Applied GeoTech

GEOTECHNICAL INVESTIGATION

PROPOSED ENCLAVE SUBDIVISION

POWDER MOUNTAIN RESORT

EDEN, UTAH

PREPARED FOR:

POWDER MOUNTAIN SKI RESORT
3923 NORTH WOLF CREEK DRIVE
EDEN, UTAH 84310

ATTN: ERIK ANDERSON

PROJECT NO. 1250365 **JULY 25, 2025**

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EXECUTIVE SUMMARY

1. Approximately ½ to 3 feet of topsoil was encountered in the test pits. Clay was encountered below the topsoil in Test Pits TP-2, TP-3 and TP-4, and extended to depths of approximately 3 to 4½ feet. Sand and gravel was encountered below the topsoil in other test pits. Clay was encountered below the sand and gravel in Test Pits TP-8 and TP-9 at a depth of approximately 10 and 6½ feet, respectively, and extends to the full depth of the test pits, approximately 12½ feet. Practical excavation refusal was encountered in Test Pits TP-2 through TP-7 and TP-10 on either bedrock or boulders.

2. Water was encountered in Test Pit TP-1 at a depth of approximately 5½ feet, and in Test Pit TP-8 at 9 feet. No subsurface water was encountered in the other test pits to the maximum depth investigated, approximately 12½ feet.

3. Foundations bearing on the undisturbed natural sand or gravel may be designed using an allowable net bearing pressure of 1,500 pounds per square foot (psf). Footings bearing on at least 2 feet of properly compacted structural fill extending down to the undisturbed natural sand or gravel may be designed using an allowable net bearing pressure of 2,500 psf. Footings bearing on the bedrock or on structural fill extending down to the bedrock may be designed for a net allowable bearing pressure of 4,000 pounds per square foot.

4. The fat clay is moisture sensitive and should be removed from below building areas.

5. Quartzite bedrock was encountered in some of the test pits. Difficult excavation can be expected where heavy-duty excavation equipment and jack hammering or other rock excavation methods will be needed.

6. Some of the upper soil consists of clay and will be easily disturbed by construction traffic when it is very moist to wet. Placement of 1 to 2 feet of gravel will improve site access when the upper soil is very moist to wet.

7. Geotechnical information related to foundations, subgrade preparation, materials and compaction is included in the report.

SCOPE

This report presents the results of a geotechnical investigation for the proposed Enclave Subdivision to be constructed at Powder Mountain Ski Resort southeast of the Shelter Hill Subdivision in Eden Utah. The report presents the subsurface conditions encountered, laboratory test results and recommendations for foundation support. The study was conducted in general accordance with our proposal dated May 20, 2025.

Field exploration was conducted to obtain information on the subsurface conditions. Samples obtained from the field investigation were tested in the laboratory to determine physical and engineering characteristics of the on-site soil. Information obtained from the field and laboratory was used to define conditions at the site for our engineering analysis and to develop recommendations for proposed foundations.

This report has been prepared to summarize the data obtained during the study and to present our conclusions and recommendations based on the proposed construction and the subsurface conditions encountered. Design parameters and a discussion of geotechnical engineering considerations related to construction are included in the report.

SITE CONDITIONS

The site consists of nine undeveloped lots on the southern end of the Powder Mountain Resort. There are no permanent structures or pavements on the site. A dirt road runs down the western side of the of project area. There are boulders up to approximately 3 feet in size scattered across the northeastern portion of the site.

The ground surface at the northern portion of the site slopes gently down to the west, east and south. The southern portion of the site slopes steeply upward to the southeast. Vegetation consists of grass, brush and trees.

The surrounding areas are undeveloped. The Shelter Hill subdivision is approximately 1 mile to the north-northeast of the project site. Shelby John Way runs along the western portion of the project site.

FIELD STUDY

The test pits were excavated on June 10 and 11, 2025 at the approximate locations indicated on Figure 2 using a trackhoe. The test pits were logged and soil samples obtained from the test pits. Logs of the subsurface conditions encountered in the test pits are graphically shown on Figure 3 and Figure 4 with legend and notes on Figure 5.

The test pits were backfilled with the excavated material without significant compaction. The backfill in the test pits should be removed and properly compacted where they will support proposed structures, floor slabs and/or other settlement-sensitive site improvements.

SUBSURFACE CONDITIONS

Approximately ½ to 3 feet of topsoil was encountered in the test pits. Clay was encountered below the topsoil in Test Pits TP-2, TP-3 and TP-4, and extended to depths of approximately 3 to 4½ feet. Sand and gravel was encountered below the topsoil in other test pits. Clay was encountered below the sand and gravel in Test Pits TP-8 and TP-9 at a depth of approximately 10 and 6½ feet, respectively, and extends to the full depth of the test pits, approximately 12½ feet. Practical excavation refusal was encountered in Test Pits TP-2 through TP-7 and TP-10 on either bedrock or boulders.

A description of the various soils and bedrock encountered in the test pits follows:

Topsoil - The topsoil consists of sandy lean clay to clayey gravel with sand. It contains occasional boulders up to approximately 2½ feet in size. The topsoil is moist, dark brown and contains organics.

Fat Clay - The fat clay contains small to moderate amounts of sand, gravel, cobbles and boulders. It is stiff to very stiff, moist to wet, and brown to gray.

Laboratory tests conducted on samples of the clay indicate it has natural moisture contents ranging from 22 to 35 percent and natural dry densities of 78 to 102 pounds per cubic foot. Consolidation tsts on the clay indicate the clay is moisture sensitive. Results of the consolidation tests are presented on Figures 6 to 9. Results of a gradation test on the clay are presented on Figure 10.

Clayey Sand - The clayey sand contains moderate amounts of gravel, cobbles and boulders up to approximately 2½ feet in size. It is medium dense, moist to wet and brown to reddish brown.

Laboratory tests conducted on samples of the clayey sand indicate it has natural moisture contents ranging from 4 to 23 percent and a natural dry density of 94 pounds per cubic foot. Results of a gradation test on the sand are presented on Figure 11.

Clayey Gravel with Sand - The gravel contains cobble and boulders up to 2 ½ feet in diameter. It is medium dense, moist to wet and reddish brown.

Laboratory tests conducted on samples of the gravel indicate it has natural moisture contents of 6 to 12 percent. Results of a gradation test on the gravel are presented on Figure 10.

Quartzite Bedrock - The bedrock is very hard, moist and gray to light brown.

Results of the laboratory tests are summarized on Table I and are included on the logs of the test pits.

SUBSURFACE WATER

Water was encountered in Test Pit TP-1 at a depth of approximately 5½ feet, and in Test ZPit TP-8 at 9 feet. No subsurface water was encountered in the other test pits to the maximum depth investigated, approximately 12½ feet.

PROPOSED CONSTRUCTION

We anticipate that the proposed residences will consist of one to two-story structures with basements. We have assumed building loads will consist of wall loads of up to 4 kips per lineal foot and column loads of up to 50 kips.

If the proposed construction or building loads are significantly different from those described above, we should be notified to reevaluate the recommendations given.

RECOMMENDATIONS

Based on the subsurface conditions, our understanding of the proposed construction and our experience in the area, the following recommendations are given:

A. Site Grading

We anticipate that less than 4 feet of cut and/or fill will be needed to facilitate construction at the site.

1. Subgrade Preparation

Prior to placing grading fill, the topsoil, organics, unsuitable fill, debris and other deleterious materials should be removed from below building areas.

Some of the upper soil consists of clay and will be easily disturbed by construction traffic when it is very moist to wet. Placement of 1 to 2 feet of gravel will improve site access when the upper soil is very moist to wet.

