Pavement Study
Trails at Aspen Ridge, Filing 4
El Paso County, Colorado

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Project Number 252742-P1
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ATTACHMENTS

1.0 EXECUTIVE SUMMARY

AGW completed the pavement study for the proposed streets to be constructed at the subject site. This study was conducted in general conformance with the El Paso County pavement design procedures. The following pavement study summarizes the field exploration, subsurface conditions encountered, laboratory tests performed, and the pavement recommendations.

The subsurface materials encountered in our test borings consisted of slightly sandy to sandy clay fill with varying portions of gravel overlying claystone bedrock. Ground water was not encountered at the time of drilling. Based on our sampling and laboratory testing, expansive subgrade mitigation per El Paso County is required.

The pavement recommendations for the local residential streets are composite sections of 5.5 inches of asphalt concrete overlying 7.0 inches of aggregate base course over 12.0 inches of chemically treated subgrade or 5.5 inches of asphalt concrete overlying 19.0 inches of aggregate base course. The pavement recommendations for the residential collector are composite sections of 6.5 inches of asphalt concrete overlying 10.0 inches of aggregate base course over 12.0 inches of chemically treated subgrade or 6.5 inches of asphalt concrete overlying 22.0 inches of aggregate base course. We encourage the Client to read this study in its entirety and not rely solely on the cursory information contained in this summary.

2.0 PURPOSE

The purpose of this study was to provide pavement thickness recommendations for the subject site in general conformance with the "El Paso County Engineering Criteria Manual" (Manual). This study presents the analysis of approximately 3,600 of local residential streets and 400 feet minor collector streets. Factual data gathered during the field and laboratory work and our analyses are summarized on Figures 1 through 6 and in Appendices A and B. Our opinions and recommendations shown in this study are based on the data generated during this field exploration, laboratory testing, and our experience with similar projects.

3.0 PROPOSED CONSTRUCTION

Based on the "Trails at Aspen Ridge Filing No. 4 - Roadway & Storm Improvement Plan" prepared by Matrix Design Group, Inc., Project No. 21.886.038, dated July 2025 (Plans), the local residential streets have a right-of-way (ROW) width of 50 feet with two travel lanes, curb, gutter, and attached sidewalks. The minor collector street has a ROW width of 80 feet with two travel lanes, a center turn lane, shoulders, curb, gutter, and detached sidewalks. These streets will be paved with asphalt concrete sloped with a 2% crown.

4.0 FIELD EXPLORATION

The subgrade soils were sampled by drilling 17 test borings within the proposed street alignments at the locations shown on Figure 1. The test borings were drilled after sanitary sewer installation to depths of 5 to 10 feet with disturbed bulk samples collected in the upper 5 feet of rough subgrade elevation. Samples of the subsurface materials were obtained using a Modified California sampler which was driven into the soil by dropping a 140-pound hammer through a free fall of 30 inches. The Modified California sampler is a 2.5-inch outside diameter by 2-inch inside diameter device. The number of blows required for the sampler to penetrate 12 inches and/or the number of inches that the sampler is driven by 50 blows gives an indication of the consistency or relative density of the soils and bedrock. Results of the penetration tests are presented on the "Test Boring Logs", Figures 3 through 6. Ground water was not encountered at the time of drilling.

5.0 LABORATORY TESTING

The samples obtained during drilling were returned to the laboratory where they were visually classified by a geotechnical engineer. Laboratory testing was then assigned to specific samples to evaluate their engineering properties. The laboratory tests included gradation analysis and Atterberg limits to evaluate grain size distribution and plasticity. Swell-consolidation testing was conducted to evaluate the effect of wetting under load on selected samples. Representative samples were tested for density, moisture content, and water-soluble sulfate concentration. Selected bulk samples were combined and tested for standard Proctor and resilient modulus to determine the subgrade support strength. The test results are summarized on Figures 3 through 6 and are included in Appendix A.

6.0 SUBSURFACE CONDITIONS

The subsurface materials encountered in our test borings consisted of slightly sandy to sandy clay fill with varying portions of gravel overlying claystone bedrock. According to the AASHTO Soil Classification system, the soils from the bulk samples collected classify as A-6 (17 to 24) and A-7-6 (22 to 28). Fill was encountered in all 17 test borings and was between 5 to 10 feet thick. AGW performed moisture-density testing during overlot grading and sanitary utility backfill operations (AGW Project Number 252742). Claystone bedrock was encountered in three of the test borings at depths ranging from 6 to 7 feet. Ground water was not encountered at the time of drilling.

7.0 WATER-SOLUBLE SULFATES

The Colorado Department of Transportation (CDOT) stipulates requirements for the risk of sulfate exposure on concrete structures based on Table 601-2 of the "Standard Specifications for Road and Bridge Construction (2023)". The water-soluble sulfate concentration of the samples tested ranged from 5,600 parts per million (ppm) to 7,800 ppm. Based on these results, the sulfate concentrations represent a Class 2 risk of sulfate exposure. We recommend concrete structures bearing upon onsite materials meet the requirements stipulated in Section 601.04 of the CDOT "Standard Specifications for Road and Bridge Construction". A high sulfate resistant Portland cement or double application will be required for chemical treatment of the subgrade.

8.0 EXPANSIVE SUBGRADE CONDITIONS

The Manual stipulates subgrade soils requiring expansive subgrade mitigation be discussed in the pavement design. Subgrade soils exhibiting 2% or greater swell potential require expansive subgrade mitigation. Swell-consolidation tests were conducted to determine expansion potential under a surcharge load of 200 pounds per square foot (psf). The test results exhibited swells ranging from 0.7 to 4.7%. Based on our sampling and laboratory testing, expansive subgrade mitigation per El

Paso County is required. Expansive subgrade mitigation consists of either chemical treatment of the subgrade to a minimum depth of 12.0 inches or removal of a minimum of 12.0 inches of subgrade and replacement with CDOT "Class 6" aggregate base course below the designed pavement section.

Chemical subgrade treatment is the process of adding lime, fly ash, Portland cement, or another chemical agent to produce a stable paving platform. We recommend a mix design be conducted (using on-site soils and a sample of the chemical agent) to determine the percentage of chemical agent necessary to achieve a minimum unconfined compressive strength of 160 pounds per square inch (psi) when cured at 100°F. Construction recommendations for chemical modification of the subgrade are provided in "Chemically Treated Subgrade".

Composite (multi-layered) pavements are considered less likely to exhibit edge line cracking. An intermediate layer creates a transition zone within the pavement system that aids in the distribution of stress over the weaker subgrade materials. Prior to placement of the aggregate base course, the subgrade should be prepared to a minimum depth of 12 inches.

9.0 SUBGRADE SUPPORT

The pavement subgrade support strength of soils is based on the resilient modulus (M_R). The resilient modulus is a measure of the elastic property of soil, which is dependent upon moisture content, density, and the applied stress level. The soils encountered in Test Borings 5 and 10 as representative of A-7-6 (26 and 28) were combined and tested for standard Proctor and M_R. The M_R testing was performed on a sample remolded to a minimum of 95% of standard Proctor (ASTM D698) maximum dry density at approximately 3% above optimum moisture content. The resilient modulus testing exhibited an M_R of 3,964 psi. We found this value to be reasonable for the soils encountered.

10.0 TRAFFIC CONSIDERATIONS

Based on the Manual and the Plans, the proposed streets at the site classify as local residential and collector. The Manual stipulates default Equivalent Single Axle Load (ESALs (18-kip)) values for each classification based on a 20-year design period. The default ESAL values appear higher than those typically adopted by other municipalities. However, Section D.3.2 of the Manual requires using the minimum ESAL default values if no actual traffic data is available. The following table summarizes the design criteria.

Street Classification	ESALs	Reliability (%)	Serviceability Index
Local Residential	292,000	80	2.5
Minor Collector	821,000	85	2.0

11.0 PAVEMENT THICKNESS RECOMMENDATIONS

The pavement thickness recommendations were calculated using the 1993 AASHTO Pavement Design, DARWin Pavement Design and Analysis System computer program. Based on the design criteria referenced above, the expansive subgrade mitigation, and the calculations included in

Appendix B, the following pavement thicknesses are recommended. This pavement sections meet or exceed the minimum required by El Paso County. The pavement thicknesses are provided on the table below and are shown on Figure 2.

Street Classification	Alternate	ACS (in)	ABC (in)	CTS (in)	Total (in)
Local Residential (ESAL = 292,000; M_R = 3,964 psi)	A	5.5	7.0	12.0	24.5
	B	5.5	19.0	—	24.5
Residential Collector (ESAL = 821,000; M_R = 3,964 psi)	A	6.5	10.0	12.0	28.5
	B	6.5	22.0	—	28.5

ACS – Asphalt Concrete Surface
ABC – Aggregate Base Course
Note: The alternates include either 12.0 inches of chemically treated subgrade or the removal of 12.0 inches of subgrade and replacement with an additional 12.0 inches of CDOT "Class 6" aggregate base course for expansive subgrade mitigation.

Proper and timely maintenance will be required during the lifetime of the pavement to reach the designed service life. Pavement maintenance recommendations are provided in "Pavement Maintenance".

12.0 DRAINAGE CONSIDERATIONS

Long-term pavement performance is aided by proper drainage. Surface drainage is necessary for water to drain into the proper collection system instead of fully infiltrating into the subgrade soils below the pavement structure. If the pavement is not properly drained, the soils below the pavement structure may become saturated, and the subgrade will lose strength, ultimately affecting the performance of the pavement layers above (generally from imposed traffic loads). A drain system may aid pavement performance near irrigated areas. Excessive irrigation could negatively impact the pavement structure. In addition, xeriscaping the landscaped areas is recommended.

13.0 GENERAL DISCUSSION

Several municipalities in the region allow vertical residential construction prior to the completion of the designed pavement structure (i.e., after placement of the bottom lift of asphalt). Construction traffic during the buildout phase often exceeds the anticipated daily traffic volume on residential streets. Pavement distress may occur on incomplete pavement structures because of construction traffic. Full placement of the designed pavement structure prior to vertical residential construction should be considered or a minimum of two lifts of pavement should be paved before vertical construction begins. In addition, bottom lift only paving allows accumulation of water since the drainage structures cannot be effectively used. This could result in wetting of the subgrade soils and may result in weakening of the pavement structure.

14.0 CONSTRUCTION RECOMMENDATIONS

The following recommendations are intended as a guideline and not as replacement for the jurisdictional standards and specifications. It shall be the responsibility of the Contractor to abide by the standards and specifications stipulated in the Manual.

14.1 Chemically Treated Subgrade

Chemically treated subgrade operations generally consist of blending chemicals (lime, fly-ash, cement kiln-dust, or Portland cement) with subgrade soils to a specified depth to improve the subgrade support properties. A mix design stating the amount of chemical agent necessary to modify the subgrade support properties should be performed using on-site soils. In addition, the chemical agent used in the mix design should be from the same source as to be used during construction.

14.1.1 Weather Limitation

The subgrade should not be chemically treated when the ambient temperature at ground level is below 40°F in the shade or may fall below 40°F within 24 hours, when it is rainy, or in other adverse conditions. The jurisdictional representative has authority to alter these requirements. In no case should the subgrade be treated when the material to be treated is frozen. If the subgrade is chemically treated and is expected to be exposed to freezing temperatures, the treated subgrade should be protected by either covering the subgrade or by placement of the subsequent course.

14.1.2 Equipment

The equipment required should include all equipment necessary but not limited to complete such items as: grading, scarifying, spreading (slaker for slurry mixtures), pulverizing, mixing, hauling, compacting, sprinkling of water, finishing, protecting, curing, and maintaining the completed course.

14.1.3 Subgrade Preparation

Prior to chemical treatment, the subgrade should be cut or bladed to the required surface according to the approximate line, grade, and/or cross sections specified in the plans. The subgrade should be moisture conditioned to within 0 to +3% of optimum moisture content prior to chemical treatment to permit proper processing of the subgrade. The subgrade should be proof rolled to detect any loose or soft areas. These areas should be overexcavated and replaced with suitable compacted fill. The stabilized subgrade should be free of roots, sod, weeds, wood, construction debris, other deleterious materials, or stones larger than 3 inches.

14.1.4 Construction Methods

The construction methods used must achieve a subgrade containing a mixture (free of loose or segregated areas) of uniform density and moisture content with a smooth surface suitable for placing subsequent courses. The subgrade must meet the established design parameters. It is the responsibility of the Contractor to regulate the sequence of this work, to use the proper amount of chemical agent, to maintain the work, and to rework the courses as necessary to meet the above requirements.

14.1.5 Application

The chemical agent should be spread only in the area where the mixing operations can be completed during the same working day. Chemically treated subgrade with a cementitious stabilization agent should be completed (mixing, compacting, and finish grading, etc.) within 90 minutes of the time cementitious stabilizing agent and water is applied. The application rate should be established by the Contractor to ensure the required amount of chemical agent stipulated in the job mix formula is applied to achieve a uniform mixture for the specified depth. The chemical agent should be applied using the "Dry Placement" method or the "Slurry Placement" method.

<u>Dry Placement</u>

The design amount of chemical agent should be spread uniformly over the top of the subgrade by an approved screw-type spreader box or other approved spreading equipment. The chemical agent should be distributed in a manner that minimizes scattering by wind. The chemical agent should not be applied when wind conditions, in the opinion of the jurisdictional representative, are detrimental to achieving proper application and sequentially an overall successful operation.

<u>Slurry Placement</u>

The design amount of chemical agent applied by slurry should be mixed with water in approved slaking equipment and applied on the subgrade as a thin water suspension or slurry. The slurry mixture should be applied with a percentage not less than that applicable for the grade of lime used. The distribution equipment should be capable of continuous agitation to keep the slurry mixture uniform until applied on the subgrade. The distribution of the slurry mixture should be achieved by successive applications over a measured section of subgrade until the proper amount of slurry mixture has been applied. The slurry should not be exposed to allow the slurry mixture to runoff or dry out. If the slurry becomes "brittle", its effectiveness is reduced, and additional slurry will be required.

14.1.6 Mixing and Mellowing

<u>Mixing</u>

The treated subgrade material should be mixed continuously with an approved mixing machine to the specified depth below the bottom of the proposed pavement structure. The mixing machine should make enough passes to achieve 100% of the mixture material passing the 1-inch sieve and 60% passing the ¼-inch sieve. Streaks or pockets of chemical agent is evidence of inadequate mixing. There should be a minimum 6-inch overlap between passes to establish proper mixing and breakdown. Water should be added to the subgrade during mixing to maintain a moisture content a minimum of 3% above optimum moisture. Sufficient water in the mixture allows for the reaction of the chemical agent and the subgrade soils. After mixing is completed, lime treated soils should be lightly rolled to reduce evaporation during the mellowing period. Portland cement treated soils should be compacted within 90 minutes after mixing.

<u>Mellowing (Lime Only)</u>

During the mellowing period, the water content of the mixture should be maintained at moisture contents of 3% above optimum moisture by sprinkling water as necessary. A mellowing period of a minimum of two days (48 hours) is required or until the subgrade modification design criteria are met (i.e., pH and plasticity reduction). Remixing may be necessary to assist the reaction, as determined by the Engineer.

<u>Final Mixing (Lime Only)</u>

Prior to final mixing, pH and plasticity reduction requirements should be confirmed. Final mixing cannot proceed until these parameters are confirmed. Cement or other chemical application may be added during this phase, if necessary, to meet strength requirements.

14.1.7 Compaction

Compaction of the material mixture should begin immediately after mixing for Portland cement or final mixing for lime applications. The material should be aerated or sprinkled as necessary to keep the material within the specified moisture content limits during and following compaction. Laboratory samples should be taken from the treated material prior to compaction or after the curing period. The laboratory samples should be tested in accordance with ASTM D558 to determine the maximum dry density and optimum moisture content. The field density of the compacted mixture should be a minimum of 95% of maximum dry density at moisture contents between 0% to +3% of optimum moisture content. The thickness of the treated layer should be determined by depth tests a minimum of every 1,000 square yards or less. Compaction should be accompanied by sufficient blading to eliminate irregularities. The Contractor should remedy any deficiencies observed in the treated subgrade. Otherwise, redesigning the pavement may be necessary.

14.1.8 Finishing and Curing

After the final layer of the specified depth of treated subgrade has been compacted, it should be brought to the required lines and grades in accordance with typical roadway sections. Rolling with a pneumatic or other suitable roller that is sufficiently light to prevent hairline cracking should be conducted on the completed section. Traffic on the chemically treated subgrade should be limited. During the curing period, the subgrade should be lightly sprinkled with water as necessary to prevent the surface from possible shrinkage or cracking. Chemical treatment of the subgrade does not create a "weatherproof" surface. Therefore, proper curing and protection are necessary. If subsequent courses are not placed after the curing period, liquid asphalt (an emulsified asphalt CSS 1-H diluted 1 to 1 with water) may be applied over the chemically modified subgrade to provide a protective film for the treated subgrade.

14.1.9 Strength Testing

According to the Manual, the chemical modification process should be observed and tested on a full-time basis. Chemically treated subgrade courses that are part of the pavement section should be tested for unconfined compressive strength. The chemically treated subgrade should have a minimum compressive strength of 160 psi in five days at 100°F in accordance with ASTM D5102 or ASTM D1633. If earlier strength tests meet 160 psi, subsequent construction may proceed (e.g., paving operations). If the strength parameters are not achieved, remixing with additional cement or redesign may be necessary. If the purpose of the chemical treatment is expansive subgrade mitigation, then strength testing may not be necessary. Micro-fracturing for Portland cement treated subgrade should be expected.

14.2 Subgrade

Prior to paving operations, the subgrade must be prepared in a manner that allows for adequate pavement support. The subgrade should only be prepared when ambient conditions will not prevent the Contractor from achieving the required density and moisture content. Frozen soil should never be used as subgrade fill. The entire subgrade should be proof-rolled with a loaded 988 front-end loader or similar heavy rubber-tired vehicle (GVW of 50,000 pounds with 18-kip per axle at tire pressures of 90 pounds per square inch (psi)) to detect any soft or loose areas. All areas exhibiting unstable subgrade conditions such as loose soils, pumping, or excessive movement, should be overexcavated to a firm soil layer or to a maximum depth of 2 feet, whichever is shallowest, and replaced with suitable compacted fill. If unstable subgrade conditions persist, AGW should be contacted for our opinion.

If no unstable areas are observed during the proof-roll or after removal and replacement of unsuitable soils, the entire subgrade may be prepared by windrowing, tilling, or by removing a minimum of 12 inches of subgrade from proposed pavement subgrade elevation. If necessary, add or reduce moisture to the required moisture content. The subgrade fill should be placed in maximum 8-inch loose lifts and compacted to a minimum of 95% of standard Proctor (ASTM D698) maximum dry density at optimum to +3.0% of optimum moisture content for A-6 and A-7-6 soils. The fill should be compacted to a minimum of 95% of modified Proctor (ASTM D1557) maximum dry density at −2.0% to +2.0% of optimum moisture content for other soil types. Chemically treated subgrade should be compacted to a minimum of 95% maximum dry density (ASTM D558) at optimum to +3.0% of optimum moisture content. If additional fill is required to reach the pavement subgrade elevation, the fill should have a soil classification similar to or better than the poorest soils encountered during this study. The subgrade should be free of organics, vegetation, large rocks, or any other deleterious materials. The pavement subgrade should be crowned to the appropriate grade lines. Additional compactive effort should be applied along edged concrete structures such as curbs and crosspans.

