THE CHURCH OF **JESUS CHRIST** OF LATTER-DAY SAINTS	Geotechnical Evaluation Report

PROPOSED SENIOR SEMINARY BUILDING
FUTURE TOOELE HIGH SCHOOL

2200 NORTH BERRA BOULEVARD

TOOELE, UTAH

LDS CHURCH PROPERTY NUMBER 5013450

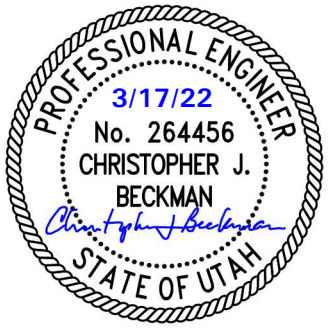
Prepared For:

Corporation of the Presiding Bishop of the Church of Jesus Christ
of Latter-day Saints
US & Canada New Space PM Office
50 East North Temple Street, 12th Floor
Salt Lake City, Utah 84150

Attention: Richard Piacente

AGEC
Applied GeoTech

Applied Geotechnical
Engineering Consultants, Inc.



Project No. 1220051

March 17, 2022

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EXECUTIVE SUMMARY

1. Test Pits TP-1 through TP-3 were excavated adjacent the proposed seminary building. Test Pits TP-4 though TP-6 were excavated within the future extension of Berra Boulevard. Approximately 1 to 1½ feet of topsoil was encountered in the test pits. Approximately 1½ to 2 feet of clay was encountered below the topsoil in Test Pits TP-2, TP-4 and TP-5. Silty and clayey gravel was encountered below the clay and below the topsoil in the other test pits and generally extends the maximum depth investigated, approximately 12 feet. A layer of silty sand was encountered between depths of approximately 7 to 8½ feet in Test Pit TP-5.

2. No subsurface water was encountered in the test pits at the time of excavation to the maximum depth investigated, approximately 12 feet.

3. The clay contains a slightly porous structure and was found to be sensitive to changes in moisture. A sample of clay tested in the laboratory was found to be significantly more compressible when wetted under a constant pressure of 1,000 pounds per square foot. The clay should be removed from below the proposed building.

4. The proposed seminary building may be supported on spread footings bearing on undisturbed natural gravel and may be designed using an allowable net bearing pressure of 3,000 pounds per square foot.

5. The upper clay will result in construction access difficulties when the upper soil is very moist to wet such as in the winter and spring or at times of prolonged rainfall or irrigation. Placement of 1 to 2 feet of gravel or excavation down to granular soil may be needed to provide access for construction equipment when the upper soil is very moist to wet.

6. Geotechnical information related to foundations, subgrade preparation, seismicity and liquefaction, pavement design and materials is included in the report.

INTRODUCTION

This report presents the results of a geotechnical investigation for the proposed senior seminary building for a future Tooele High School to be located at 2200 North Berra Boulevard in Tooele, Utah. The report is prepared for the Corporation of the Presiding Bishop of the Church of Jesus Christ of Latter-day Saints.

AUTHORIZATION

Our services are provided in accordance with the master agreement between AGEC and the Corporation of the Presiding Bishop of the Church of Jesus Christ of Latter-day Saints. A statement of work was authorized by Rick Piacente on February 8, 2022.

PROJECT DESCRIPTION, PURPOSE OF EVALUATION, AND SCOPE OF WORK

This report has been prepared to provide geotechnical design information for the proposed seminary building and a portion of the future Berra Boulevard. The report presents the subsurface conditions encountered at the site, laboratory test results and recommendations for foundation support and pavement. The study was conducted in general accordance with the scope of services outlined in our proposal dated January 21, 2022. The option to conduct topsoil and California Bearing Ratio testing was requested by the client while the option for percolation testing was declined.

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 the proposed foundations and pavement.

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.

Figures 1, 2 and 3 are included with the report and present the locations of test pits, logs of subsurface conditions encountered in the test pits, legend and notes of test pits and the results of laboratory testing. Laboratory test results are also summarized on Table I.

DESIGN CRITERIA

We understand that the seminary building will be a single-story, wood-frame structure with a slab-on-grade floor. We understand that paved parking and drive areas are planned around the building.

The following anticipated design loads apply to the project:

1. Seminary Building
   a. Wall loads will be between 2,000 plf and 4,000 plf.
   b. Column loads will be between 10,000 pounds and 60,000 pounds.
2. Seminary Paving
   a. Parking areas are to be designed to support six equivalent single-axle loads of 18 kips per week.
   b. Drive lanes and driveways are to be designed to support 15 equivalent single-axle loads of 18 kips per week from buses and garbage trucks.

c. The trash enclosure approach slab is to be designed for one 40,000-pound axle load per week.

d. Design life of concrete and asphalt paving is to be a minimum of 40 years.

3. Future Berra Boulevard

Traffic for the future extension of Berra Boulevard is assumed to consist of up to 3,000 cars, 10 light delivery trucks and 10 school buses per day with 3 garbage trucks per week.

If the proposed construction or design criteria are different from those described above, we should be notified so that we can reevaluate the recommendations given.

SITE CONDITIONS

The site is located at approximately latitude 40.5698 degrees north and longitude 112.3037 degrees west.

The site consists of undeveloped land. There are no permanent structures or pavement on the site.

The site is relatively flat with a gentle slope down to the north. The site has an approximate elevation of 4,675 feet based on the USGS 7½ minute quadrangle map.

Vegetation at the site generally consists of grass and weeds.

The area to the north, east and west of the site consists of undeveloped land and pasture. To the south is 2200 North Street and a residential development.

FIELD STUDY

Three test pits (TP-1 through TP-3) were excavated adjacent to the proposed seminary building area and three test pits (TP-4 through TP-6) were excavated in the area of the proposed future extension of Berra Boulevard. The approximate locations of the test pits are shown on Figure 1. The test pits were excavated on February 25, 2022 with a rubber-tired backhoe. The test pits were logged and soil samples obtained by an engineer from AGEC. Logs of the subsurface conditions encountered in the test pits are graphically shown on Figure 2 with legend and notes on Figure 3.

The test pits excavated adjacent to the proposed seminary building were extended to a depth of approximately 12 feet below the ground surface and the test pits for the Berra Boulevard extension were extended to depths of approximately 8½ to 9 feet.

The test pits were backfilled without significant compaction. The backfill in the test pits should be removed and replaced with properly compacted fill where it will support proposed buildings, pavements or other improvements that may be sensitive to settlement.

SUBSURFACE WATER AND SUBSURFACE SOIL CONDITIONS

Approximately 1 to 1½ feet of topsoil was encountered in the test pits. Approximately 1½ to 2 feet of clay was encountered below the topsoil in Test Pits TP-2, TP-4 and TP-5. Silty and clayey gravel was encountered below the clay and below the topsoil in the other test pits and generally extends the maximum depth investigated, approximately 12 feet. A layer of silty sand was encountered between depths of approximately 7 to 8½ feet in Test Pit TP-5.

No subsurface water was encountered in the test pits at the time of excavation to the maximum depth investigated, approximately 12 feet.

A description of the soil encountered in the test pits follows:

Topsoil - The topsoil consists of sandy lean clay to clayey gravel with sand. The topsoil is moist to very moist, dark brown and contains roots and organics.

Lean Clay - The clay contains small to large amounts of sand and some gravel. It is slightly porous, stiff, slightly moist and light brown.

Silty Sand - The sand contains silt layers. It is medium dense, slightly moist and light brown.

