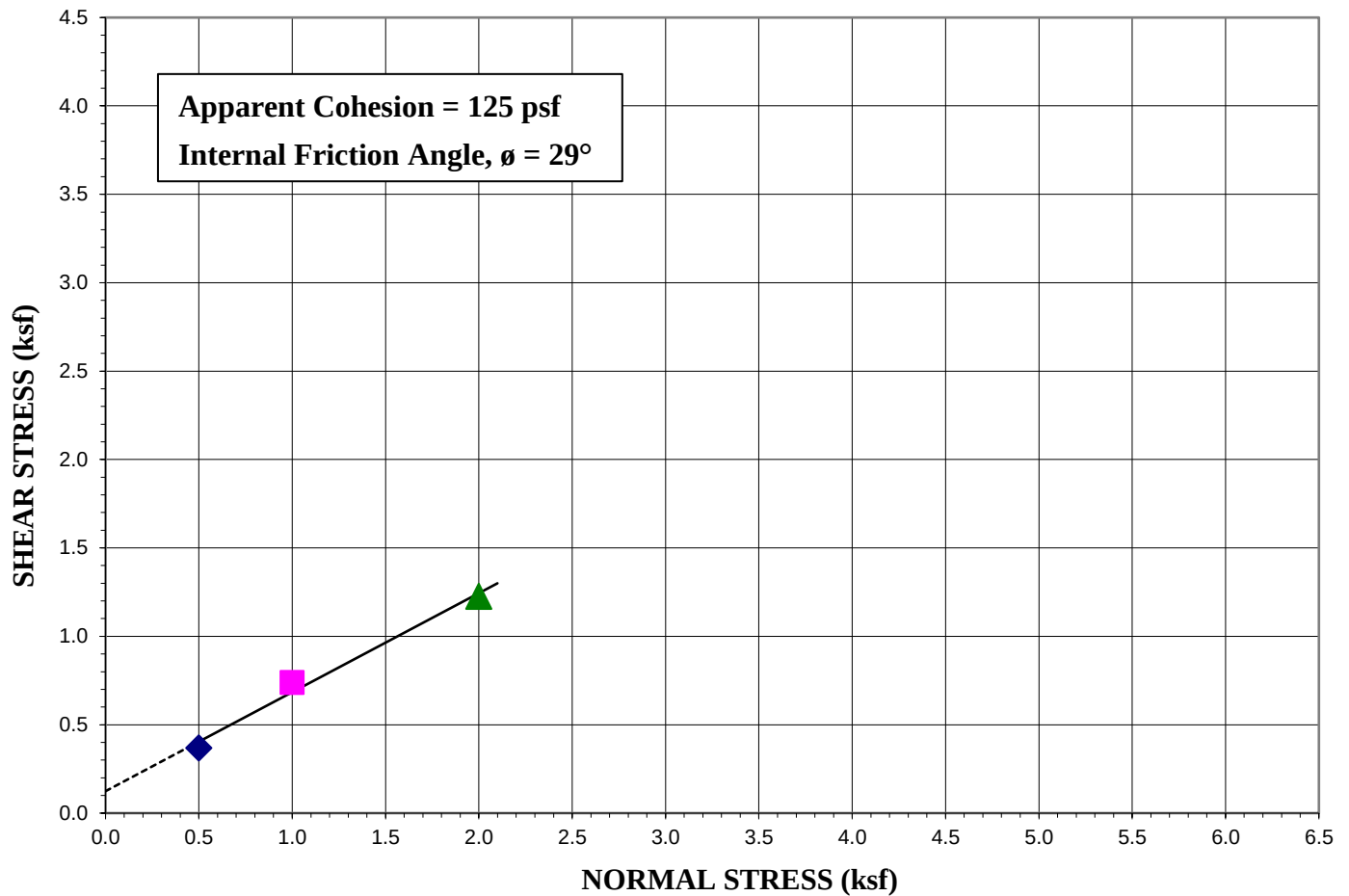
Location:	TP-11	Depth:	3.0 ft
Type of Test:	Consolidated Drained/Saturated		
Test No. (Symbol)	1 (◆)	2 (■)	3 (▲)
Sample Type:	Fully Softened		
Initial Height, in.	1	1	1
Diameter, in.	2.5	2.5	2.5
Dry Density Before, pcf	77.4	78.7	77.4
Moisture % Before	41.2	41.2	41.2
Normal Load, ksf	0.5	1.0	2.0
Shear Stress, ksf	0.40	0.67	1.29
Strain Rate	0.0003 in/min		

Sample Properties	
Cohesion, psf	90
Friction Angle, ϕ	31
Liquid Limit, %	45
Plasticity Index, %	25
Percent Gravel	---
Percent Sand	---
Percent Passing No. 200 sieve	98.9
Classification	Lean CLAY w/ sand (CL)



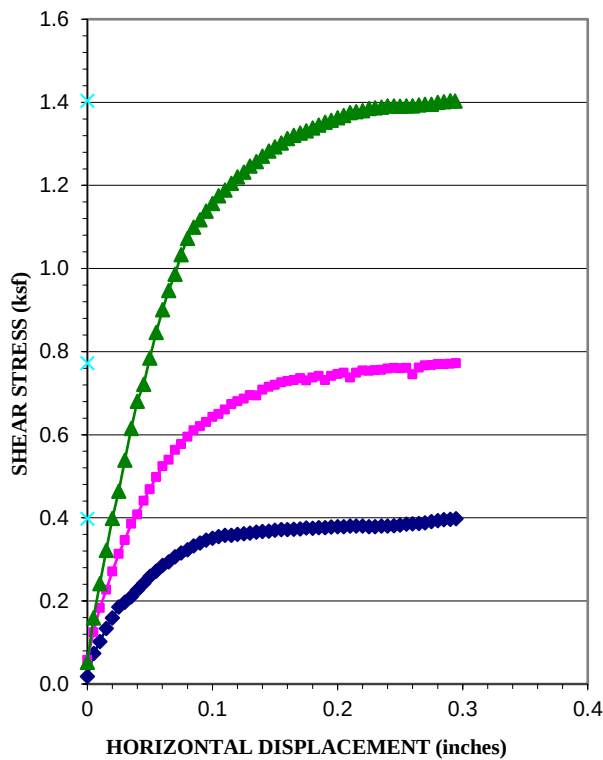
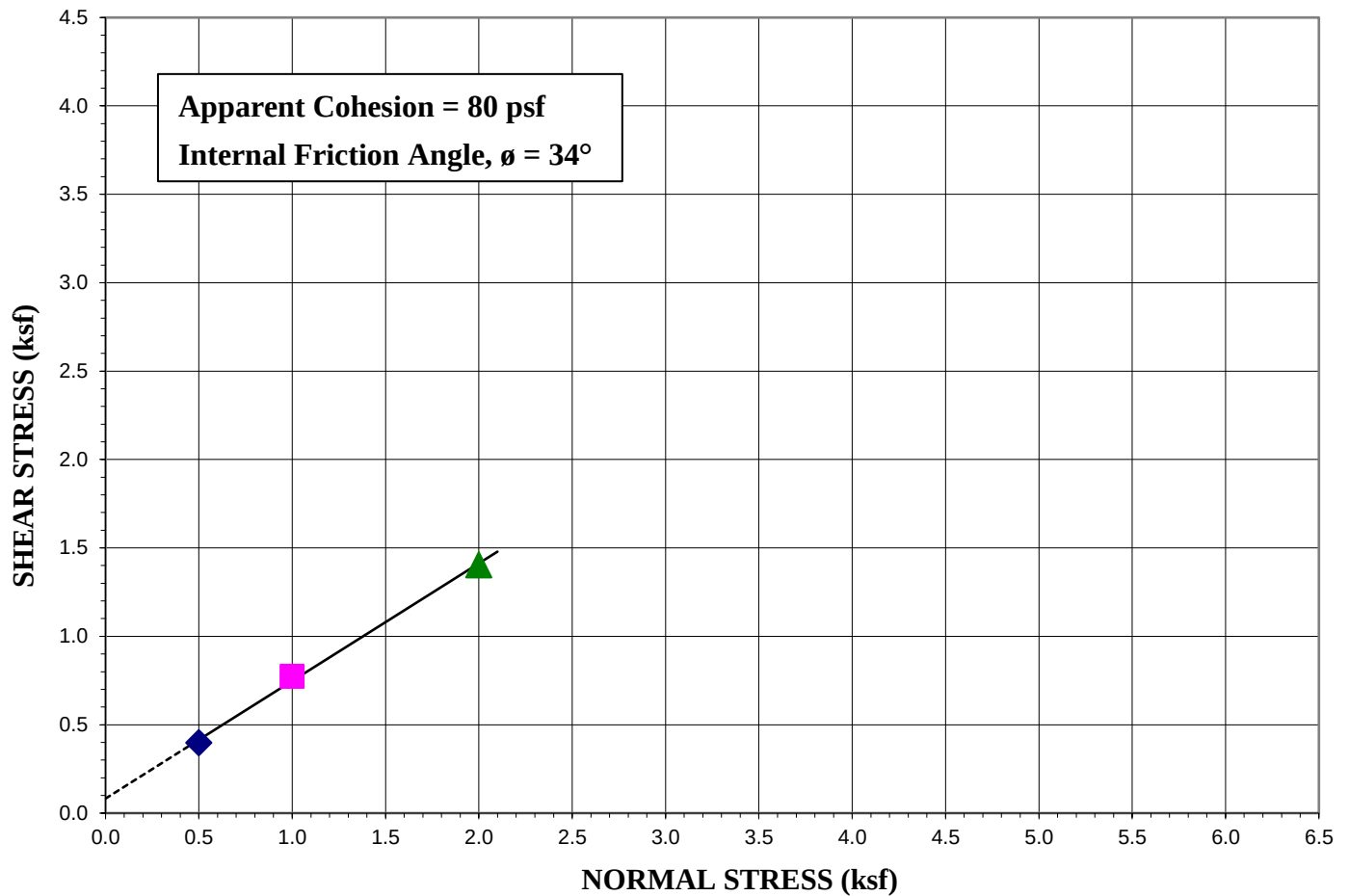
Location:	TP-16		
Depth:	2.0 ft		
Type of Test:	Consolidated Drained/Saturated		
Test No. (Symbol)	1 (◆)	2 (■)	3 (▲)
Sample Type:	Fully Softened		
Initial Height, in.	1	1	1
Diameter, in.	2.4	2.4	2.4
Dry Density Before, pcf	58.1	58.7	58.2
Moisture % Before	70.4	70.4	70.4
Normal Load, ksf	0.5	1.0	2.0
Shear Stress, ksf	0.34	0.60	1.13
Strain Rate	0.0003 in/min		

Sample Properties	
Cohesion, psf	70
Friction Angle, ϕ	28
Liquid Limit, %	82
Plasticity Index, %	44
Percent Gravel	---
Percent Sand	---
Percent Passing No. 200 sieve	95.2
Classification	Bedrock (Elastic SILT)



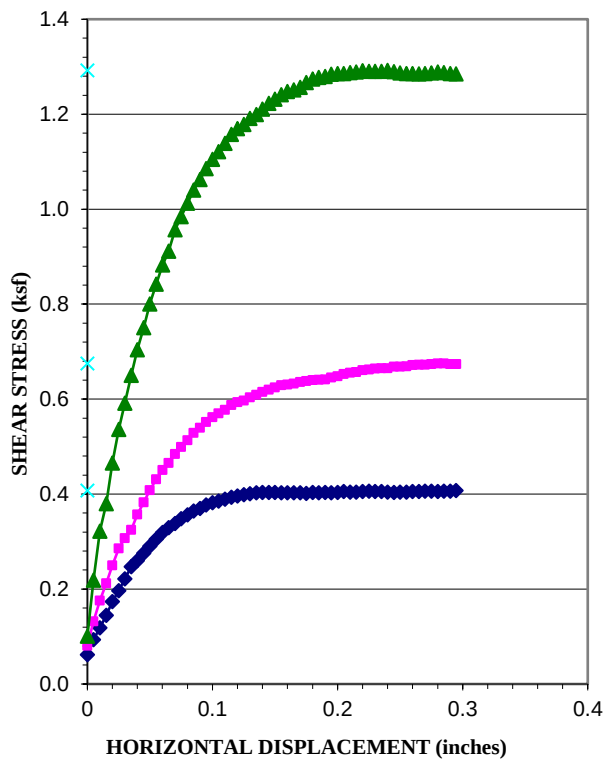
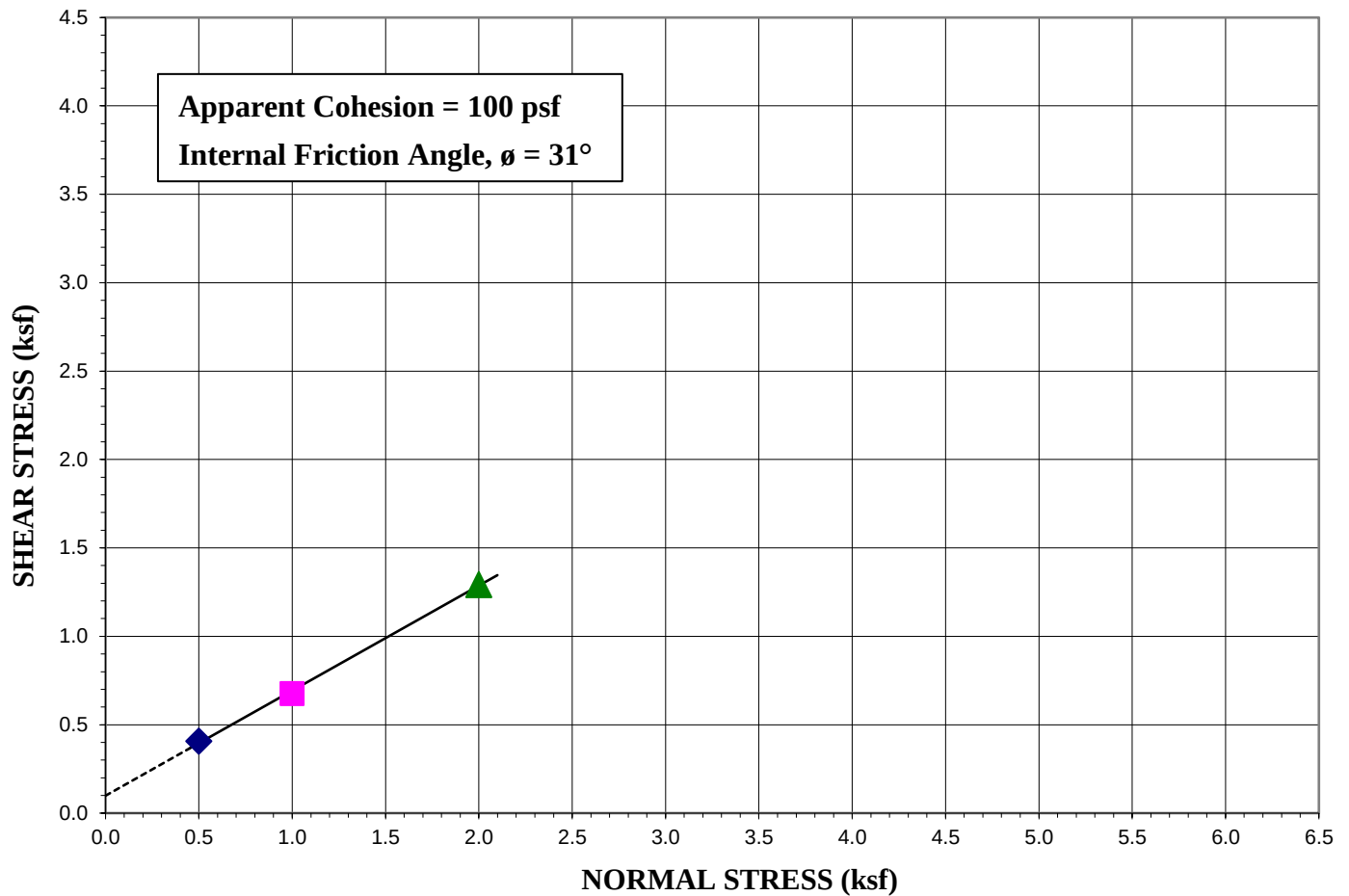
Location:	TP-19	Depth:	4.0 ft
Type of Test:	Consolidated Drained/Saturated		
Test No. (Symbol)	1 (◆)	2 (■)	3 (▲)
Sample Type:	Fully Softened		
Initial Height, in.	1	1	1
Diameter, in.	2.4	2.4	2.4
Dry Density Before, pcf	65.6	65.9	64.6
Moisture % Before	57.4	57.4	57.4
Normal Load, ksf	0.5	1.0	2.0
Shear Stress, ksf	0.37	0.74	1.23
Strain Rate	0.0006 in/min		

Sample Properties	
Cohesion, psf	125
Friction Angle, ϕ	29
Liquid Limit, %	62
Plasticity Index, %	25
Percent Gravel	---
Percent Sand	---
Percent Passing No. 200 sieve	85.3
Classification	Bedrock (Elastic SILT)



Location:	TP-42	Depth:	3.0 ft
Type of Test:	Consolidated Drained/Saturated		
Test No. (Symbol)	1 (◆)	2 (■)	3 (▲)
Sample Type:	Fully Softened		
Initial Height, in.	1	1	1
Diameter, in.	2.4	2.4	2.4
Dry Density Before, pcf	87.3	86.9	86.6
Moisture % Before	32.2	32.2	32.2
Normal Load, ksf	0.5	1.0	2.0
Shear Stress, ksf	0.40	0.77	1.40
Strain Rate	0.0005 in/min		

Sample Properties	
Cohesion, psf	80
Friction Angle, ϕ	34
Liquid Limit, %	46
Plasticity Index, %	26
Percent Gravel	---
Percent Sand	---
Percent Passing No. 200 sieve	83.8
Classification	Bedrock (Lean CLAY w/ sand)



Location:	TP-47	Depth:	4.0 ft
Type of Test:	Consolidated Drained/Saturated		
Test No. (Symbol)	1 (◆)	2 (◻)	3 (▲)
Sample Type:	Fully Softened		
Initial Height, in.	1	1	1
Diameter, in.	2.4	2.4	2.4
Dry Density Before, pcf	67.6	67.0	66.8
Moisture % Before	53.1	53.1	53.1
Normal Load, ksf	0.5	1.0	2.0
Shear Stress, ksf	0.41	0.68	1.29
Strain Rate	0.0007 in/min		

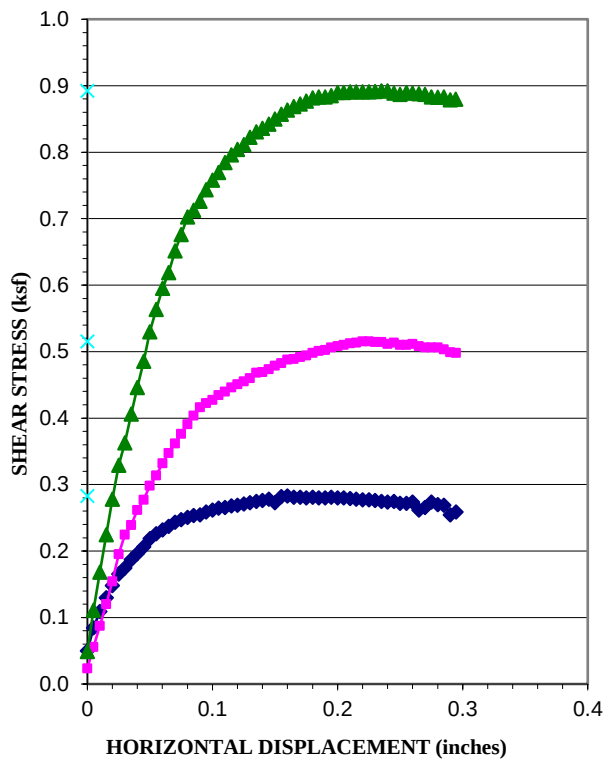
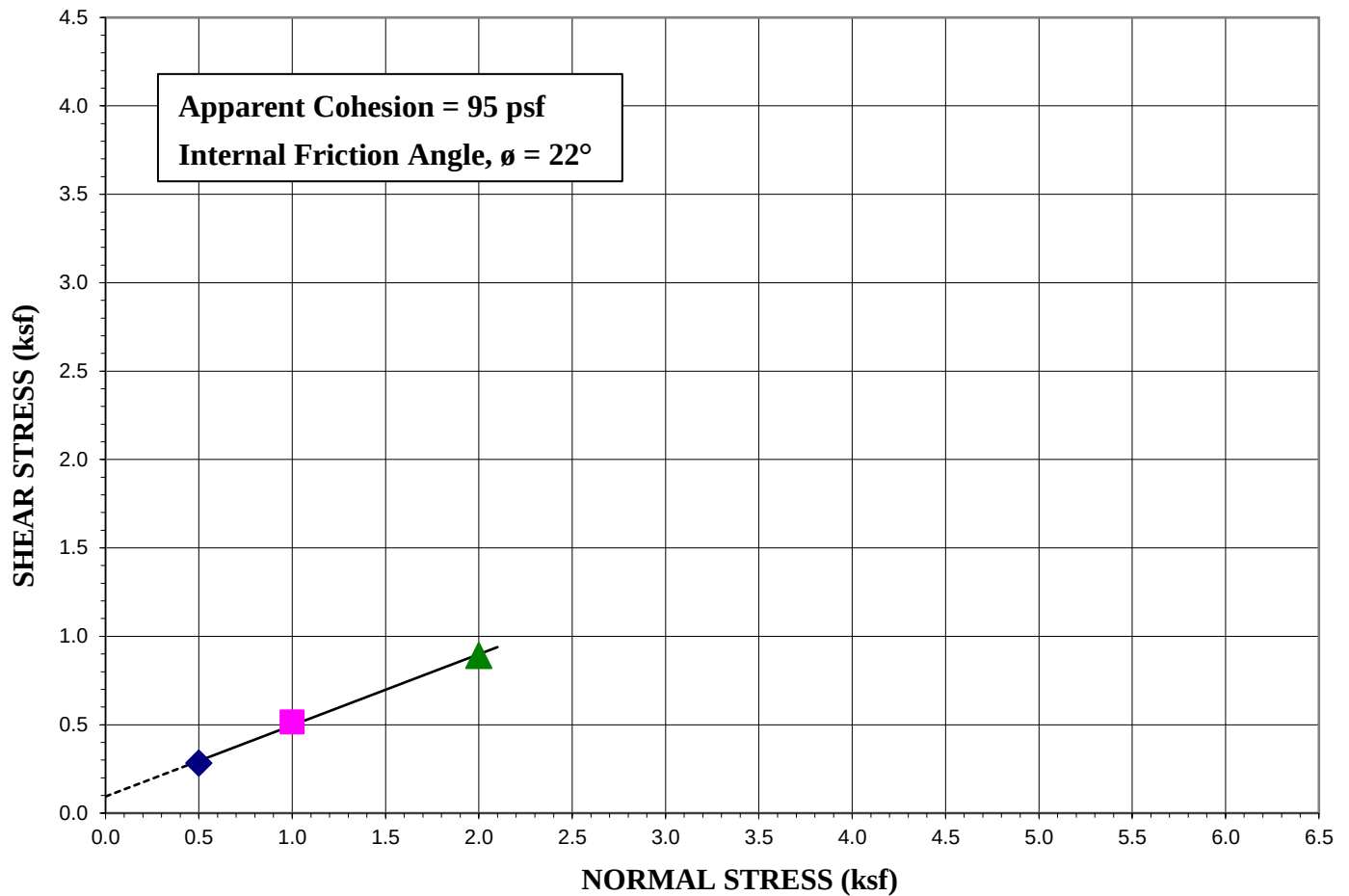
Sample Properties	
Cohesion, psf	100
Friction Angle, ϕ	31
Liquid Limit, %	58
Plasticity Index, %	22
Percent Gravel	---
Percent Sand	---
Percent Passing No. 200 sieve	81.5
Classification	Bedrock (Elastic SILT w/ sand)