14.3 Aggregate Base Course

Aggregate base course (ABC) should consist of aggregate which meets specifications for gradation, plasticity, abrasion wear, and strength. We recommend the use of material meeting CDOT "Class 6" specifications and having an R-value ≥ 78. The ABC should be tested to determine compliance with these specifications prior to use. The ABC should be placed in loose lifts not exceeding 8 inches and should be compacted to a minimum of 95% of modified Proctor maximum dry density (ASTM D1557). Aggregate thicknesses exceeding 8 inches should be placed and compacted in two separate lifts. The ABC should not be placed when weather conditions prevent achievement of the required compaction.

14.4 Asphalt Concrete Surface

Asphalt material should conform to an agency approved mix design that states the SHRP Gyratory design properties (i.e., maximum density, optimum asphalt content, job mix formula, recommended mixing and placing temperatures, etc.). We recommend that the aggregate used in the asphalt meet

CDOT "Grading S", "Grading SX", or equivalent regulatory aggregate specifications. If the material does not meet or exceed these specifications, the asphalt thickness should be revised. The asphalt material should be placed in lifts a minimum of three times the aggregate size and should be compacted to 92 to 96% of Theoretical Maximum Specific Gravity for S and SX Super Pave mixes. The asphalt material should be compacted to 93 to 97% of Theoretical Maximum Specific Gravity for SMA Super Pave mixes. Materials standards and specifications in the Manual are required. Asphalt binder selection should be appropriate for each roadway classification. The paving contractor is responsible for mix submittal to the agency. Asphalt concrete should not be placed when weather conditions are such that the materials cannot be properly placed or compacted. The asphalt concrete should be placed on a prepared surface, graded to the appropriate elevation. In no case should the asphalt concrete be placed on frozen subgrade or base. When applicable, a tack coat should be applied at joints, adjacent to curbs, gutters or crosspans. The Contractor is responsible for establishing rolling patterns to determine the amount of effort required to meet the compaction requirements. Field testing conducted by AGW will not relieve the Contractor from proper compaction and construction of the pavement.

15.0 PAVEMENT MAINTENANCE

Flexible pavement structures are typically designed for a service period of 20 years. However, timely and proper maintenance during the life of the pavement is essential to reach the designed service period and to possibly extend the serviceability of the pavement. We recommend implementing a maintenance program aimed at preserving the structural integrity of the pavement. The implementation of available maintenance operations varies depending upon pavement type and on-site conditions. Flexible pavements will exhibit some type of pavement distress during their service life. Periodic maintenance and rehabilitation should be anticipated to reach the anticipated design life. Typically, minor cracks may develop within the first three years. Crack sealant should be used immediately upon recognition of these cracks to reduce further deterioration and/or potential moisture induced damage. The use of crack sealants may extend the life of the pavement by two to five years before any other treatment is applied. A variety of seal coats are available and can delay the need for a major surface structural treatment. However, careful engineering judgment should be used to determine the type of seal application that is most appropriate. Seal coats should not be applied on pavements with severe cracks, raveling or potholes. Fog seals typically have an estimated service life of approximately one to two years but should only be used on structurally sound pavements. Slurry seals generally have a service life of four to seven years and are commonly used on pavements exhibiting no to low pavement distress. Chip seals aid in slowing surface oxidation, minor raveling, and sealing small cracks. Chip seals are considered to have a service life of approximately four to seven years. Structural mill and overlay are a rehabilitation technique that generally occurs within eight to 12 years after initial construction. This technique should only be used on stable pavements with minor surface distress and a strong base. Conventional structural mill and overlay operations are known to have a service life of eight to 14 years.

16.0 LIMITATIONS

This pavement study was based upon laboratory testing of samples obtained at widely spaced locations. Variations in subsoil conditions could occur between sample locations. We should evaluate and test the subgrade and pavement materials during construction to determine that our recommendations have been properly interpreted. However, AGW shall not be responsible for constant or exhaustive inspection of the work, the means and methods of construction or the safety procedures employed by Client's contractor. Client shall hold its contractor solely responsible for the quality and completion of the project, including construction in accordance with the construction documents. Any duty hereunder is for the sole benefit of the Client and not for any third party, including the contractor or any subcontractor. The Owner should be aware that this study was prepared utilizing the Manual standards. Highly plastic and expansive soils pose a significant risk to pavement structures. This risk includes heave and cracking upon wetting. In addition, utility backfill settlement is a risk of development that can affect pavement performance. The Client is aware that isolated to more wide-spaced damage may occur. Longitudinal cracking parallel to the curb line may be indicative of an expansive subgrade becoming wetted. The only positive solution is removal of the subgrade materials to the depth of wetting and replacement or treatment. The Manual specifications do not require that the Client take these measures, but the Client should be aware that these measures are the only solution to dealing with highly plastic and expansive soils. As this is generally economically unfeasible, this design may be used as an attempt to provide a reasonable cost-effective pavement structure. The Owner assumes all liability for the performance of this pavement structure. We are available to discuss the risks associated with this design.

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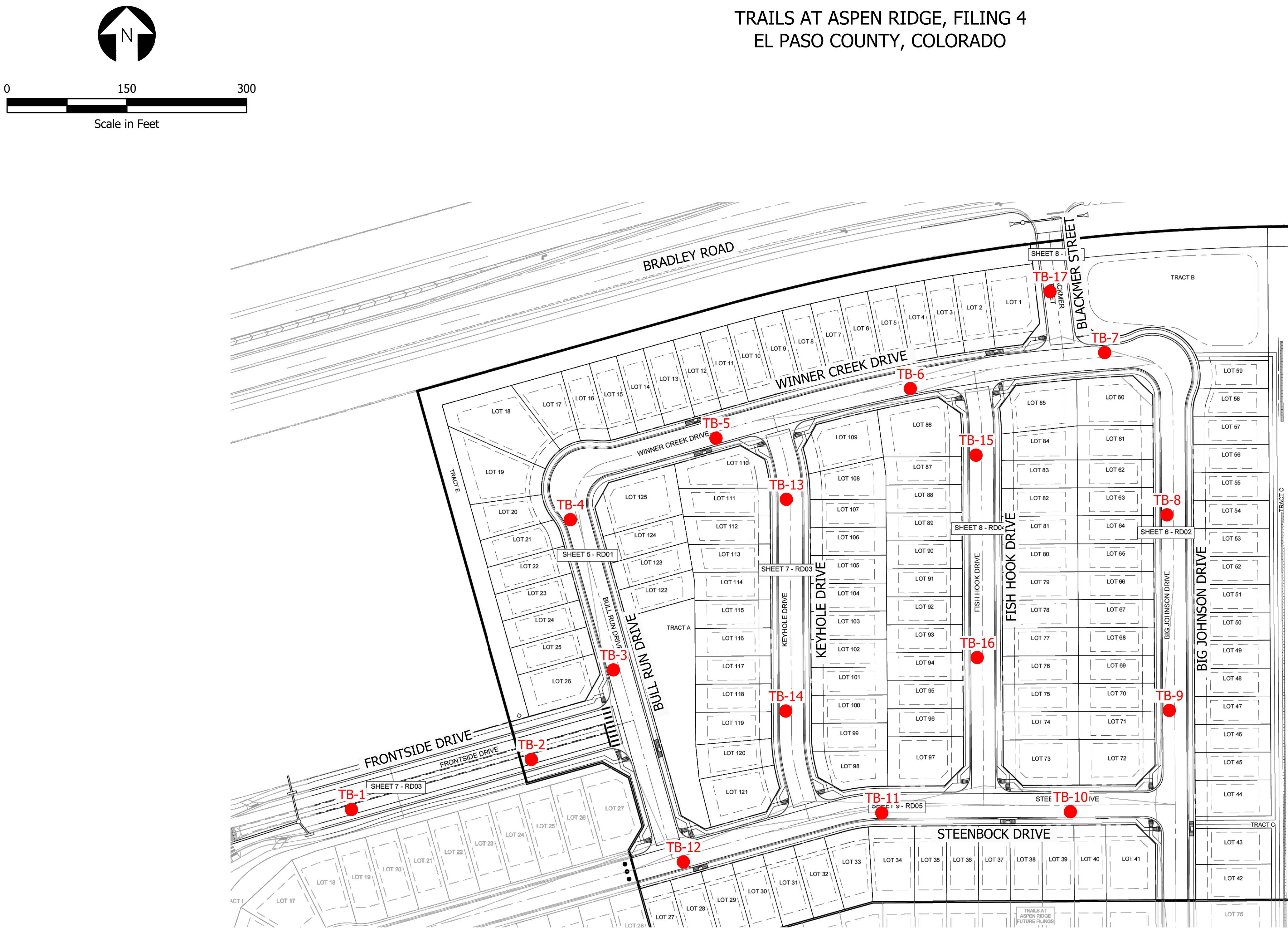
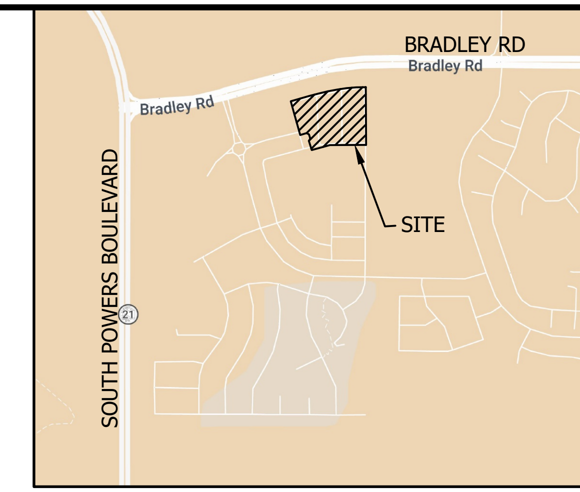
TRAILS AT ASPEN RIDGE, FILING 4
EL PASO COUNTY, COLORADO





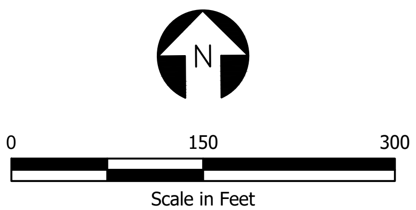
VICINITY MAP
NOT TO SCALE

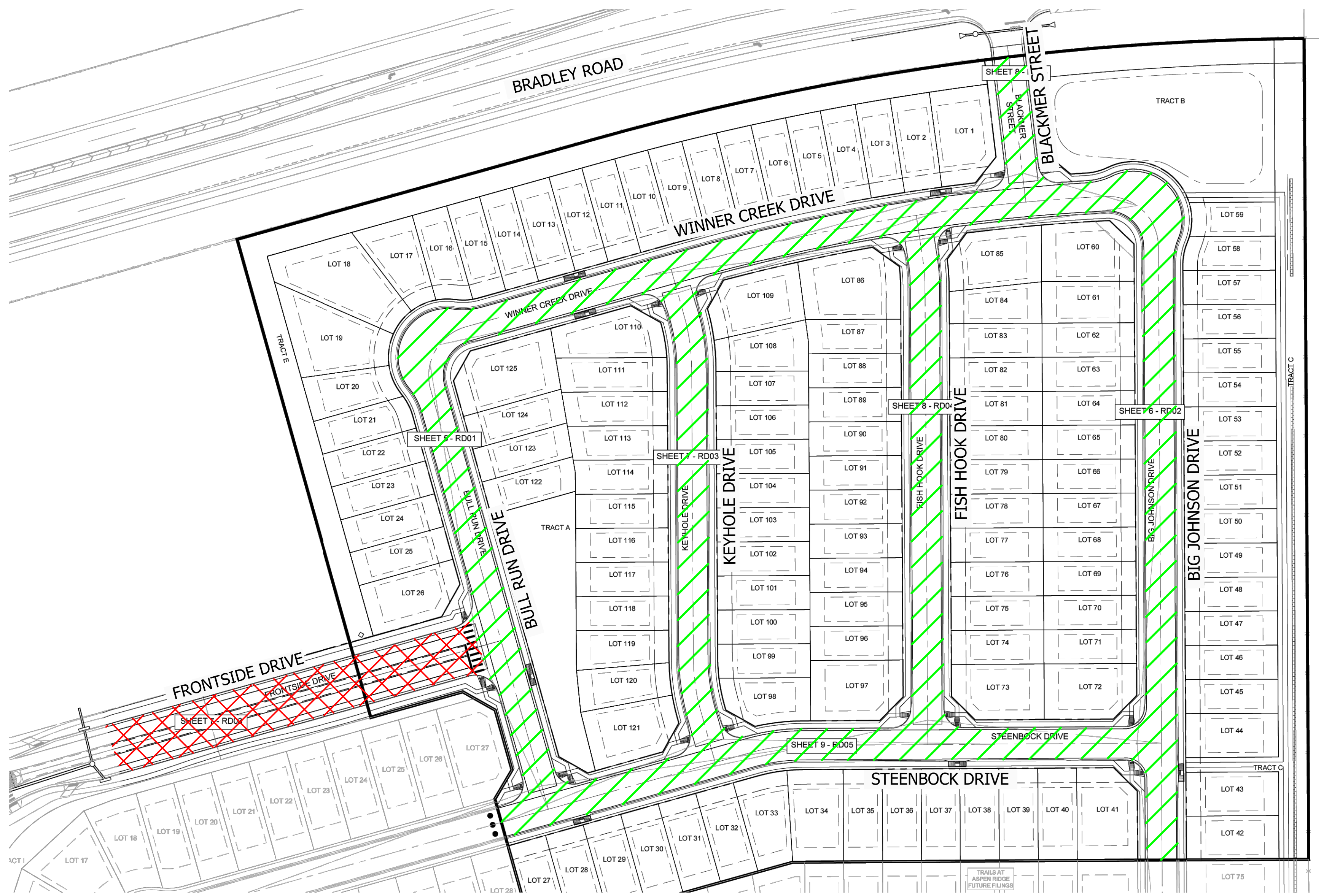
NOTES:
1. TEST BORINGS ARE OVERLAID ON THE "TRAILS AT ASPEN RIDGE, FILING NO. 4, ROADWAY & STORM IMPROVEMENTS PLANS, ROAD CENTERLINE KEY MAP", SHEET 4 OF 32, PREPARED BY MATRIX DESIGN GROUP, INC., PROJECT NO. 21.886.038, DATED JANUARY, 2025.
2. ALL LOCATIONS ARE APPROXIMATE.

AGW

SITE PLAN AND VICINITY MAP	PROJECT NO. 252742-P1 FIGURE 1

TRAILS AT ASPEN RIDGE, FILING 4
EL PASO COUNTY, COLORADO





LOCAL RESIDENTIAL
(ESAL = 292,000; M_R = 3,964 psi)

ALT	ACS (IN)	ABC (IN)	CTS (IN)	TOTAL (IN)
A	5.5	7.0	12.0	24.5
B	5.5	19.0	-	24.5

COLLECTOR
(ESAL = 821,000; M_R = 3,964 psi)

ALT	ACS (IN)	ABC (IN)	CTS (IN)	TOTAL (IN)
A	6.5	10.0	12.0	28.5
B	6.5	22.0	-	28.5

ALT - ALTERNATE
ACS - ASPHALT CONCRETE SURFACE
ABC - AGGREGATE BASE COURSE
CTS - CHEMICALLY TREATED SUBGRADE

NOTE: THE ALTERNATES INCLUDE EITHER REMOVAL OF A MINIMUM OF 12.0 INCHES OF SUBGRADE AND REPLACEMENT WITH CDOT "CLASS 6" AGGREGATE BASE COURSE OR 12.0 INCHES OF CHEMICALLY TREATED SUBGRADE FOR EXPANSIVE SUBGRADE MITIGATION.

NOTES:
1. TEST BORINGS ARE OVERLAID ON THE "TRAILS AT ASPEN RIDGE, FILING NO. 4, ROADWAY & STORM IMPROVEMENTS PLANS, ROAD CENTERLINE KEY MAP", SHEET 4 OF 32, PREPARED BY MATRIX DESIGN GROUP, INC., PROJECT NO. 21.886.038, DATED JANUARY, 2025.
2. ALL LOCATIONS ARE APPROXIMATE.

AGW

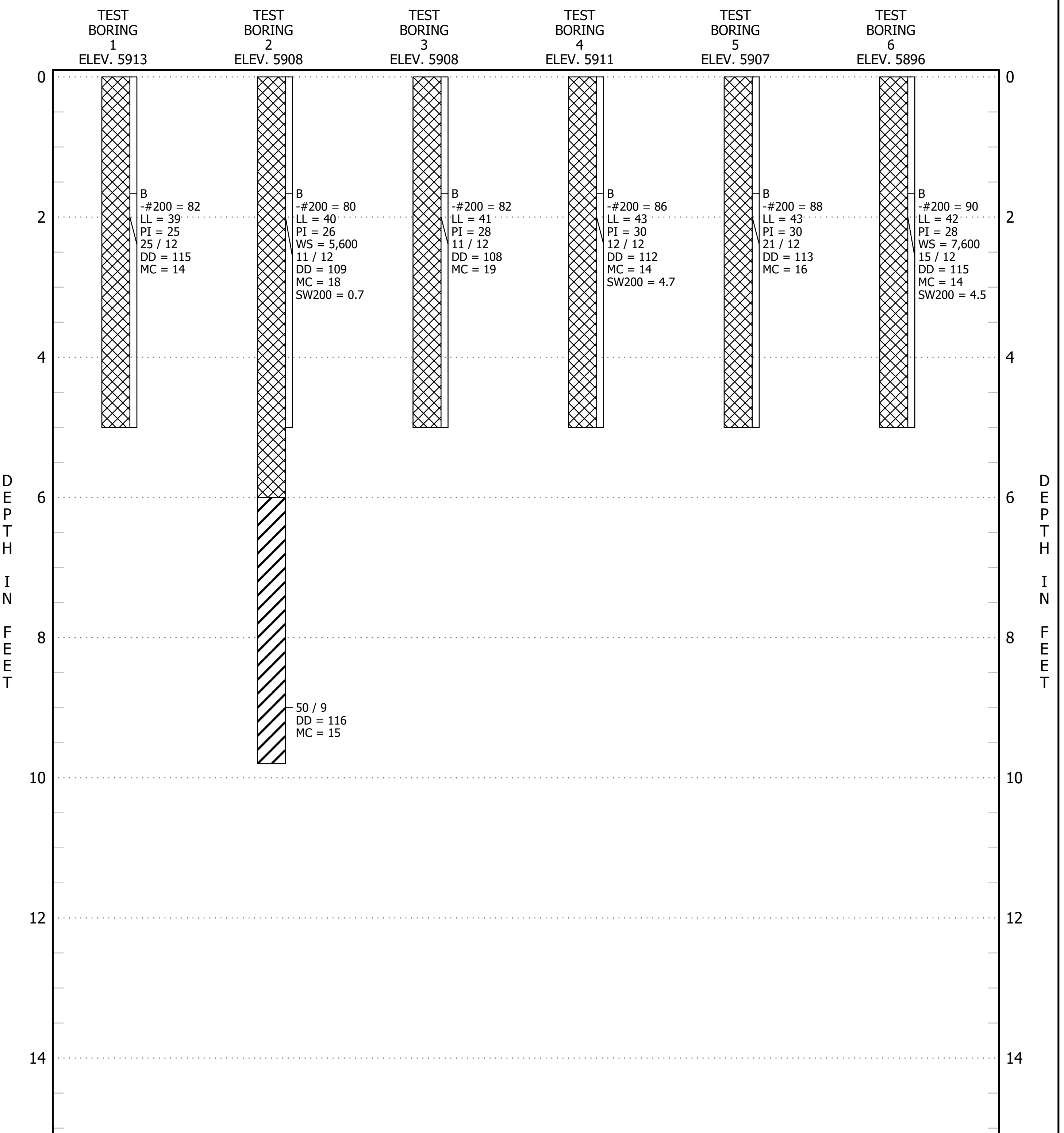
PAVEMENT THICKNESS RECOMMENDATIONS	PROJECT NO. 252742-P1 FIGURE 2

CLIENT Richmond American Homes of Colorado, Inc.