2. Excavation

We anticipate that excavation in the soil can be accomplished with heavy-duty excavation equipment.

Jack hammering or other rock excavation methods will likely be required where excavations extend down into the bedrock.

Temporary unretained excavations may be sloped at 1½ horizontal to 1 vertical or flatter.

3. Cut and Fill Slopes

Permanent unretained cut and fill slopes in the sand, gravel and bedrock may be constructed at 2 horizontal to 1 vertical or flatter. Slopes on the order of 3 horizontal to 1 vertical or flatter should be considered for the clay. Permanent unretained cut and fill slopes should be protected from erosion by revegetation or other methods. Surface drainage should be directed away from cut and fill

slopes.

4. Materials

Listed below are materials recommended for imported structural fill.

Fill to Support	Recommendation
Footings	Non-expansive granular soil Passing the No. 200 Sieve <35% Liquid Limit < 30% Maximum size 4 inches
Floor Slabs (Upper 4 inches)	Sand and/or Gravel Passing the No. 200 Sieve < 5% Maximum size 2 inches
Slab Support	Non-expansive granular soil Passing the No. 200 Sieve < 50% Liquid Limit < 30% Maximum size 6 inches

The natural soil is not recommended for use as structural fill in proposed building, pavement and slab areas, but may be used as site grading fill and as utility trench backfill outside of the proposed building, pavement and slab areas. The topsoil, organics and other deleterious materials should be removed prior to use of the soil as fill.

The use of the on-site soil as fill may require moisture conditioning (wetting or drying) to facilitate compaction. Drying of the soil may not be practical during cold or wet times of the year.

5. Compaction

Compaction of fill placed at the site should equal or exceed the minimum densities as indicated below when compared to the maximum dry density as determined by ASTM D1557.

Fill To Support	Compaction Criteria
Foundations	≥ 95%
Concrete Slabs	≥ 90%
Pavement	
Base Course	≥ 95%
Fill placed below Base Course	≥ 90%
Landscaping	≥ 85%
Retaining Wall Backfill	85 - 90%

To facilitate the compaction process, the fill should be compacted at a moisture content within 2 percent of the optimum moisture content.

Fill and pavement materials placed for the project should be frequently tested for compaction.

B. Foundations

1. Bearing Material

With the proposed construction and the subsurface conditions encountered, the proposed residences may be supported on spread footings bearing on the undisturbed natural sand, gravel or bedrock or on compacted structural fill extending down to the undisturbed natural sand, gravel and/or bedrock. The clay is moisture sensitive and should be removed from below building areas. Structural fill should extend out away from the edge of footings at least a distance equal to the depth of fill beneath the footings.

Topsoil, organics, unsuitable fill, debris and other deleterious materials should be removed from below proposed footing areas.

2. Bearing Pressure

Foundations bearing on the undisturbed natural sand or gravel may be designed using an allowable net bearing pressure of 1,500 pounds per square foot (psf). Footings bearing on at least 2 feet of properly compacted structural fill extending down to the undisturbed natural sand or gravel may be designed using an allowable net bearing pressure of 2,500 psf. Footings bearing on the bedrock or on structural fill extending down to the bedrock may be designed for a net allowable bearing pressure of 4,000 pounds per square foot.

Footings should have a minimum width of 1½ feet and a minimum depth of embedment of 1 foot.

3. Settlement

We estimate that settlement will be on the order of 1 inch or less for footings designed as indicated above. Differential settlement is estimated to be on the order of ¾ of an inch.

Disturbance of the soil below foundations can result in greater settlement. Care should be taken to minimize disturbance of the soil to remain below foundations so that settlement can be maintained within tolerable limits.

4. Temporary Loading Conditions

The allowable bearing pressure may be increased by one-half for temporary loading conditions such as wind or seismic loads.

5. Frost Depth

Exterior footings and footings beneath unheated areas should be placed at least 42 inches below grade for frost protection.

6. Foundation Base

The base of foundation excavations should be cleared of loose or deleterious material prior to structural fill or concrete placement.

7. Drainage

The below grade floor portions of the residences should be protected with subsurface drains. We recommend the subsurface drains include at least the following items:

a. The subsurface drain systems should consist of a perforated pipe installed in a gravel filled trench around the perimeter of the subgrade floor portion of the residences. The gravel should extend up foundation walls to within 3 feet of the finished ground surface adjacent the foundation walls. A geotextile drain could be considered for the portion of the drains which extends up the foundation walls.

b. At least 6 inches of free-draining gravel should be placed below the basement floor slabs. The gravel should connect to the drain pipes.

c. The flow line of the pipes should be placed at least 18 inches below the finished floor level and should slope to sumps where water can be removed by pumping or gravity flow.

d. If placing the gravel and drain pipe requires excavation below the bearing level of the footings, the excavations for the drain pipe and gravel should have a slope no steeper than 1 horizontal to 1 vertical so as not to disturb the soil below the buildings.

e. A filter fabric should be placed between the natural soil and the drain gravel. This will help reduce the potential for fine grained material filling in the void spaces of the gravel.

f. Consideration should be given to installing cleanouts to allow access into the perimeter drains should cleaning of the pipe be required in the future.

g. If pumps are used, they should have sufficient capacity to remove the anticipated volume of subsurface water. Consideration should be given to providing a backup pump and high water level monitors. Pumps should be checked periodically to verify they are functioning as intended.

The ground surface surrounding the proposed residences should be sloped away from the structures in all directions with at least 6 inches of drop in the first 10 feet. Roof downspouts and drains should discharge beyond the limits of foundation backfill.

8. Construction Observation

A representative of the geotechnical engineer should observe footing excavations prior to structural fill or concrete placement.

C. Concrete Slabs on Grade

1. Slab Support

Concrete slabs may be supported on the undisturbed natural sand, gravel and/or bedrock or on compacted structural fill extending down to the undisturbed natural sand, gravel and/or bedrock. The clay, topsoil, unsuitable fill, organics, debris and other deleterious materials should be removed from below proposed concrete slabs.

2. Underslab Sand and/or Gravel

A 4-inch layer of free-draining sand and/or gravel (less than 5 percent passing the No. 200 sieve) should be placed below the concrete slabs for ease of construction and to promote even curing of the slab concrete.

D. Lateral Earth Pressures

1. Lateral Resistance for Footings

Lateral resistance for spread footings placed on compacted structural fill or the natural soil is controlled by sliding resistance developed between the footing and the structural fill or natural soil. A friction value 0.35 may be used in design for ultimate lateral resistance for footings bearing on the natural granular soil and granular structural fill. The passive resistance of the soil adjacent footings may also be considered in design for lateral resistance of footings.

2. Subgrade Walls

The following equivalent fluid weights are given for design of subgrade walls. The active condition is where the wall moves away from the soil. The passive condition is where the wall moves into the soil and the at-rest condition is where the wall does not move. The values listed below assume a horizontal surface adjacent the top and bottom of the wall.

Soil Type	Active	At-Rest	Passive
Sand & Gravel	40 pcf	55 pcf	300 pcf

3. Seismic Conditions

Under seismic conditions, the equivalent fluid weight should be increased by 26 pcf for the active condition and 11 pcf for at-rest condition. The equivalent fluid weight should be decreased by 26 pcf for the passive condition. This assumes a horizontal ground acceleration of 0.43g, which represents a 2 percent probability of exceedance in a 50-year period.

4. Safety Factors

The values recommended above for active and passive conditions assume mobilization of the soil to achieve the soil strength. Conventional safety factors used for structural analysis for such items as overturning and sliding resistance should be used in design.

