DRAFT

GEOTECHNICAL REPORT

Maywood Elementary Site
1410 – South 200th Street
SeaTac, Washington

Project No. T-8402

Terra Associates, Inc.

Prepared for:

Bridge Development Partners
Bellevue, Washington

October 28, 2020
Revised January 25, 2021

TERRA ASSOCIATES, Inc.
Consultants in Geotechnical Engineering, Geology
and
Environmental Earth Sciences

October 28, 2020
Revised January 25, 2021
Project No. T-8402

Mr. Kyle Siekawitch
Bridge Development Partners
10655 – NE 4th Street, Suite 500
Bellevue, Washington 98004

DRAFT

Subject: Geotechnical Report
Maywood Elementary Site
1410 – South 200th Street
SeaTac, Washington

Dear Mr. Siekawitch:

As requested, we have conducted a geotechnical engineering study for the subject project. The attached report presents our findings and recommendations for the geotechnical aspects of project design and construction.

In general, the soil conditions at the site consisted of approximately 7 to 12 inches of topsoil overlying approximately 2 to 6 feet of fill material consisting of medium dense silty sand or sand with silt and gravel, overlying dense silty sand with gravel, silty sand, sand with silt and gravel, and sand to the termination of the test pits. The soil conditions observed in the test borings were consistent with those observed in the test pits except no fill material was observed overlying the native soils. The fill material observed in the northern portion of the site (Test Pits TP-102, TP-103, and TP-105) had abundant roots and debris to depths of four to six feet.

No groundwater seepage was observed during our explorations except in test pits TP-101 and TP-103. In these test pits, groundwater was observed at depths of 3 and 6 feet below existing grade, respectively. The groundwater appeared to be perched on top of the underlying medium dense to dense native soils and likely the groundwater, where encountered at the site, is shallower during the wet winter months. However, the volume of the perched groundwater would be expected to be minor with minimal impacts to the proposed development.

In our opinion, the soil conditions we observed at the site will be suitable for support of the proposed development, provided the recommendations presented in this report are incorporated into project design and construction.

We trust the information presented in this report is sufficient for your current needs. If you have any questions or require additional information, please call.

Sincerely yours,
TERRA ASSOCIATES, INC.

Zakeyo Ngoma, P.E.
Project Engineer

Carolyn S. Decker, P.E.
Project Engineer

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Geotechnical Report
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1410 – South 200th Street
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1.0 PROJECT DESCRIPTION

The project consists of redeveloping the site with three industrial buildings along with associated access and utilities. Review of the site plan prepared by Nelson dated October 30, 2020, shows an approximately 113,000 square-foot building in the northwest portion of the site, a smaller approximately 65,000 square-foot building in the middle of the site, and an approximately 91,000 square-foot building in the southeastern portion of the site. Retaining walls are planned in the northwest corner of the site and along the eastern property lines. Site stormwater will be collected and directed to a stormwater facility in the north-central portion of the site. Based on the existing topography, we expect the grading to achieve building lots and roadway elevations will be around 5 to 20 feet of cut or fill across the majority of the site.

We expect the structures will be constructed using precast concrete tilt-up wall panels with interior isolated columns supporting the roof framing. The floor slab will be constructed at-grade with dock-high loading. Structural loading is expected to be relatively light with isolated building columns carrying 100 to 150 kips and continuous bearing walls carrying 4 to 6 kips per foot. Product loading on the floor slab is not expected to exceed 350 pounds per square foot.

The recommendations in the following sections of this report are based on the design discussed above. If actual features vary or changes are made, we should review the plans in order to modify our recommendations, as required. We should review final design drawings and specifications to verify our recommendations have been properly interpreted and incorporated into the project design.

2.0 SCOPE OF WORK

Our work was completed in accordance with our authorized proposal, revised September 1, 2020. Accordingly, on October 13, 2020, we observed soil and groundwater conditions by excavating 6 test pits to depths of approximately 8 to 14 feet below existing site grades using a track-mounted excavator. On October 15, 2020, we supplemented this data by drilling 3 test borings to a maximum depth of about 41.5 feet. On December 31, 2020, we further supplemented this data by excavating 5 test pits in the northwestern portion of the site to depths of approximately 8 to 10.5 feet below existing site grades using a track-mounted excavator. Using this data, along with laboratory testing, we performed analyses to develop geotechnical recommendations for project design and construction. Specifically, this report addresses the following:

- Soil and groundwater conditions.
- Geologic hazards per the City of SeaTac Municipal Code.

- Seismic
- Site preparation and grading.
- Foundations
- Floor slabs.
- Lateral earth pressures for wall design.
- Infiltration feasibility.
- Subsurface drainage.
- Utilities
- Pavements

It should be noted, recommendations outlined in this report regarding drainage are associated with soil strength, design earth pressures, erosion, and stability. Design and performance issues with respect to moisture as it relates to the structure environment are beyond Terra Associates, Inc.'s purview. A building envelope specialist or contractor should be consulted to address these issues, as needed.

3.0 SITE CONDITIONS

3.1 Surface

The project site consists of 20 tax parcels totaling approximately 15 acres located at and north of 1410 – South 200th Street in SeaTac, Washington. The approximate site location is shown on Figure 1.

The majority of the site is currently developed with an elementary school and associated playfields, parking, and utilities. The northern and eastern-most properties are heavily forested. The western most property is developed as a gravel storage yard. Where developed, site topography is generally flat with some sloping toward the school from the upper play field, located north of the building and the parking located east of the building. The forested areas are steeper than the remainder of the site. Overall topographical relief is about 50 feet, sloping down from east to northwest.

3.2 Subsurface

In general, the soil conditions at the site generally consisted of approximately 7 to 12 inches of topsoil overlying approximately 2 to 6 feet of fill material consisting of medium dense silty sand or sand with silt and gravel, overlying dense silty sand with gravel, silty sand, sand with silt and gravel, and sand to the termination of the test pits. The soil conditions observed in the test borings were consistent with those observed in the test pits except no fill material was observed overlying the native soils. The fill material observed in the northern portion of the site (Test Pits TP-102, TP-103, and TP-105) had abundant roots and debris to depths of four to six feet.

The *Geologic Map of the Tacoma 1:100,000-scale Quadrangle, Washington*, by J. Eric Schuster, Ashley A. Cabibbo, Joseph F. Schilter, and Ian J. Hubert (2015) shows the western half of the site soils are mapped as Vashon Till (Qgt) and the eastern half of the site is mapped as Advance Outwash (Qga). The soils observed in the test pits and test borings are generally consistent with this mapping.

The preceding discussion is intended to be a general review of the soil conditions encountered. For more detailed descriptions, please refer to the Test Pit Logs and Test Boring Logs in Appendix A. The approximate location of the test pits and test borings are shown on Figure 2.

3.3 Groundwater

Minor groundwater seepage was observed in Test Pits TP-101 and TP-103 at depths of 3 and 6 feet below existing grade, respectively. The groundwater appeared to be perched on top of the underlying medium dense to dense native soils. The volume of the perched groundwater would be expected to be minor with minimal impacts to the proposed development.

3.4 Geologic Hazards

While the SeaTac Municipal Code (SMC) does not specifically define geologically hazardous areas. Section 15.700.015 of the SMC defines critical areas as areas including "coal mine hazard areas, erosion hazard areas, flood hazard areas, landslide hazard areas, seismic hazard areas, steep slope hazard areas, streams, volcanic hazard areas, wetlands and critical aquifer recharge areas." Based on these critical areas, we evaluated current site conditions for the presence of geologic hazards including erosion and landslide hazard areas, seismic hazard areas, mine hazard areas, and volcanic hazard areas.

3.4.1 Erosion Hazard Areas

Erosion Hazard Areas are typically defined as areas that are underlain by soils that are classified by the United States Department of Agriculture Natural Resources Conservation Service (NRCS) as having a severe or very severe potential for erosion.

The United States Department of Agriculture NRCS (formerly the SCS) has mapped the site soils as Alderwood gravelly sandy loam, 8 to 15 percent slopes and Everett very gravelly sandy loam, 0 to 8 percent slopes. These soils will have a slight to moderate potential for erosion when disturbed. Therefore, the site does not meet typical definitions for erosion hazard areas. Regardless, erosion protection measures as required by the City of SeaTac will need to be in place prior to initiating grading activities on the site. This would include perimeter silt fencing to contain erosion onsite and cover measures to prevent or reduce soil erosion during and following construction.

3.4.2 Steep Slope Hazard Areas

Section 15.700.015 of the SMC defines a steep slope hazard area as "those areas in the City on slopes of forty percent (40%) or greater within a vertical elevation change of at least twenty (20) feet. A slope is delineated by establishing its toe and top and is measured by averaging the inclination over at least ten (10) feet of vertical relief."

Based on our field observations and review of available topographic information, it is our opinion that slope areas meeting the criteria defining steep slope hazard areas are not present at the site. We did not observe any indications of instability, persistent seepage, or significant active erosion on the site slopes.

3.4.3 Seismic Hazard Areas

Section 15.700.015 of the SMC defines a steep slope hazard area as "those areas in the City subject to severe risk of earthquake damage as a result of soil liquefaction in areas underlain by cohesionless soils of low density and usually in association with a shallow groundwater table or other seismically induced settlement."

Liquefaction is a phenomenon where there is a reduction or complete loss of soil strength due to an increase in water pressure induced by vibrations. Liquefaction mainly affects geologically recent deposits of fine-grained sand that is below the groundwater table. Soils of this nature derive their strength from intergranular friction. The generated water pressure or pore pressure essentially separates the soil grains and eliminates this intergranular friction; thus, eliminating the soil's strength.

Considering the site is underlain by glacially consolidated and overridden sediments, the potential for earthquake damage at the site resulting from seismically induced differential settlement, and ground shaking is negligible in our opinion. Therefore, according to the SMC, the site is not considered a seismic hazard area.

3.5 Seismic Design Parameters

Based on soil conditions observed in the test pits and our knowledge of the area geology, per the current International Building Code (IBC), site class "D" should be used in structural design.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 General

Based on our study, in our opinion, there are no geotechnical considerations that would preclude development of the site, as currently planned. The buildings can then be supported on conventional spread footings bearing on competent native soils below the organic surficial soils or on structural fill placed and compacted above these competent native soils. Floor slabs and pavements can be similarly supported.

The exception to this is in the vicinity of Test Pits TP-102, TP-103, and TP-105 where the fill soils contain abundant roots and debris that would not be suitable for building support. This material will have to be removed to depths of up to six feet below existing grade and replaced with compacted structural fill prior to excavating for foundations.