Poorly-Graded Gravel with Clay and Sand - The gravel contains small to moderate amounts of clay and sand with cobbles up to approximately 6 inches in size. It is medium dense, slightly moist and dark brown to grayish brown.

Poorly-Graded Gravel with Silt and Sand - The gravel contains small to moderate amounts of silt and sand with cobbles up to approximately 7 inches in size. It is medium dense to dense, slightly moist and grayish brown.

LABORATORY TESTING

A. General

A laboratory testing program was conducted to determine engineering characteristics of the subsurface soil.

B. Gradation Analysis

1. Full Gradation Analysis

Two full gradation tests were conducted on samples of the gravel. Results of the gradation tests are presented on Figure 4.

2. Partial Gradation Analysis

Two samples of clay were tested in the laboratory for percent passing the No. 200 sieve. The samples of clay tested were found to have 77 to 80 percent passing the No. 200 sieve.

C. Atterberg Test

A sample of the lean clay from Test Pit TP-4 at a depth of 1 to 2 feet was found to have a liquid limit of 24 and plasticity index of 9.

D. Natural In-Place Moisture and Density Tests

A sample of clay tested in the laboratory was found to have a natural moisture content of 9 percent and a natural dry density of 82 pounds per cubic foot (pcf).

Samples of gravel tested in the laboratory were found to have a natural moisture contents of 2 and 5 percent.

E. Consolidation Test

A consolidation test was conducted on a sample of clay obtained from Test Pit TP-4 at a depth of 2½ feet. The test results indicate that the clay is sensitive to changes in moisture. The sample tested collapsed approximately ½ percent and became significantly more compressible when wetted under a constant pressure of

1,000 pounds per square foot (psf). Results of the consolidation test are presented on Figure 5.

F. Compaction Test

No compaction tests were conducted.

G. Proctor and California Bearing Ratio Tests

The results of a moisture-density relationship (Proctor) test conducted on the clay are presented on Figure 6. A California Bearing Ratio (CBR) test was conducted on a sample of the clay obtained from Test Pit TP-4. The results of the CBR test are presented on Figure 7.

H. Chemical Tests

One sample of the natural soil was tested in the laboratory for water soluble sulfate content. The sample tested was found to have less than 0.1 percent water soluble sulfates. The test results indicate that the sample tested has a negligible sulfate attack potential on concrete. No special cement type is required for concrete placed in contact with the natural soil based on the results of this test.

I. Topsoil

A sample of topsoil obtained from Test Pit TP-1 was submitted to a subcontract laboratory for topsoil evaluation. The results of the topsoil testing are presented in the appendix.

FINDINGS AND RESULTS

Based on the test pits excavated at the site, up to approximately 1½ feet of topsoil was encountered overlying up to approximately 2 feet of clay in Test Pits TP-2, TP-4 and TP-5. Gravel was encountered below the clay and in the other test pits and extends the full depth investigated. The location of the test pits are indicated on Figure 1, which is a site plan provided by the architect.

Logs of the test pits are presented on Figure 2. The elevations of the test pits are indicated on the logs and reference to a benchmark with an assumed elevation of 100 feet. The benchmark is the cover of a sewer manhole located in the pavement southeast of the site at the approximate location indicated on Figure 1.

The soils are identified by visual and laboratory classifications based on the Unified Soil Classification System. A chart for the Unified Soil Classification System is included in the appendix.

RECOMMENDATIONS AND CONCLUSIONS

A. General

In our professional opinion, the site is suitable for the proposed development. The natural clay contains a slightly porous structure and was found to be sensitive to changes in moisture. The clay, topsoil, organics, unsuitable fill and other deleterious material should be removed from below the proposed building.

The proposed building may be supported on spread footings bearing on undisturbed natural gravel. The footings may be designed using an allowable net bearing pressure of 3,000 pounds per square foot.

B. Temporary Excavations

Temporary unretained excavations in the natural soil extending to depths of up to approximately 15 feet below the ground surface may be constructed at 1½ horizontal to 1 vertical or flatter.

C. Utility Trenches

Utility trenches may be backfilled with the natural soil exclusive of organics, debris and other deleterious material or may be backfilled with imported fill meeting project specifications. Utility trench backfill should be compacted to at least 90 percent of the maximum dry density as determined by ASTM D 1557, except below the building area where it should be compacted to at least 95 percent of the maximum dry density as determined by ASTM D 1557 and should meet the material recommendations given for structural fill.

D. Site Grading

1. Subgrade Preparation

Prior to placing grading fill or base course, the unsuitable fill, organics, topsoil, debris and other deleterious materials should be removed.

The subgrade should be proof-rolled to identify soft areas. Soft areas should be removed and/or replaced with properly compacted granular fill consisting primarily of gravel and having less than 15 percent passing the No. 200 sieve.

The upper natural soil in portions of the site consists of clay. The clay can result in construction equipment access difficulties when it is very moist to wet as may occur during times of precipitation or snow melt. Placement of 1 to 2 feet of gravel or excavation down to granular soil may be needed for

rubber-tired construction equipment access and to facilitate pavement construction when the upper soil is very moist to wet.

2. Excavation

We anticipate that excavation at the site can be accomplished with typical excavation equipment.

3. Cut and Fill Slopes

Permanent, unretained cut and fill slopes may be constructed at 2 horizontal to 1 vertical or flatter. 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	Recommendations
Footings	Non-expansive granular soil Passing No. 200 Sieve < 35% Liquid Limit < 30% Maximum size 4 inches
Floor Slab (Upper 4 inches)	Sand and/or Gravel Passing No. 200 Sieve < 5% Maximum size 2 inches
Slab Support	Non-expansive granular soil Passing No. 200 Sieve < 50% Liquid Limit < 30% Maximum size 6 inches

The natural gravel meeting the recommendations given above for imported structural fill may be used as structural fill within the proposed building area, if the topsoil, organics, debris, over-sized particles and other deleterious materials are removed or it may be used in landscape areas.

The clay is not recommended for use as structural fill but may be considered for use as fill in pavement areas or for trench or wall backfill outside of the building area if the topsoil, organics and other deleterious materials are removed or it may be used in landscape areas.

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

5. Compaction

Compaction of materials 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 D 1557.

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%

The moisture of the soil should be adjusted to within 2 percent of the optimum moisture content to facilitate compaction.

Fill and pavement materials placed for the project should be frequently tested for compaction. Full-time observation and testing should be provided for fill placed below the proposed building area. Fill should be placed in thin enough lifts to allow for proper compaction.

6. Drainage

The ground surface surrounding the proposed building should be sloped away from the building in all directions. Roof downspouts and drains should discharge beyond the limits of backfill.

The collection and diversion of drainage away from the pavement surface is important to the satisfactory performance of the pavement section. Proper drainage should be provided.

E. Foundations

1. Bearing Material

The proposed seminary building may be supported on spread footings bearing on the undisturbed natural gravel or on compacted structural fill extending down to undisturbed natural gravel. Compacted structural fill should extend down to the undisturbed natural soil and out away from the edge of the footings at least a distance equal to the depth of structural fill placed beneath the footings.

The clay, unsuitable fill, topsoil, debris and other deleterious materials should be removed from below proposed foundation areas.

2. Bearing Pressures

Spread footings bearing on compacted structural fill or the undisturbed natural gravel may be designed using an allowable net bearing pressure of 3,000 psf.

3. Settlement

We estimate that total and differential settlement will be less than ½ of an inch. Care should be taken to avoid disturbance of the natural soil to remain below foundations to maintain settlement 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. Minimum Footing Width and Embedment

Spread footings should have a minimum width of 1½ feet and a minimum depth of embedment of 10 inches.