E. Seismicity

Listed below is a summary of the site parameters that may be used with the 2021 International Building Code:

Description	Value
Site Class	Default D[1]
S_s - MCE_R ground motion (period=0.2s)	0.78g
S_1 - MCE_R ground motion (period=1.0s)	0.27g
F_a - Site amplification factor at 0.2s	1.2
PGA - MCE_G peak ground acceleration	0.34g
PGA_M - Site modified peak ground acceleration	0.43g

[1]Site Class Default D was selected based on the subsurface conditions encountered and our understanding of the geology in the area. The shear wave velocity of the upper 100 feet of the site could be measured to determine the site class to be used in design.

2. Faulting

There are no mapped active faults extending through the site. The closest mapped active fault is the Wasatch Fault located approximately 11 miles to the west of the site (Utah Geological Survey, 2025).

3. Liquefaction

Based on the subsurface conditions encountered and our understanding of the geology of the area, liquefaction is not a potential hazard.

F. Preconstruction Meeting

A preconstruction meeting should be held with representatives of the owner, project architect, geotechnical engineer, general contractor, earthwork contractor and other members of the design team to review construction plans, specifications, methods and schedule.

The geotechnical engineer should observe the excavation, earthwork and foundation phases of the work to determine that subsurface conditions are consistent with those used in the analysis and design. During site grading and placement of structural fill, the work should be observed and tested to confirm that the proper density has been achieved.

LIMITATIONS

This report has been prepared in accordance with generally accepted soil and foundation engineering practices in the area for the use of the client for design purposes. The conclusions and recommendations included within the report are based on information obtained from the test pits excavated at the approximate locations indicated on the site plan, the data obtained from laboratory testing and our experience in the area. Variations in the subsurface conditions may not become evident until additional exploration or excavation is conducted. If the proposed construction, subsurface conditions or groundwater level is found to be significantly different from what is described above, we should be notified to reevaluate our recommendations.

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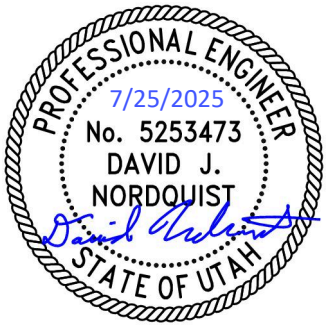


David J. Nordquist, P.E.

Douglas R Hawkes

Reviewed by Douglas R. Hawkes, P.E., P.G.

