ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO 80907
PHONE (719) 531-5599
FAX (719) 531-5238

January 8, 2019

Turkey Cañon Quarry, Inc.
20 Boulder Crescent St., 2nd Floor
Colorado Springs, CO 80903

Attn: Mark Morley

Re: Vollmer Pit
Permit Number M-1983-035
El Paso County

Dear Mr. Morley,

As requested, personnel of Entech Engineering, Inc. have observed the existing berms around the above referenced pit. The pit was operated by Schmidt Construction Company. An aerial of the pit is attached with this letter.

It is our understanding that the existing perimeter soil berms are to be removed as part of the mine closure. Information regarding the berms composition and construction was provided by Scott Davis who was the project manager on the Black Forest Property (Vollmer Pit) for Schmidt Construction. The berms were placed to shield the pit operations from view of surrounding properties. The berms were reportedly constructed from the overburden soils within the pit. The overburden soils in this area typically consist of Silty sands. Scrapers and dozers were reportedly used to place the berm materials.

The berms to be removed are constructed above adjacent grades. The removal of the berms will not require excavation below the grades of the adjacent properties. Due to the use of overburden soils from the pit to build the berms, efforts to remove them are not expected to be difficult. It is anticipated that the berm soil will be picked up with scrapers to be placed within the interior of the property. One house is situated with its side yard adjacent to the property (see site aerial). The remaining adjacent structures have rear yards between houses and the property. The distance from the toe of the berm to the nearest house is approximately 40 feet. The majority of the earth moving will be at distances greater than 50 feet. Again, no excavation for the berm removals will be below the existing grade outside of the berm area.

It is our opinion that the berm removal will not impact the adjacent properties based on our observation of the site, the proposed construction, location, and the grades of the berms. During operations, BMP;s for erosion and dust control should be implemented.

We trust that this has provided you with the information you require. Should you have any questions or need further information, please do not hesitate to contact us.

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Joseph C Goode Jr., P.E.
President

COLORADO LICENSED
JOSEPH COLLIN GOODE JR
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PROFESSIONAL ENGINEER

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Vollmer Pit
Legend
Vollmer Pit
Silver Pond Heights
Panama Dr
Azore Rd
Vollmer Rd
Black Forest Rd
Loftwood Rd
Wagon Top Ct
Dry Needle Pl
Google Earth
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1000 ft

Geotechnical Site Development Study
Proposed Residential Development
Schmidt Property
Southwest of Marksheffel and Vollmer Roads
Colorado Springs, Colorado

AMH Development, LLC
3131 South Vaughn Way, Suite 220
Aurora, Colorado 80014

A.G. WASSENAAR, INC.
3211 South Zuni Street
Englewood, Colorado 80110
www.agwco.com (303) 759-8100

Project Number 213542
October 12, 2021

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

ATTACHMENTS

1.0 EXECUTIVE SUMMARY

A. G. Wassenaar, Inc. (AGW) completed the geotechnical site development study for the proposed residential development at the subject site. The data collected during our field exploration and laboratory work and our analysis, opinions, and conclusions are presented. The purpose of our study is to provide design recommendations for planning and site development and preliminary design concepts for foundation systems, interior floor support, and streets.

The subsurface materials encountered in our test borings consist of up to 1 feet of topsoil over sand overlying sedimentary bedrock. Fill was encountered in Test Borings 22 and 23 to depths of 17 and 12 feet, respectively. Claystone, claystone/sandstone, or sandstone bedrock was encountered at depths ranging from 0 to 27 feet. Ground water was measured at depths ranging from 5 to greater than 34.5 feet during this study.

Site development considerations should include provisions for existing fill, shallow expansive claystone and interbedded claystone/sandstone bedrock, shallow ground water, and loose sand soils.

Based upon the results of this preliminary study, we anticipate that approximately 35 to 45% of the site will require structures to be founded on straight shaft piers drilled into competent bedrock. If the site is overexcavated and the excavated soils are placed as moisture treated fill using the recommendations presented in this report, it is likely that most of the structures could be founded on spread or pad-type footings bearing on the moisture treated fill below frost depth. We estimate that about 35 to 45% of the site will require a full depth overexcavation of 10 feet below the lowest foundation element. Overlot grading plans were not available at the time of this study. **Should grading plans become available, the contents of this report must be reviewed and possibly revised by AGW.** Drilling additional test borings is also recommended to better define overexcavation limits/extents. Preliminary foundation design concepts are presented.

Floors and flatwork being considered for construction on-grade will require a specific risk analysis by the Client because of the potential for movement of the soils and bedrock encountered. Where the structures are founded upon straight shaft piers, engineered structural floors or modification of the floor supporting soils or bedrock can be anticipated. Where footings are constructed, slabs-on-grade may be possible depending on the expansion potential of the supporting materials and the Client's analysis of risk. Slabs supported by soil will be subject to movement. Options for floor support are discussed.

Foundation subsurface drainage systems will be necessary for all below grade areas. Extensive drain systems will be required when foundations are within 4 feet of ground water.

Water soluble sulfate test results indicate that site and foundation concrete should be designed for negligible sulfate exposure. Preliminary pavement and other geotechnical-related recommendations are presented in the following report. We encourage the Client to read this report in its entirety and not to solely rely on the cursory information contained in this summary.

2.0 PURPOSE

This report presents the results of a geotechnical site development study for the proposed residential development known as the Schmidt Property to be located southwest of Marksheffel and Vollmer Roads, in Colorado Springs, Colorado. The study was conducted by AGW to assist in determining geotechnical design criteria for planning, site evaluation, and development considerations. Preliminary geotechnical design concepts are also presented for foundations, interior floor support, foundation drainage, and street construction. Factual data gathered during the field and laboratory work are summarized on Figures 1 through 6 and in Appendix A. Our opinions and recommendations presented in this report are based on the data generated during our field exploration, laboratory testing, our understanding of the proposed project, and our experience with similar projects and geotechnical conditions.

This study was performed in general conformance with our Proposal Number 213542, dated March 17, 2021, revised on March 29, 2021 and July 15, 2021. This report is not intended to provide design criteria for individual foundations or street construction. Additional geotechnical studies will be required to provide final design criteria and construction recommendations.

3.0 PROPOSED CONSTRUCTION

We understand the proposed development will include 387 single family lots with crawl space or full depth basements and the associated utility and roadway infrastructure. We also understand that the Client prefers to develop the site in order to avoid, if possible, the use of drilled piers and interior structural floors. Overlot grading plans were not available. We have assumed maximum cut/fill depths will not exceed 5 feet across the site. Should grading plans become available, the contents of this report must be reviewed and possibly revised by AGW.

4.0 SITE CONDITIONS

The site is situated southwest of Marksheffel and Vollmer Roads, in Colorado Springs, Colorado. The site is bordered by the proposed Marksheffel Road extension to the north, Vollmer Road to the east, The Trails at Forest Meadows subdivision to the south, and Cottonwood Creek and vacant land to the west. Black Forest Road, trending north/south was situated further to the west. Silver Ponds subdivision (acreage lots) was situated further north beyond the planned road extension. The east half of the site was flat, and vegetation consisted of native prairie grasses and flowers. The west half of the site was flat and had previously been excavated/mined to approximately 15 feet below original grade for sand material. Manmade berms with trees were observed on the north and south sides of this area. Stockpiles (with trash and debris) and outbuildings were also observed in this area. No bedrock outcrops were observed on the site. Gas lines and a remnant water well were observed on the west half of the site.

5.0 FIELD EXPLORATION

Subsurface conditions for the proposed development were explored by drilling 28 test borings at the approximate locations indicated on Figure 1. The test borings were advanced using a 4-inch diameter, continuous flight auger powered by a truck-mounted drill rig. At frequent intervals, 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 materials encountered. Results of the penetration tests and locations of sampling are presented on the "Test Boring Logs", Figures 2 through 6. Ground water measurements were made at the time of drilling and subsequent to drilling.

6.0 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 swell-consolidation tests to evaluate the effect of wetting and loading on the selected samples. Gradation analysis and Atterberg limits tests were conducted to evaluate grain size distribution and plasticity. One standard Proctor test and remolded swell-consolidation test were performed on a blended bulk sample of the soils anticipated to be used as fill. In addition, representative samples were tested for water soluble sulfates, pH, resistivity, and chlorides. The test results are summarized on Figures 2 through 6 and presented in Appendix A.

7.0 SUBSURFACE CONDITIONS

The subsurface materials encountered in our test borings consist of up to 1 feet of topsoil over sand overlying sedimentary bedrock. Fill was encountered in Test Borings 22 and 23 to depths of 17 and 12 feet, respectively. Claystone, claystone/sandstone, or sandstone bedrock was encountered at depths ranging from 0 to 27 feet. Ground water was encountered in 11 of the 28 test borings at the time of drilling and in 22 of the 28 test borings when checked subsequent to drilling. Cave was also encountered in 22 of the 28 test borings when checked subsequent to drilling. A more complete description of the subsurface conditions is shown on Figures 2 through 7.

7.1 Fill

Fill was encountered in two of the 28 test borings and was between 12 and 17 feet thick. The fill consisted of sand, medium dense to very dense, slightly silty to silty, slightly gravelly, moist, and brown to dark brown. The samples tested exhibited no plasticity. The fill is considered to possess no expansion potential. The existing fill is more fully discussed under "Geotechnical Concerns".

7.2 Natural Soil

Topsoil was found in 19 of the 28 test borings. The topsoil encountered consisted of silty, clayey sand to sandy, silty clay up to 1-foot thick. It was organic, moist, and dark brown. The topsoil is not considered capable of supporting structures and should be removed.

Sand was encountered in 25 of 28 test borings, ranging in depths of between 0 and 17 feet. The sand was loose to dense, slightly silty, very clayey, clayey/silty, trace gravel to slightly gravelly, slightly moist to wet, and brown to rust. The samples tested exhibited no to low plasticity. The sand has no expansion and low to moderate settlement potential.

7.3 Bedrock

Claystone bedrock was encountered in 12 of 28 test borings at depths ranging from 0 to 26 feet. The claystone was weathered to very hard, slightly sandy to very sandy, with very clayey sandstone, slightly moist to very moist, and gray to olive to brown. The claystone is considered to possess high expansion potential.

Claystone/sandstone was encountered in five of 28 test borings at depths ranging from 11 to 27 feet. The claystone/sandstone was hard to very hard, slightly silty, poorly cemented, moist to very moist to wet, and gray to brown to rust. The claystone within the claystone/sandstone is considered to possess moderate to high expansion potential.

Sandstone bedrock was encountered in 27 of 28 test borings at depths ranging from 0 to 32 feet. The sandstone was hard to very hard, silty, clayey to very clayey, trace gravel, poorly cemented, occasional lignite, moist to wet, and gray to brown to rust. The sandstone is considered to possess no expansion potential. Estimated depth and elevation of bedrock are shown on Figures 8 and 9.

7.4 Ground Water

Ground water was measured at depths ranging from 12 to 34 feet in 11 of the 28 test borings at the time of drilling. Ground water was measured at depths ranging from 5 to 24 feet in 22 of the 28 test borings when checked one to five days after drilling. Cave and/or potential (lower) ground water was measured at depths ranging from 6 to 33.5 feet in 22 of 28 test borings when checked one to five days after drilling. Ground water levels fluctuate with changing seasons and irrigation patterns and are expected to rise after construction is complete and landscape irrigation commences. Estimated depth and elevation of the ground water are shown on Figures 10 and 11.

8.0 GEOTECHNICAL CONCERNS

8.1 Existing Fill

Fill was encountered in two of the 28 test borings and ranged from 12 to 17 feet thick. It is not known whether the fill encountered was placed as fill capable of supporting a structure or other structural elements. No records of this fill placement have been provided for our review. Unless documentation is provided that is deemed acceptable, with maps indicating original and as built topography, all the existing fill should be excavated prior to placement of new fill, structures, or other structural appurtenances. The excavated fill should be evaluated to determine its suitability for placement as new fill across the site.

8.2 Expansive Bedrock

Claystone, and interbedded claystone and sandstone bedrock with low to moderate expansion potential were encountered across the site. The average measured swell in the claystone,

claystone/sandstone across the site was 1.2% under a 1,000 psf surcharge with a range from -0.9% to +3.9%. Approximately 23% of the tests exhibited moderate (2% or more) swell. Therefore, we believe that a portion of the structures across the site will be constructed near expansive materials should traditional methods of grading be employed. These structures will need to be supported upon straight shaft piers bottomed in bedrock. The interior floors for these structures will likely need to be supported structurally.

Alternatively, overexcavation and placement of a moisture treated fill process to reduce swell potential may be considered. This may allow for shallow foundations and slab-on-grade construction or a reduction in the length of the straight shaft piers. Based upon the materials encountered, we have estimated that 35 to 45% of the site may require overexcavation of 10 feet below planned lowest foundation elements and/or some type of soil modification if the Client desires to reduce the likelihood of foundations supported by straight shaft piers. This estimation is approximate and subject to change based on review of the final site grading plans and the actual amount of swell reduction attained. The drilling of additional test borings would be useful to better define the estimated areas and depths of overexcavation.

8.3 Ground Water

Ground water was encountered less than 15 feet beneath the existing ground surface across about 15% of the site. Ground water less than 15 feet below the site grading elevation will likely affect utility construction and some site grading operations. Ground water less than 10 feet below the site grading elevation will likely affect foundation excavations. In addition, ground water less than 5 feet below the existing or final ground surface will pose stabilization problems during site grading, foundation construction, and may cause problems during pavement construction. We recommend that foundations be constructed at least 4 feet above ground water level to reduce the potential for future water problems.

Site development should be planned to avoid or manage the ground water. Avoidance may entail raising the site grades to provide sufficient distance between the bottom of foundations and the ground water, allowing only at-grade construction (no basements) or other methods. Removing the ground water may entail the construction of drain systems and/or barriers that draw the ground water down sufficiently to allow below grade construction. A geohydrologist familiar with long term dewatering of projects of this nature should be consulted.

8.4 Loose Soils

Loose sand soils were encountered near the ground surface in Test Borings 11 and 12. The loose sands can present concerns for site grading, foundation excavations, and pavement construction. Any significant fills or foundation loads placed on top of the or loose soils could cause significant settlement over time. Movement of large, rubber-tired equipment may cause severe rutting which may result in not being able to traverse the areas. It may be necessary to stabilize the soft areas prior to fill placement. It may also be necessary to stabilize the soils prior to foundation and pavement construction.

9.0 SITE DEVELOPMENT

9.1 Overlot Grading

We understand the fill materials to be used at the site may be from on-site cut areas. In general, suitable inorganic on-site or off-site soils may be used for structural fill. Existing fill should be excavated prior to placement of new fill. Topsoil, soil containing significant vegetation, organic debris or other deleterious material should be excavated and removed from the structural areas. Off-site material considered for new fill should be evaluated by AGW prior to importing to the site.

Construction of the fill embankments throughout the site should consist of proper foundation preparation, constructing embankment benching where necessary, disposition of strippings, proper fill placement and compaction, and designing slopes in accordance with the recommendations provided in this report and the applicable governing regulations. The following are general site grading recommendations:

1. It is recommended that we be retained on an essentially full-time basis to observe and test the fill placement. We should also be retained to provide observations and/or testing of the other items discussed below. The purpose of this observation and testing is to provide the Client with a greater degree of confidence that the work is being performed within the recommendations of this geotechnical study and the project specifications.
2. Various structures were observed across the site. All of the existing structures, including their foundations, should be completely removed from the site. Our experience indicates that other below grade or undisclosed structures such as root cellars, wells, cisterns, etc. may be present. Any of these structures encountered should also be removed. Any wells encountered should be abandoned in accordance with the regulations of the Colorado State Engineer.
3. Existing fill was found in various locations across the site. The fill was placed under unknown conditions. Therefore, we recommend that the fill be entirely excavated. The fill should be observed during excavation in order to determine whether the excavated material may be re-used in the structural areas as new fill. Excavation of isolated test pits (with or without density-compaction testing) will not provide enough information, in our opinion, to allow the fill to remain in place.
4. Utilities beneath structural areas that are to be abandoned should be entirely removed. The excavation should then be widened to allow access to a self-propelled compactor. New fill should be placed and compacted as described in this section and Appendix B.
5. All topsoil and vegetation should be stripped and removed prior to fill placement. The vegetation, organic soils, or topsoil should be wasted from the site, placed in non-structural areas (e.g., parks, landscaping, tracts, etc.) and/or stockpiled for future use in revegetating the surface of exposed slopes. In no case should these materials be used in the structural areas or where the stability of slopes will be affected. If placed in lots, topsoil must be placed outside of the structure setbacks and should not be placed where the fill depths exceed 5 feet. If placed in depth across the back of lots, movements of fences and dry utilities should be expected.

6. Poorly cemented sandstone was encountered in the test borings. If the sandstone becomes moderately to well cemented, these materials will likely require some extra effort to remove and process. The use of a Caterpillar D8 or larger dozer using a single shank ripper tool may be necessary. Some areas of well cemented sandstone may require removal using hydraulic hammers or blasting.
7. Where soft, rutting soils are found beneath planned fill areas, removal, in-place drying, or stabilization may be necessary. Stabilization prior to fill placement may be accomplished by placing crushed rock or equivalent material, which should be evaluated by AGW prior to use. The material should be spread across the area and worked into the underlying soft or loose soils with fully-loaded rubber-tired equipment. This procedure should continue until scraper-type equipment can be supported on the rock fill with no significant deflection or rutting. In some instances, a geogrid or geotextile stabilization fabric may be economical for use in conjunction with rock stabilization.
8. Where the existing slopes are steeper than a 5:1 (horizontal:vertical), benching will be required for structural integrity of any fills (see Figure 12).
9. The stripped foundation areas should be observed by AGW prior to fill placement. Any soft soils found in these areas must be removed or stabilized as necessary prior to fill placement.
10. After the fill areas have been cleared, the exposed soils should be scarified to a minimum depth of 6 inches, brought to the proper moisture content, and then compacted according to Appendix B.
11. Rock excavation will likely result in removal of large sandstone pieces. If it is desired to use this material as fill, it will be necessary to crush the rock to a usable size. In general, the rock should be crushed such that all of the material passes a 3-inch sieve, at least 30% of the material passes a U.S. Standard #4 sieve, and from 5% to 20% passes a U.S. Standard #200 sieve.
12. The compaction and moisture content of the soils will be dependent upon material types and the depth and location of placement. The specifications outlined in Appendix B are based upon providing a fill with sufficient shear strength to support structures and sufficient moisture to reduce the potential of swell of the expansive soil used in the fill.
13. The result of a Standard Proctor test performed on a bulk sample of the upper level soils likely to be used for fill is shown on Figure A-30 and in Appendix A. This result can be used as guideline for contractors to estimate how much additional moisture may be required to bring the on-site soils to the required moisture content.
14. Where fill depths exceed 20 feet, additional compactive effort will be necessary to limit settlement of the fill. Where fill depths exceed 25 feet, we recommend a granular fill (less than 35% passing the U. S. Standard Number 200 Sieve) be placed below the 25-foot depth. If this is not feasible, additional testing of the proposed deep fill material will be required to estimate settlements. In any case, monitoring of fills greater than 25 feet in depth will be necessary. Compaction and moisture content specifications are provided in Appendix B.

15. Particular attention should be paid to compaction of the exterior faces of slopes.
16. Placement and compaction of fill should continue to final overlot grade. We recommend that the lots not be left low or "dished-out" and that placement of fill not stop at foundation elevation.
17. Other specifications outlined in Appendix B should be followed.

9.2 Overexcavation and Placement of Moisture Treated Fill

Based on the expansion potential of the claystone and claystone/sandstone bedrock, we recommend that the site be overexcavated if the use of shallow foundations is desired. Our experience indicates that overexcavation and placement of a moisture treated fill would be most effectively performed using mass grading techniques. The ideal time to do this would be during site development operations. As some overexcavation beneath the roadways will likely be required, it would be advantageous to perform this overexcavation during site grading. The following recommendations should be followed in order to enable the placement of a moisture treated fill that could be used for slab and foundation support. These recommendations may be modified during construction if soil conditions differing from those anticipated are encountered.

1. These recommendations are based upon our understanding that a basement and/or crawl space depth product will be constructed. If a different product is considered, these recommendations must be reviewed by AGW.
2. The final site grading plans should be provided to AGW prior to commencement of work at the site in order to evaluate which areas and to what depth overexcavation should be performed.
3. The expansive claystone and claystone/sandstone should be excavated to a depth of at least 10 feet below the lowest proposed/planned foundation elevation over 35 to 45% of the site or to sandstone bedrock. The base of the excavation should extend, at a minimum, to a width of at least 5 feet beyond the foundation footprint (including any counterforts, covered porches, patios, decks, etc.). Excavations that do not extend to these minimums risk future foundation performance issues. It may be prudent to extend the base of the excavation to 5 feet outside of the front and rear setbacks in order to accommodate potential changes in structure dimension. Additionally, the street subgrade should be overexcavated to a depth of at least 3 feet which should extend to at least 1 foot beyond back of sidewalk (combination sidewalk) or back of curb (detached sidewalk). The excavation should be sloped following current OSHA regulations. We will not be responsible for testing near excavations that do not meet OSHA regulations. A licensed surveyor must verify the extents of the excavation prior to any fill placement.
4. Water flow into the overexcavation may occur in areas of shallow ground water. We believe that the water can be handled during construction by channeling the water in the excavation(s) and pumping from sumps. It may be prudent to provide permanent drains at the base of the overexcavation in these areas. However, if an outfall for the drains cannot be found, they should not be constructed. The drain(s) should be sloped to a positive gravity outfall. Depending on the location of the inflow, chimney drains may be necessary to convey water from sidewall seepage areas to

the drain. The configuration of these drains should be determined at the time of construction.

5. Where soft, rutting soils are found beneath planned fill areas, removal, in-place drying, or stabilization may be necessary. Stabilization prior to fill placement may be accomplished by placing crushed rock or equivalent material, which should be evaluated by AGW prior to use. The material should be spread across the area and worked into the underlying soft or loose soils with fully-loaded rubber-tired equipment. This procedure should continue until scraper-type equipment can be supported on the rock fill with no significant deflection or rutting. In some instances, a geogrid or geotextile stabilization fabric may be economical for use in conjunction with rock stabilization.
6. Once the excavation depth and width have been verified, fill placement may begin. The bottom of the excavation should be scarified and moistened prior to fill placement. The fill, consisting of the excavated materials, should be placed in maximum 8-inch loose lifts. Moisture should be added and the lift processed. The use of a construction disc to mix and process each lift is suggested. Mixing should be performed until the moisture content is relatively uniform throughout the lift and the majority of the particles are less than 3 inches in dimension. Additional processing of the excavated claystone bedrock may be required due to the hardness of the material and low moisture content. The earthwork contractor should be made aware of the extra processing required. The fill should then be compacted as described in Appendix B.
7. The result of a Standard Proctor test performed on a bulk sample of the upper level soils likely to be used for fill is shown on Figure A-30 and in Appendix A. This result can be used as guideline for contractors to estimate how much additional moisture may be required to bring the on-site soils to the required moisture content.
8. Essentially full-time observation and testing of fill placement must be performed by AGW. Testing should include in-place moisture content and dry density. Swell-consolidation or other testing may also be performed at the discretion of AGW.
9. Placement and compaction of fill should continue to final overlot grade. We recommend that the lots not be left low or "dished-out" and that placement of fill not stop at foundation elevation. If the residences will not be constructed within two years of completion of the fill, additional effort may be necessary to help maintain the moisture within the fill. This may include the addition of more soil to blanket the compacted fill, the placement of mechanical or chemical barriers, or applying water periodically to the fill surface. We are available to discuss this with you.

It must be understood that while this method is used to reduce the likelihood of future heave, it is not free of risk of foundation movement. While future heave is less likely, the possibility of settlement induced by excess moisture is increased. Therefore, the control and removal of surface water at the site will continue to be very important.

Our experience indicates that clay materials of the type encountered at this site will likely exhibit an average swell of less than 2% under a surcharge load of 1,000 pounds per square foot (psf) when thoroughly mixed with water and processed with typical earthmoving equipment. It is anticipated that if this level of swell reduction is achieved, the foundations may be constructed by placing footings upon the fill. This level of swell should also provide for a low to moderate risk of basement slab movement. However, it must be understood that even with the procedures outlined above, there is a possibility that moderate to high measured swells may be found in the fill. This may require rework of portions of the fill or the use of pier foundations and structural support of interior floors. Additional drilling after the soil modification has been completed will be required to provide final foundation recommendations and basement slab risk assessments for each residence.

9.3 Construction Excavation

In our opinion, the majority of the site grading, utility, and foundation excavations may be constructed using conventional earth-moving equipment for the Front Range area.

Excavations deeper than 3 feet should be properly sloped or braced to prevent collapse of potentially caving soils. For planning purposes, fills, the overburden sand, sand and gravel, and any soil influenced by ground water are "Type C", the clay is "Type B", and the underlying bedrock is "Type A" according to OSHA regulations. A final determination of the soil type must be made by the Contractor's "Competent Person" (as defined by OSHA Regulation). Local, city, county, state, and federal (OSHA) regulations should be followed.

The presence of ground water will be a significant constraint on construction excavation. It will be necessary to dewater all excavations constructed below the ground water level. Dewatering may include pumping from the work area or construction of well points. The excavation and utility contractor(s) must be made aware of the ground water conditions so that contract bidding will include the appropriate provisions.

9.4 Utility Construction

In our experience, utility excavations may be constructed using conventional earth-moving equipment for the Front Range area. All excavations should be sloped or shored in the interest of safety, following local and federal (OSHA) regulations. For planning purposes, OSHA soil type designations are discussed under "Construction Excavations". Final determination of the soil types must be made by the contractor's "Competent Person" (as defined by OSHA) at the time of construction.

The presence of ground water may be a constraint upon utility construction. It will be necessary to dewater all trenches constructed below the ground water level. A possible method for dewatering would be to begin construction of the deeper (sewer) utilities at their outfall and to work upstream. Other methods include pumping from the trench in the work area or construction of well points along the trenches. The utility contractor must be made aware of the ground water conditions.

Trench backfill within all structural areas should, as a minimum, be compacted using the same methods and to the same specifications as required for overlot grading. This is especially important where utility lines and laterals are constructed beneath foundation, alley, and driveway areas. Trenches in streets should be compacted to the Town of Windsor specifications. Observation and testing of fill placement must be performed during trench backfilling.

The choice of compaction equipment can have a significant effect on the performance of trench fills. It is our experience that utility trench backfills compacted with a compaction wheel attached to an excavator experience more settlement (both in area and magnitude) than those compacted with self-propelled equipment. While the contractor has control of the means and methods of construction, the Client should be aware of this issue.

9.5 Subsurface Drainage

The ground water encountered is anticipated to cause significant problems in areas of the site during development, especially if the overexcavation option is selected. As discussed under "Geotechnical Concerns", ground water should be avoided wherever possible. Plans showing estimated depth and elevation of ground water are presented on Figures 10 and 11.

Additionally, claystone bedrock was encountered in the test borings drilled for this study. This type of material has a relatively low permeability and can develop a perched water condition. Perched water conditions generally occur after development and construction have taken place, when landscape irrigation and surface drainage conditions are changed.

For these reasons, an overall area drain (underdrain) can be considered for the site. In addition, the overall area drain could also provide for a discharge and collection point for individual foundation drains. If an area drain discharge is not available, the individual foundation drains will discharge collected water to the ground surface near each residence. Surface discharge can result in water recycling to the foundation drain and ponding of water where surface grading is not sufficient for water flow. Foundation drain discharge can also result in algae growth where water continually crosses sidewalks which become ice hazards on walkways and gutters in the winter months.

Typically, overall area drains can be designed and constructed with installation of the sanitary sewer system. However, the City of Colorado Springs should be consulted to determine where an overall system is allowed. The civil engineering company contracted to design the infrastructure should be able to provide this design. We are available to assist in drain design. For the system to work, the area drain must be graded to a positive discharge point. If a permanent outfall for an area drain cannot be determined, the area drain should not be constructed.

If it is decided not to install an overall area drain, an alternative would be to establish points of positive gravity discharge for the gravel bedding beneath the sewer. We also recommend any basement or below grade area be provided with a perimeter subsurface drainage system sloped to drain to a positive gravity discharge such as a sump or connected directly to the overall area drain system.

9.6 Surface Drainage

We recommend that provisions be made to divert surface runoff away from development areas. This may reduce potential problems associated with excess water in structure bearing soils. The site should be designed such that a 10% slope can be established near the structures after foundation construction. Slopes of at least 2% should be planned in landscaped areas once the water is away from the foundations.

10.0 SITE CONCRETE AND CORROSIVITY

Laboratory tests conducted on selected soil samples yielded water soluble sulfates ranging from less than 100 parts per million (ppm) to 400 ppm. Based upon these results and our experience in the area, the site soils and bedrock are assigned to possess negligible (S0 or RS0) sulfate exposure per ACI 318 or ACI 332. We recommend the "ACI Manual of Concrete Practice", of the most recent edition be used for proper concrete mix design properties as they relate to these conditions.

The pH test results ranged from 6.0 to 7.8. Resistivity test results at in-situ moistures ranged from 1,976 to 4,726 ohm·cm. Chloride test results ranged from 0.0011% to 0.0004%. These results are summarized on Figures 2 through 6 and Appendix A. The results of this testing should be used as an aid in choosing the construction materials in contact with these soils which will be resistant to the various corrosive forces. Manufacturer's representatives should be contacted regarding the specific corrosivity resistance for their products. In addition, local specifications should be consulted when selecting pipe materials.

11.0 PRELIMINARY FOUNDATION DESIGN CONCEPTS

The foundation recommendations for each structure are dependent upon the subsurface profile and engineering properties of the materials encountered at and near the depth of the proposed foundation. These are dependent upon the final configuration of and construction methods used during overlot grading at the site. The information in the following sections presents preliminary foundation concepts which must be finalized for each building site. AGW should be retained to perform design level soil and foundation studies after completion of site grading.

11.1 Straight-Shaft Piers

A possible foundation system for structures founded where moderately expansive claystone or claystone/sandstone are at or near the bottom of the foundation excavations would be straight shaft piers drilled into bedrock. If soil modification is not employed, we believe that 35 to 45% of the structures will require a pier foundation system. Straight-shaft piers will likely be designed for an end bearing pressure in the range of 20,000 to 30,000 psf, a minimum dead load pressure in the range of 15,000 to 20,000 psf, and a side shear in the range of 2,000 to 3,000 psf. Pier lengths on the order of 30 to 40 feet with bedrock penetration from 10 to 15 feet can be anticipated. Casing of the piers should be anticipated. Due to shallow ground water, sand, and depth to bedrock, construction of straight-shaft piers may be hindered.

11.2 Footings

Foundations supported by spread footings or footing pads may be possible for structures where sufficient sands, sandstone bedrock or properly placed and compacted fills are encountered beneath the foundation elevation. The footings must be founded below frost depth. The footings will likely be designed for maximum soil bearing pressures ranging from 1,500 to 2,500 pounds per square foot (psf). Minimum dead load pressure on the order of 800 to 1,000 psf will likely be required.

We anticipate 55 to 65% of the site will be able to utilize this foundation type if traditional grading techniques are used. Should the more expansive clays and claystone be overexcavated and the excavated materials are placed as moisture treated fill, it is likely most if not all of the structures could be founded on spread or pad-type footings bearing on the moisture treated fill.

11.3 Lateral Earth Pressures

Foundation walls with fill on only one side will need to be designed for lateral earth pressures. For this site, lateral earth pressures calculated based upon equivalent fluid densities on the order of 50 to 70 pcf should be anticipated. The preliminary estimates are for properly placed and compacted fill at foundation walls. They should not be used for site retaining walls.

11.4 Interior Floors

If the site is developed using traditional overlot grading techniques, it is likely that the sites where piers are required for foundation support will be assessed with moderate to high slab risk performance. If the site is developed using overexcavation and placement of moisture treated fill, it is likely that most of the sites will be assessed with low to moderate slab risk performance evaluation. Slab-on-grade construction may be appropriate for full, unfinished basement construction on sites with low or moderate evaluations. Structural floors are generally recommended on sites with higher evaluations and for finished basements or any site where floor movement or cracking cannot be tolerated. If slab movement cannot be tolerated, structural floors should be constructed.

11.5 First Floor Construction (Crawl Space Products)

Some of the structures may be constructed over crawl spaces. Structural floors will be constructed in the living areas of the residences. For the garage areas, it is likely that there will be a low to moderate risk of garage slab movement.

11.6 Drain Systems

Drain systems will be required around the lowest excavation level for below grade spaces for each structure. Either interior or exterior drains may be used for the site. Where ground water is within 4 feet of the foundation, a more extensive drain system will be required. This may include gravel across the entire foundation, drain laterals, or combination interior and exterior drains. The drains must be led to a positive gravity outfall or sump. If an overall subdivision area drain is constructed, individual drains should be connected into this system if allowed by the jurisdiction.

11.7 Backfill and Surface Drainage

Foundation backfill should be moistened and compacted to reduce future settlement. The site grading should consider a slope of 10% away from the foundation at the completion of construction. All other drainage swales in landscaped areas should slope at a minimum of 2%.

12.0 PRELIMINARY STREET PAVEMENT DESIGN

Pavement design is based on the engineering properties of the subgrade and pavement materials, the assumed design traffic conditions, and the City of Colorado Springs pavement regulations. Effective pavement structures are composed of various pavement materials bearing upon properly prepared subgrade soils. The following preliminary pavement recommendations are based upon the subsurface conditions encountered and our experience in the area.

It appears the proposed subgrade materials will likely be sand, clay, or fill constructed from these materials. These soils are summarized below according to the AASHTO Soil Classification System and Group Index Methods.

Soil	AASHTO	
	Classification	Group Index
Sand, slightly silty, trace gravel to slightly gravelly	A-1-b	0
Sand, clayey, trace gravel	A-2-4	0
Sand, clayey, trace gravel	A-2-6	0
Sand, slightly silty	A-4	0
Clay	A-6	4-5

Depending on proposed/planned grades, potential subgrade soils may consist of clay, claystone or claystone/sandstone bedrock. Claystone or claystone/sandstone can be expected to exhibit enough swell to negatively impact the performance of the pavement. If these soils are encountered during grading operations and are within 3 feet of final subgrade elevation, we recommend that the expansive subgrade materials be modified during site grading operations to reduce the potential future heave of the pavement. The expansive claystone or claystone/sandstone should be overexcavated to a depth of at least three feet below the subgrade elevation. The overexcavation should be performed during site grading prior to construction of utilities within the right-of-way. Overexcavation should cover the area from 1 foot beyond back of sidewalk (for attached sidewalk areas) or back of curb (for detached sidewalks). The excavated material may be placed as moisture treated fill (see Appendix B) within the right-of-way. All fill placed within 5 feet of the subgrade elevation should be placed as moisture treated fill. Lime or other chemical treatment, or other methods of subgrade preparation may also be required dependent upon the results of the final pavement design report.

Moisture treatment is the process of removing subgrade materials, adding moisture between 0 to 4% above optimum moisture content, and compacting the subgrade to at least 95% of Proctor maximum dry density. The Client should understand soils treated to 4% above optimum moisture content will have low support values and may be soft and yielding under load. Stabilization by chemical or mechanical means may be necessary to achieve a stable paving platform.

Based upon existing grades and the subgrade soil classifications, we have estimated the relative strengths of the subgrade soils presented above in order to determine the preliminary pavement thicknesses. Based upon the nature of the development, we believe the roadways and alleyways will be classified as local residential (EDLA = 10). Access from Black Forest Road may be classified as collector (EDLA=50). We believe the Marksheffel Road extension will be classified as public/major arterial (EDLA = 300). Based on this information and utilizing the design methodology determined from the pavement design regulations, the alternatives presented below were calculated.

Pavement Thickness Alternatives for Interior Streets, Alleys, Public Arterial

A-1-b to A-4 (0) Soils			
Traffic Category	HBP* (in.)	HBP / ABC (in.)	Concrete Pavement (in.)
Local Residential/Alleyway	5.0-6.5	4.0-5.0/6.0 – 8.0	6.0–8.0**
Collector	6.5-8.0	5.0-6.5/8.0-10.0	7.0-9.0
Major Arterial	9.0-11.0	7.0-8.5/10.0 – 12.0	8.0-10.0

HBP* = Hot Bituminous Pavement only allowed over chemically treated or suitable subgrade
ABC = Aggregate Base Course
**8-inch minimum if inverted alleys

Pavement Thickness Alternatives for Interior Streets, Alleys, Public Arterial

A-6 (4-5) Soils			
Traffic Category	HBP* (in.)	HBP / ABC (in.)	Concrete Pavement (in.)
Local Residential/Alleyway	5.5-7.0	4.5-5.5/6.5 – 8.5	6.0–8.0**
Collector	7.0-8.5	5.5-7.0/8.5-10.5	7.0-9.0
Major Arterial	9.5-11.5	7.5-9.0/10.5 – 12.5	8.0-10.0

HBP* = Hot Bituminous Pavement only allowed over chemically treated or suitable subgrade
ABC = Aggregate Base Course
**8-inch minimum if inverted alleys

The above preliminary thickness recommendations are based on a design life of 20 years. It should be emphasized that the design alternatives provided above are preliminary for the materials anticipated. The final design thicknesses could be more or less than indicated depending upon the materials sampled during the final pavement design.