PROJECT NUMBER 252742-P1

PROJECT NAME Trails at Aspen Ridge, Filing 4

PROJECT LOCATION El Paso County, Colorado



SEE FIGURE 6 FOR LEGEND AND NOTES

TEST BORING LOGS

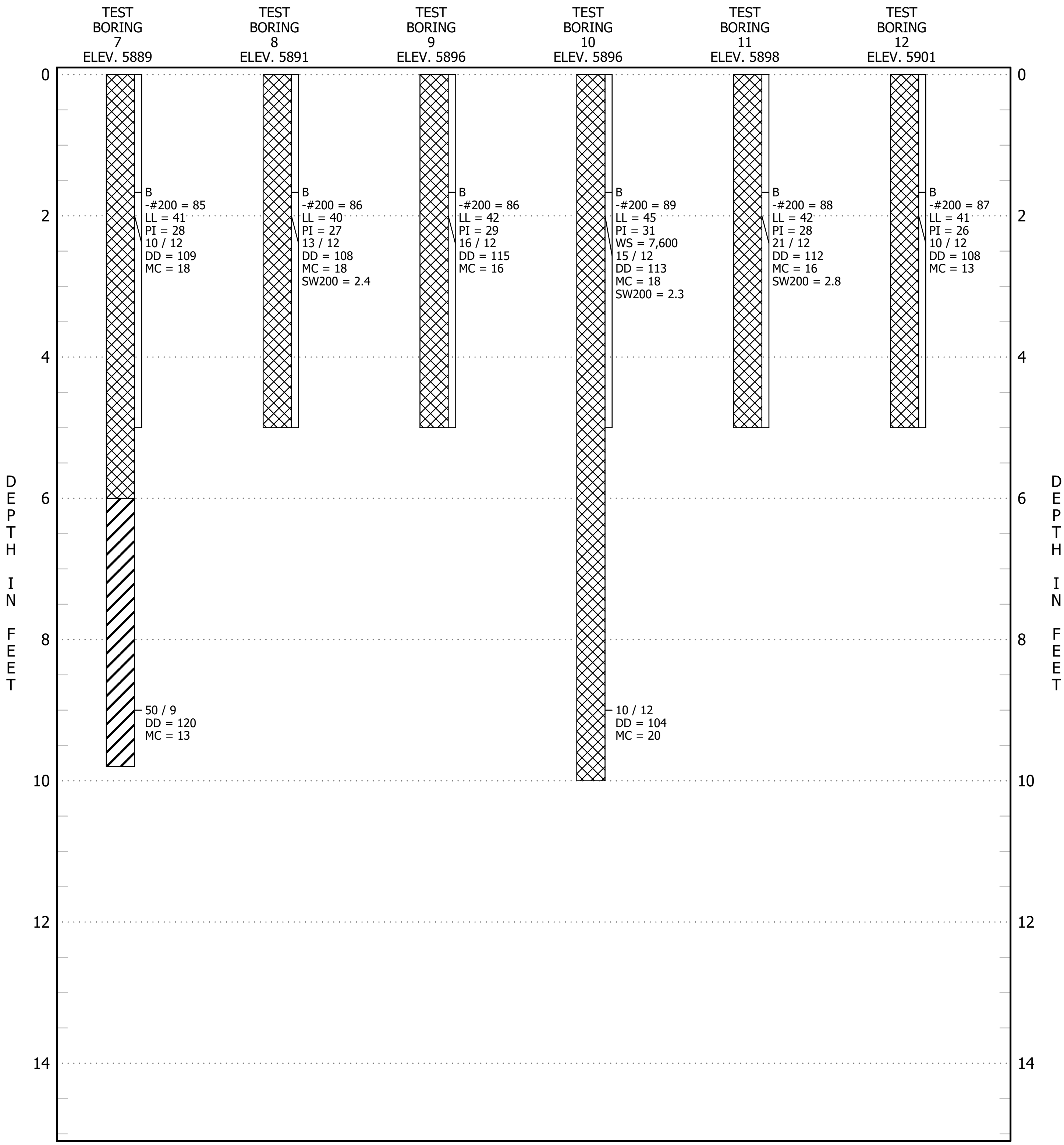
FIGURE 3

CLIENT Richmond American Homes of Colorado, Inc.

PROJECT NUMBER 252742-P1

PROJECT NAME Trails at Aspen Ridge, Filing 4

PROJECT LOCATION El Paso County, Colorado



SEE FIGURE 6 FOR LEGEND AND NOTES

TEST BORING LOGS

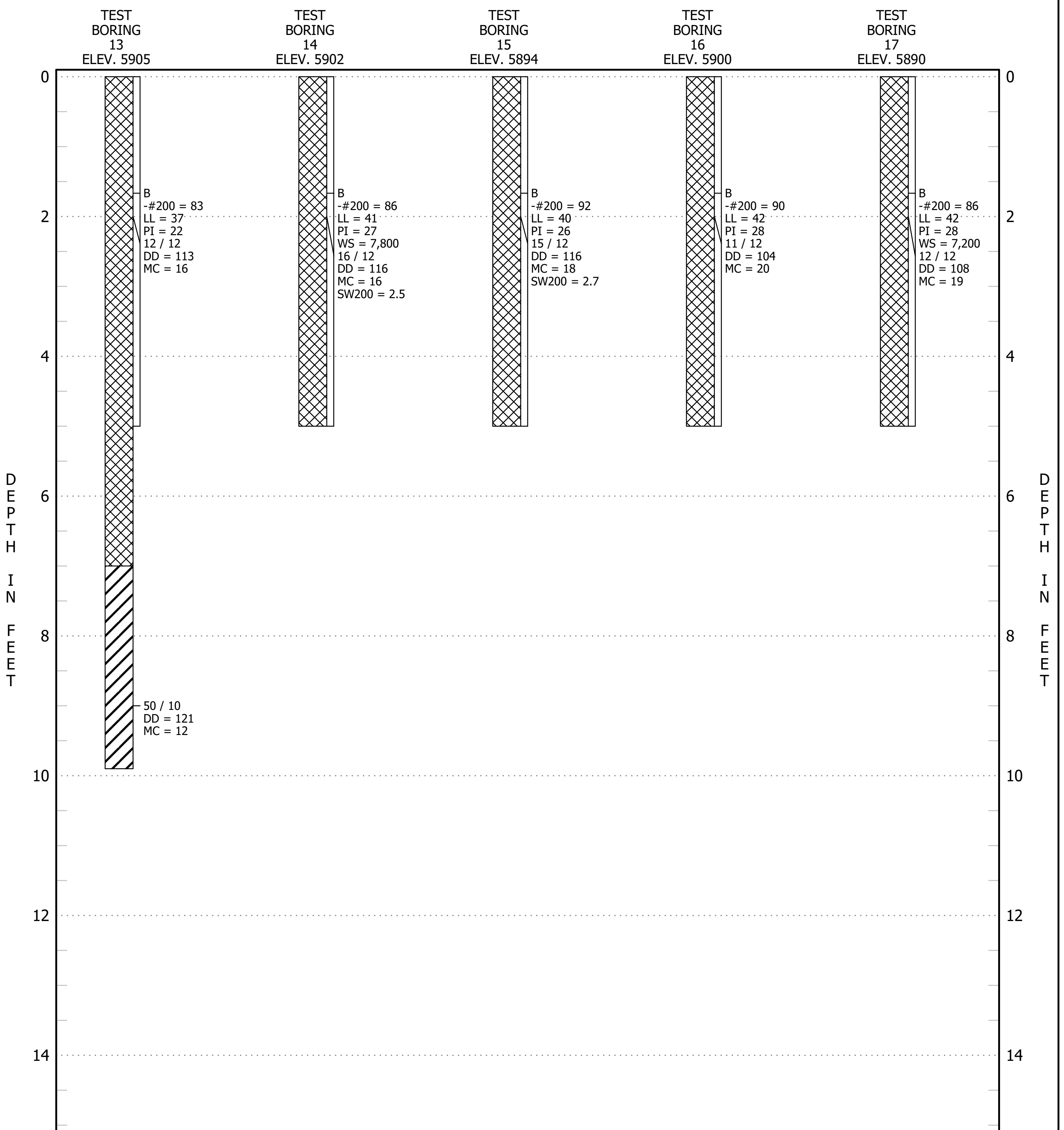
FIGURE 4

CLIENT Richmond American Homes of Colorado, Inc.

PROJECT NUMBER 252742-P1

PROJECT NAME Trails at Aspen Ridge, Filing 4

PROJECT LOCATION El Paso County, Colorado



SEE FIGURE 6 FOR LEGEND AND NOTES

TEST BORING LOGS

FIGURE 5

AGW

CLIENT Richmond American Homes of Colorado, Inc.

PROJECT NUMBER 252742-P1

PROJECT NAME Trails at Aspen Ridge, Filing 4

PROJECT LOCATION El Paso County, Colorado

SOIL DESCRIPTIONS

Fill (moisture treated), clay, stiff to very stiff, sandy, with processed claystone and sandstone

Claystone (Bedrock), hard to very hard

ABBREVIATIONS

AC	Asphalt concrete (in)
CTS	Chemically treated subgrade (in)
GF	Granular fill (in)
DD	Dry density of sample, pounds per cubic foot (pcf)
MC	Moisture content, percentage of dry weight of soil (%)
SW200	Swell under a surcharge of 200 pounds per square foot (psf) upon wetting (%)
COM200	Compression under a surcharge of 200 psf upon wetting (%)
UC	Unconfined compressive strength (psf)
-#200	Percent passing the No. 200 sieve (%)
LL	Liquid Limit
PI	Plasticity Index
NP	Nonplastic
NV	No Value
WS	Water soluble sulfates, parts per million (ppm)
x/y	x blows of a 140-pound hammer falling 30 inches were required to drive a 2.5-inch outside diameter sampler y inches
x/y SS	x blows of a 140-pound hammer falling 30 inches were required to drive a 2.0-inch outside diameter sampler y inches
C-x	Depth of cut to grade of x feet
F-x	Depth of fill to grade of x feet
FG	Finished grade
NR	No sample recovered
ND	No drive taken
Bounce	Sampler bounced during driving
B	Bulk sample
AS	Auger sample
	Well to very well cemented layer
	Practical drilling refusal

Notes:

1. Test borings were drilled June 1, 2026.
2. Locations of the test borings were staked by others at locations chosen by AGW.
3. The horizontal lines shown on the logs differentiate materials and represent the approximate boundaries between materials. The transitions between materials may be gradual.
4. Elevations were obtained from information provided by others and were rounded to the nearest foot.
5. Test boring logs shown are subject to the limitations, explanations, and conclusions of this report.

LEGEND AND NOTES

FIGURE 6

APPENDIX A
LABORATORY TEST RESULTS

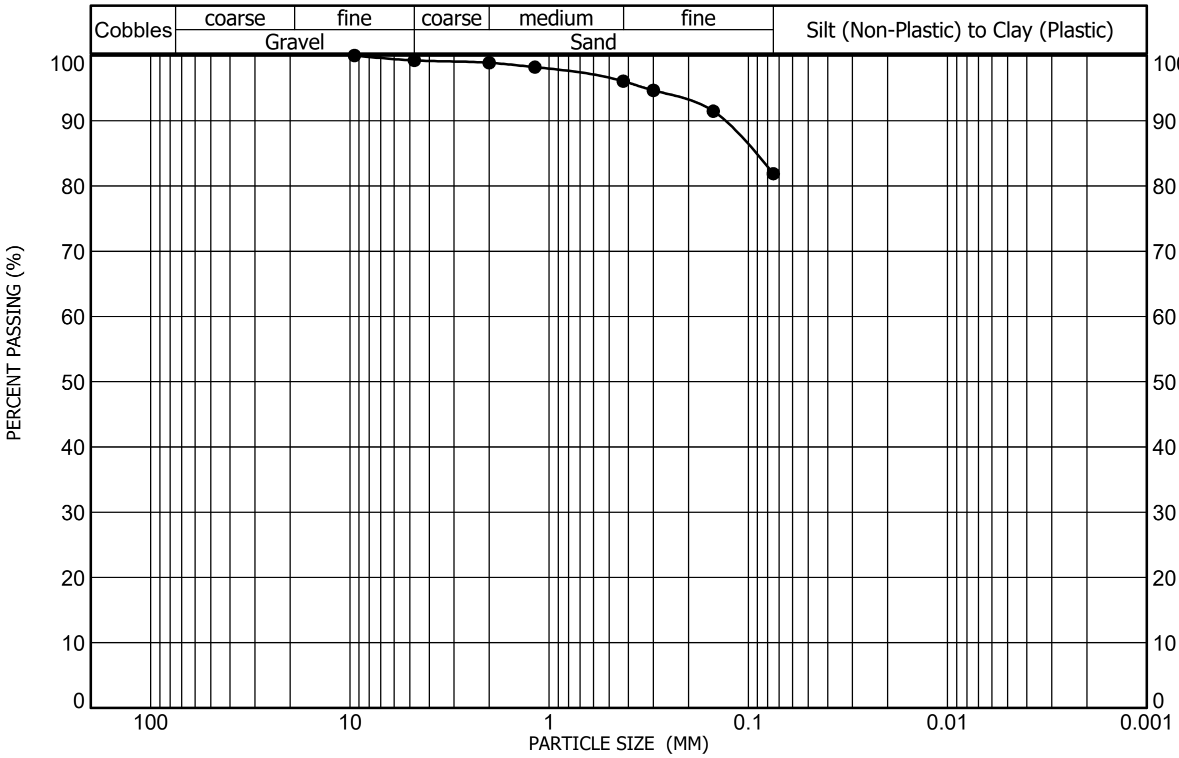
TABLE A-1
SUMMARY OF LABORATORY TEST RESULTS
July 7, 2026

Test Boring Number	Depth (feet)	Soil Type	AASHTO Soil Classification	Dry Density (pcf)	Moisture (%)	Swell / Consolidation (-) (%) [1]	% Passing #200 Sieve	Atterberg Limits			Water Soluble Sulfates (ppm)
								Liquid Limit	Plastic Limit	Plasticity Index	
1	0-5	Fill, clay, sandy, trace gravel	A-6(19)				82	39	14	25	
1	2	Fill, clay, sandy, trace gravel		115	14						
2	0-5	Fill, clay, sandy	A-6(19)				80	40	14	26	5,600
2	2	Fill, clay, sandy		109	18	0.7					
2	9	Claystone, slightly sandy		116	15						
3	0-5	Fill, clay, sandy	A-7-6(22)				82	41	13	28	
3	2	Fill, clay, sandy		108	19						
4	0-5	Fill, clay, slightly sandy	A-7-6(25)				86	43	13	30	
4	2	Fill, clay, slightly sandy		112	14	4.7					
5	0-5	Fill, clay, slightly sandy	A-7-6(26)				88	43	13	30	
5	2	Fill, clay, slightly sandy		113	16						
6	0-5	Fill, clay, slightly sandy	A-7-6(25)				90	42	14	28	7,600
6	2	Fill, clay, slightly sandy		115	14	4.5					
7	0-5	Fill, clay, slightly sandy, trace gravel	A-7-6(23)				85	41	13	28	
7	2	Fill, clay, slightly sandy, trace gravel		109	18						
7	9	Claystone, slightly sandy		120	13						
8	0-5	Fill, clay, slightly sandy	A-6(22)				86	40	13	27	
8	2	Fill, clay, slightly sandy		108	18	2.4					
9	0-5	Fill, clay, slightly sandy	A-7-6(24)				86	42	13	29	
9	2	Fill, clay, slightly sandy		115	16						
10	0-5	Fill, clay, slightly sandy	A-7-6(28)				89	45	14	31	7,600
10	2	Fill, clay, slightly sandy		113	18	2.3					
10	9	Fill, clay, slightly sandy		104	20						

TABLE A-1
SUMMARY OF LABORATORY TEST RESULTS
July 7, 2026

Test Boring Number	Depth (feet)	Soil Type	AASHTO Soil Classification	Dry Density (pcf)	Moisture (%)	Swell / Consolidation (-) (%) [1]	% Passing #200 Sieve	Atterberg Limits			Water Soluble Sulfates (ppm)
								Liquid Limit	Plastic Limit	Plasticity Index	
11	0-5	Fill, clay, slightly sandy	A-7-6(24)				88	42	14	28	
11	2	Fill, clay, slightly sandy		112	16	2.8					
12	0-5	Fill, clay, slightly sandy	A-7-6(22)				87	41	15	26	
12	2	Fill, clay, slightly sandy		108	13						
13	0-5	Fill, clay, sandy, trace gravel	A-6(17)				83	37	15	22	
13	2	Fill, clay, sandy, trace gravel		113	16						
13	9	Claystone, slightly sandy		121	12						
14	0-5	Fill, clay, slightly sandy	A-7-6(23)				86	41	14	27	7,800
14	2	Fill, clay, slightly sandy		116	16	2.5					
15	0-5	Fill, clay, slightly sandy	A-6(24)				92	40	14	26	
15	2	Fill, clay, slightly sandy		116	18	2.7					
16	0-5	Fill, clay, slightly sandy	A-7-6(25)				90	42	14	28	
16	2	Fill, clay, slightly sandy		104	20						
17	0-5	Fill, clay, slightly sandy	A-7-6(23)				86	42	14	28	7,200
17	2	Fill, clay, slightly sandy		108	19						
Bulk [2]	0-5	Fill, clay, slightly sandy		111.5 [3]	16.3 [3]						