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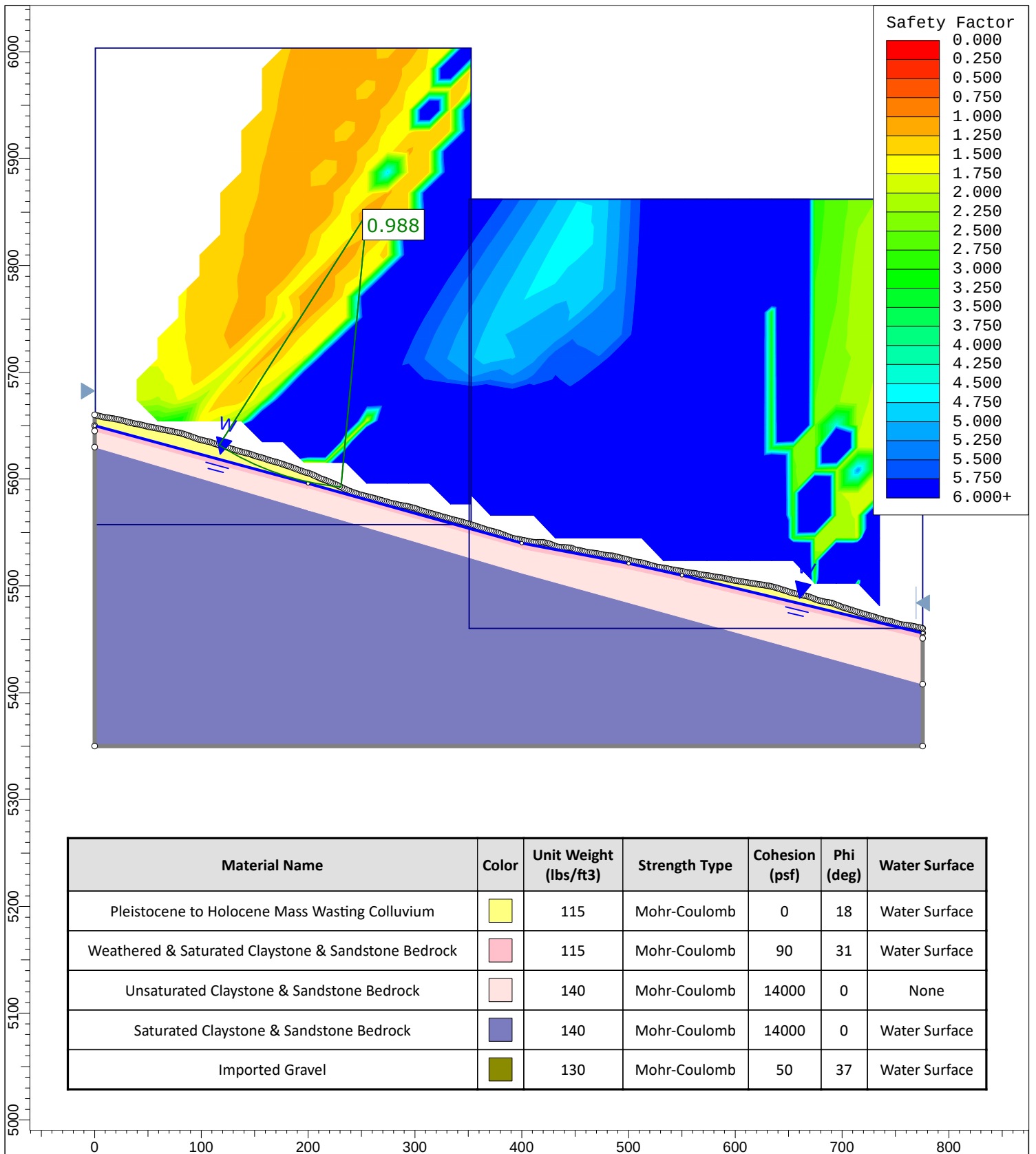
Plate

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Location:	TP-60		
Depth:	2.0 ft		
Type of Test:	Consolidated Drained/Saturated		
Test No. (Symbol)	1 (◆)	2 (■)	3 (▲)
Sample Type:	Fully Softened		
Initial Height, in.	1	1	1
Diameter, in.	2.4	2.4	2.4
Dry Density Before, pcf	60.9	61.2	61.7
Moisture % Before	64.4	64.4	64.4
Normal Load, ksf	0.5	1.0	2.0
Shear Stress, ksf	0.28	0.52	0.89
Strain Rate	0.0003 in/min		

Sample Properties	
Cohesion, psf	95
Friction Angle, ϕ	22
Liquid Limit, %	85
Plasticity Index, %	56
Percent Gravel	---
Percent Sand	---
Percent Passing No. 200 sieve	97
Classification	Bedrock (Fat CLAY)

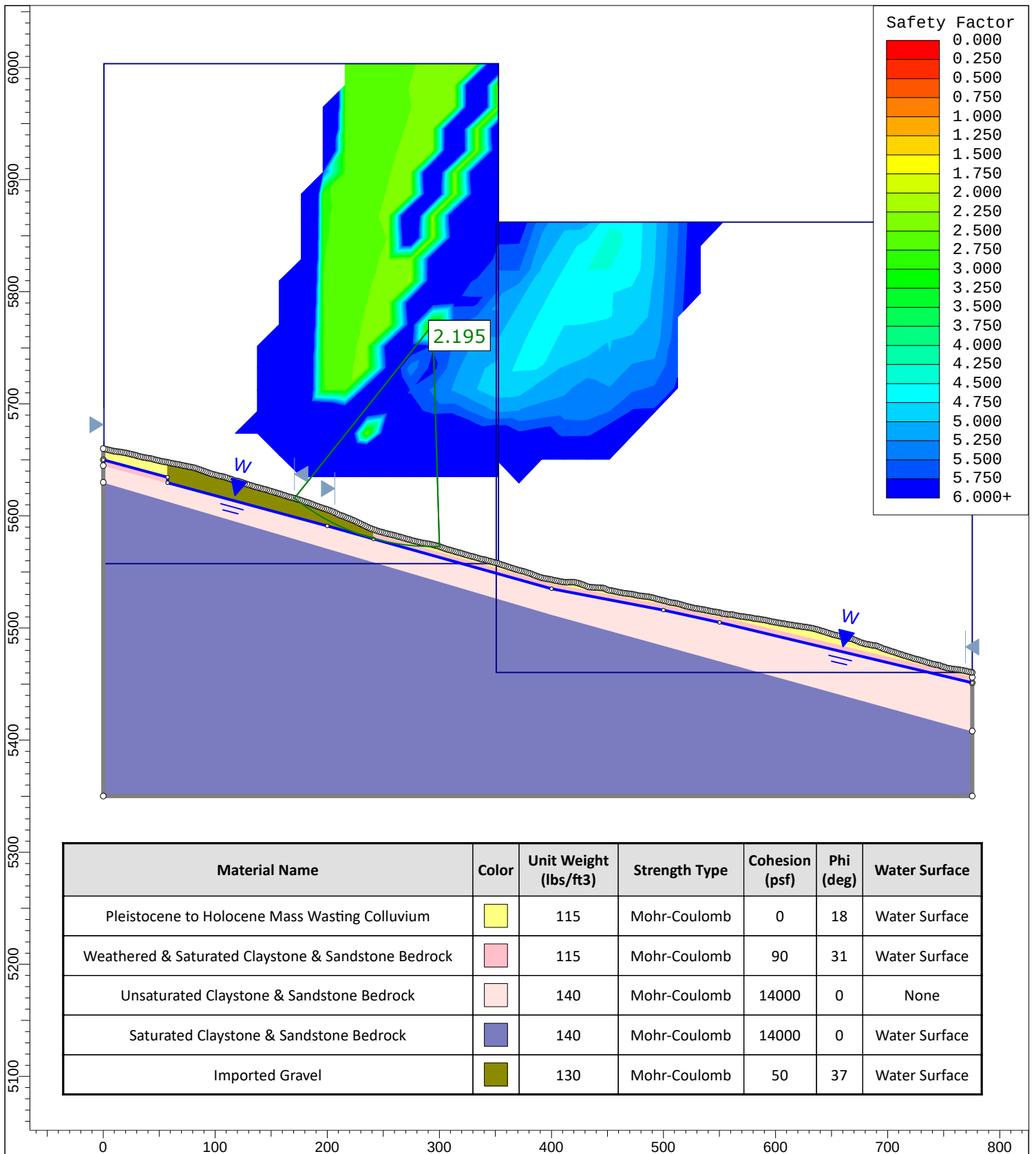


Profile A - Static



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Plate
90

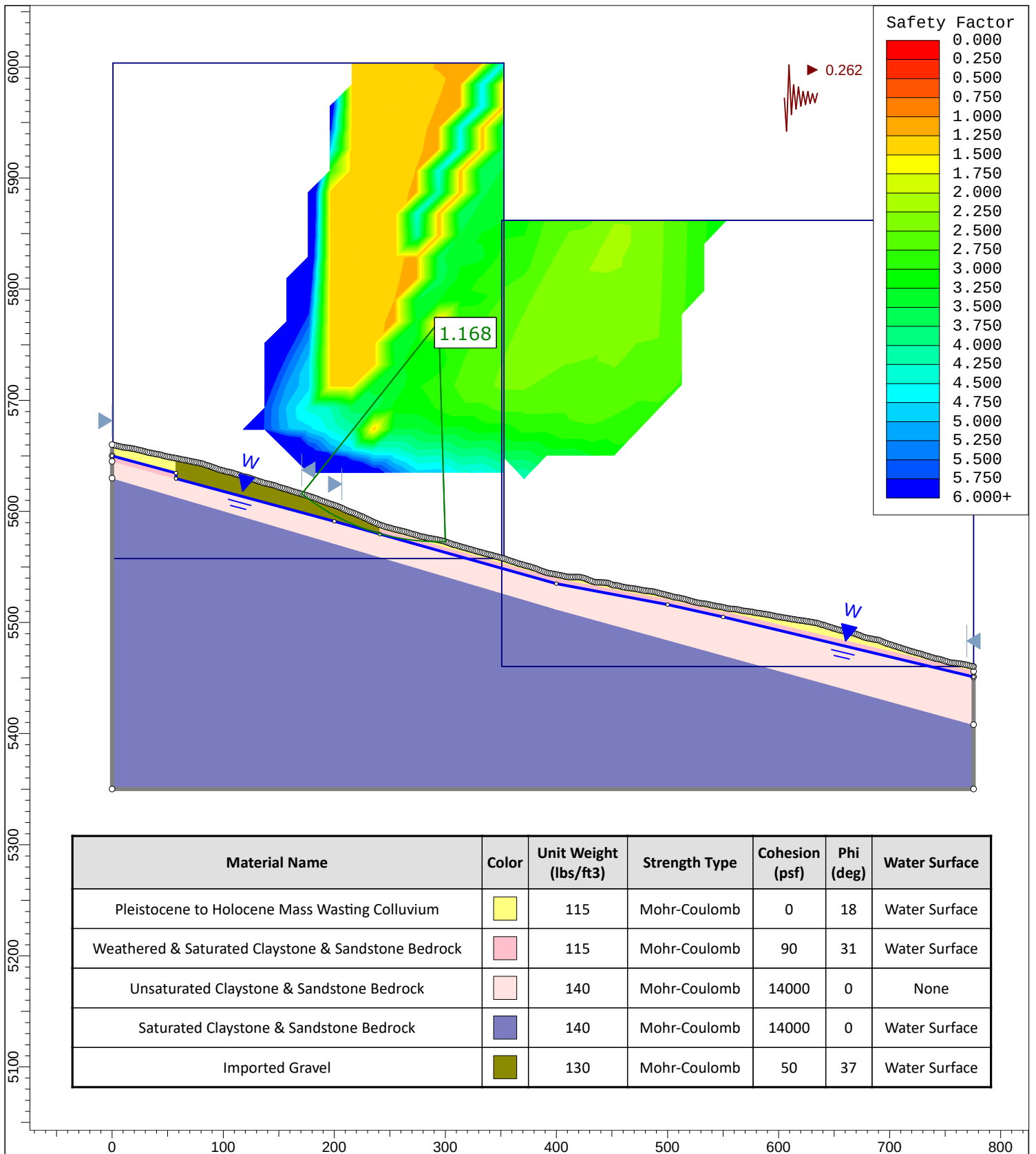


Profile A with Gravel Pad - Static



Lewis Homes
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91

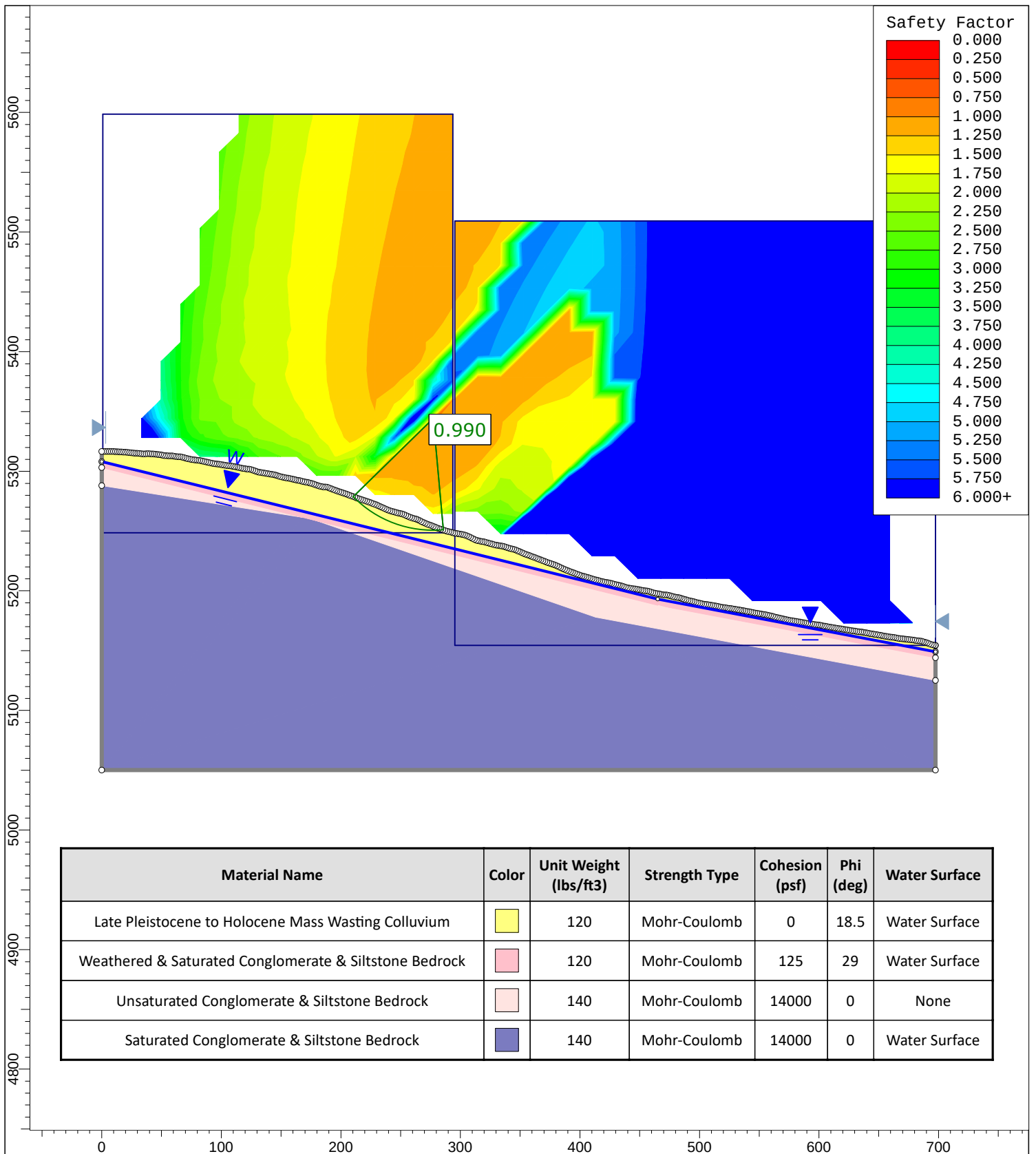


Profile A with Gravel Pad - Pseudo Static



Lewis Homes
Osprey Ranch Development
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92

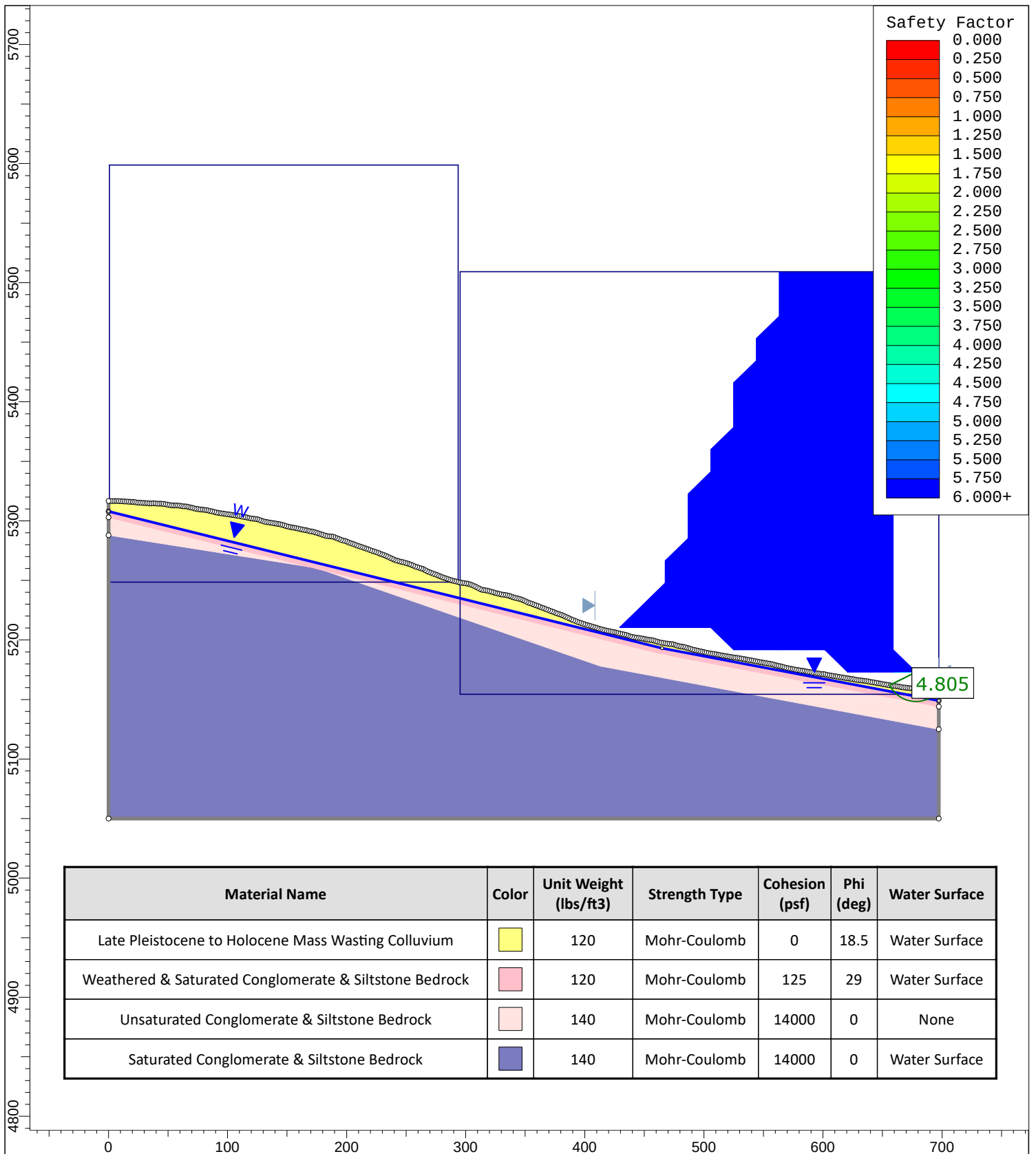


Profile B - Static



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93

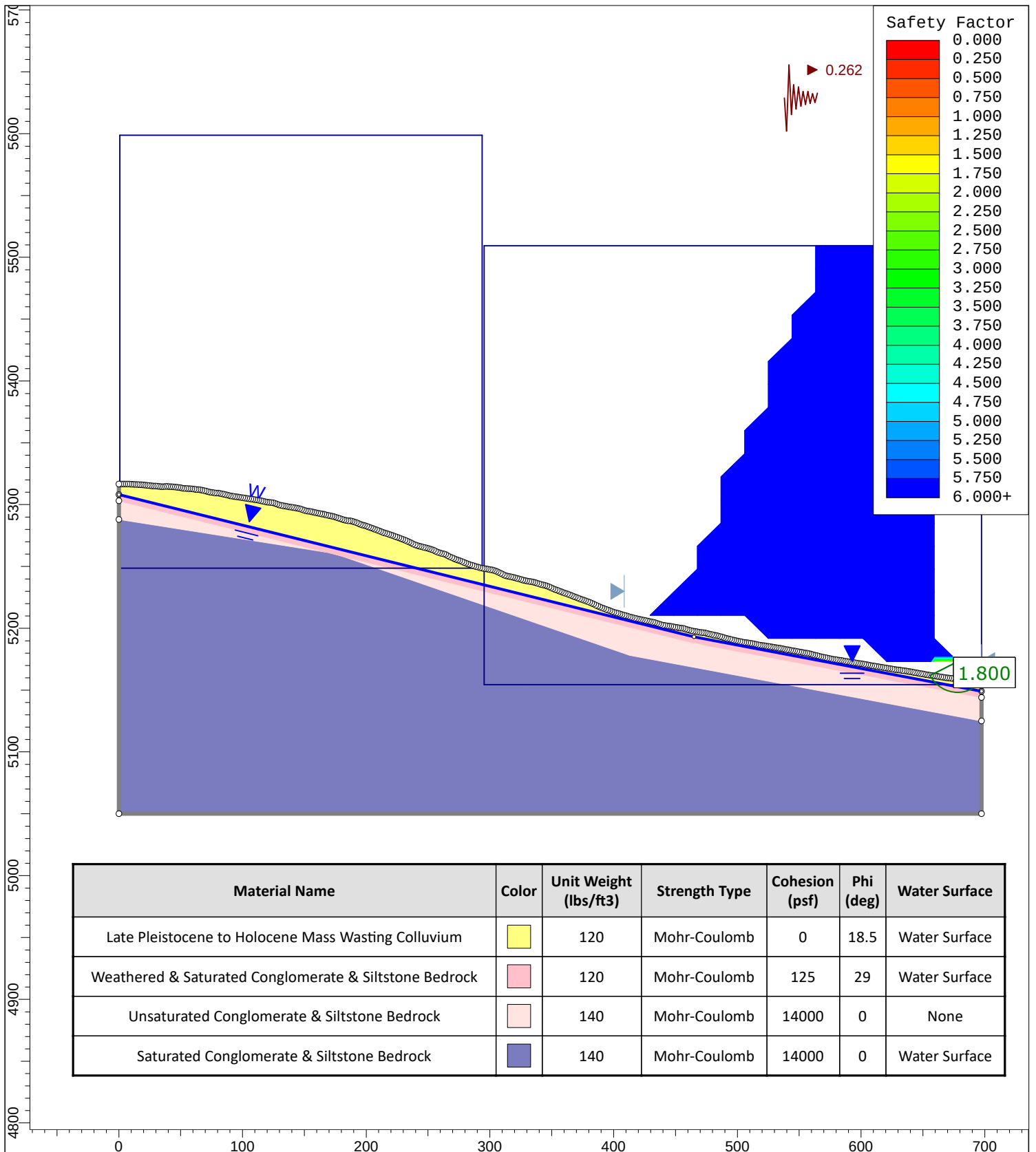


Profile B Excluding Steep Slopes - Static



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Plate
94

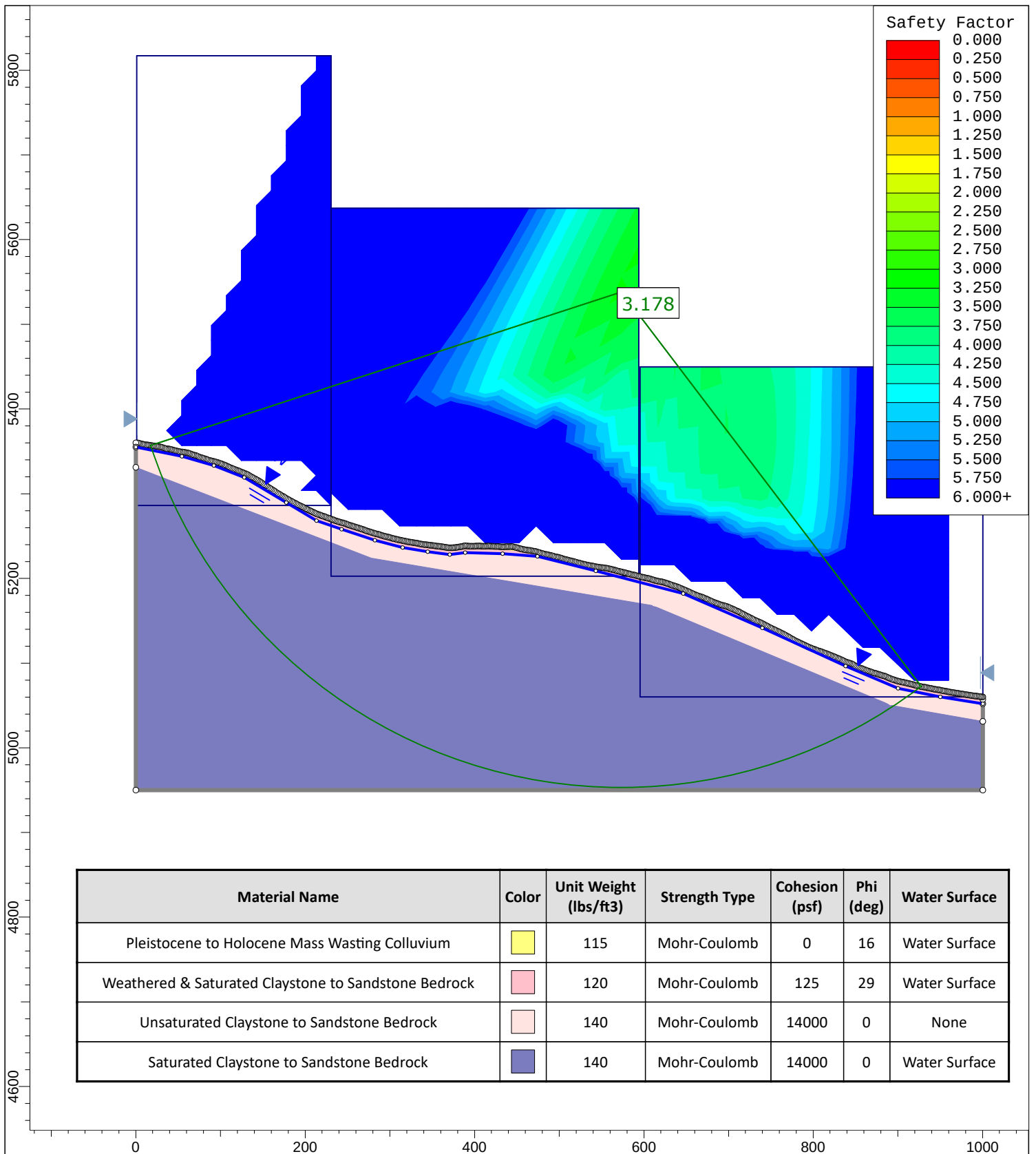


Profile B Excluding Steep Slopes - Pseudo Static



Lewis Homes
Osprey Ranch Development
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95