Proper surface and subsurface drainage is essential for adequate performance of pavements. It has been our experience that water from landscaped areas can infiltrate pavement subgrade soils and result in softening of the subgrade followed by pavement damage. Therefore, provisions should be made to maintain adequate drainage and/or contain runoff from such areas. In addition, water and irrigation lines should be thoroughly pressure tested for leaks prior to placement of pavement materials.

It must be reiterated that the information contained in this section is preliminary in nature. More detailed information will be required by the City of Colorado Springs prior to issuance of a paving permit. Therefore, when overlot grading is complete at the site, a final pavement evaluation must be performed.

13.0 FINAL DESIGN CONSULTATION AND CONSTRUCTION OBSERVATION

This report has been prepared for the exclusive use of AMH Development, LLC for the purpose of providing geotechnical criteria for the proposed project. The data gathered and the conclusions and recommendations presented herein are based upon the consideration of many factors including, but not limited to, the type of structures proposed, the configuration of the structures, the proposed usage of the site, the configuration of surrounding structures, the geologic setting, the materials encountered, and our understanding of the level of risk acceptable to the Client. Therefore, the conclusions and recommendations contained in this report should not be considered valid for use by others unless accompanied by written authorization from AGW.

AGW should be contacted if the Client desires an explanation of the contents of this report. AGW should be retained to provide future geotechnical services for the site including, but not limited to, design level geotechnical studies, consultation during design, observation and testing during construction, and other geotechnically related services. Failure to contract with AGW for these services or selection of a firm other than AGW to provide these services will eliminate liability for AGW. We are available to discuss this with you.

14.0 GEOTECHNICAL RISK

The concept of risk is an important aspect of any geotechnical evaluation. The primary reason for this is that the analytical methods used to develop geotechnical recommendations do not comprise an exact science. The analytical tools which geotechnical engineers use are generally empirical and must be tempered by engineering judgment and experience. Therefore, the solutions or recommendations presented in any geotechnical evaluation should not be considered risk-free and, more importantly, are not a guarantee that the interaction between the soils and the proposed structures will perform as desired or intended. What the engineering recommendations presented in the preceding sections do constitute is our judgement of those measures that increase the chances for the structures and improvements performing satisfactorily. The Developer, Builder, and Owner must understand this concept of risk, as it is they who must ultimately decide what is an acceptable level of risk for the proposed development of the site.

15.0 LIMITATIONS

We believe the professional judgments expressed in this report are consistent with that degree of skill and care ordinarily exercised by practicing design professionals performing similar design services in the same locality, at the same time, at the same site and under the same or similar circumstances and conditions. No other warranty, express or implied, is made. In the event that any changes in the nature, design or location of the facility are made, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and the conclusions of this report are modified or verified in writing. Because of the constantly changing state of the practice in geotechnical engineering, and the potential for site changes after our field exploration, this report must not be relied upon after a period of three years without AGW being given the opportunity to review and, if necessary, revise our findings.

The test borings drilled for this study were spaced to obtain an understanding of subsurface conditions for design purposes. Variations frequently occur from these conditions which are not indicated by the test borings. These variations are sometimes sufficient to necessitate modifications in the designs. If unexpected subsurface conditions are observed by any party during site development, we must be notified to review our recommendations.

Our scope of services for this project did not include, either specifically or by implication, any research, identification, testing, or assessment relative to past or present contamination of the site by any source, including biological (i.e., mold, fungi, bacteria, etc.). If such contamination were present, it is likely that the exploration and testing conducted for this report would not reveal its existence. If the Client is concerned about the potential for such contamination or pollution, additional studies should be undertaken. We are available to discuss the scope of such studies with you.

Our scope of services for this project did not include a local or global geological risk assessment. Therefore, issues such as mine subsidence, slope stability, faults, etc. were not researched or addressed as part of this study. If the Client is concerned about these issues, we are available to discuss the scope of such studies upon your request.

Sincerely,

A. G. Wassenaar, Inc.

Keith E. Asay
Staff Engineer

Reviewed by:

COLORADO LICENSED PROFESSIONAL ENGINEER MICHAEL R. CONNER 30731

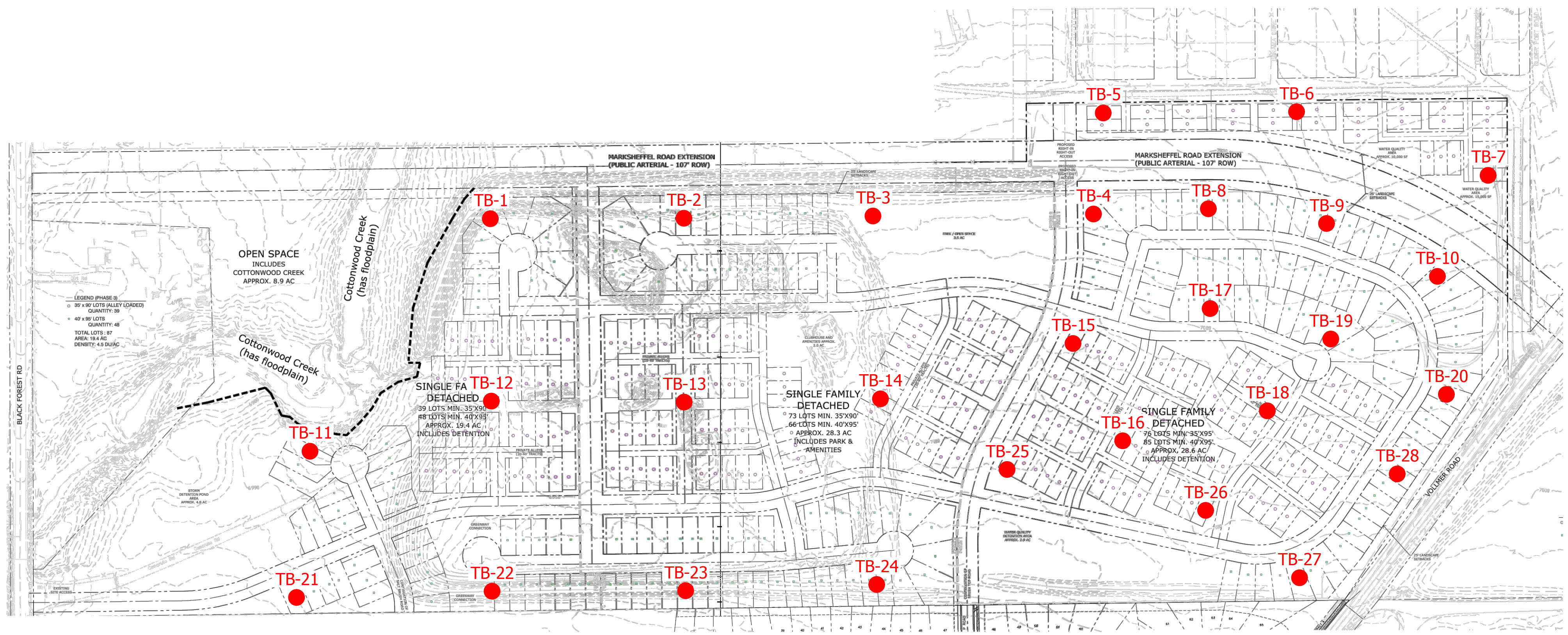
Michael R. Conner, P.E.
Senior Engineer

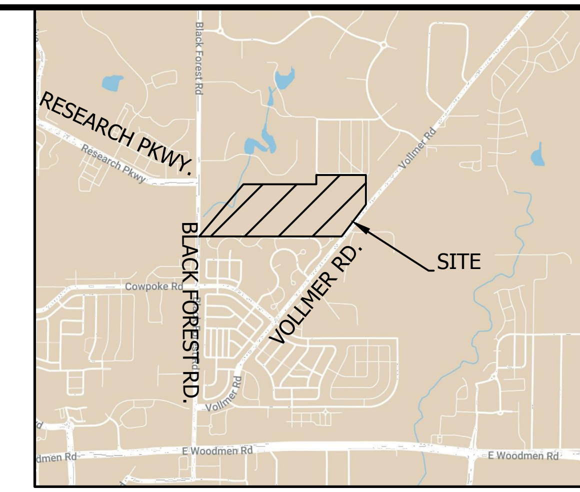
KEA/MRC/kea/bab

SCHMIDT PROPERTY
COLORADO SPRINGS, COLORADO

N

0 200 400
Scale in Feet





VICINITY MAP
NOT TO SCALE

NOTES:
1. TEST BORINGS ARE OVERLAID ON THE "CONCEPTUAL LAYOUT PLANS", PREPARED BY NES, DATED FEBRUARY 6, 2021.
2. ALL LOCATIONS ARE APPROXIMATE.

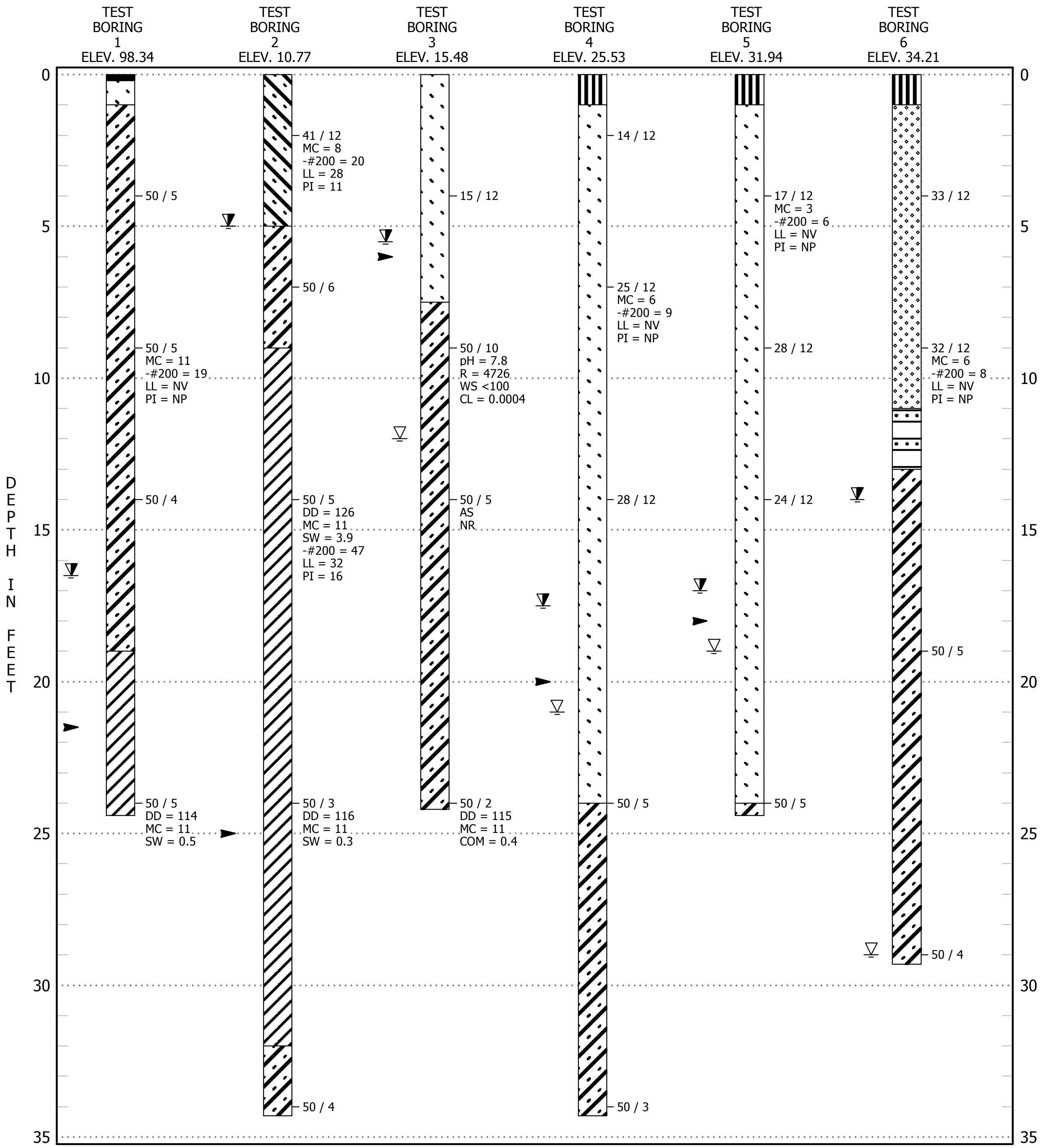
AGW
A.G. WASSENAAR, INC.

SITE PLAN AND VICINITY MAP	PROJECT NO. 213542 FIGURE 1

A.G. WASSENAAR, INC.

CLIENT AMH Development, LLC **PROJECT NAME** Schmidt Property

PROJECT NUMBER 213542 **PROJECT LOCATION** Colorado Springs, Colorado



SEE FIGURE 7 FOR LEGEND AND NOTES

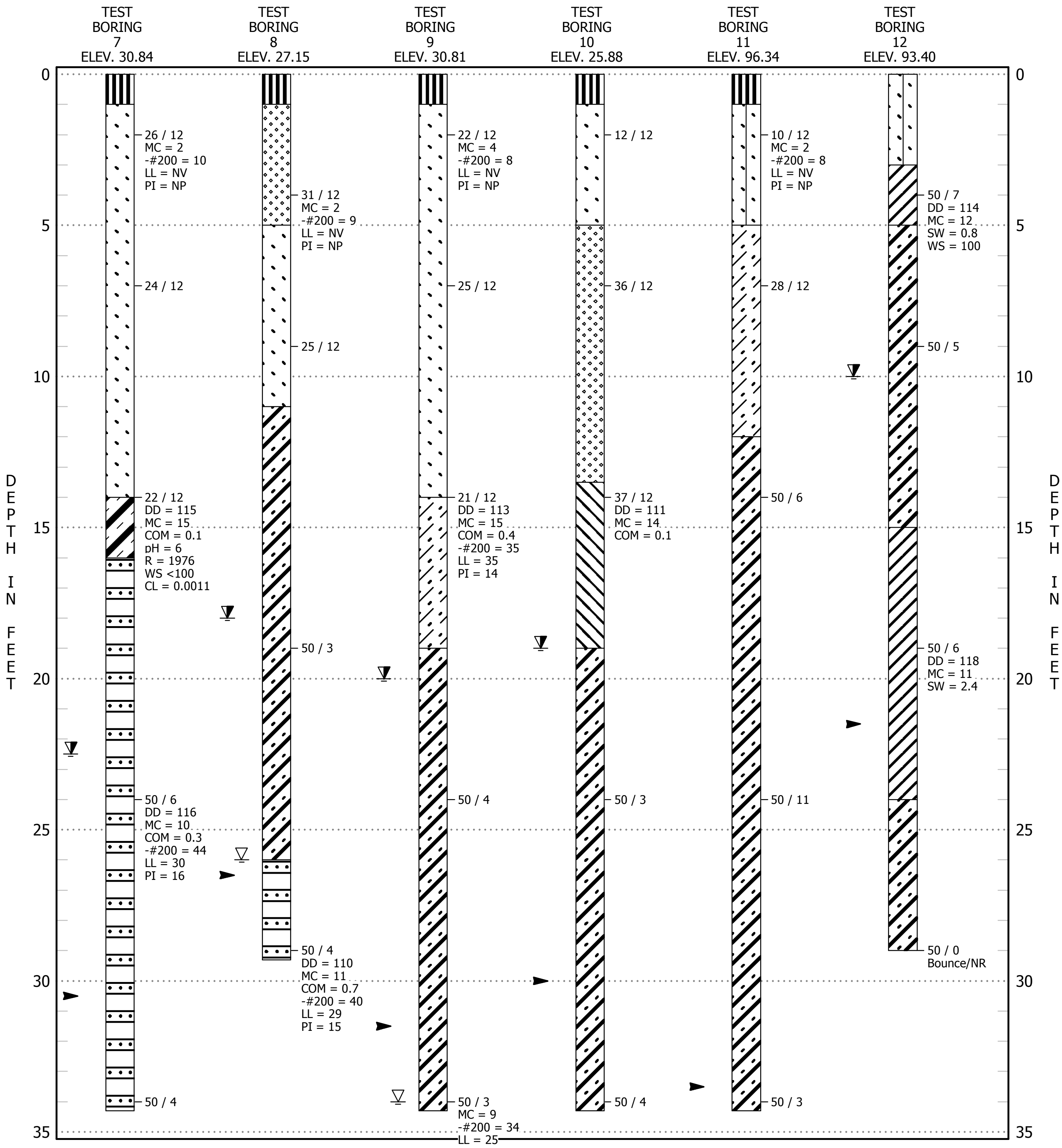
TEST BORING LOGS

FIGURE 2

AGW
A.G. WASSENAAR, INC.

CLIENT AMH Development, LLC **PROJECT NAME** Schmidt Property

PROJECT NUMBER 213542 **PROJECT LOCATION** Colorado Springs, Colorado



SEE FIGURE 7 FOR LEGEND AND NOTES

TEST BORING LOGS

FIGURE 3

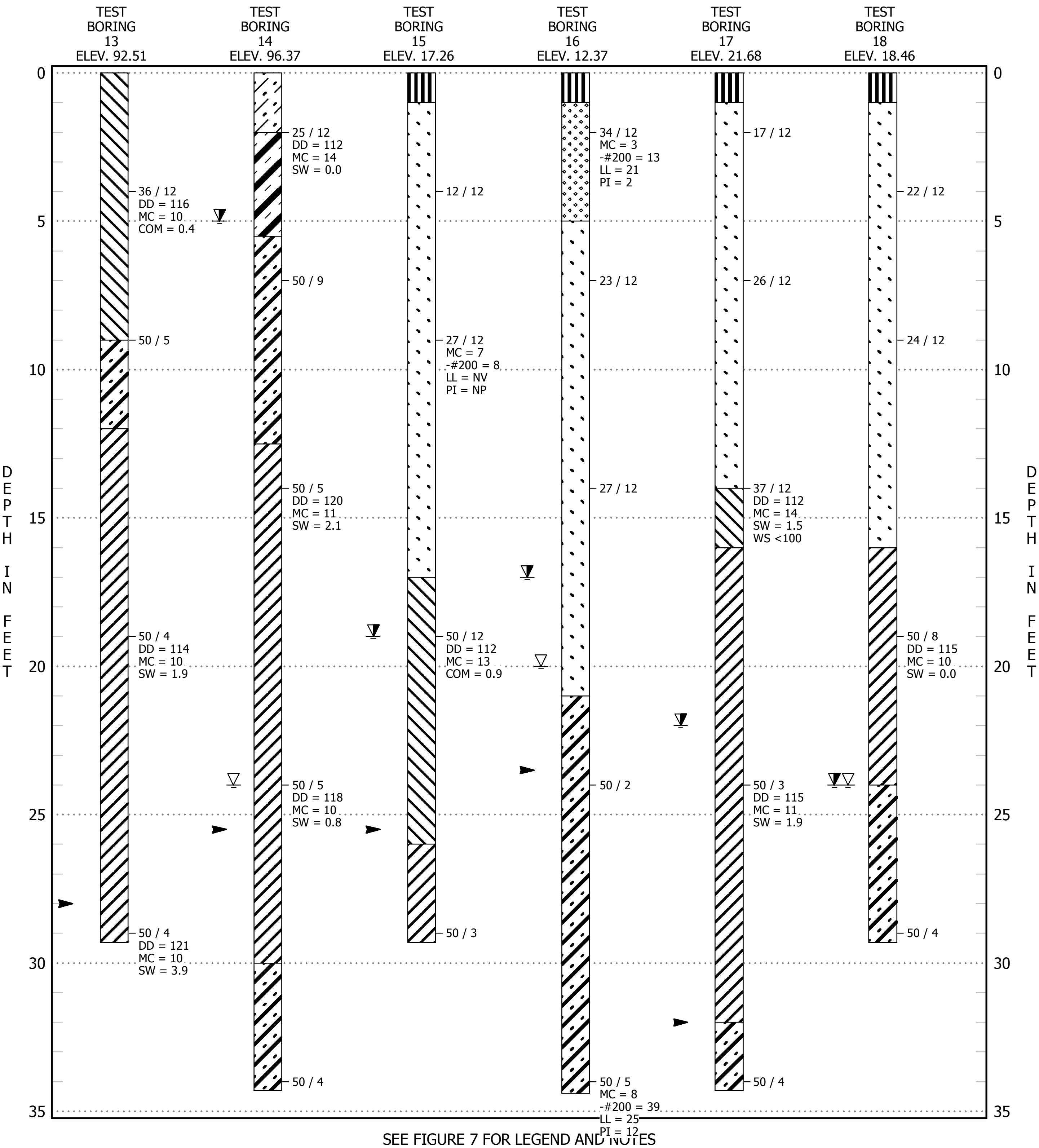
AGW
A.G. WASSENAAR, INC.

CLIENT AMH Development, LLC

PROJECT NAME Schmidt Property

PROJECT NUMBER 213542

PROJECT LOCATION Colorado Springs, Colorado



SEE FIGURE 7 FOR LEGEND AND NOTES

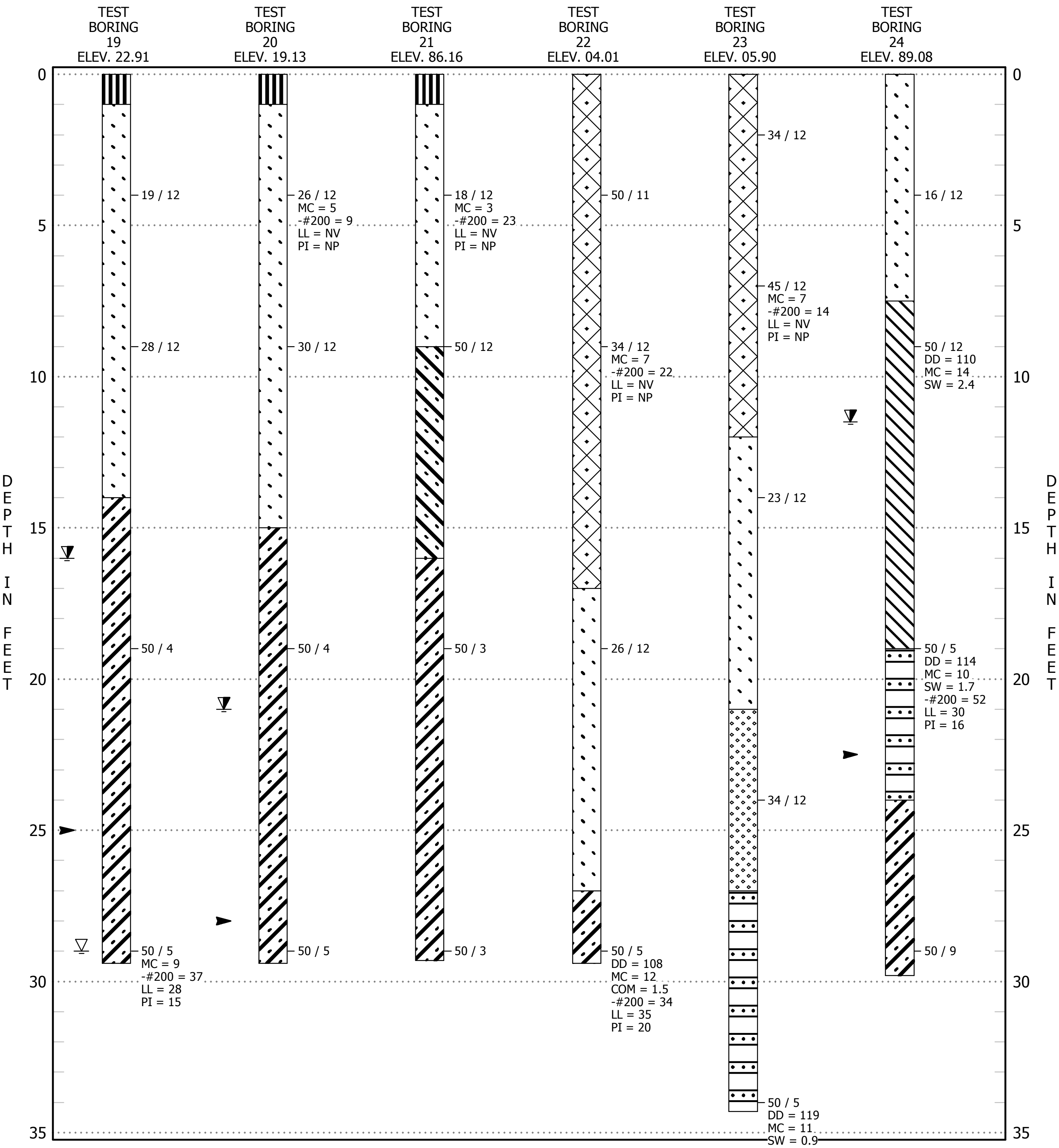
TEST BORING LOGS

FIGURE 4

A.G. WASSENAAR, INC.

CLIENT AMH Development, LLC **PROJECT NAME** Schmidt Property

PROJECT NUMBER 213542 **PROJECT LOCATION** Colorado Springs, Colorado



SEE FIGURE 7 FOR LEGEND AND NOTES

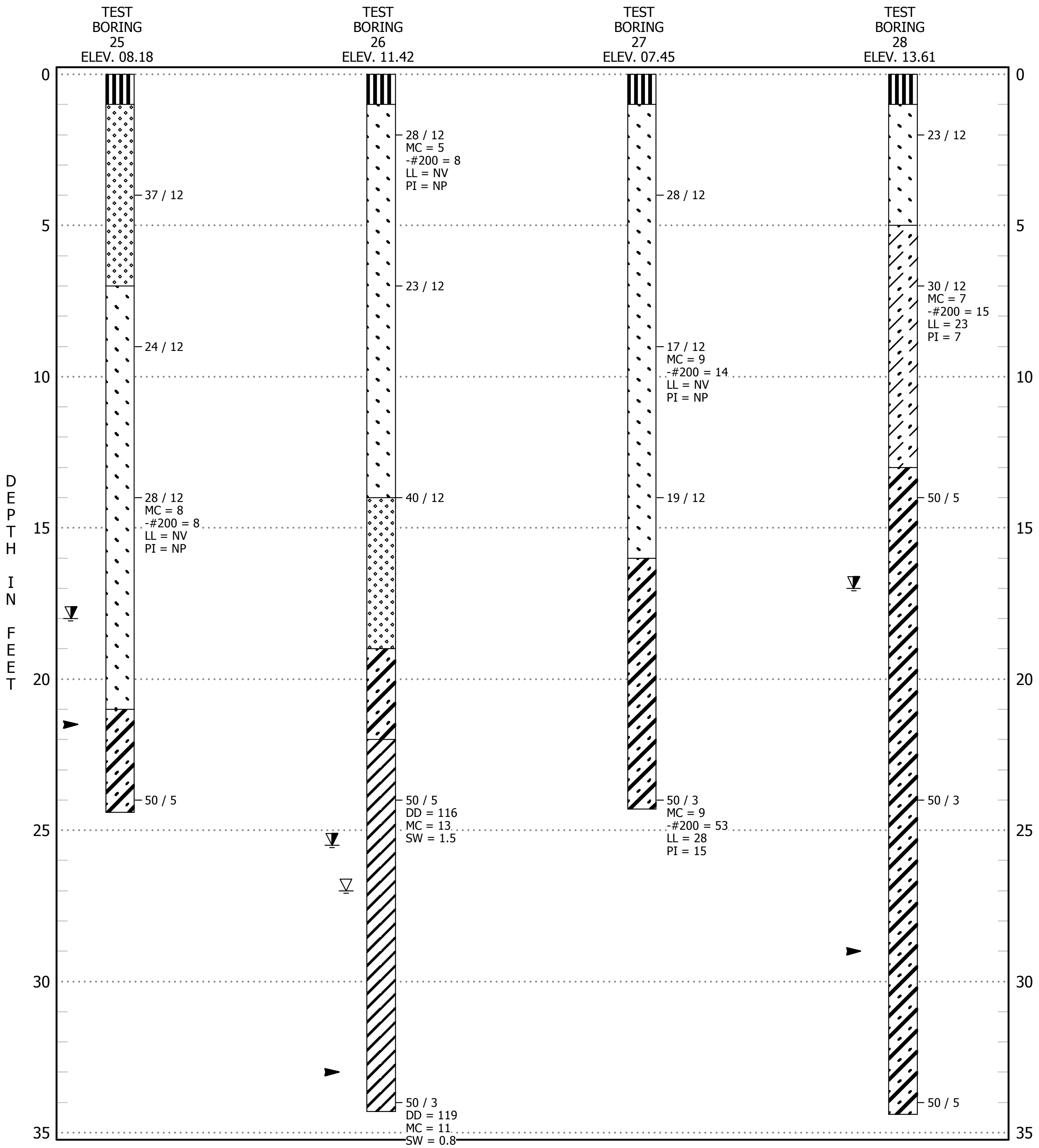
TEST BORING LOGS

FIGURE 5

A.G. WASSENAAR, INC.

CLIENT AMH Development, LLC | **PROJECT NAME** Schmidt Property

PROJECT NUMBER 213542 | **PROJECT LOCATION** Colorado Springs, Colorado



SEE FIGURE 7 FOR LEGEND AND NOTES

TEST BORING LOGS

FIGURE 6

A.G. WASSENAAR, INC.

CLIENT AMH Development, LLC

PROJECT NUMBER 213542

PROJECT NAME Schmidt Property

PROJECT LOCATION Colorado Springs, Colorado

SOIL DESCRIPTIONS

- Asphalt
- Fill, sand, medium dense, silty, clayey
- Topsoil, clay, sandy, organic
- Sand, loose
- Sand, medium dense, silty
- Sand, medium dense, silty, clayey
- Sand, dense to very dense, silty
- Clay (weathered claystone), medium stiff to stiff
- Claystone (Bedrock), firm to medium hard
- Claystone (Bedrock), hard to very hard
- Sandstone (Bedrock), firm to medium hard
- Sandstone (Bedrock), hard to very hard
- Claystone/Sandstone (Bedrock), interbedded, hard to very hard

ABBREVIATIONS

DD	Dry density of sample in pounds per cubic foot (pcf)
MC	Moisture content as a percentage of dry weight of soil (%)
SW	Percent swell under a surcharge of 1000 pounds per square foot (psf) upon wetting (%)
COM	Percent compression under a surcharge of 1000 pounds per square foot (psf) upon wetting (%)
UC	Unconfined compressive strength in pounds per square foot (psf)
-#200	Percent passing the Number 200 sieve (%)
LL	Liquid Limit
PI	Plasticity Index
NP	Non-Plastic
NV	No Value
pH	Acidity or alkalinity of sample in pH units
R	Resistivity in ohms.cm
WS	Water soluble sufates in parts per million (ppm)
CL	Chlorides in percent (%)
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 (rounded to the nearest foot)
F-x	Depth of fill to grade (rounded to the nearest foot)
FG	Finished grade (rounded to the nearest foot)
NR	No sample recovered
Bounce	Sampler bounced during driving
B	Bulk sample
AS	Auger sample
▤	Moderately to well cemented layer
—	Approximate depth of cut
▲	Depth at which practical drilling refusal was encountered
▽	Water level at time of drilling
▷	Caved depth at time of drilling
▼	Water level 1 to 5 day(s) after drilling
►	Caved depth 1 to 5 day(s) after drilling

Notes:

1. Test borings were drilled August 11, 2021 to August 16, 2021.
2. Location of the test borings were staked by others at locations chosen by this firm.
3. The horizontal lines shown on the logs are to differentiate materials and represent the approximate boundaries between materials. The transitions between materials may be gradual.
4. Elevations were obtained from staking provided by others and have been rounded to the nearest foot.
5. Boring logs shown in this report are subject to the limitations, explanations, and conclusions of this report.

LEGEND AND NOTES

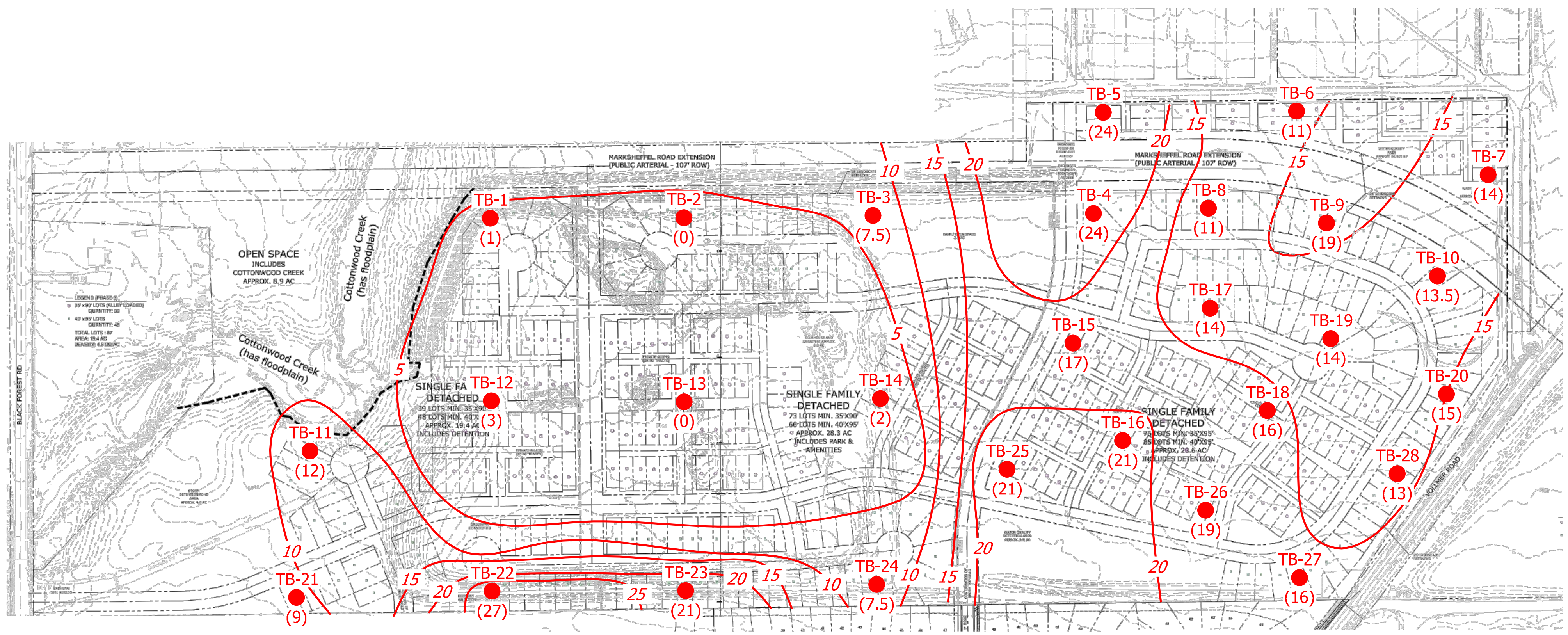
FIGURE 7

SCHMIDT PROPERTY
COLORADO SPRINGS, COLORADO

N

0 200 400

Scale in Feet



NOTES:

1. TEST BORINGS ARE OVERLAID ON THE "CONCEPTUAL LAYOUT PLANS", PREPARED BY NES, DATED FEBRUARY 6, 2021.
2. ALL LOCATIONS ARE APPROXIMATE.
3. BEDROCK CONTOURS ARE BASED UPON THE EXTRAPOLATION OF DATA FROM WIDELY SPACED TEST BORINGS. LOCAL AND SIGNIFICANT VARIATIONS MAY OCCUR BETWEEN BORINGS. THIS FIGURE REPRESENTS AN OPINION WHICH IS ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

(XX) BEDROCK ENCOUNTERED AT A DEPTH OF XX FEET

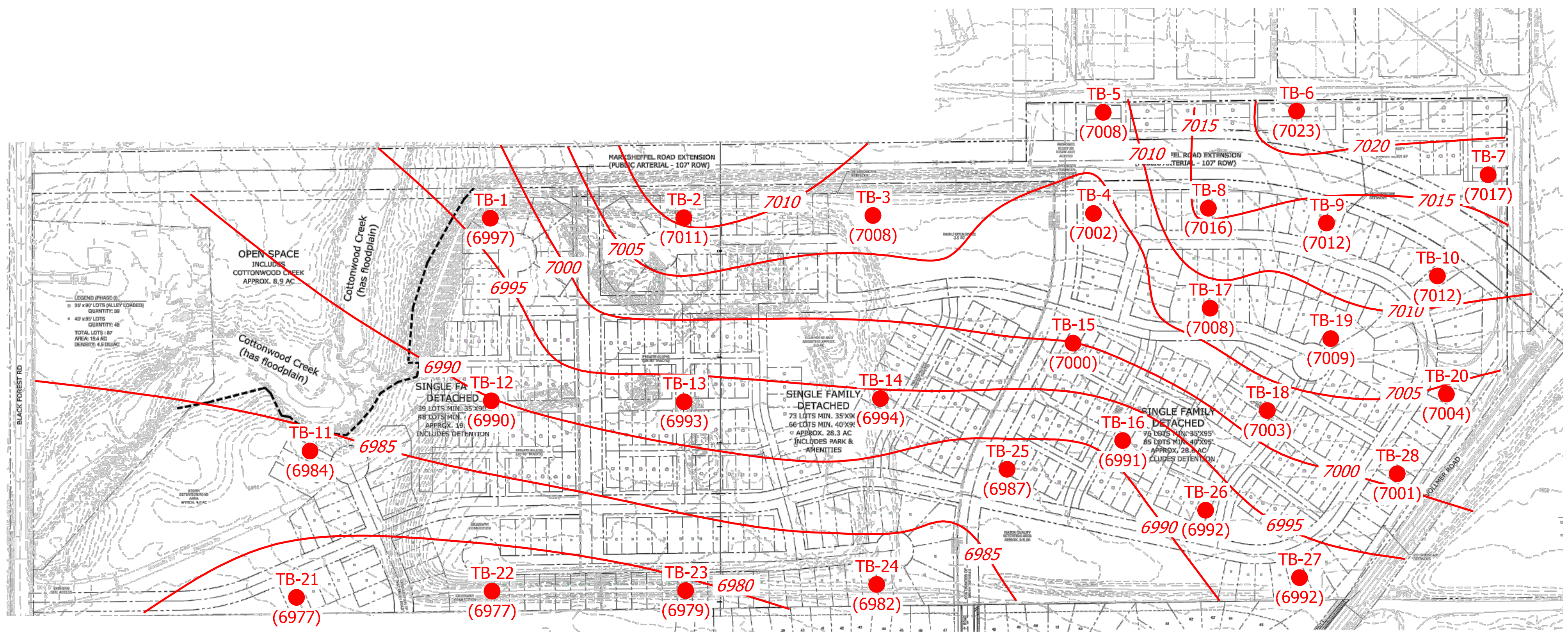
AGW
A.G. WASSENAAR, INC.