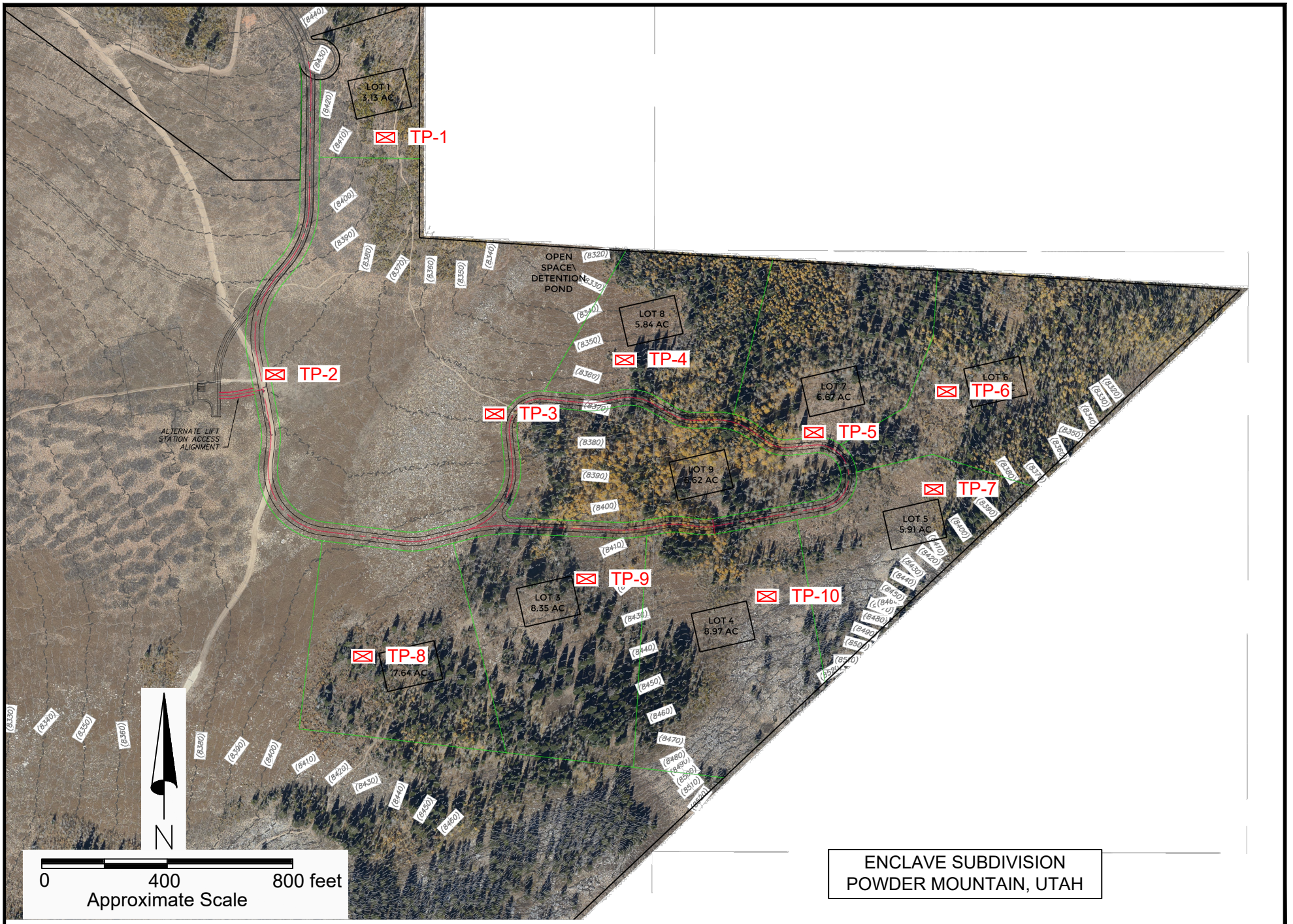
DJN/bw

REFERENCES

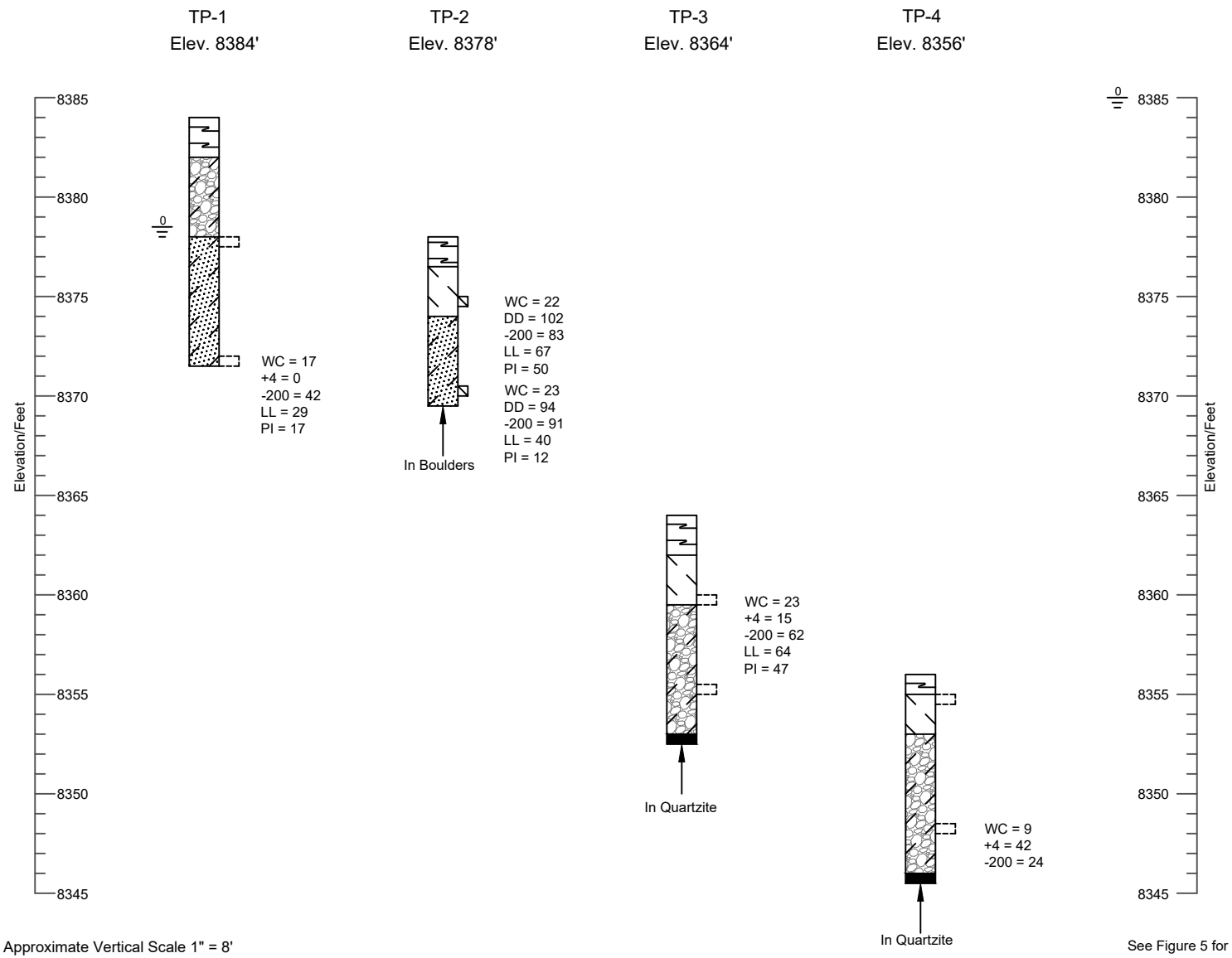
International Code Council, Inc., 2020; 2021 International Building Code; Falls Church, Virginia.

Utah Geological Survey, 2025; Utah Geologic Hazards Portal accessed July 15, 2025 at https://geology.utah.gov/apps/hazards/.

1250365	AGEC	Vicinity Map	Figure 1



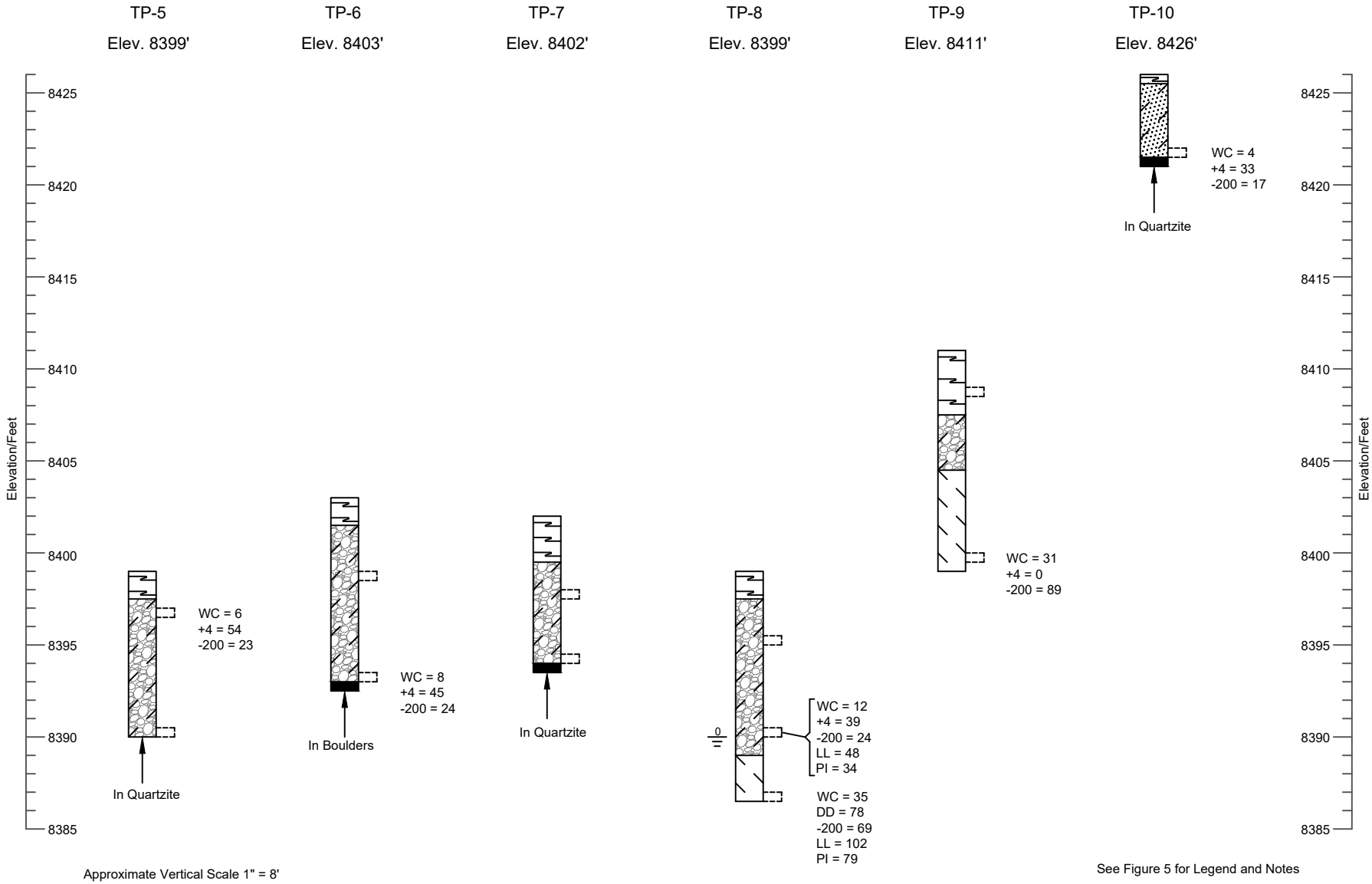
1250365	AGEC	Test Pit Locations	Figure 2



Approximate Vertical Scale 1" = 8'

See Figure 5 for Legend and Notes

1250365	AGEC	Test Pit Logs	Figure 3



1250365	AGEC	Test Pit Logs	Figure 4

LEGEND:

Topsoil; sandy lean clay to clayey gravel with sand, occasional boulders up to 2½ feet in size, moist, dark brown, organics.

Fat Clay (CH); varying amounts of sand and gravel with occasional boulders, stiff to very stiff, moist to wet, brown to gray.

Clayey Sand (SC); moderate amounts of gravel, cobbles and boulders up to approximately 2½ feet in size, medium dense, moist, brown to reddish brown.

Clayey Gravel with Sand (GC); cobbles, boulders up to approximately 2½ feet in size, medium dense, moist to wet, reddish brown.

Quartzite Bedrock; very hard, moist, gray to light brown.

Indicates disturbed sample taken.

Indicates practical excavation refusal.

Indicates the depth to free water and the number of days after excavation the measurement was taken.