The sand and gravel soils observed throughout the site would be suitable for use as structural fill during most weather conditions. The upper layers of silty soils contain a sufficient amount of fines such that they will be difficult to compact as structural fill when too wet. Accordingly, the ability to use the soils from site excavations as structural fill will depend on their moisture content and the prevailing weather conditions at the time of construction. Depending on the excavation depth and volume of clean sand soils available, and if grading activities will take place during the winter season, the owner should be prepared to import free-draining granular material for use as structural fill and backfill.

The following sections provide detailed recommendations regarding the preceding issues and other geotechnical design and construction considerations. These recommendations should be incorporated into the final design drawings and construction specifications.

4.2 Site Preparation and Grading

To prepare the site for construction, all vegetation and organic surface soils should be stripped and removed from below the building lots and roadway areas. Surface stripping depths of approximately 7 to 12 inches should be expected to remove the organic surficial soils. Soil containing organic material will not be suitable for use as structural fill, but may be used for limited depths in nonstructural areas. In the developed portions of the site, demolition of existing structures should include removal of existing foundations and abandonment of underground septic systems and other buried utilities. Abandoned utility pipes that fall outside of the new building areas can be left in place provided they are sealed to prevent intrusion of groundwater seepage and soil.

In the northern portion of the site (Test Pits TP-102, TP-103, and TP-105), over-excavation of the fill material consisting of roots and debris will have to be removed to depths of up to six feet below existing grade and replaced with compacted structural fill. The lateral extent of the over-excavation will need to be determined in the field during grading.

Once stripping and demolition operations are complete, cut and fill operations can be initiated to establish desired grades. Prior to placing fill, all exposed bearing surfaces should be observed by a representative of Terra Associates, Inc. to verify soil conditions are as expected and suitable for support of building foundations and pavement elements or placement of structural fill. Our representative may request proofrolling the exposed surface with a heavy rubber-tired vehicle to determine if any isolated soft and yielding areas are present. If unsuitable yielding areas are observed, they should be cut to firm bearing soil and filled to grade with structural fill. If depth of excavation to remove unstable soils is excessive, use of geotextile fabric such as Mirafi 500X or equivalent in conjunction with structural fill can be considered in order to limit the depth of removal. Our experience has shown, in general, a minimum of 18 inches of a clean, granular structural fill placed and compacted over the geotextile fabric should establish a stable bearing surface.

Our study indicates the existing fill material and silty sand native soils contains a sufficient percentage of fines (silt and clay-sized particles) that will make them difficult to compact as structural fill if they are too wet or too dry. Accordingly, the ability to use the existing fill and silty sand soils as structural fill will depend on their moisture content and the prevailing weather conditions when site grading activities take place. If wet soils are encountered, the contractor will need to dry the soils by aeration during dry weather conditions. Alternatively, the use of an additive such as Portland cement or lime to stabilize the soil moisture can be considered. If the soil is amended, additional Best Management Practices (BMPs) addressing the potential for elevated pH levels will need to be included in the Stormwater Pollution Prevention Program (SWPPP) prepared with the Temporary Erosion and Sedimentation Control (TESC) plan. The cleaner sand and gravel should be suitable for use as structural fill year-round.

If grading activities are planned during the wet winter months, or if they are initiated during the summer and extend into fall and winter, the owner should be prepared to import wet-weather structural fill. For this purpose, we recommend importing a granular soil that meets the following grading requirements:

U.S. Sieve Size	Percent Passing
6 inches	100
No. 4	75 maximum
No. 200	5 maximum*

* Based on the ¾-inch fraction.

Prior to use, Terra Associates, Inc. should examine and test all materials imported to the site for use as structural fill.

Structural fill should be placed in uniform loose layers not exceeding 12 inches and compacted to a minimum of 95 percent of the soil's maximum dry density, as determined by American Society for Testing and Materials (ASTM) Test Designation D-1557 (Modified Proctor). The moisture content of the soil at the time of compaction should be within two percent of its optimum, as determined by this ASTM standard. In nonstructural areas, the degree of compaction can be reduced to 90 percent.

4.4 Foundation Support

The buildings may be supported on conventional isolated or continuous footing foundations bearing on competent native soils or new structural fill placed above competent soils. Foundation subgrades should be prepared as recommended in Section 4.2 of this report. Perimeter foundations exposed to the weather should be at a minimum depth of 18 inches below final exterior grades for frost protection. Interior foundations can be constructed at any convenient depth below the floor slab.

As noted above, the existing fill material in the vicinity of Test Pits TP-102, TP-13, and TP-105 would not be suitable for building support. Over-excavation of four to six feet should be expected in the vicinity of these test pits. The lateral extent of the over-excavation should be determined in the field during grading.

We recommend designing foundations supported on competent soils for a net allowable bearing capacity of 2,500 pounds per square foot (psf). For short-term loads, such as wind and seismic, a one-third increase in this allowable capacity can be used. With the anticipated building loads and this bearing stress applied to the soil, we estimate total foundation settlement would not exceed one inch.

For designing foundations to resist lateral loads, a base friction coefficient of 0.35 can be used. Passive earth pressures acting on the side of the footing and buried portion of the foundation stem wall can also be considered. We recommend calculating this lateral resistance using an equivalent fluid weight of 350 pcf. We recommend not including the upper 12 inches of soil in this computation because they can be affected by weather or disturbed by future grading activity. This value assumes the foundation will be constructed neat against competent native soil or backfilled with structural fill as described in Section 4.2 of this report. The values recommended include a safety factor of 1.5.

4.5 Slab-on-Grade Floors

Slab-on-grade floors may be supported on a subgrade as recommended in Section 4.2. Immediately below the floor slab, we recommend placing a four-inch thick capillary break layer composed of clean, coarse sand or fine gravel that has less than three percent passing the No. 200 sieve. This material will reduce the potential for upward capillary movement of water through the underlying soil and subsequent wetting of the floor slab.

The capillary break layer will not prevent moisture intrusion through the slab caused by water vapor transmission. Where moisture by vapor transmission is undesirable, such as covered floor areas, a common practice is to place a durable plastic membrane on the capillary break layer and then cover the membrane with a layer of clean sand or fine gravel to protect it from damage during construction, and to aid in uniform curing of the concrete slab. It should be noted, if the sand or gravel layer overlying the membrane is saturated prior to pouring the slab, it will not be effective in assisting uniform curing of the slab and can actually serve as a water supply for moisture bleeding through the slab, potentially affecting floor coverings. Covering the membrane with a layer of sand or gravel should be avoided if floor slab construction occurs during the wet winter months and the layer cannot be effectively drained. We recommend floor designers and contractors refer to the current American Concrete Institute (ACI) Manual of Concrete Practice for further information regarding vapor barrier installation below slab-on-grade floors.

4.6 Lateral Earth Pressures on Lower-Level Walls

The magnitude of earth pressure development on retaining walls will partly depend on the quality of the wall backfill. We recommend placing and compacting wall backfill as structural fill as described in Section 4.2 of this report. To guard against hydrostatic pressure development, drainage must be installed behind the wall. A typical wall drainage detail is shown on Figure 3.

With wall backfill placed and compacted as recommended and drainage properly installed, we recommend designing unrestrained walls for an active earth pressure equivalent to a fluid weighing 35 pounds per cubic foot (pcf). For restrained walls, an additional uniform load of 100 psf should be added to the 35 pcf. To account for typical traffic surcharge loading, the walls can be designed for an additional imaginary height of two feet (two-foot soil surcharge). For evaluation of wall performance under seismic loading, a uniform pressure equivalent to 8H psf, where H is the height of the below-grade portion of the wall should be applied in addition to the static lateral earth pressure. These values assume a horizontal backfill condition and no other surcharge loading, sloping embankments, or adjacent buildings will act on the wall. If such conditions exist, then the imposed loading must be included in the wall design. Friction at the base of foundations and passive earth pressure will provide resistance to these lateral loads. Values for these parameters are provided in Section 4.4 of this report.

4.7 Infiltration Feasibility

Our evaluation of feasibility for site infiltration as a means for site stormwater disposal was based on review of the Test Pit Logs, Test Boring Logs, and laboratory grain size distribution testing. Based on our evaluation of soil conditions, discharge of development stormwater by use of infiltration may be feasible for facilities that are founded in the sand and gravel formation typically observed approximately 10 feet below current site grades. The ability to utilize infiltration should be based on the proposed location of the facilities with additional analysis undertaken to determine the depth of the infiltratable soils.

We used the Soil Grain Size Analysis Method as outlined in Volume III Section 3.3.6 of the *2014 Washington State Department of Ecology Stormwater Management Manual for Western Washington*, to determine a preliminary long-term design infiltration rate. This method correlates the saturated hydraulic conductivity with the D_{10}, D_{60}, and D_{90} particle sizes determined from gradation testing of the soils in accordance with ASTM Test Designation D-422. The D_{10} particle size represents the grain size below which ten percent of the soil is smaller in size. The D_{60} particle size represents the grain size below which 60 percent of the soil is smaller in size. The D_{90} particle size represents the grain size below which 90 percent of the soil is smaller in size. The particle sizes are put in the Massman formula to determine the saturated hydraulic conductivity. Gradation curves from laboratory testing on the soils are attached in Appendix A. Based on the results of the testing, a long-term design infiltration rate of one inch per hour can be used.

In the absence of a groundwater mounding analysis, the 2016 *King County Surface Water Design Manual* (KCSWDM) requires a minimum five-foot separation between the bottom of the infiltration facility and the seasonal high groundwater elevation. A separation of three feet may be considered if a groundwater mounding analysis demonstrates the facility would function and not overflow. Groundwater was not observed at the time of exploration. For design purposes, we recommend placing the groundwater at 30 feet below current site grades.

We recommend a representative of Terra Associates, Inc. observe the subgrade of the infiltration facility during construction to ensure the soils exposed are as expected and suitable for infiltration of development stormwater.

Our analysis included size factors that were assumed based on our experience. Once the facilities have been sized and located, we will need to perform onsite infiltration tests in accordance with the 2016 KCSWDM to confirm the design infiltration rates.

The permeability of the native sand and gravel soils will be significantly impacted by the intrusion of soil fines (silt- and clay-sized particles). Even a relatively minor amount of soil fines can reduce the permeability of the formation by a factor of ten. The greatest exposure to soil fines contamination will occur during mass grading and construction. Therefore, we recommend that the Temporary Erosion and Sedimentation Control (TESC) plans route construction stormwater to a location other than the permanent infiltration trenches.