6. Frost Depth

Exterior footings and footings beneath unheated areas should be placed at least 30 inches below grade for frost protection.

7. Foundation Base

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

8. Construction Observation

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

F. Interior Concrete Slabs on Grade

1. Slab Support

Concrete slabs may be supported on the undisturbed natural gravel or on compacted structural fill that extends down to the undisturbed natural gravel.

The clay, topsoil, unsuitable fill, organics, debris and other deleterious materials should be removed from below proposed 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.

3. Vapor Barrier

A vapor barrier should be placed under the concrete floor slab if the floor will receive an impermeable floor covering. The barrier will reduce the amount of water vapor passing from below the slab to the floor covering.

4. Cement Type

The natural soil tested in the laboratory was found to have a negligible sulfate attack potential on concrete. No special cement type is required for concrete placed in contact with the natural soil.

G. Exterior Concrete Slabs-on-Grade (Sidewalks, Curbs, Gutters, Misc.)

1. Slab Support

Exterior concrete slabs may be supported on the undisturbed natural soil or on properly compacted fill extending down to the undisturbed natural soil.

2. Concrete Type

The results of a water soluble content test conducted on the natural soil indicate that there is negligible water soluble sulfates in the natural soil. No special cement type is required for concrete placed in contact with the natural soil.

H. Pavement Design

Based on the subsurface soil conditions encountered, laboratory test results and the anticipated design loads outlined in the Project Description and Scope of Work section of the report, the following pavement support recommendations are given:

1. Subgrade Support

The near surface soil consists primarily of clay. A CBR value of 3 percent was used for the clay.

2. Pavement Thickness

The pavement thicknesses calculated are based on the subsurface soil conditions, traffic conditions given, a design life of 40 years and methods presented by the AASHTO.

a) Parking Areas

A pavement section consisting of 3 inches of asphaltic concrete overlying 9 inches of base course is recommended. The base course thickness may be reduced to 6 inches where at least 6 inches of granular borrow is provided or the subgrade consists of gravel with a CBR of at least 20. Alternatively, a pavement section consisting of 5 inches of Portland cement concrete placed above a prepared subgrade may be used.

b) Drive Lanes

A pavement section consisting of 3 inches of asphaltic concrete overlying 6 inches of base course and 8 inches of granular borrow is recommended. The granular borrow may be eliminated if the subgrade consists of at least 8 inches of natural gravel with a CBR of at least 20 percent. Alternatively, a pavement section consisting of 5 inches of Portland cement concrete placed above a prepared subgrade may be used.

c) Trash Enclosure Approach Slab

A Portland cement concrete section consisting of 6½ inches of Portland cement concrete overlying 4 inches of base course is recommended.

d) Future Berra Boulevard

A pavement section consisting of 4 inches of asphaltic concrete, 6 inches of base course and 12 inches of granular borrow are recommended. The granular borrow may be eliminated if the subgrade consists of at least 12 inches of natural gravel with a CBR of at least 20. Alternatively, a pavement section consisting of 5½ inches of Portland cement concrete placed above a prepared subgrade may be used.

3. Maintenance

Routine maintenance for pavements should be anticipated. Asphaltic concrete pavements are typically designed for a design life of 20 years. The pavement sections given above are based on the requested design traffic over a 40-year period. The pavement surface will experience wear and

deterioration over time and will likely require placement of surface treatments and/or milling/overlay during the requested design life.

4. Pavement Materials and Construction

The pavement materials should meet the material and compaction specifications for LDS Church projects. Pavement materials for the future extension of Berra Boulevard should meet the specifications of the applicable jurisdiction.

5. Jointing

Joints for concrete pavement should be laid out in a square or rectangular pattern. Joint spacings should not exceed 30 times the thickness of the slab. The joint spacings indicated should accommodate the contraction of the concrete and under these conditions steel reinforcing will not be required. The depth of joints should be approximately one-fourth of the slab thickness.

6. Testing

Pavement materials should be tested for conformance with project specifications. Compaction testing and concrete testing should be performed in accordance with project specifications.

I. Sliding Resistance of Soils

Lateral resistance for footings placed on compacted structural fill or the natural gravel is controlled by sliding resistance between the footing and foundation soil. A friction coefficient of 0.45 may be used in design for ultimate lateral resistance. The passive resistance of the soil adjacent footings may also be considered in design for lateral resistance of footings.

J. Lateral Earth Pressures

The following equivalent fluid weights are given for design of subgrade walls and retaining structures. 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 following values assume a horizontal surface adjacent the top and bottom of the wall.

Soil Type	Active	At-Rest	Passive
Clay & Silt	50 pcf	65 pcf	250 pcf
Sand & Gravel	40 pcf	55 pcf	300 pcf

Under seismic conditions, the equivalent fluid weight should be increased by 24 pcf for the active condition, increased by 9 pcf for the at-rest condition and decreased by 24 pcf for the passive condition. This assumes a peak horizontal ground acceleration of 0.39g for a 2 percent probability of exceedance in a 50-year period (ICC, 2017).

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.

K. Seismicity Hazard Concerns, Liquefaction, Seismicity and Faulting

1. Building Code Parameters

   Listed below is a summary of the site parameters that may be used with the 2018 International Building Code:

Description	Value[1]
Site Class	D[2]
S_s - MCE_R ground motion (period = 0.2s)	0.72g
S_1 - MCE_R ground motion (period = 1.0s)	0.26g
F_a - Site amplification factor at 0.2s	1.23
F_v - Site amplification factor at 1.0s	2.08[3]
PGA - MCE_G peak ground acceleration	0.30g
PGA_M - Site modified peak ground acceleration	0.39g

[1]Values obtained from information provided by the Applied Technology Council at https://hazards.atcouncil.org

[2]Site Class D was selected based on the subsurface conditions encountered to the depth investigated and our understanding of geologic conditions in the area. Site Class C may be representative of the site but the shear wave velocity of the upper 100 feet of soil would need to be measured to determine this.

[3]F_v was determined from Section 11.4.4 of ASCE/SEI 7-16.

2. Faulting

There are no mapped active faults extending near or through the site. The closest mapped fault considered to be active is the Oquirrh Fault Zone located approximately 3.3 miles northeast of the site (UGS, 2022).

3. Liquefaction

The site is located within an area mapped as have a "very low" susceptibility for liquefaction (Black, 1995). Based on our understanding of the geologic conditions in the area, liquefaction is not considered to be a hazard at this site.

L. Preconstruction Meeting

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

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 the information obtained from the test pits excavated at the approximate locations indicated on Figure 1 and the data obtained from laboratory testing. 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 the recommendations given.

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

Christopher J. Beckman, P.E.