NOTES:

1. The test pits were excavated on June 10 and 11, 2025 with a trackhoe.
2. Locations of the test pits were measured approximately by pacing from features shown on Figure 2.
3. Elevations of the test pits were determined by interpolating between contours shown on the site plan provided.
4. The test pit locations and elevations should be considered accurate only to the degree implied by the method used.
5. The lines between materials shown on the logs represent the approximate boundaries between material types and the transitions may be gradual.
6. The water level readings shown on the logs were made at the time and under the conditions indicated. Fluctuations in the water level will occur with time
7. WC = Water Content (%);
   DD = Dry Density (pcf);
   +4 = Percent Retained on the No. 4 Sieve;
   -200 = Percent Passing the No. 200 Sieve;
   LL = Liquid Limit (%);
   PI = Plasticity Index (%).

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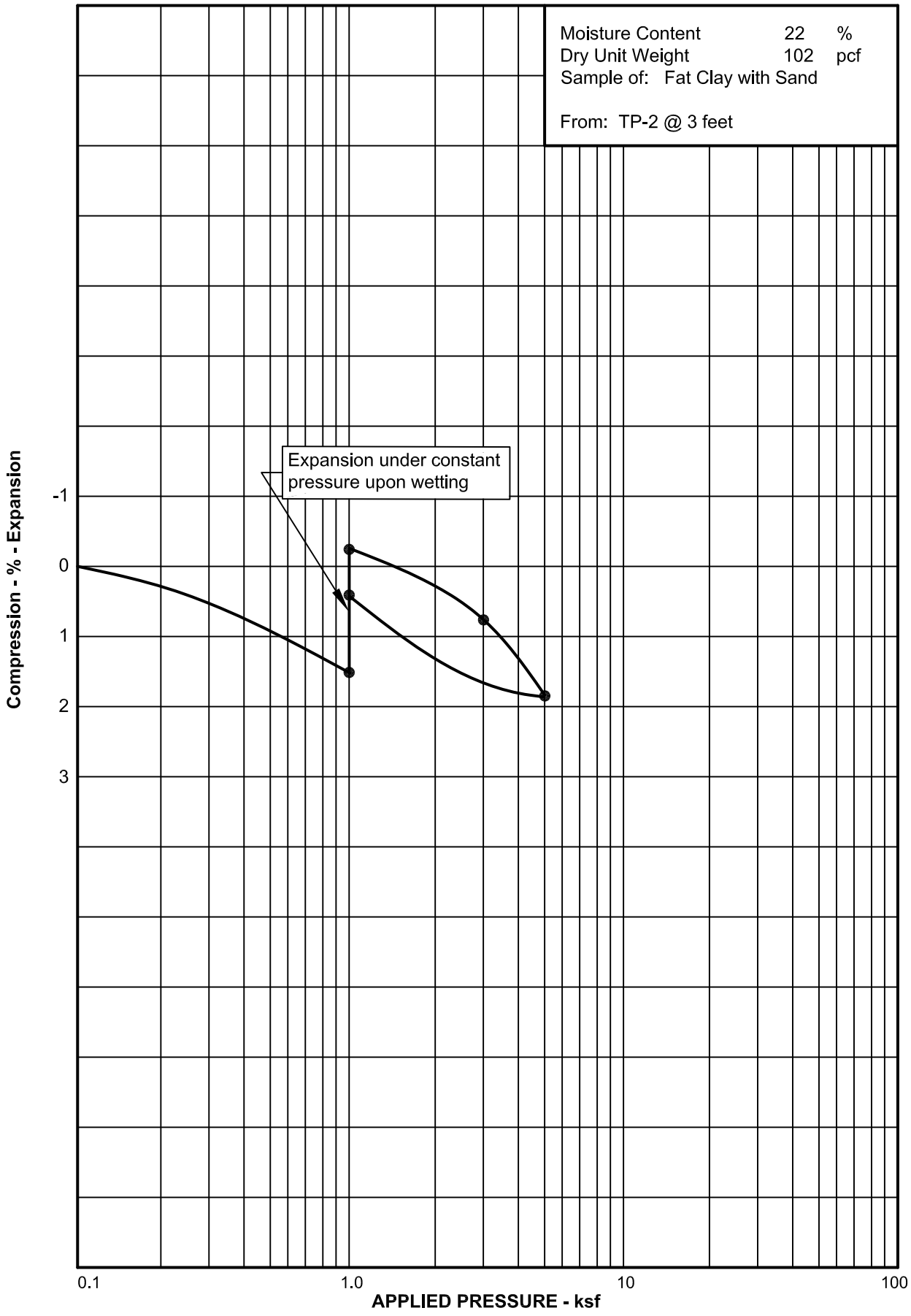
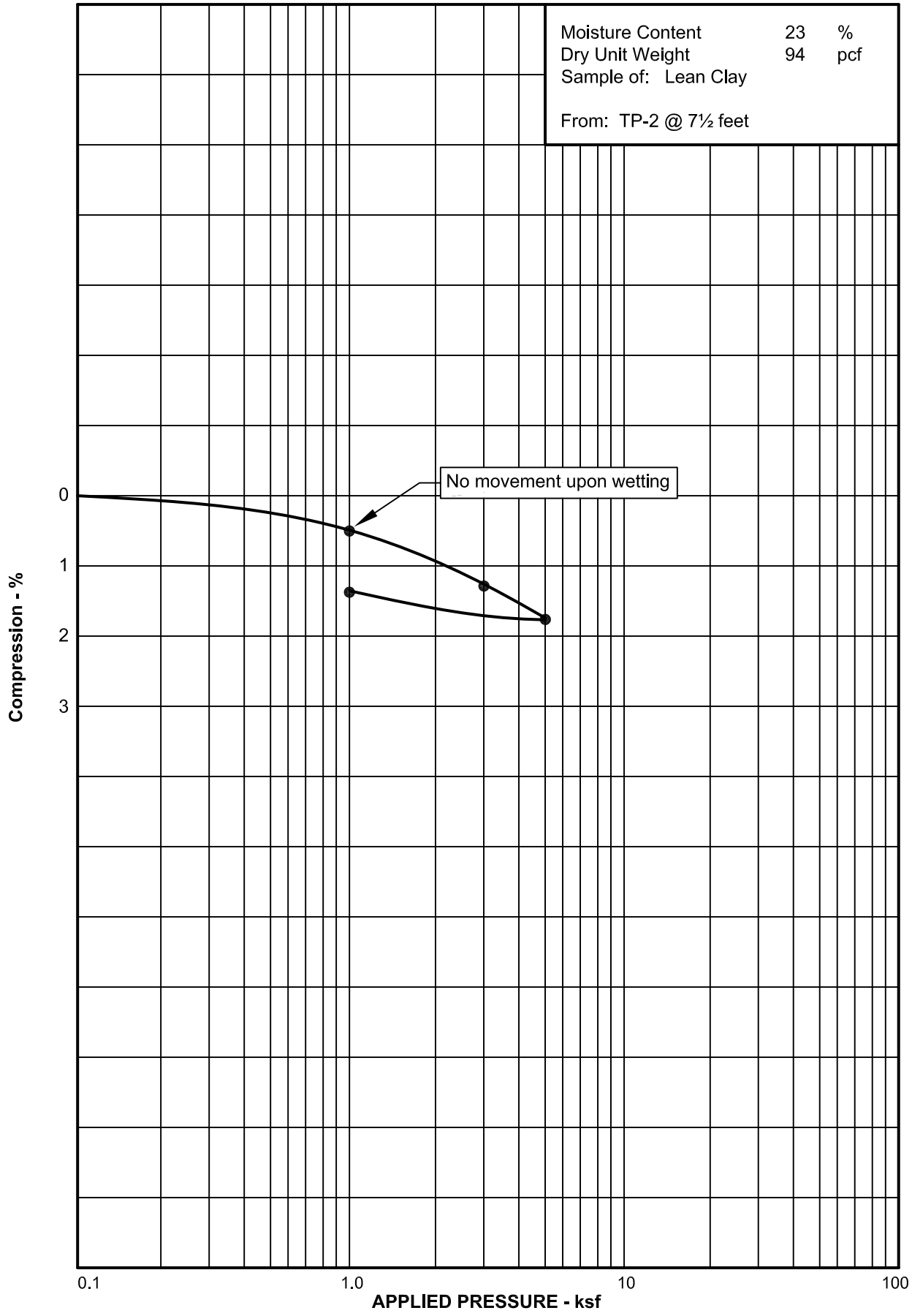