4.8 Drainage

Subsurface

Installation of perimeter foundation drains will not be required where site pavements extend to the building perimeters and positive drainage away from the building is provided. Where landscaping is placed adjacent the buildings, we recommend installing a continuous drain along the outside lower edge of the perimeter building foundations. The drains can be laid to grade at an invert elevation equivalent to the bottom of footing grade. The drains can consist of four-inch diameter perforated PVC pipe that is enveloped in washed pea gravel-sized drainage aggregate. The aggregate should extend six inches above and to the sides of the pipe. Roof and foundation drains should be tightlined separately to the storm drains. All drains should be provided with cleanouts at easily accessible locations.

4.9 Utilities

Utility pipes should be bedded and backfilled in accordance with American Public Works Association (APWA) or the local jurisdiction's specifications. At a minimum, trench backfill should be placed and compacted as structural fill, as described in Section 4.2 of this report. As noted, depending on the soil moisture when excavated most inorganic native soils on the site should be suitable for use as backfill material during dry weather conditions. However, if utility construction takes place during the wet winter months, it will likely be necessary to import suitable wet-weather fill for utility trench backfilling. The deeper sands and gravels should be suitable to reuse as structural fill in most weather conditions.

4.10 Pavement

Pavements should be constructed on subgrades prepared as recommended in Section 4.2 of this report. Regardless of the degree of relative compaction achieved, the subgrade must be firm and relatively unyielding before paving. Proofrolling the subgrade with heavy construction equipment should be completed to verify this condition.

The pavement design section is dependent upon the supporting capability of the subgrade soils and the traffic conditions to which it will be subjected. We expect traffic at the facility will consist of cars and light trucks, along with heavy traffic in the form of semi-trucks. For design considerations, we have assumed traffic in parking and in car/light truck access pavement areas can be represented by an 18-kip Equivalent Single Axle Loading (ESAL) of 50,000 over a 20-year design life. For heavy traffic pavement areas, we have assumed an ESAL of 300,000 would be representative of the expected loading. These ESALs represent loading approximately equivalent to 3 and 18, loaded (80,000-pound GVW) tractor-trailer rigs traversing the pavement daily in each area, respectively.

With a stable subgrade prepared as recommended for the design ESAL values, we recommend the following pavement sections:

Light Traffic/Car Access:

- Two inches of hot mix asphalt (HMA) over four inches of crushed rock
- Full depth HMA – 3.5 inches

Heavy Traffic/Truck Access:

- Three inches of HMA over six inches of crushed rock
- Full depth HMA – 5 inches

For exterior Portland cement concrete (PCC) pavement, we recommend the following:

- 6 inches of PCC over two inches of crushed surfacing top course
    - 28 day compressive strength – 4,000 psi
    - Control joints spaced at a maximum of 15 feet

The paving materials used should conform to the Washington State Department of Transportation (WSDOT) specifications for half-inch class HMA, PCC, and CRB.

Long-term pavement performance will depend on surface drainage. A poorly drained pavement section will be subject to premature failure resulting from surface water infiltrating the subgrade soils and reducing their supporting capability. For optimum performance, we recommend surface drainage gradients of at least two percent. Some degree of longitudinal and transverse cracking of the pavement surface should be expected over time. Regular maintenance should be planned to seal cracks as they occur.

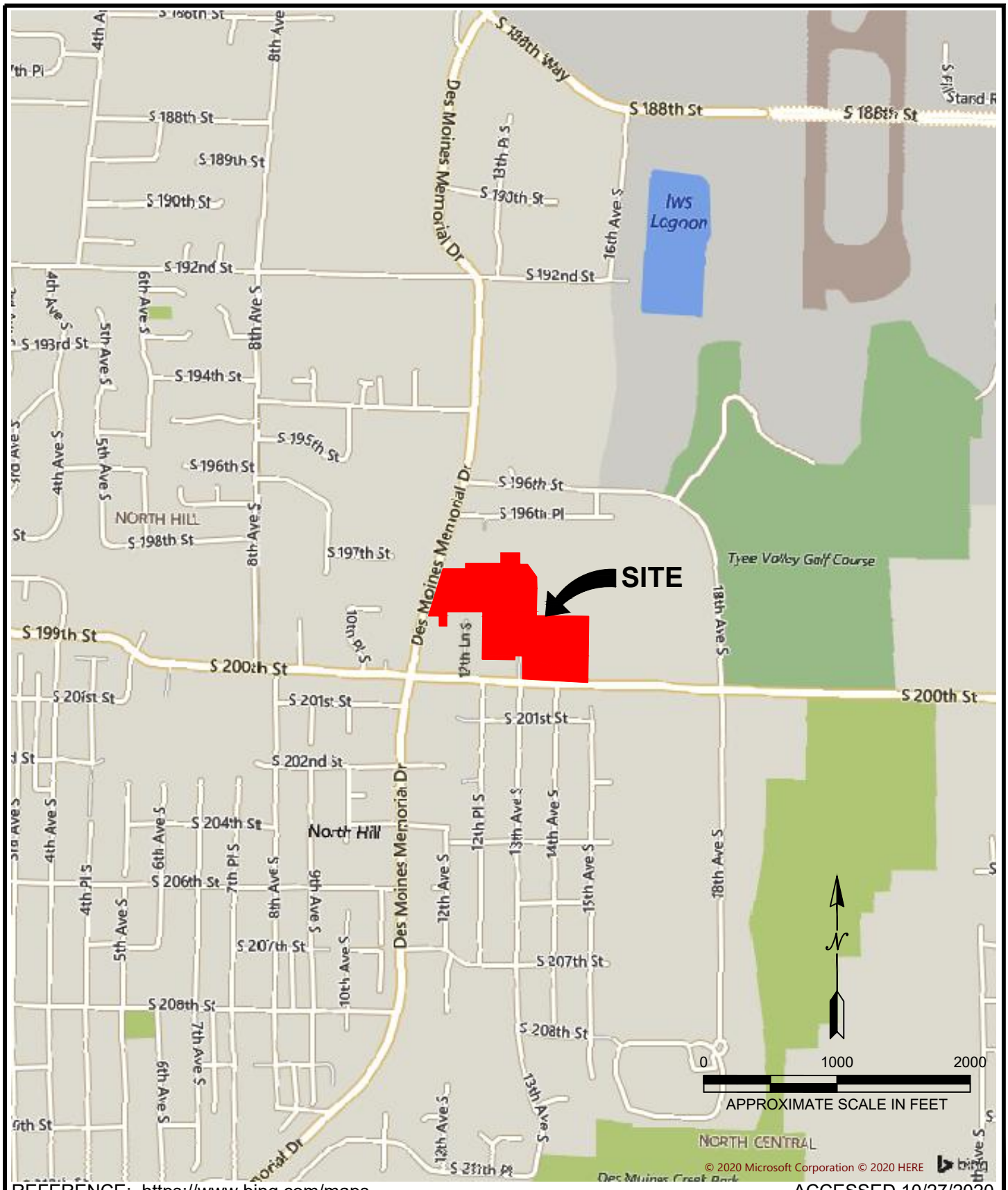
5.0 ADDITIONAL SERVICES

Terra Associates, Inc. should review the final design drawings and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and implemented in project design. We should also provide geotechnical service during construction to observe compliance with our design concepts, specifications, and recommendations. This will allow for design changes if subsurface conditions differ from those anticipated prior to the start of construction.

6.0 LIMITATIONS

We prepared this report in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made. This report is the copyrighted property of Terra Associates, Inc. and is intended for specific application to the Maywood Elementary Site project in SeaTac, Washington. This report is for the exclusive use of Bridge Development Partners, LLC and their authorized representatives.

The analyses and recommendations presented in this report are based on data obtained from the subsurface explorations completed on the site. Variations in soil conditions can occur, the nature and extent of which may not become evident until construction. If variations appear evident, Terra Associates, Inc. should be requested to reevaluate the recommendations in this report prior to proceeding with construction.

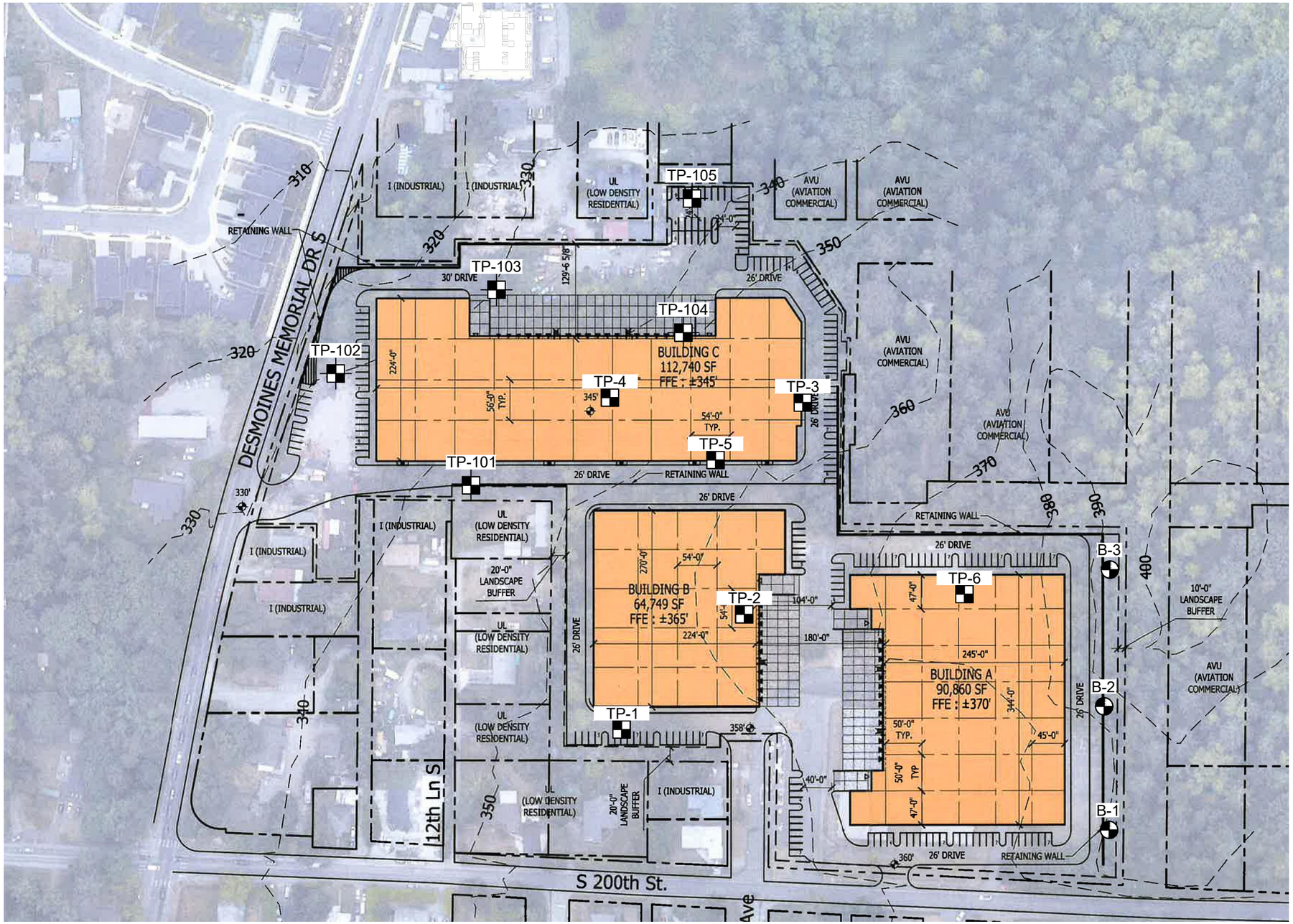


REFERENCE: https://www.bing.com/maps ACCESSED 10/27/2020

Terra Associates, Inc.
Consultants in Geotechnical Engineering
Geology and
Environmental Earth Sciences