ESTIMATED DEPTH TO BEDROCK	PROJECT NO. 213542 FIGURE 8

SCHMIDT PROPERTY
COLORADO SPRINGS, COLORADO

N

0 200 400
Scale in Feet



NOTES:

1. TEST BORINGS ARE OVERLAID ON THE "CONCEPTUAL LAYOUT PLANS", PREPARED BY NES, DATED FEBRUARY 6, 2021.
2. ALL LOCATIONS ARE APPROXIMATE.
3. BEDROCK ELEVATION CONTOURS ARE BASED UPON THE EXTRAPOLATION OF DATA FROM WIDELY SPACED TEST BORINGS. LOCAL AND SIGNIFICANT VARIATIONS MAY OCCUR BETWEEN BORINGS. THIS FIGURE REPRESENTS AN OPINION WHICH IS ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

(XXXX) BEDROCK ENCOUNTERED AT AN ELEVATION OF XXXX FEET

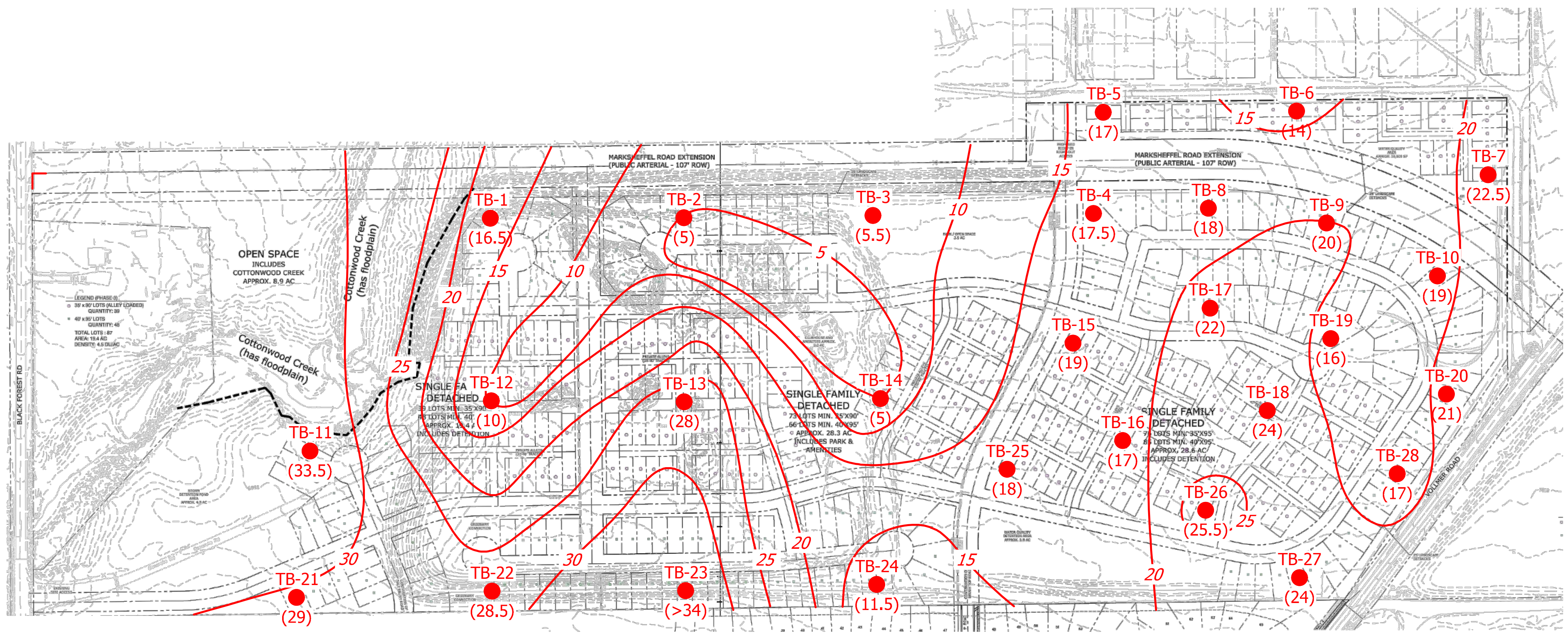
AGW
A.G. WASSENAAR, INC.

ESTIMATED ELEVATION OF BEDROCK	PROJECT NO. 213542 FIGURE 9

SCHMIDT PROPERTY
COLORADO SPRINGS, COLORADO

N

0 200 400
Scale in Feet



NOTES:

1. TEST BORINGS ARE OVERLAID ON THE "CONCEPTUAL LAYOUT PLANS", PREPARED BY NES, DATED FEBRUARY 6, 2021.
2. ALL LOCATIONS ARE APPROXIMATE.
3. GROUND WATER CONTOURS ARE BASED UPON THE EXTRAPOLATION OF DATA FROM WIDELY SPACED TEST BORINGS. LOCAL AND SIGNIFICANT VARIATIONS MAY OCCUR BETWEEN BORINGS. THIS FIGURE REPRESENTS AN OPINION WHICH IS ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

(XX) GROUND WATER OR WET CAVE ENCOUNTERED AT A DEPTH OF XX FEET

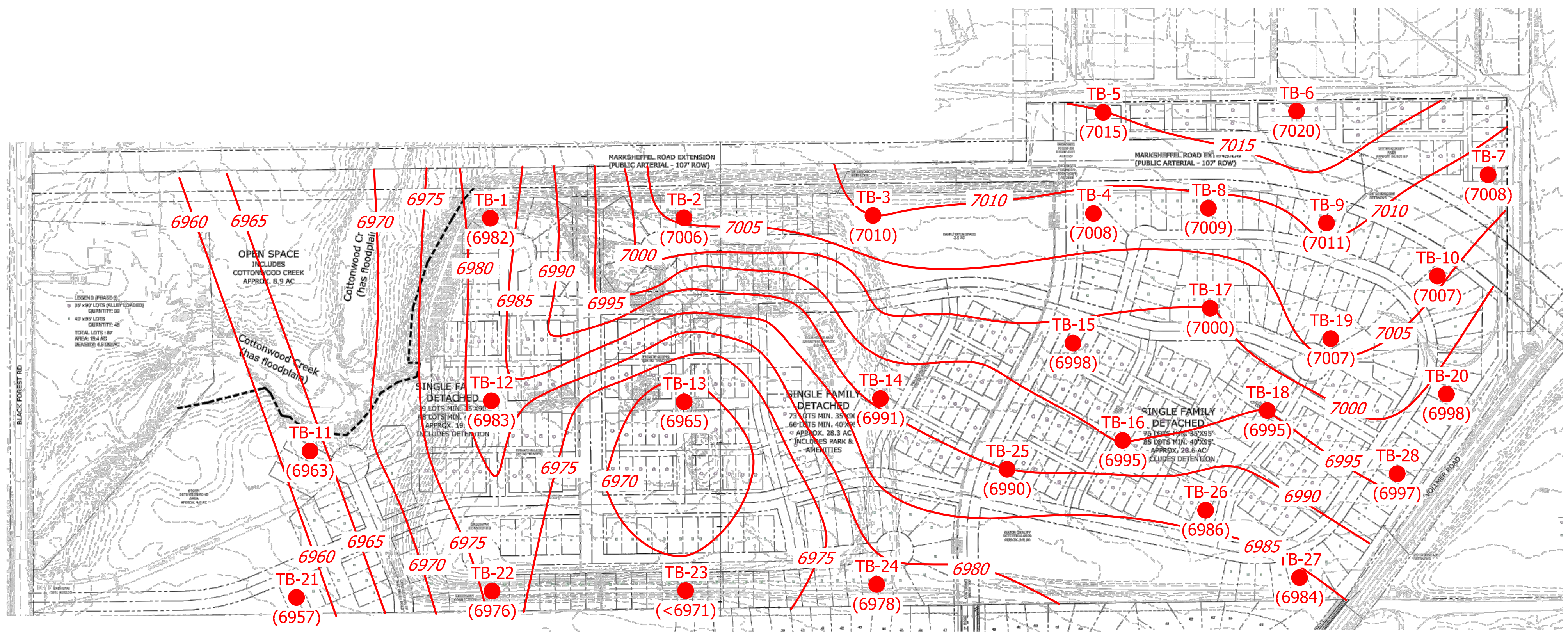
AGW
A.G. WASSENAAR, INC.

ESTIMATED DEPTH TO GROUND WATER	PROJECT NO. 213542 FIGURE 10

SCHMIDT PROPERTY
COLORADO SPRINGS, COLORADO

N

0 200 400
Scale in Feet

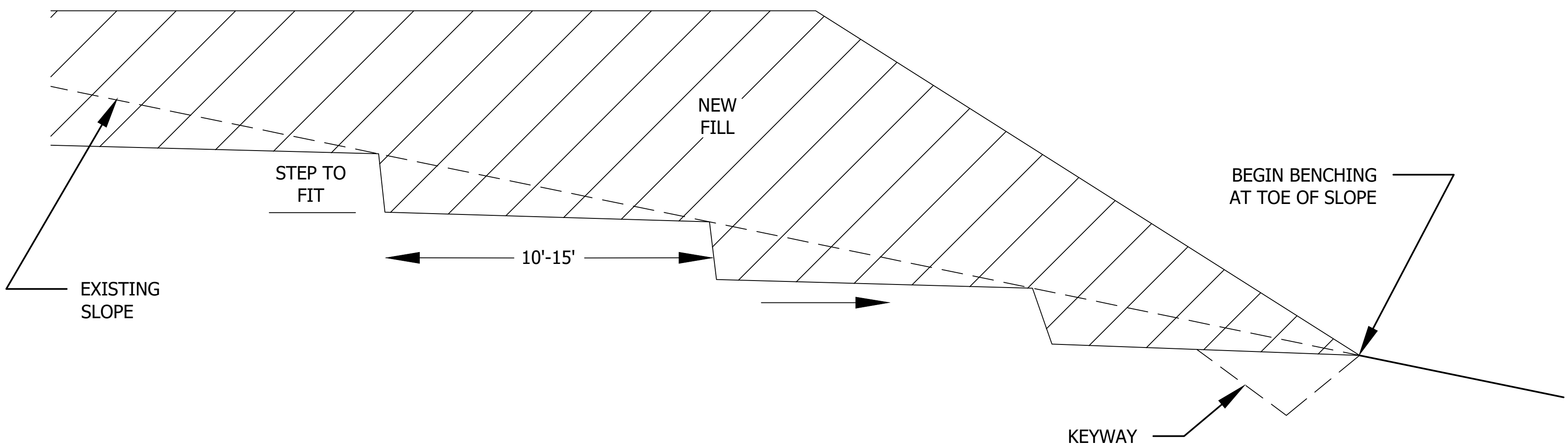


NOTES:
1. TEST BORINGS ARE OVERLAID ON THE "CONCEPTUAL LAYOUT PLANS", PREPARED BY NES, DATED FEBRUARY 6, 2021.
2. ALL LOCATIONS ARE APPROXIMATE.
3. GROUND WATER ELEVATION CONTOURS ARE BASED UPON THE EXTRAPOLATION OF DATA FROM WIDELY SPACED TEST BORINGS. LOCAL AND SIGNIFICANT VARIATIONS MAY OCCUR BETWEEN BORINGS. THIS FIGURE REPRESENTS AN OPINION WHICH IS ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

(XXXX) GROUND WATER OR WET CAVE ENCOUNTERED AT AN ELEVATION OF XXXX FEET

AGW
A.G. WASSENAAR, INC.

ESTIMATED ELEVATION OF GROUND WATER	PROJECT NO. 213542 FIGURE 11



NOTES:
1. BENCHING REQUIRED WHEN EXISTING SLOPE IS 5 : 1 (HORIZONTAL : VERTICAL) OR STEEPER
2. CONTINUE BENCHING UNTIL NATURAL SLOPE FLATTENS OR DAYLIGHTS
3. DRAINS MAY BE REQUIRED IF GROUND WATER IS ENCOUNTERED
4. ADDITIONAL EXCAVATION MAY BE REQUIRED BY AGW IF SLOPE INSTABILITY IS NOTED
5. A KEYWAY MAY BE REQUIRED BY AGW DEPENDING UPON SLOPE CONFIGURATION
6. NOT TO SCALE

AGW
A.G. WASSENAAR, INC.

GENERALIZED BENCHING DETAIL	PROJECT NO. 213542 FIGURE 12

APPENDIX A
LABORATORY TEST RESULTS

A.G. WASSENAAR, INC.

TABLE A-1
SUMMARY OF LABORATORY TEST RESULTS
October 12, 2021

Test Boring Number	Depth (feet)	Soil Type	Natural Dry Density (pcf)	Natural Moisture (%)	Swell / Consolidation (-) (%) [1]	Swell Pressure (psf)	% Passing #200 Sieve	Atterberg		pH	Resistivity (ohm•cm)	Water Soluble Sulfates (ppm)	Chlorides (%)
								Liquid Limit LL	Plasticity Index PI				
1	9	Sandstone, silty		11			19	NV	NP				
1	24	Claystone, sandy	114	11	0.5	2,000							
2	2	Sandstone, clayey, trace gravel		8			20	28	11				
2	14	Claystone, slightly sandy, interbedded sand, very clayey	126	11	3.9	12,600	47	32	16				
2	24	Claystone, sandy	116	11	0.3	1,800							
3	9	Sandstone, clayey								7.8	4,726	<100	0.0004
3	24	Sandstone, very clayey	115	11	-0.4								
4	7	Sand, slightly silty, slightly gravelly		6			9	NV	NP				
5	4	Sand, gravelly, slightly silty		3			6	NV	NP				
6	9	Sand, slightly silty, trace gravel		6			8	NV	NP				
7	2	Sand, slightly silty, slightly gravelly		2			10	NV	NP				
7	14	Claystone, weathered	115	15	-0.1					6.0	1,976	<100	0.0011
7	24	Sandstone, very clayey, trace gravel	116	10	-0.3		44	30	16				
8	4	Sand, slightly silty, trace gravel		2			9	NV	NP				
8	29	Sandstone, very clayey	110	11	-0.7		40	29	15				
9	2	Sand, slightly silty		4			8	NV	NP				
9	14	Sand, very clayey	113	15	-0.4		35	35	14				
9	34	Sandstone, very clayey		9			34	25	9				
10	14	Claystone, very sandy	111	14	-0.1								
11	2	Sand, slightly silty, slightly gravelly		2			8	NV	NP				
12	4	Claystone, sandy	114	12	0.8	2,300						100	
12	19	Claystone, slightly sandy	118	11	2.4	3,500							

TABLE A-1
SUMMARY OF LABORATORY TEST RESULTS
October 12, 2021

Test Boring Number	Depth (feet)	Soil Type	Natural Dry Density (pcf)	Natural Moisture (%)	Swell / Consolidation (-) (%) [1]	Swell Pressure (psf)	% Passing #200 Sieve	Atterberg Liquid Limit LL	Atterberg Plasticity Index PI	pH	Resistivity (ohm•cm)	Water Soluble Sulfates (ppm)	Chlorides (%)
13	4	Claystone, very sandy	116	10	-0.4								
13	19	Claystone, sandy	114	10	1.9	3,600							
13	29	Claystone, slightly sandy	121	10	3.9	8,300							
14	2	Claystone, weathered	112	14	0.0								
14	14	Claystone, slightly sandy	120	11	2.1	8,400							
14	24	Claystone, sandy	118	10	0.8	2,800							
15	9	Sand, slightly gravelly, slightly silty		7			8	NV	NP				
15	19	Claystone, very sandy	112	13	-0.9								
16	2	Sand, slightly silty, trace gravel		3			13	21	2				
16	34	Sandstone, very clayey, trace gravel		8			39	25	12				
17	14	Claystone, sandy	112	14	1.5	3,400						<100	
17	24	Claystone, sandy	115	11	1.9	3,700							
18	19	Claystone, very sandy	115	10	0.0								
19	29	Sandstone, very clayey, trace gravel		9			37	28	15				
20	4	Sand, slightly silty, trace gravel		5			9	NV	NP				
21	4	Sand, silty, slightly gravelly		3			23	NV	NP				
22	9	Fill, sand, silty, slightly gravelly		7			22	NV	NP				
22	29	Sandstone, very clayey, trace gravel	108	12	-1.5		34	35	20				
23	7	Fill, sand, slightly silty, slightly gravelly		7			14	NV	NP				
23	34	Claystone/sandstone	119	11	0.9	3,200							
24	9	Claystone, slightly sandy	110	14	2.4	4,500							
24	19	Claystone/sandstone	114	10	1.7	3,700	52	30	16				

A.G. WASSENAAR, INC.

TABLE A-1
SUMMARY OF LABORATORY TEST RESULTS
October 12, 2021

Project Number 213542
Schimidt Property
Colorado Springs, Colorado

Test Boring Number	Depth (feet)	Soil Type	Natural Dry Density (pcf)	Natural Moisture (%)	Swell / Consolidation (-) (%) [1]	Swell Pressure (psf)	% Passing #200 Sieve	Atterberg Liquid Limit LL	Atterberg Plasticity Index PI	pH	Resistivity (ohm•cm)	Water Soluble Sulfates (ppm)	Chlorides (%)
25	14	Sand, slightly silty, slightly gravelly		8			8	NV	NP				
26	2	Sand, slightly silty, slightly gravelly		5			8	NV	NP				
26	24	Claystone, sandy	116	13	1.5	3,500							
26	34	Claystone, sandy	119	11	0.8	2,500							
27	9	Sand, slightly silty		9			14	NV	NP				
27	24	Claystone, very sandy		9			53	28	15				
28	7	Sand, clayey/silty, slightly gravelly		7			15	23	7				
Bulk [2]	-	Sand, clayey, trace gravel	123.9 [3]	8.7 [3]			20	26	10				
Bulk [2]	-	Sand, clayey, trace gravel	118	9	(-) 0.1 [4]							400	

Notes:

NA - Not Applicable, NV - No Value, NP - Nonplastic

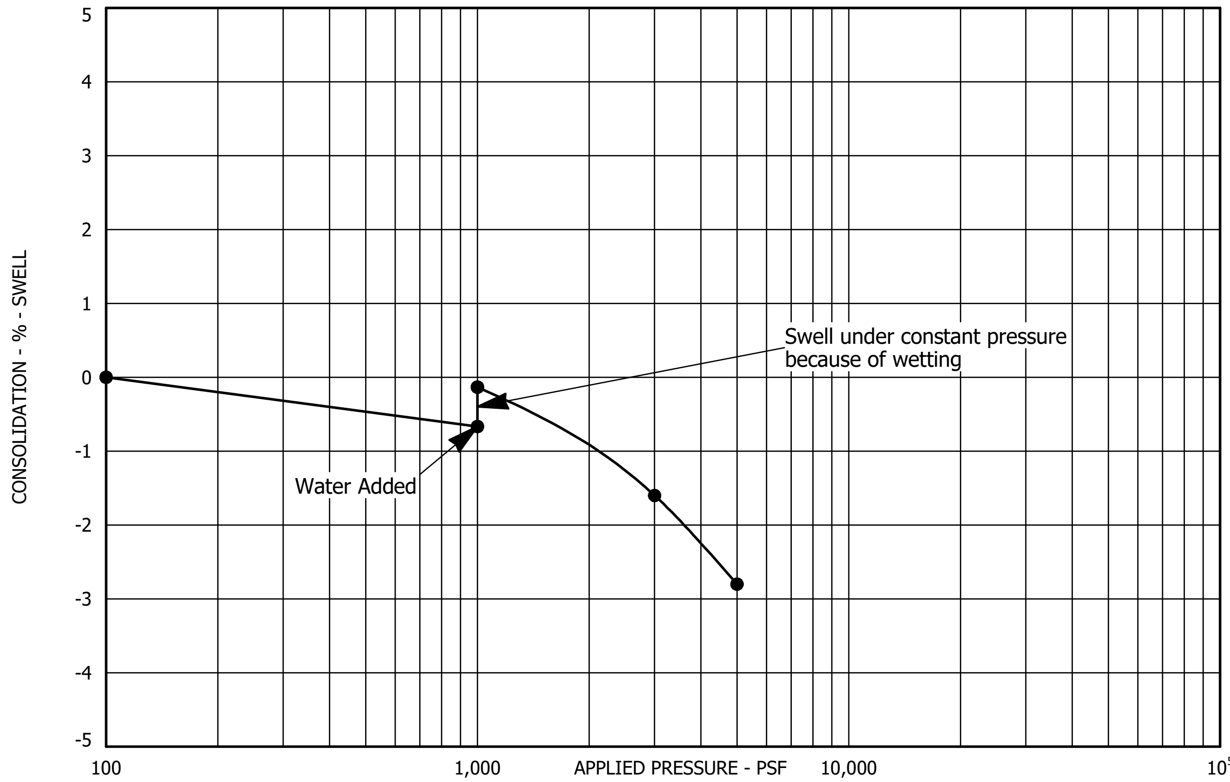
[1] Indicates percent swell or consolidation (-) when wetted under a 1,000 psf load

[2] Bulk is a blended bulk sample obtained from the auger cuttings of various test borings

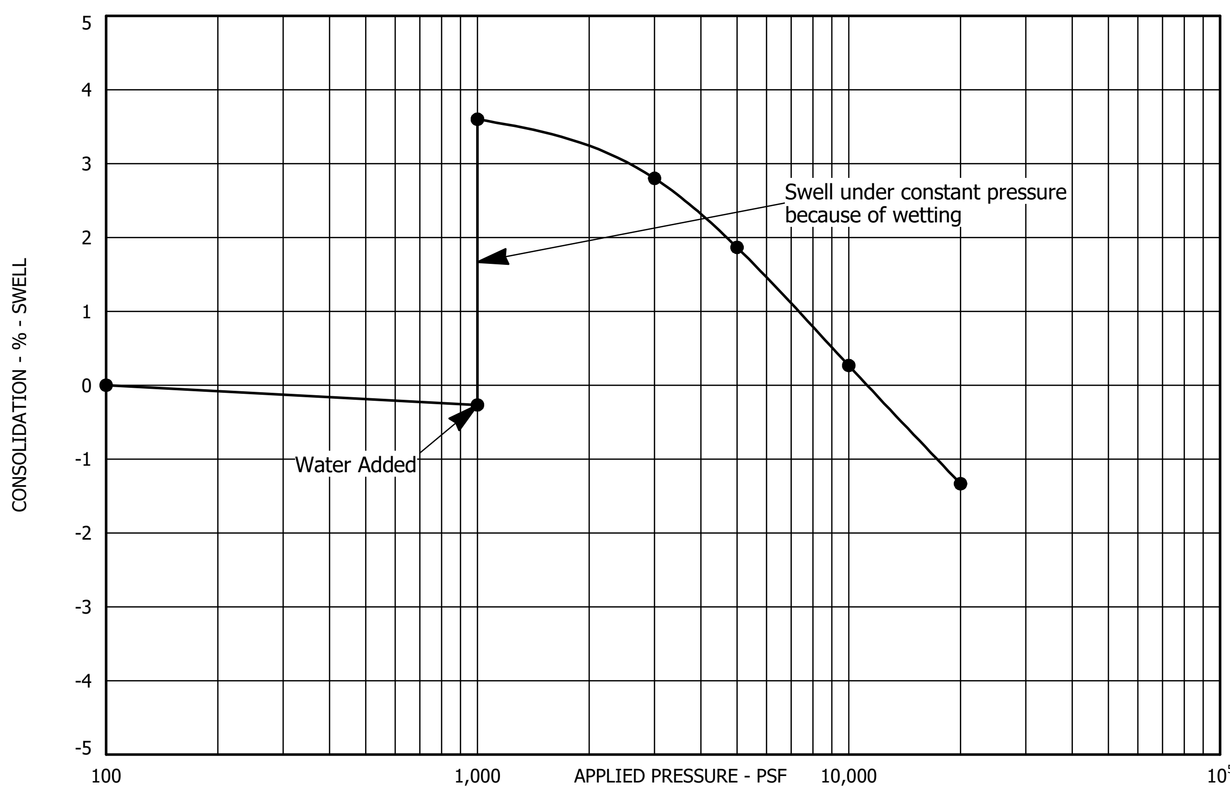
[3] Maximum dry density (MDD) and optimum moisture content (OMC)

[4] Sample was remolded to approximately 95% MDD

A.G. WASSENAAR, INC.



Sample Location: Test Boring No. 1 at a depth of 24 feet
Dry Unit Weight (pcf): 114
Sample Description: Claystone, sandy
Moisture Content (%): 11



Sample Location: Test Boring No. 2 at a depth of 14 feet
Dry Unit Weight (pcf): 126
Sample Description: Claystone, sandy,
Moisture Content (%): 11

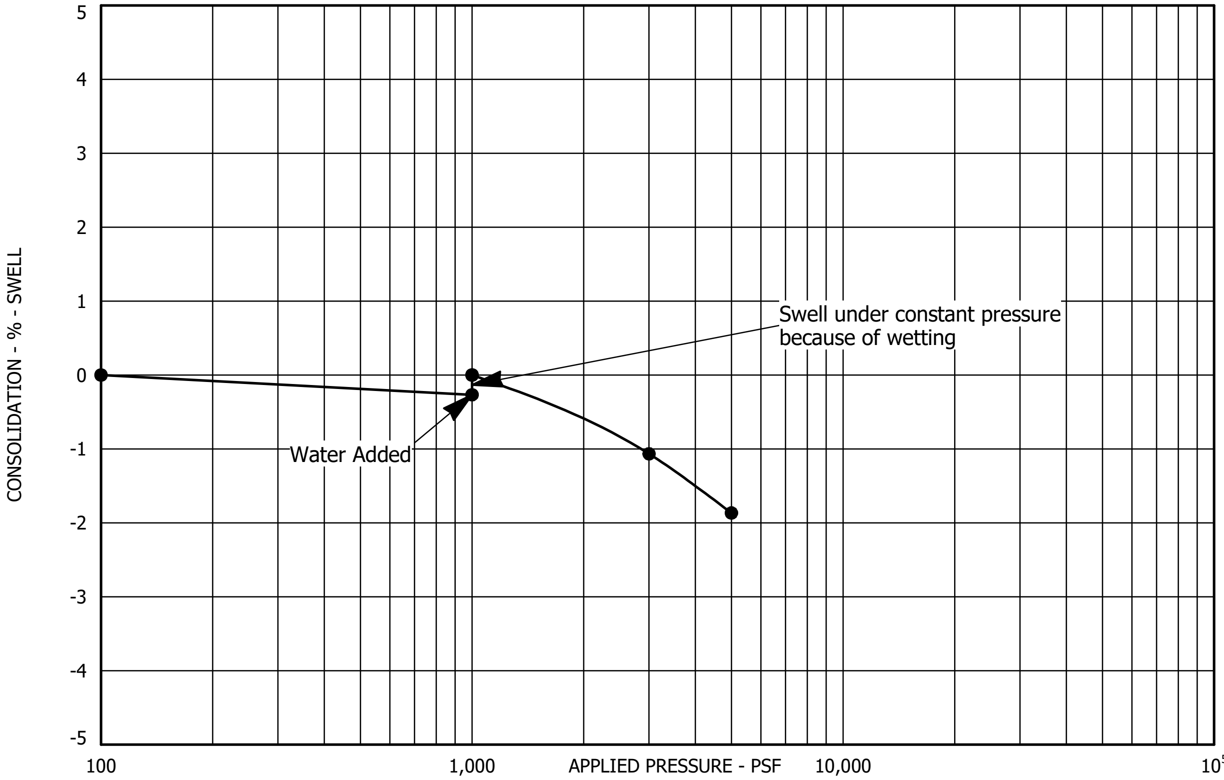
SWELL - CONSOLIDATION TEST RESULTS

FIGURE A-1

PROJECT NO. 213542

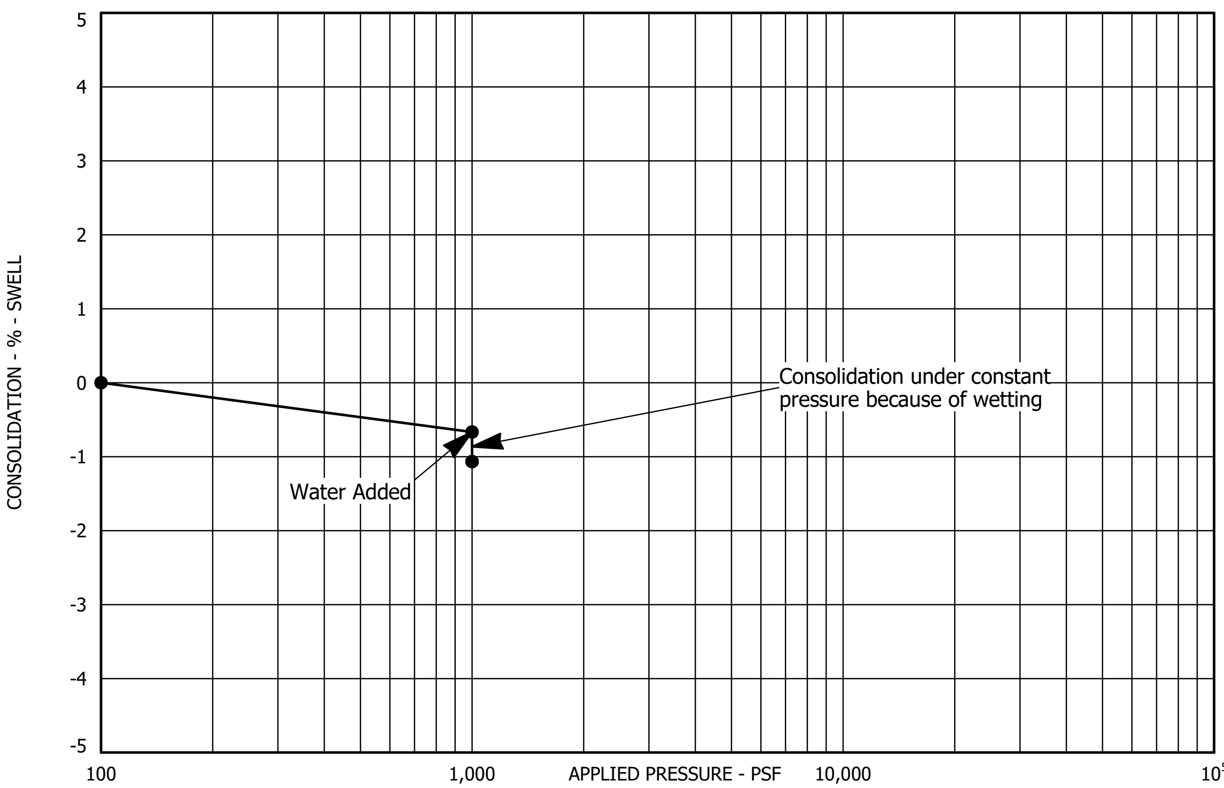
AGW

A.G. WASSENAAR, INC.



Sample Location: Test Boring No. 2 at a depth of 24 feet — Dry Unit Weight (pcf): 116

Sample Description: Claystone, sandy — Moisture Content (%): 11



Sample Location: Test Boring No. 3 at a depth of 24 feet — Dry Unit Weight (pcf): 115

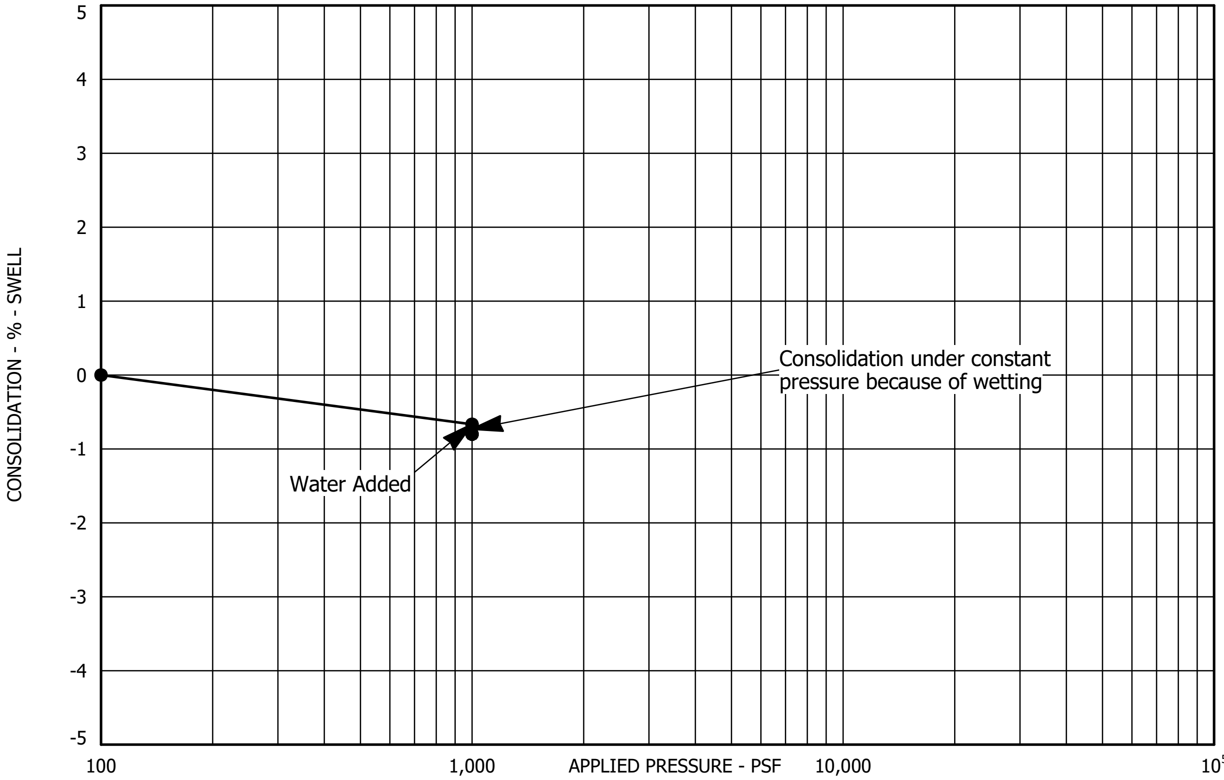
Sample Description: Sandstone, very clayey — Moisture Content (%): 11

SWELL - CONSOLIDATION TEST RESULTS

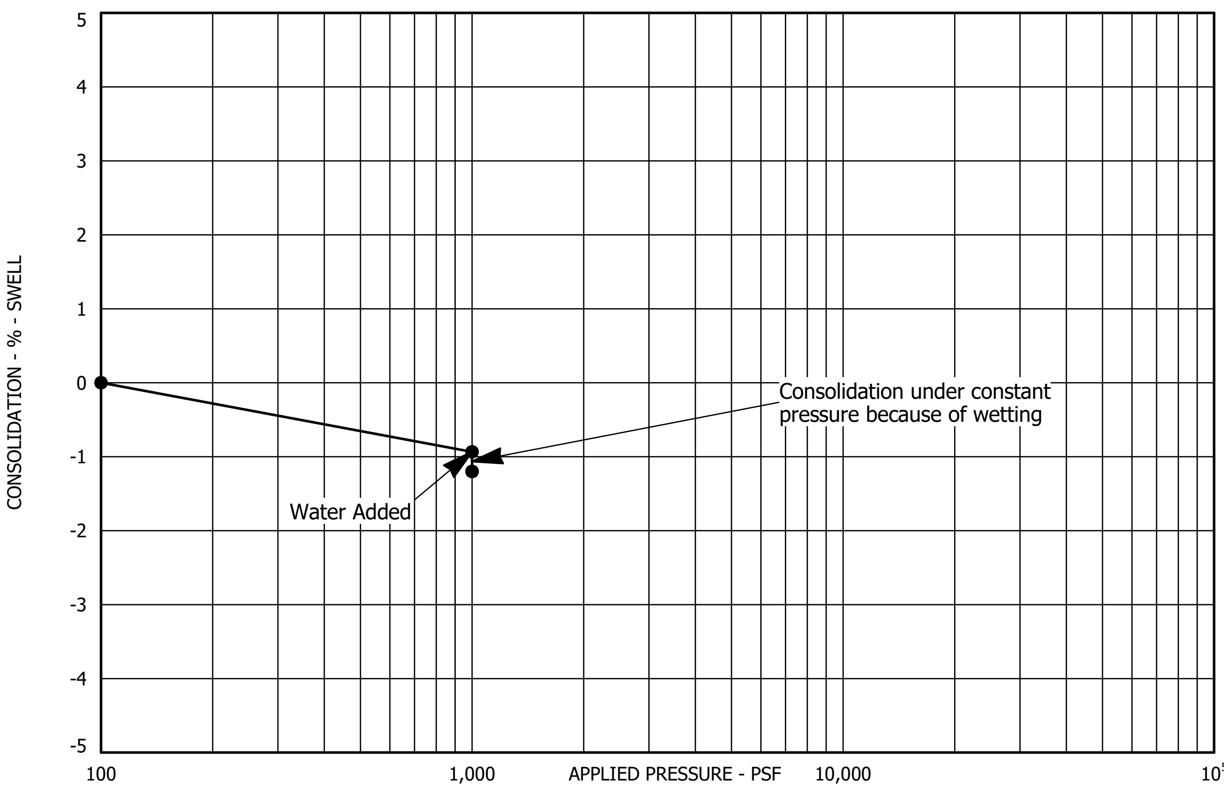
FIGURE A-2

PROJECT NO. 213542

A.G. WASSENAAR, INC.