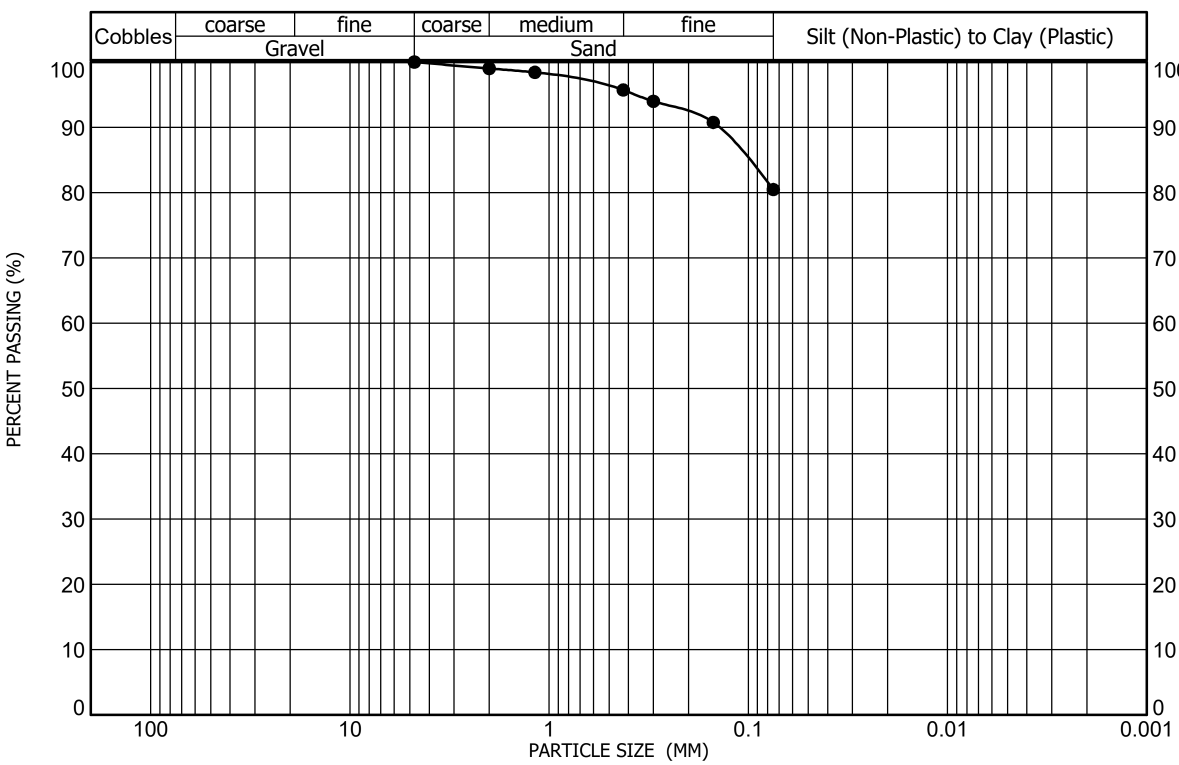
[1] Indicates Percent Swell or Consolidation (–) when wetted under a 200 psf load.
[2] Blended bulk sample from Test Borings 5 and 10
[3] Maximum Dry Density and Optimum Moisture Content



Sample Location: Test Boring No. 1 at a depth of 0 feet to 5 feet — Gravel (%): 1 — Liquid Limit: 39

Sample Description: Fill, clay, sandy, trace gravel — Sand (%): 17 — Plasticity Index: 25

Classification: A-6(19), LEAN CLAY with SAND(CL) — Clay/Silt (%): 82



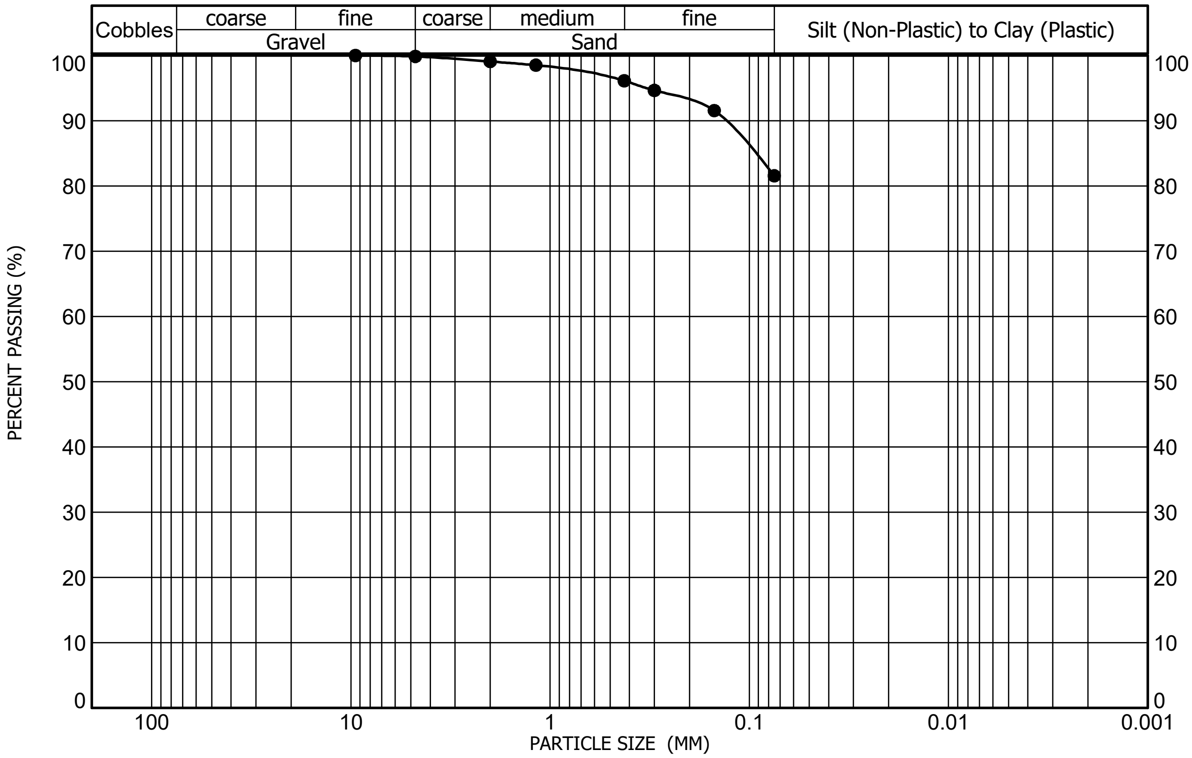
Sample Location: Test Boring No. 2 at a depth of 0 feet to 5 feet — Gravel (%): 0 — Liquid Limit: 40

Sample Description: Fill, clay, sandy — Sand (%): 20 — Plasticity Index: 26

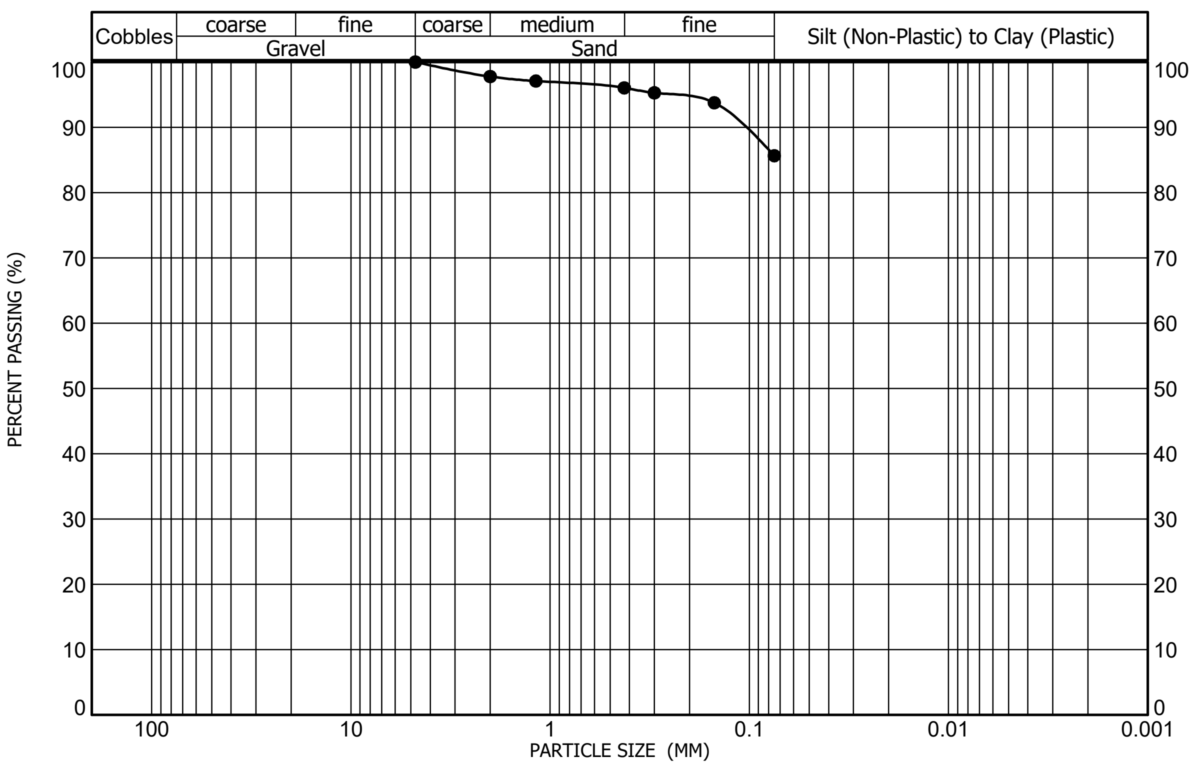
Classification: A-6(19), LEAN CLAY with SAND(CL) — Clay/Silt (%): 80

GRADATION AND ATTERBERG TEST RESULTS

FIGURE A-1



Sample Location: Test Boring No. 3 at a depth of 0 feet to 5 feet
Sample Description: Fill, clay, sandy
Classification: A-7-6(22), LEAN CLAY with SAND(CL)
Gravel (%): 0
Sand (%): 18
Clay/Silt (%): 82
Liquid Limit: 41
Plasticity Index: 28

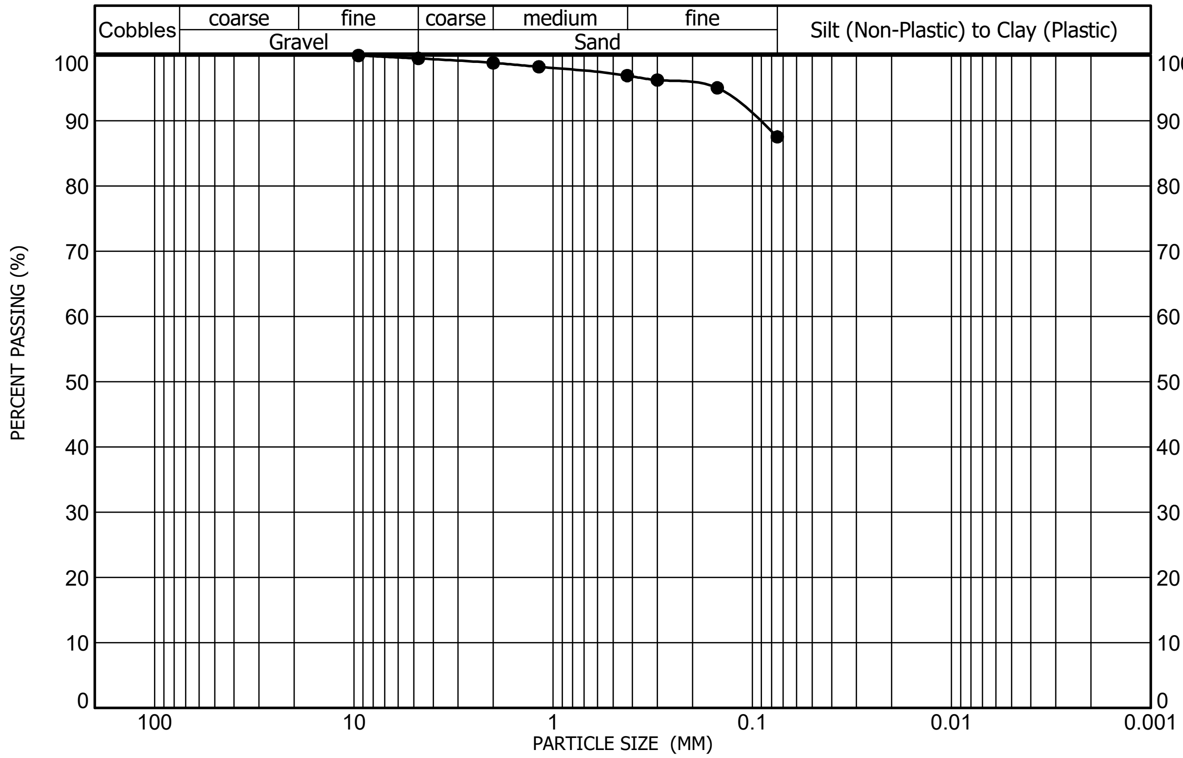


Sample Location: Test Boring No. 4 at a depth of 0 feet to 5 feet
Sample Description: Fill, clay, slightly sandy
Classification: A-7-6(25), LEAN CLAY(CL)
Gravel (%): 0
Sand (%): 14
Clay/Silt (%): 86
Liquid Limit: 43
Plasticity Index: 30

GRADATION AND ATTERBERG TEST RESULTS

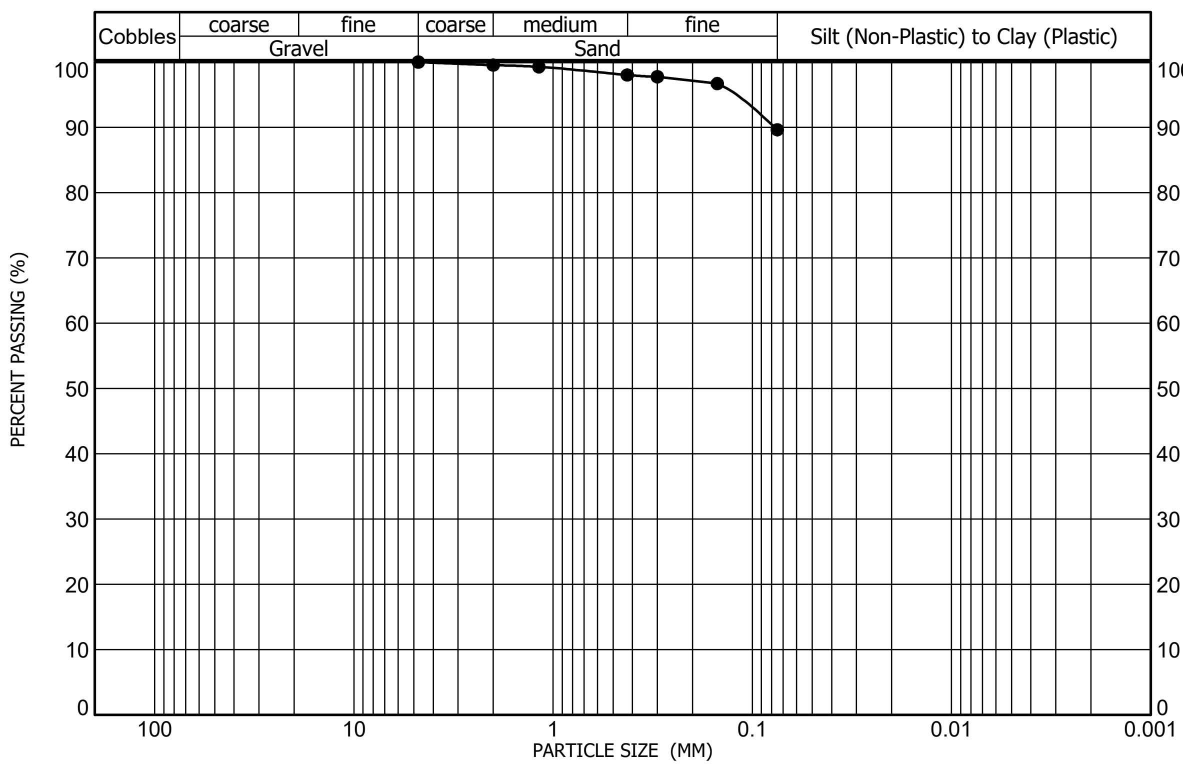
FIGURE A-2

PROJECT NO. 252742-P1



Sample Location Test Boring No. 5 at a depth of 0 feet to 5 feet
Sample Description Fill, clay, slightly sandy
Classification A-7-6(26), LEAN CLAY(CL)

Gravel (%) 0
Sand (%) 12
Clay/Silt (%) 88
Liquid Limit 43
Plasticity Index 30



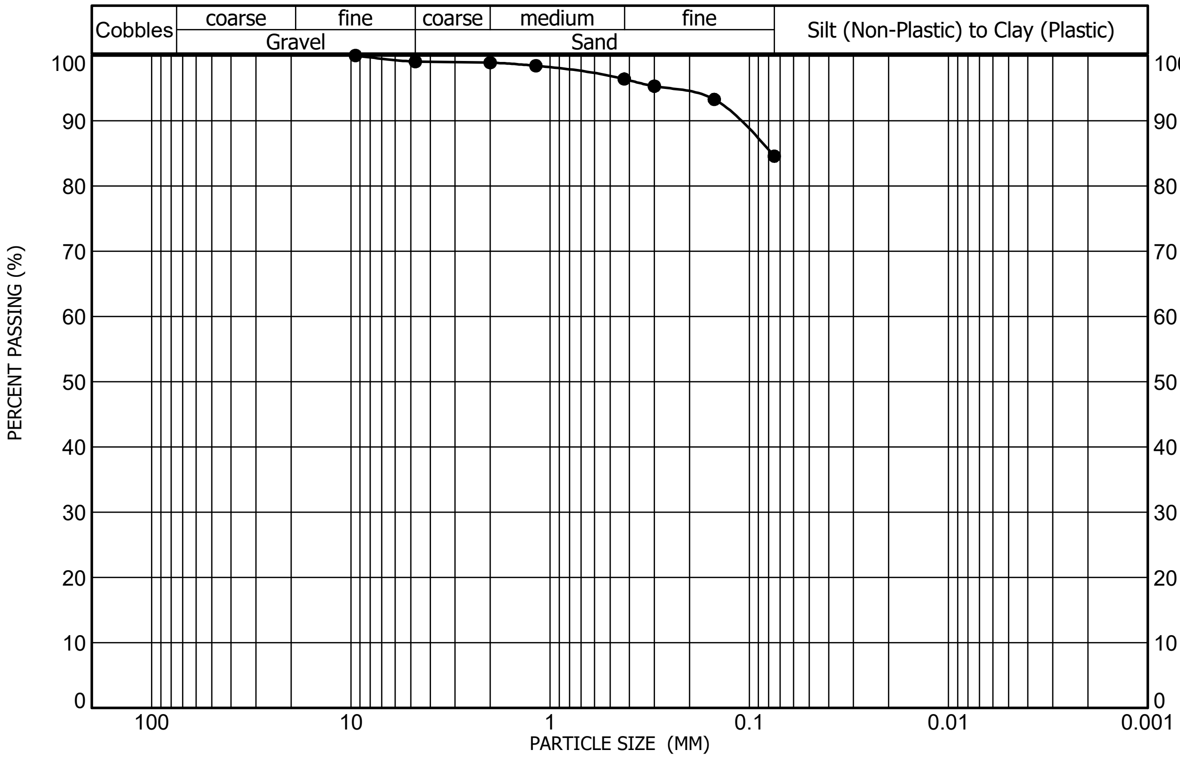
Sample Location Test Boring No. 6 at a depth of 0 feet to 5 feet
Sample Description Fill, clay, slightly sandy
Classification A-7-6(25), LEAN CLAY(CL)