VICINITY MAP
MAYWOOD ELEMENTARY SITE
SEATAC, WASHINGTON

Proj.No. T-8402	Date: JAN 2021	Figure 1



NOTE:

THIS SITE PLAN IS SCHEMATIC. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. IT IS INTENDED FOR REFERENCE ONLY AND SHOULD NOT BE USED FOR DESIGN OR CONSTRUCTION PURPOSES.

REFERENCE: SITE PLAN PROVIDED BY NELSON.

LEGEND:

- APPROXIMATE TEST PIT LOCATION
- APPROXIMATE BORING LOCATION
- APPROXIMATE TEST PIT LOCATION

0 150 300

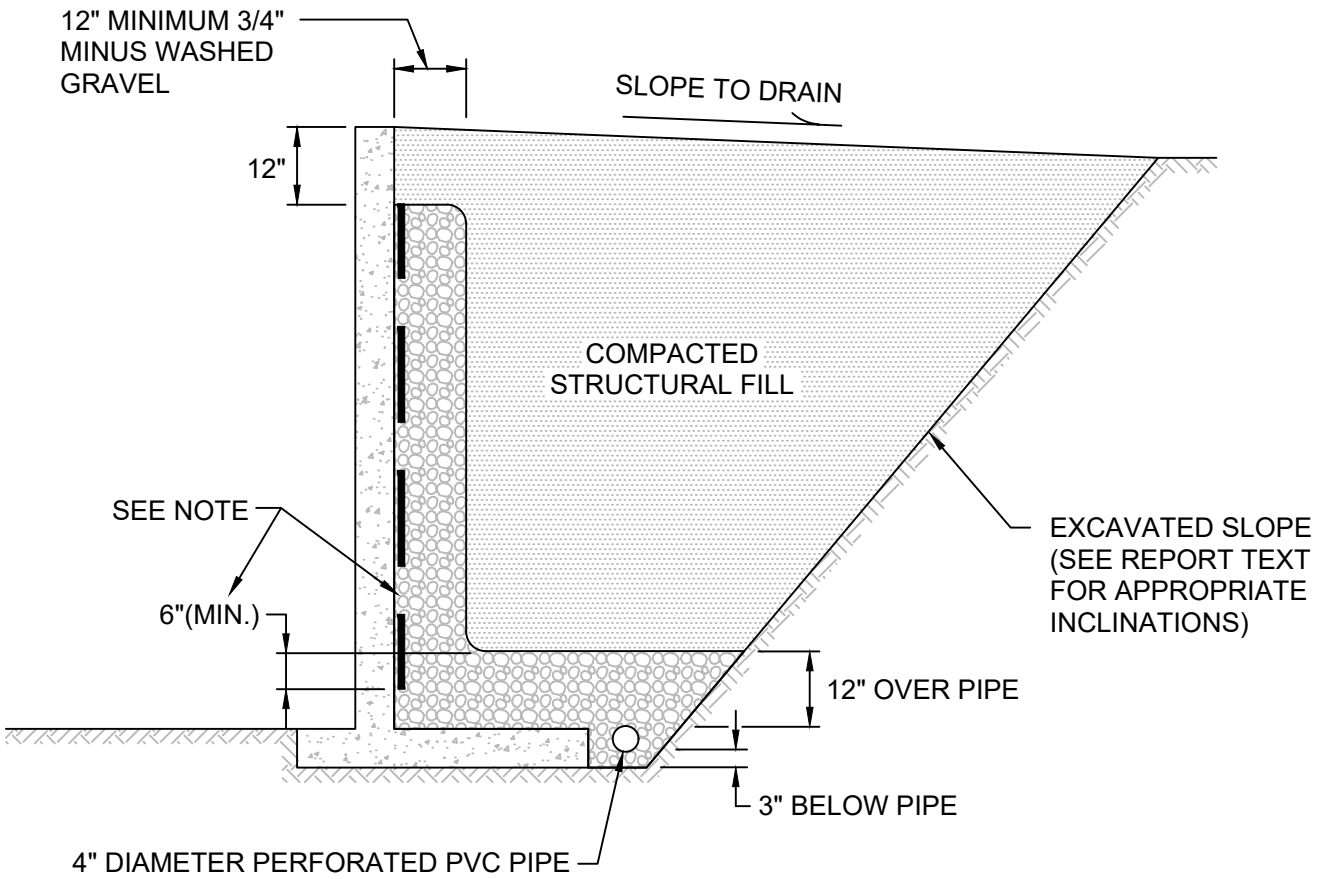
APPROXIMATE SCALE IN FEET

N

Terra Associates, Inc.
Consultants in Geotechnical Engineering Geology and Environmental Earth Sciences

EXPLORATION LOCATION PLAN
MAYWOOD ELEMENTARY SITE
SEATAC, WASHINGTON

Proj.No. T-8402	Date: JAN 2021	Figure 2



NOT TO SCALE

NOTE:

MIRADRAIN G100N PREFABRICATED DRAINAGE PANELS OR SIMILAR PRODUCT CAN BE SUBSTITUTED FOR THE 12-INCH WIDE GRAVEL DRAIN BEHIND WALL. DRAINAGE PANELS SHOULD EXTEND A MINIMUM OF SIX INCHES INTO 12-INCH THICK DRAINAGE GRAVEL LAYER OVER PERFORATED DRAIN PIPE.

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Geology and
Environmental Earth Sciences

TYPICAL WALL DRAINAGE DETAIL
MAYWOOD ELEMENTARY SITE
SEATAC, WASHINGTON

Proj.No. T-8402	Date: JAN 2021	Figure 3

APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING

Maywood Elementary Site
SeaTac, Washington

On October 13, 2020, we explored subsurface conditions at the site by excavating 6 test pits to depths of approximately 8 to 14 feet below existing site grades using a track-mounted excavator. The Test Pits at the northern portion of the site had 1-inch diameter PVC pipes installed to an approximate maximum depth of 10 feet upon completion of the test pit. On October 15, 2020 we supplemented this data by drilling 3 test borings to a maximum depth of about 41.5 feet below current site grades. On December 31, 2020, we further supplemented this data by excavating 5 test pits in the northwest portion of the site to depths of approximately 8 to 10.5 feet below existing site grades using a track-mounted excavator.

The Test Pit and Test Boring locations were approximately determined in the field using GPS tracking and by pacing and sighting from existing site features. The approximate locations of the Test Pit and Test Borings are shown on the attached Exploration Location Plan, Figure 2. Test Pit Logs and Test Boring Logs are attached as Figures A-2 through A-15.

A geotechnical engineer from our office conducted the field exploration. Our representative classified the soil conditions encountered, maintained a log of each test pit/boring, obtained representative soil samples, and recorded water levels observed during subsurface exploration. During drilling, soil samples were obtained in general accordance with ASTM Test Designation D-1586. Using this procedure, a 2-inch (outside diameter) split barrel sampler is driven into the ground 18 inches using a 140-pound hammer free-falling from a height of 30 inches. The number of blows required to drive the sampler 12 inches after an initial 6-inch set is referred to as the Standard Penetration Resistance value or N value. This is an index related to the consistency of cohesive soils and relative density of cohesionless materials. N values obtained for each sampling interval are recorded on the Test Boring Logs, Figures A-13 through A-15. The test pits were excavated using a track-mounted excavator and representative grab samples were obtained from the excavator bucket. The Test Pit logs are represented in Figures A-2 through A-12. All soil samples were visually classified in accordance with the Unified Soil Classification System (USCS) described on Figure A-1.

Representative soil samples obtained from the test borings/pits were placed in closed containers and taken to our laboratory for further examination and testing. The moisture content of each sample was measured and is reported on the individual Test Boring/Pit Logs. Grain size analyses were completed on select samples. The results of the grain size analyses are shown on Figures A-16 through A-20.

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS: More than 50% material larger than No. 200 sieve size	**GRAVELS** More than 50% of coarse fraction is larger than No. 4 sieve	Clean Gravels (less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines.
		Gravels with fines	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SANDS More than 50% of coarse fraction is smaller than No. 4 sieve	Clean Sands (less than 5% fines)	SW	Well-graded sands, sands with gravel, little or no fines.
			SP	Poorly-graded sands, sands with gravel, little or no fines.
		Sands with fines	SM	Silty sands, sand-silt mixtures, non-plastic fines.
			SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS: More than 50% material smaller than No. 200 sieve size	**SILTS AND CLAYS** Liquid Limit is less than 50%		ML	Inorganic silts, rock flour, clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity. (Lean clay)
			OL	Organic silts and organic clays of low plasticity.
	SILTS AND CLAYS Liquid Limit is greater than 50%		MH	Inorganic silts, elastic.
			CH	Inorganic clays of high plasticity. (Fat clay)
			OH	Organic clays of high plasticity.
HIGHLY ORGANIC SOILS			PT	Peat.