Sample Location	Test Boring No. 7 at a depth of 14 feet	Dry Unit Weight (pcf)	115
Sample Description	Clay (Weathered Claystone)	Moisture Content (%)	15



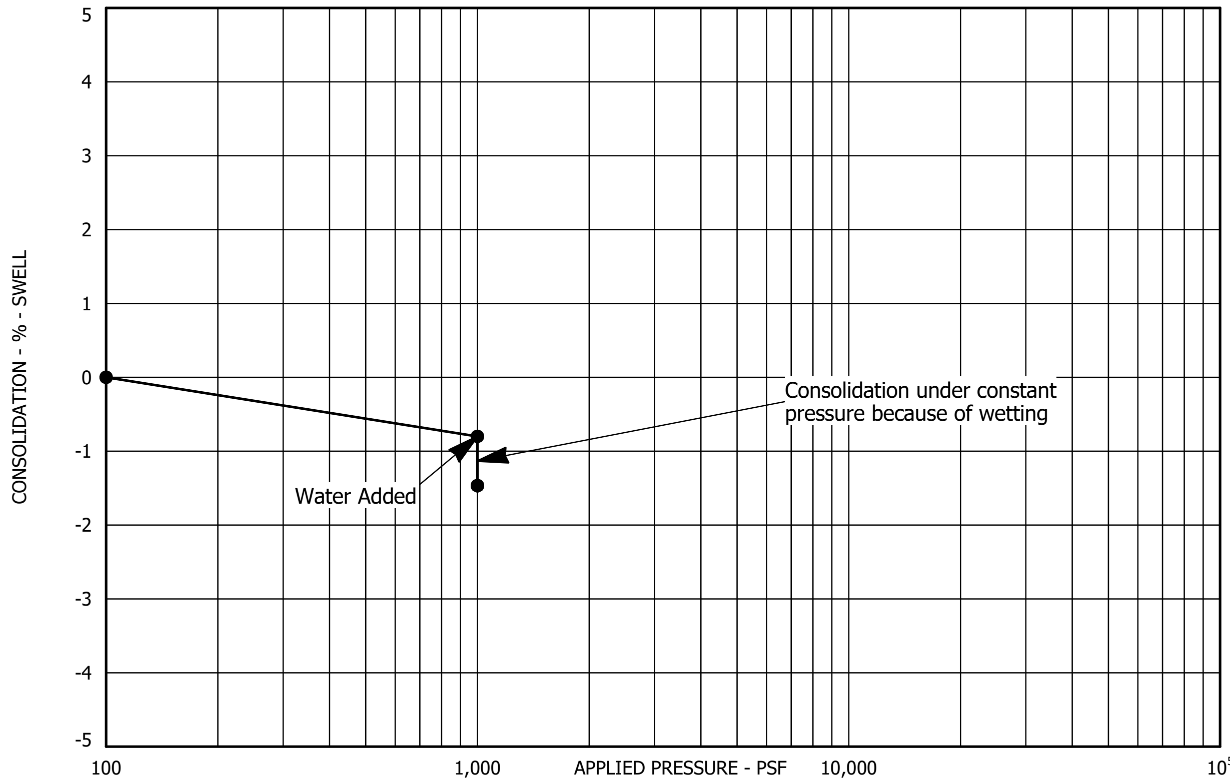
Sample Location	Test Boring No. 7 at a depth of 24 feet	Dry Unit Weight (pcf)	116
Sample Description	Sandstone/Claystone	Moisture Content (%)	10

SWELL - CONSOLIDATION TEST RESULTS

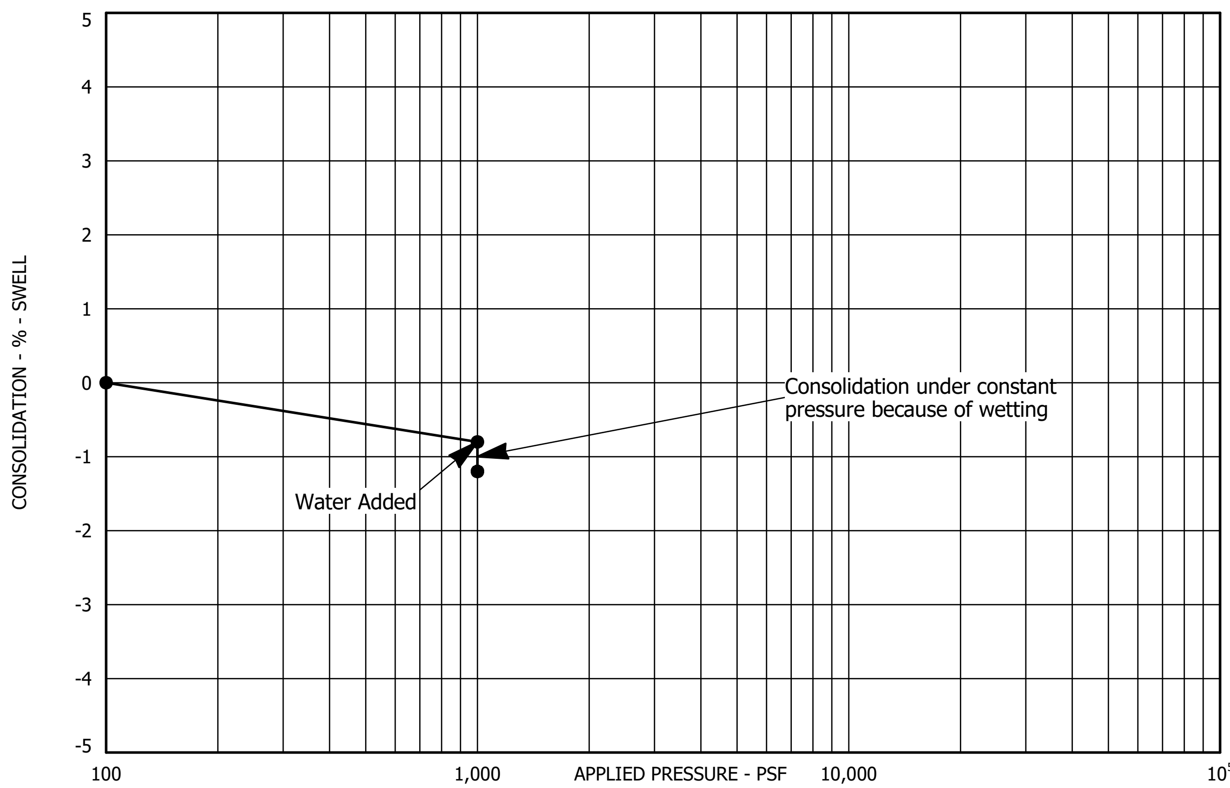
FIGURE A-3

PROJECT NO. 213542

A.G. WASSENAAR, INC.



Sample Location	Test Boring No. 8 at a depth of 29 feet	Dry Unit Weight (pcf)	110
Sample Description	Sandstone/Claystone	Moisture Content (%)	11



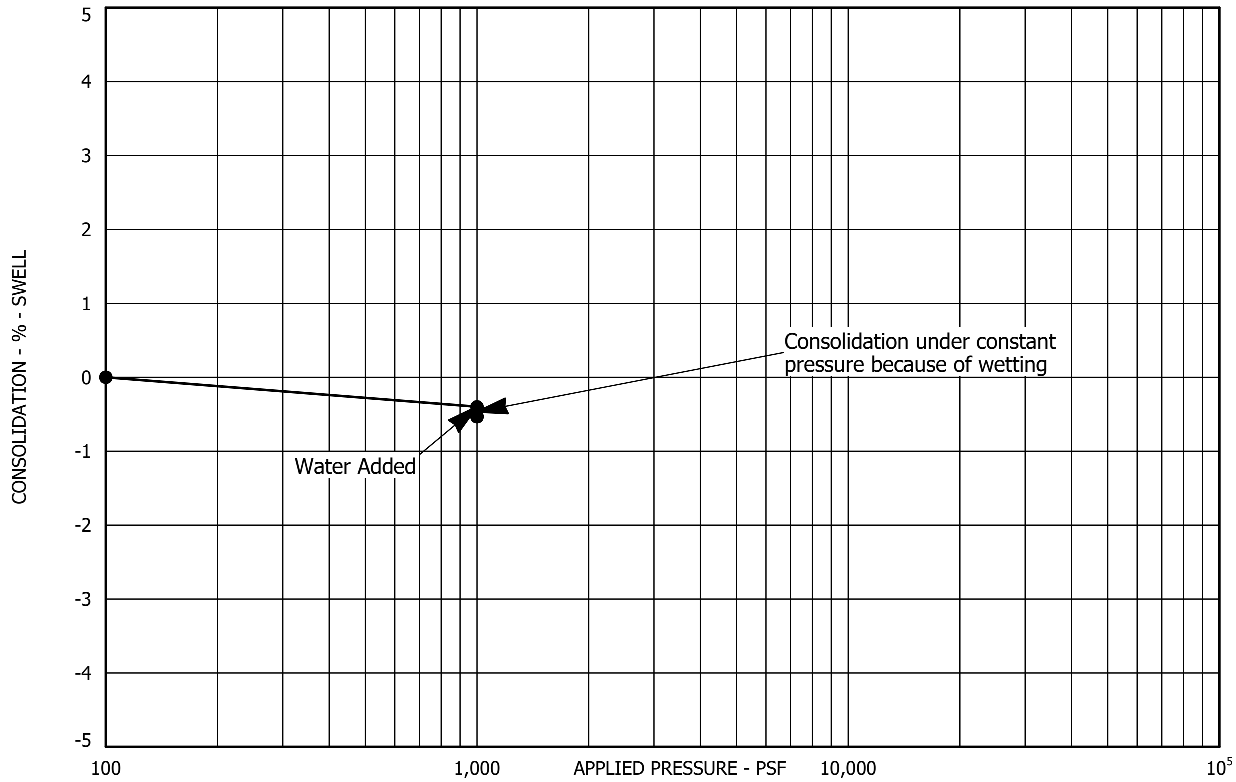
Sample Location	Test Boring No. 9 at a depth of 14 feet	Dry Unit Weight (pcf)	113
Sample Description	Sand, very clayey	Moisture Content (%)	15

SWELL - CONSOLIDATION TEST RESULTS

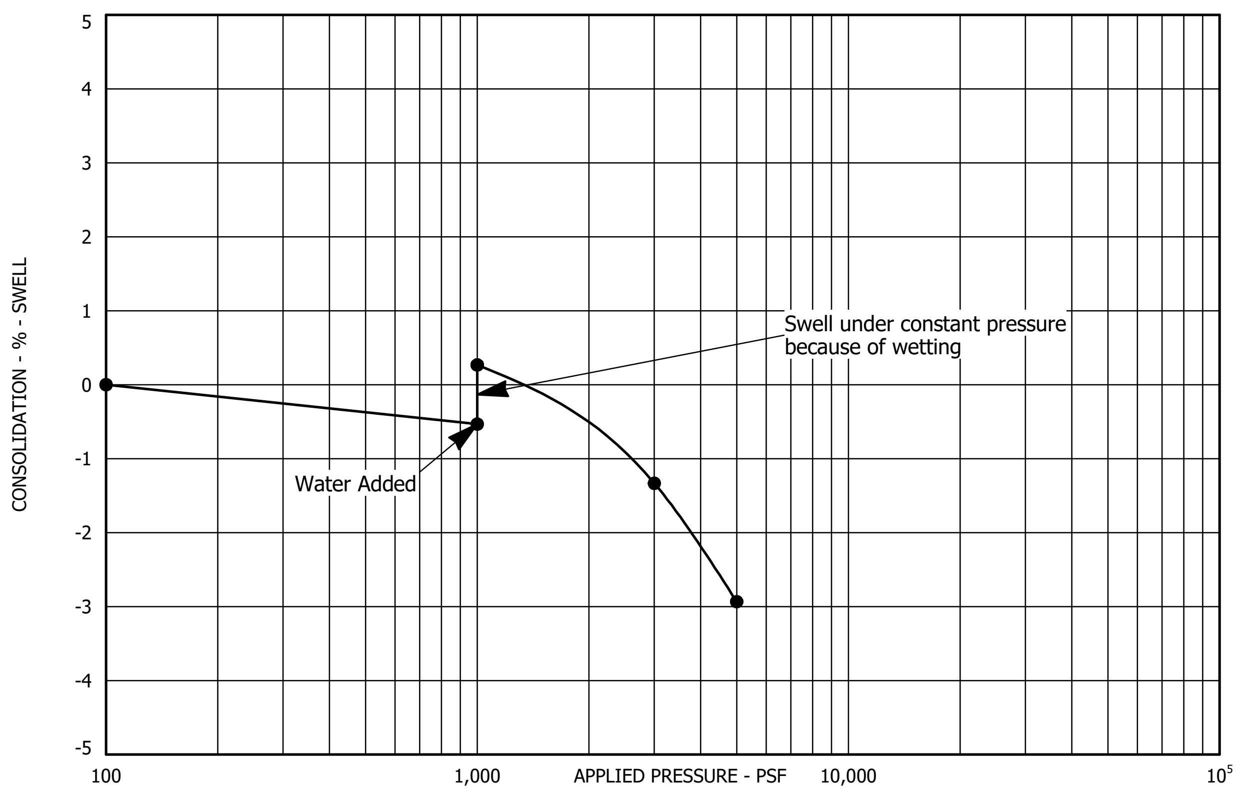
FIGURE A-4

PROJECT NO. 213542

A.G. WASSENAAR, INC.



Sample Location: Test Boring No. 10 at a depth of 14 feet
Sample Description: Claystone, very sandy
Dry Unit Weight (pcf): 111
Moisture Content (%): 14



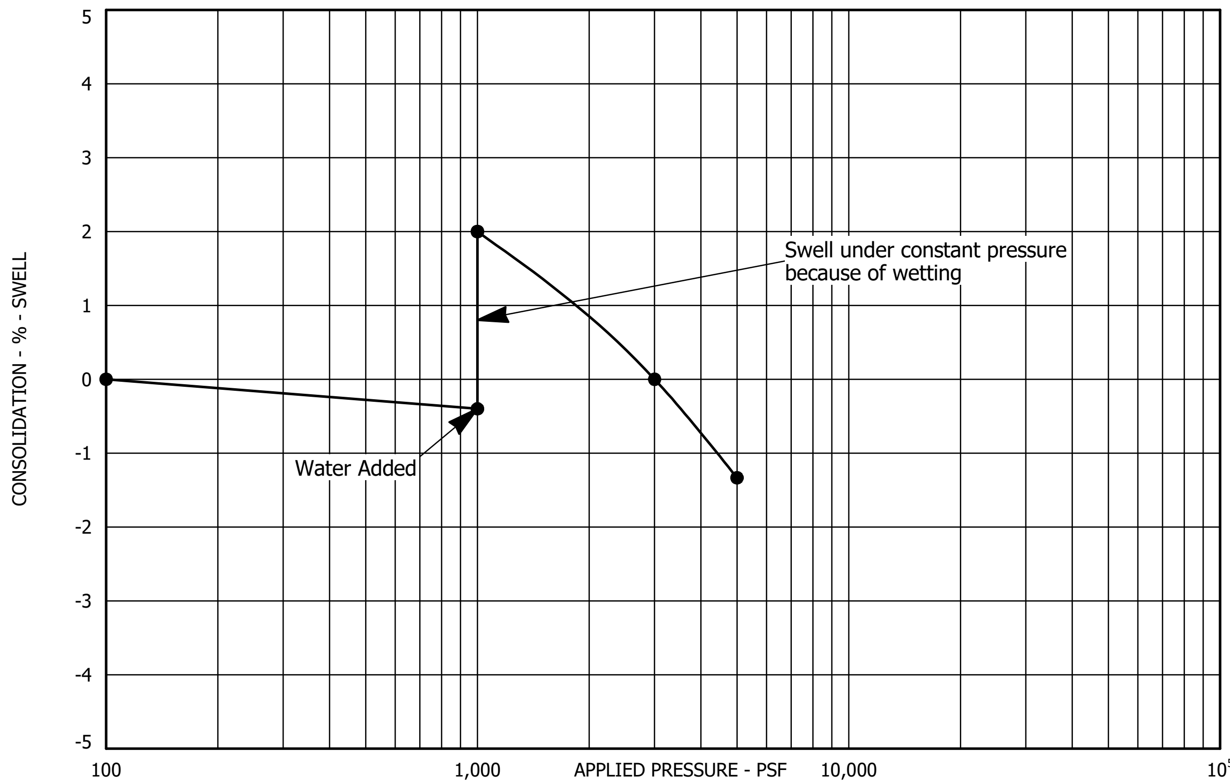
Sample Location: Test Boring No. 12 at a depth of 4 feet
Sample Description: Claystone, sandy
Dry Unit Weight (pcf): 114
Moisture Content (%): 12

SWELL - CONSOLIDATION TEST RESULTS

FIGURE A-5

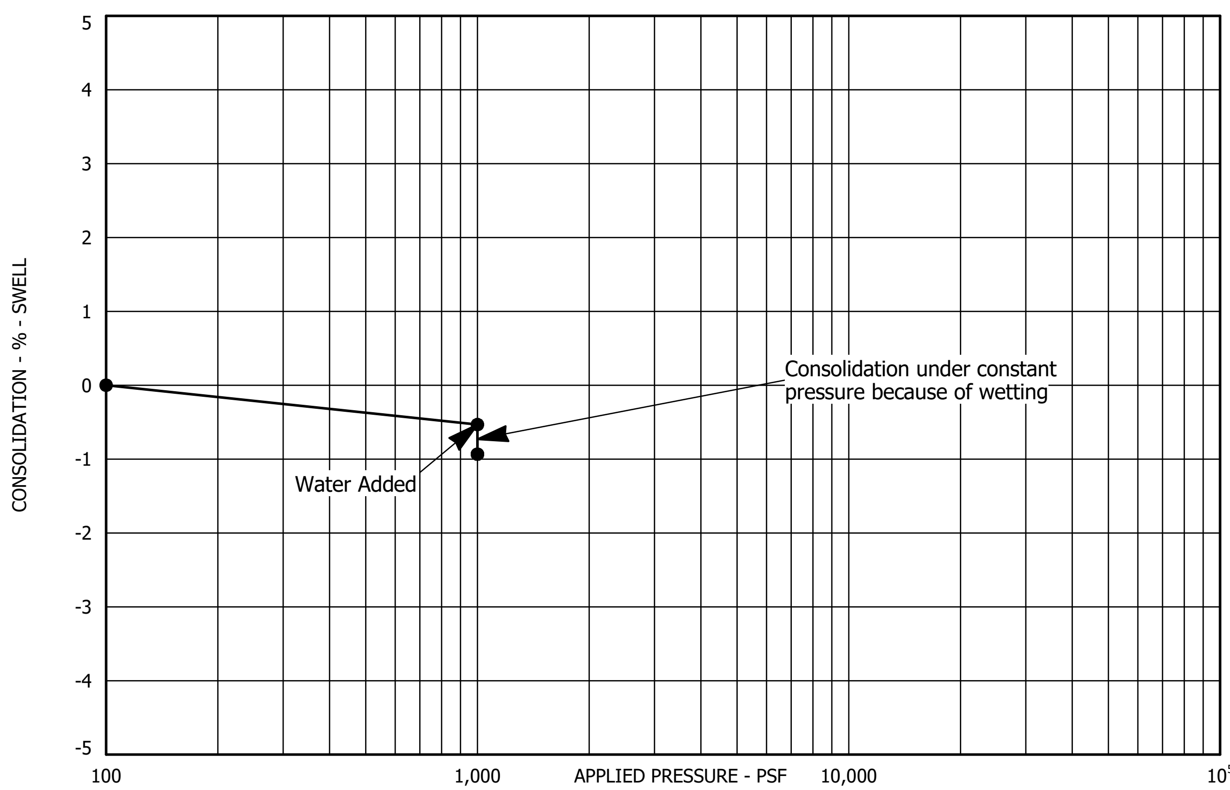
PROJECT NO. 213542

A.G. WASSENAAR, INC.



Sample Location Test Boring No. 12 at a depth of 19 feet Dry Unit Weight (pcf) 118

Sample Description Claystone, slightly sandy Moisture Content (%) 11



Sample Location Test Boring No. 13 at a depth of 4 feet Dry Unit Weight (pcf) 116

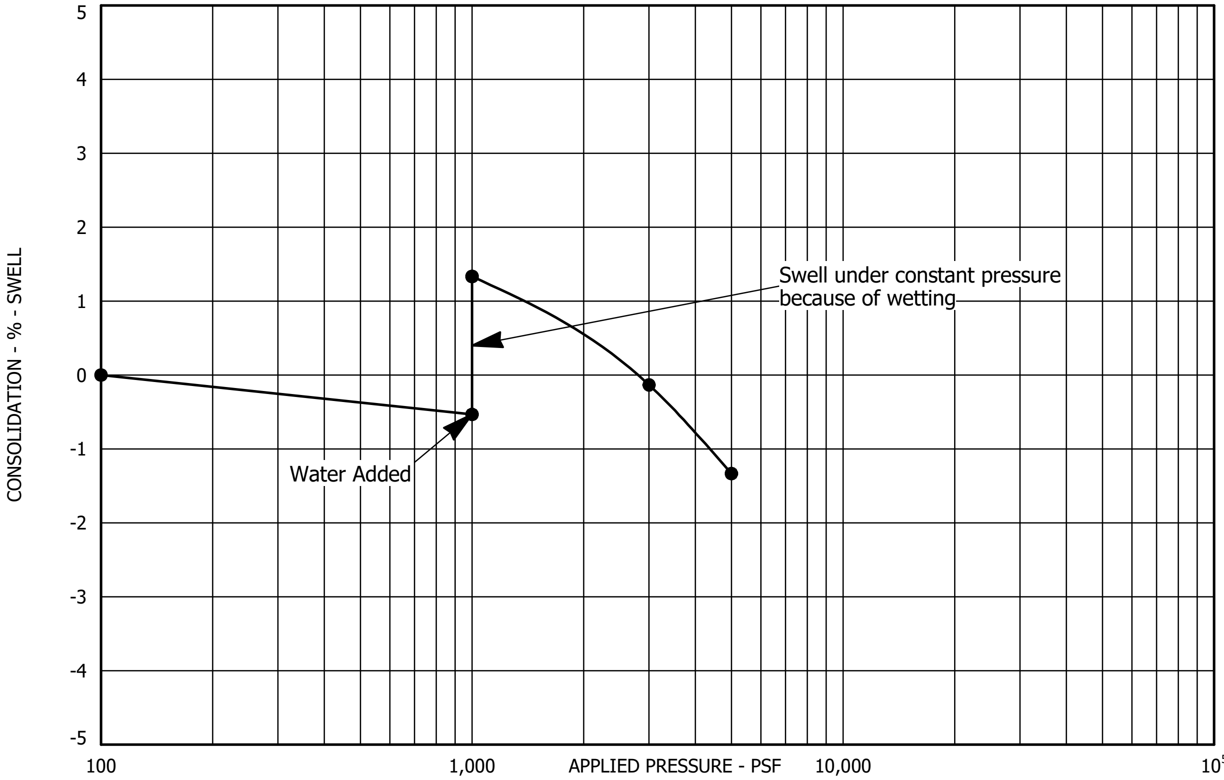
Sample Description Claystone, very sandy Moisture Content (%) 10

SWELL - CONSOLIDATION TEST RESULTS

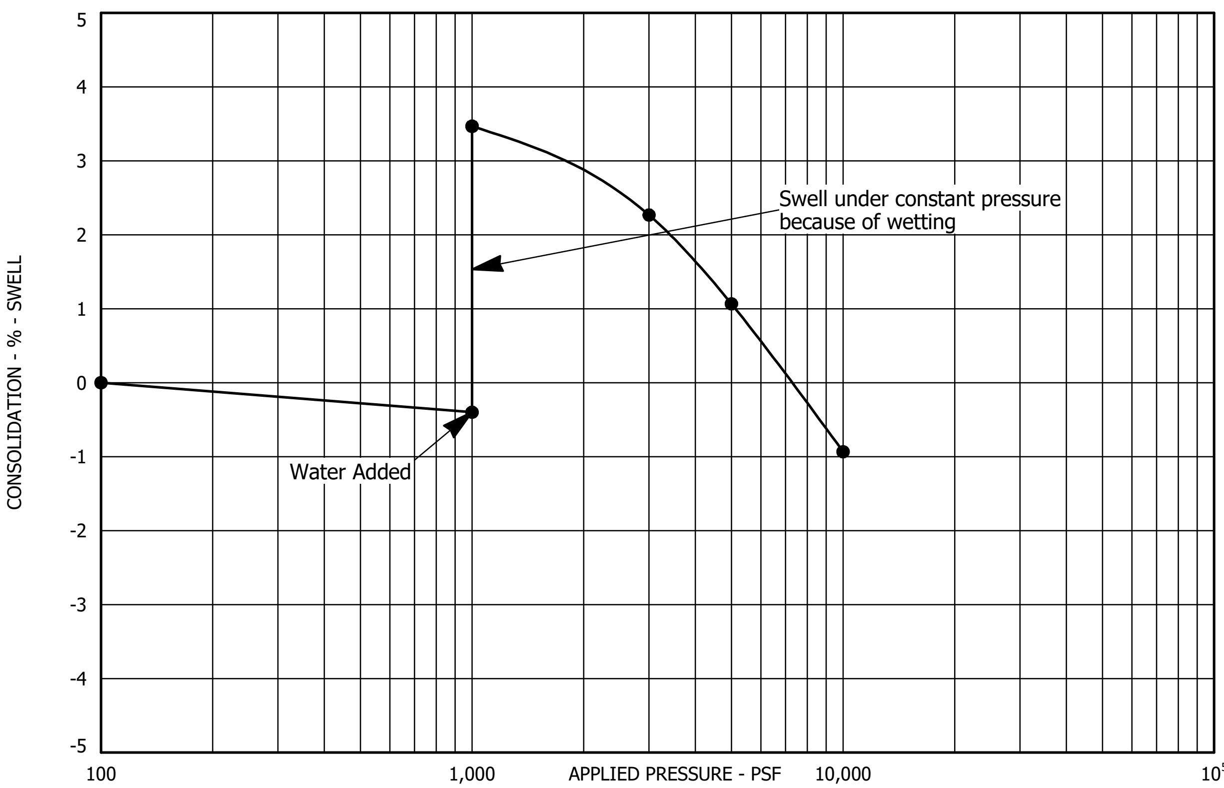
FIGURE A-6

PROJECT NO. 213542

A.G. WASSENAAR, INC.



Sample Location: Test Boring No. 13 at a depth of 19 feet
Sample Description: Claystone, sandy
Dry Unit Weight (pcf): 114
Moisture Content (%): 10

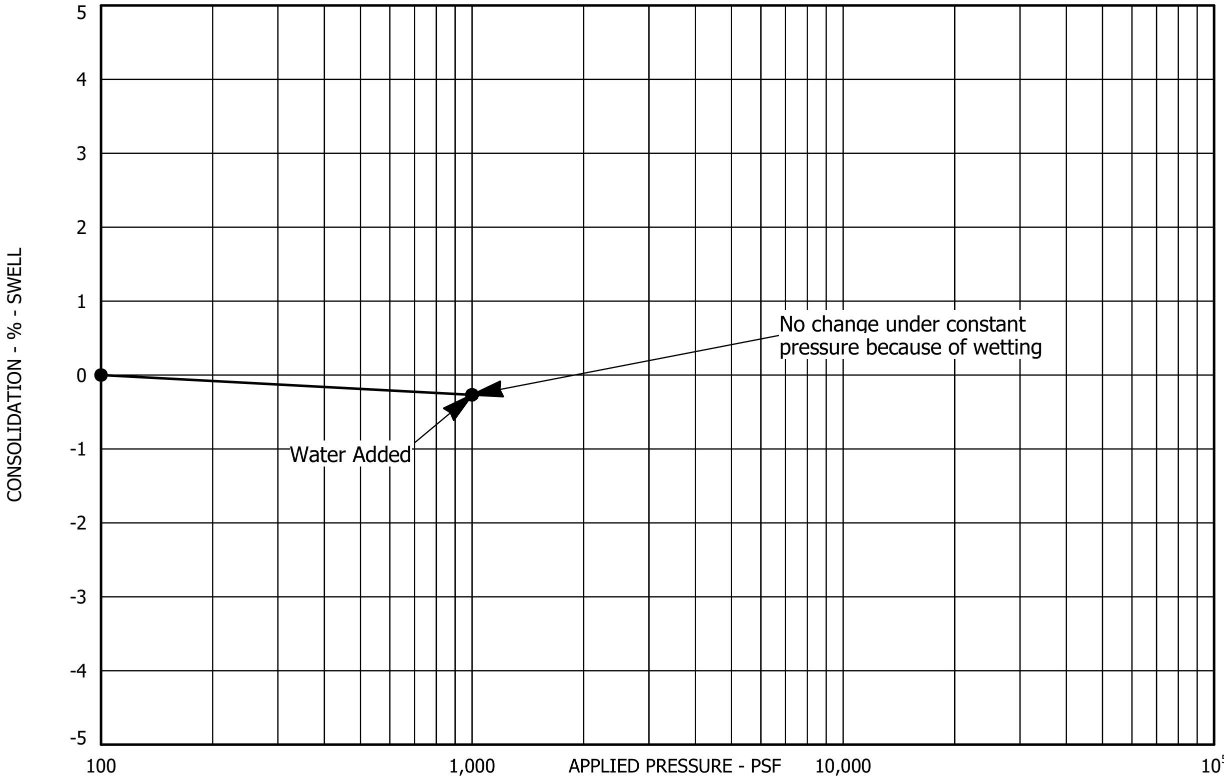


Sample Location: Test Boring No. 13 at a depth of 29 feet
Sample Description: Claystone, slightly sandy
Dry Unit Weight (pcf): 121
Moisture Content (%): 10

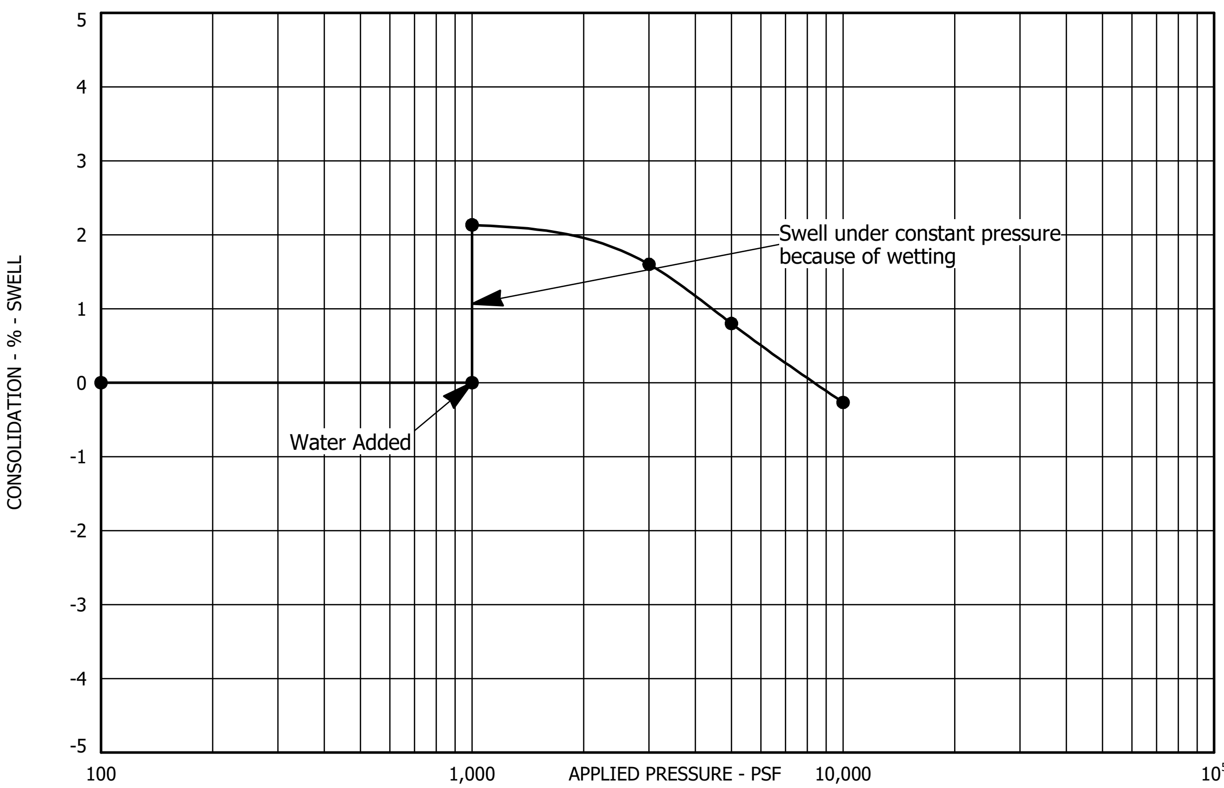
SWELL - CONSOLIDATION TEST RESULTS

FIGURE A-7

PROJECT NO. 213542



Sample Location	Test Boring No. 14 at a depth of 2 feet	Dry Unit Weight (pcf)	112
Sample Description	Clay (Weathered Claystone)	Moisture Content (%)	14



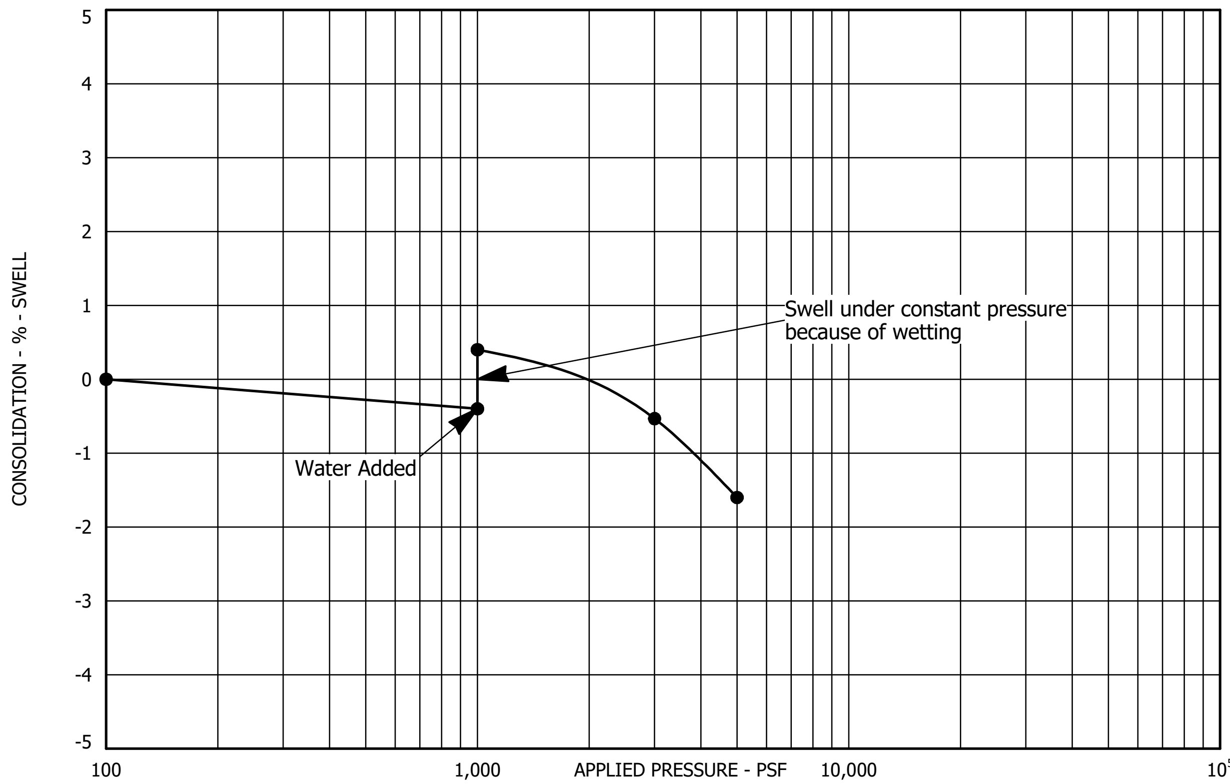
Sample Location	Test Boring No. 14 at a depth of 14 feet	Dry Unit Weight (pcf)	120
Sample Description	Claystone, slightly sandy	Moisture Content (%)	11

SWELL - CONSOLIDATION TEST RESULTS

FIGURE A-8

PROJECT NO. 213542

A.G. WASSENAAR, INC.