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

CJB/bw

REFERENCES

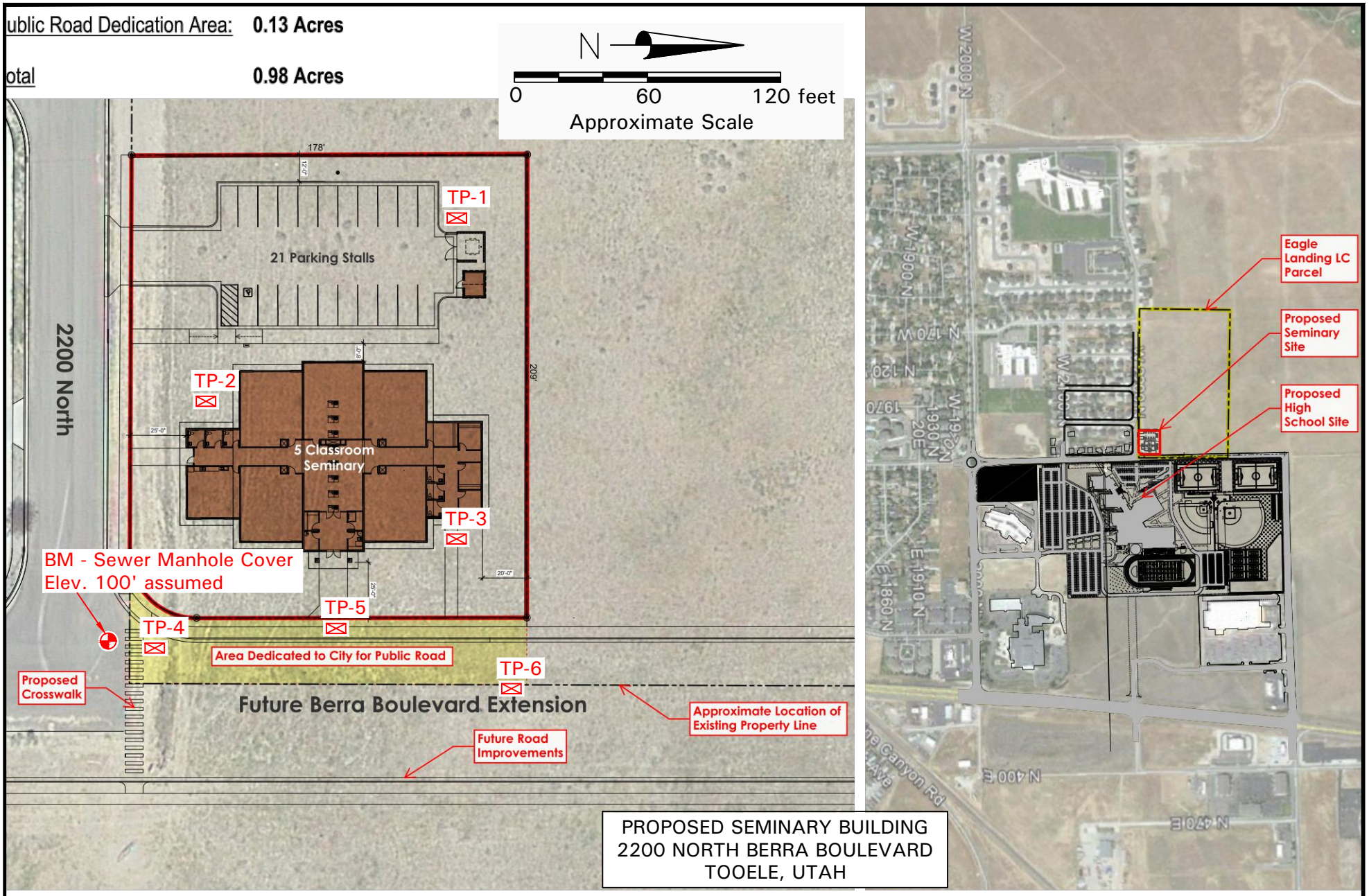
Black, B.D., 1995; Liquefaction susceptibility, Tooele Quadrangle, Tooele County, Utah, Utah Geological Survey Open-File Report 318, plate 2½.

International Code Council, Inc., 2017; 2018 International Building Code; Falls Church, Virginia.

Utah Geological Survey, 2022; Utah Quaternary Fault and Fold Database, http://geology.utah.gov/resources/data-databases/qfaults/ accessed March 8, 2022.

ublic Road Dedication Area: **0.13 Acres**

otal **0.98 Acres**



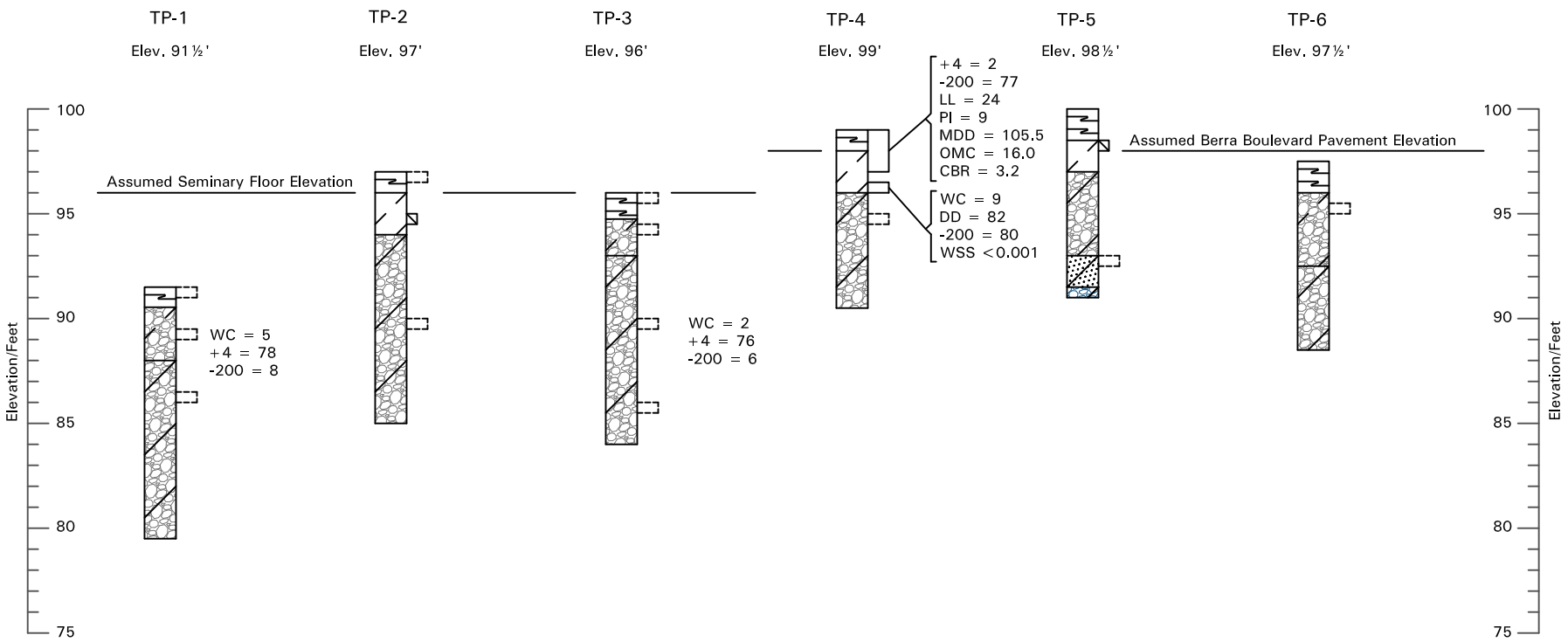
PROPOSED SEMINARY BUILDING
2200 NORTH BERRA BOULEVARD
TOOELE, UTAH

Proposed Site Plan
Scale: 1" = 20'-0"

0' 10' 20' 40' 60'

② **Vicinity Plan**
Scale: Not to Scale

1220051	AGEC	Test Pit Locations	Figure 1



Approximate Vertical Scale 1" = 8'

See Figure 3 for Legend and Notes

1220051	AGEC	Test Pit Logs	Figure 2

LEGEND:

Topsoil; sandy lean clay to clayey gravel with sand , moist to very moist, dark brown, roots and organics.

Lean Clay (CL); small to large amounts of sand, some gravel, slightly porous, stiff, slightly moist, light brown.

Silty Sand (SM); silt layers, medium dense, slightly moist, light brown.