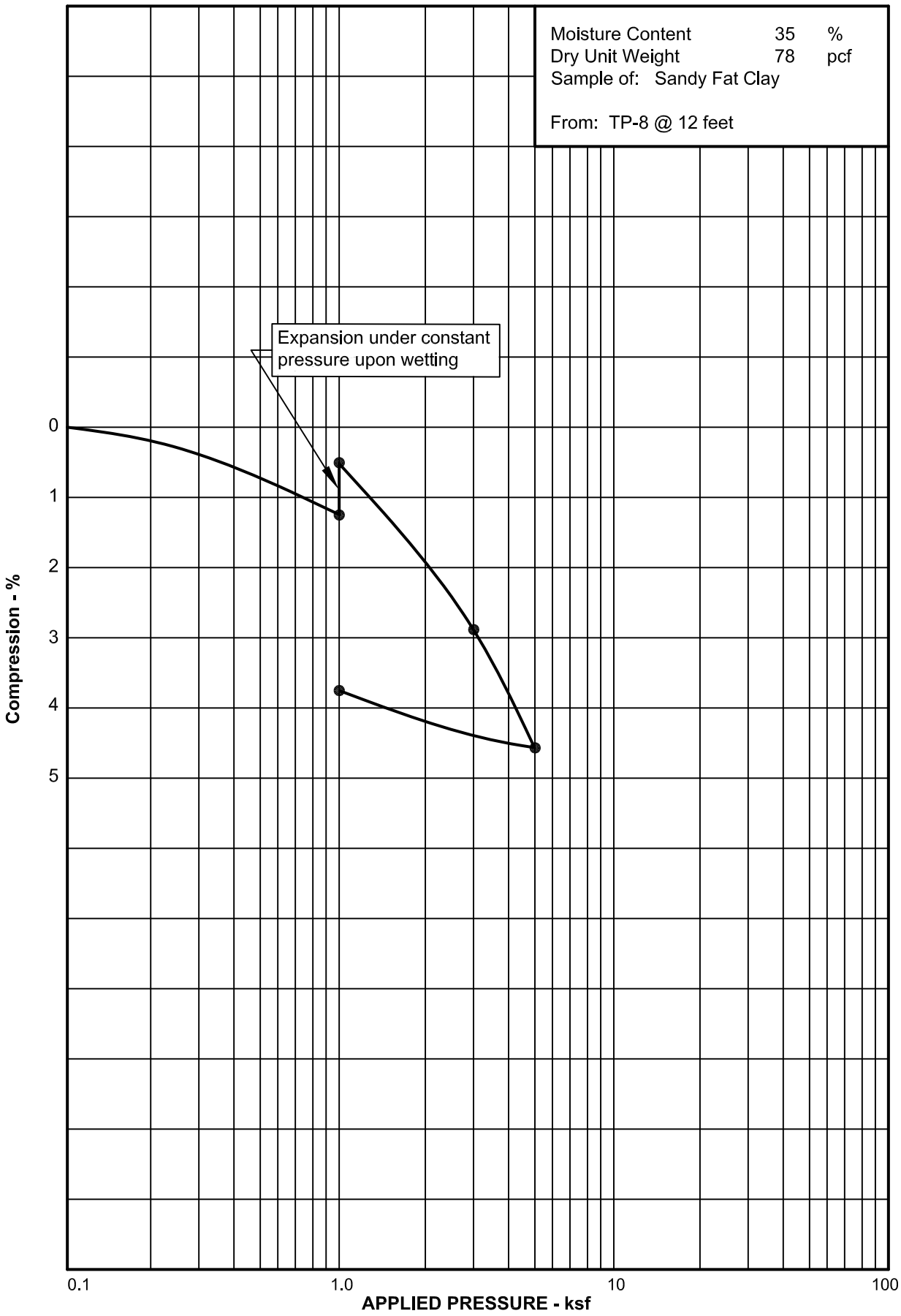
Project No. 1250365 **CONSOLIDATION TEST RESULTS** **Figure 6**

Applied Geotechnical Engineering Consultants, Inc.



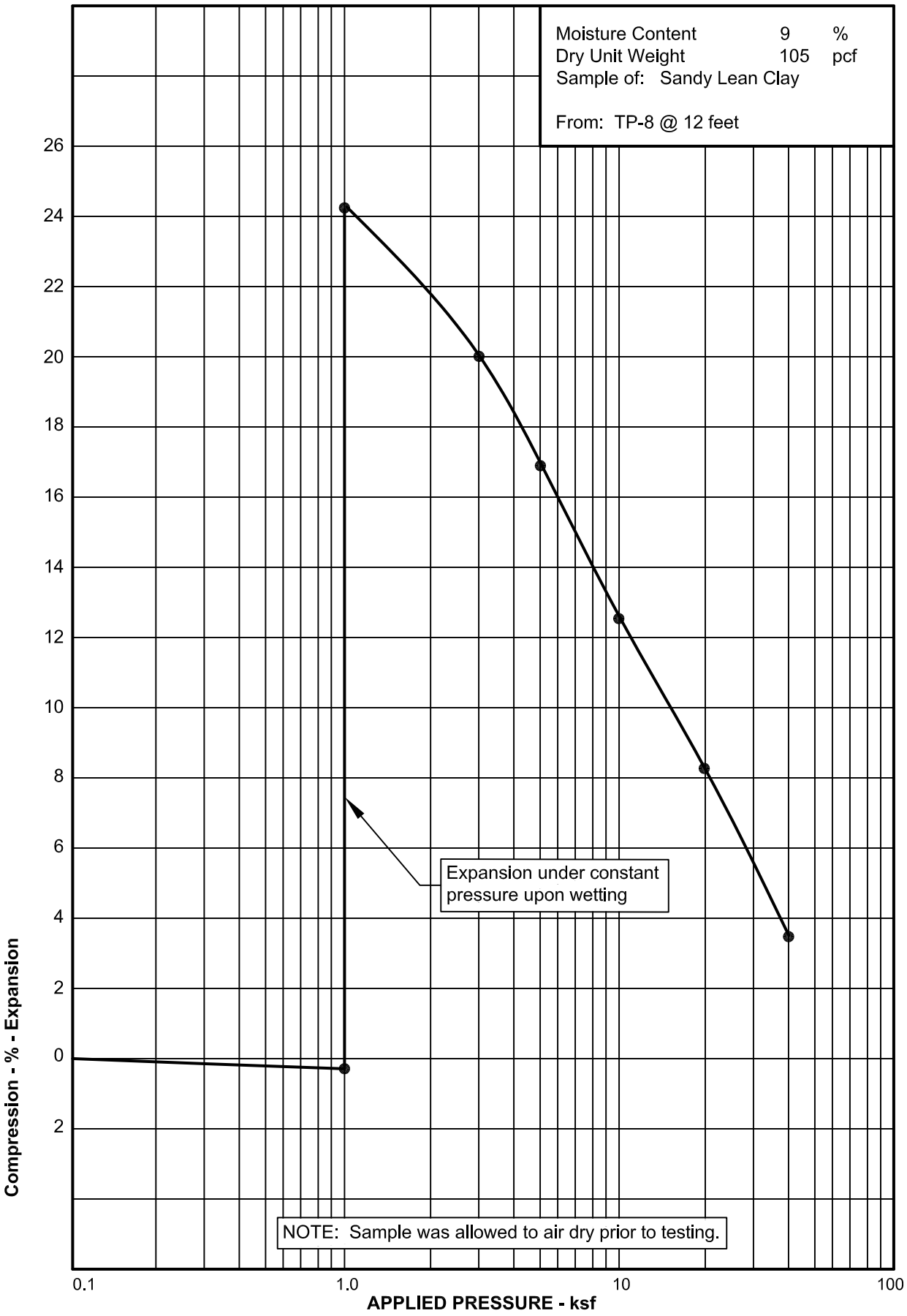
Project No. 1250365 **CONSOLIDATION TEST RESULTS** **Figure 7**

