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GEOTECHNICAL ENGINEERING REPORT

Central Kitsap High School and Middle School Campus Redevelopment

10130 Frontier Place NW and 3700 NW Anderson Hill Road

Silverdale, Washington

Prepared for:

Central Kitsap School District #401
9210 Silverdale Way NW
Silverdale, Washington 98383

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
11810 North Creek Parkway N
Bothell, Washington 98011

April 2017

Project No. 6-917-18096-0

Permit Number: 20-03281

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TODD D. WENTWORTH
STATE OF WASHINGTON
32245
REGISTERED
PROFESSIONAL ENGINEER
19 Apr 17

State of Washington
2202
Licensed Geologist
Todd D. Wentworth

Konrad H. Moeller, LG, LEG
Senior Geologist
konrad.moeller@amecfw.com

Todd D. Wentworth, PE, LG
Associate Engineer
todd.wentworth@amecfw.com

Reviewed by:
James S. Dransfield, PE
Principal Engineer
james.dransfield@amecfw.com

Permit Number: 20-03281

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EXECUTIVE SUMMARY

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler), performed a geotechnical engineering evaluation for the Central Kitsap High School (CKHS) and Central Kitsap Middle School (CKMS) (collectively CKHSMS) campus redevelopment project on behalf of Central Kitsap School District #401 (CKSD). This summary of project geotechnical engineering considerations is presented for introductory purposes and should be used only in conjunction with the full text of this report.

Project Description: CKSD will redevelop both the existing CKHS campus at 3700 NW Anderson Hill, and CKMS campus at 10130 Frontier Place NW, as well as the bus maintenance facility, and a number of adjacent CKSD-owned parcels into a combined high school and middle school campus in Silverdale, Washington. Almost all existing site features will be demolished for the redevelopment. In general, a combined high school and middle school building will be centrally located with athletic fields to the north and south of the building and tennis courts and a softball field in the campus northwest corner. School access roads, bus/fire lanes, and parking will generally be situated near the school building and athletic fields. A stormwater infiltration facility will be constructed at the site's southwest corner.

Exploratory Methods: We explored subsurface conditions across the site between August 2016 and February 2017 by completing 21 geotechnical borings (B-1 thorough B-21), five test pits (IT-1 through IT-4 and TP-1), borings for three observation wells (OW-1 through OW-3), and five hand-auger borings (HB-1 through HB-5) ranging in depth from 3 to 36 feet below the ground surface (bgs). This report also includes data from 11 borings and four test pit exploration logs from earlier work at the site.

Soil Conditions: Previous development of the site included cuts and fills to create terraces. This finding was confirmed during field investigations, as 4 to 12 feet of fill was encountered in some of our explorations. Most of the fill was medium dense silty sand, and appears to be derived from on-site cut soils. The native, intact soil consisted of very dense, gravelly silty sand (glacial till) and was encountered in most of the explorations. In the southwest portion of the site, very dense sand (advance outwash) was encountered.

Groundwater Conditions: Borings B-15 and OW-1 through OW-3, advanced in the planned infiltration facility located in the southwest area of the site, encountered groundwater within the advance outwash soils at depths of 18 to 21 feet bgs. None of our other explorations encountered groundwater at the time of drilling or excavating. Observation wells were installed in borings OW-1 through OW-3, and subsequent groundwater readings were collected from December 2016 to March 2017. The seasonally highest groundwater readings at each observation well were 13.7 feet bgs for OW-1, 10.8 feet bgs for OW-2, and 16.7 feet bgs for OW-3.

Foundations: Conventional spread footings cast atop the existing medium dense silty sand or newly placed structural fill may be designed for an allowable bearing pressure of 2,500 pounds per square foot (psf). Foundations bearing directly on dense to very dense glacial till or advance outwash can be designed with a bearing capacity of 5,000 psf. All footing subgrades should be verified during construction. The existing loose to very loose fill at borings B-20 and B-21 within the footprint of the proposed school building west wing may need to be overexcavated and replaced with structural fill.