DEFINITION OF TERMS AND SYMBOLS

COHESIONLESS

Density	Standard Penetration Resistance in Blows/Foot
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	>50

COHESIVE

Consistancy	Standard Penetration Resistance in Blows/Foot
Very Soft	0-2
Soft	2-4
Medium Stiff	4-8
Stiff	8-16
Very Stiff	16-32
Hard	>32

I	2" OUTSIDE DIAMETER SPILT SPOON SAMPLER
II	2.4" INSIDE DIAMETER RING SAMPLER OR SHELBY TUBE SAMPLER
▼	WATER LEVEL (Date)
Tr	TORVANE READINGS, tsf
Pp	PENETROMETER READING, tsf
DD	DRY DENSITY, pounds per cubic foot
LL	LIQUID LIMIT, percent
PI	PLASTIC INDEX
N	STANDARD PENETRATION, blows per foot

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UNIFIED SOIL CLASSIFICATION SYSTEM
MAYWOOD ELEMENTARY SITE
SEATAC, WASHINGTON

Proj.No. T-8402	Date: JAN 2021	Figure A-1

LOG OF TEST PIT NO. TP-1

FIGURE A-2

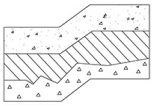
PROJECT NAME: Maywood Elementary Site **PROJ. NO:** T-8402 **LOGGED BY:** SLK

LOCATION: SeaTac, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** 357 Feet

DATE LOGGED: October 13, 2020 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		(8 inches TOPSOIL)		
1		FILL: Red/brown silty SAND with gravel, fine to medium sand, coarse gravel, moist, scattered cobbles. (SM)		
2			Medium Dense	4.3
3		Light brown silty SAND with gravel, fine to medium sand, fine to coarse gravel, dry, scattered cobbles and roots. (SM)		
4				
5		Gray silty SAND with gravel, fine to medium sand, coarse gravel, moist, weakly cemented. (SM)	Dense	
6				7.4
7				
8		Brown SAND with gravel, fine to medium sand, coarse gravel, moist. (SP)	Medium Dense to Dense	6.7
9				
10				
11		Brown/gray SAND with gravel and silt, fine to coarse sand, coarse gravel, moist, trace mottling, weakly cemented. (SP-SM)	Dense	
12				
13				11.9
14		Test pit terminated at approximately 13 feet. No groundwater seepage observed. No caving observed.		
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. TP-2

FIGURE A-3

PROJECT NAME: Maywood Elementary Site **PROJ. NO:** T-8402 **LOGGED BY:** SLK

LOCATION: SeaTac, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** 363 Feet

DATE LOGGED: October 13, 2020 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		(7 inches TOPSOIL) FILL: Red/brown silty SAND with gravel, fine to medium sand, fine gravel, moist, scattered roots. (SM)	Medium Dense	13.4
2		*Broken 6-inch diameter concrete pipe observed at 2 feet, residual water seepage observed.		
4		FILL(?): Brown SAND with silt, fine to medium sand, moist to wet, some gravel, weakly cemented. (SP-SM)		11.5
5		Gray silty SAND with gravel, fine to medium sand, coarse gravel, moist, weakly cemented, trace faint mottling. (SM)	Medium Dense to Dense	
10		Gray SAND with silt and gravel, fine to coarse sand, coarse gravel, wet, trace silt. (SP-SM)		
13				11.4
15		Test pit terminated at approximately 15 feet. No groundwater seepage observed. No caving observed.		
20				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-3

FIGURE A-4

PROJECT NAME: Maywood Elementary Site **PROJ. NO:** T-8402 **LOGGED BY:** SLK

LOCATION: SeaTac, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** 355 Feet

DATE LOGGED: October 13, 2020 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		(12 inches TOPSOIL)		
1		FILL: Brown silty SAND with gravel, fine to medium sand, coarse gravel, moist, scattered roots. (SM)		
2			Medium Dense	7.2
3				
4				8.1
5		Light brown/gray silty SAND with gravel, fine to medium sand, coarse gravel, moist, weakly cemented. (SM)		
6		*Roots observed to 6 feet.		
7			Dense	
8				
9				
10				14.7
11		Brown silty SAND, fine to medium sand, moist, trace gravel. (SM)	Medium Dense to Dense	
12				8.4
13		Test pit terminated at approximately 12 feet. No groundwater seepage observed. No caving observed.		
14				
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-4

FIGURE A-5

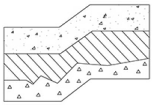
PROJECT NAME: Maywood Elementary Site **PROJ. NO:** T-8402 **LOGGED BY:** SLK

LOCATION: SeaTac, Washington **SURFACE CONDITIONS:** Vegetation **APPROX. ELEV:** 344 Feet

DATE LOGGED: October 13, 2020 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		(12 inches TOPSOIL)		
1		Red/brown SAND with silt and gravel, fine to medium sand, fine to coarse gravel, moist, scattered roots. (SP-SM)	Medium Dense	6.8
2		Gray sandy SILT, fine to medium sand, moist, some gravel, cemented, mottled. (ML)		
3				
4				19.3
5		Gray silty SAND with gravel, fine to medium sand, coarse gravel, moist, cemented. (SM)	Dense	
6				
7				
8		Brown/gray SAND with silt and gravel, fine to medium sand, coarse gravel, moist to wet. (SP-SM)		
9				
10			Medium Dense to Dense	
11				
12				
13				10.6
14		Test pit terminated at approximately 13 feet. No groundwater seepage observed. No caving observed.		
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. TP-5

FIGURE A-6

PROJECT NAME: Maywood Elementary Site **PROJ. NO:** T-8402 **LOGGED BY:** SLK

LOCATION: SeaTac, Washington **SURFACE CONDITIONS:** Vegetation **APPROX. ELEV:** 355 Feet

DATE LOGGED: October 13, 2020 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		(12 inches TOPSOIL)		
1		Red/brown SAND with silt and gravel, fine to medium sand, fine to coarse gravel, moist. (SP-SM)	Medium Dense	
2				5.4
3		Brown gravelly SAND, fine to coarse sand and gravel, moist to wet. (SP)		
4				
5		*Scattered roots observed at 5 feet.		
6			Medium Dense to Dense	4.0
7				
8				
9				6.8
10		Test pit terminated at approximately 10 feet. No groundwater seepage observed. No caving observed.		
11				
12				
13				
14				
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-6

FIGURE A-7

PROJECT NAME: Maywood Elementary Site **PROJ. NO:** T-8402 **LOGGED BY:** SLK

LOCATION: SeaTac, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** 375 Feet

DATE LOGGED: October 13, 2020 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–2		(7 inches TOPSOIL) FILL: Brown silty SAND with gravel, fine to medium sand, fine gravel, moist. (SM)	Medium Dense	3.4
2–9		Gray silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist, slightly cemented. (SM) *Scattered roots observed to 4 feet. *Boulders observed at 5 feet.	Dense	3.4
9–14		Brown/gray SAND, fine to medium sand, moist, trace gravel. (SP)	Medium Dense to Dense	5.8 5.6
14–20		Test pit terminated at approximately 14 feet. No groundwater seepage observed. No caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-101

FIGURE A-8

PROJECT NAME: Maywood Elementary Site **PROJ. NO:** T-8402 **LOGGED BY:** ZN

LOCATION: SeaTac, Washington **SURFACE CONDITIONS:** Trees and shrubs **APPROX. ELEV:** N/A

DATE LOGGED: December 31, 2020 **DEPTH TO GROUNDWATER:** 3 feet **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0	1	(12 inches TOPSOIL) Yellow-brown, silty SAND, fine to medium sand, moist. (SM)	Loose	20.7
3	2	Olive-gray, silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist, slightly cemented. (SM)	Medium Dense	16.8
6	3	Olive-gray, SILT, moist. (ML)	Hard	26.5
8	4	Olive-brown, SAND, fine sand, moist. (SP)	Dense	8.3
9		Olive-brown, silty SAND, fine sand, moist. (SM)		
10	5			4.6
11		Test pit terminated at approximately 10.5 feet. Minor groundwater seepage observed at approximately 3 feet. No caving observed.		
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-102

FIGURE A-9

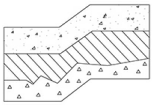
PROJECT NAME: Maywood Elementary Site **PROJ. NO:** T-8402 **LOGGED BY:** ZN

LOCATION: SeaTac, Washington **SURFACE CONDITIONS:** Gravel **APPROX. ELEV:** N/A

DATE LOGGED: December 31, 2020 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		FILL: Dark olive-brown, silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist, abundant roots and debris. (SM)		
2	1		Medium Dense	31.3
3				
4	2			10.0
5		Olive-gray, silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist, slightly cemented. (SM)		
6	3		Dense	14.2
7				
8		Becomes very dense at 7.5 feet.	Very Dense	
9	4			11.5
10		Test pit terminated at approximately 9.5 feet. No groundwater seepage observed. No caving observed.		
11				
12				
13				
14				
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. TP-103

FIGURE A-10

PROJECT NAME: Maywood Elementary Site **PROJ. NO:** T-8402 **LOGGED BY:** ZN

LOCATION: SeaTac, Washington **SURFACE CONDITIONS:** Gravel **APPROX. ELEV:** N/A

DATE LOGGED: December 31, 2020 **DEPTH TO GROUNDWATER:** 6 feet **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		(6 inches TOPSOIL)		
1		FILL: Red-brown, silty SAND, fine to medium sand, moist, abundant roots and debris. (SM)		
2				
3			Medium Dense	
4				
5				
	1			18.3
▼ 6				
		Yellow-brown, silty SAND with gravel, fine to medium sand, fine to coarse gravel, wet. (SM)		
7				
8	2		Dense	7.4
9				
10				
		Test pit terminated at approximately 10 feet. Minor to moderate groundwater seepage observed at approximately 6 feet. No caving observed.		
11				
12				
13				
14				
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-104

FIGURE A-11

PROJECT NAME: Maywood Elementary Site **PROJ. NO:** T-8402 **LOGGED BY:** ZN

LOCATION: SeaTac, Washington **SURFACE CONDITIONS:** Trees and shrubs **APPROX. ELEV:** N/A

DATE LOGGED: December 31, 2020 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0	1	(12 inches TOPSOIL) Olive-gray, silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist. (SM)	Loose	9.9
4	2	Olive-brown, SAND with gravel, fine to medium sand, fine to coarse gravel, moist. (SP)	Medium Dense	4.1
7	3	Olive-gray, silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist. (SM)	Dense to Very Dense	8.5
8		Test pit terminated at approximately 8 feet. No groundwater seepage observed. No caving observed.		
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-105