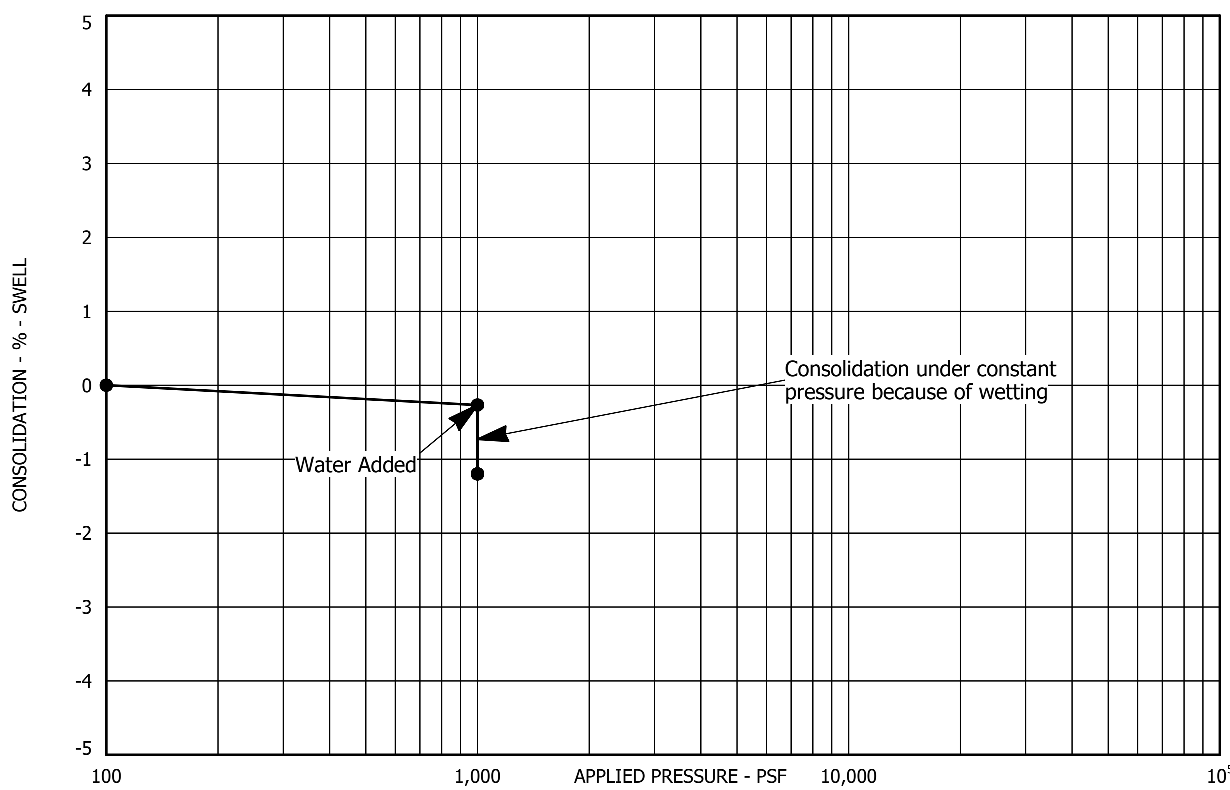


Sample Location: Test Boring No. 14 at a depth of 24 feet

Dry Unit Weight (pcf): 118

Sample Description: Claystone, sandy

Moisture Content (%): 10



Sample Location: Test Boring No. 15 at a depth of 19 feet

Dry Unit Weight (pcf): 112

Sample Description: Claystone, very sandy

Moisture Content (%): 13

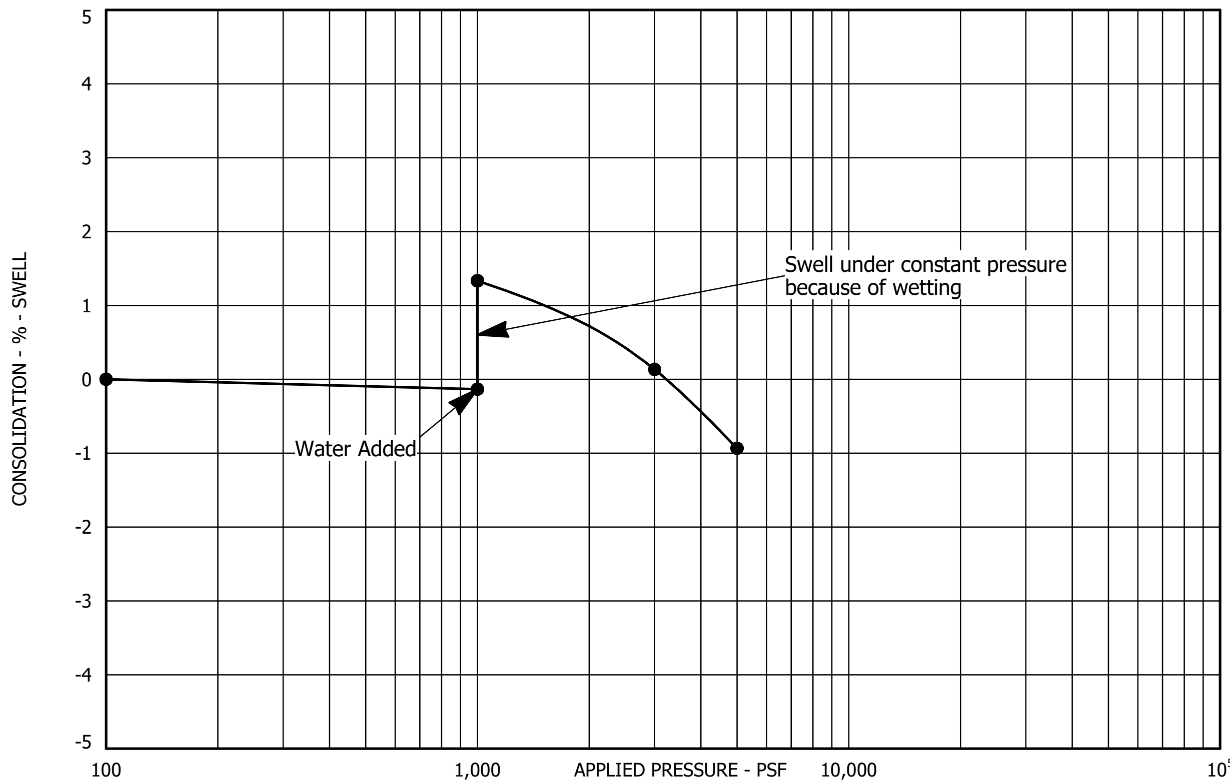
SWELL - CONSOLIDATION TEST RESULTS

FIGURE A-9

PROJECT NO. 213542

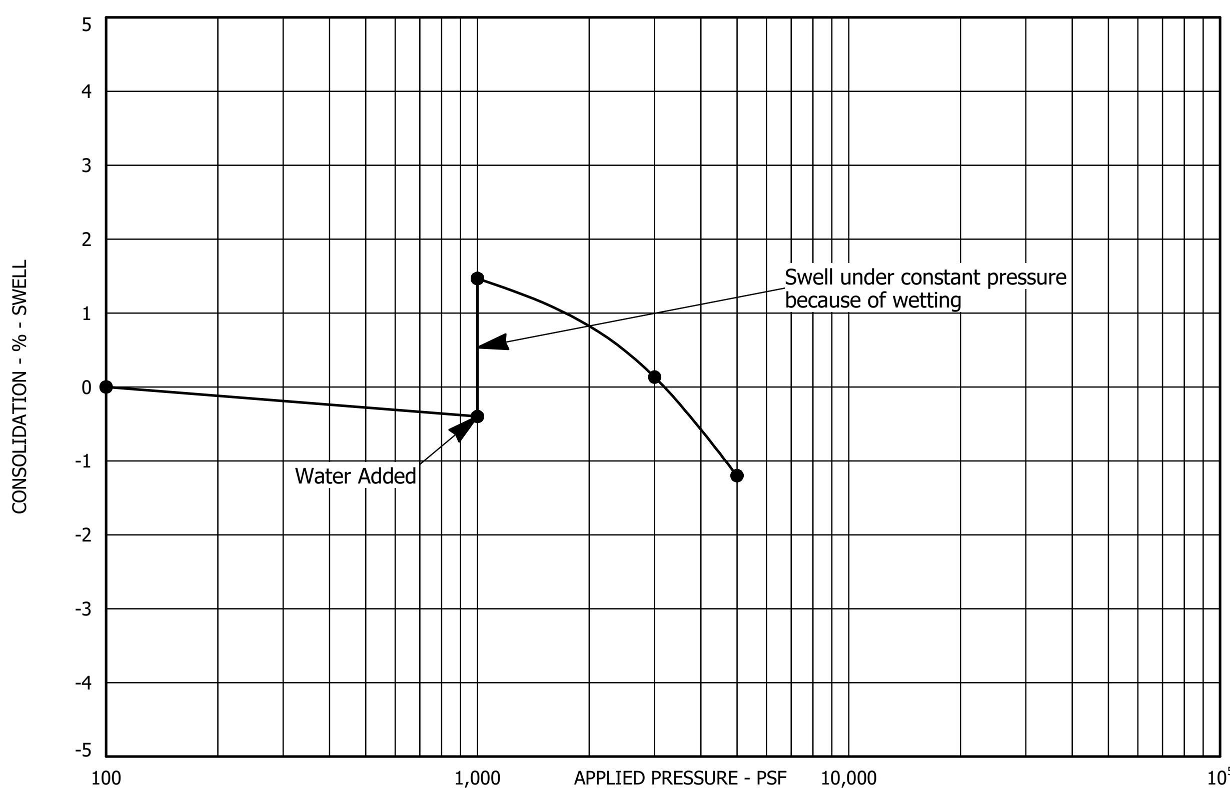
AGW

A.G. WASSENAAR, INC.



Sample Location: Test Boring No. 17 at a depth of 14 feet — Dry Unit Weight (pcf): 112

Sample Description: Claystone, sandy — Moisture Content (%): 14



Sample Location: Test Boring No. 17 at a depth of 24 feet — Dry Unit Weight (pcf): 115

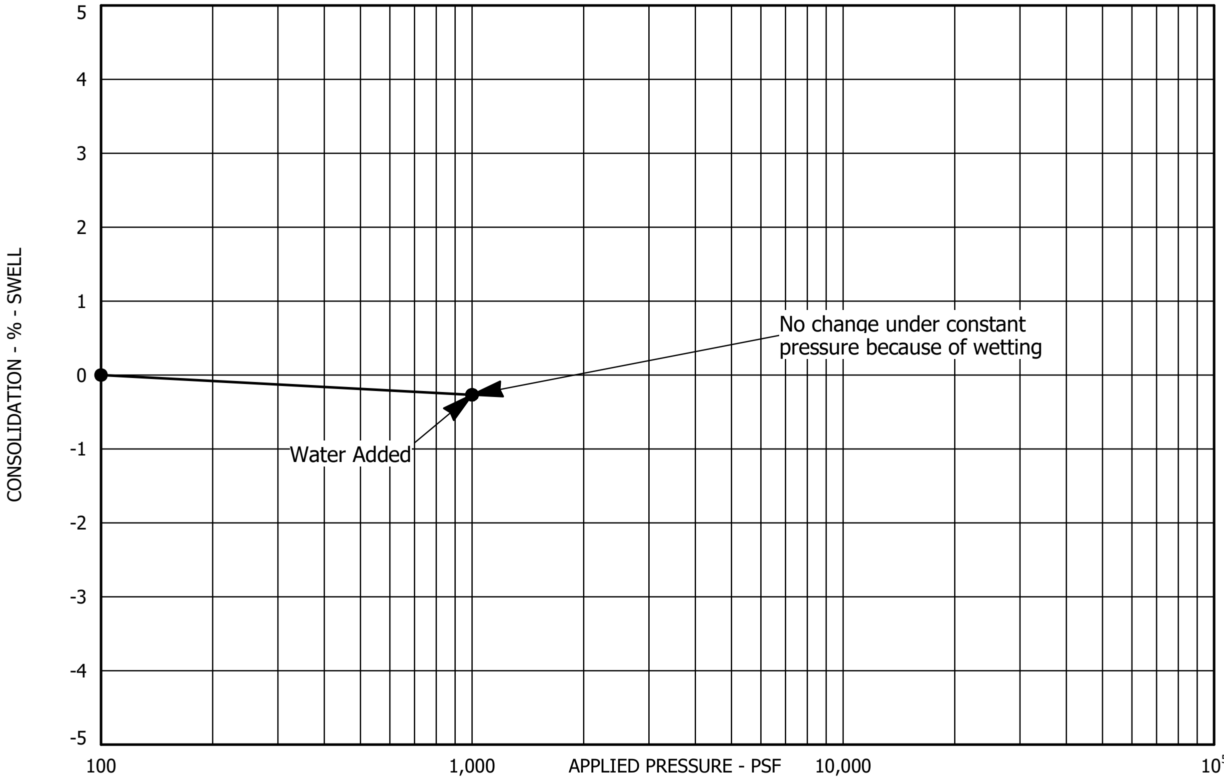
Sample Description: Claystone, sandy — Moisture Content (%): 11

SWELL - CONSOLIDATION TEST RESULTS

FIGURE A-10

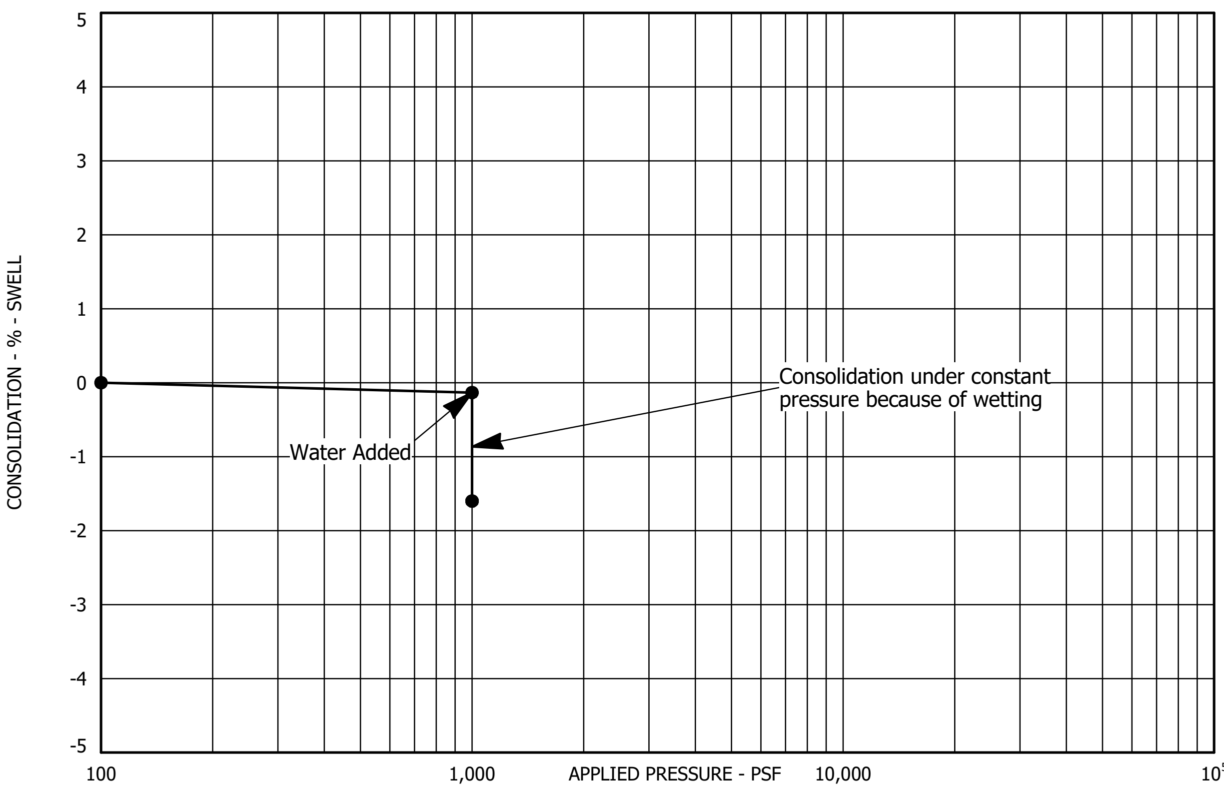
AGW

A.G. WASSENAAR, INC.



Sample Location: Test Boring No. 18 at a depth of 19 feet — Dry Unit Weight (pcf): 115

Sample Description: Claystone, very sandy — Moisture Content (%): 10



Sample Location: Test Boring No. 22 at a depth of 29 feet — Dry Unit Weight (pcf): 108

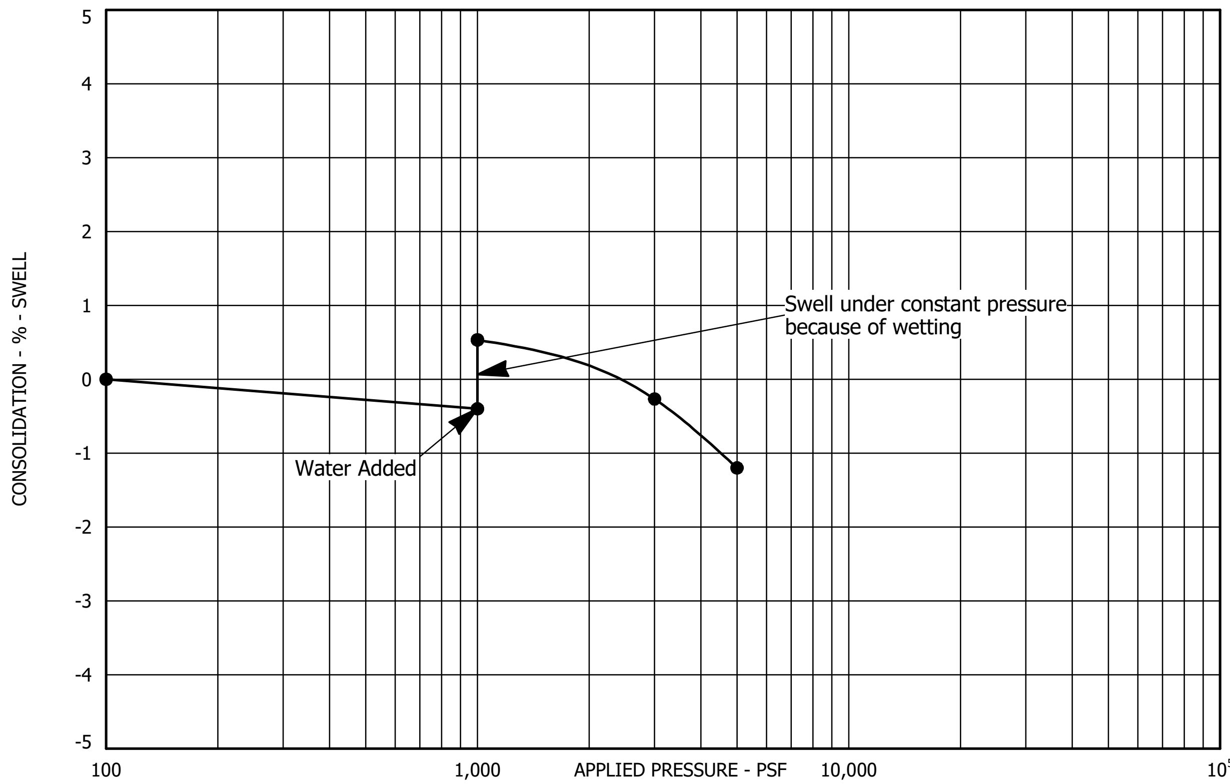
Sample Description: Sandstone, very clayey, trace gravel — Moisture Content (%): 12

SWELL - CONSOLIDATION TEST RESULTS

FIGURE A-11

PROJECT NO. 213542

A.G. WASSENAAR, INC.

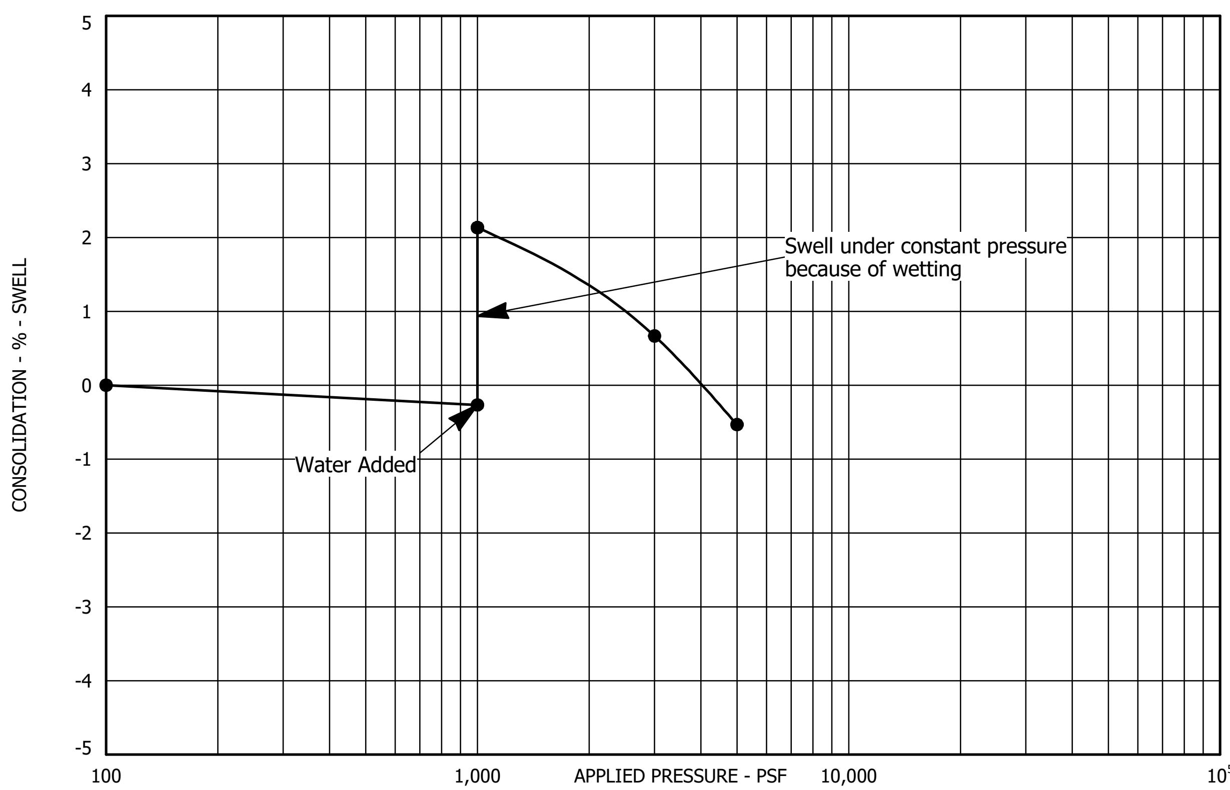


Sample Location Test Boring No. 23 at a depth of 34 feet

Sample Description Claystone/Sandstone

Dry Unit Weight (pcf) 119

Moisture Content (%) 11



Sample Location Test Boring No. 24 at a depth of 9 feet

Sample Description Claystone, slightly sandy

Dry Unit Weight (pcf) 110

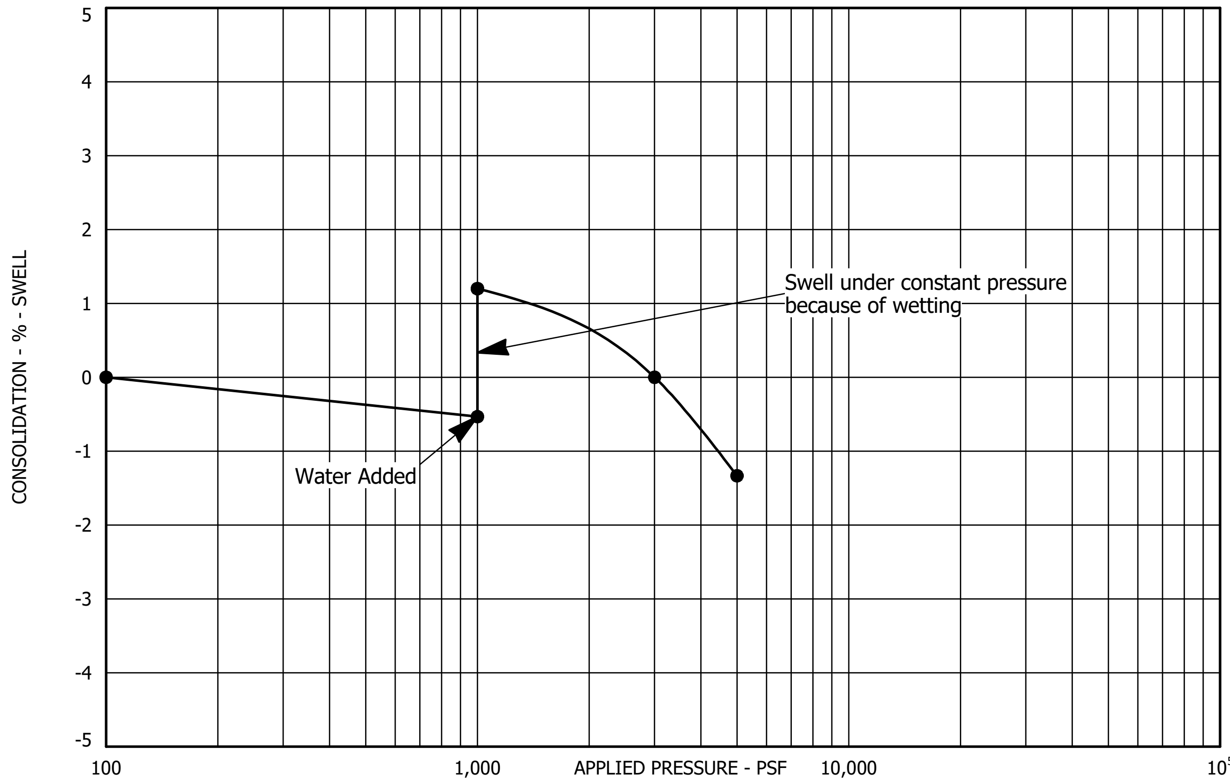
Moisture Content (%) 14

SWELL - CONSOLIDATION TEST RESULTS

FIGURE A-12

PROJECT NO. 213542

A.G. WASSENAAR, INC.

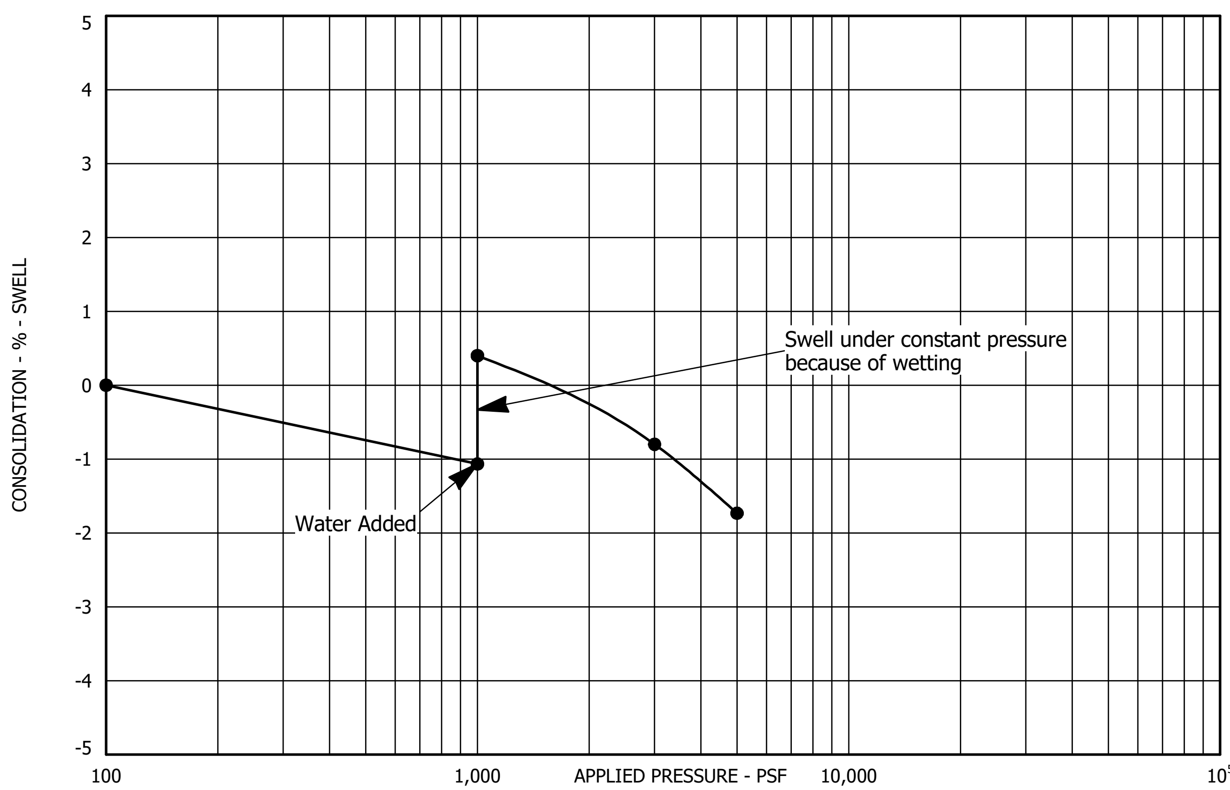


Sample Location Test Boring No. 24 at a depth of 19 feet

Sample Description Claystone/Sandstone

Dry Unit Weight (pcf) 114

Moisture Content (%) 10



Sample Location Test Boring No. 26 at a depth of 24 feet

Sample Description Claystone, sandy

Dry Unit Weight (pcf) 116

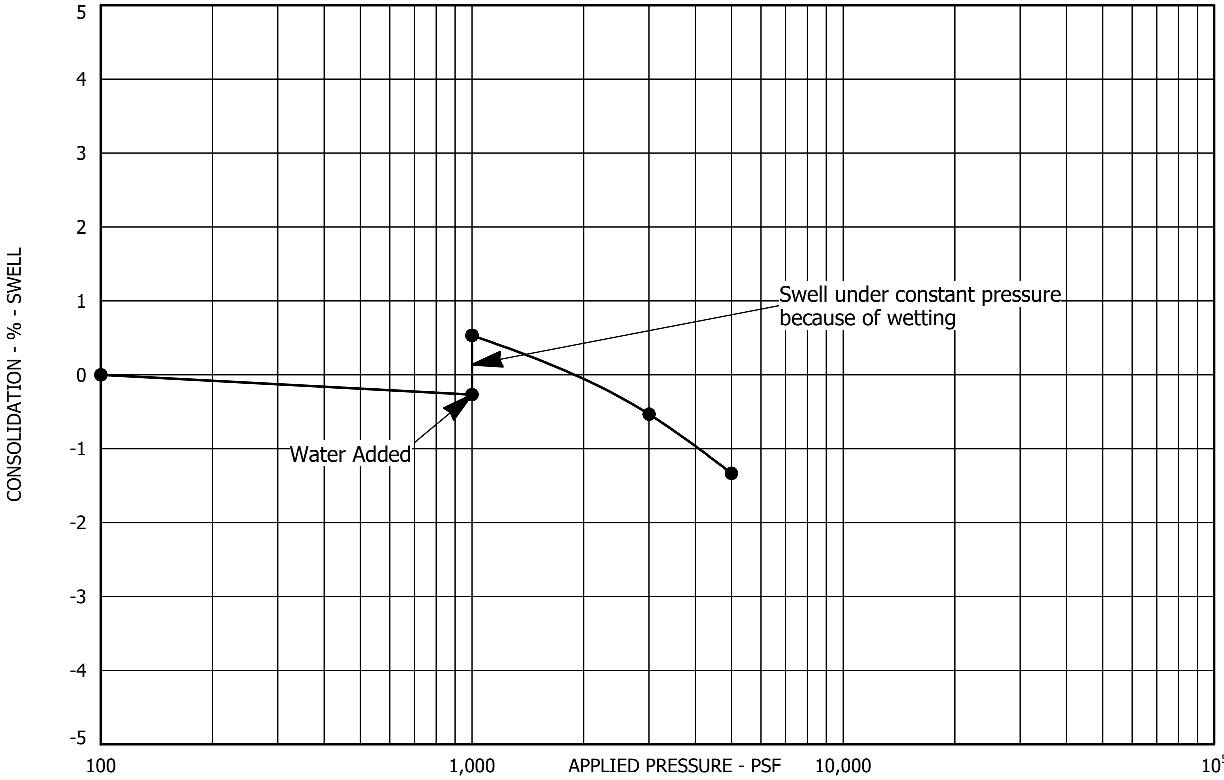
Moisture Content (%) 13

SWELL - CONSOLIDATION TEST RESULTS

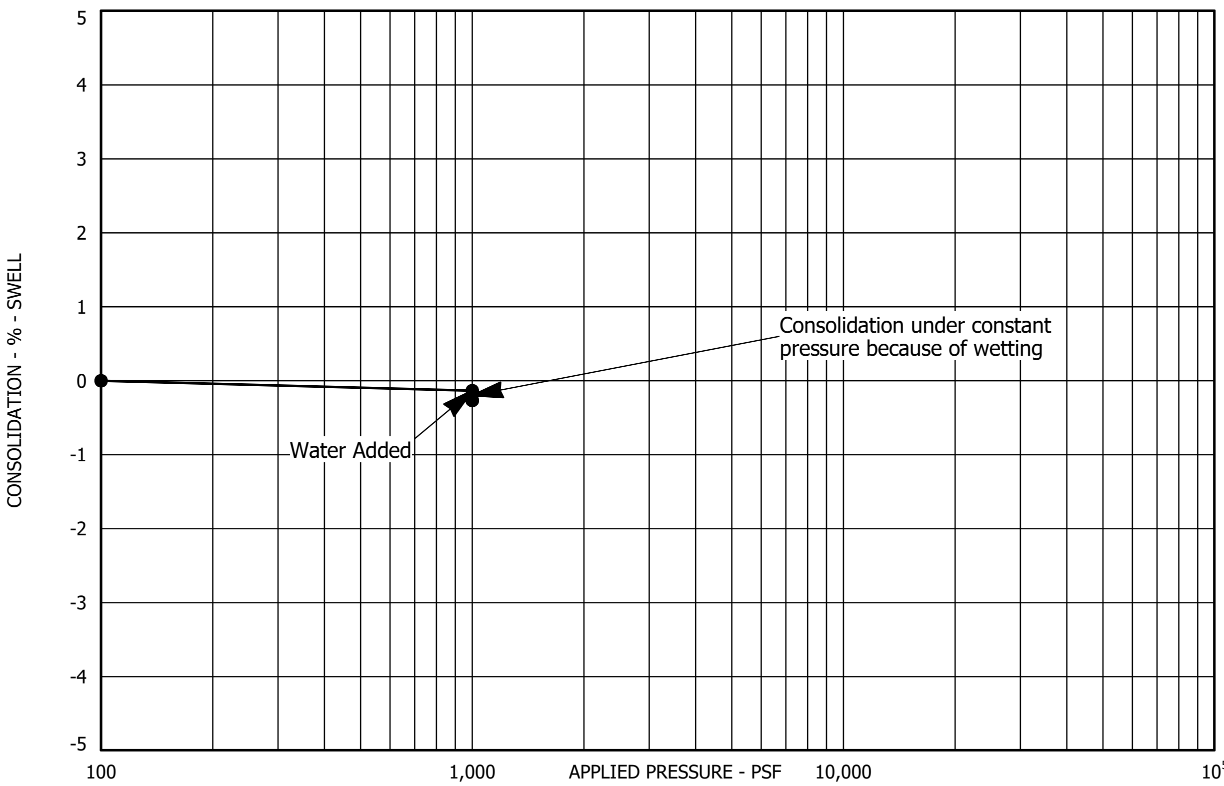
FIGURE A-13

PROJECT NO. 213542

A.G. WASSENAAR, INC.