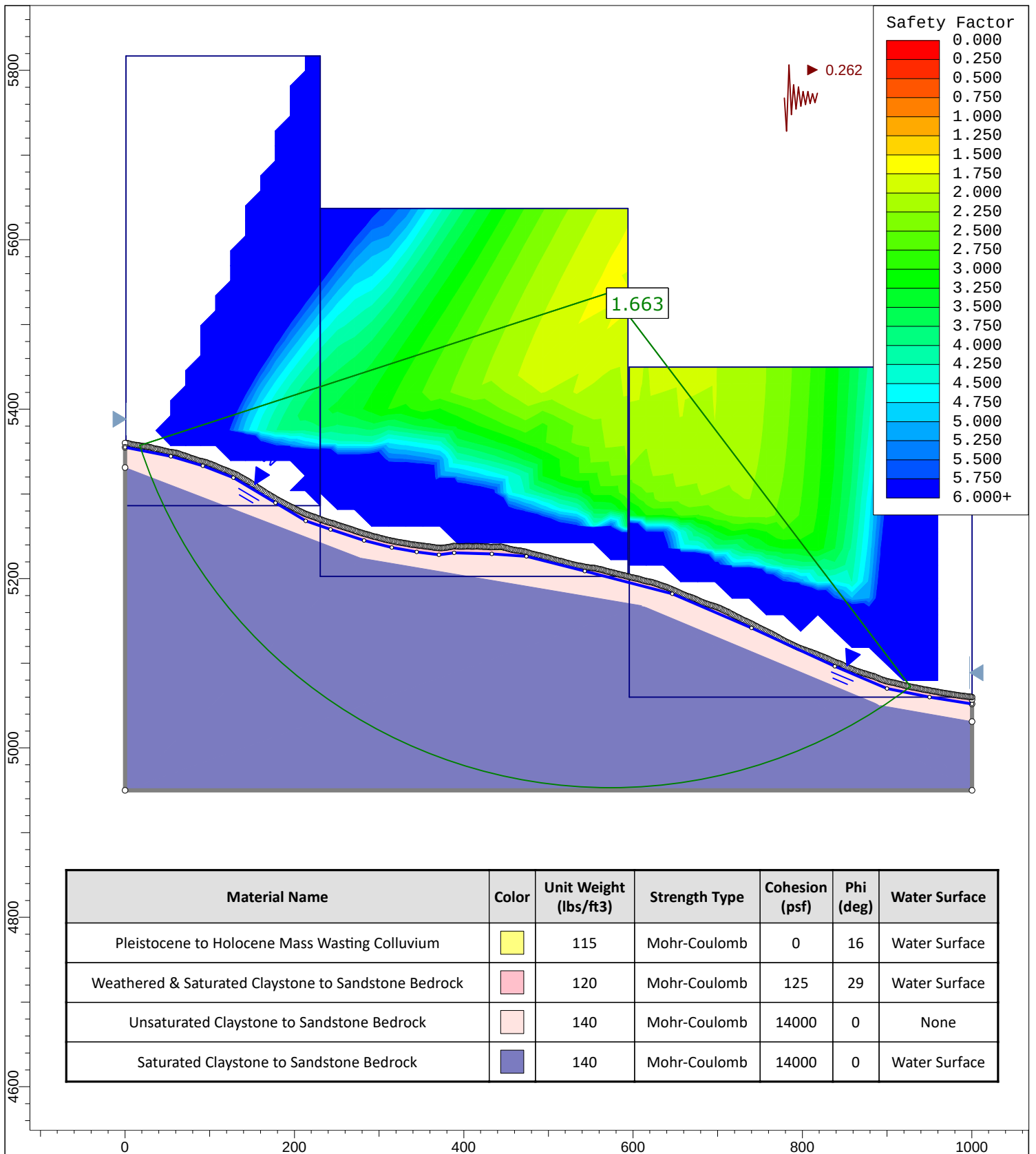


Profile C - Static



Lewis Homes
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96

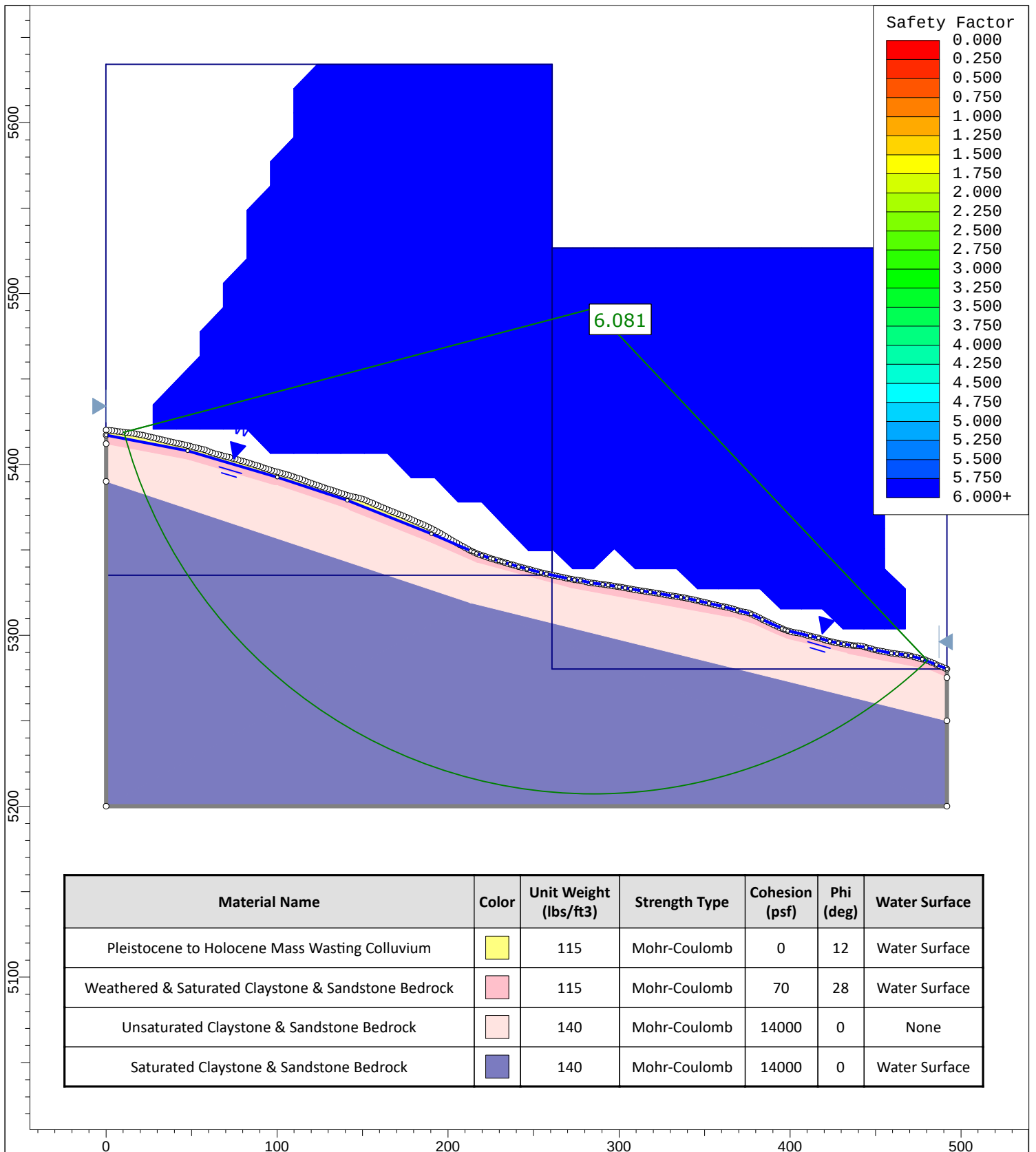


Profile C - Pseudo Static



Lewis Homes
Osprey Ranch Development
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97