Poorly-graded Gravel with Clay and Sand (GP-GC); small to moderate amounts of clay and sand, cobbles up to approximately 6 inches in size, medium dense, slightly moist, dark brown to grayish brown.

Poorly-graded Gravel with Silt and Sand (GP-GM); small to moderate amounts of silt and sand, cobbles up to approximately 7 inches in size, medium dense, slightly moist, grayish brown.

Indicates relatively undisturbed hand drive sample taken.

Indicates disturbed sample taken.

Indicates relatively undisturbed block sample taken.

Indicates slotted 1½-inch PVC pipe installed in the test pit to the depth shown.

NOTES:

1. The test pits were excavated on February 25, 2022 with a rubber-tired backhoe.
2. Locations of the test pits were measured approximately by pacing from features shown on the site plan provided.
3. Elevations of the test pits were measured by automatic level and refer to the benchmark shown on Figure 1.
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. No free water was encountered in the test pits at the time of excavation.
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 (%);
   UC = Unconfined Compressive Strength (psf);
   WSS = Water Soluble Sulfates (%).

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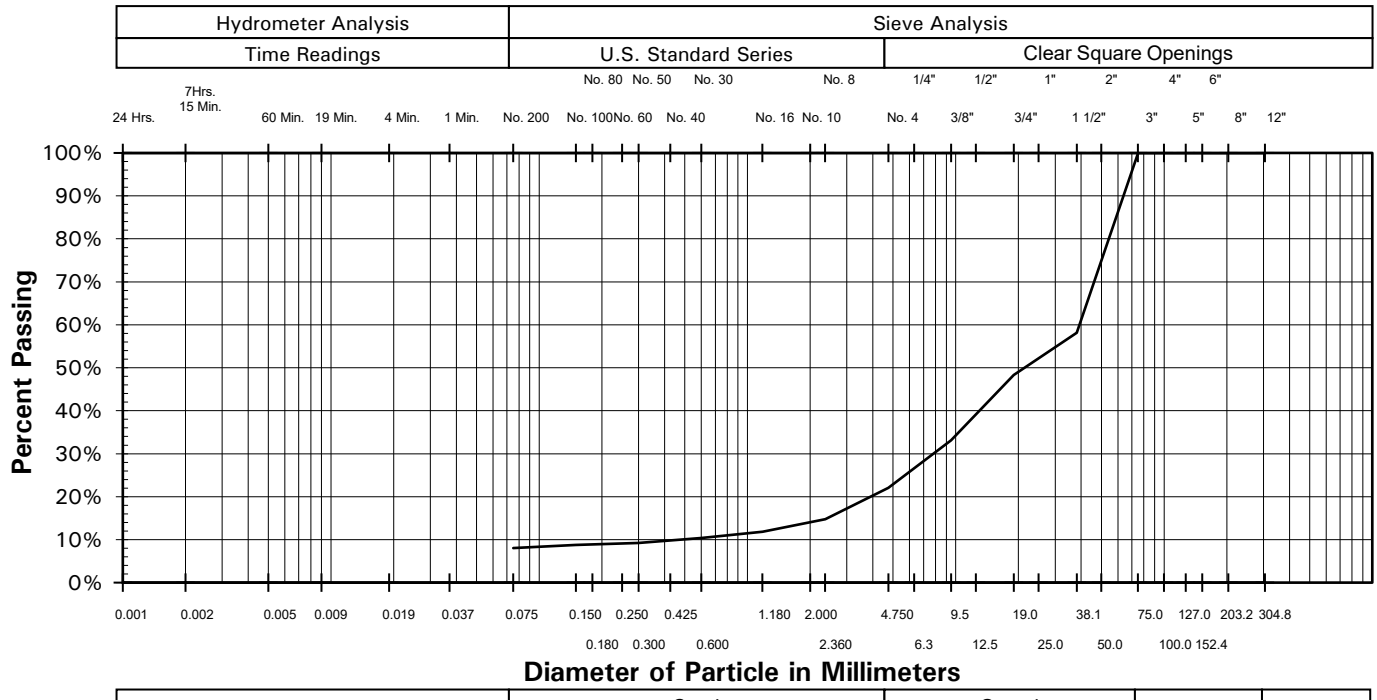
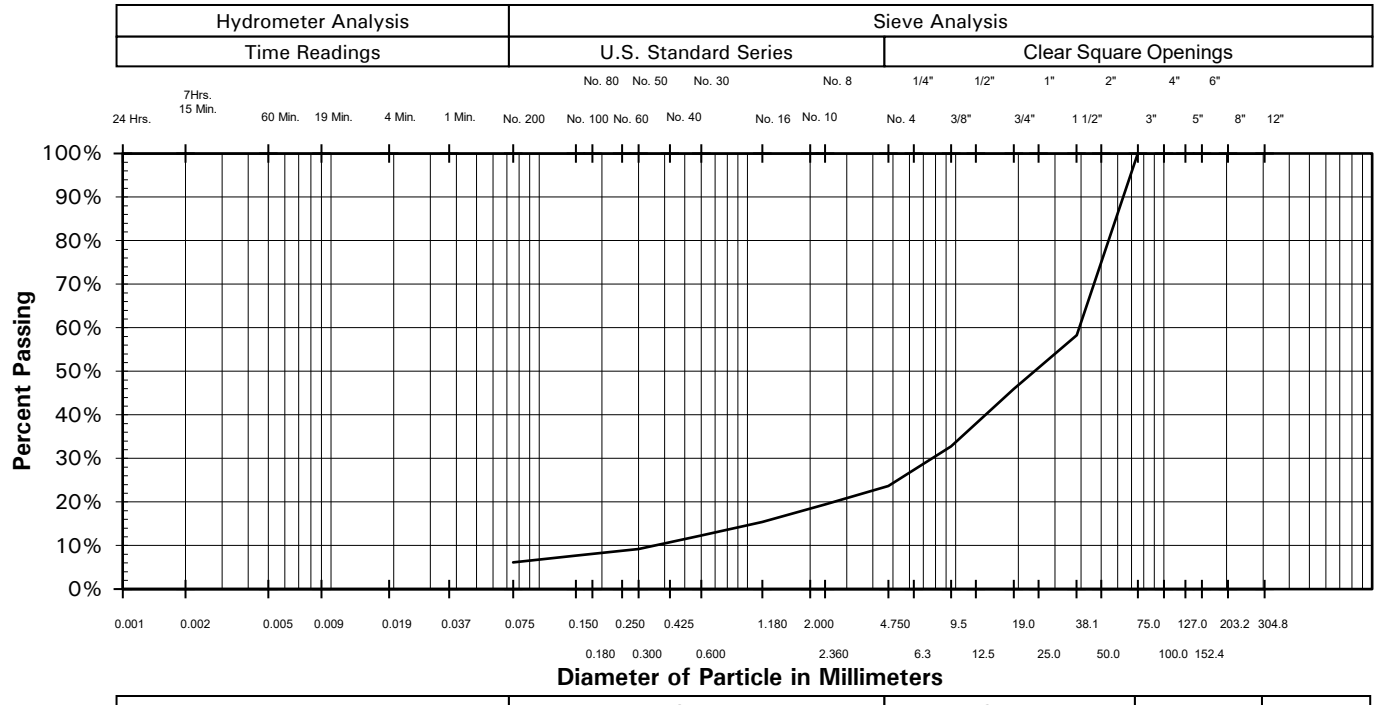