Gravel (%) 0
Sand (%) 10
Clay/Silt (%) 90
Liquid Limit 42
Plasticity Index 28

GRADATION AND ATTERBERG TEST RESULTS

FIGURE A-3

PROJECT NO. 252742-P1



Sample Location Test Boring No. 7 at a depth of 0 feet to 5 feet

Sample Description Fill, clay, slightly sandy, trace gravel

Classification A-7-6(23), LEAN CLAY with SAND(CL)

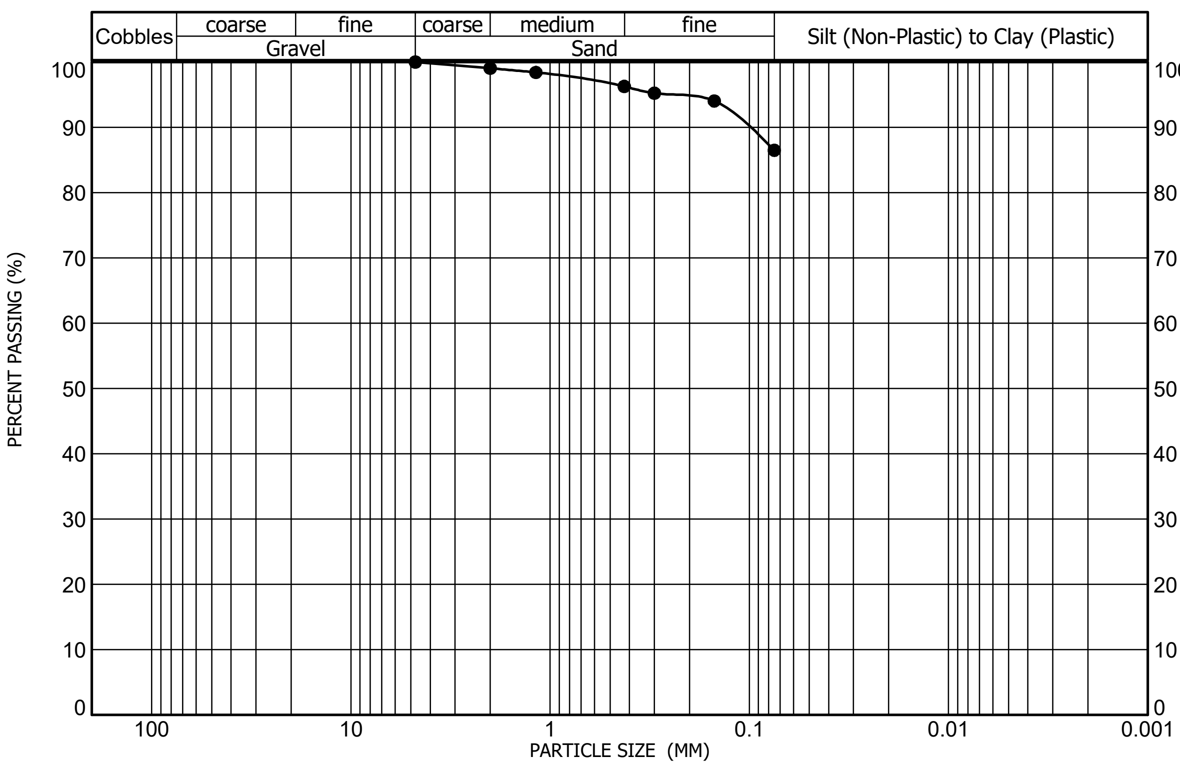
Gravel (%) 1

Sand (%) 14

Clay/Silt (%) 85

Liquid Limit 41

Plasticity Index 28



Sample Location Test Boring No. 8 at a depth of 0 feet to 5 feet

Sample Description Fill, clay, slightly sandy

Classification A-6(22), LEAN CLAY(CL)

Gravel (%) 0

Sand (%) 14

Clay/Silt (%) 86

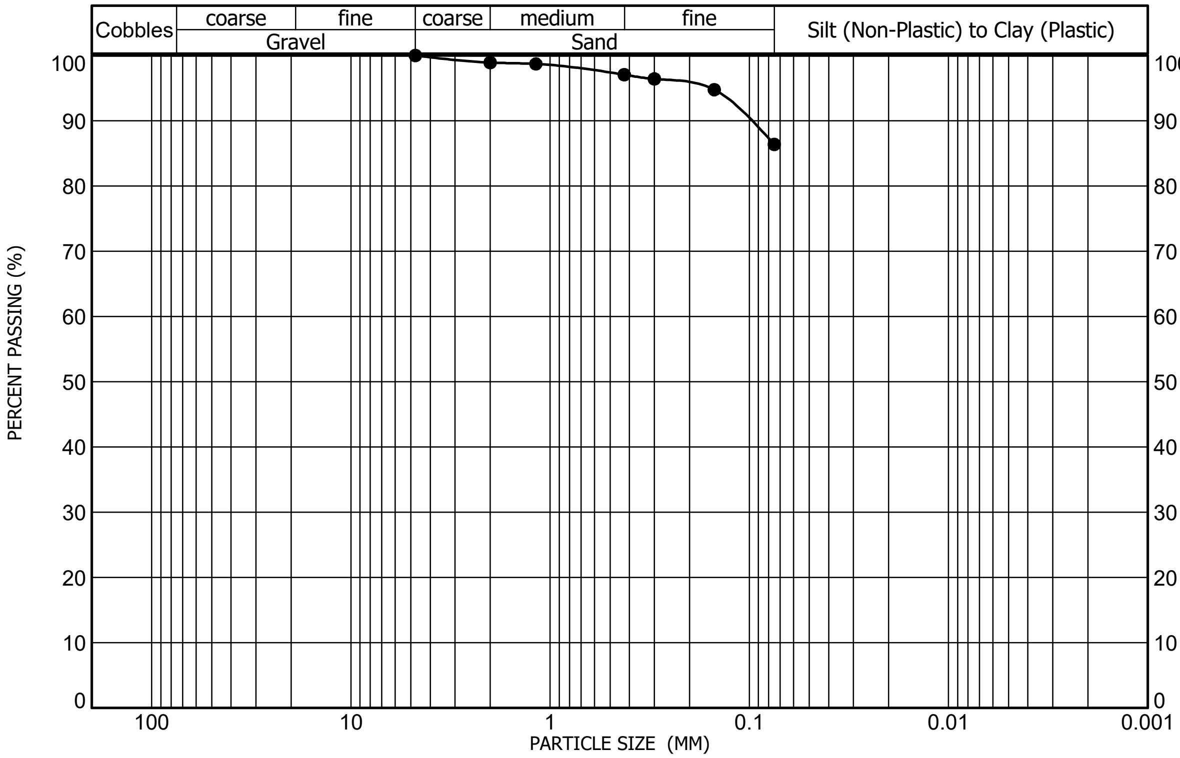
Liquid Limit 40

Plasticity Index 27

GRADATION AND ATTERBERG TEST RESULTS

FIGURE A-4

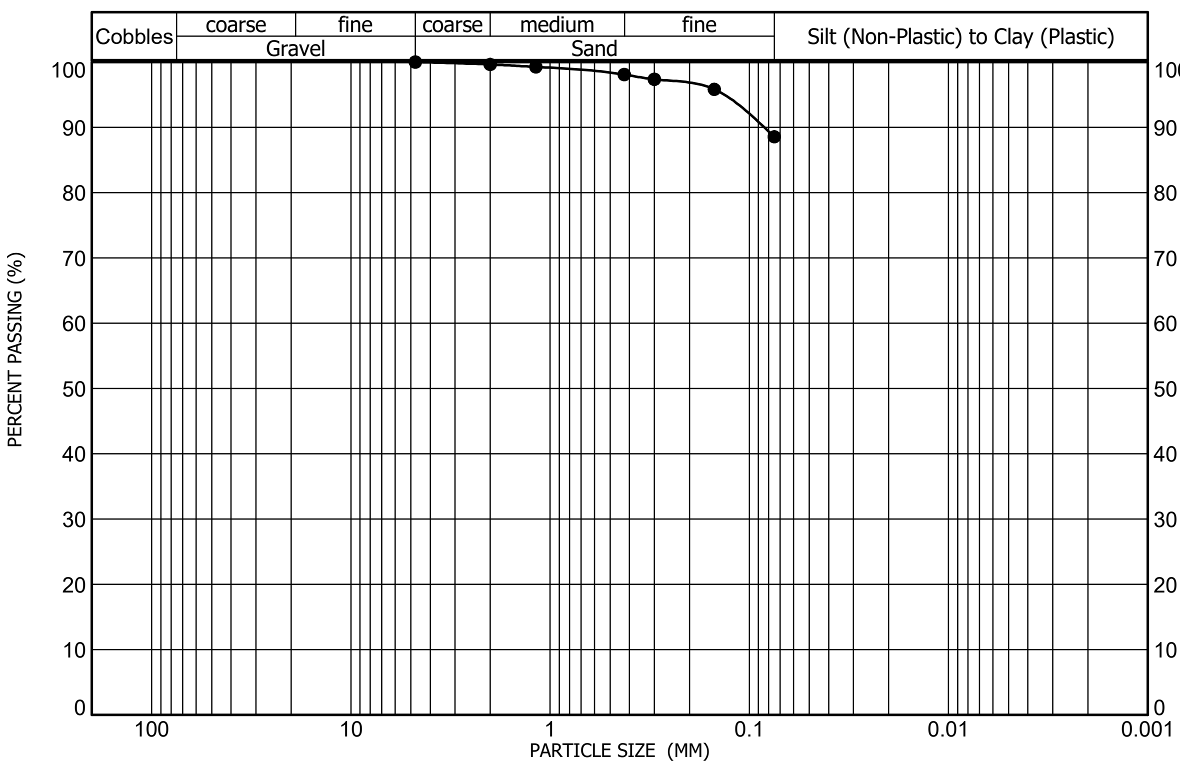
PROJECT NO. 252742-P1



Sample Location Test Boring No. 9 at a depth of 0 feet to 5 feet
Sample Description Fill, clay, slightly sandy
Classification A-7-6(24), LEAN CLAY(CL)

Gravel (%) 0
Sand (%) 14
Clay/Silt (%) 86

Liquid Limit 42
Plasticity Index 29



Sample Location Test Boring No. 10 at a depth of 0 feet to 5 feet
Sample Description Fill, clay, slightly sandy
Classification A-7-6(28), LEAN CLAY(CL)

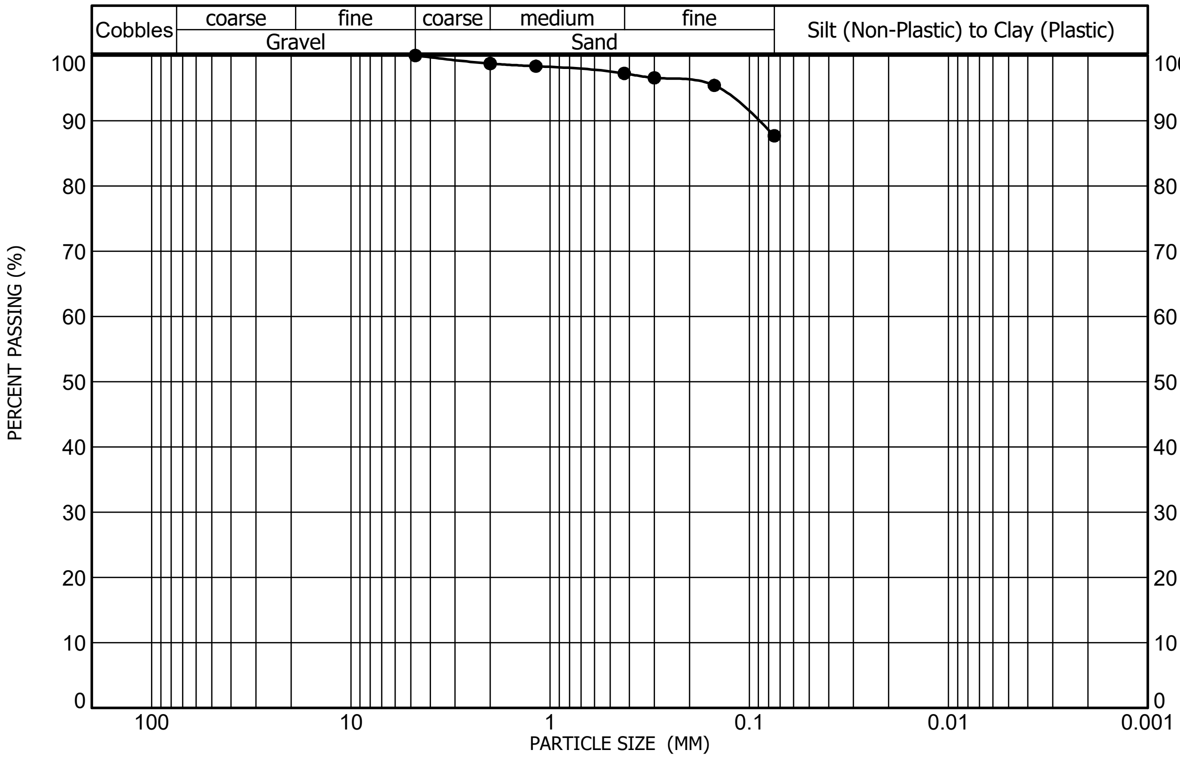
Gravel (%) 0
Sand (%) 11
Clay/Silt (%) 89

Liquid Limit 45
Plasticity Index 31

GRADATION AND ATTERBERG TEST RESULTS

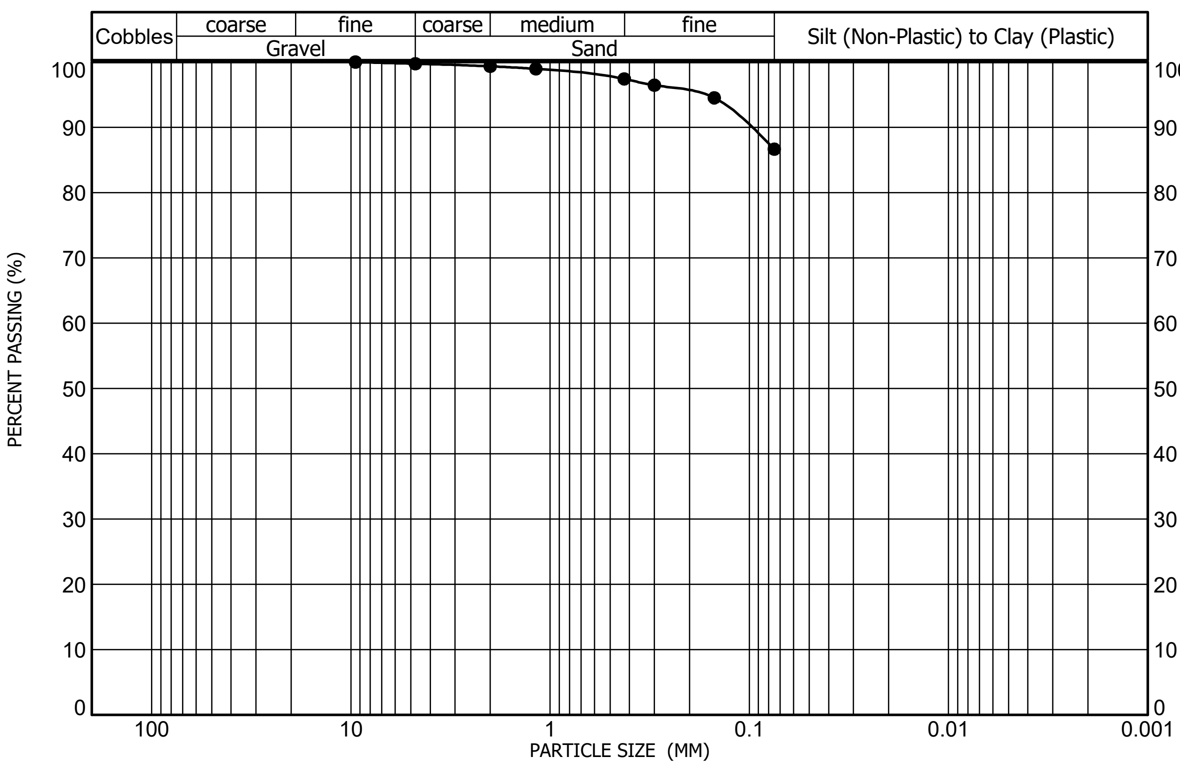
FIGURE A-5

PROJECT NO. 252742-P1



Sample Location Test Boring No. 11 at a depth of 0 feet to 5 feet
Sample Description Fill, clay, slightly sandy
Classification A-7-6(24), LEAN CLAY(CL)