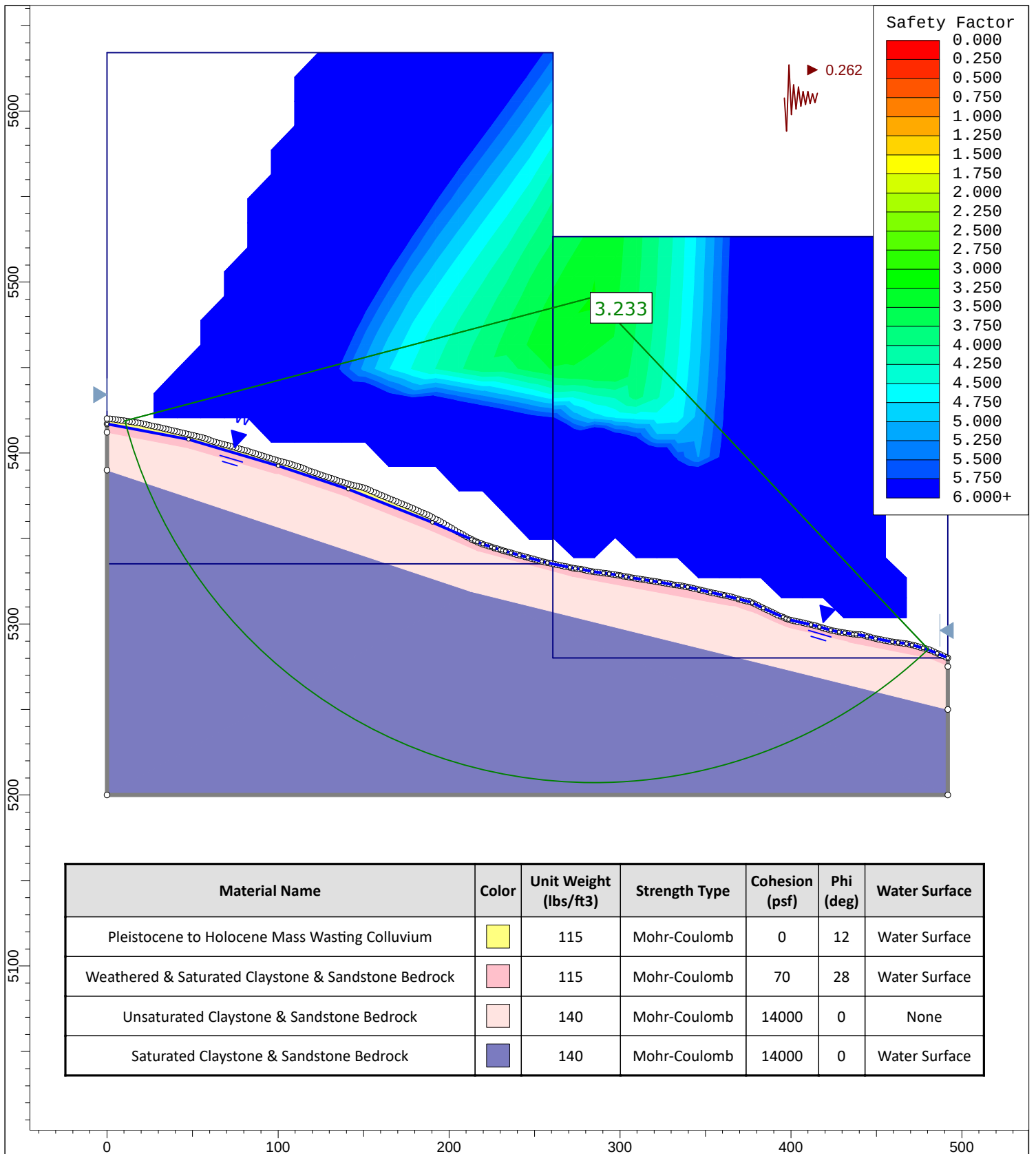


Profile D - Static



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98

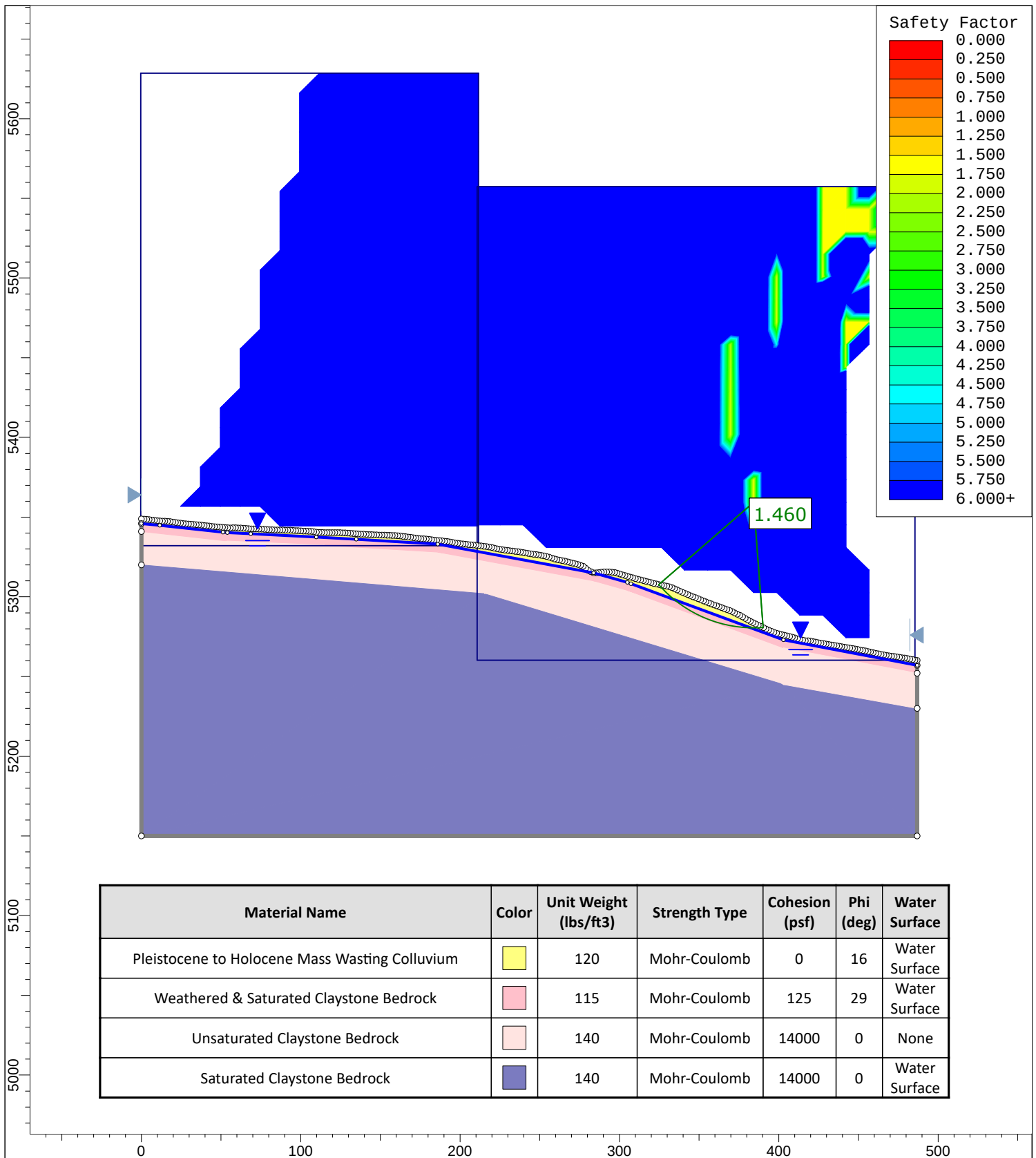


Proile D - Pseudo Static



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Plate
99

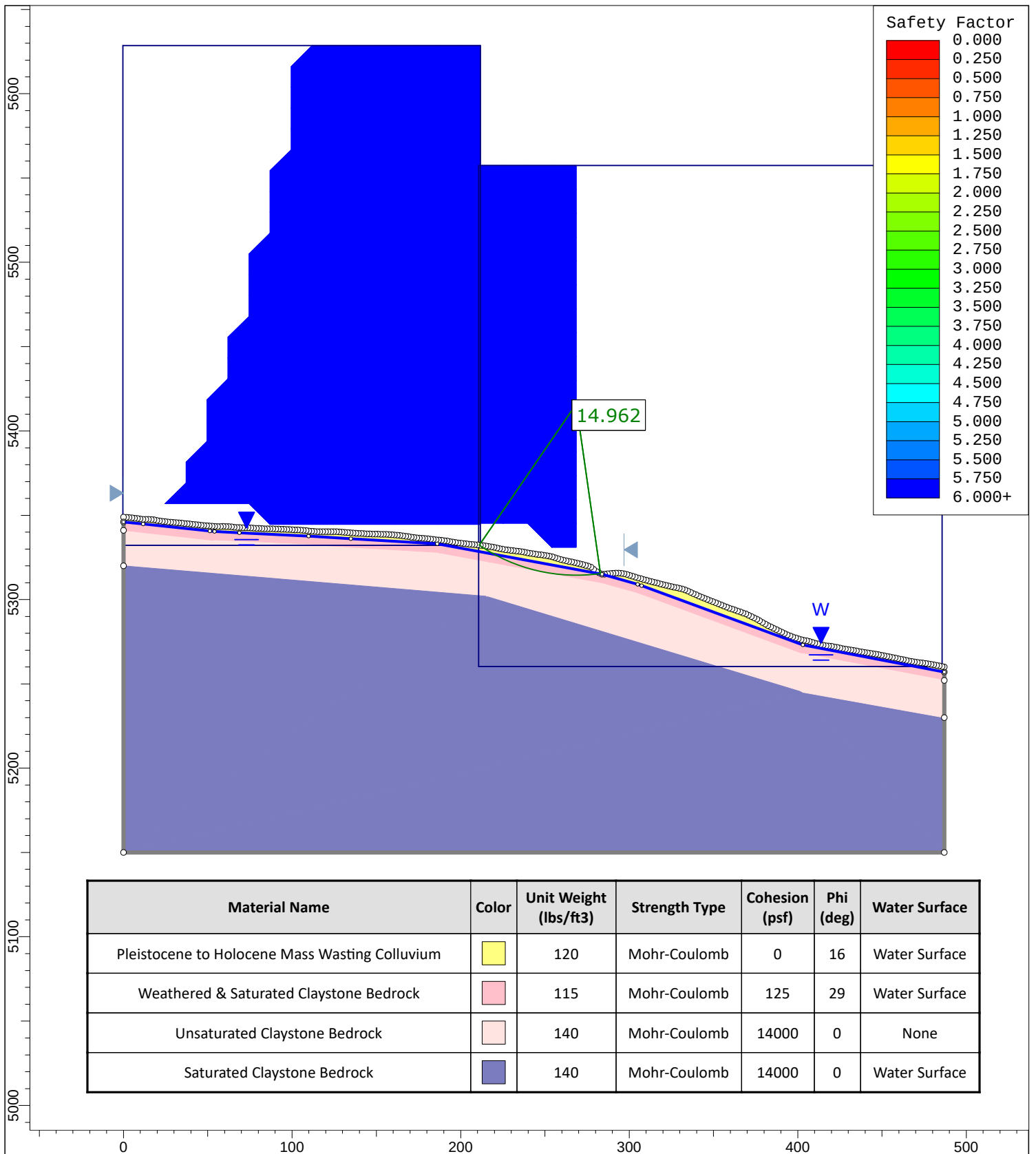


Profile E - Static



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Plate
100

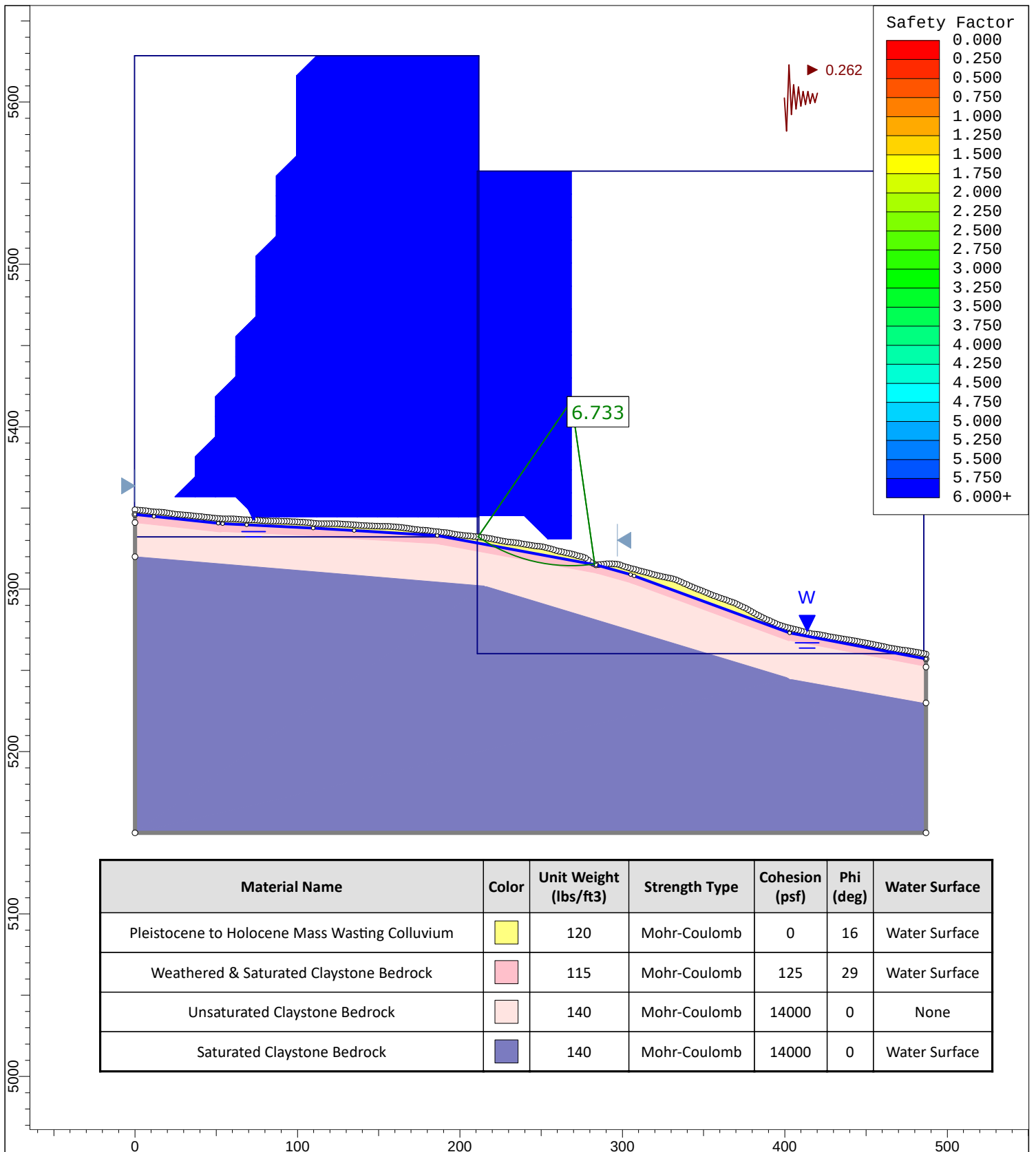


Profile E Excluding Steep Slopes - Static



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101

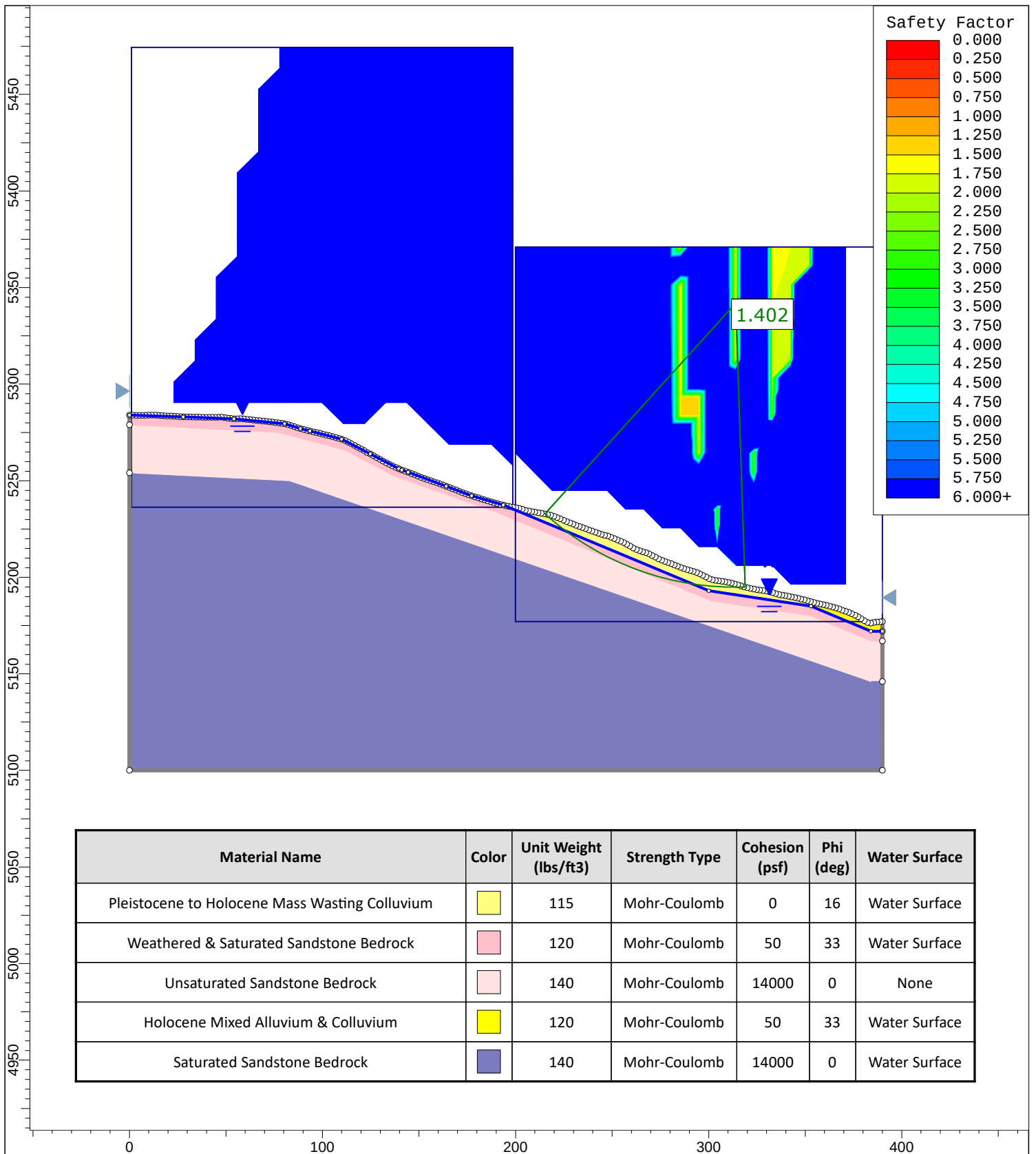


Profile E Excluding Steep Slopes - Pseudo Static



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Plate
102

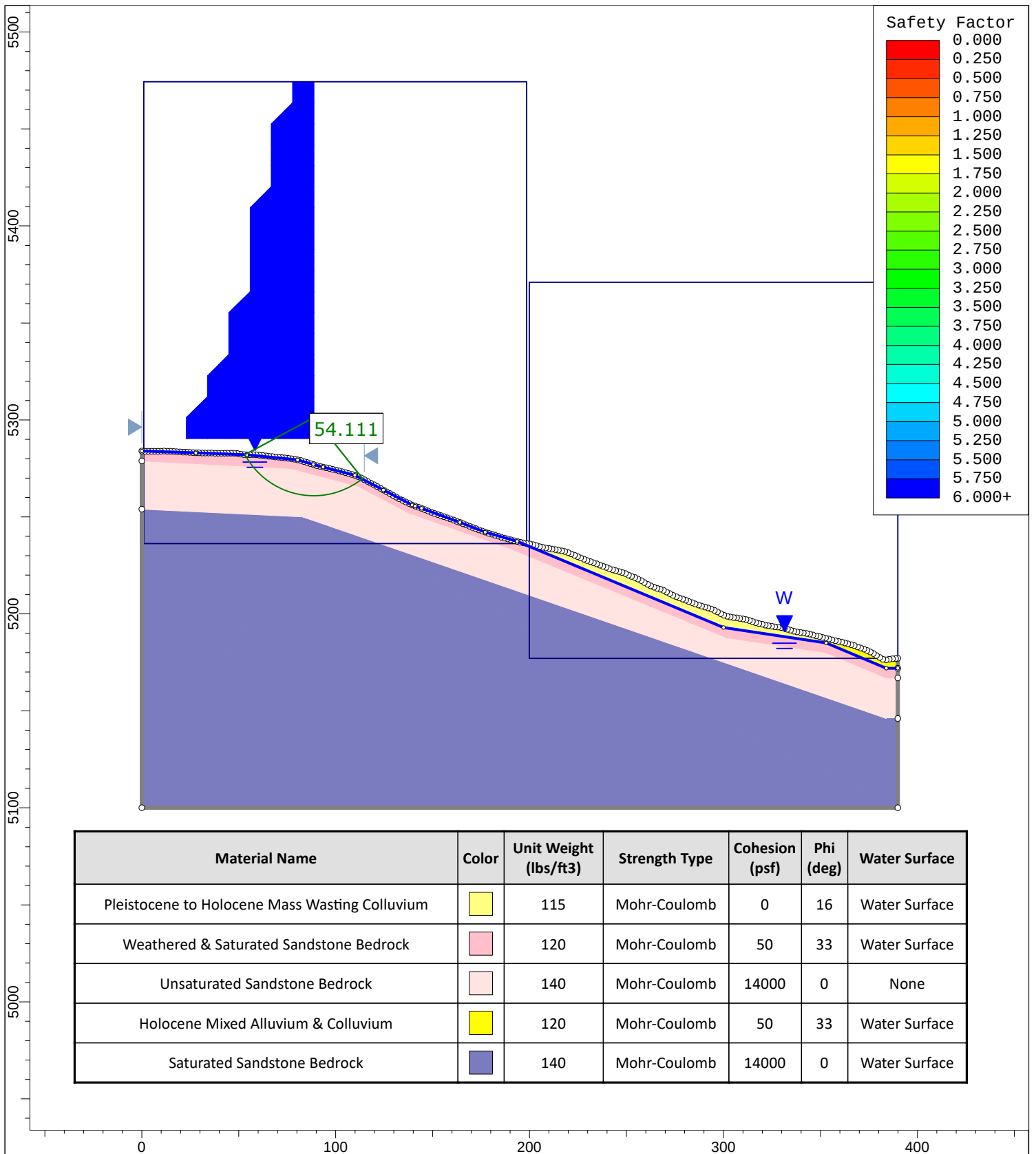


Profile F - Static



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103

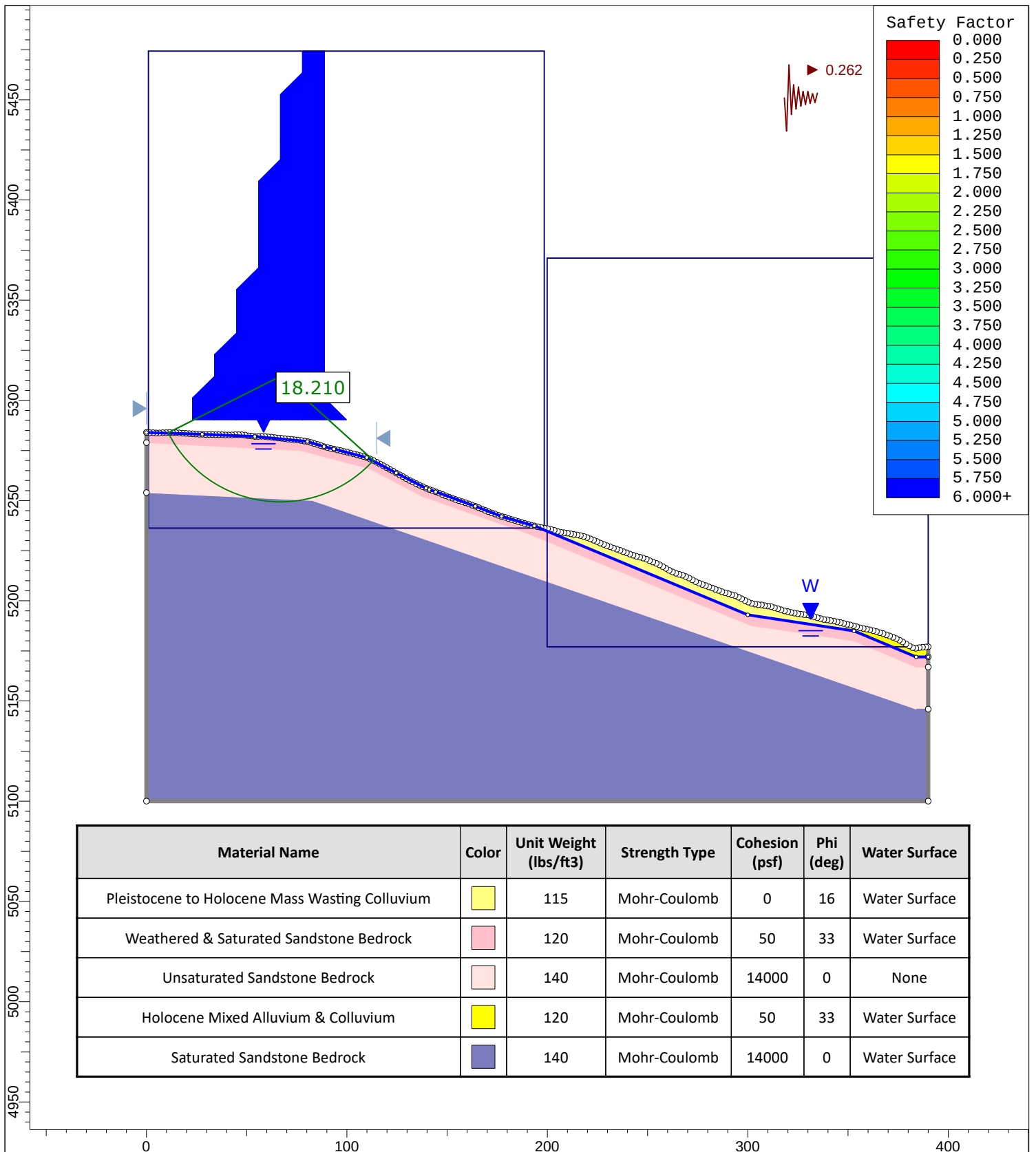


Profile F Excluding Steep Slopes - Static



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104

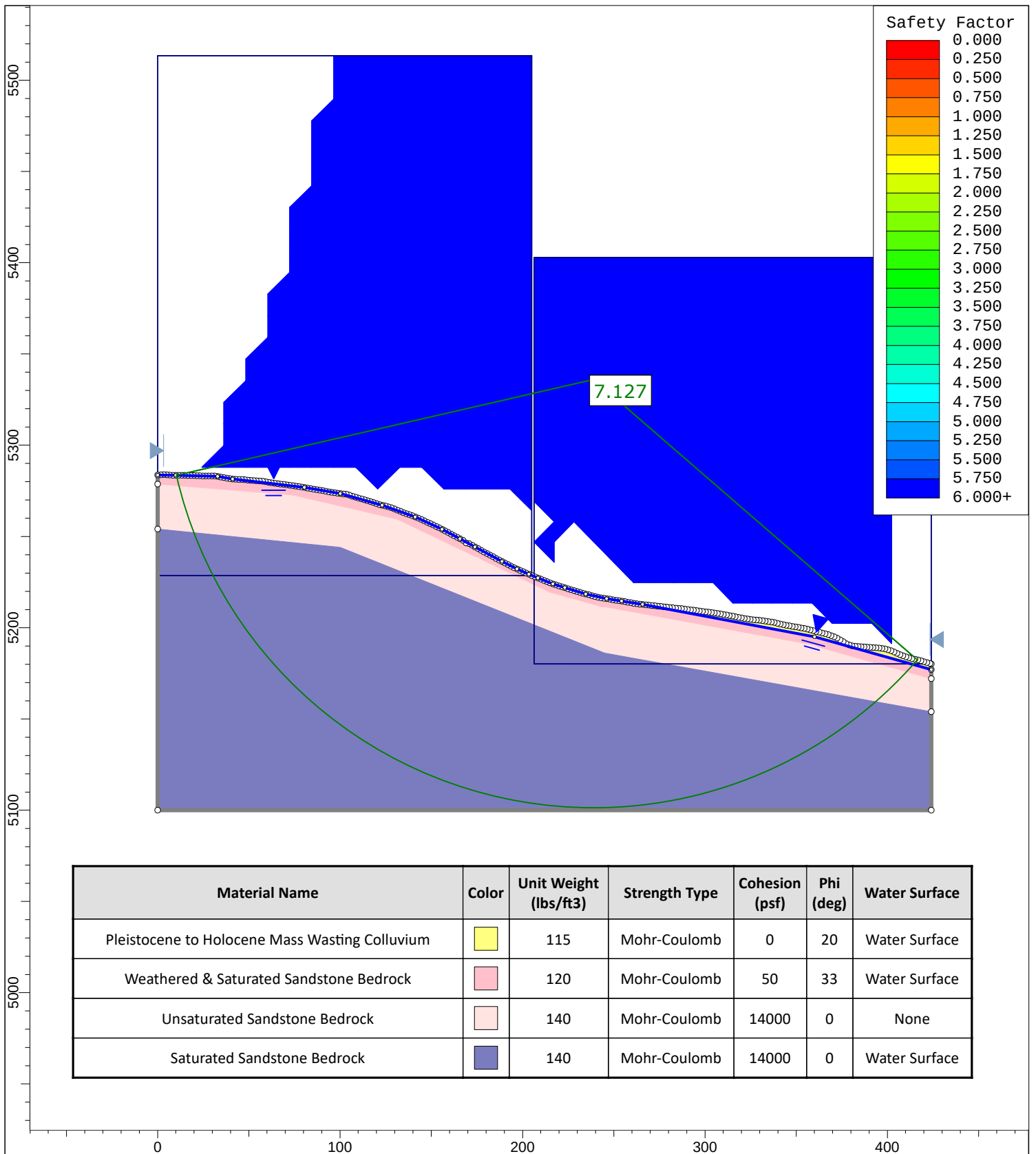


Profile F Excluding Steep Slopes - Pseudo Static



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105

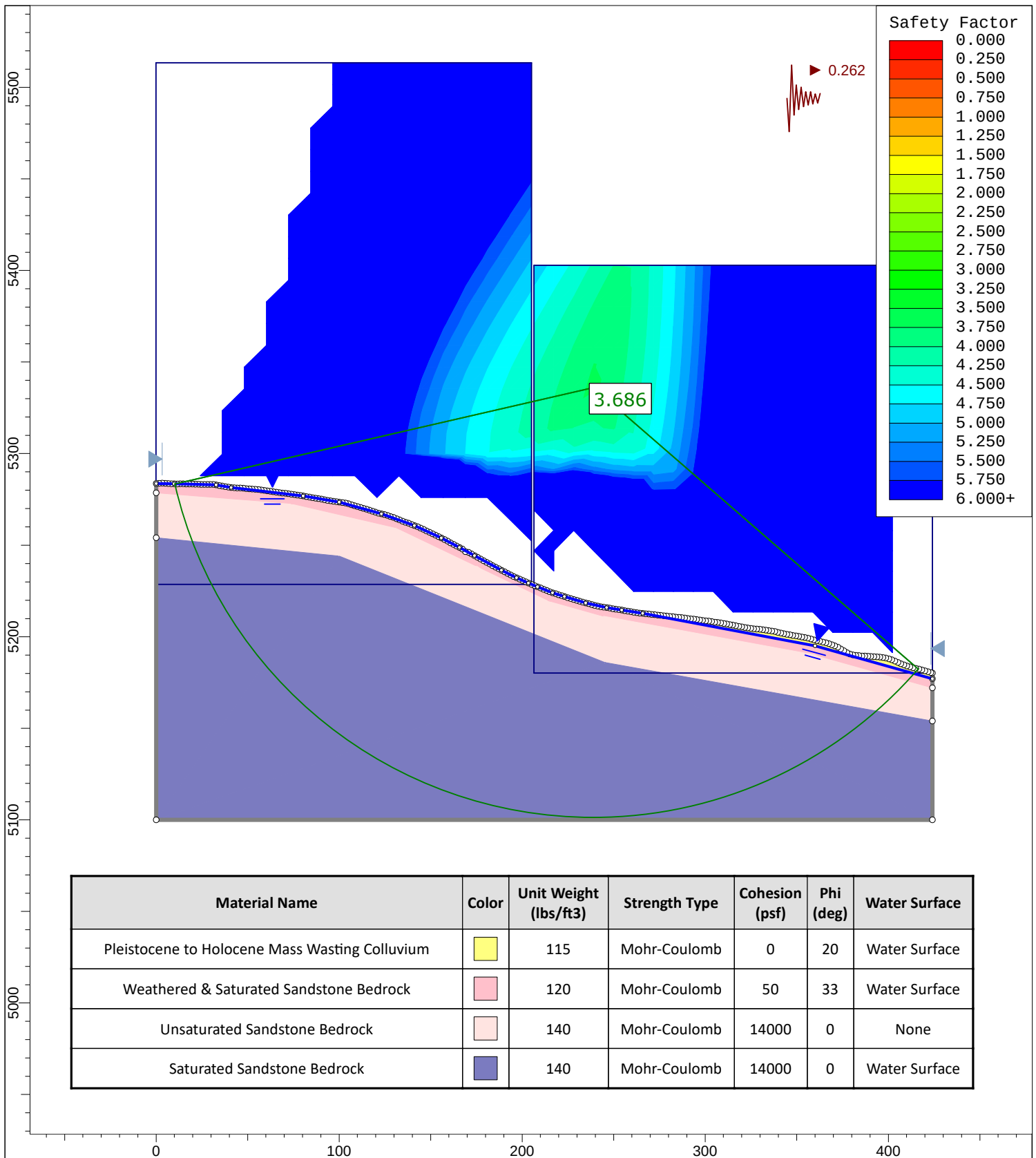


Profile G - Static



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106

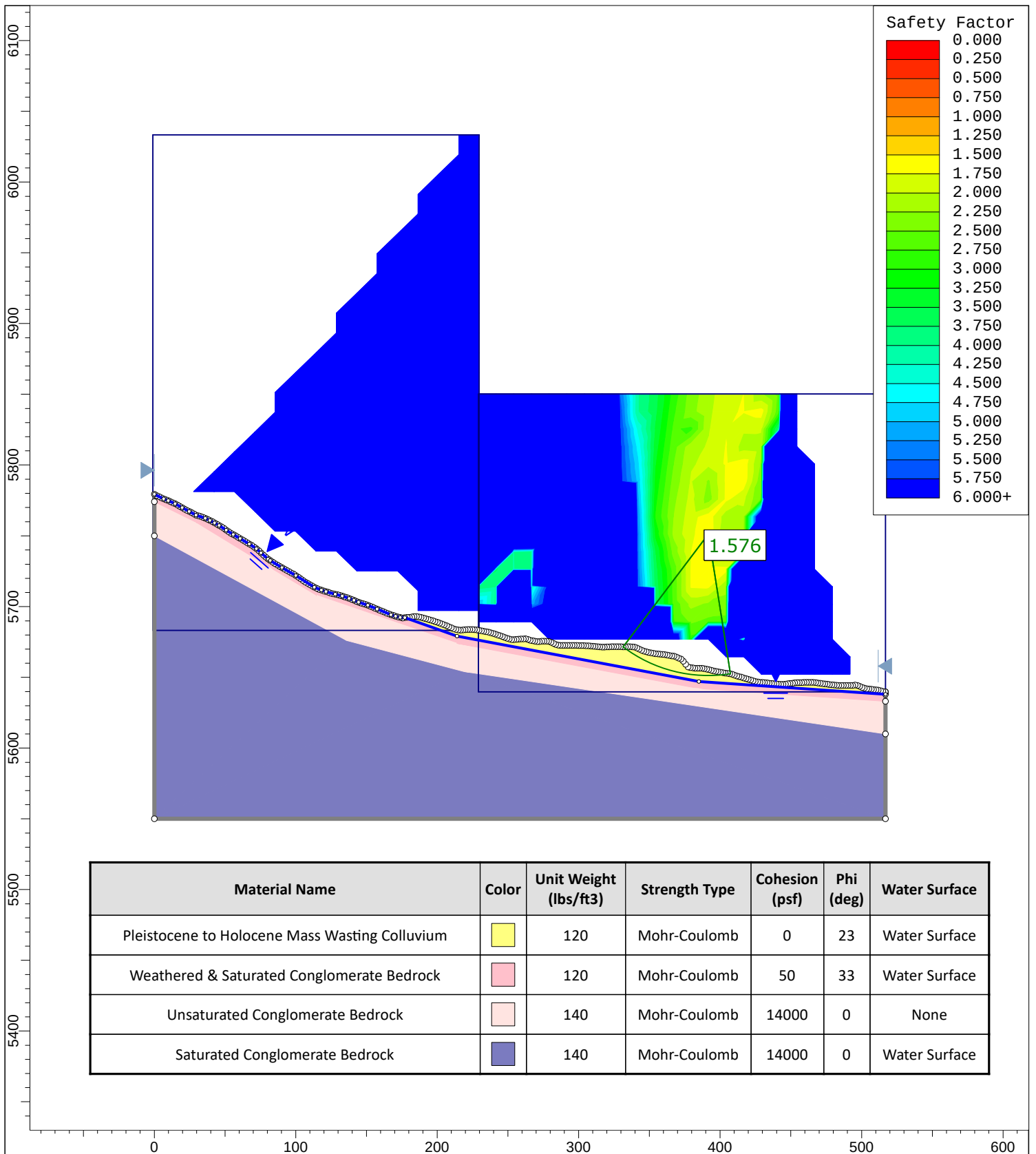


Profile G - Pseudo Static



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107

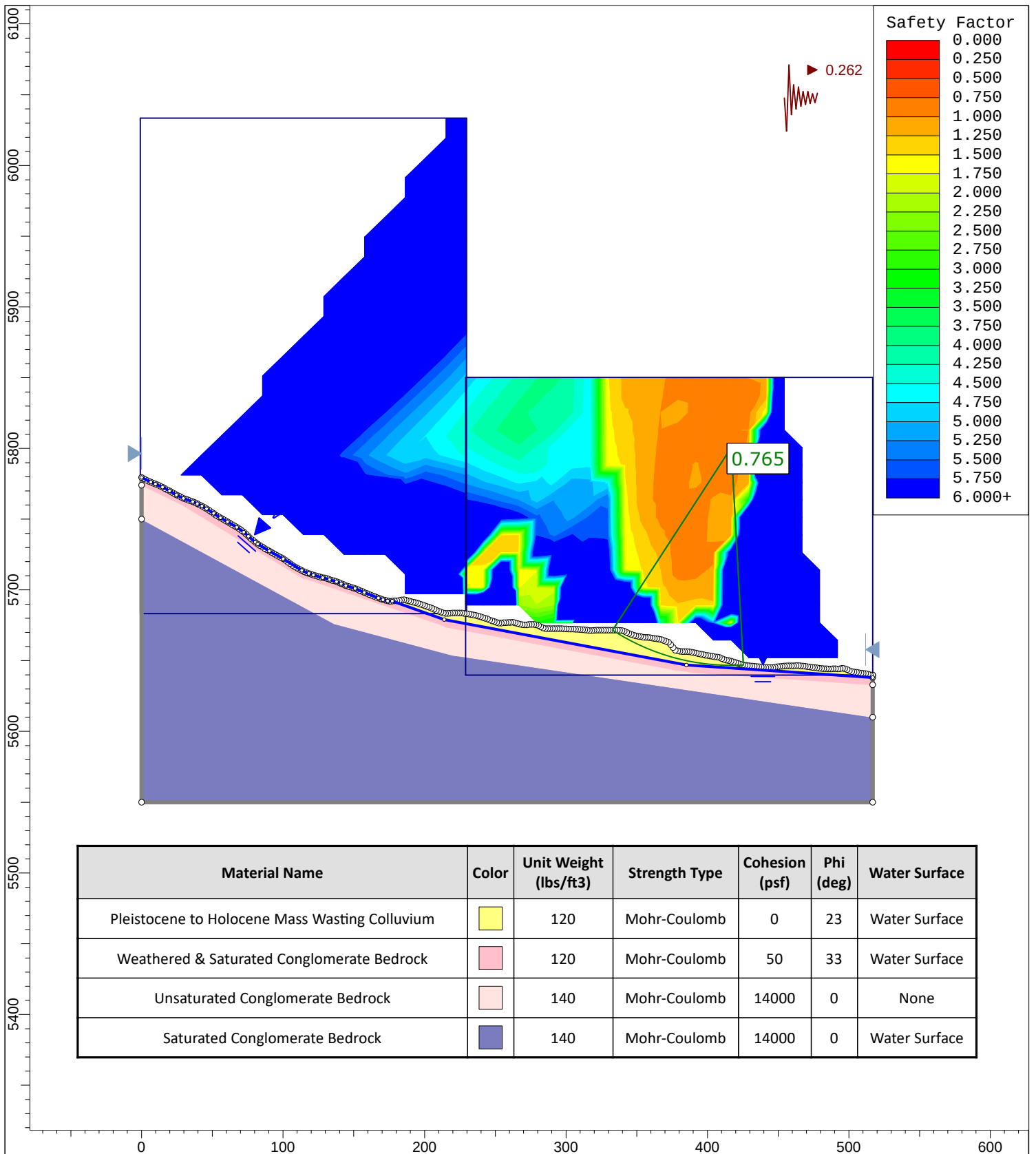


Profile H - Static



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108

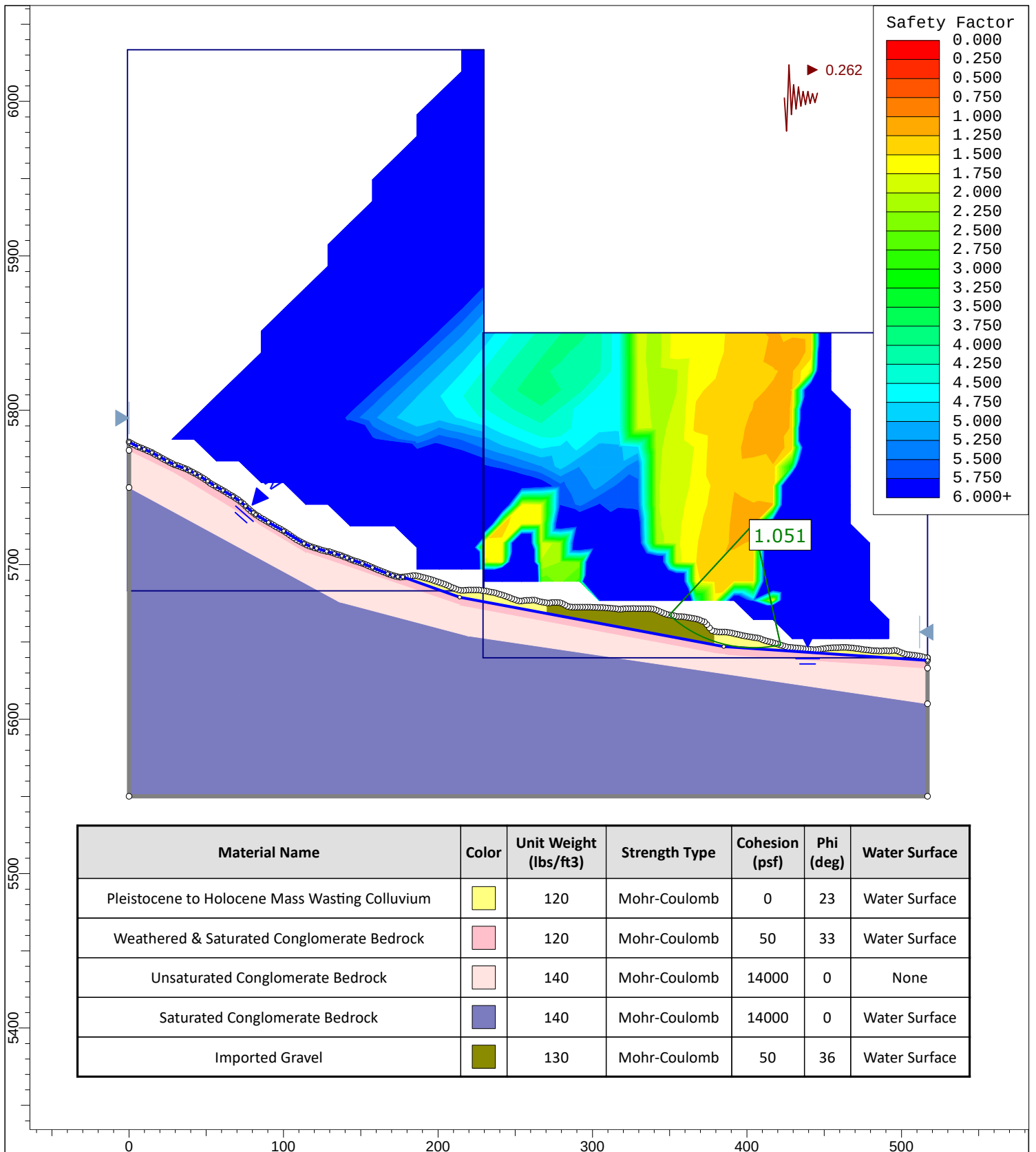


Profile H - Pseudo Static



Lewis Homes
Osprey Ranch Development
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Plate
109