FIGURE A-12

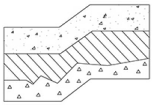
PROJECT NAME: Maywood Elementary Site **PROJ. NO:** T-8402 **LOGGED BY:** ZN

LOCATION: SeaTac, Washington **SURFACE CONDITIONS:** Trees and shrubs **APPROX. ELEV:** N/A

DATE LOGGED: December 31, 2020 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		(12 inches TOPSOIL)		
1		FILL: Olive-gray, silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist, abundant roots and debris. (SM)		
2			Loose	
3	1			18.1
4		Yellow-brown, silty SAND, fine to medium sand, moist. (SM)		
5				
6	2	Olive-brown, silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist. (SM)	Medium Dense	16.9
7				
8	3	Olive-gray, SAND with silt and gravel, fine to medium sand, fine to coarse gravel, moist. (SP-SM)	Dense to Very Dense	8.9
9	4			12.2
10		Test pit terminated at approximately 9 feet. No groundwater seepage observed. No caving observed.		
11				
12				
13				
14				
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF BORING NO. B-1

Figure No. A-13

Project: Maywood Elementary Site **Project No:** T-8402 **Date Drilled:** October 15, 2020

Client: Bridge Development Partners **Driller:** Boretec **Logged By:** SLK

Location: SeaTac, Washington **Depth to Groundwater:** N/A **Approx. Elev:** 378 Feet

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)	Moisture Content (%)
0		Dark brown SILT with gravel and sand, fine to medium sand, fine gravel, moist. (ML)			
		Red/brown silty SAND with gravel, fine to medium sand, fine gravel, moist. (SM)		50/6"	22.5
5		Gray/brown gravelly SAND with silt, fine to medium sand, fine to coarse gravel, dry. (SP-SM)	Very Dense	50/6"	8.2
		Gray SAND, fine to coarse sand, moist, weakly cemented. (SP)		63	3.8 5.6 7.0
10		Gray to gray/brown SAND with gravel, fine to coarse sand, fine gravel, moist, trace silt, weakly cemented. (SP)		54	6.2
			Dense	37	5
15		Brown/gray SAND, fine to coarse sand, trace silt and gravel, moist, cemented. (SP) *Trace mottling observed at 16.5 feet.		68	7.0
20		Brown/gray SAND with silt and gravel, fine to medium sand, fine gravel, moist, cemented. (SP-SM)	Very Dense	92/10"	5.5
		*Continued on Next Page.		77	11.8
25					

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

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LOG OF BORING NO. B-1

Figure No. A-13

Project: Maywood Elementary Site **Project No:** T-8402 **Date Drilled:** October 15, 2020

Client: Bridge Development Partners **Driller:** Boretec **Logged By:** SLK

Location: SeaTac, Washington **Depth to Groundwater:** N/A **Approx. Elev:** 378 Feet

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)	Moisture Content (%)
25		Brown/gray SAND with silt and gravel, fine to medium sand, fine gravel, moist, some to trace, silt, cemented. (SP-SM)	Very Dense		
			Dense		
30				41	8.5
			Very Dense		
35				53	4.4
			Dense		
40				36	8.1
		Test boring terminated at approximately 41.5 feet. No groundwater seepage observed.			
45					
50					

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

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LOG OF BORING NO. B-2

Figure No. A-14

Project: Maywood Elementary Site **Project No:** T-8402 **Date Drilled:** October 15, 2020

Client: Bridge Development Partners **Driller:** Boretec **Logged By:** SLK

Location: SeaTac, Washington **Depth to Groundwater:** N/A **Approx. Elev:** 385 Feet

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)	Moisture Content (%)
0		Dark brown SILT with gravel and sand, fine to medium sand, fine gravel, moist. (ML)			
				50/6"	23.7
		Brown silty SAND, fine to medium sand, dry, trace gravel. (SM)			5.6
5			Very Dense	50/6"	4.4
		Brown SAND with silt and gravel, fine to medium sand, fine gravel, dry to moist. (SP-SM)		51	2.9
10				54	3.1
		Gray silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist, moderately cemented, trace mottling. (SM)			6.5
			Dense	37	
15		Gray to gray/brown SAND with silt and gravel, fine to medium sand, fine to coarse gravel, moist, weakly cemented. (SP-SM)		68	9.8
			Very Dense		
20				92/10"	10.4
		*Continued on Next Page.			
25				77	7.9

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

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LOG OF BORING NO. B-2

Figure No. A-14

Project: Maywood Elementary Site **Project No:** T-8402 **Date Drilled:** October 15, 2020

Client: Bridge Development Partners **Driller:** Boretec **Logged By:** SLK

Location: SeaTac, Washington **Depth to Groundwater:** N/A **Approx. Elev:** 385 Feet

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)	Moisture Content (%)
25		Gray SAND with silt and gravel, fine to medium sand, fine to coarse gravel, moist, weakly cemented. (SP-SM)	Very Dense		
			Dense		
30		Gray/brown gravelly SAND, fine to coarse sand and gravel, moist, trace silt. (SP)		41	2.9
			Very Dense		
35				53	4.9
			Dense		
40		Interbedded layers of brown silty SAND, fine sand and brown/gray SAND, fine to medium sand, moist. (SM/SP)		36	16.7 8.2
		Test boring terminated at approximately 41.5 feet. No groundwater seepage observed.			
45					
50					

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

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LOG OF BORING NO. B-3

Figure No. A-15

Project: Maywood Elementary Site **Project No:** T-8402 **Date Drilled:** October 15, 2020

Client: Bridge Development Partners **Driller:** Boretec **Logged By:** SLK

Location: SeaTac, Washington **Depth to Groundwater:** N/A **Approx. Elev:** 395 Feet

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 30 50)	Moisture Content (%)
0		Dark brown SILT with gravel and sand, fine to medium sand, fine gravel, moist. (ML)			
		Red/brown silty SAND with gravel, fine to medium sand, fine gravel, moist, weakly cemented. (SM)	Medium Dense	30	41.5 11.9 8.1
5		Gray/brown SAND with silt, fine to medium sand, dry, some gravel, weakly cemented. (SP-SM)		26	16.4 8.7
			Very Dense	53	5.1
10		Gray/brown gravelly SAND, fine to medium sand, fine gravel, moist., trace silt, weakly cemented. (SP)		33	8.1
		Brown/gray SAND with silt and gravel, fine to medium sand, fine to coarse gravel, moist, weakly cemented. (SP-SM)	Dense	44	8.6
15				43	11.8
20			Very Dense	92/10"	6.8
		*Continued on Next Page.		53	
25					

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

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LOG OF BORING NO. B-3

Figure No. A-15

Project: Maywood Elementary Site **Project No:** T-8402 **Date Drilled:** October 15, 2020

Client: Bridge Development Partners **Driller:** Boretec **Logged By:** SLK

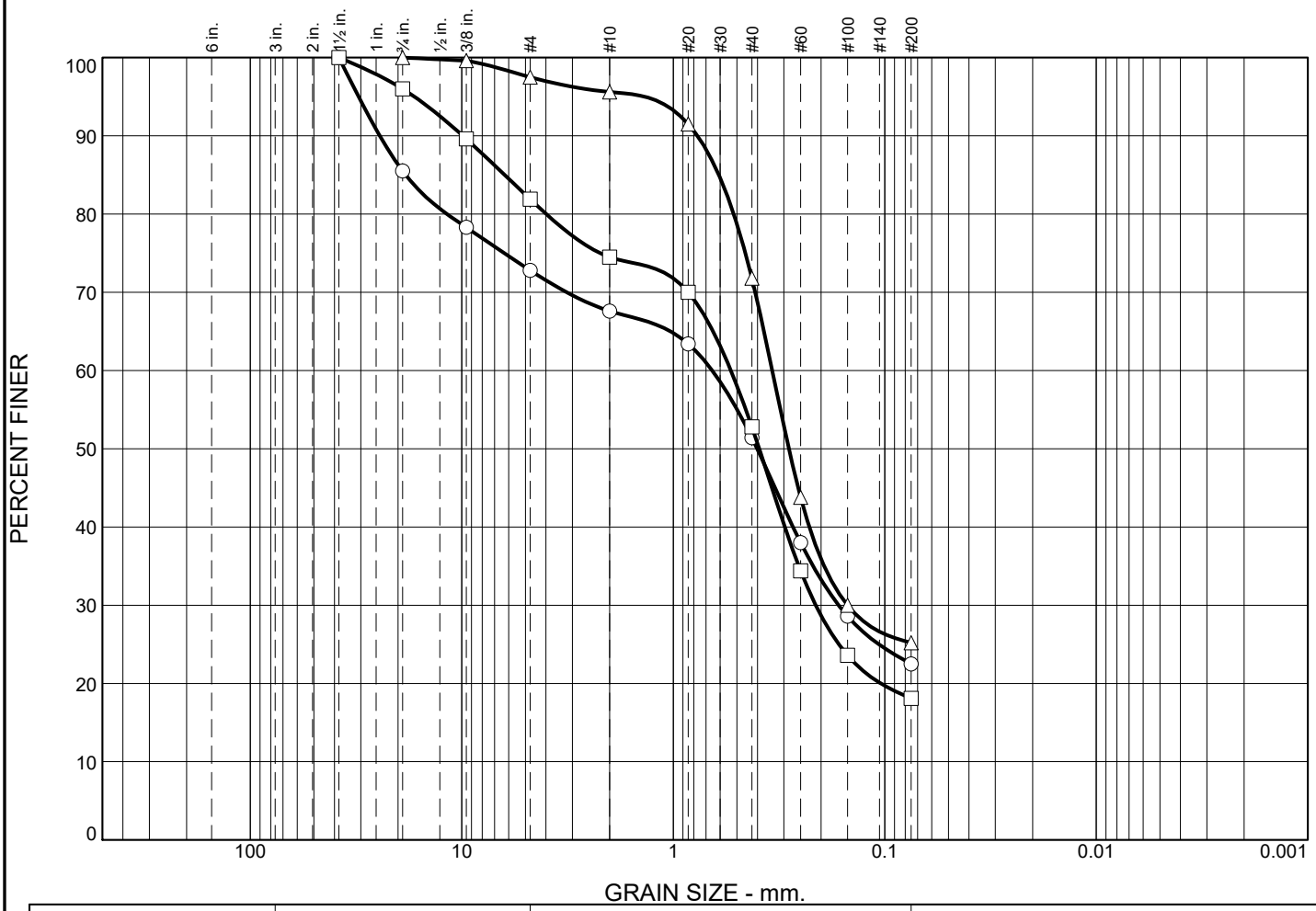
Location: SeaTac, Washington **Depth to Groundwater:** N/A **Approx. Elev:** 395 Feet