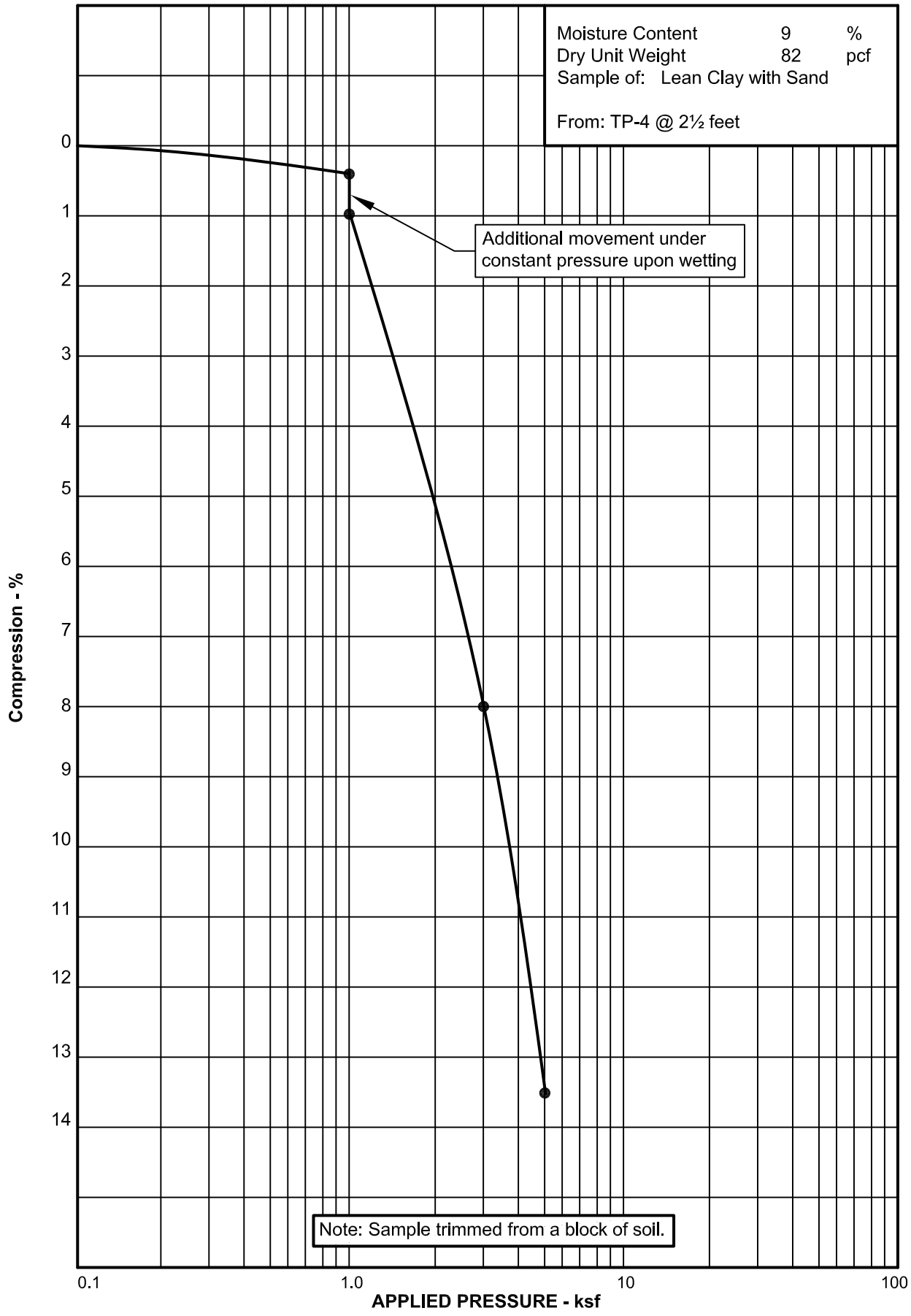
Gravel	78%	Liquid Limit	-
Sand	14%	Plasticity Index	-
Silt and Clay	8%	Sample Location	TP-1 @ 2 feet
Sample Description	Poorly-graded Gravel with Clay and Sand		



Gravel	76%	Liquid Limit	-
Sand	18%	Plasticity Index	-
Silt and Clay	6%	Sample Location	TP-3 @ 6 feet
Sample Description	Poorly-graded Gravel with Silt and Sand		

Project No. 1220051 **GRADATION TEST RESULTS** Figure 4

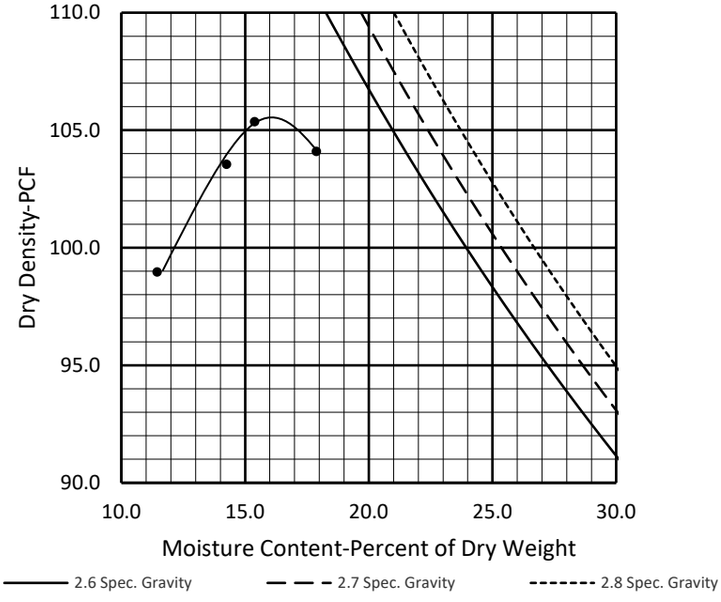
Applied Geotechnical Engineering Consultants, Inc.



Project No. 1220051 **CONSOLIDATION TEST RESULTS** **Figure 5**

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, Inc.

Moisture - Density Relationship, Gradation, & Classification Results



SAMPLE IDENTIFICATION

Project Name:	Tooele High School Seminary
Project No.	1220051
Sample No.	17664
Sample Location:	TP-4 at 1' to 2'
Date Sampled:	02/28/22
Sampled By:	AGEC

TESTING INFORMATION

Date Tested:	03/01/22
Tested By:	OM
Reviewed By:	KBB
Test Procedure:	AASHTO T99 A
Specific Gravity:	Not Used
Moisture Curing:	Not Used

ATTERBERG DATA

Liquid Limit	24
Plasticity Index	9

Determined by ASTM D 4318

PROCTOR RESULTS

Maximum Dry Density	105.5 pcf
Optimum Moisture	16.0 %
Rock Correction	*0.0 pcf*

Final Based on Microwave Oven Moisture Contents

VISUAL-MANUAL DESCRIPTION (ASTM D2488)

Lean Clay with Sand (CL)

GRADATION RESULTS

Sieve Designation	Sieve Opening Size (mm)	Percent Passing (%)	Project Specification (%)
4"	100	100	-
3"	76.2	100	-
1 1/2"	38.1	100	-
3/4"	19.1	100	-
3/8"	9.52	99	-
#4	4.76	98	-
#8	2.38	-	-
#16	1.19	-	-
#30	0.59	-	-
#50	0.297	-	-
#100	0.149	-	-
#200	0.074	77	-