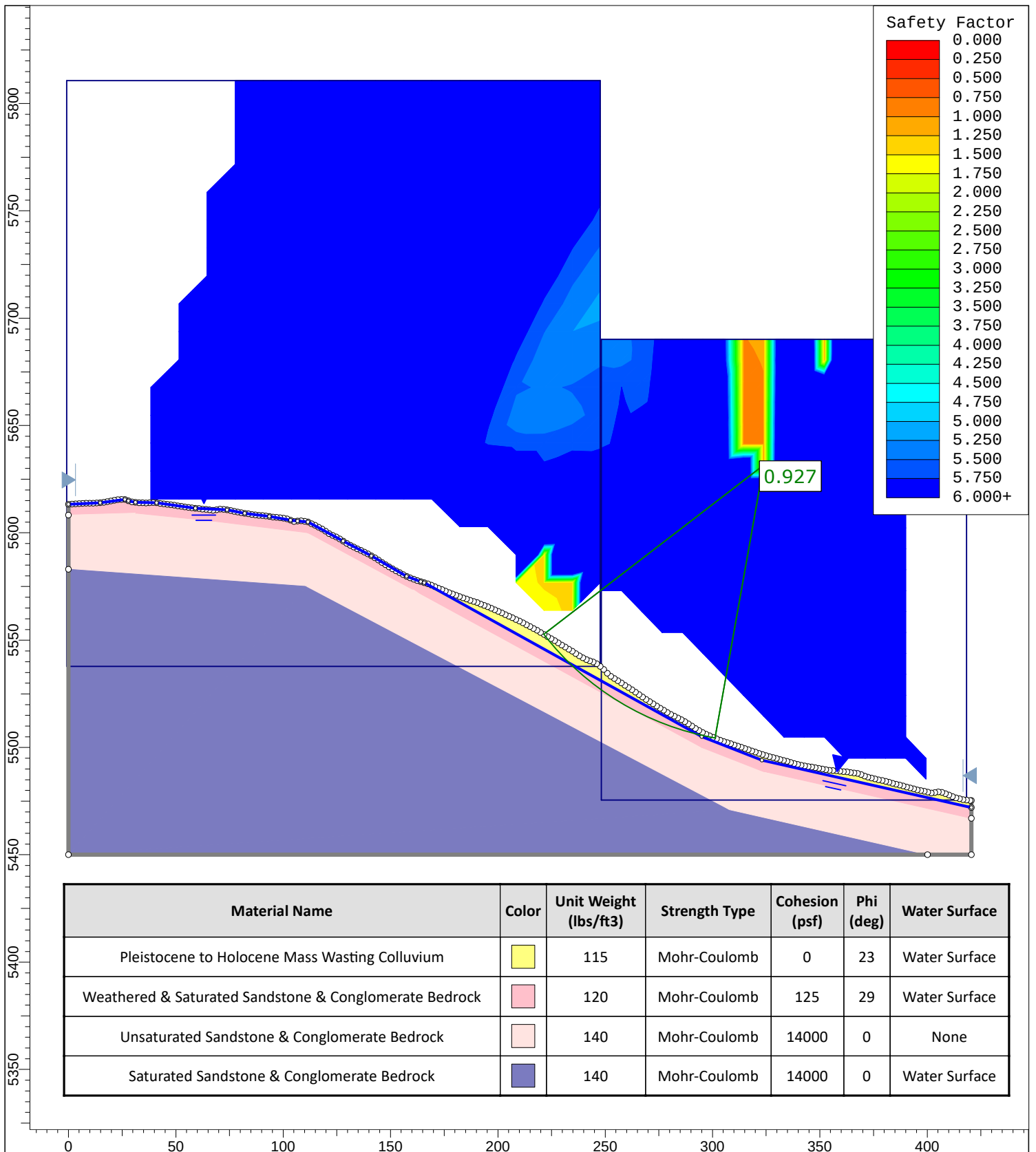
Profile H with Gravel Pad -Pseudo Static



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Plate

110



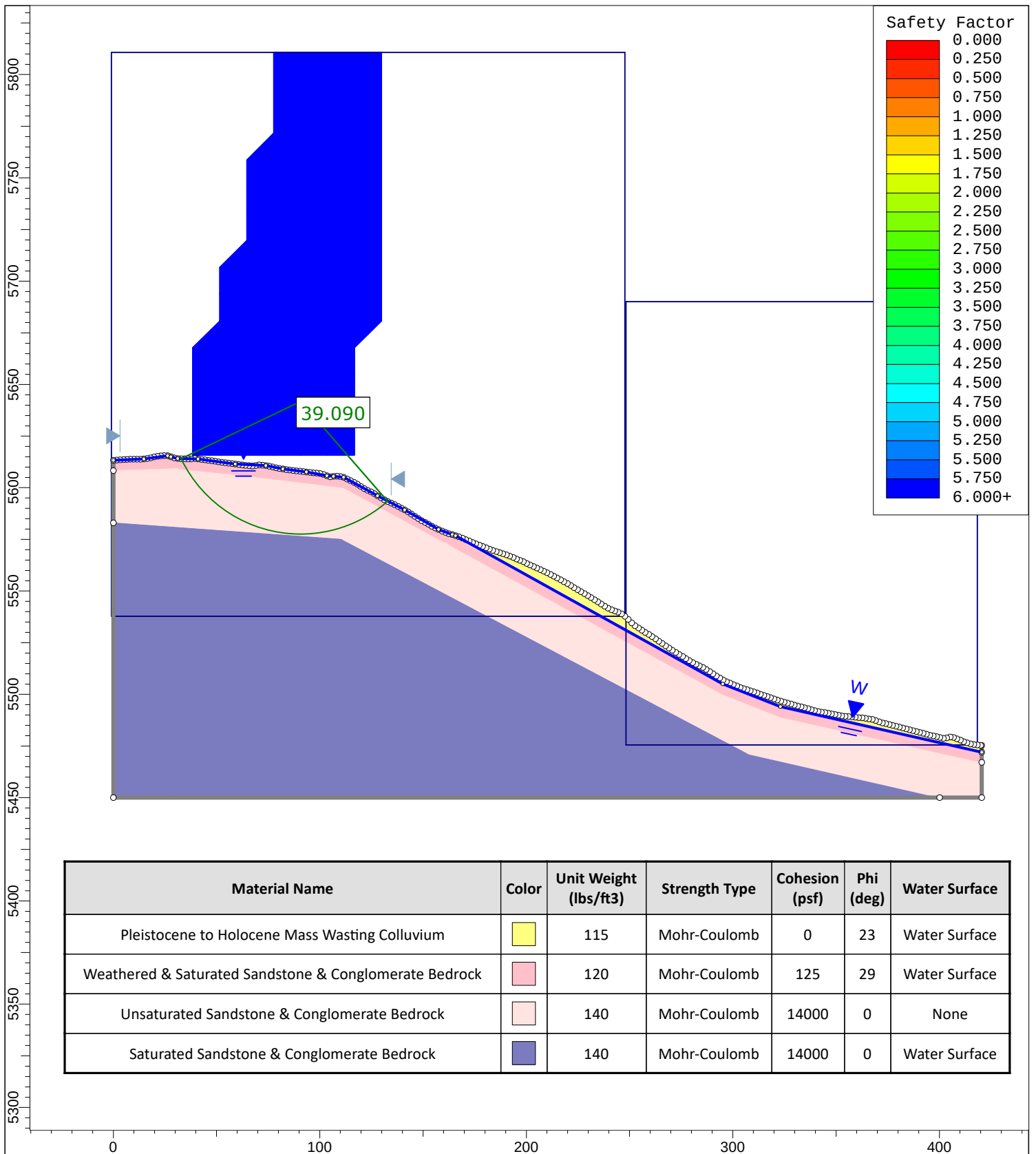
Profile I - Static



Lewis Homes
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Plate

111

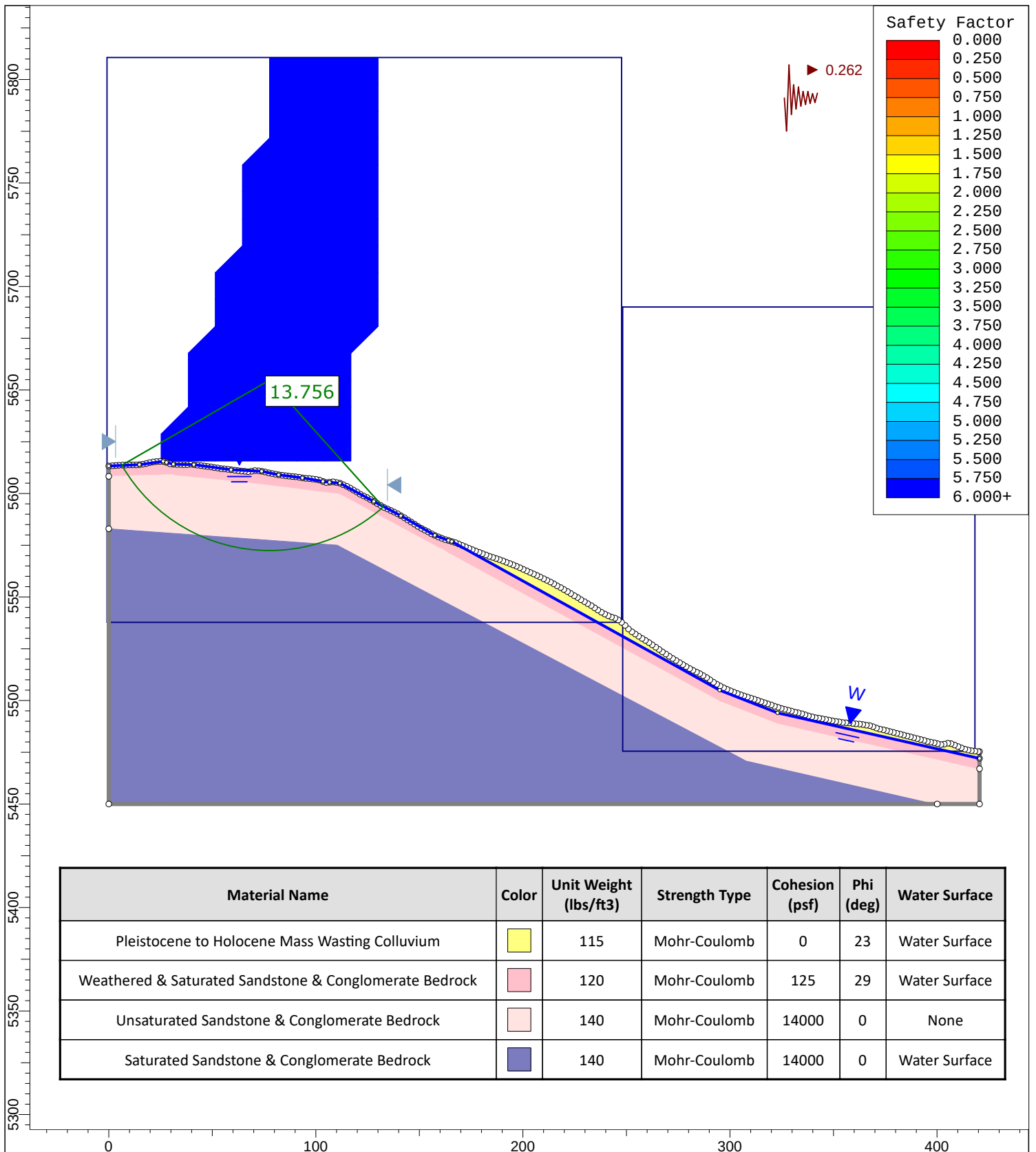


Profile I Excluding Steep Slopes - Static



Lewis Homes
Osprey Ranch Development
Eden, Utah
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Plate
112