Applied Geotechnical Engineering Consultants, Inc.



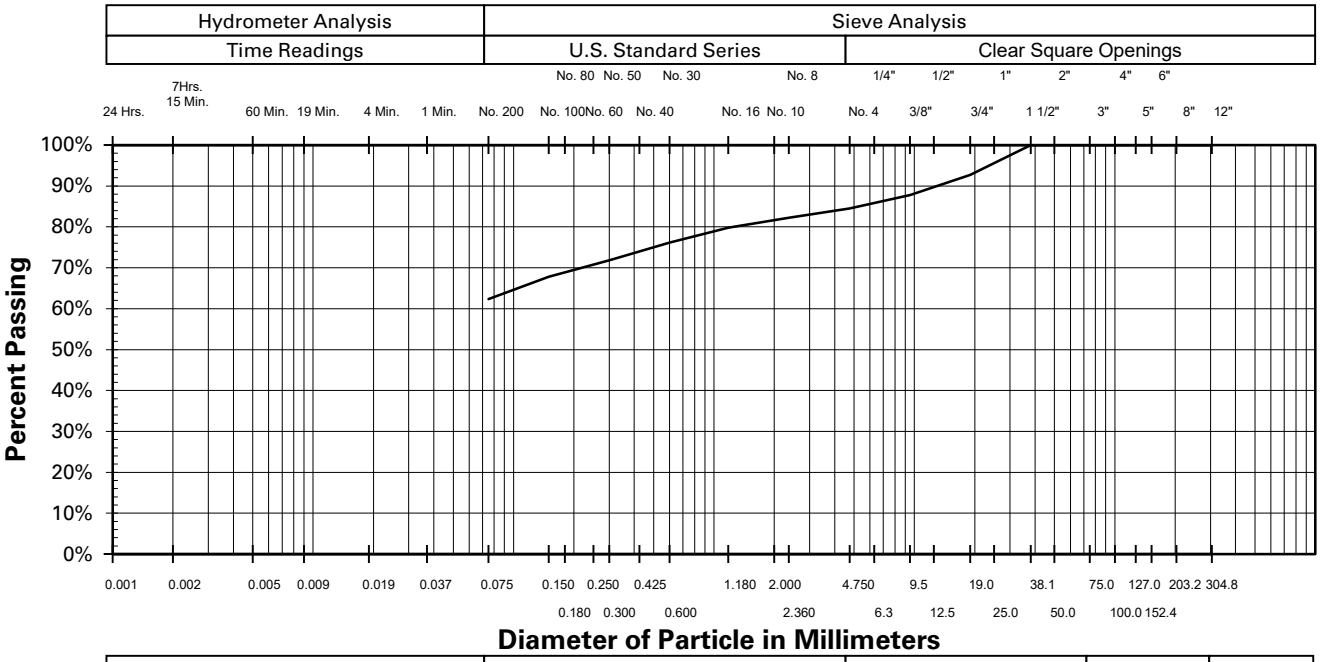
Project No. 1250365 **CONSOLIDATION TEST RESULTS** **Figure 8**

Applied Geotechnical Engineering Consultants, Inc.



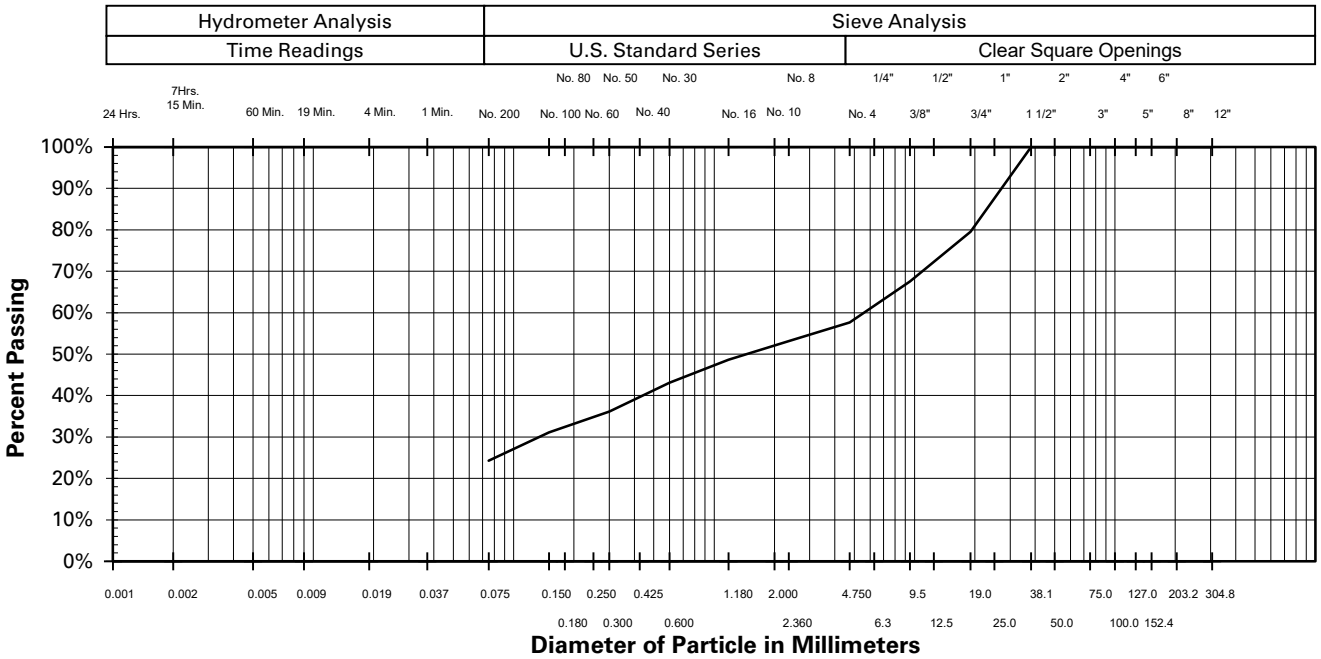
Project No. 1250365 **CONSOLIDATION TEST RESULTS** **Figure 9**

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.