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)	Moisture Content (%)
25		Brown/gray SAND with silt and gravel, fine to medium sand, fine to coarse gravel, moist, weakly cemented. (SP-SM)			5.8
30				59	5.3
			Very Dense		
35				78	6.0
		*Faint mottling observed at about 36 feet.			
40		Brown/gray SAND with gravel, fine to coarse sand, fine to coarse gravel, moist, weakly cemented. (SP)		50/6"	4.9
		Test boring terminated at approximately 41 feet. No groundwater seepage observed.			
45					
50					

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

Terra Associates, Inc.
Consultants in Geotechnical Engineering
Geology and
Environmental Earth Sciences

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	14.5	12.7	5.2	16.2	28.9	22.5	
□	0.0	4.0	14.1	7.4	21.7	34.7	18.1	
△	0.0	0.0	2.5	1.9	23.8	46.6	25.2	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			18.4348	0.6545	0.4012	0.1654				
□			6.2697	0.5343	0.3923	0.2121				
△			0.6087	0.3405	0.2840	0.1500				

Material Description	USCS	AASHTO
○ silty SAND with gravel	SM	
□ silty SAND with gravel	SM	
△ silty SAND	SM	

Project No. T-8402 **Client:** Bridge Development Partners

Project: Maywood Elementary Site

○ **Location:** TP-1 **Depth:** -2 feet

□ **Location:** TP-2 **Depth:** -4 feet

△ **Location:** TP-3 **Depth:** -12 feet

Remarks:

○ Tested on October 27, 2020

□ Tested on October 27, 2020

△ Tested on October 27, 2020

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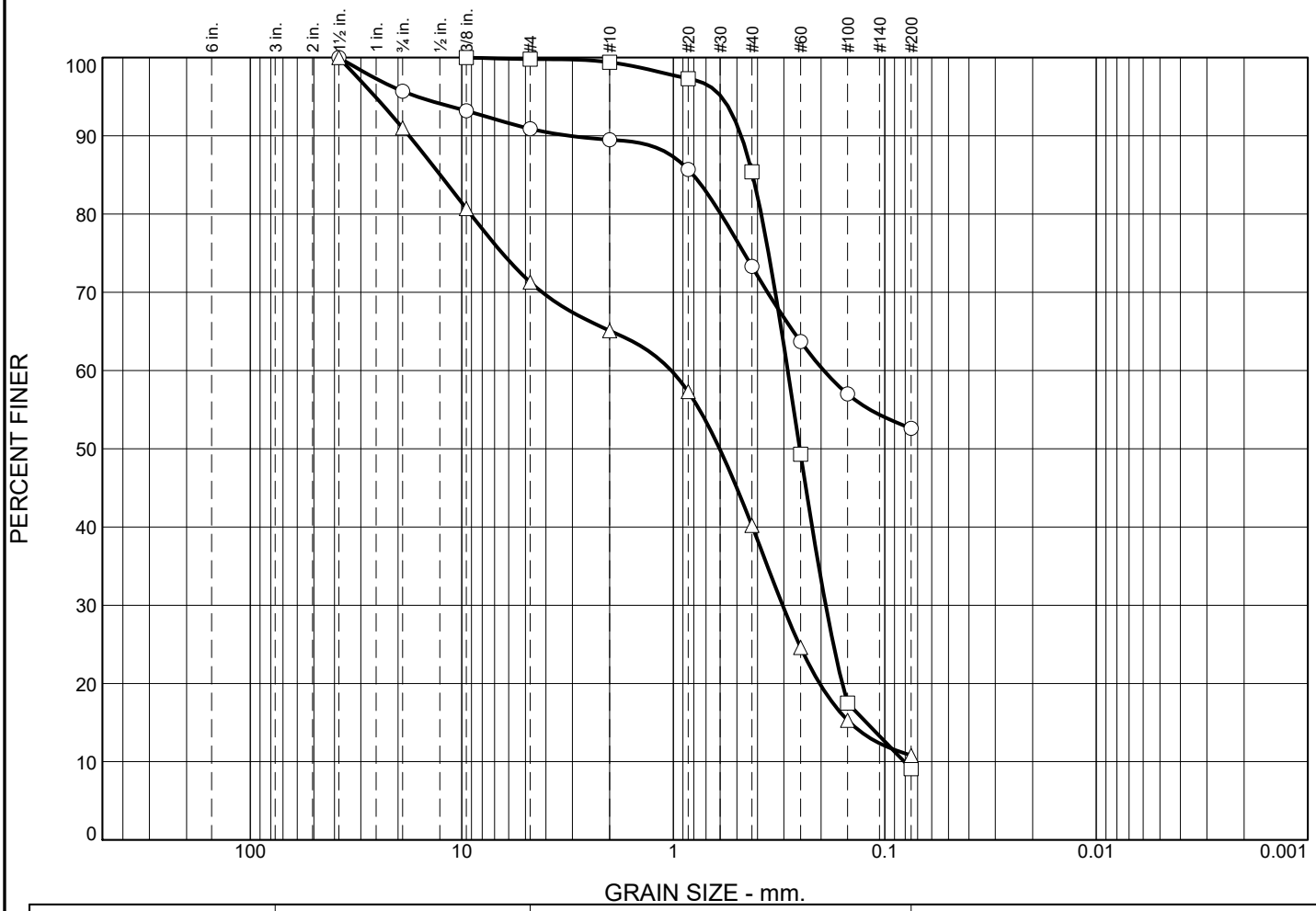
Figure A-16

Tested By: FQ

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	4.3	4.8	1.4	16.2	20.7	52.6	
□	0.0	0.0	0.2	0.4	14.0	76.3	9.1	
△	0.0	9.0	19.7	6.2	24.9	29.4	10.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.8050	0.1943						
□			0.4214	0.2876	0.2523	0.1903	0.1220	0.0808	1.56	3.56
△			12.6483	1.0222	0.6036	0.3042	0.1461			

	Material Description	USCS	AASHTO
○	sandy SILT	ML	
□	poorly graded SAND with silt	SP-SM	
△	poorly graded SAND with silt and gravel	SP-SM	

Project No. T-8402 **Client:** Bridge Development Partners

Project: Maywood Elementary Site

○ **Location:** TP-4 **Depth:** -4 feet

□ **Location:** B-1 **Depth:** -40 feet **Sample Number:** S-11

△ **Location:** B-2 **Depth:** -15 feet **Sample Number:** S-5

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Remarks:

○ Tested on October 27, 2020

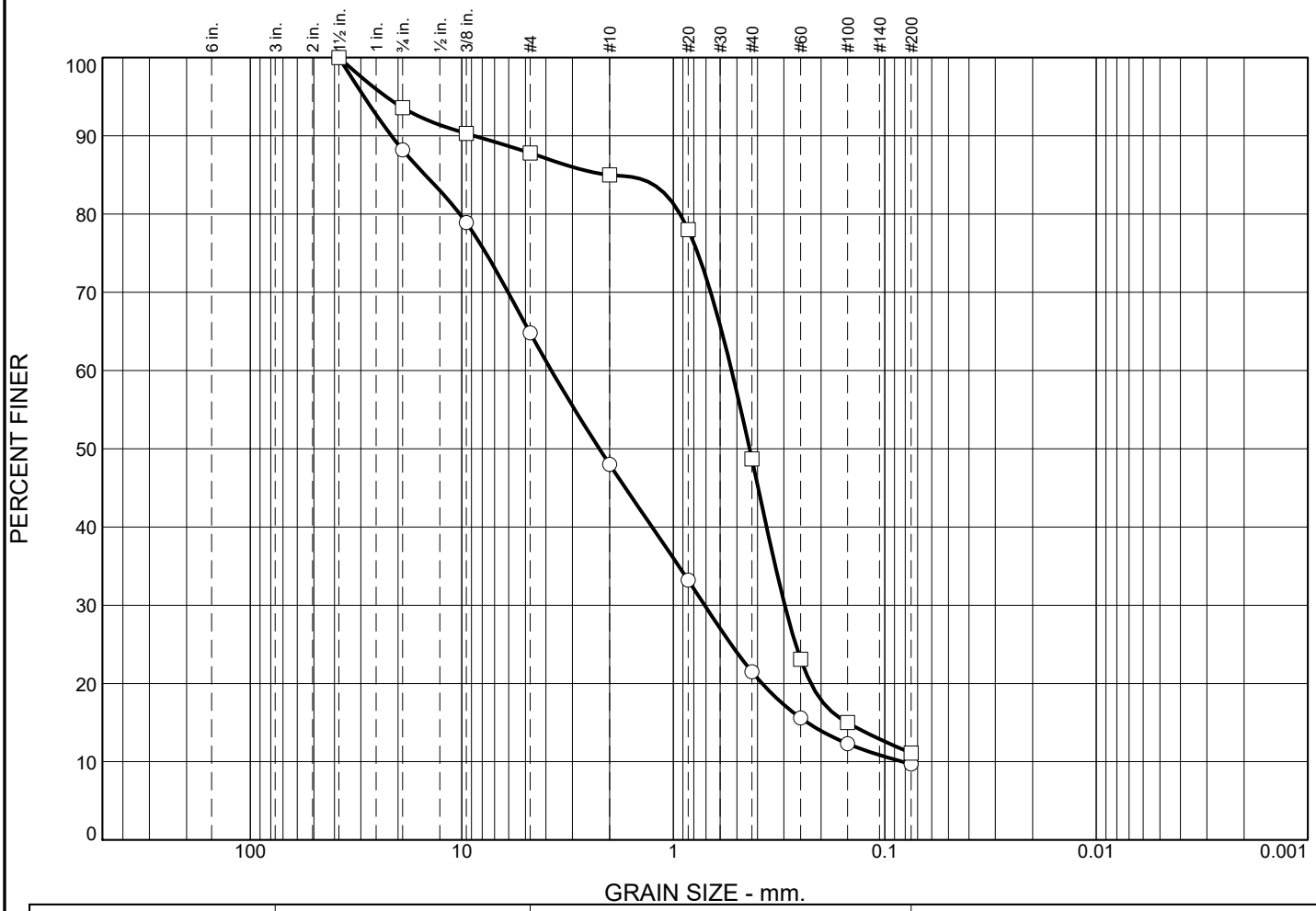
□ Tested on October 27, 2020

△ Tested on October 27, 2020

Figure A-17

Tested By: FQ

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	11.8	23.4	16.8	26.5	11.8	9.7	
□	0.0	6.4	5.8	2.8	36.3	37.6	11.1	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			14.9004	3.7697	2.2356	0.7104	0.2321	0.0824	1.63	45.76
□			2.0000	0.5299	0.4355	0.2971	0.1500			