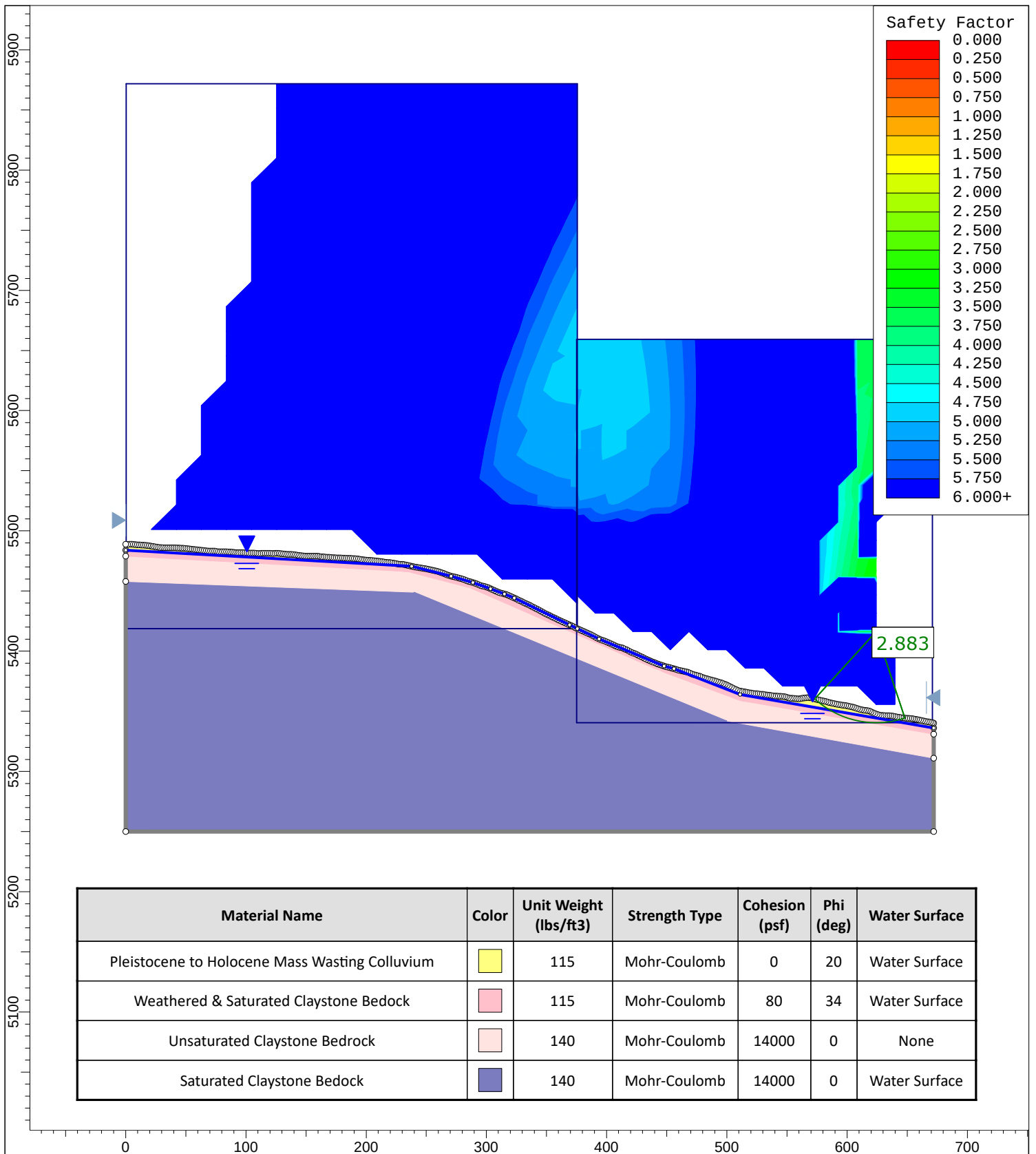


Profile I Excluding Steep Slopes - Pseudo Static



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Plate
113



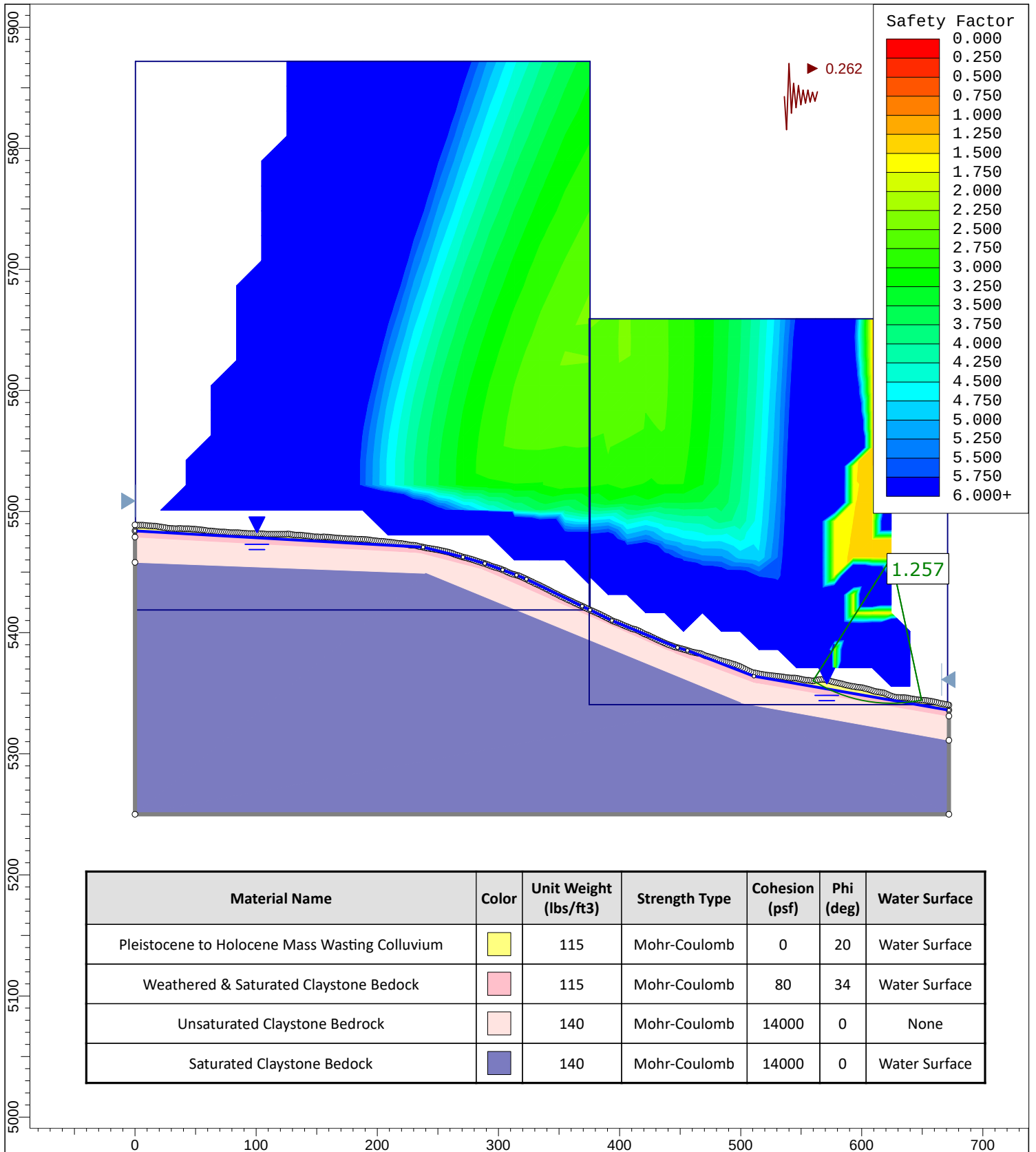
Profile J - Static



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114

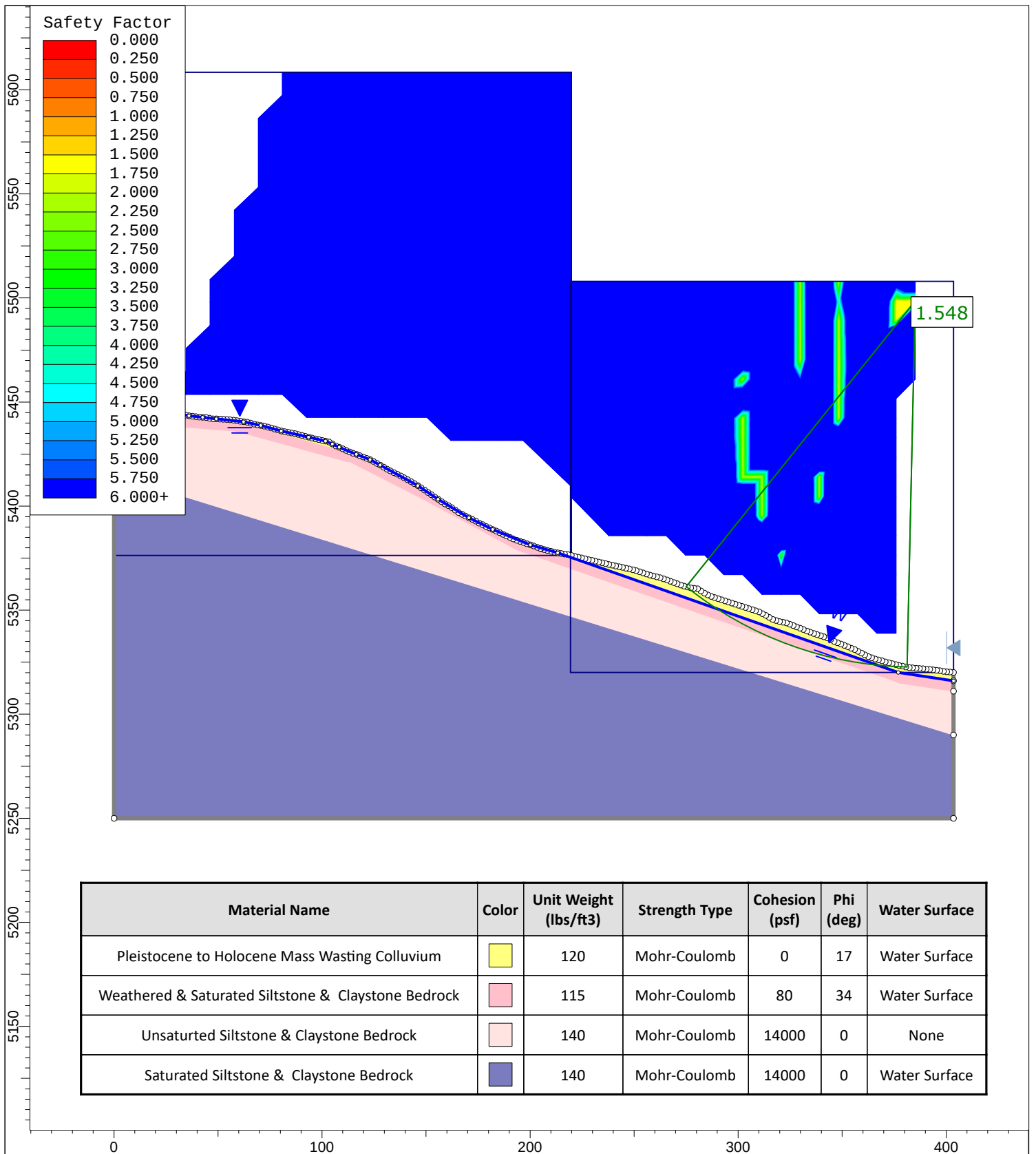


Profile J - Pseudo Static



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Plate
115

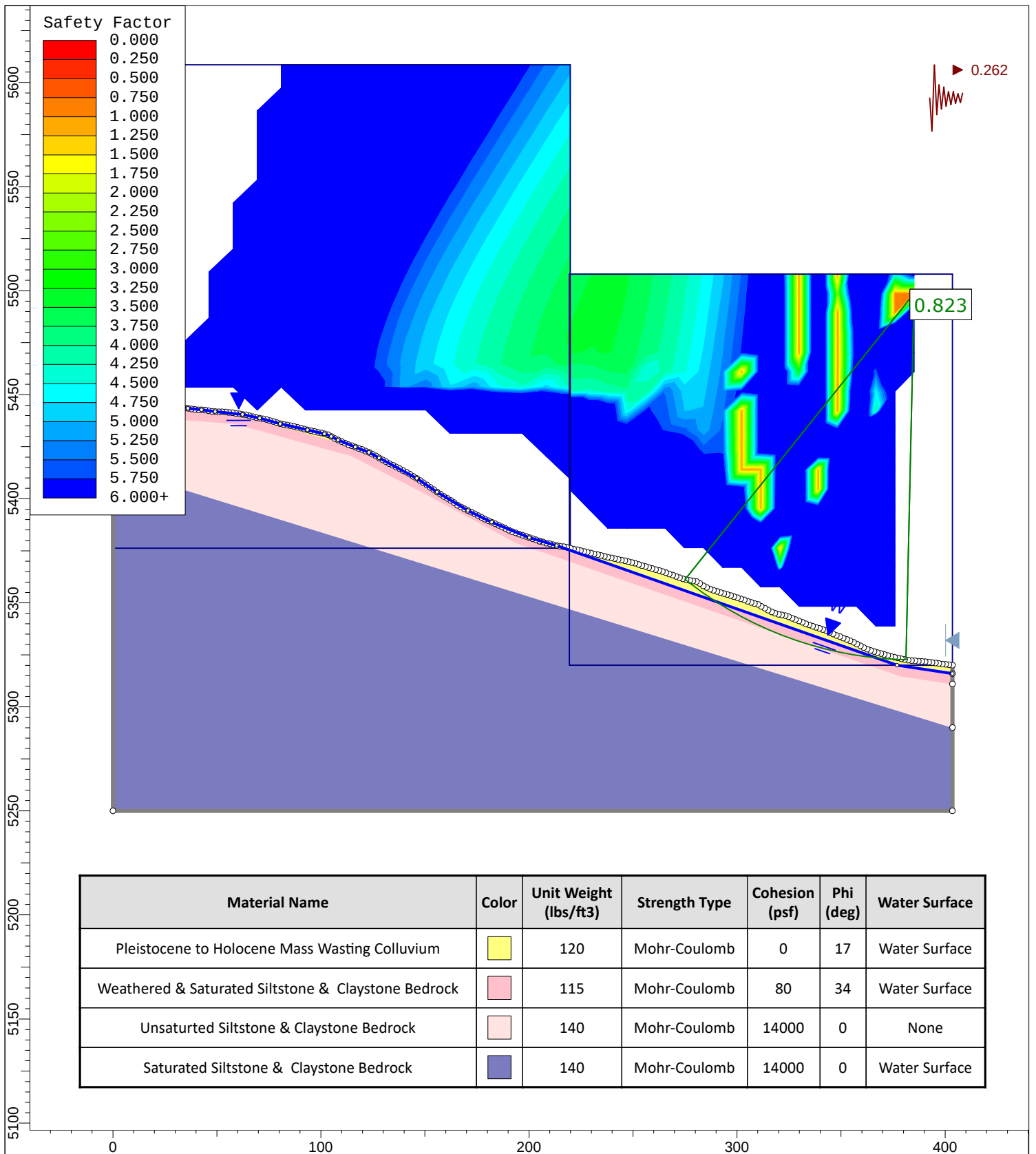


Profile K - Static



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116

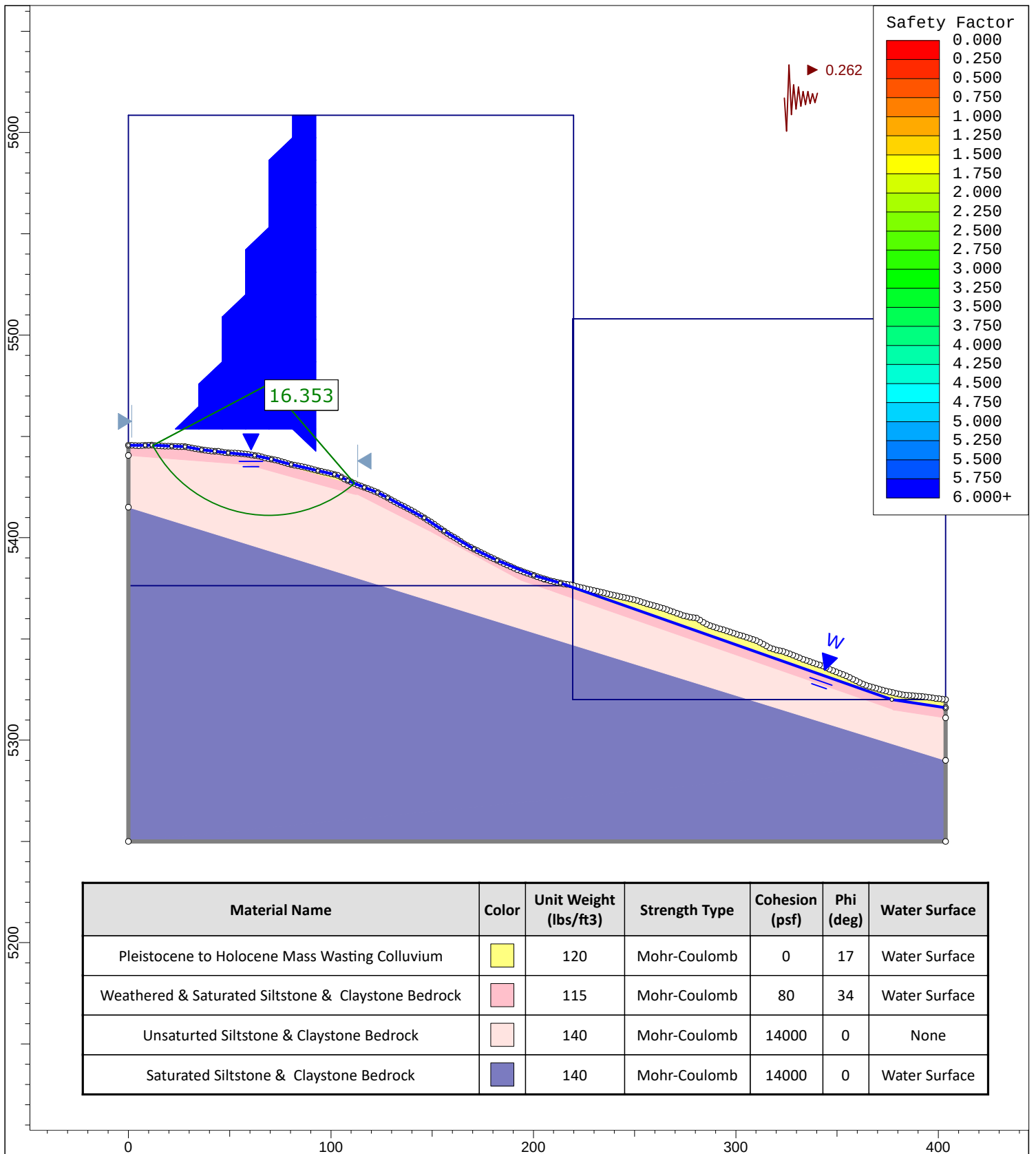


Profile K - Pseudo Static



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117

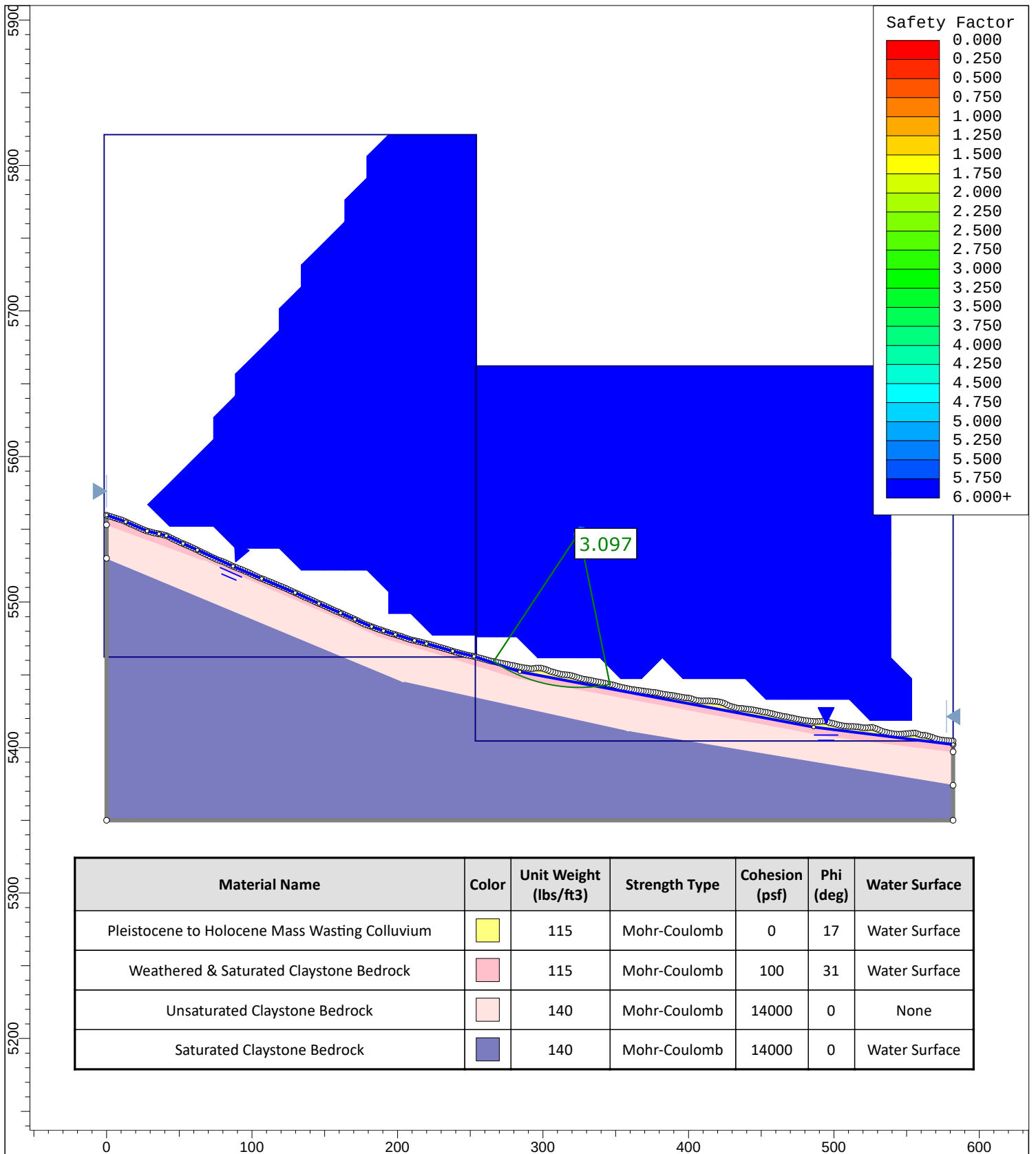


Profile K Excluding Steep Slopes- Pseudo Static



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118

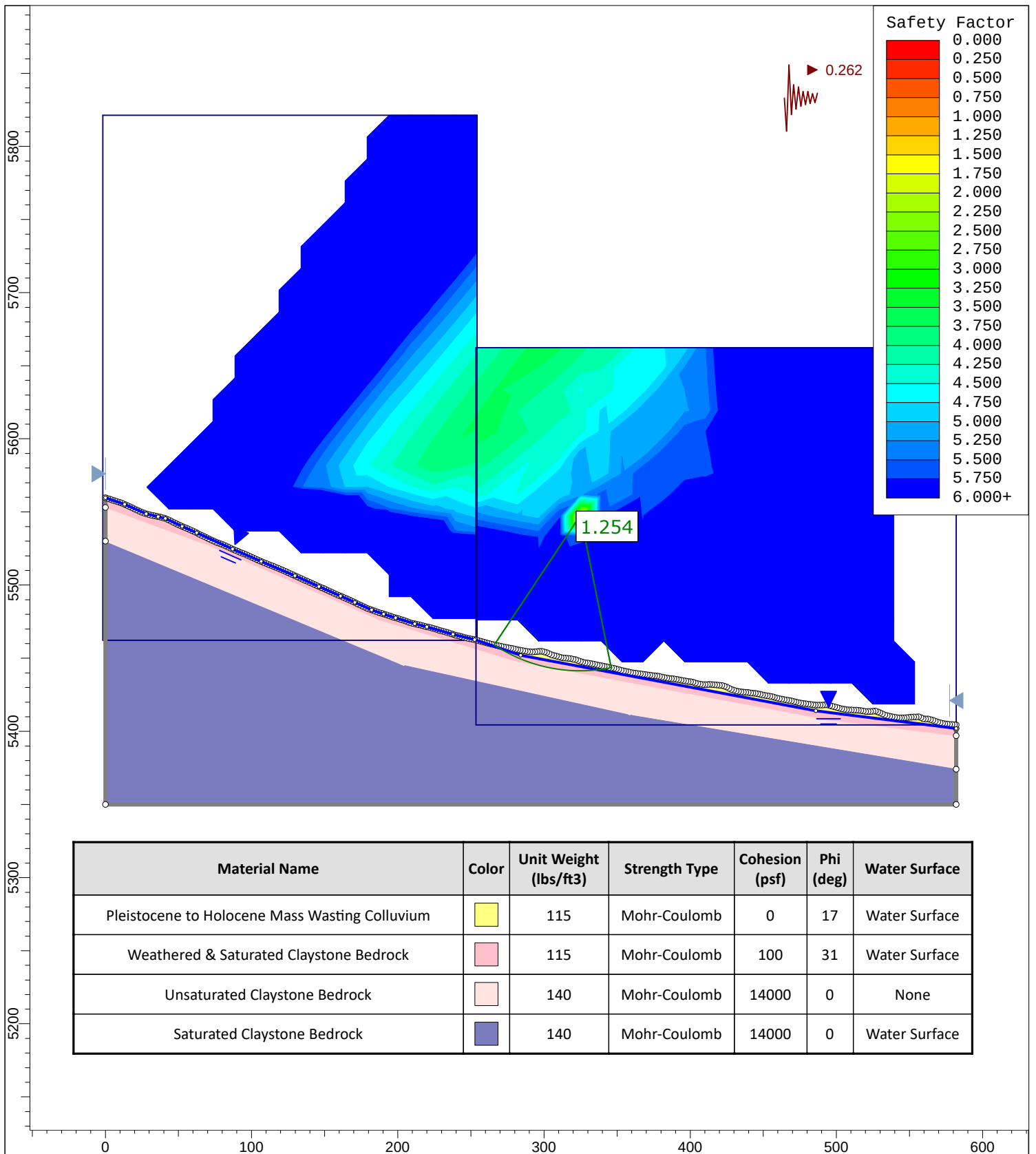


Profile L - Static



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Plate
119

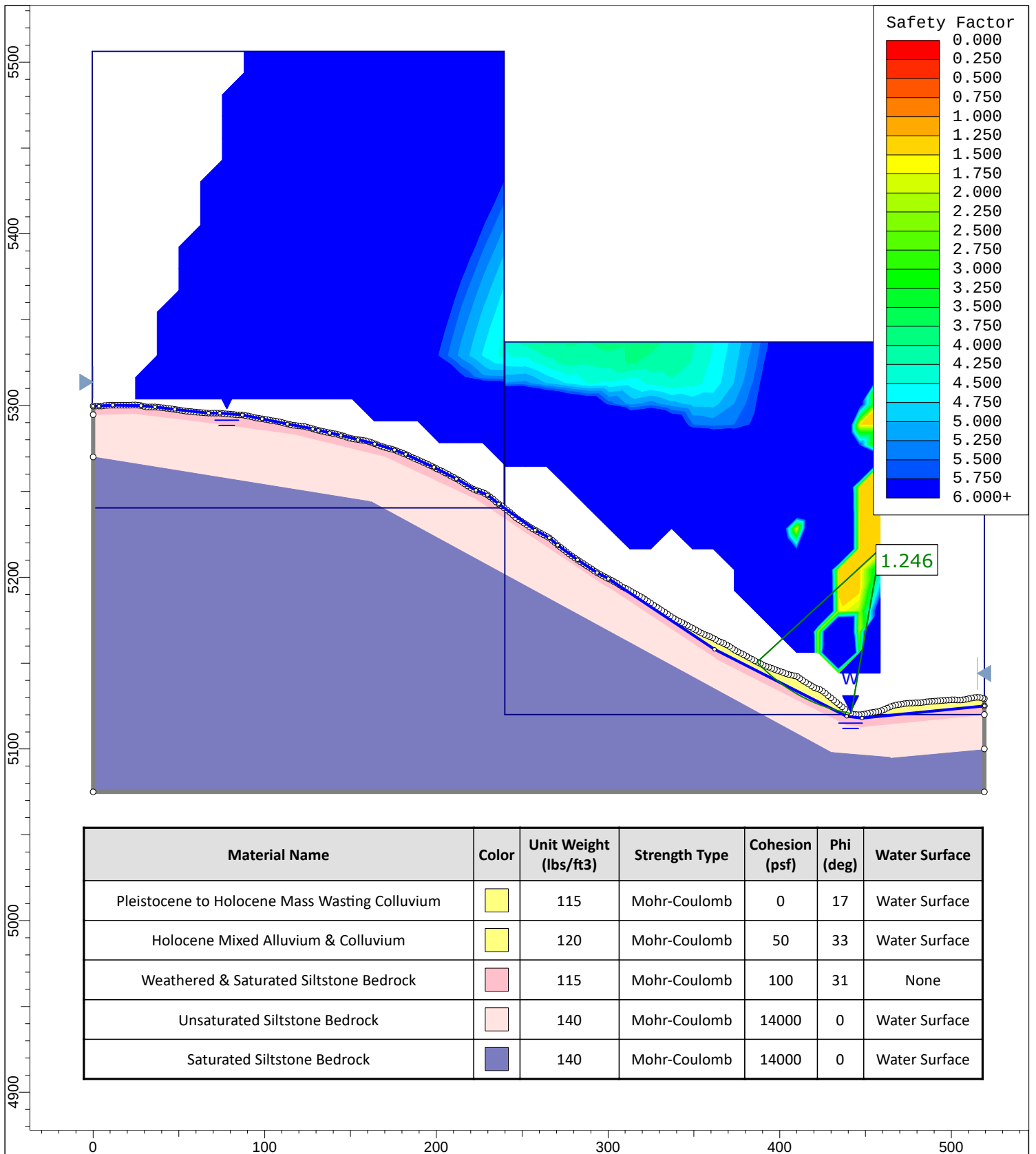


Profile L - Pseudo Static



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120

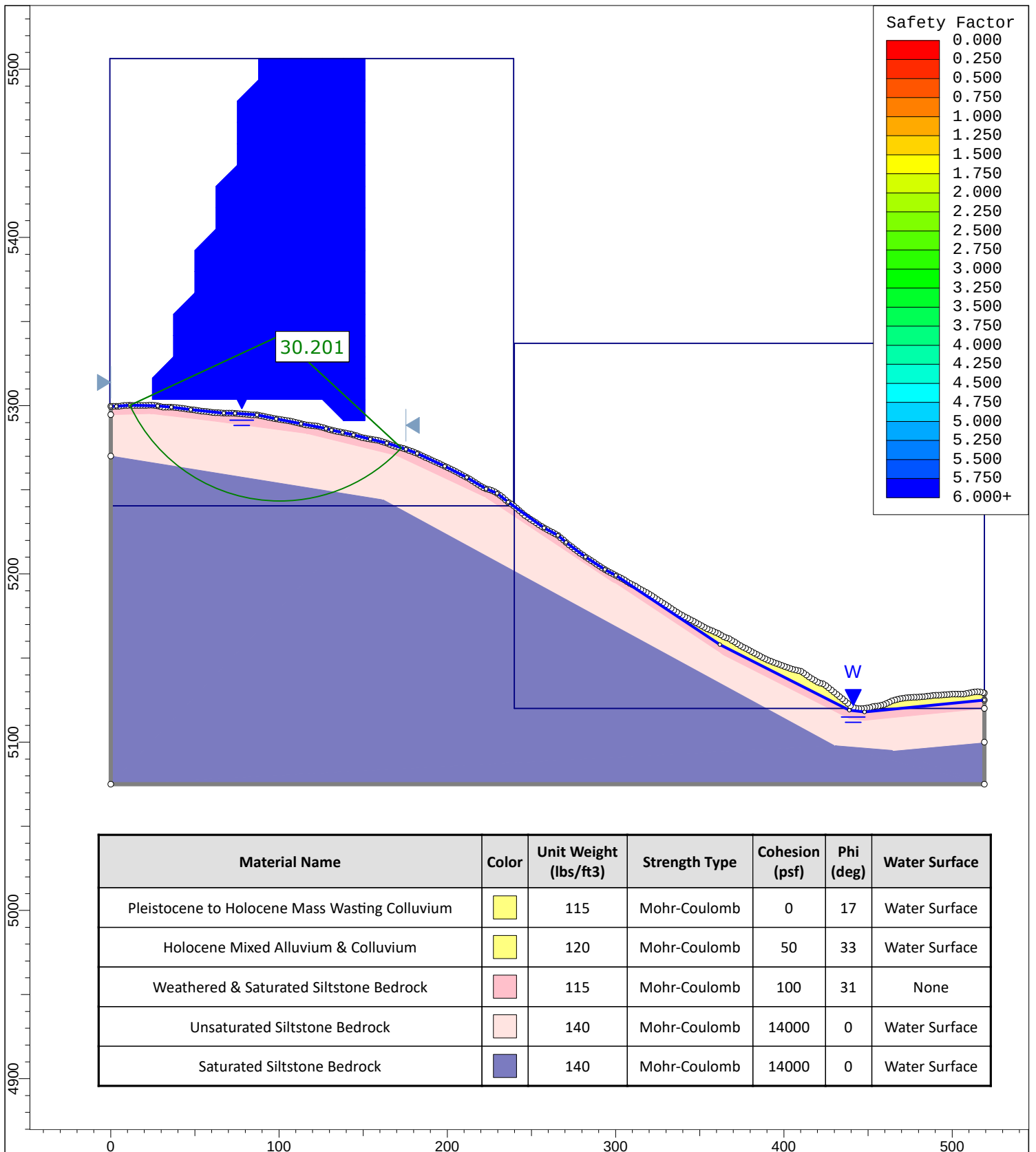


Profile M - Static



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121