GRAVEL	SAND	SILT & CLAY
2%	21%	77%

Figure 6

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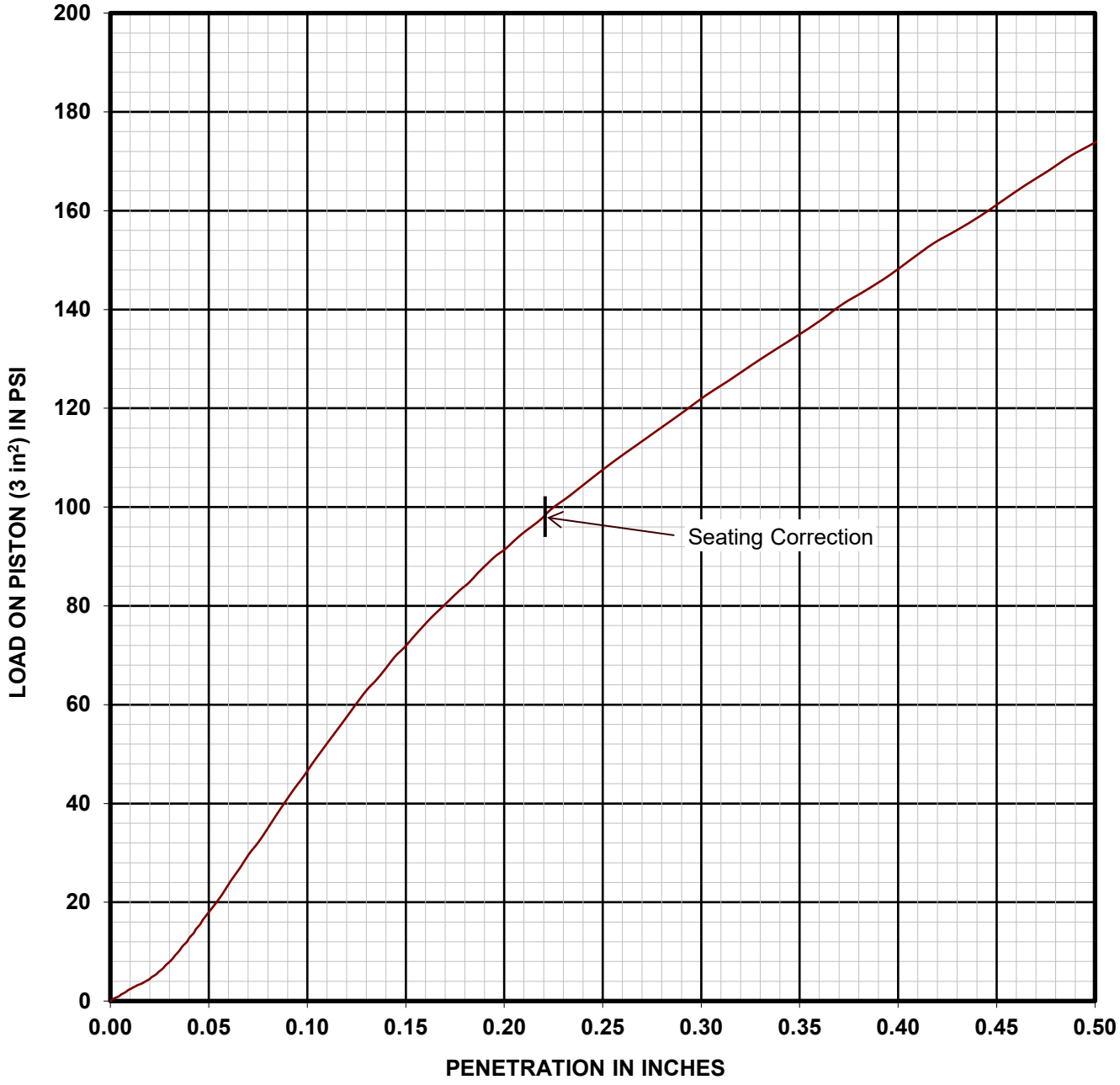


Sample of: Lean Clay with Sand

Location: TP-4 at 1' to 2' CS#: 17664

Remold Criteria: Compacted to near the maximum dry density and optimum moisture content per AASHTO T-99

Sample penetration after soaking for 95 hours

Dry Density: as molded 105 pcf Moisture Content: as molded 16 percent

after soaking 105 pcf top 1-inch after soaking 18 percent

Swell: after soaking 0.5 percent average after soaking 18 percent

(Swell Expressed as Positive Value, Compression Expressed as Negative Value)

Bearing Ratio of Sample, **CBR = 3.2*** percent with a surcharge of 10 lb

*CBR value adjusted per UDOT recommendations

Proj. No. 1220051 **CALIFORNIA BEARING RATIO TEST RESULTS** Figure 7

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

TABLE I
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NUMBER: 1220051

SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (PCF)	GRADATION			STANDARD PROCTOR		CALIFORNIA BEARING RATIO (%)	WATER SOLUBLE SULFATE (%)	SAMPLE CLASSIFICATION
TEST PIT	DEPTH (FEET)			GRAVEL (%)	SAND (%)	SILT/ CLAY (%)	MAXIMUM DRY DENSITY (PSF)	OPTIMUM MOISTURE CONTENT (%)			
TP-1	2	5		78	14	8					Poorly-graded Gravel with Clay and Sand
TP-3	6	2		76	18	6					Poorly-graded Gravel with Clay and Sand
TP-4	1-2			2	21	77	105.5	16.0	3.2		Lean Clay with Sand
	2½	9	82			80				<0.001	Lean Clay with Sand

APPENDIX

UNIFIED SOIL CLASSIFICATION SYSTEM CHART
AND
TOPSOIL TESTING REPORT

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel [F,G,H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or $1 > Cc > 3$ [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G,H,I]
			Fines classify as CL or CH		SC	Clayey sand [G,H,I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A" line [J]		CL	Lean clay [K,L,M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K,L,M,N]
			Liquid limit - not dried			Organic silt [K,L,M,O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K,L,M]
			PI plots below "A" line		MH	Elastic Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K,L,M,P]
			Liquid limit - not dried			Organic silt [K,L,M,Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

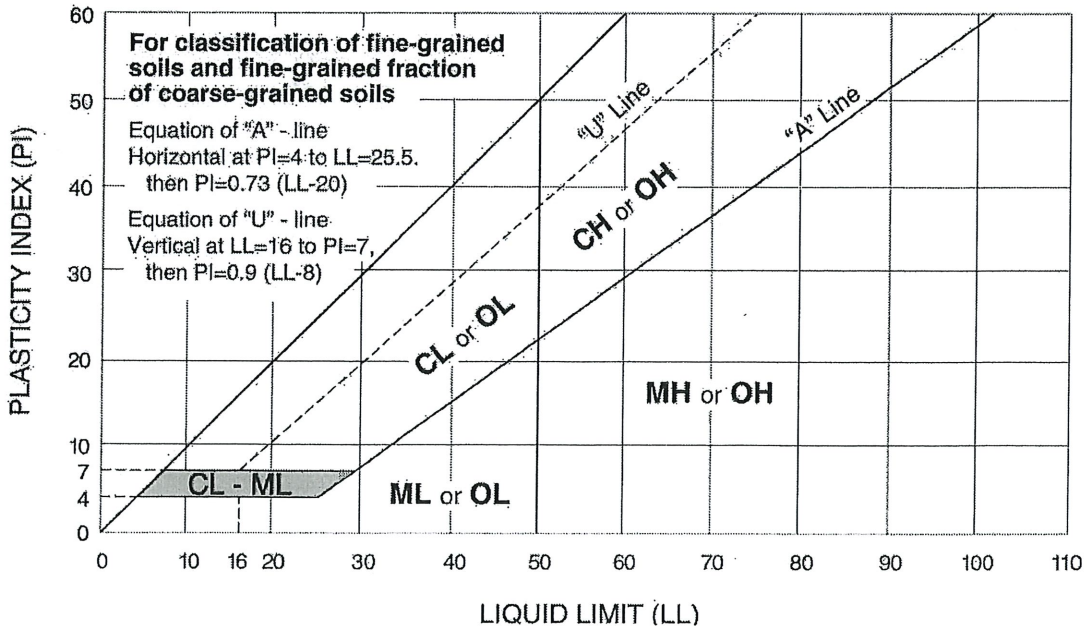
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