Clay to Silt	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

Gravel	15%	Liquid Limit	64%
Sand	23%	Plasticity Index	47%
Silt and Clay	62%	Sample Location	TP-3 @ 4 feet
Sample Description	Sandy Fat Clay with Gravel (CH)		



Clay to Silt	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

Gravel	42%	Liquid Limit	-
Sand	34%	Plasticity Index	-
Silt and Clay	24%	Sample Location	TP-4 @ 7½ feet
Sample Description	Clayey Gravel with Sand (GC)		

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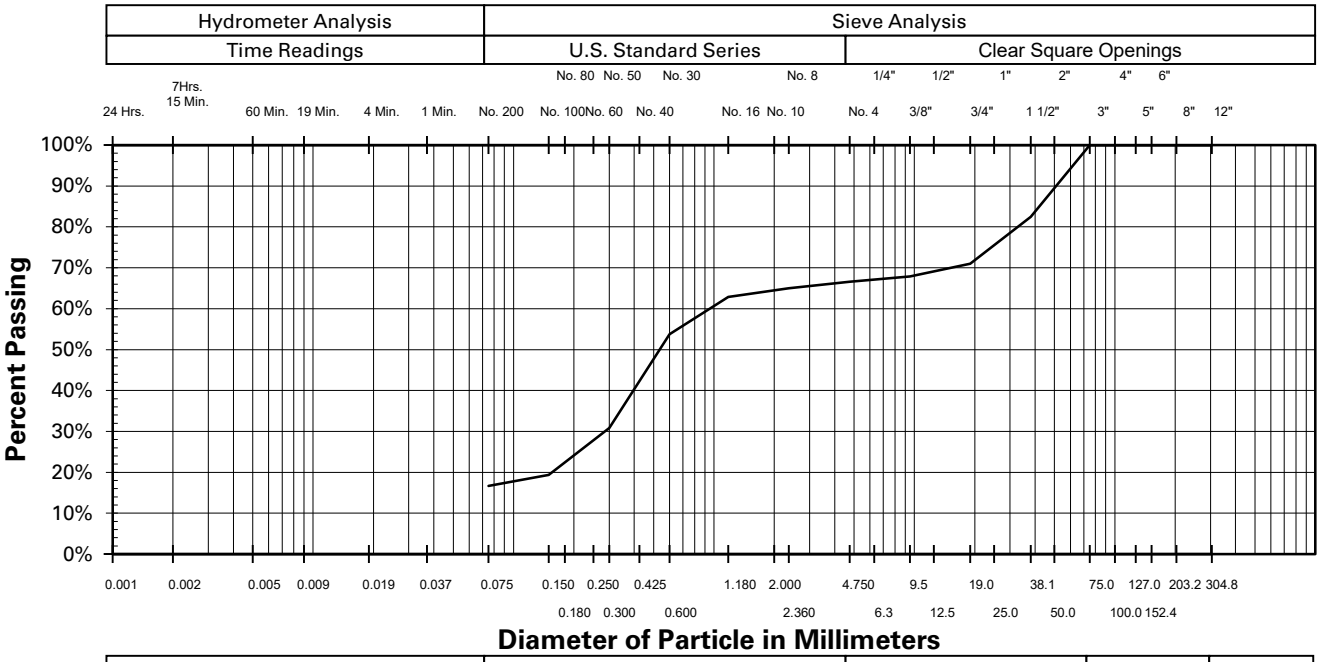
GRADATION TEST RESULTS

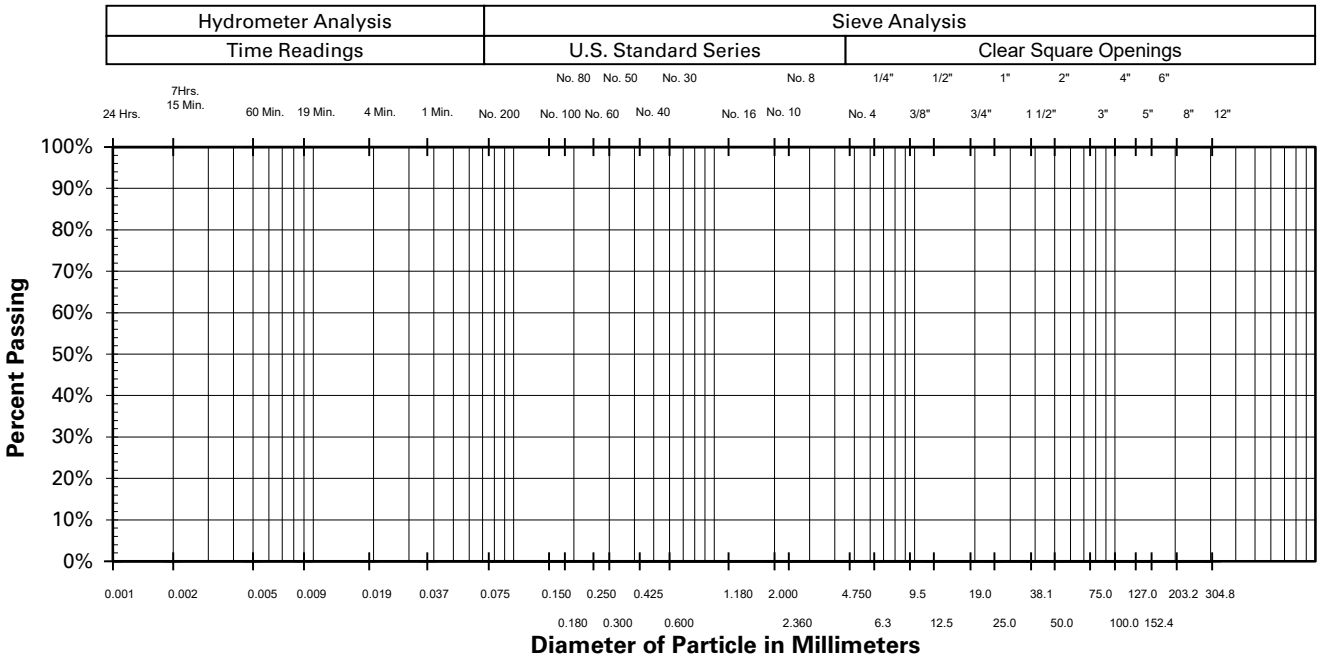
Figure 10

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.



Clay to Silt	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

Gravel	33%	Liquid Limit	-
Sand	50%	Plasticity Index	-
Silt and Clay	17%	Sample Location	TP-10 @ 4 feet
Sample Description	Clayey Sand with Gravel (SC)		



Clay to Silt	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

Gravel	-	Liquid Limit	-
Sand	-	Plasticity Index	-
Silt and Clay	-	Sample Location	
Sample Description			

Project No. 1250365

GRADATION TEST RESULTS

Figure 11

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

TABLE I
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NUMBER: 1250365

SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (PCF)	GRADATION			ATTERBERG LIMITS		UNCONFINED COMPRESSIVE STRENGTH (PSF)	WATER SOLUBLE SULFATE (%)	SAMPLE CLASSIFICATION
TEST PIT	DEPTH (FEET)			GRAVEL (%)	SAND (%)	SILT/ CLAY (%)	LIQUID LIMIT (%)	PLASTICITY INDEX			
TP-1	12	17		0	58	42	29	17			Clayey Sand (SC)
TP-2	3	22	102			83	67	50			Fat Clay with Sand (CH)
	7½	23	94			91	40	12			Lean Clay (CL)
TP-3	4	23		15	23	62	64	47			Sandy Fat Clay with Gravel (CH)
TP-4	7½	9		42	34	24					Clayey Gravel with Sand (GC)
TP-5	2	6		54	23	23					Clayey Gravel with Sand (GC)
TP-6	9½	8		45	31	24					Clayey Gravel with Sand (GC)
TP-8	8½	12		39	37	24	48	34			Clayey Sand with Gravel (SC)
	12	35	78			69	102	79			Sandy Fat Clay (CH)
TP-9	11	31		0	11	89					Fat Clay (CH)
TP-10	4	4		33	50	17					Clayey Sand with Gravel (SC)