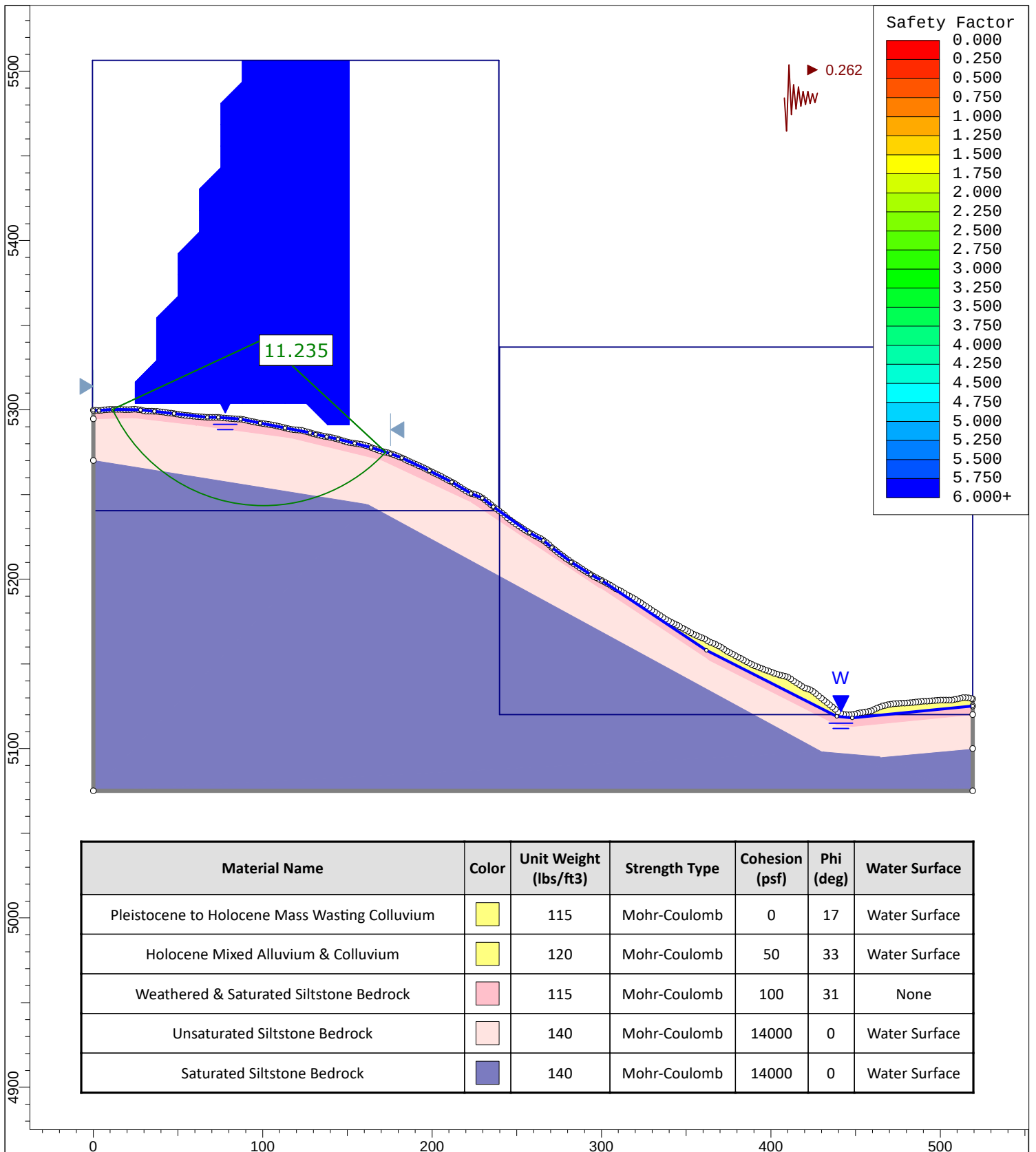


Profile M Excluding Steep Slopes - Static



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122

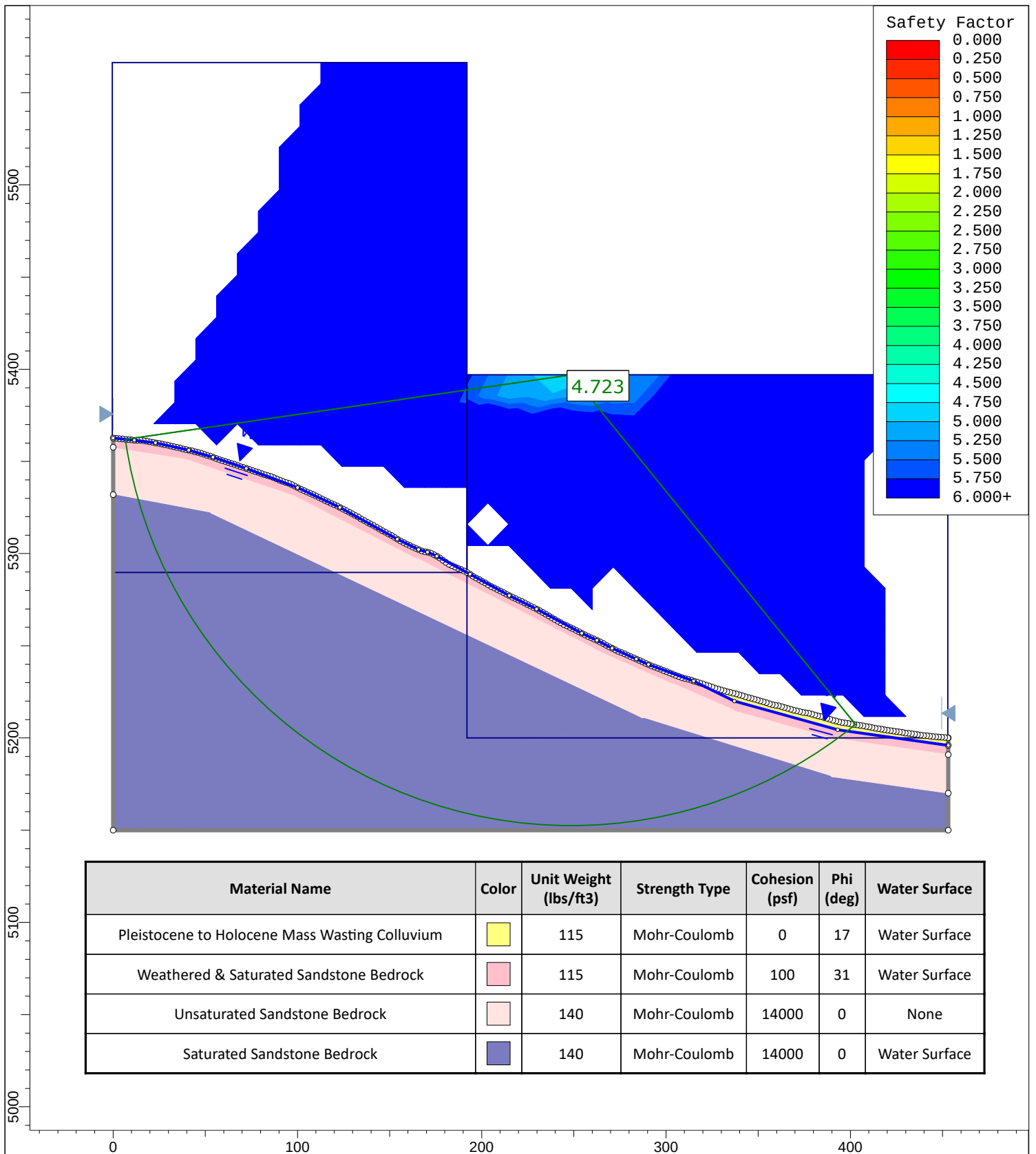


Profile M Excluding Steep Slopes - Pseudo Static



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123

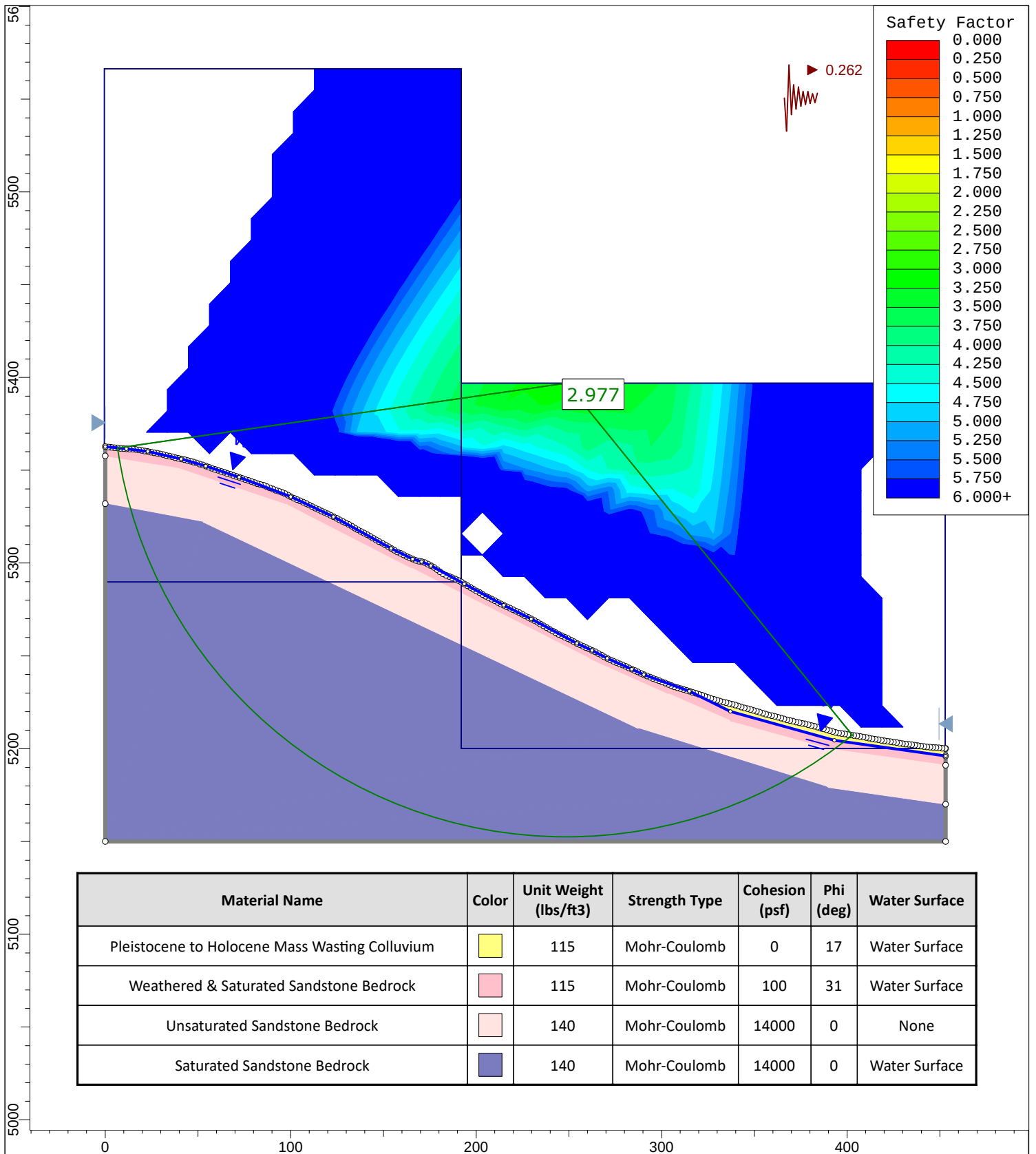


Profile N - Static



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124

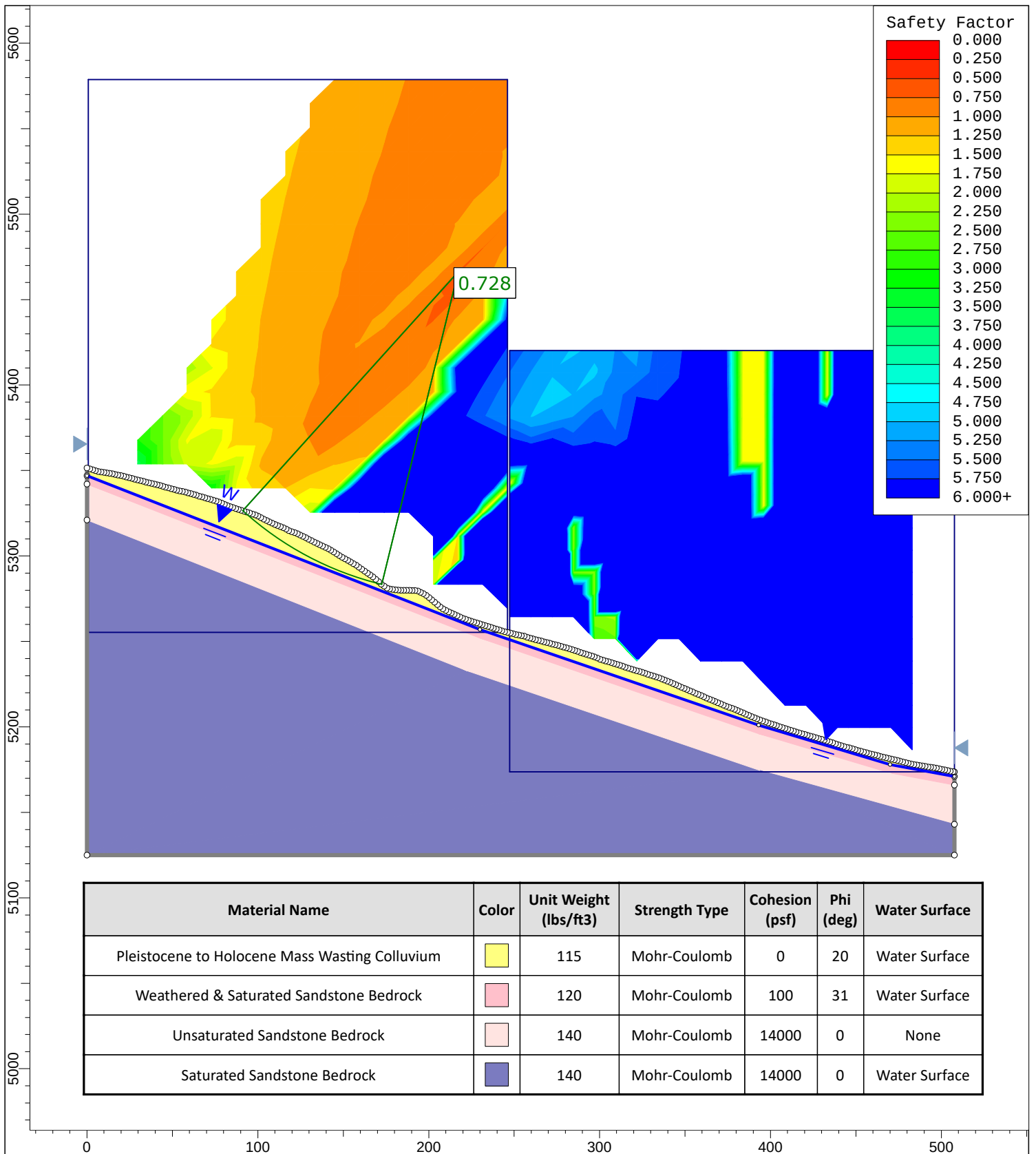


Profile N - Pseudo Static



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125

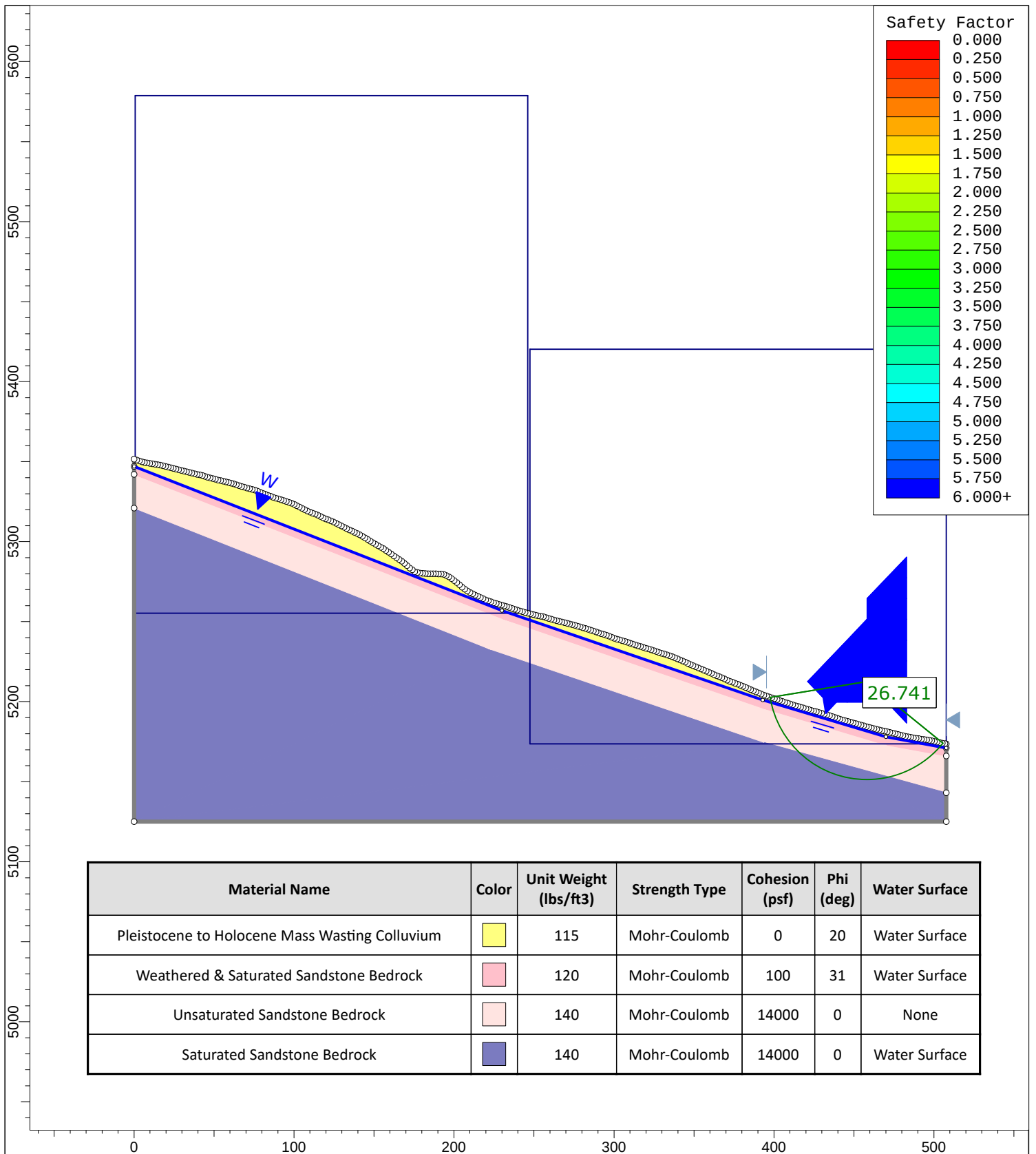


Profile O - Static



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126

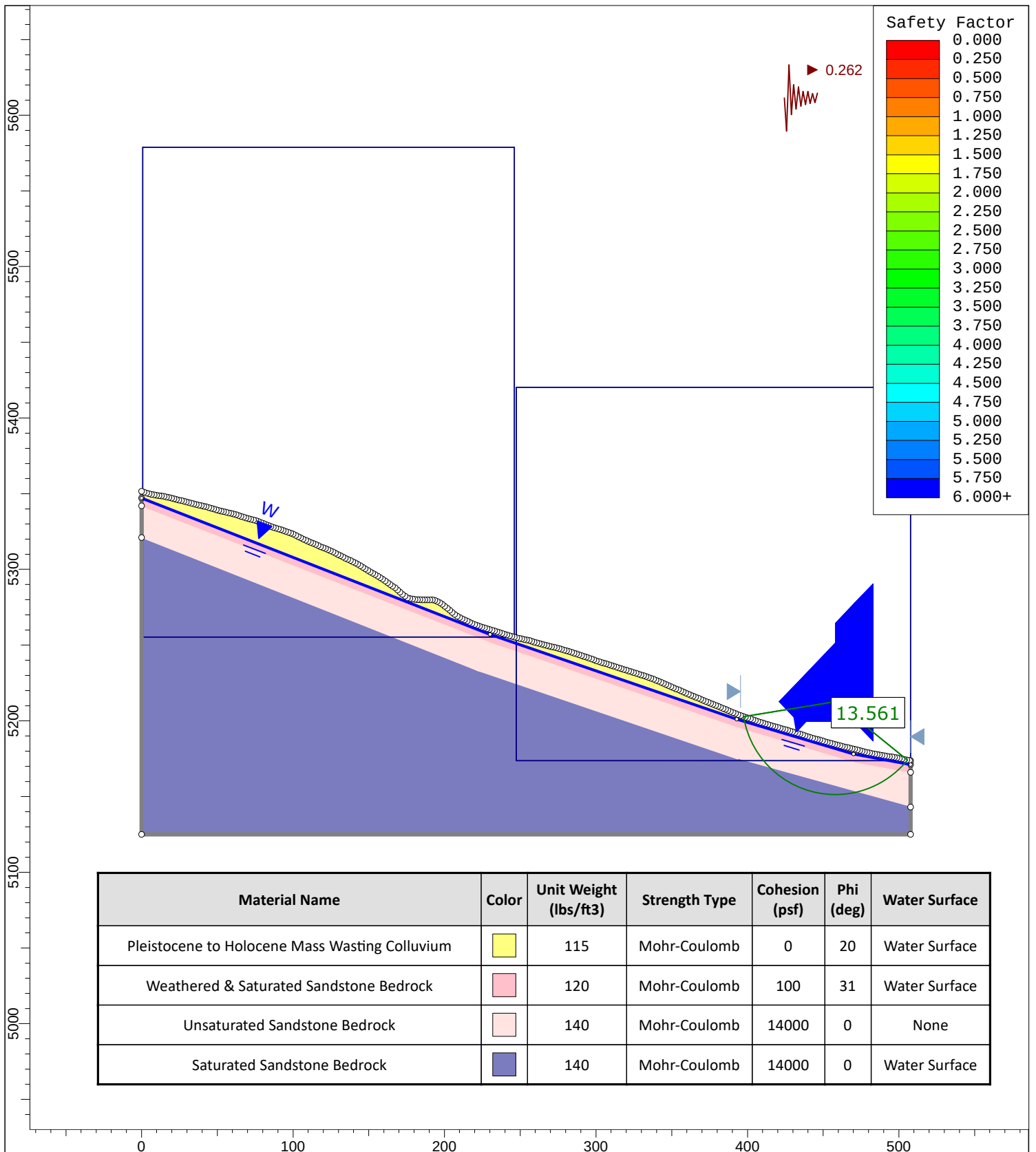


Profile O Excluding Steep Slopes - Static



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127

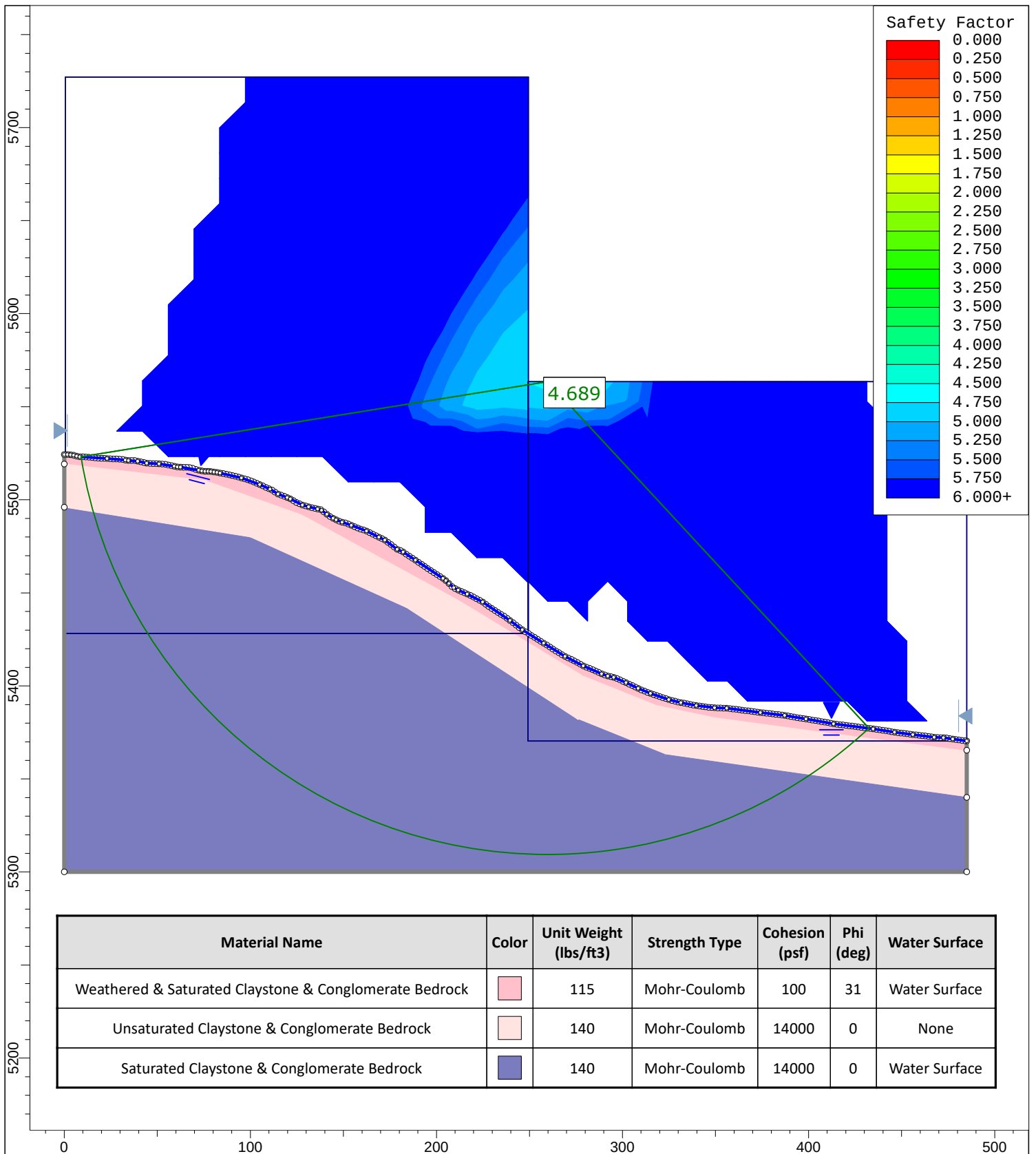


Profile O Excluding Steep Slopes - Pseudo Static



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128

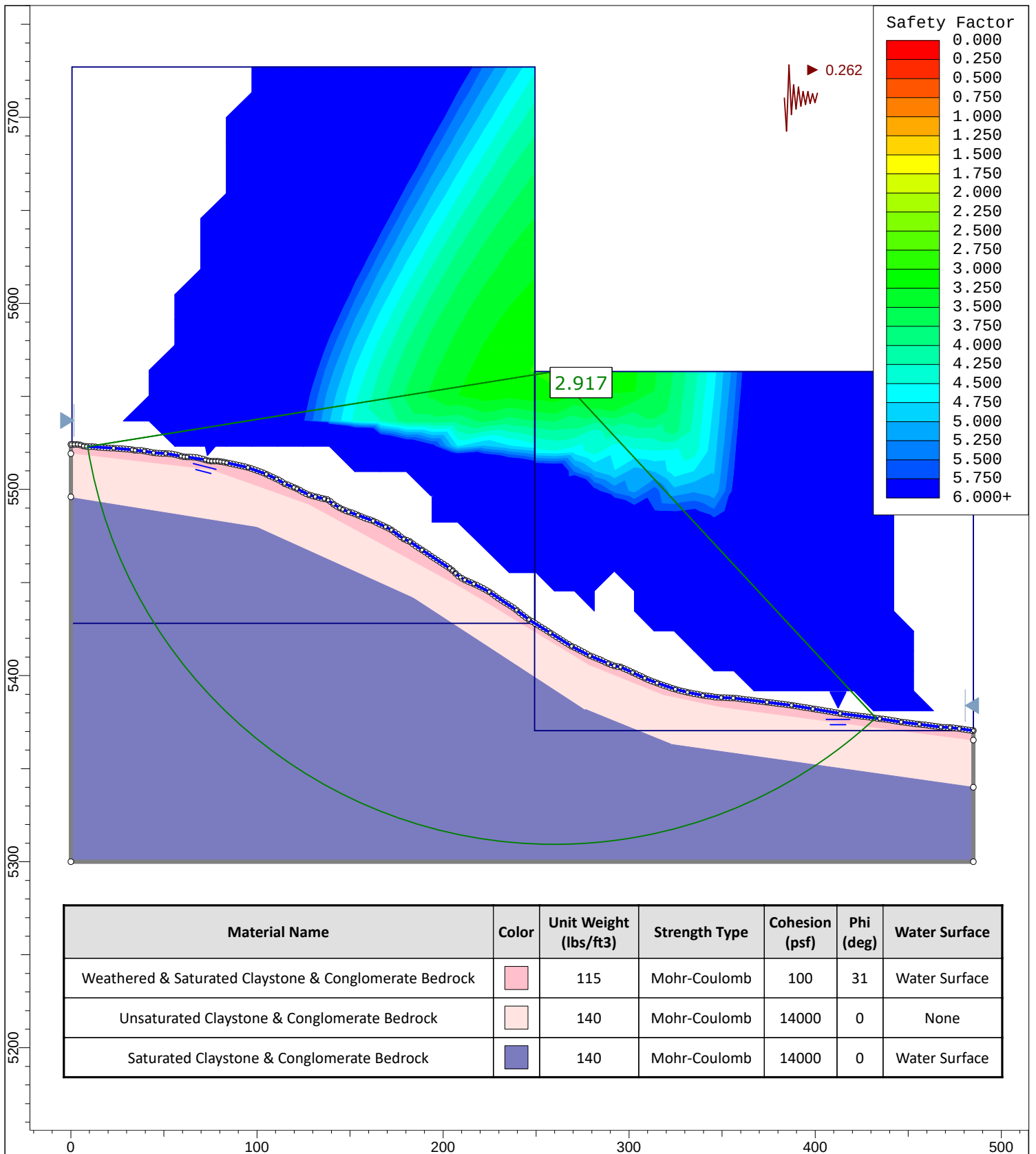


Profile P - Static



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129

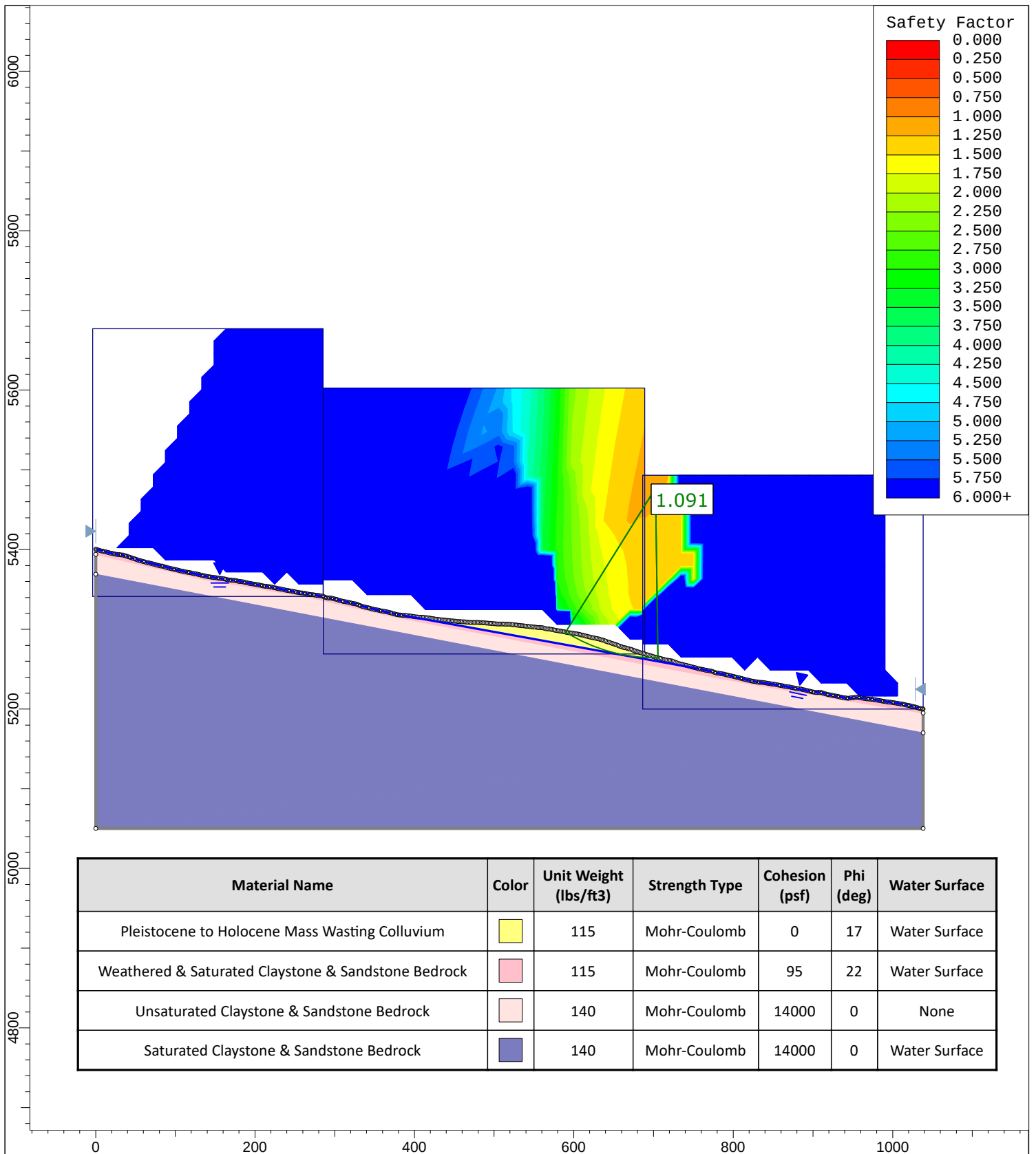


Profile P - Pseudo Static