Gravel (%) 0
Sand (%) 12
Clay/Silt (%) 88
Liquid Limit 42
Plasticity Index 28

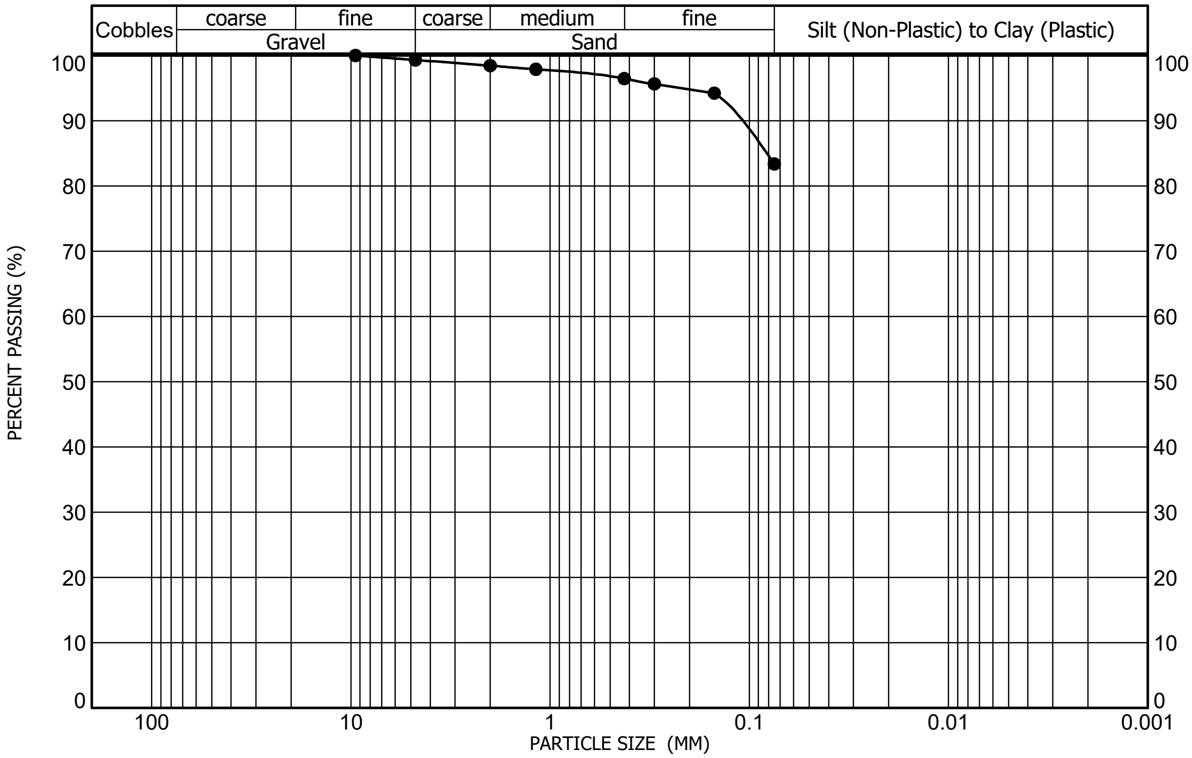


Sample Location Test Boring No. 12 at a depth of 0 feet to 5 feet
Sample Description Fill, clay, slightly sandy
Classification A-7-6(22), LEAN CLAY(CL)

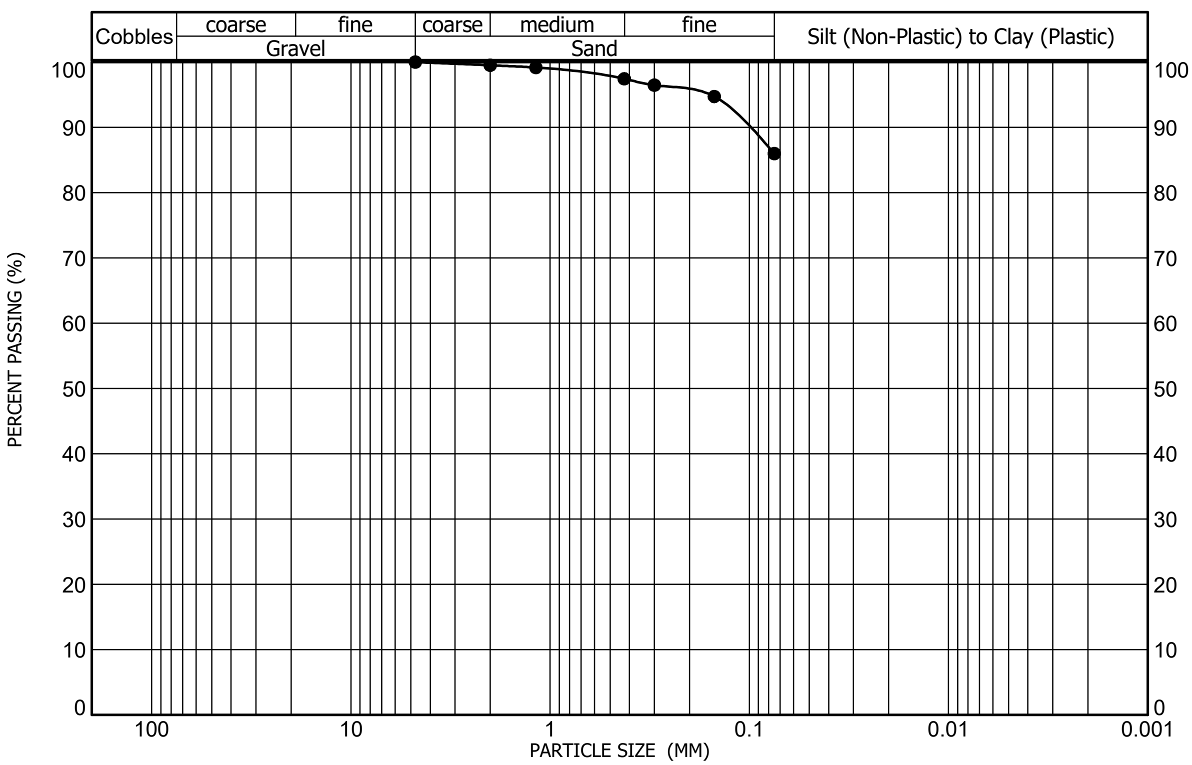
Gravel (%) 0
Sand (%) 13
Clay/Silt (%) 87
Liquid Limit 41
Plasticity Index 26

GRADATION AND ATTERBERG TEST RESULTS

FIGURE A-6



Sample Location Test Boring No. 13 at a depth of 0 feet to 5 feet
Sample Description Fill, clay, sandy, trace gravel
Classification A-6(17), LEAN CLAY with SAND(CL)
Gravel (%) 1
Sand (%) 16
Clay/Silt (%) 83
Liquid Limit 37
Plasticity Index 22

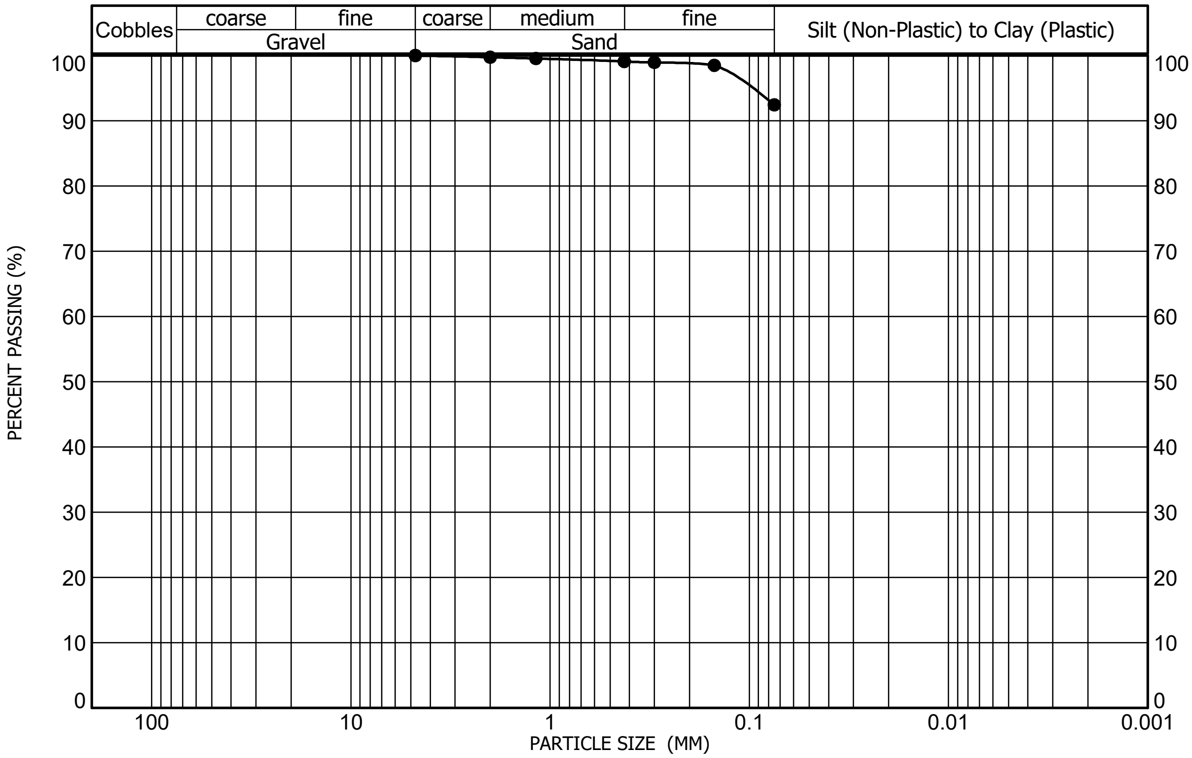


Sample Location Test Boring No. 14 at a depth of 0 feet to 5 feet
Sample Description Fill, clay, slightly sandy
Classification A-7-6(23), LEAN CLAY(CL)
Gravel (%) 0
Sand (%) 14
Clay/Silt (%) 86
Liquid Limit 41
Plasticity Index 27

GRADATION AND ATTERBERG TEST RESULTS

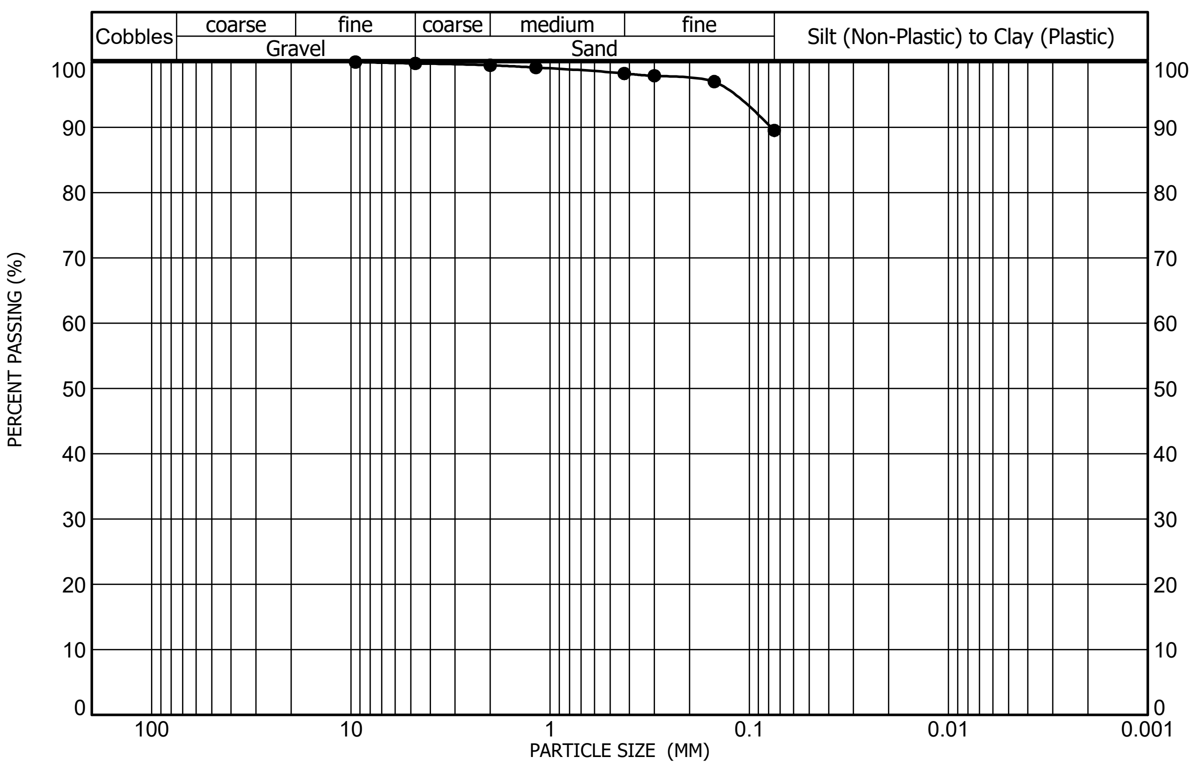
FIGURE A-7

PROJECT NO. 252742-P1



Sample Location: Test Boring No. 15 at a depth of 0 feet to 5 feet
Sample Description: Fill, clay, slightly sandy
Classification: A-6(24), LEAN CLAY(CL)

Gravel (%): 0
Sand (%): 8
Clay/Silt (%): 92
Liquid Limit: 40
Plasticity Index: 26

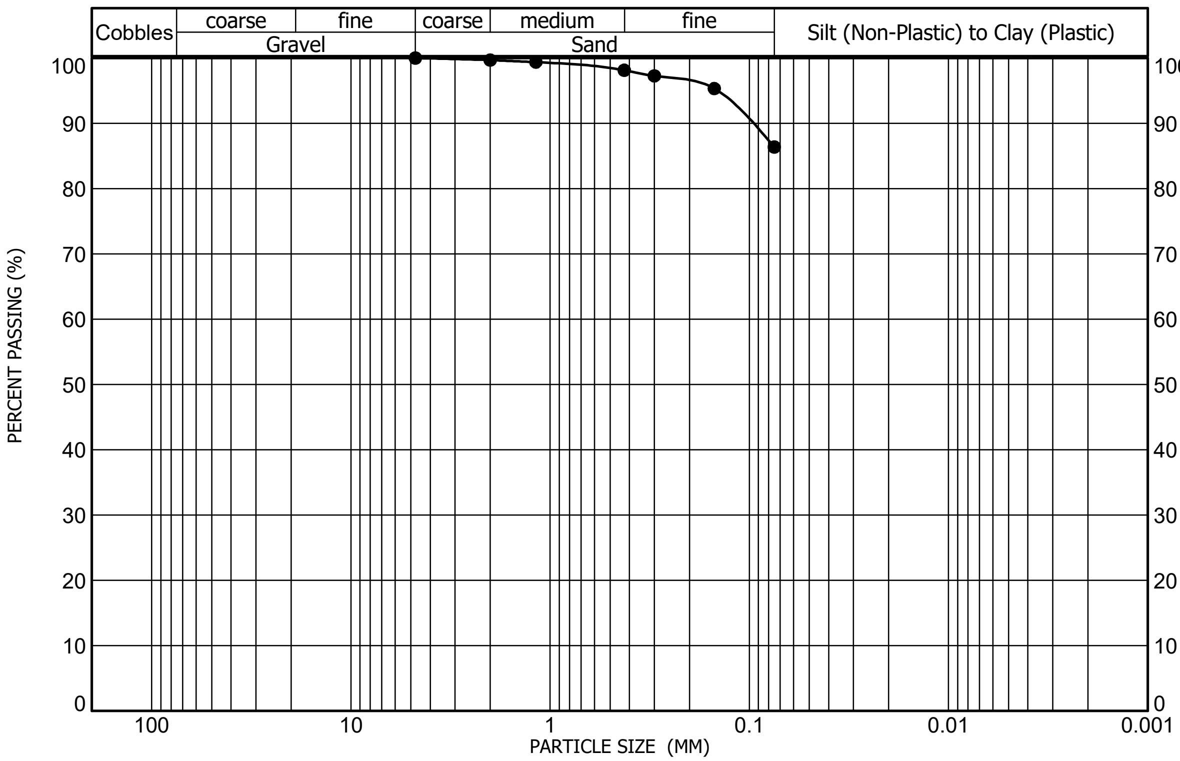


Sample Location: Test Boring No. 16 at a depth of 0 feet to 5 feet
Sample Description: Fill, clay, slightly sandy
Classification: A-7-6(25), LEAN CLAY(CL)

Gravel (%): 0
Sand (%): 10
Clay/Silt (%): 90
Liquid Limit: 42
Plasticity Index: 28

GRADATION AND ATTERBERG TEST RESULTS

FIGURE A-8



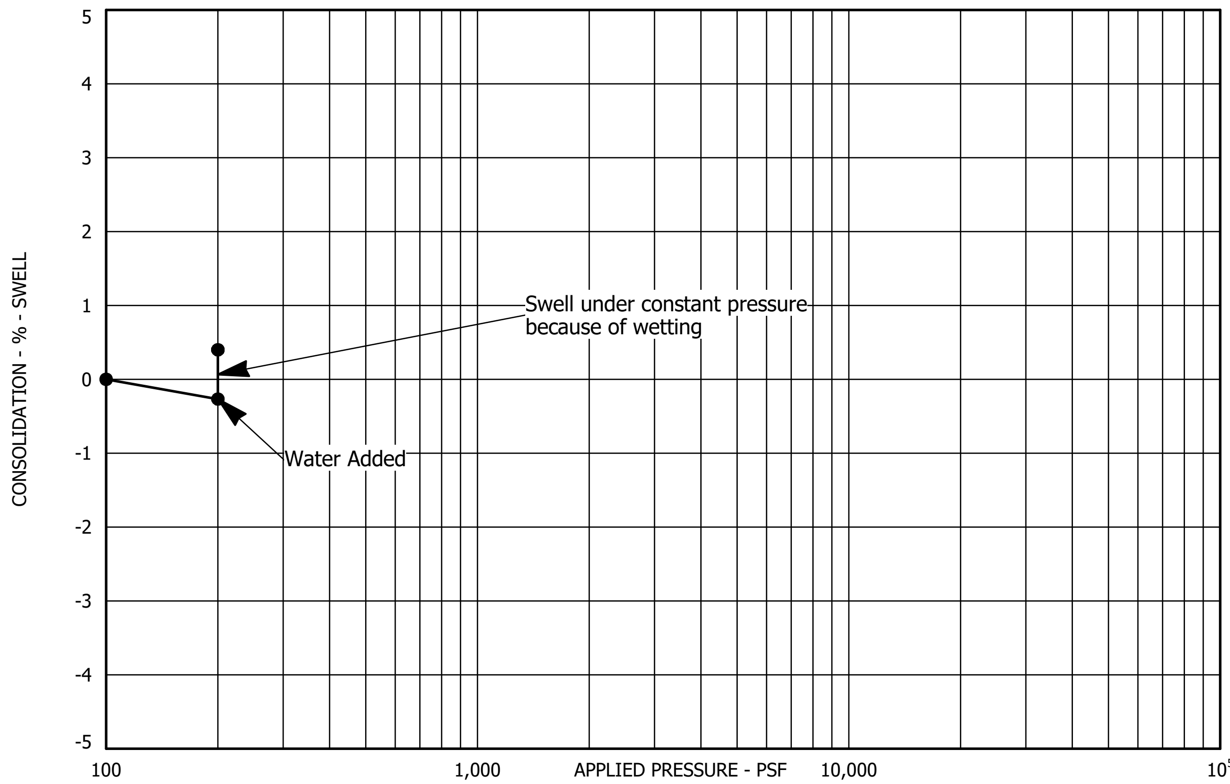
Sample Location ______ Test Boring No. 17 at a depth of 0 feet to 5 feet ______ Gravel (%) __0__ Liquid Limit __42__

Sample Description ______ Fill, clay, slightly sandy ______ Sand (%) __14__ Plasticity Index __28__