AGEC

Topsoil Testing Report

Project	Name Tooele HS Seminary		Property Number : 1220051
	Site Street Address, City, State/Province Not given		
Person Submitting Test	Name Katrina Black AGEC kblack@agecinc.com	Date Requested 04 Mar 2022	Phone 801 566 6399
	Address, City, State/Province 600 W Sandy Pkwy Sandy UT 84070		Cel 801 839 6414
Soil Testing Laboratory	Name QA Consulting and Testing, LLC	Date Submitted 14 Mar 2022	Cel 801 372 7177
	Address, City, State/Province 645 South 240 East Salem, UT 84653 vonisaman@comcast.net		Cel 801 372 7177

General

1. Owner will pay for pre-bid testing and one (1) final top-soil test.

Landscape Architect Instructions

1. Landscape Architect shall determine by investigation quality and quantity of topsoil on site before landscape design. Add physical and fertility recommendations from laboratory recommendations to relevant Church specifications.

Contractor Instructions

1. Test installed topsoil. Installed topsoil shall comply with Project Specifications.
2. If installed topsoil does not comply, Contractor will enhance and test at no cost to Owner until installed topsoil complies with Project Specifications.
3.

Testing Instructions

1. Collect at least two (2) samples of on-site topsoil and each anticipated topsoil source. If site soil profile or borrow pit are not uniform, additional samples shall be taken. Uniform composite samples may also be used if properly acquired and documented.
2. Submit required soil samples to soil testing laboratory along with all required (for this report and laboratory) information.

Soil Testing Laboratory Instructions

1. This report must be completely filled out and provide soil interpretation and amendment, fertilizer, and soil conditioner recommendations for use by Landscape Architect. These recommendations should consider lawn areas, tree and shrub areas, and native plant areas.
2. Provide appropriate times for fertilizing.
3. Return completed Topsoil Testing Report to person submitting the test.

SOIL SAMPLE LOG		
Soil Sample No.	Description of location where sample was taken	History of use of the soil
TP-1	0' – ½'	Not given

Existing Conditions Test Report ("Acceptable Levels" refers to the allowable soil specifications prior to being amended)

SOIL TEST DATA												
Sample No.	pH(1)	EC(1) Mmhos/cm	SAR(1)	% Sand	% Silt	% Clay	Text(2) Class	%(3) OM	NO3-N(4) ppm	P(5) ppm	K(5) ppm	Fe(5) ppm
TP-1	7.2	0.4	0.5	32	45	23	Loam	1.7	1	12	434	9
Acceptable Level(s)	5.5 - 8.4	<3.0	<6.0	15-60	10-60	5-30	(2)	>1.0	>20	>11	>130	>10

(1) Saturated soil paste 1:1 soil:water method (please Indicate)
(2)Hydrometer method (Acceptable soil- Sand:15-60 %, Silt:10-60 %, Clay-5-30 %)
(3)Potassium dichromate method (Walkey-Black).
(4)Chromotropic acid method (5)AB-DTPA method.
Other methods: NO3-N, P, K, and Fe, then note.

Continued next page.

ROCKS (Coarse Fragments)		
Sample No.	Percent > 1/4 inch (6.4 mm)	**Rocks Present ≥ 1.5 inch (38 mm) Indicate as present or not present**
TP-1	**35.8**	**Present**
Acceptable Level	≤ 5.0 percent	**< 1.5 inch (38 mm)**

Landscape Area Description
Lawn Areas: Receive 5 inch (125 mm) topsoil plus recommended amendments and fertilizers.

Shrub/Tree Areas: Unless otherwise indicated, plant pits are to be backfilled with three (3) parts native soil and one part compost or other recommended amendments. Additionally, contractor will add recommended fertilizer.

INFILTRATION RATE		
Documented Infiltration rate of test sample(s) based on texture at 90 percent relative density (to nearest 1/10th of an inch)		
Sample No.	Rate	
TP-1	1.0	Inches/Hour

Native Grass/Shrub/Tree Areas: Planting to receive minimum recommended amendments and fertilizers for establishment.

Interpretation Summary of Test Results:

Tooele HS Seminary

TP-1 Nitrate Nitrogen and Iron do not meet Acceptable Levels. Coarse Fragments <1/4" and Rocks <1.5" do not meet Acceptable levels.

Screen this soil to meet Acceptable Coarse Fragment/Rock Levels.

Soil Amendments, Fertilizer and Soil Conditioner – Recommendations:

Lawn Areas: Amendments: Apply an organic material (compost, etc.) at 5 cu yds/1000 sq ft for every 5" of topsoil depth. Incorporate well. See the Compost Quality Guidelines for Landscaping, attached. Or, apply a similar product at label rate following manufacturer's recommendation for soil preparation and turf maintenance. No additional organic material is recommended for organic matter content ≥5%. Fertilizer: Apply a Nitrogen and Iron fertilizer at label rate. Incorporate well. Conditioner: None.

Shrub/Tree Areas: Amendments: See **Landscape Area Description** above. Fertilizer: Apply a Nitrogen and Iron fertilizer at label rate. Conditioner: None.

Native Grass/Shrub/Tree Areas: Amendments: None. Conditioners: None. Fertilizer: Incorporate an Nitrogen and Iron fertilizer at 1/2 label rate, or per nurseryman's recommendation.

Scarify the subsoil at least 6" before applying topsoil.

Long Term (5 Year) Fertilizer and Soil Conditioner – Recommendations:

Lawn Areas: Amendments: None. Conditioner: None. Fertilizer: Continue with above recommendation.

Shrub/Tree Areas: Amendments: None. Conditioner: None. Fertilizer: As top dress, continue with above recommendation.

Native Grass/Shrub/Tree Areas: Amendments: None. Conditioner: None. Fertilizer: Top dress every other year with 1/2 label rate of a Nitrogen and Iron and Iron fertilizer; or per nurseryman's recommendation.

Continued next page.

COMPOST QUALITY GUIDELINES FOR LANDSCAPING*

Category	pH**	Soluble Salts** dS/m or mmho/cm	Sodium Adsorption Ratio** (SAR)	Carbon:Nitrogen Ratio*** (C:N)	% Moisture****	≥98% Coarse Material Passing (dry wt basis)
Ideal	6 to 8	≤5	<10	≤20:1	25 to 35	3/8" (9.5 mm)
Acceptable	5-6, 8-9	≤10	≤20	21:1 to 30:1	<25, >35	3/4" (19 mm)
Suspect	<5, >9	>10	>20	<10:1, >30:1	<20, >50	<98% 3/4"

for composts with biosolid feedstocks, biosolids must meet EPA 503 Class A standards

*Von Isaman MS, President of QA Consulting and Testing LLC, Dr. Rich Koenig, USU Cooperative Extension Soils Specialist, and Dr. Teresa Cerny, USU Cooperative Extension Horticulturalist, 3 March 2003.
** 1:5 Compost:Water Slurry on Coarse Material passing 3/8" (9.5 mm)
*** on Coarse Material passing 3/8" (9.5 mm)
**** on total sample

Acceptable level Soluble Salts and/or SAR composts then do not exceed 3 cu yds/1000 sq ft for every 3 inches of soil depth.

End.

AgecTooeleHSSeminaryLdsReport22.310