Sample Location: Test Boring No. 26 at a depth of 34 feet
Sample Description: Claystone, sandy
Dry Unit Weight (pcf): 119
Moisture Content (%): 11



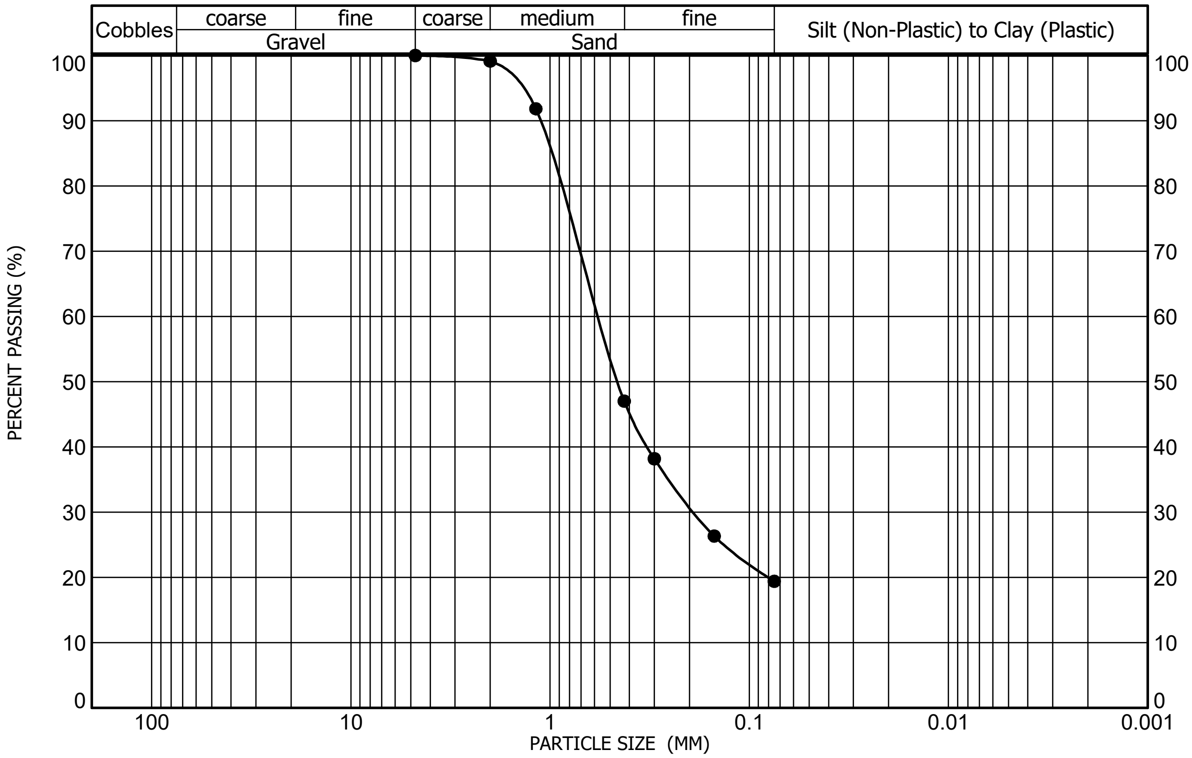
Sample Location: Blended Bulk Sample
Sample Description: Sand, clayey, trace gravel
Dry Unit Weight (pcf): 118
Moisture Content (%): 9

SWELL - CONSOLIDATION TEST RESULTS

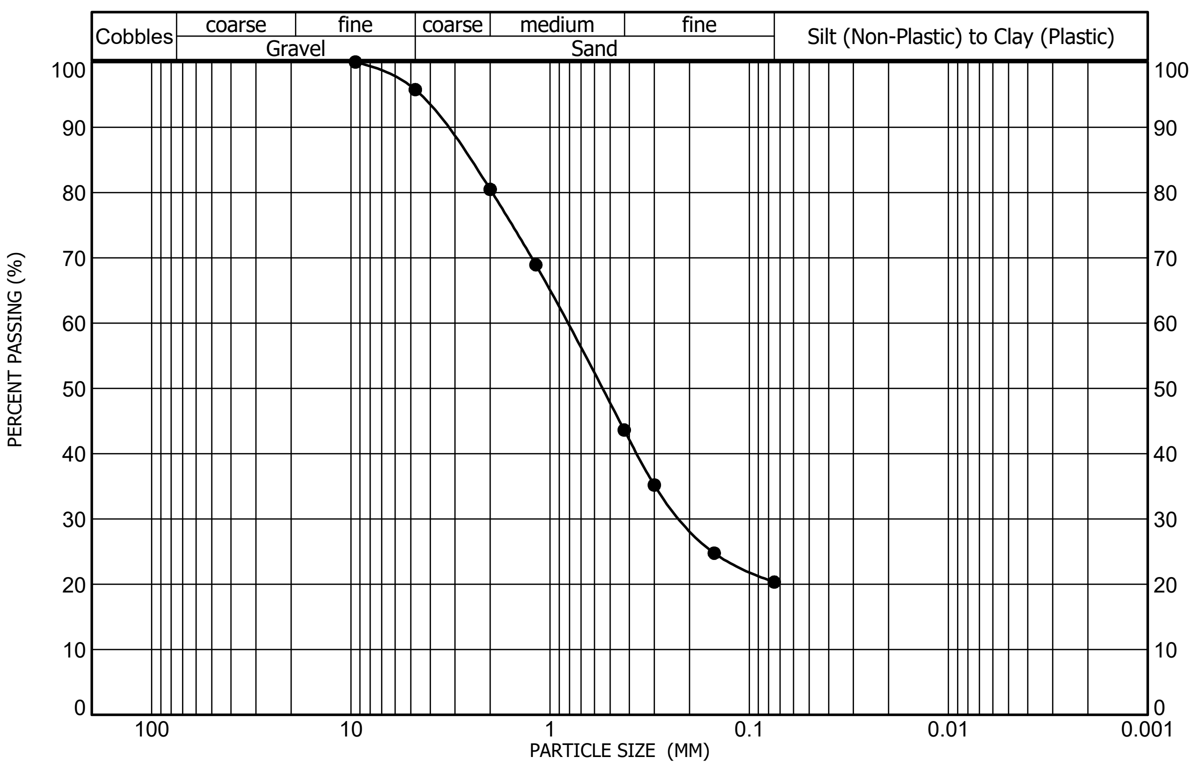
FIGURE A-14

PROJECT NO. 213542

A.G. WASSENAAR, INC.



Sample Location	Test Boring No. 1 at a depth of 9 feet	Gravel (%)	0	Liquid Limit	NV
Sample Description	Sandstone, silty	Sand (%)	81	Plasticity Index	NP
Classification	A-1-b(0), SILTY SAND(SM)	Clay/Silt (%)	19		

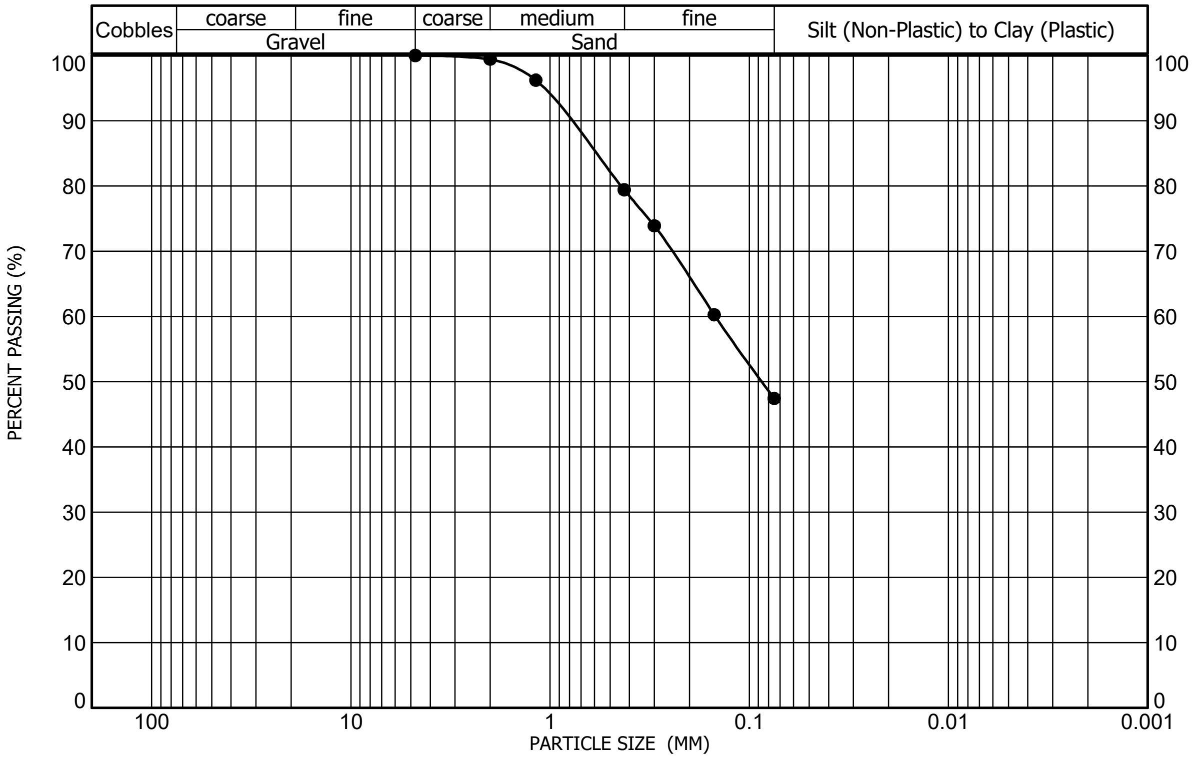


Sample Location	Test Boring No. 2 at a depth of 2 feet	Gravel (%)	4	Liquid Limit	28
Sample Description	Sandstone, clayey, trace gravel	Sand (%)	75	Plasticity Index	11
Classification	A-2-6(0), CLAYEY SAND(SC)	Clay/Silt (%)	20		

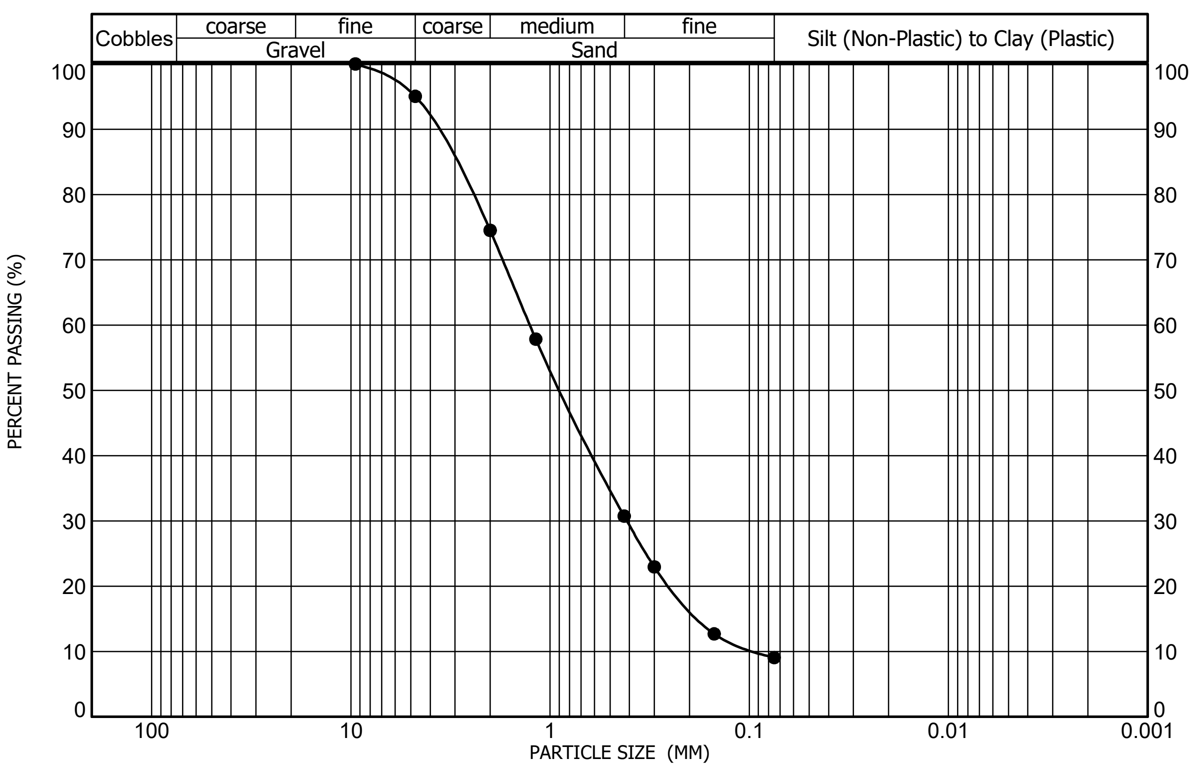
GRADATION AND ATTERBERG TEST RESULTS

FIGURE A-15

A.G. WASSENAAR, INC.



Sample Location	Test Boring No. 2 at a depth of 14 feet	Gravel (%)	0	Liquid Limit	32
Sample Description	Claystone, sandy,	Sand (%)	53	Plasticity Index	16
Classification	A-6(4), CLAYEY SAND(SC)	Clay/Silt (%)	47		

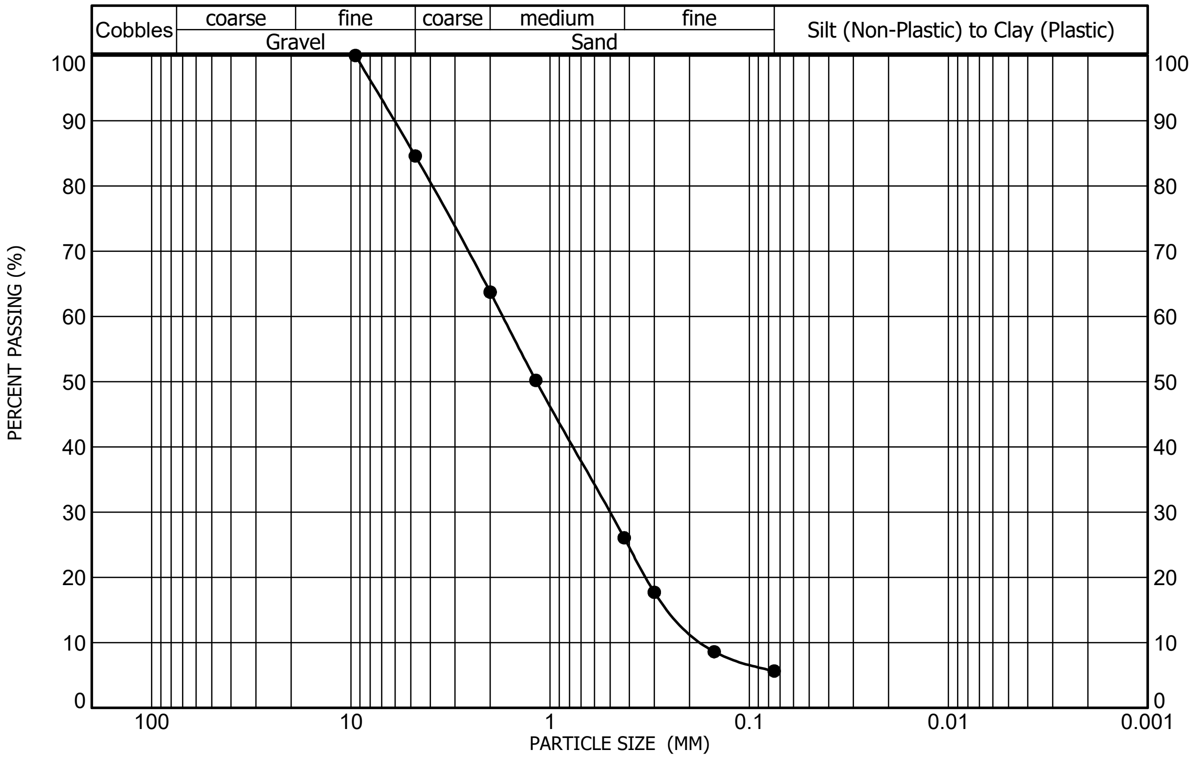


Sample Location	Test Boring No. 4 at a depth of 7 feet	Gravel (%)	5	Liquid Limit	NV
Sample Description	Sand, slightly silty, slightly gravelly	Sand (%)	86	Plasticity Index	NP
Classification	A-1-b(0), WELL-GRADED SAND with SILT(SW-SM)	Clay/Silt (%)	9		

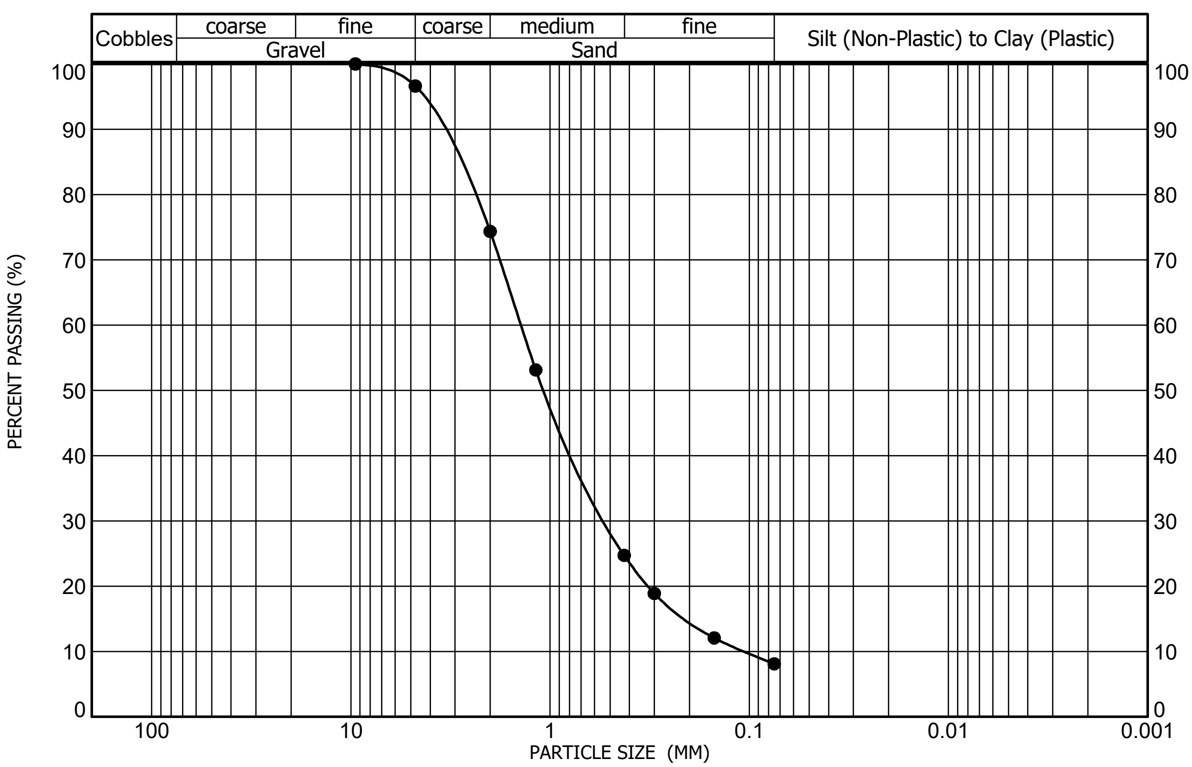
GRADATION AND ATTERBERG TEST RESULTS

FIGURE A-16

PROJECT NO. 213542



Sample Location Test Boring No. 5 at a depth of 4 feet
Sample Description Sand, gravelly, slightly silty
Classification A-1-b(0), POORLY GRADED SAND with SILT and GRAVEL(SP-SM)
Gravel (%) 15
Sand (%) 79
Clay/Silt (%) 6
Liquid Limit NV
Plasticity Index NP



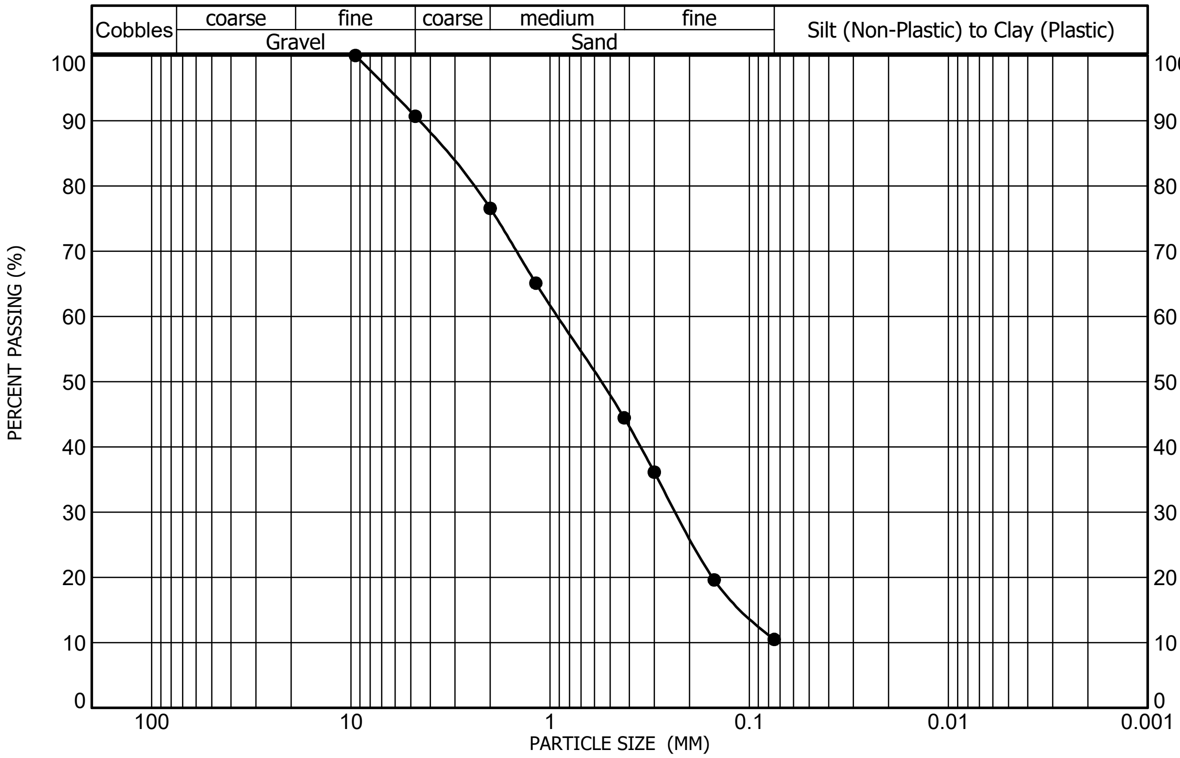
Sample Location Test Boring No. 6 at a depth of 9 feet
Sample Description Sand, slightly silty, trace gravel
Classification A-1-b(0), WELL-GRADED SAND with SILT(SW-SM)
Gravel (%) 3
Sand (%) 89
Clay/Silt (%) 8
Liquid Limit NV
Plasticity Index NP

GRADATION AND ATTERBERG TEST RESULTS

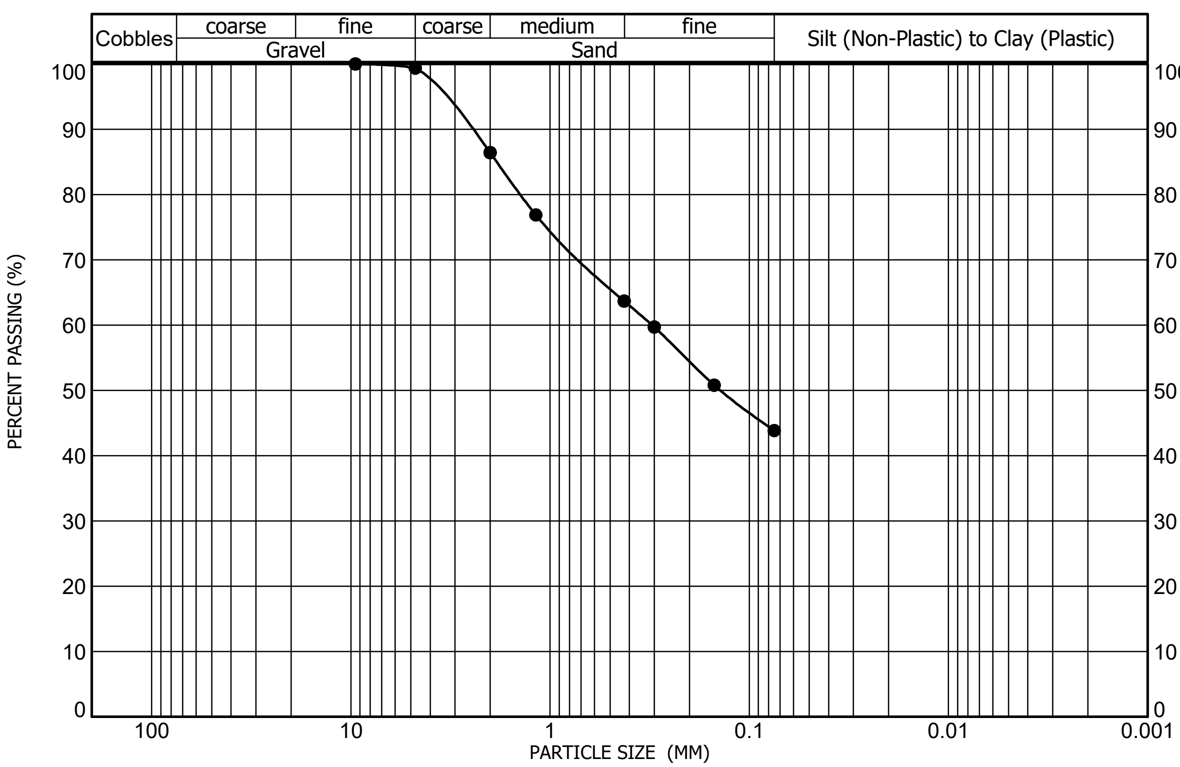
FIGURE A-17

PROJECT NO. 213542

AGW
A.G. WASSENAAR, INC.



Sample Location: Test Boring No. 7 at a depth of 2 feet	Gravel (%): 9	Liquid Limit: NV
Sample Description: Sand, slightly silty, slightly gravelly	Sand (%): 80	Plasticity Index: NP
Classification: A-1-b(0), POORLY GRADED SAND with SILT(SP-SM)	Clay/Silt (%): 10	

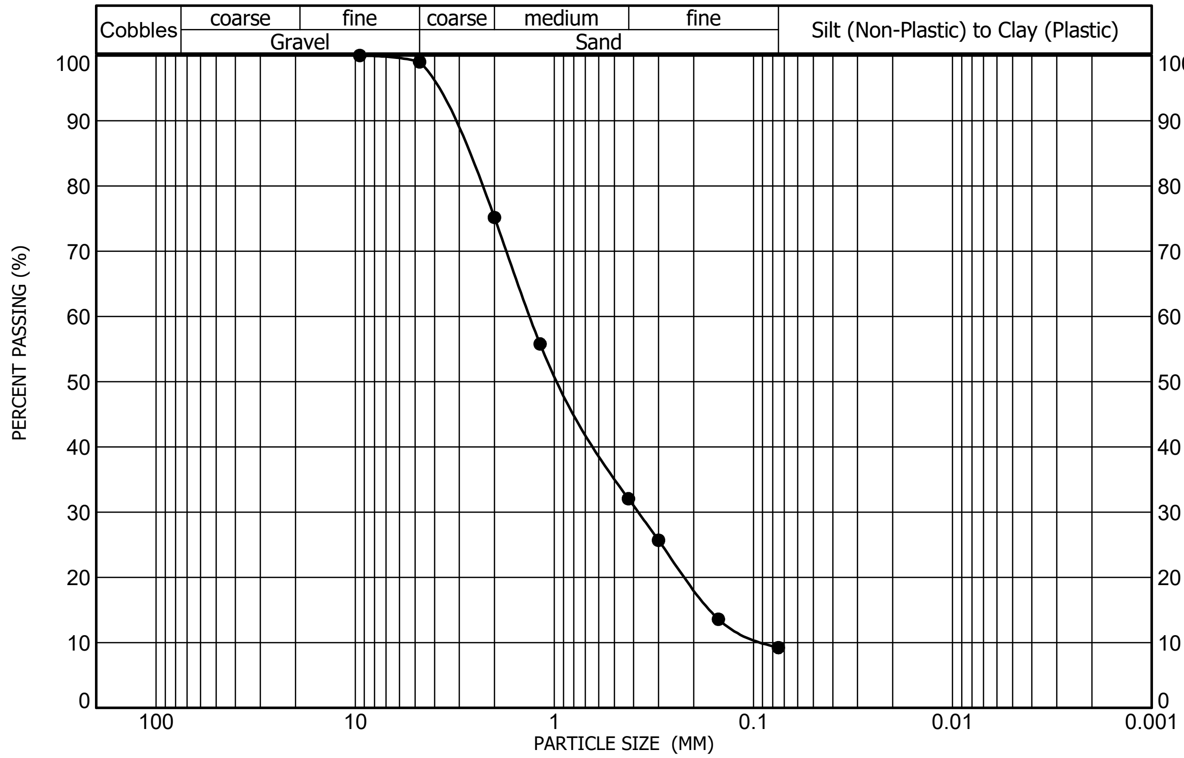


Sample Location: Test Boring No. 7 at a depth of 24 feet	Gravel (%): 1	Liquid Limit: 30
Sample Description: Sandstone/Claystone	Sand (%): 56	Plasticity Index: 16
Classification: A-6(3), CLAYEY SAND(SC)	Clay/Silt (%): 44	

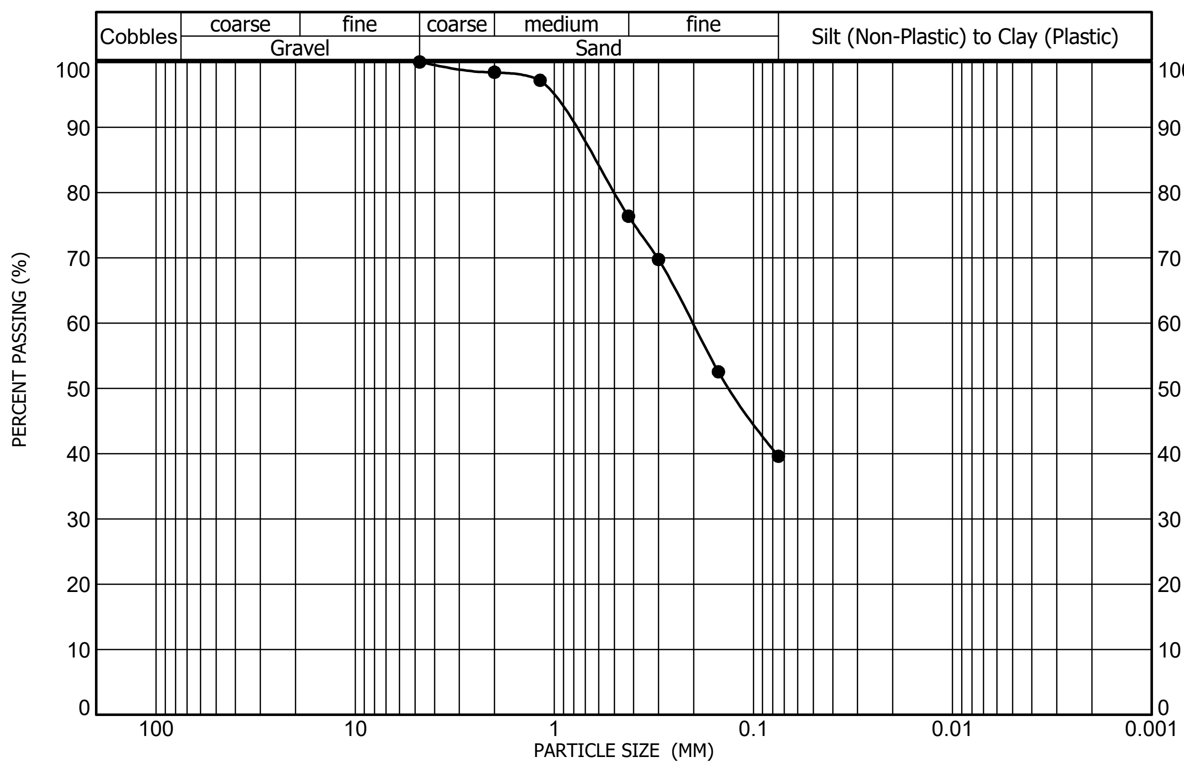
GRADATION AND ATTERBERG TEST RESULTS

FIGURE A-18

PROJECT NO. 213542



Sample Location	Test Boring No. 8 at a depth of 4 feet	Gravel (%)	1	Liquid Limit	NV
Sample Description	Sand, slightly silty, trace gravel	Sand (%)	90	Plasticity Index	NP
Classification	A-1-b(0), WELL-GRADED SAND with SILT(SW-SM)	Clay/Silt (%)	9		