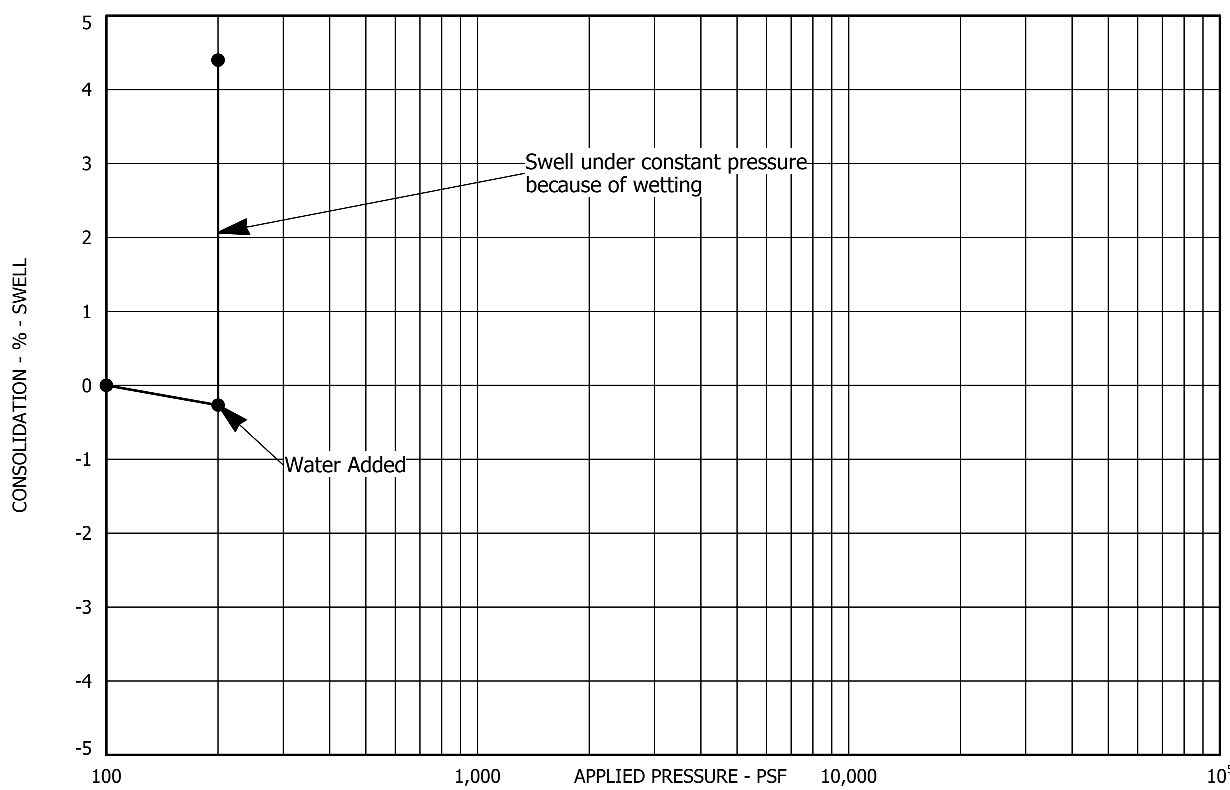
Classification ______ A-7-6(23), LEAN CLAY(CL) ______ Clay/Silt (%) __86__

GRADATION AND ATTERBERG TEST RESULTS

FIGURE A-9



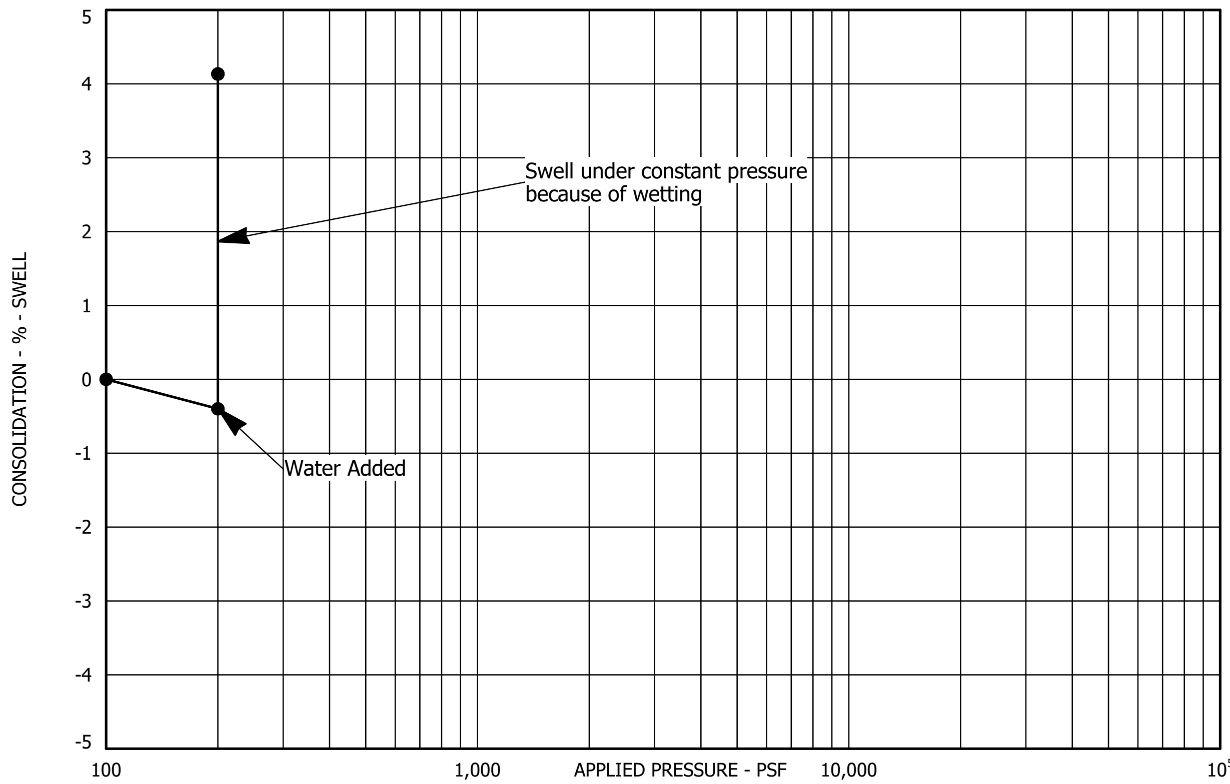
Sample Location	Test Boring No. 2 at a depth of 2 feet	Dry Unit Weight (pcf)	109
Sample Description	Fill, clay, sandy	Moisture Content (%)	18



Sample Location	Test Boring No. 4 at a depth of 2 feet	Dry Unit Weight (pcf)	112
Sample Description	Fill, clay, slightly sandy	Moisture Content (%)	14

SWELL - CONSOLIDATION TEST RESULTS

FIGURE A-10

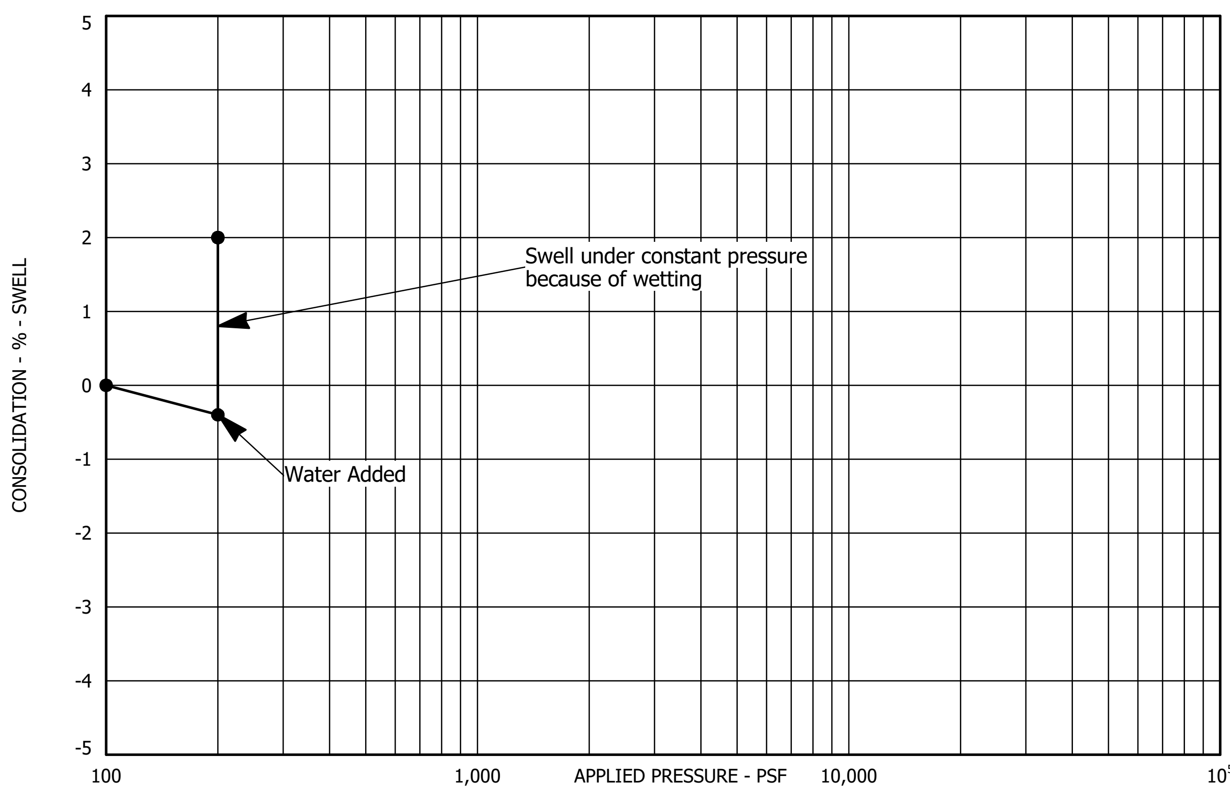


Sample Location Test Boring No. 6 at a depth of 2 feet

Sample Description Fill, clay, slightly sandy

Dry Unit Weight (pcf) 115

Moisture Content (%) 14



Sample Location Test Boring No. 8 at a depth of 2 feet

Sample Description Fill, clay, slightly sandy

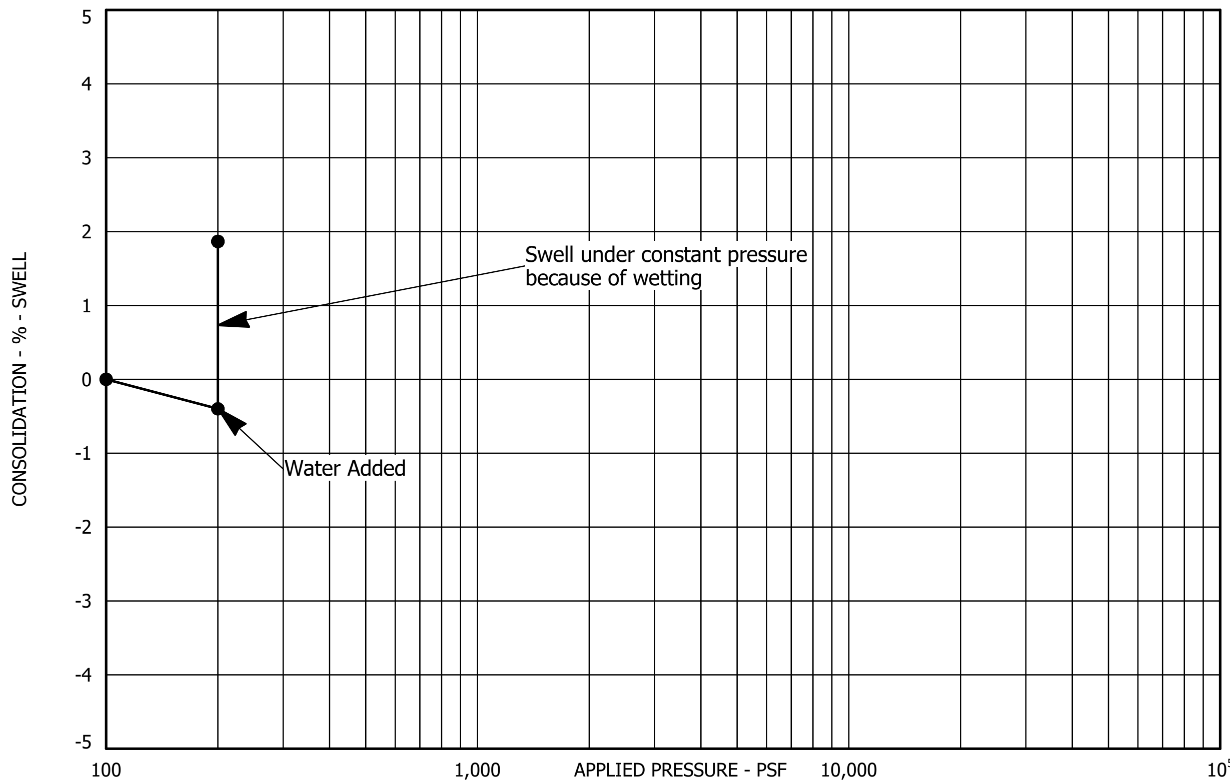
Dry Unit Weight (pcf) 108

Moisture Content (%) 18

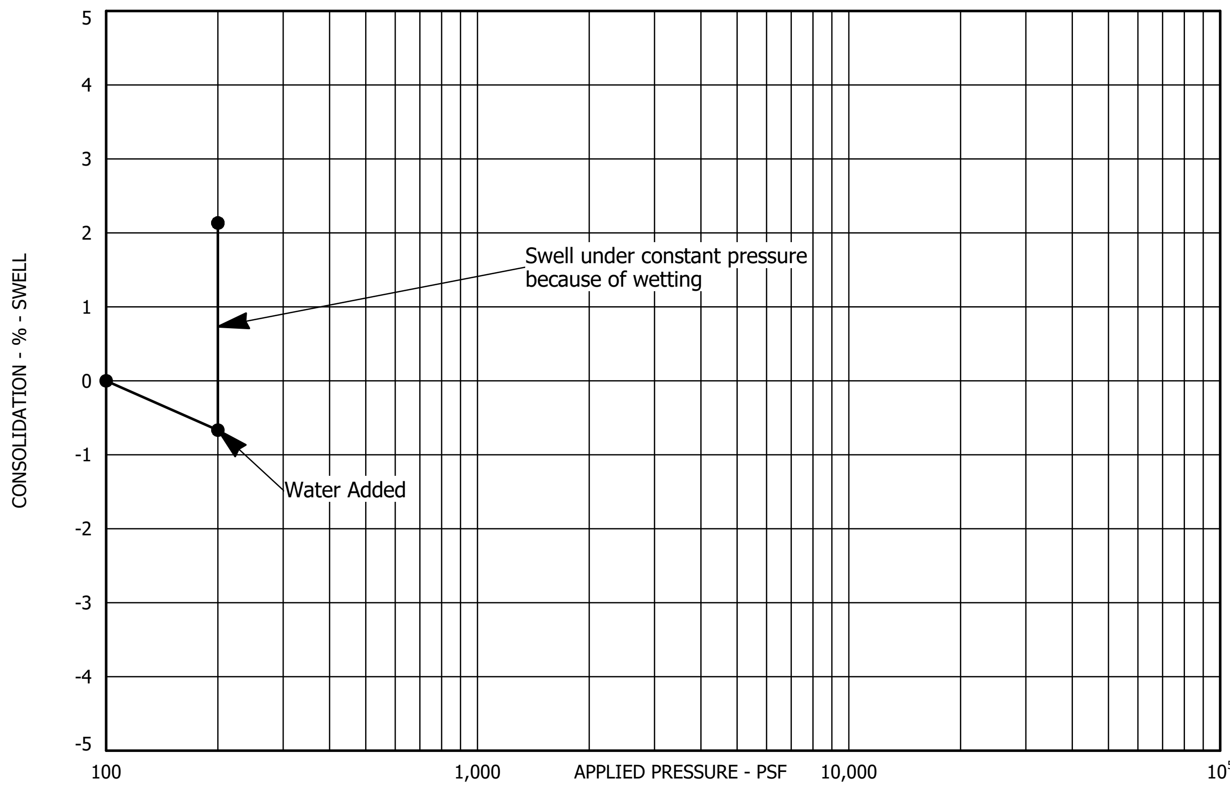
SWELL - CONSOLIDATION TEST RESULTS

FIGURE A-11

PROJECT NO. 252742-P1



Sample Location: Test Boring No. 10 at a depth of 2 feet
Sample Description: Fill, clay, slightly sandy
Dry Unit Weight (pcf): 113
Moisture Content (%): 18

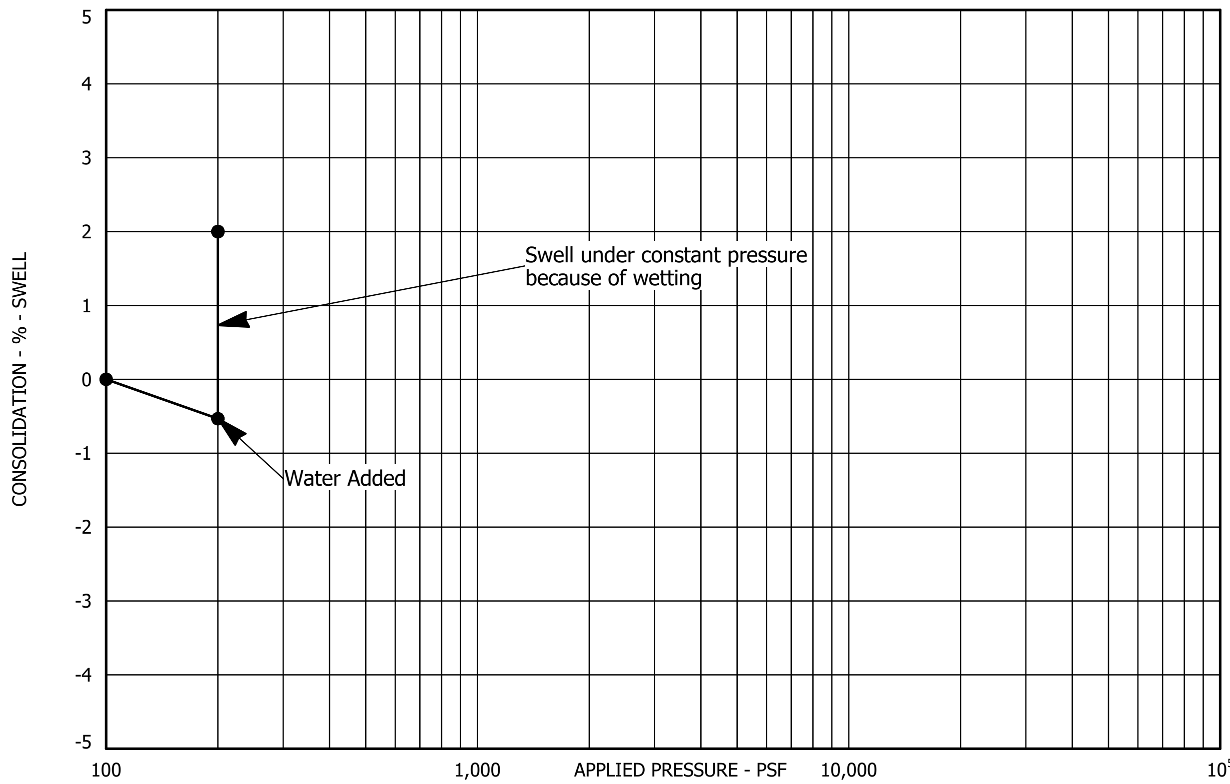


Sample Location: Test Boring No. 11 at a depth of 2 feet
Sample Description: Fill, clay, slightly sandy
Dry Unit Weight (pcf): 112
Moisture Content (%): 16