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130

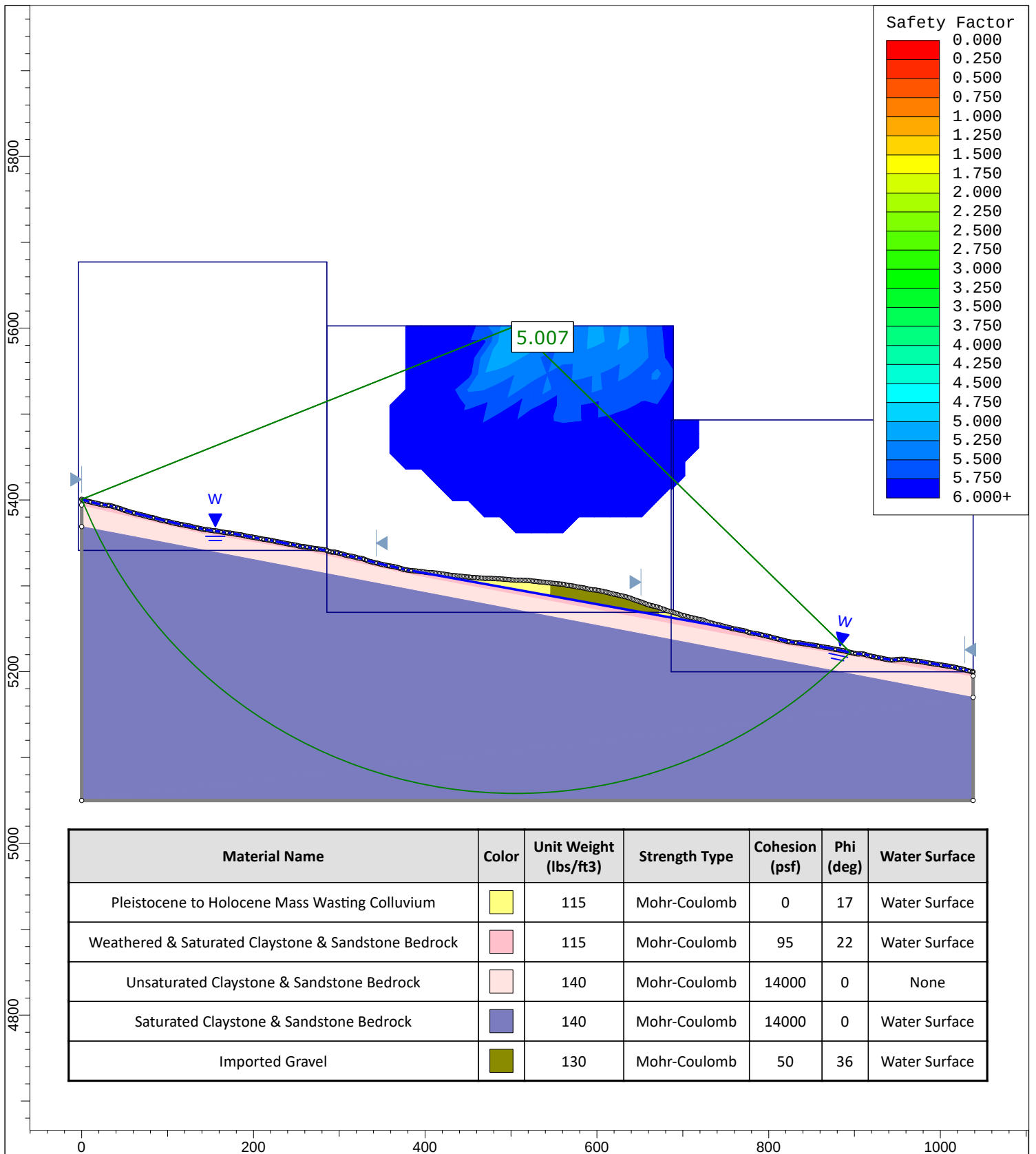


Profile A - Static



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131

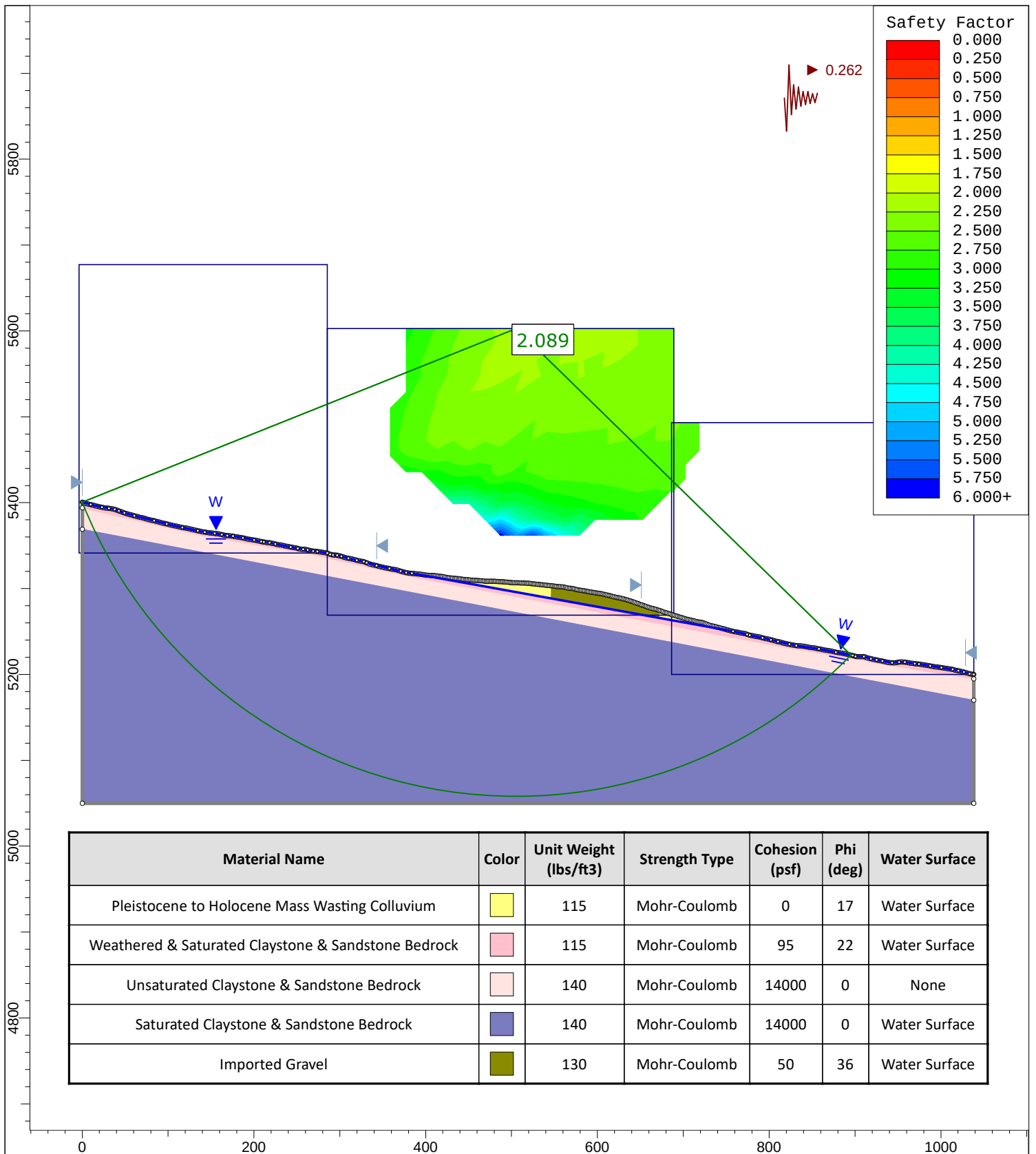


Profile A with Gravel Pad - Static



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132

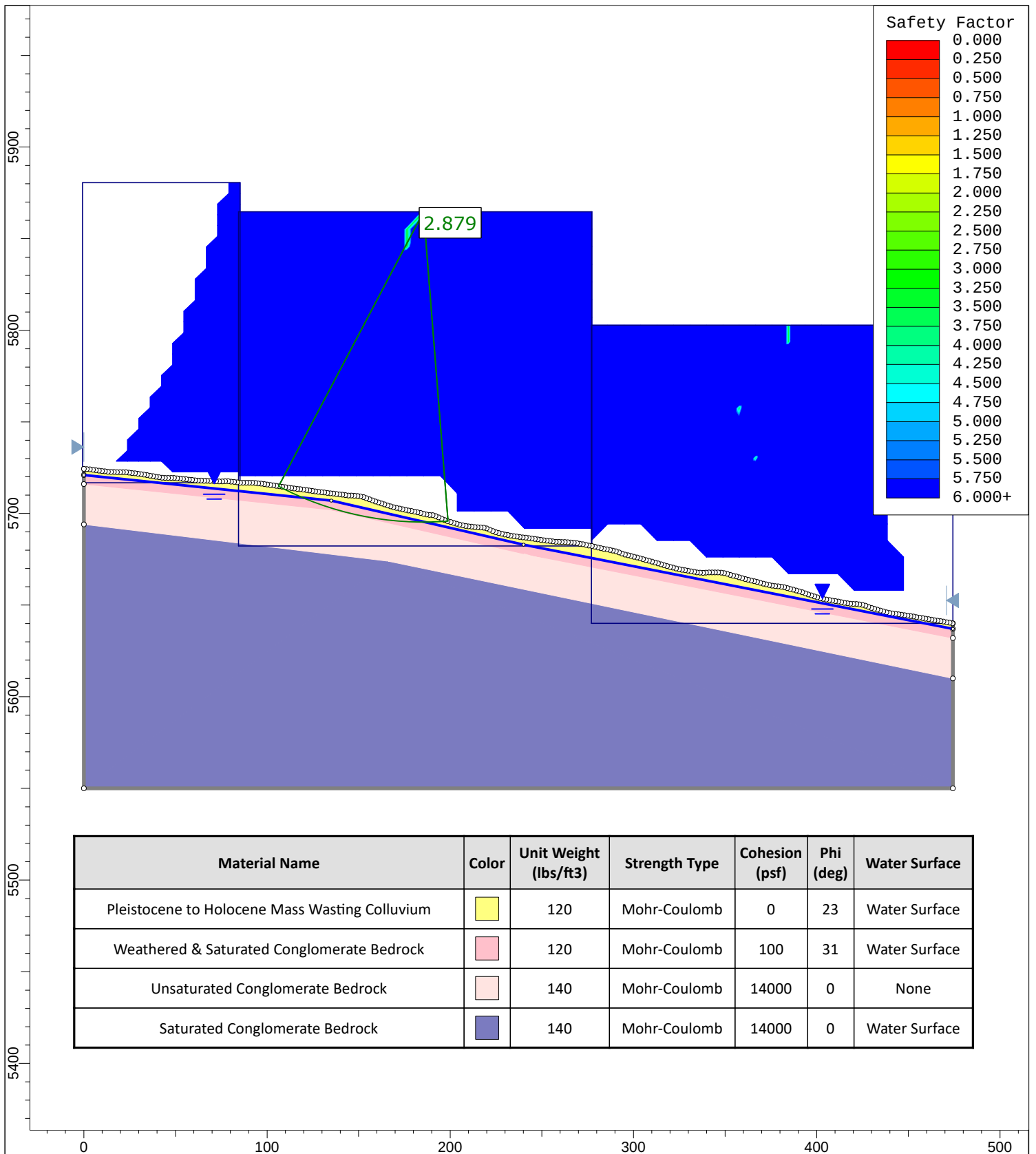


Profile A with Gravel Pad - Pseudo Static



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133

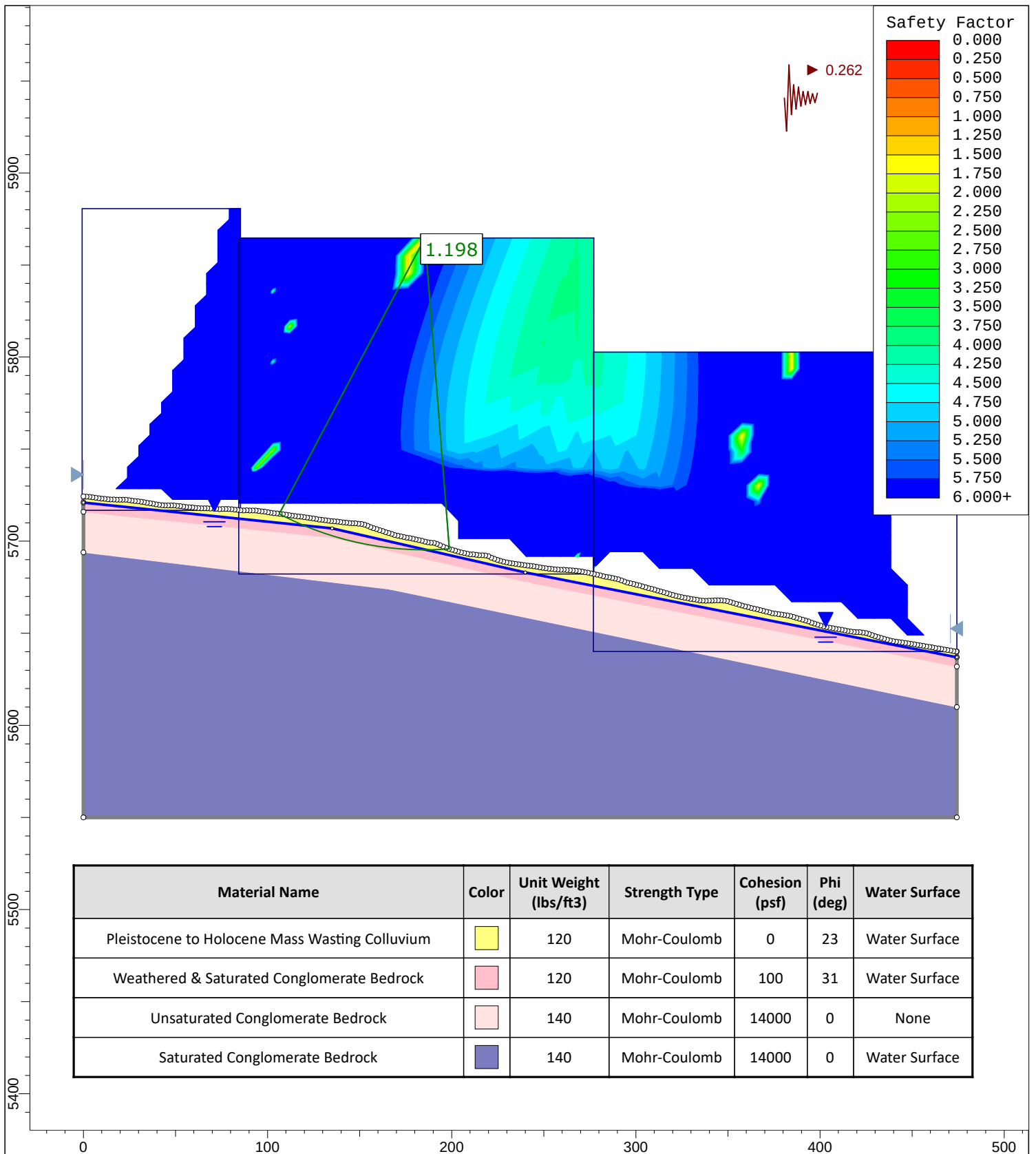


Profile R - Static



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134

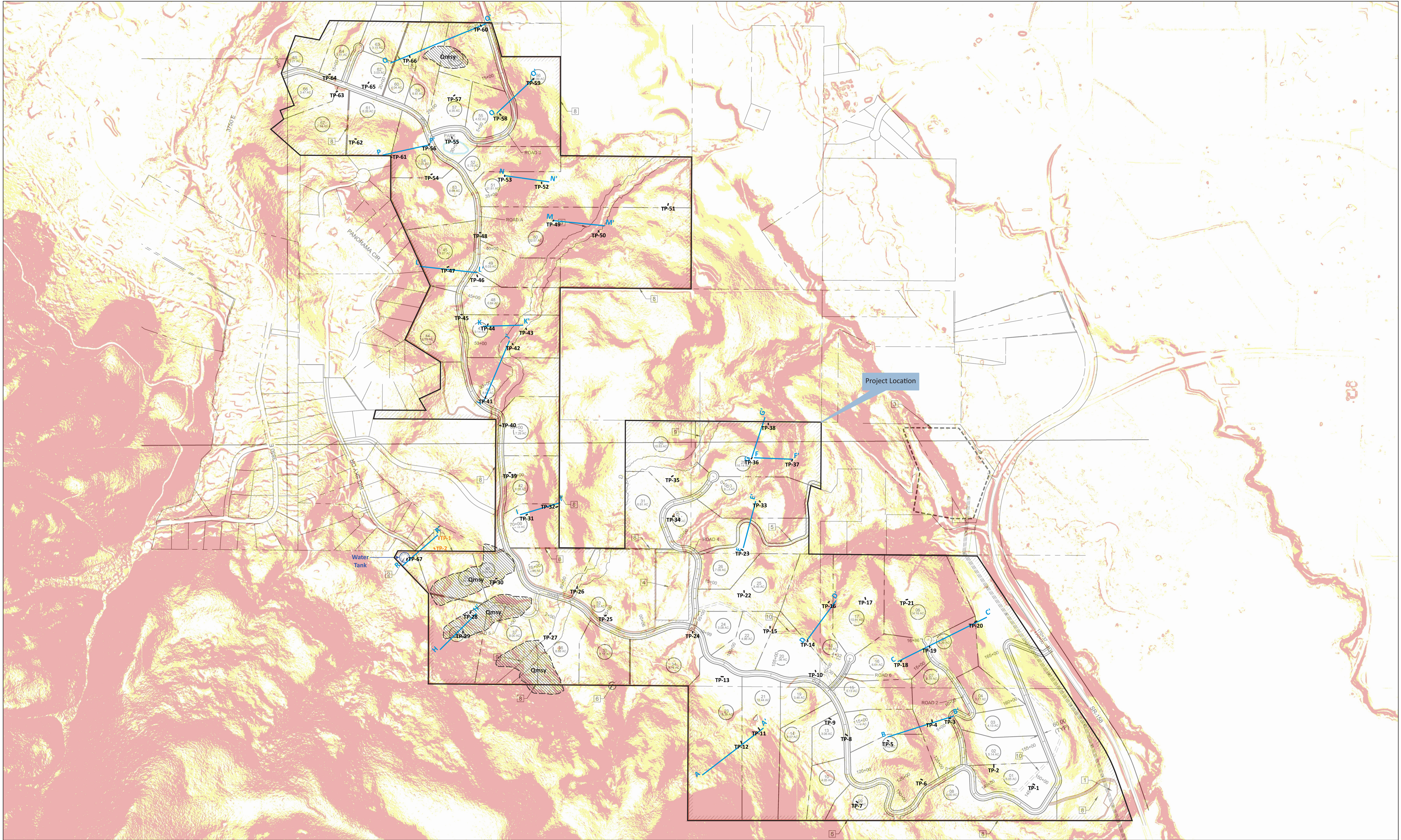


Profile R - Pseudo Static

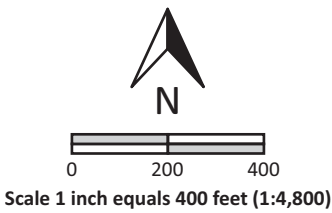


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135



Base: Utah Geographic Resource Center 2016 LIDAR bare earth DEM. Site plan from Gardner Engineering preliminary plan sheet SP1 dated 06-22-2021. Slopes < 20% gradient unshaded; 20-30% gradient shaded in yellow, and > 30% gradient shaded in red. Young (Qmsy) landslides hatched.



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Osprey Ranch Development
Eden, Weber County, Utah,
Project No. 133-012

LIDAR Analysis