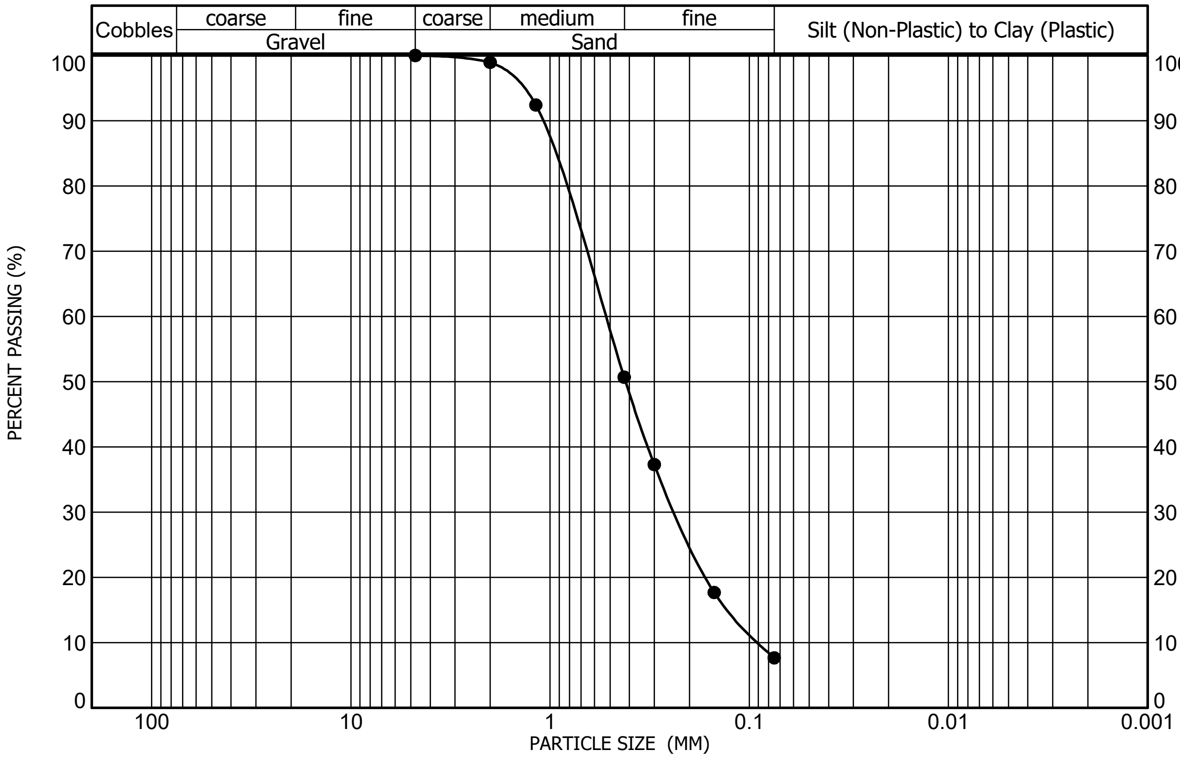


Sample Location	Test Boring No. 8 at a depth of 29 feet	Gravel (%)	0	Liquid Limit	29
Sample Description	Sandstone/Claystone	Sand (%)	60	Plasticity Index	15
Classification	A-6(2), CLAYEY SAND(SC)	Clay/Silt (%)	40		

GRADATION AND ATTERBERG TEST RESULTS

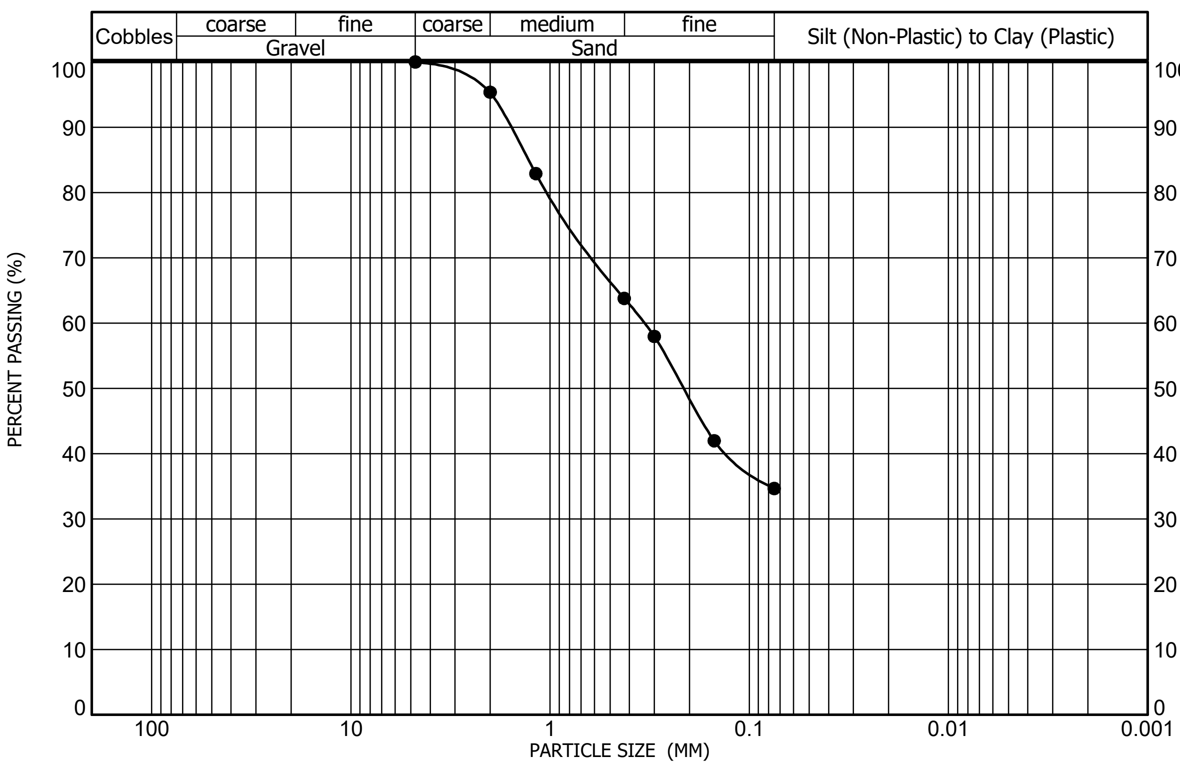
FIGURE A-19

PROJECT NO. 213542



Sample Location: Test Boring No. 9 at a depth of 2 feet
Sample Description: Sand, slightly silty
Classification: A-3(0), WELL-GRADED SAND with SILT(SW-SM)

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



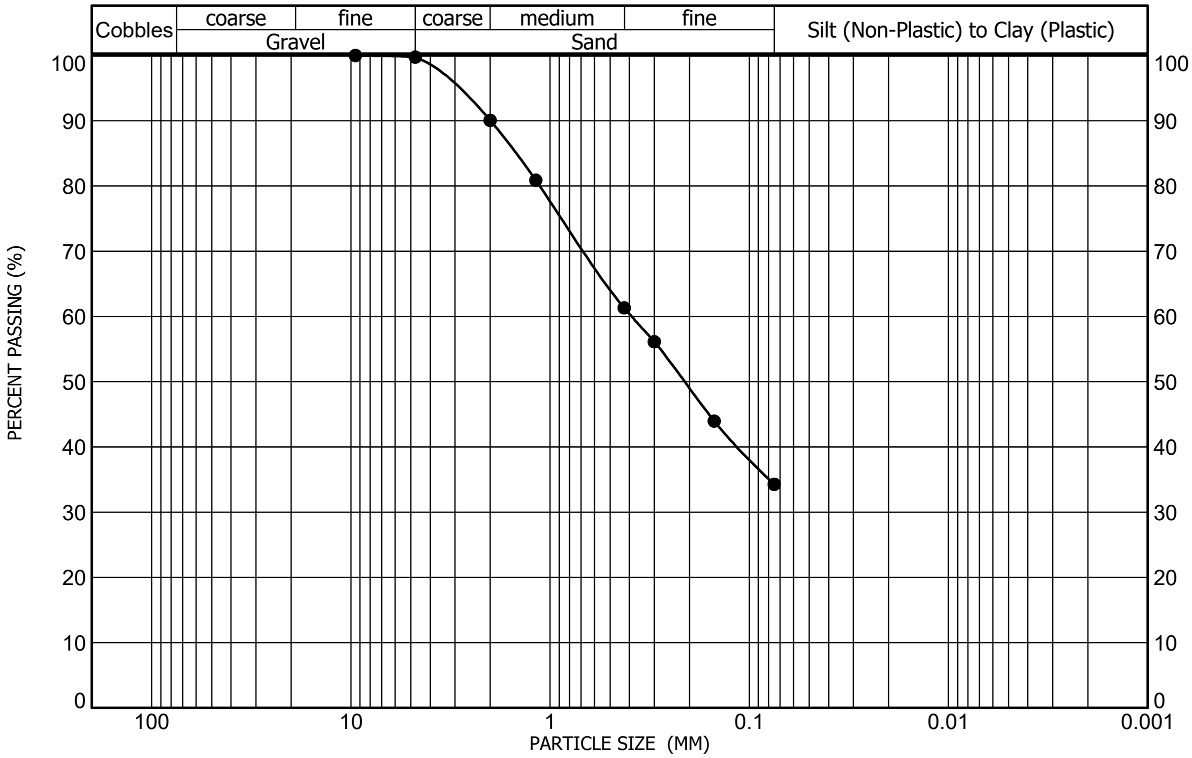
Sample Location: Test Boring No. 9 at a depth of 14 feet
Sample Description: Sand, very clayey
Classification: A-2-6(1), CLAYEY SAND(SC)

Gravel (%): 0
Sand (%): 65
Clay/Silt (%): 35
Liquid Limit: 35
Plasticity Index: 14

GRADATION AND ATTERBERG TEST RESULTS

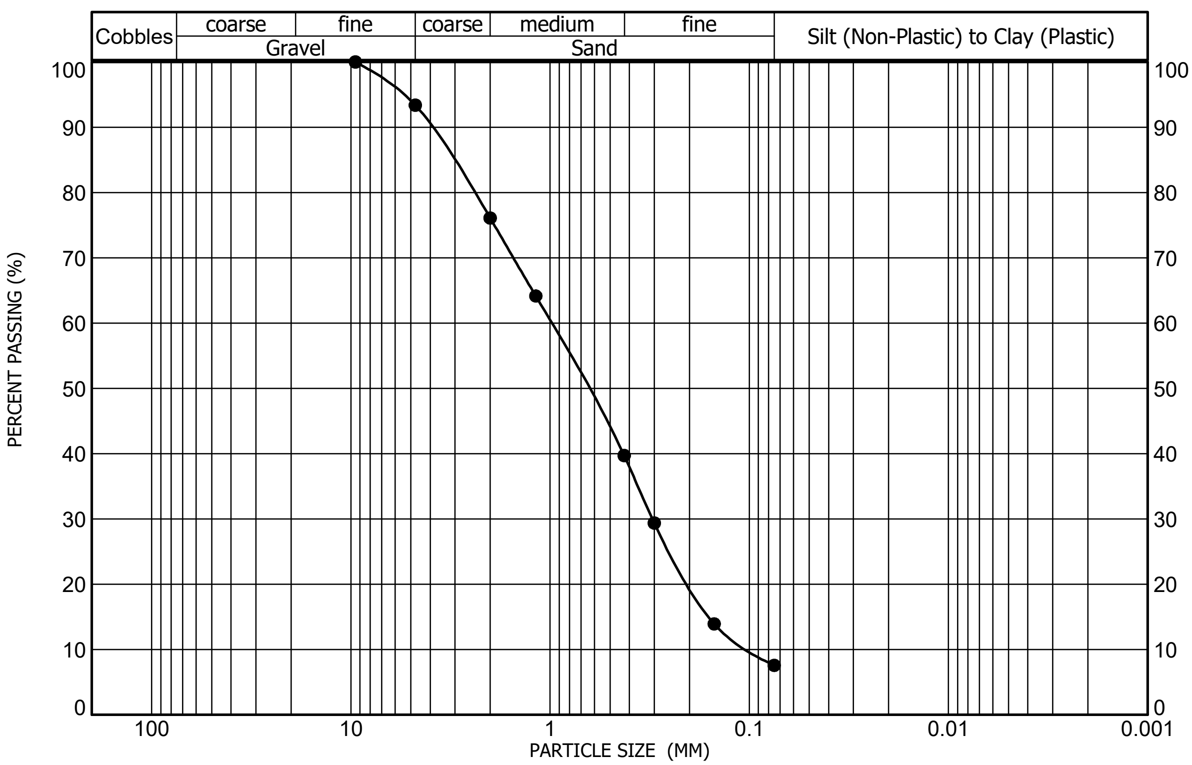
FIGURE A-20

A.G. WASSENAAR, INC.



Sample Location Test Boring No. 9 at a depth of 34 feet
Sample Description Sandstone, very clayey
Classification A-2-4(0), CLAYEY SAND(SC)

Gravel (%) 0 Liquid Limit 25
Sand (%) 65 Plasticity Index 9
Clay/Silt (%) 34



Sample Location Test Boring No. 11 at a depth of 2 feet
Sample Description Sand, slightly silty, slightly gravelly
Classification A-1-b(0), POORLY GRADED SAND with SILT(SP-SM)

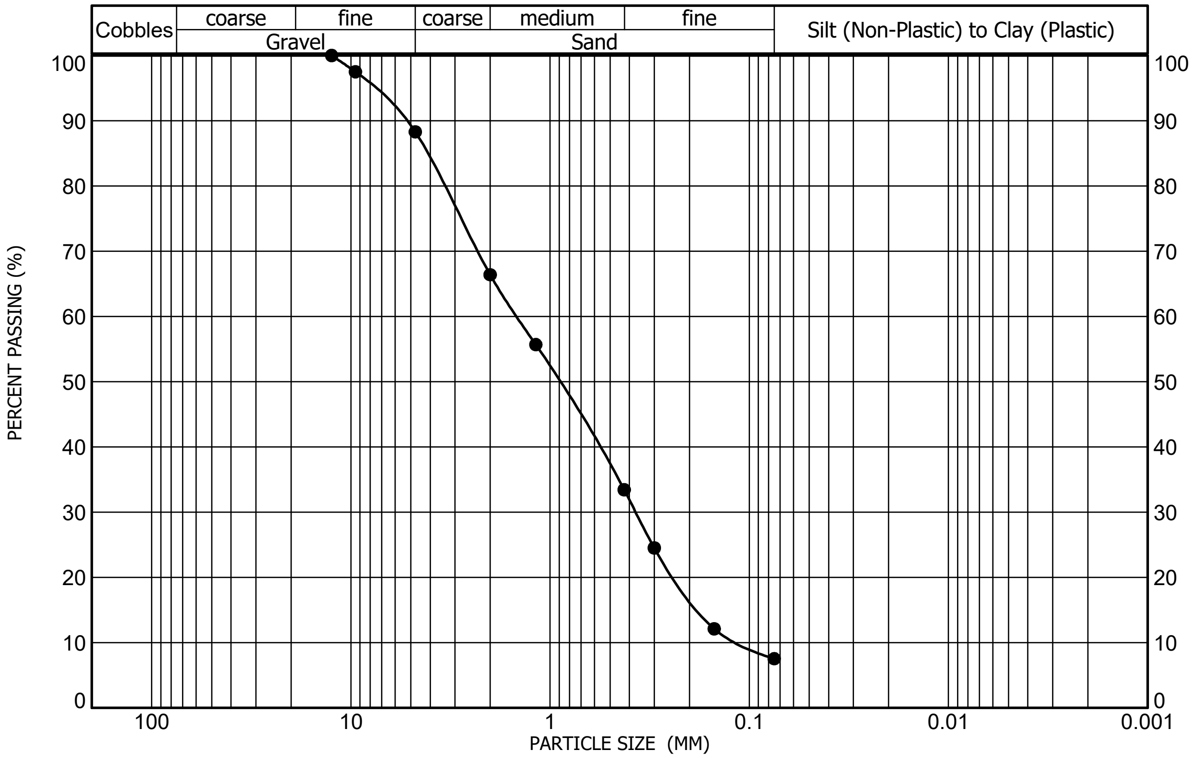
Gravel (%) 7 Liquid Limit NV
Sand (%) 86 Plasticity Index NP
Clay/Silt (%) 8

GRADATION AND ATTERBERG TEST RESULTS

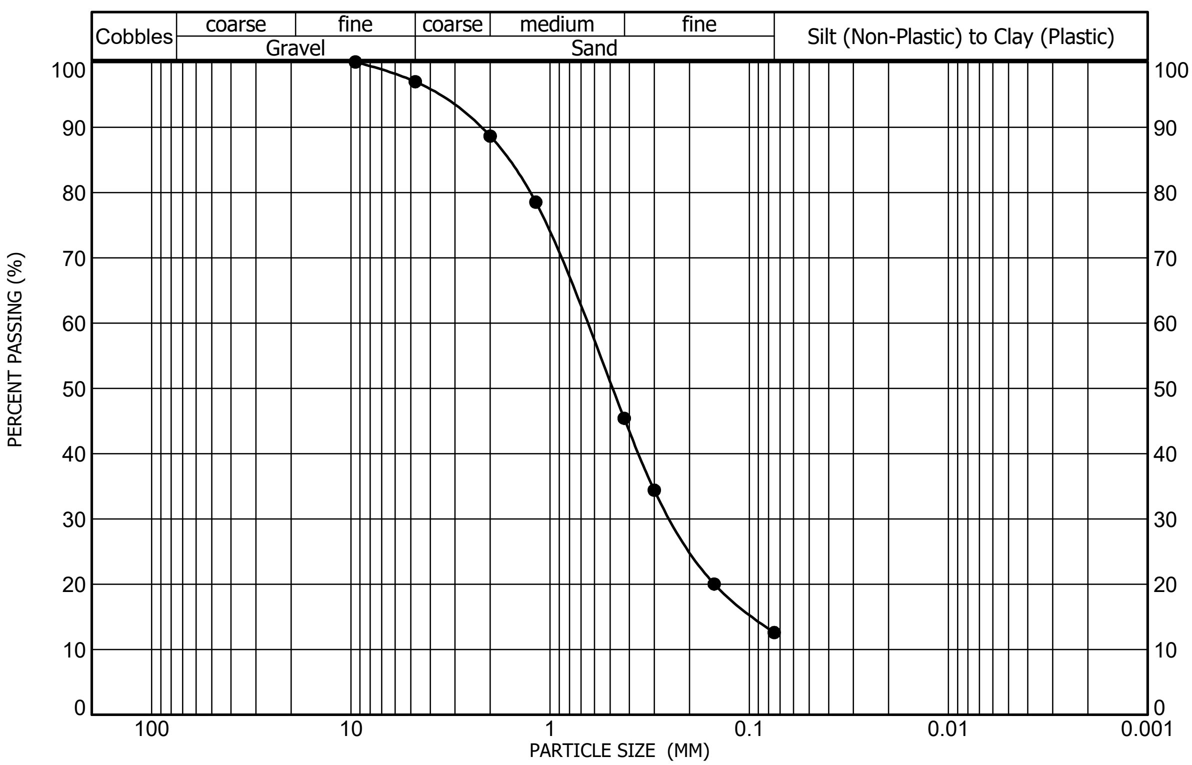
FIGURE A-21

PROJECT NO. 213542

A.G. WASSENAAR, INC.



Sample Location: Test Boring No. 15 at a depth of 9 feet
Sample Description: Sand, slightly gravelly, slightly silty
Classification: A-1-b(0), POORLY GRADED SAND with SILT(SP-SM)
Gravel (%): 12
Sand (%): 81
Clay/Silt (%): 8
Liquid Limit: NV
Plasticity Index: NP



Sample Location: Test Boring No. 16 at a depth of 2 feet
Sample Description: Sand, slightly silty, trace gravel
Classification: A-1-b(0), SILTY SAND(SM)
Gravel (%): 3
Sand (%): 84
Clay/Silt (%): 13
Liquid Limit: 21
Plasticity Index: 2

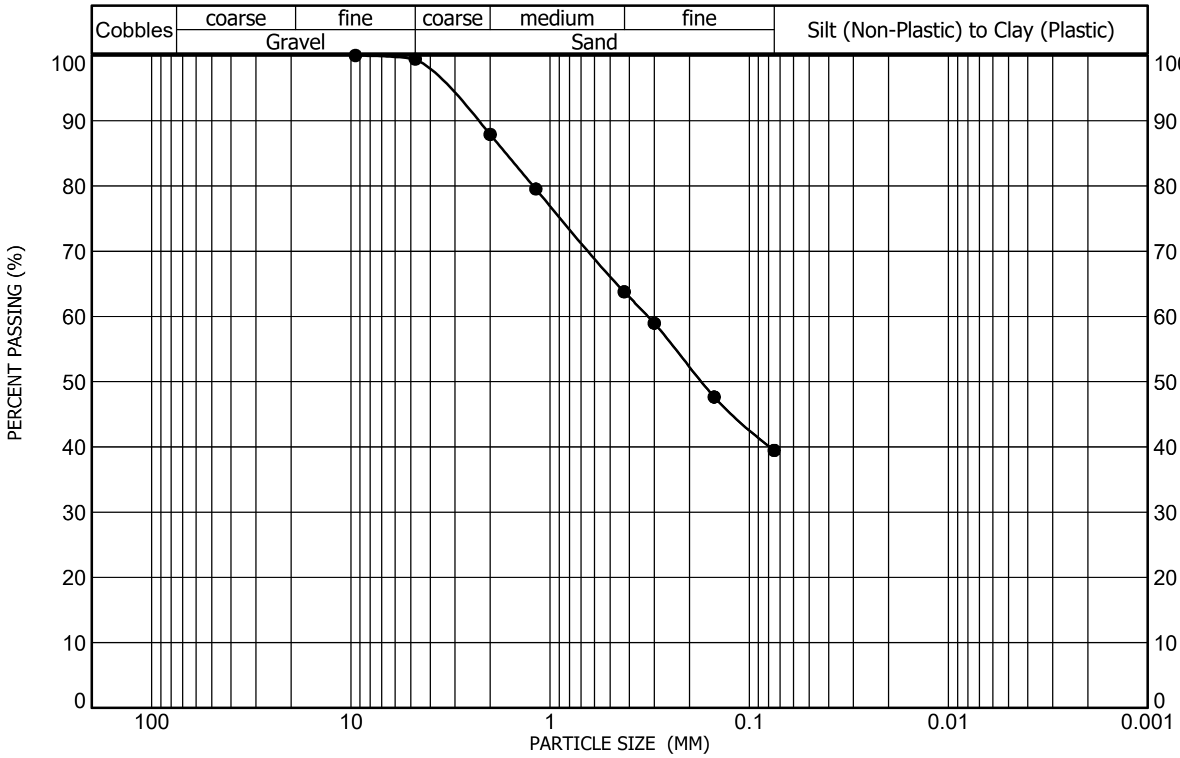
GRADATION AND ATTERBERG TEST RESULTS

FIGURE A-22

PROJECT NO. 213542

AGW

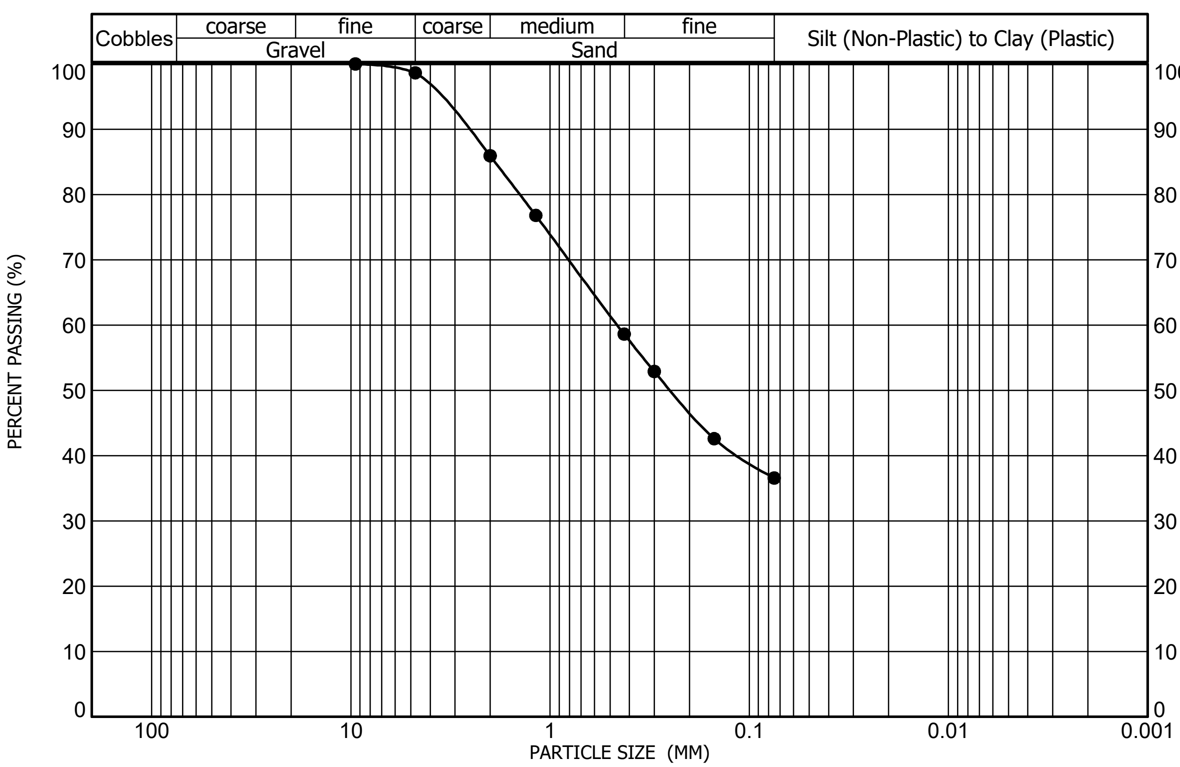
A.G. WASSENAAR, INC.



Sample Location: Test Boring No. 16 at a depth of 34 feet — Gravel (%): 1 — Liquid Limit: 25

Sample Description: Sandstone, very clayey, trace gravel — Sand (%): 60 — Plasticity Index: 12

Classification: A-6(1), CLAYEY SAND(SC) — Clay/Silt (%): 39



Sample Location: Test Boring No. 19 at a depth of 29 feet — Gravel (%): 1 — Liquid Limit: 28

Sample Description: Sandstone, very clayey, trace gravel — Sand (%): 62 — Plasticity Index: 15

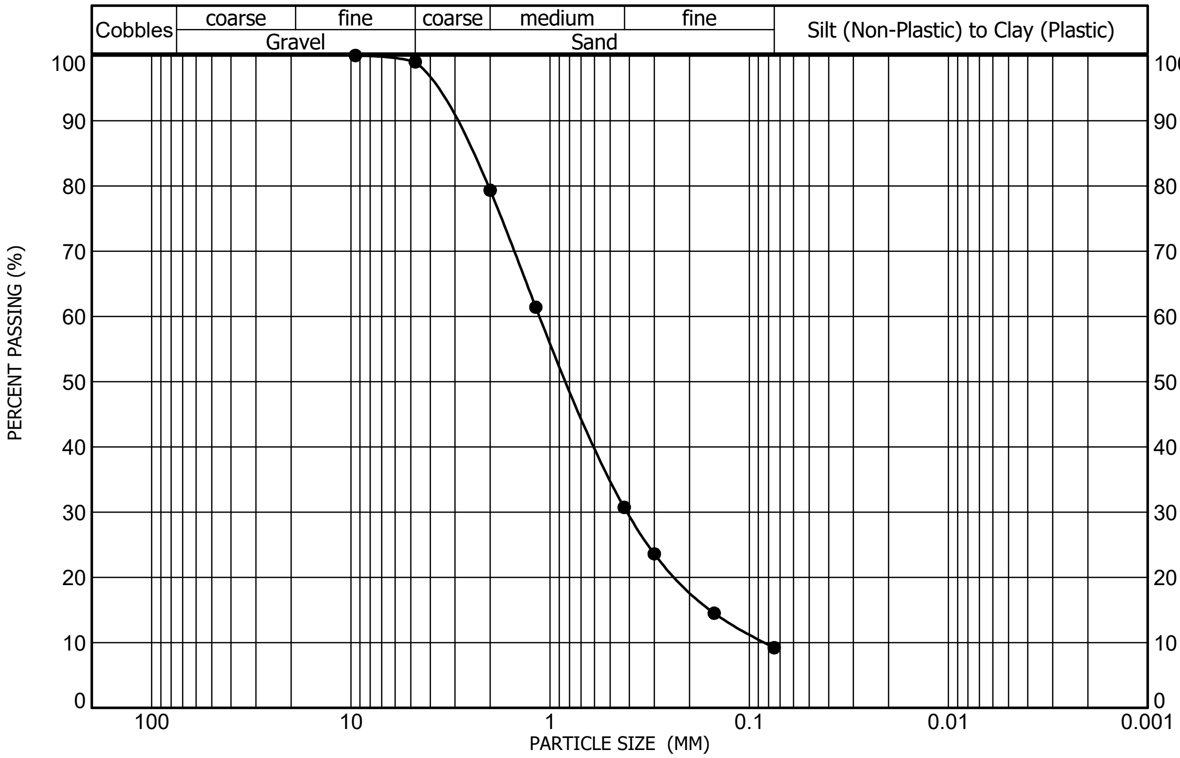
Classification: A-6(1), CLAYEY SAND(SC) — Clay/Silt (%): 37

GRADATION AND ATTERBERG TEST RESULTS

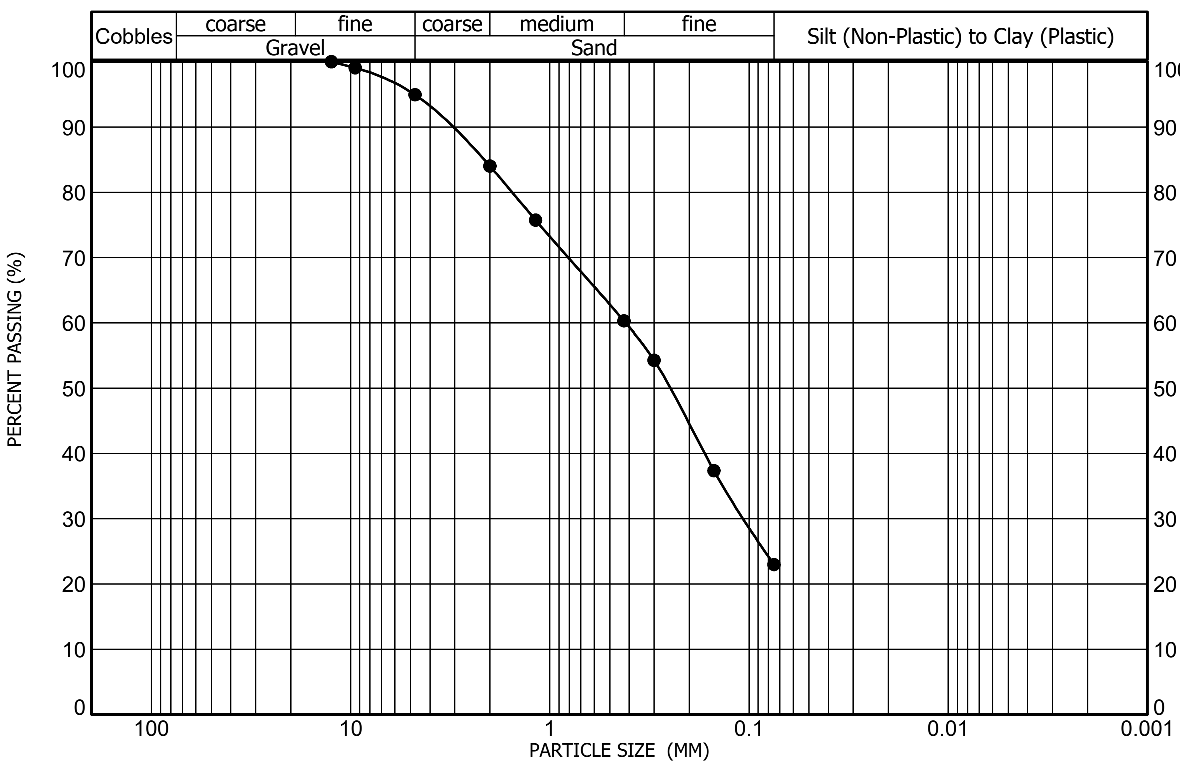
FIGURE A-23

PROJECT NO. 213542

A.G. WASSENAAR, INC.



Sample Location: Test Boring No. 20 at a depth of 4 feet
Sample Description: Sand, slightly silty, trace gravel
Classification: A-1-b(0), WELL-GRADED SAND with SILT(SW-SM)
Gravel (%): 1
Sand (%): 90
Clay/Silt (%): 9
Liquid Limit: NV
Plasticity Index: NP



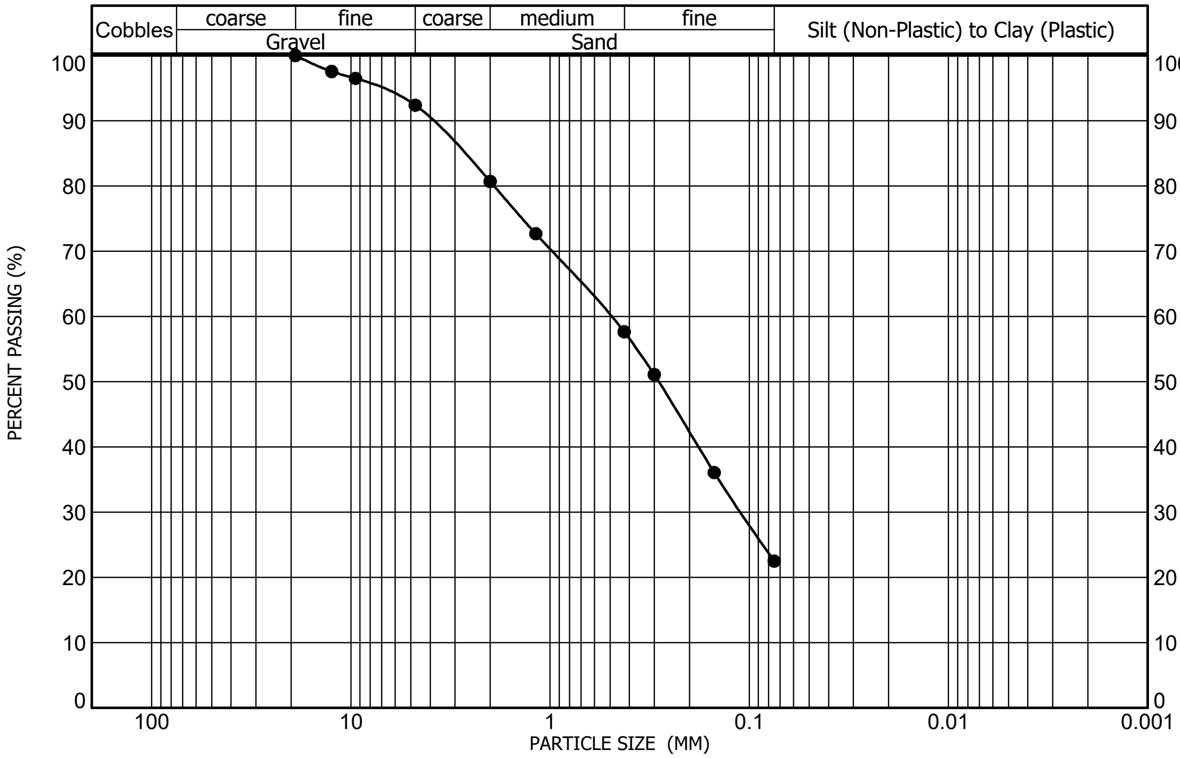
Sample Location: Test Boring No. 21 at a depth of 4 feet
Sample Description: Sand, silty, slightly gravelly
Classification: A-2-4(0), SILTY SAND(SM)
Gravel (%): 5
Sand (%): 72
Clay/Silt (%): 23
Liquid Limit: NV
Plasticity Index: NP

GRADATION AND ATTERBERG TEST RESULTS

FIGURE A-24

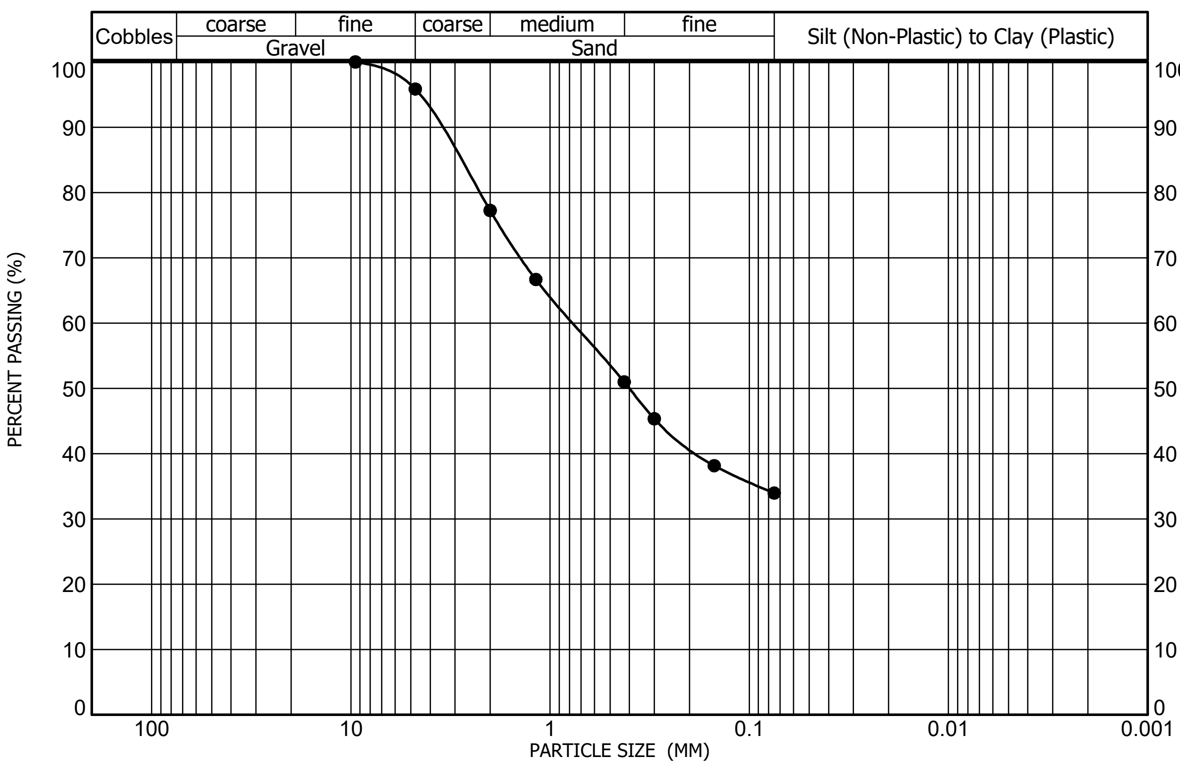
PROJECT NO. 213542

A.G. WASSENAAR, INC.