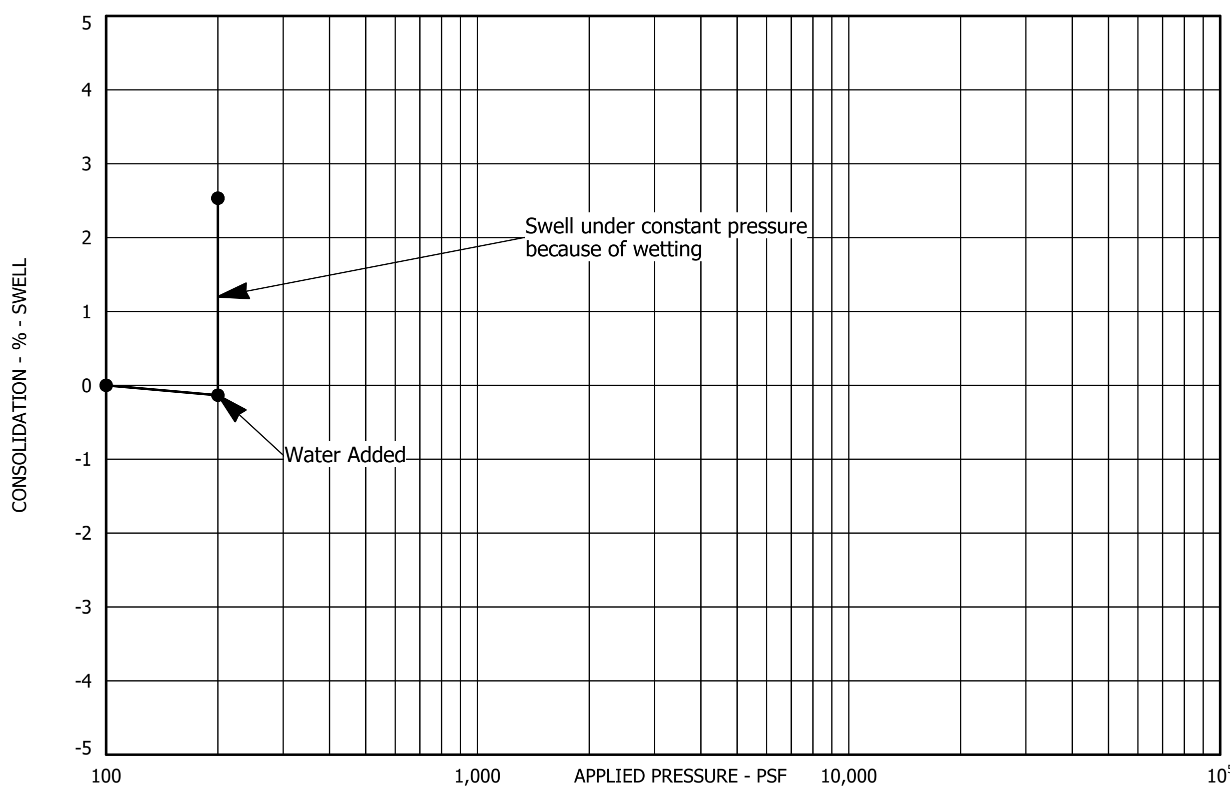
SWELL - CONSOLIDATION TEST RESULTS

FIGURE A-12

PROJECT NO. 252742-P1



Sample Location: Test Boring No. 14 at a depth of 2 feet
Sample Description: Fill, clay, slightly sandy
Dry Unit Weight (pcf): 116
Moisture Content (%): 16



Sample Location: Test Boring No. 15 at a depth of 2 feet
Sample Description: Fill, clay, slightly sandy
Dry Unit Weight (pcf): 116
Moisture Content (%): 18

SWELL - CONSOLIDATION TEST RESULTS

FIGURE A-13

PROJECT NO. 252742-P1

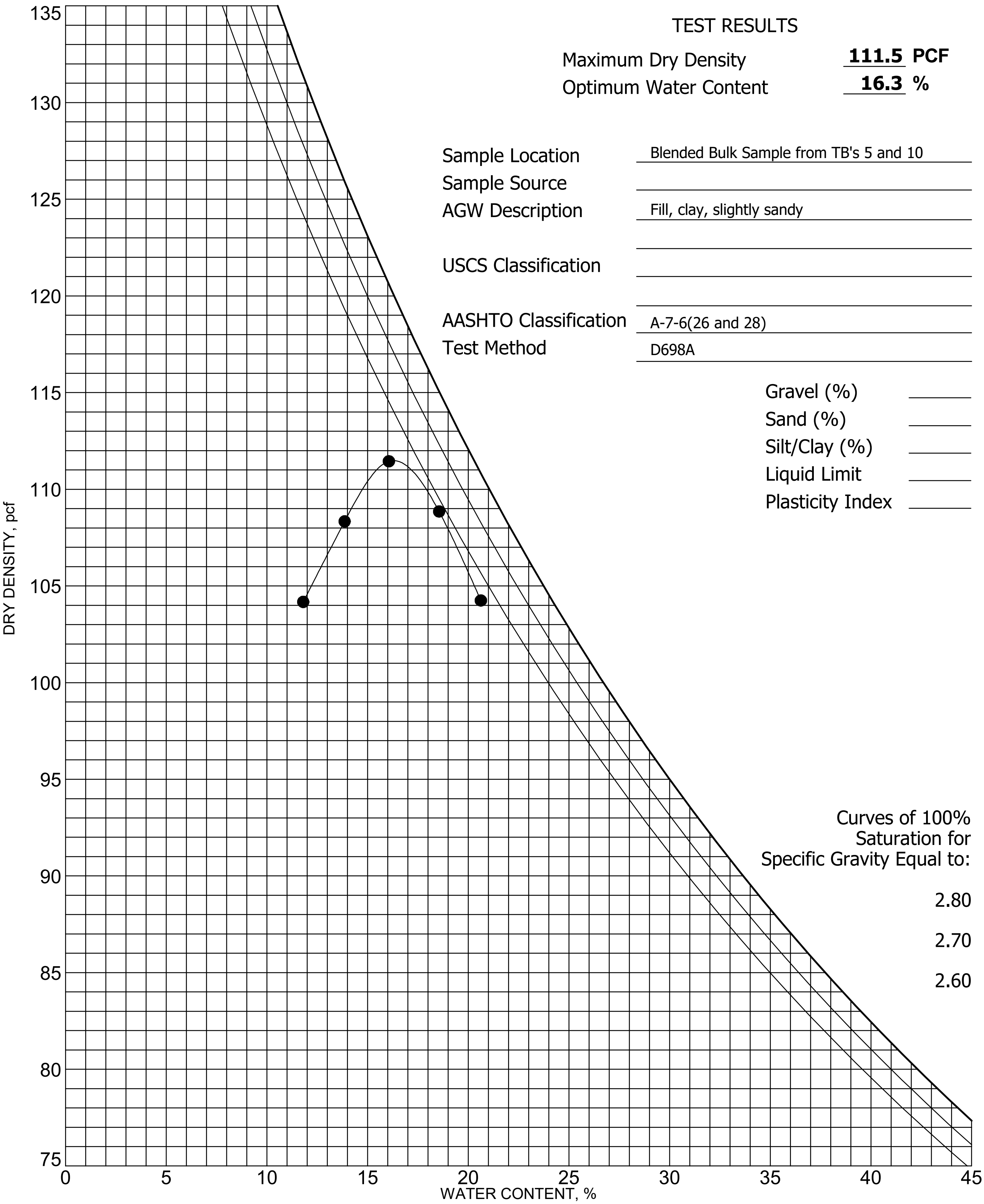
MOISTURE-DENSITY RELATIONSHIP

CLIENT Richmond American Homes of Colorado, Inc.

PROJECT NUMBER 252742-P1

PROJECT NAME Trails at Aspen Ridge, Filing 4

PROJECT LOCATION El Paso County, Colorado



TEST RESULTS

Maximum Dry Density	**111.5** PCF
Optimum Water Content	**16.3** %

Sample Location	Blended Bulk Sample from TB's 5 and 10
Sample Source	
AGW Description	Fill, clay, slightly sandy
USCS Classification	
AASHTO Classification	A-7-6(26 and 28)
Test Method	D698A

Gravel (%)	
Sand (%)	
Silt/Clay (%)	
Liquid Limit	
Plasticity Index	

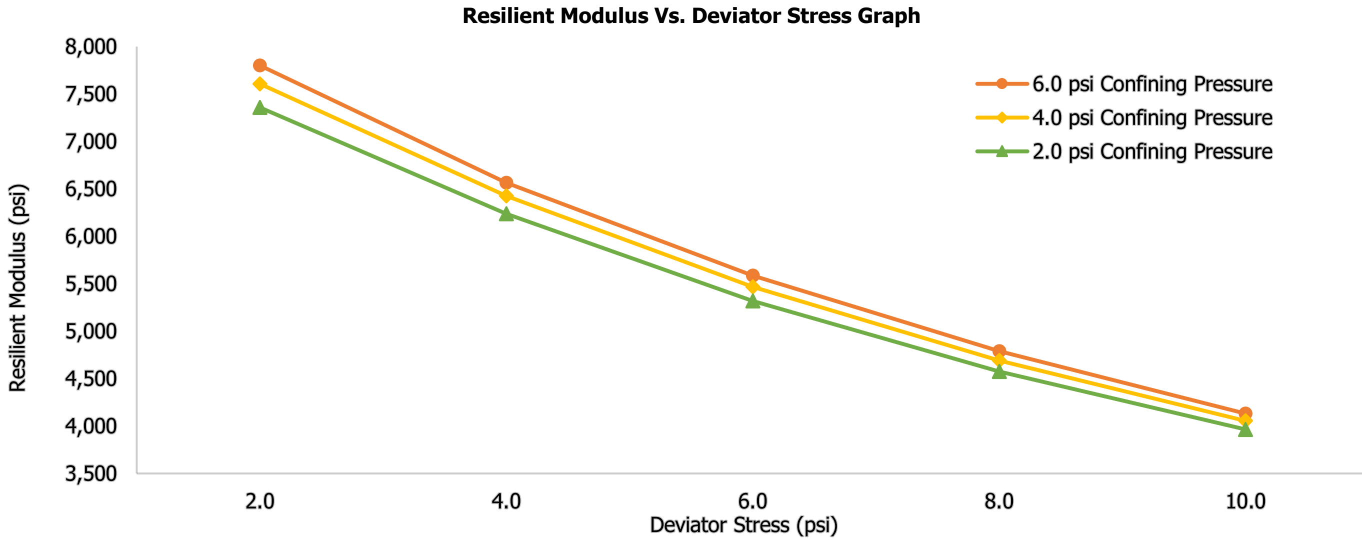
FIGURE A-14

AGW

Resilient Modulus Testing - AASHTO T307

Client Richmond American Homes of Colorado, Inc.
4350 South Monaco Street
Denver, Colorado 80237

Project Number 252742-P1
Project Name Trails at Aspen Ridge, Filing 4
Date June 24, 2026



Sample Location	**Test Borings 5 and 10**	**AASHTO Classification**	**A-7-6 (26 and 28)**
Soil Description	**Fill, clay, slightly sandy**	**-No. 200 (%)**	**-**
Height (in)	**5.6**	**Liquid Limit**	**-**
Diameter (in)	**2.8**	**Plastic Limit**	**-**
Area (in^2)	**6.2**	**Plasticy Index**	**-**
Volume (in^3)	**34.5**	**Proctor Type**	**ASTM D698A**
Remold Dry Density (pcf)	**105.9**	**Max Dry Density (pcf)**	**111.5**
Remold Moisture (%)	**19.3**	**Optimum Moisture (%)**	**16.3**
Percent Compaction (%)	**95**	**Material Type**	**2**
Water Content after (%)	**19.3**		

Loading Sequence and Test Results

Test Sequence	Actual Confining Pressure (psi)	Nominal Maximum Axial Stress (psi)	Actual Maximum Axial Load (lbs)	Actual Cyclic Load (lbs)	Actual Contact Load (lbs)	Actual Max Deviator Stress (psi)	Actual Cyclic Stress (psi)	Actual Contact Stress (psi)	Recoverable Deformation LVDT 1 (mils)	Recoverable Deformation LVDT 2 (mils)	Recoverable Deformation LVDT Average (mils)	Measured Resilient Strain (%)	Resilient Modulus (psi)
0	6.0	4.0	25.0	23.0	2.0	4.1	3.7	0.3	3.10	3.18	3.14	0.056	N/A
1	6.0	2.0	12.0	11.0	1.0	1.9	1.8	0.2	1.25	1.28	1.27	0.022	7,800
2	6.0	4.0	24.0	22.0	2.0	3.9	3.6	0.3	2.92	2.99	2.95	0.052	6,565
3	6.0	6.0	36.0	33.0	4.0	5.8	5.4	0.6	5.37	5.51	5.44	0.096	5,584
4	6.0	8.0	49.0	44.0	5.0	8.0	7.1	0.8	8.64	8.82	8.73	0.155	4,789
5	6.0	10.0	61.0	55.0	6.0	9.9	8.9	1.0	12.35	12.56	12.45	0.221	4,131
6	4.0	2.0	12.0	11.0	1.0	1.9	1.8	0.2	1.32	1.36	1.34	0.024	7,606
7	4.0	4.0	24.0	22.0	2.0	3.9	3.6	0.3	3.22	3.29	3.25	0.058	6,425
8	4.0	6.0	37.0	33.0	4.0	6.0	5.4	0.6	8.78	5.91	5.85	0.104	5,466
9	4.0	8.0	49.0	44.0	5.0	8.0	7.1	0.8	8.80	8.97	8.89	0.158	4,691
10	4.0	10.0	61.0	55.0	6.0	9.9	8.9	1.0	12.05	12.26	12.16	0.216	4,054
11	2.0	2.0	12.0	11.0	1.0	1.9	1.8	0.2	1.35	1.37	1.36	0.024	7,357
12	2.0	4.0	24.0	22.0	2.0	3.9	3.6	0.3	3.26	3.32	3.29	0.058	6,237
13	2.0	6.0	37.0	33.0	4.0	6.0	5.4	0.6	5.83	5.96	5.90	0.105	5,317
14	2.0	8.0	49.0	44.0	5.0	8.0	7.1	0.8	8.81	8.98	8.89	0.158	4,574
15	2.0	10.0	61.0	55.0	6.0	9.9	8.9	1.0	11.91	12.13	12.02	0.213	3,964

Resilient Modulus **3,964 psi** (result of test sequence 15)

FIGURE A-15

APPENDIX B
PAVEMENT THICKNESS CALCULATIONS

1993 AASHTO Pavement Design

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare
Computer Software Product

A. G. Wassenaar, Inc.

Flexible Structural Design Module

Local Residential
Composite Section ACS / ABC / CTS
Trails at Aspen Ridge, Filing 4
El Paso County, Colorado
Project Number 252742-P1

Flexible Structural Design

18-kip ESALs Over Initial Performance Period	292,000
Initial Serviceability	4.5
Terminal Serviceability	2
Reliability Level	80 %
Overall Standard Deviation	0.45
Roadbed Soil Resilient Modulus	3,964 psi
Stage Construction	1
Calculated Design Structural Number	3.16 in

Specified Layer Design

Layer	Material Description	Struct Coef. (Ai)	Drain Coef. (Mi)	Thickness (Di)(in)	Width (ft)	Calculated SN (in)
1	Hot Bituminous Asphalt	0.44	1	5.5	-	2.42
2	Aggregate Base Course	0.11	1	7	-	0.77
3	Chemically Treated Subgrade	0	1	12	-	0.00
Total	-	-	-	24.50	-	3.19

FIGURE B-1

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Flexible Structural Design

18-kip ESALs Over Initial Performance Period	292,000
Initial Serviceability	4.5
Terminal Serviceability	2
Reliability Level	80 %
Overall Standard Deviation	0.45
Roadbed Soil Resilient Modulus	3,964 psi
Stage Construction	1
Calculated Design Structural Number	3.16 in

Specified Layer Design

Layer	Material Description	Struct Coef. (Ai)	Drain Coef. (Mi)	Thickness (Di)(in)	Width (ft)	Calculated SN (in)
1	Hot Bituminous Asphalt	0.44	1	5.5	-	2.42
2	Aggregate Base Course	0.11	1	19	-	2.09
Total	-	-	-	24.50	-	4.51

1993 AASHTO Pavement Design

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Flexible Structural Design Module

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Trails at Aspen Ridge, Filing 4
El Paso County, Colorado
Project Number 252742-P1

Flexible Structural Design

18-kip ESALs Over Initial Performance Period	821,000
Initial Serviceability	4.5
Terminal Serviceability	2.5
Reliability Level	85 %
Overall Standard Deviation	0.45
Roadbed Soil Resilient Modulus	3,964 psi
Stage Construction	1
Calculated Design Structural Number	3.94 in

Specified Layer Design

Layer	Material Description	Struct Coef. (Ai)	Drain Coef. (Mi)	Thickness (Di)(in)	Width (ft)	Calculated SN (in)
1	Hot Bituminous Asphalt	0.44	1	6.5	-	2.86
2	Aggregate Base Course	0.11	1	10	-	1.10
3	Chemically Treated Subgrade	0	1	12	-	0.00
Total	-	-	-	28.50	-	3.96

FIGURE B-3

1993 AASHTO Pavement Design

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare Computer Software Product

A. G. Wassenaar, Inc.

Flexible Structural Design Module

Collector
Composite Section ACS / ABC
Trails at Aspen Ridge, Filing 4
El Paso County, Colorado
Project Number 252742-P1

Flexible Structural Design

18-kip ESALs Over Initial Performance Period	821,000
Initial Serviceability	4.5
Terminal Serviceability	2.5
Reliability Level	85 %
Overall Standard Deviation	0.45
Roadbed Soil Resilient Modulus	3,964 psi
Stage Construction	1
Calculated Design Structural Number	3.94 in

Specified Layer Design

Layer	Material Description	Struct Coef. (Ai)	Drain Coef. (Mi)	Thickness (Di)(in)	Width (ft)	Calculated SN (in)
1	Hot Bituminous Asphalt	0.44	1	6.5	-	2.86
2	Aggregate Base Course	0.11	1	22	-	2.42
Total	-	-	-	28.50	-	5.28

FIGURE B-4