Material Description	USCS	AASHTO
○ well graded SAND with silt and gravel	SW-SM	
□ poorly graded SAND with silt	SP-SM	

Project No. T-8402 **Client:** Bridge Development Partners

Project: Maywood Elementary Site

○ **Location:** B-3 **Depth:** -20 feet **Sample Number:** S-7

□ **Location:** B-3 **Depth:** -30 feet **Sample Number:** S-9

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Remarks:

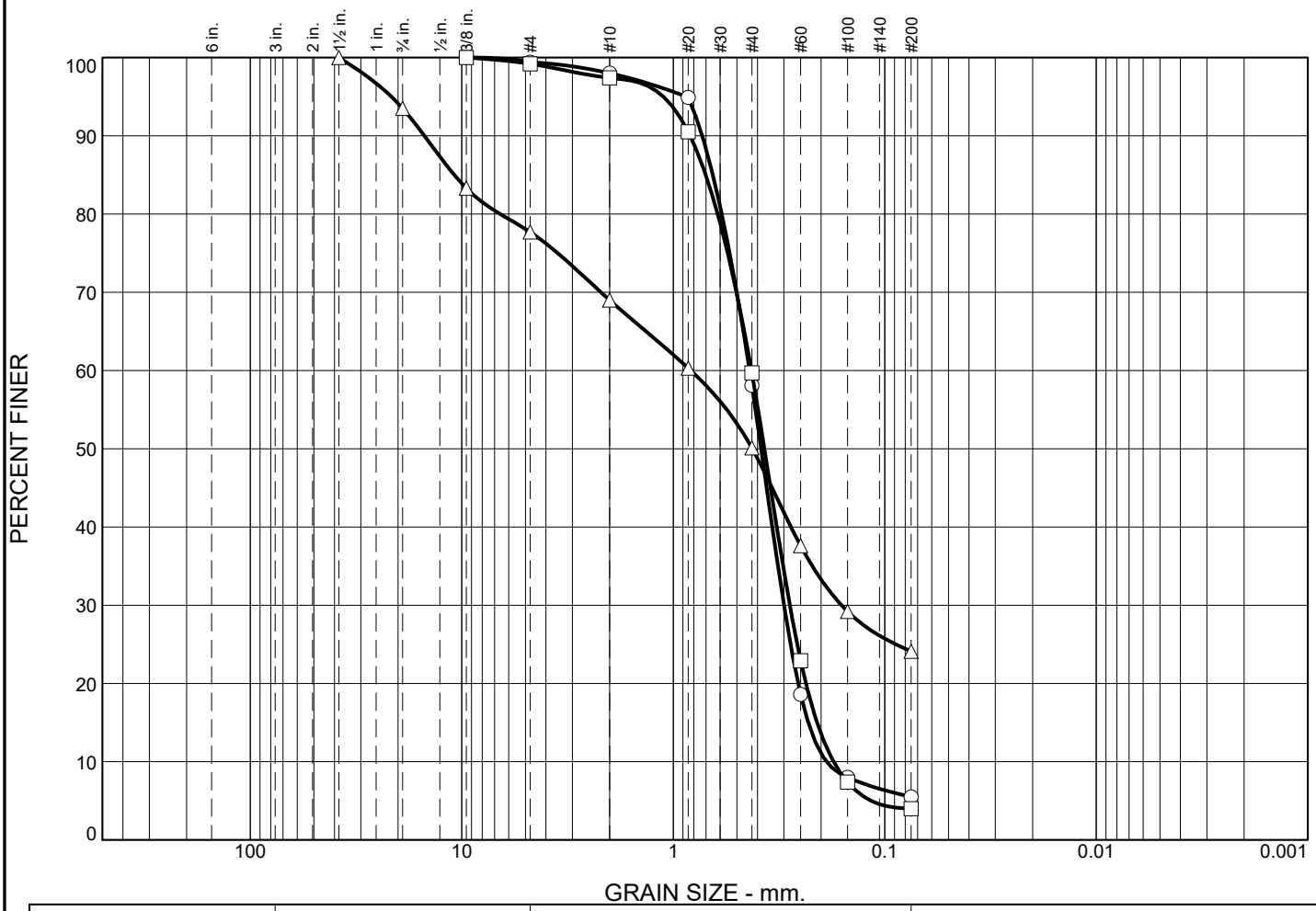
○ Tested on October 27, 2020

□ Tested on October 27, 2020

Figure A-18

Tested By: FQ

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.6	1.4	39.9	52.6	5.5	
□	0.0	0.0	0.8	1.8	37.7	55.7	4.0	
△	0.0	6.5	15.8	8.7	18.9	26.0	24.1	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.6498	0.4356	0.3843	0.2995	0.2302	0.1886	1.09	2.31
□			0.7021	0.4269	0.3708	0.2811	0.2091	0.1746	1.06	2.44
△			10.8527	0.8270	0.4230	0.1603				

	Material Description	USCS	AASHTO
○	SAND	SP	
□	SAND	SP	
△	Silty SAND with gravel	SM	

Project No. T-8402 **Client:** Bridge Development Partners, LLC

Project: Maywood Elementary Site

○ **Location:** TP-101 **Depth:** 8.0 **Sample Number:** 4

□ **Location:** TP-101 **Depth:** 10 **Sample Number:** 5

△ **Location:** TP-102 **Depth:** 9.0 **Sample Number:** 4

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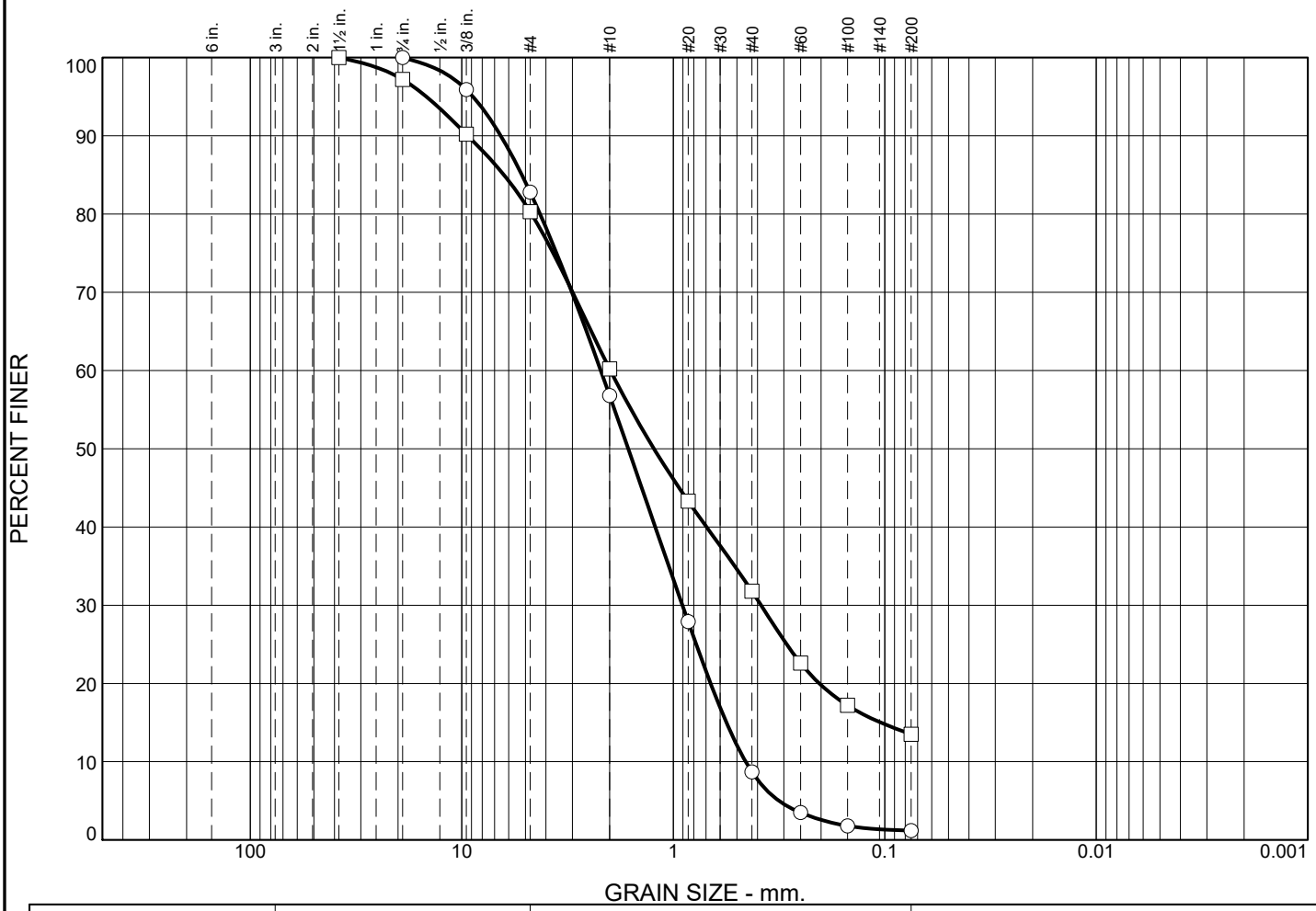
Remarks:

Figure A-19

Tested By: FQ **Checked By:** ZN

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	17.2	26.0	48.1	7.5	1.2	
□	0.0	2.8	16.9	20.1	28.4	18.3	13.5	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			5.1972	2.2032	1.6333	0.9052	0.5605	0.4549	0.82	4.84
□			6.3201	1.9829	1.2339	0.3846	0.1044			

Material Description	USCS	AASHTO
○ SAND with gravel	SP	
□ SAND with silt and gravel	SP-SM	

Project No. T-8402 **Client:** Bridge Development Partners, LLC

Project: Maywood Elementary Site

○ **Location:** TP-104 **Depth:** 4.5 **Sample Number:** 2

□ **Location:** TP-105 **Depth:** 9 **Sample Number:** 4

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Remarks:

Figure A-20

Tested By: FQ **Checked By:** ZN