Sample Location: Test Boring No. 22 at a depth of 9 feet
Sample Description: Fill, sand, silty, slightly gravelly
Classification: A-2-4(0), SILTY SAND(SM)

Gravel (%): 8
Sand (%): 70
Clay/Silt (%): 22
Liquid Limit: NV
Plasticity Index: NP



Sample Location: Test Boring No. 22 at a depth of 29 feet
Sample Description: Sandstone, very clayey, trace gravel
Classification: A-2-6(2), CLAYEY SAND(SC)

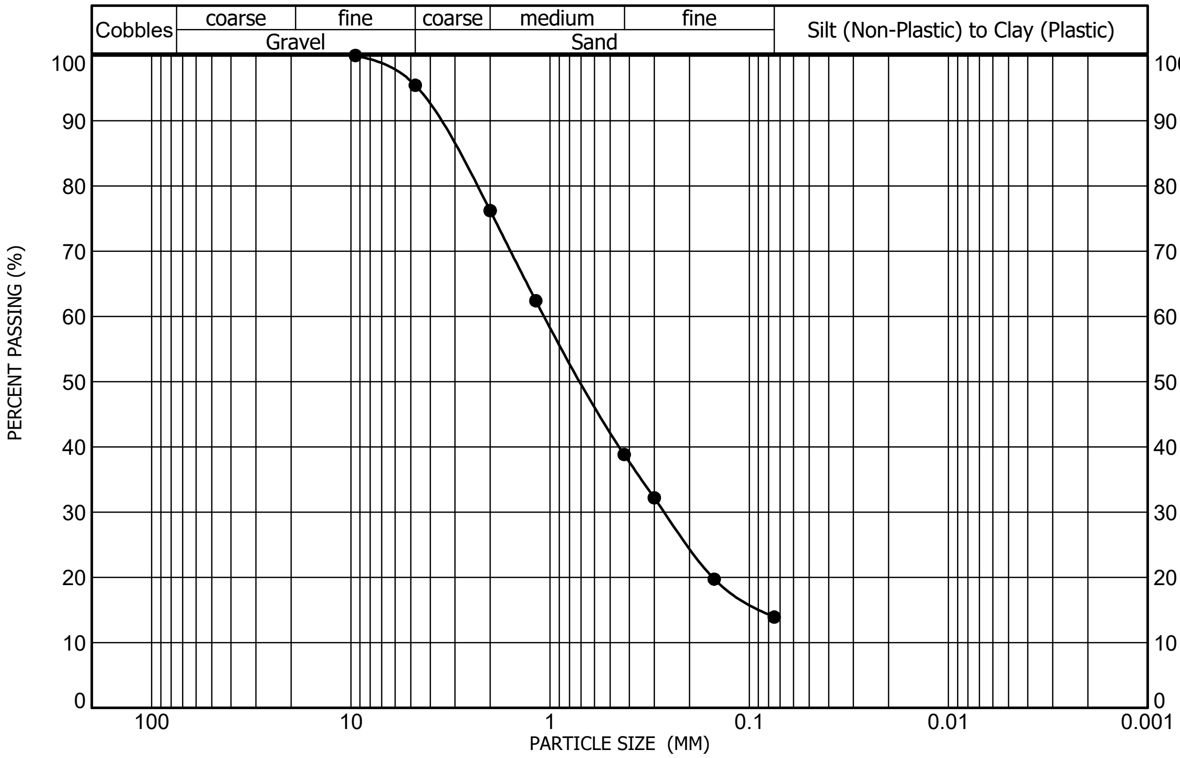
Gravel (%): 4
Sand (%): 62
Clay/Silt (%): 34
Liquid Limit: 35
Plasticity Index: 20

GRADATION AND ATTERBERG TEST RESULTS

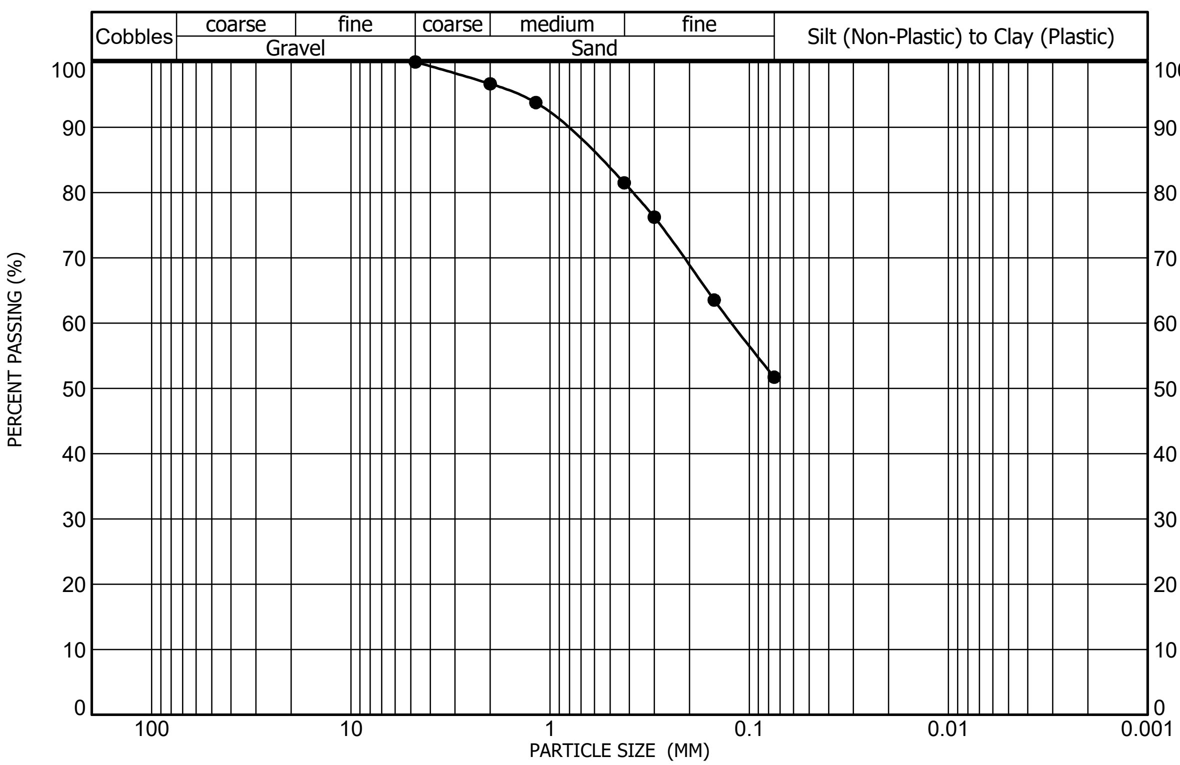
FIGURE A-25

PROJECT NO. 213542

A.G. WASSENAAR, INC.



Sample Location	Test Boring No. 23 at a depth of 7 feet	Gravel (%) 5	Liquid Limit NV
Sample Description	Fill, sand, slightly silty, slightly gravelly	Sand (%) 82	Plasticity Index NP
Classification	A-1-b(0), SILTY SAND(SM)	Clay/Silt (%) 14	



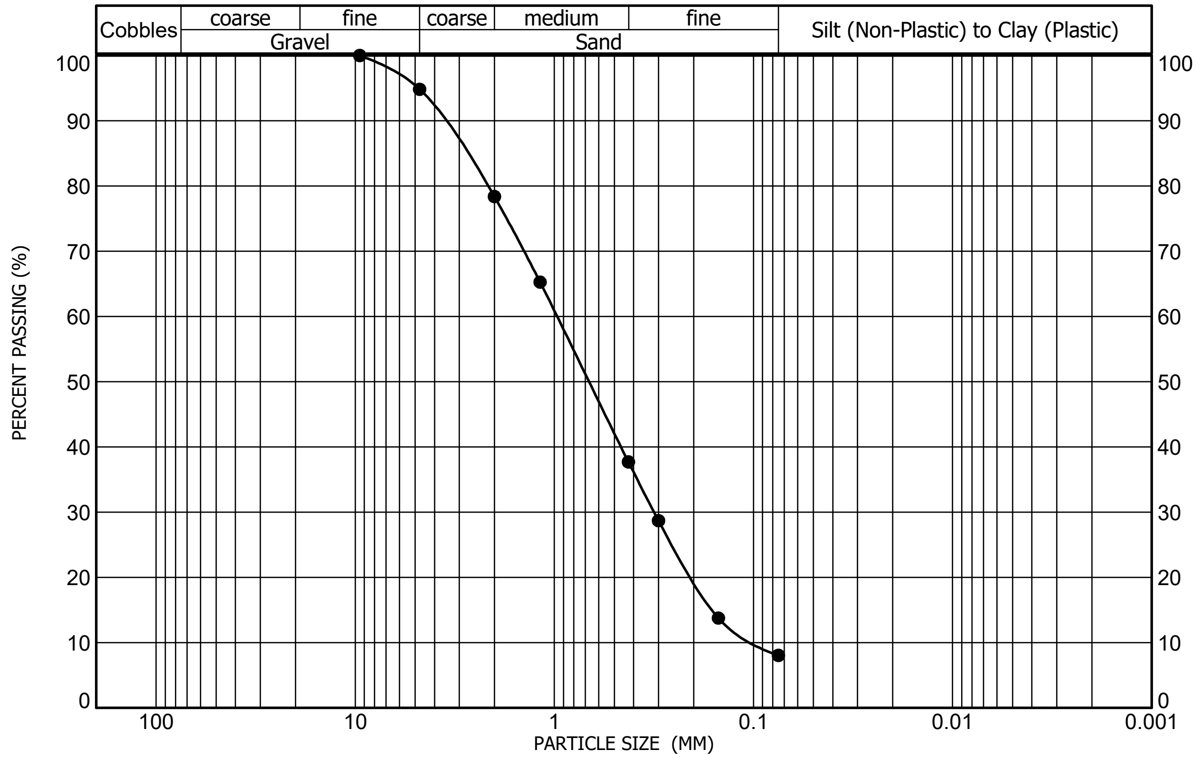
Sample Location	Test Boring No. 24 at a depth of 19 feet	Gravel (%) 0	Liquid Limit 30
Sample Description	Claystone/Sandstone	Sand (%) 48	Plasticity Index 16
Classification	A-6(5), SANDY LEAN CLAY(CL)	Clay/Silt (%) 52	

GRADATION AND ATTERBERG TEST RESULTS

FIGURE A-26

PROJECT NO. 213542

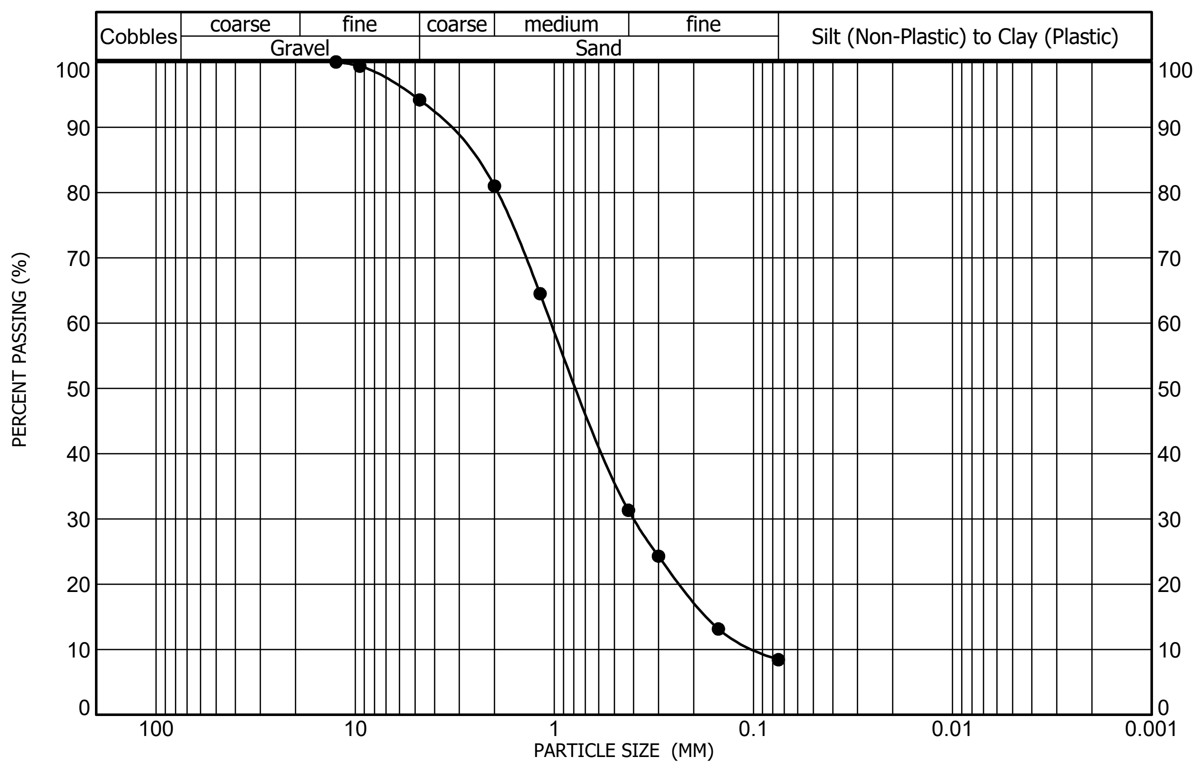
A.G. WASSENAAR, INC.



Sample Location: Test Boring No. 25 at a depth of 14 feet — Gravel (%): 5 — Liquid Limit: NV

Sample Description: Sand, slightly silty, slightly gravelly — Sand (%): 87 — Plasticity Index: NP

Classification: A-1-b(0), WELL-GRADED SAND with SILT(SW-SM) — Clay/Silt (%): 8



Sample Location: Test Boring No. 26 at a depth of 2 feet — Gravel (%): 6 — Liquid Limit: NV

Sample Description: Sand, slightly silty, slightly gravelly — Sand (%): 86 — Plasticity Index: NP

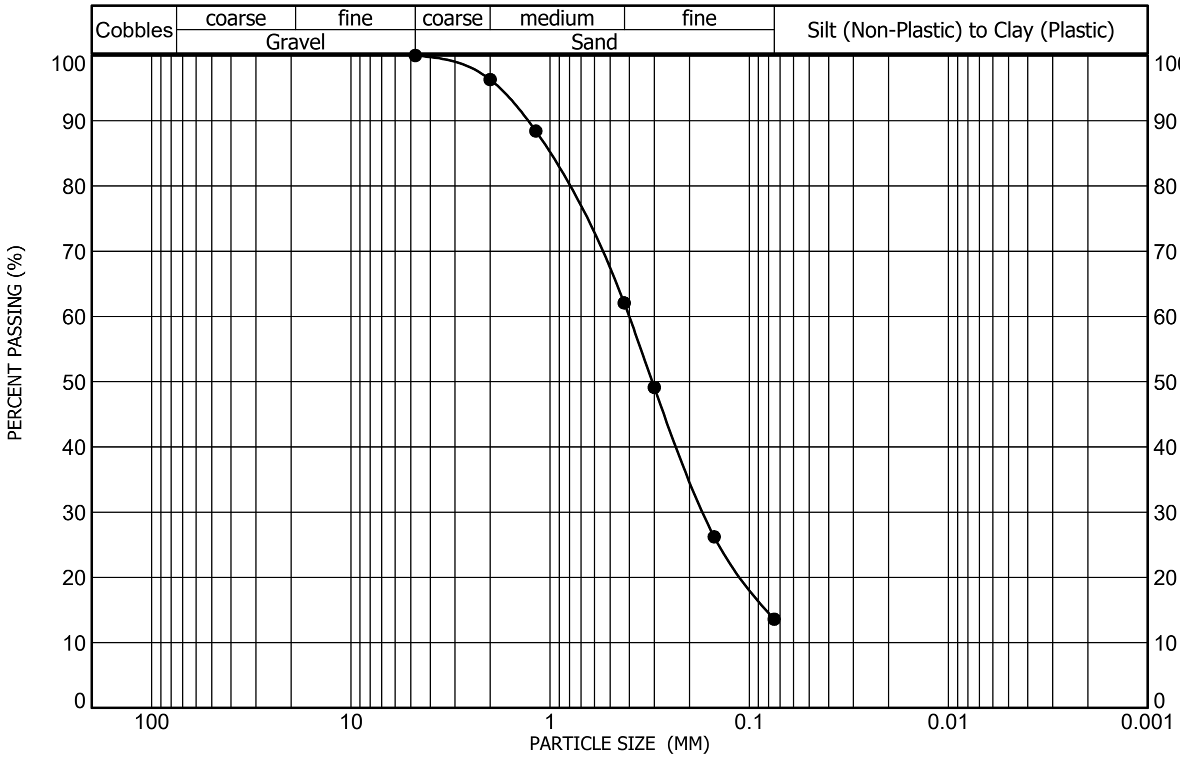
Classification: A-1-b(0), WELL-GRADED SAND with SILT(SW-SM) — Clay/Silt (%): 8

GRADATION AND ATTERBERG TEST RESULTS

FIGURE A-27

PROJECT NO. 213542

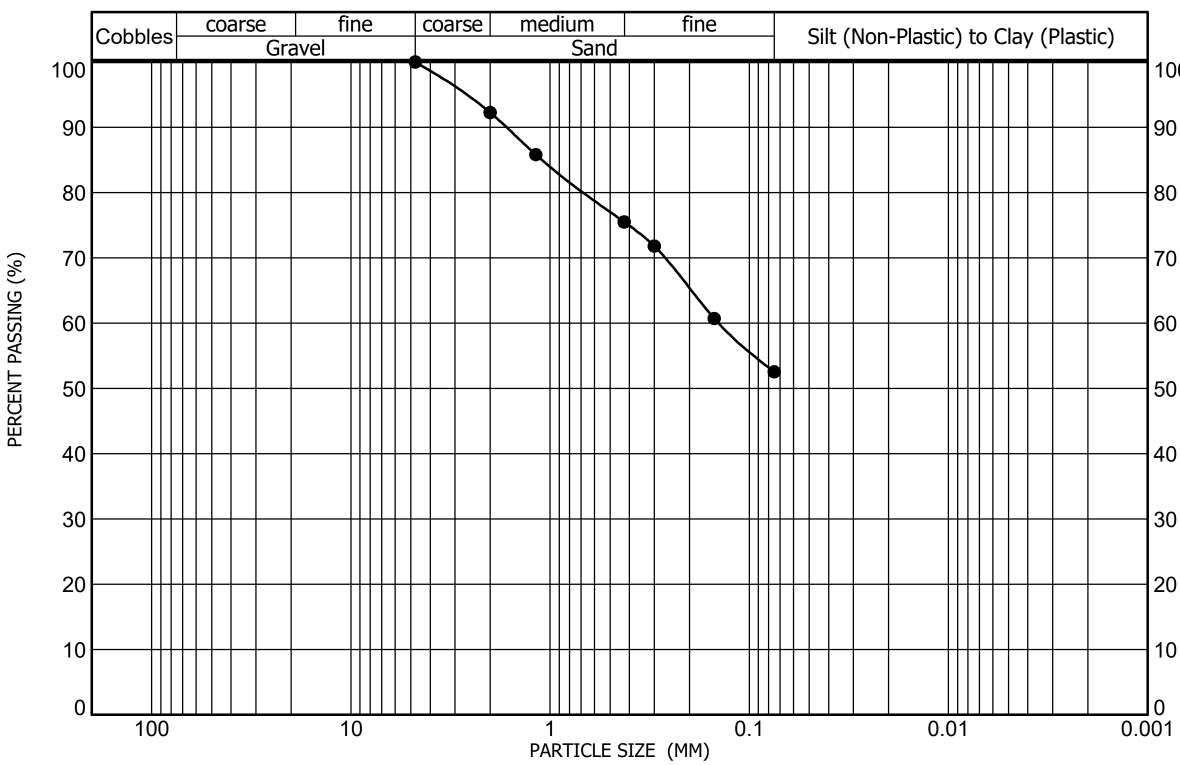
A.G. WASSENAAR, INC.



Sample Location: Test Boring No. 27 at a depth of 9 feet — Gravel (%): 0 — Liquid Limit: NV

Sample Description: Sand, slightly silty — Sand (%): 86 — Plasticity Index: NP

Classification: A-2-4(0), SILTY SAND(SM) — Clay/Silt (%): 14



Sample Location: Test Boring No. 27 at a depth of 24 feet — Gravel (%): 0 — Liquid Limit: 28

Sample Description: Claystone, very sandy — Sand (%): 47 — Plasticity Index: 15

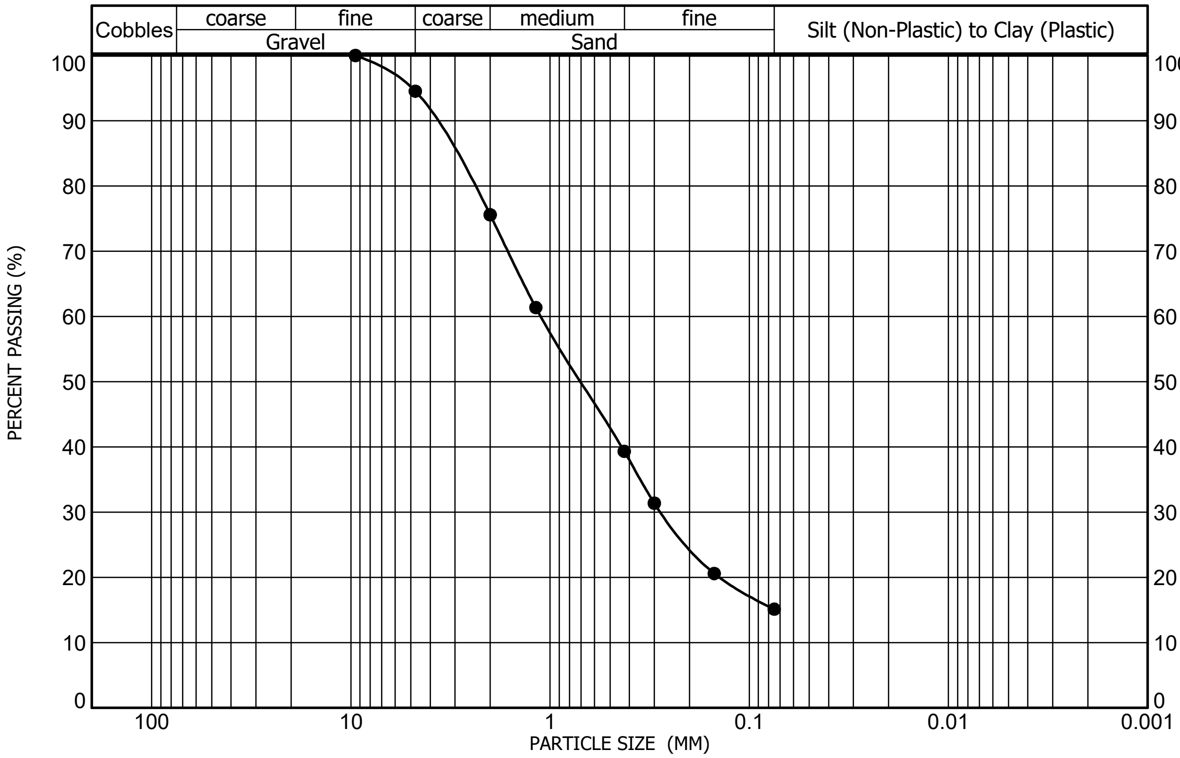
Classification: A-6(4), SANDY LEAN CLAY(CL) — Clay/Silt (%): 53

GRADATION AND ATTERBERG TEST RESULTS

FIGURE A-28

PROJECT NO. 213542

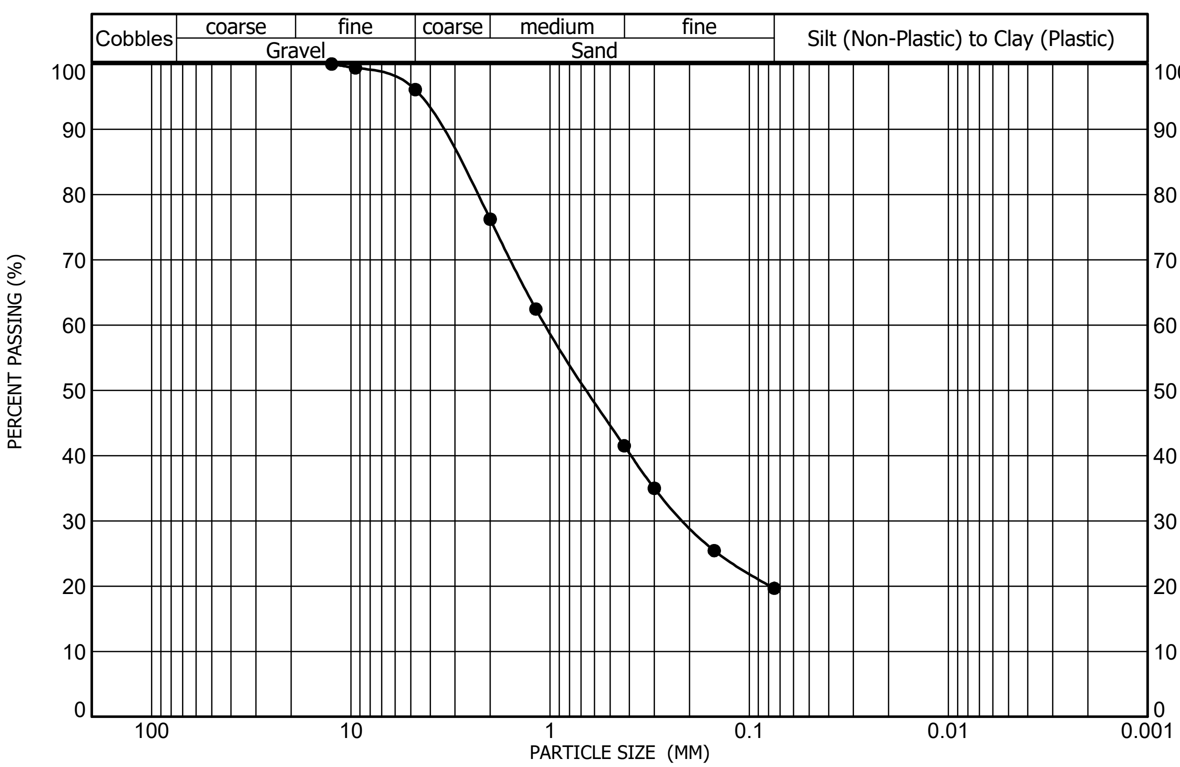
A.G. WASSENAAR, INC.



Sample Location Test Boring No. 28 at a depth of 7 feet
Gravel (%) 5
Liquid Limit 23

Sample Description Sand, clayey/silty, slightly gravelly
Sand (%) 79
Plasticity Index 7

Classification A-2-4(0), SILTY, CLAYEY SAND(SC-SM)
Clay/Silt (%) 15



Sample Location Blended Bulk Sample
Gravel (%) 4
Liquid Limit 26

Sample Description Sand, clayey, trace gravel
Sand (%) 76
Plasticity Index 10

Classification A-2-4(0), CLAYEY SAND(SC)
Clay/Silt (%) 20

GRADATION AND ATTERBERG TEST RESULTS

FIGURE A-29

PROJECT NO. 213542

MOISTURE-DENSITY RELATIONSHIP

A.G. WASSENAAR, INC.

CLIENT AMH Development, LLC

PROJECT NAME Schmidt Property

PROJECT NUMBER 213542

PROJECT LOCATION Colorado Springs, Colorado

TEST RESULTS

Maximum Dry Density	**123.9**	**PCF**
Optimum Water Content	**8.7**	**%**

Sample Location	Blended Bulk Sample
Sample Source	
AGW Description	Sand, clayey, trace gravel
USCS Classification	CLAYEY SAND(SC)
AASHTO Classification	A-2-4(0)
Test Method	D698B

Gravel (%)	4
Sand (%)	77
Silt/Clay (%)	20
Liquid Limit	26
Plasticity Index	10

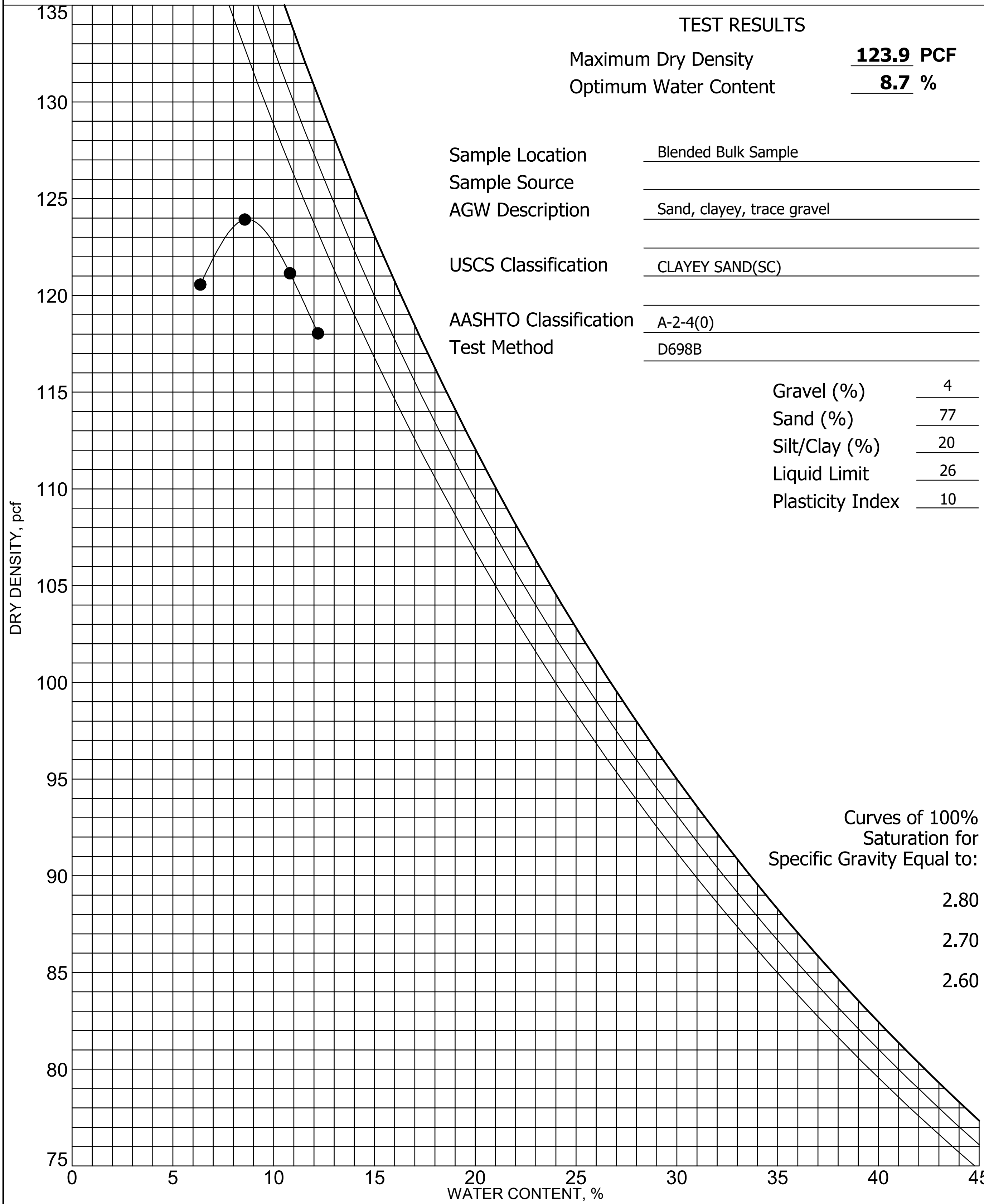


FIGURE A-30

APPENDIX B
SPECIFICATIONS FOR PLACEMENT OF FILL

APPENDIX B
SPECIFICATIONS FOR PLACEMENT OF FILL

General

AGW, as the Client's representative, should observe fill placement and conduct tests to determine if the materials placed, methods of placement, and compaction are in reasonable conformance with these specifications. Specifications presented in this Appendix are general in nature. They should be used for construction except where specifically superseded by those presented in the attendant geotechnical study.

For the purpose of this specification, structural areas include those areas that will support constructed appurtenances (e.g., foundations, slabs, flatwork, pavements, etc.) and fill embankments or slopes that support significant fills or constructed appurtenances. Structural areas will be as defined by AGW.

Fill Material

Fill material should consist of on or off-site soils which are relatively free of vegetable matter and rubble. Off-site materials should be evaluated by AGW prior to importation. No organic, frozen, perishable, rock greater than 6 inches, or other unsuitable material should be placed in the fill. For the purpose of this specification, cohesive soil is defined as a mixture of clay, sand, and silt with more than 35% passing a U. S. Standard #200 sieve and a Plasticity Index of at least 11. These materials will classify as an A-6 or A-7 by the AASHTO Classification system. Granular soils are all materials which do not classify as cohesive.

Proposed import material should be a material having 100% finer than 3 inches in diameter and not more than 80% passing a U. S. Standard No. 200 sieve, provided the Plasticity Index is less than 20. Soil not meeting these specifications, but proposed for import fill, must be evaluated by AGW.

Preparation of Fill Subgrade

Vegetation, organic topsoil, any existing fill, and any other deleterious materials should be removed from the fill area. The area to be filled should then be scarified, moistened or dried as necessary, and compacted to the moisture content and compaction level specified below prior to placement of subsequent layers of fill.

Placement of Fill Material

The materials should be delivered to the fill in a manner which will permit a well and uniformly compacted fill. Before compacting, the fill material should be properly broken down, mixed, and spread in approximately horizontal layers not greater than 8 inches in loose thickness.

Moisture Control

The material must contain uniformly distributed moisture for proper compaction. The Contractor will be required to add moisture to the materials if, in the opinion of AGW, sufficient and uniform moisture is not present in the fill. If the fill materials are too wet for proper compaction, aerating and/or mixing with drier materials will be required.

Moisture content should be controlled as a percentage deviation from optimum. Optimum moisture content is defined as the moisture content corresponding to the maximum density of a laboratory compacted sample performed according to ASTM D698 for cohesive soils or ASTM D1557 for granular soils. The moisture content specifications for the various areas are as follows:

		Cohesive Soils	Granular Soils
1.	Beneath Structural Areas:	0 to +4%	−2 to +2%
2.	Beneath Non-Structural Areas:	−3 to +3%	−3 to +3%
3.	Moisture Treated Fill:	0 to +4%	−2 to +2%

Compaction

When the moisture content and conditions of each layer spread are satisfactory, the fill should be compacted. Laboratory moisture-density tests should be performed on typical fill materials to determine the maximum density. Field density tests must then be made to determine fill compaction. The compaction standard to be utilized in determining the maximum density is ASTM D698 for cohesive soils or ASTM D1557 for granular soils. The following compaction specifications should be followed for each area:

1.	Beneath Structural Areas:	95% of Maximum Dry Density
2.	Beneath Non-Structural Areas:	90% of Maximum Dry Density
3.	Moisture Treated Fill:	95% of Maximum Dry Density

If the fill contains less than 10% passing the No. 200 sieve, it may be necessary to control compaction based on relative density (ASTM D2049). If this is the case, then compaction around the structures and beneath walkway or other slabs should be to at least 70% relative density, and compaction beneath foundations and vehicle supporting should be to at least 80% relative density.

Deep Fills

In areas where fill depths exceed 20 feet beneath structural areas, additional compaction considerations will be required to reduce fill settlement. Fill placed within 20 feet of final overlot grade should be compacted as required above. Deeper fills should be compacted to 100% of maximum dry density at a moisture content of ±2% of optimum moisture content. Relative density of at least 85% will be required when necessary.

Responsibility

Any mention of essentially full-time testing and observation does not mean AGW will accept responsibility for future fill performance. 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. Performance of construction observation services does not constitute a warranty or guarantee of any type, since even with diligent observation, some construction defects, deficiencies or omissions in the Contractor's work may occur undetected. 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.