Floors: The new structures will be able to use soil-supported, slab-on-grade floors. The floor section should be designed to include a minimum 4-inch layer of clean, uniform gravel as a capillary break and a vapor barrier placed on top of the capillary break layer.

Pavements: For design of access drives and parking lots, we recommend a minimum pavement section of 3 inches of hot-mix asphalt (HMA) over 4 inches of crushed rock base (CRB) course for car traffic roadways and parking areas; and 4 inches of HMA over 6 inches CRB course for access drives with bus, fire truck, and truck traffic. Over-excavation may be required along the fire access lane on west side of the school building (in the vicinity of boring B-20) where loose fill was encountered.

Stormwater Infiltration: Based on results of subsurface explorations, laboratory testing, groundwater readings, and the previously submitted infiltration engineering study "Geotechnical Supplement No.1: Central Kitsap High School and Middle School Redevelopment," dated March 10, 2017, infiltration at the site appears feasible within the advance outwash soils. Geotechnical Supplement No.1 provides specific design infiltration rates for infiltration facilities.

On-site Soil Considerations: The on-site soils have a high percentage of fines (silt and clay), which means that compaction can be accomplished only within a narrow range of moisture contents. Therefore, the contractor should take precaution to protect any exposed subgrades and limit construction traffic on any wet subgrade surfaces. Ideally, earthwork would be scheduled for the summer and fall months, when drier weather would maximize the potential for reuse of on-site soils.

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GEOTECHNICAL ENGINEERING REPORT

Central Kitsap High School and Middle School Campus Redevelopment
Silverdale, Washington

1.0 SITE AND PROJECT DESCRIPTION

Central Kitsap School District (CKSD) plans to redevelop the existing Central Kitsap High School (CKHS) campus, Central Kitsap Middle School (CKMS) campus, bus maintenance facility, and a number of adjacent parcels (collectively abbreviated CKHSMS). The high school campus is located at 3700 NW Anderson Hill Road, and the middle school campus is located at 10130 Frontier Place NW in Silverdale, Washington (Figure 1) (Latitude 47.65 N, Longitude 122.70 W). The project boundaries encompass approximately 56 acres and are generally delineated by NW Anderson Hill Road and Frontier Place NW to the west, single-family residences to the north, apartment complexes and single-family residences to the east, and the Central Kitsap High School building to the south.

The site currently encompasses the following existing site features and structures:

- The middle school campus lies at the north end of the site on the south side of NW Ballard Lane.
- Frontier Junior High School and a CKSD-owned vacant parcel are on the north side of NW Ballard Lane.
- The CKSD bus facility is located in the northeast corner of the site.
- Athletic fields occupy the central and eastern portions of the site.
- Numerous buildings and parking lots are situated along the project site's west side.
- An athletic track and football field are present to the north of the high school building.
- Two vacant CKSD-owned residential parcels are on the central eastern half of the site.
- Vehicle access is provided by NW Anderson Hill Road, Frontier Place NW, and NW Ballard Lane.

Figure 2 shows the existing site features and locations.

Project plans call for demolishing almost all of the existing structures on the site except the middle school gymnasium and high school building, and redeveloping the site into a combined high school and middle school campus. The middle school gymnasium will be integrated into the new development, and the high school building will be demolished in a future development phase. Figure 3 shows the redevelopment layout for proposed buildings, athletic fields, roadways, parking lots, infiltration facility, walkways, and associated infrastructure for the new campus.

Our project scope of work included field exploration, laboratory testing, geotechnical engineering, infiltration testing, and report preparation. Amec Foster Wheeler previously completed a preliminary geotechnical evaluation and infiltration study at the site and submitted a *Preliminary Geotechnical Engineering Report*, dated October 18, 2016 (Amec Foster Wheeler, 2016), and *Geotechnical Supplement No.1: Stormwater Infiltration*, dated March 10, 2017 (Amec Foster Wheeler, 2017), to CKSD.

2.0 EXPLORATORY METHODS

Surface and subsurface exploration at the project site was conducted in August and December 2016 and in January and February 2017. This report also includes information from previous explorations completed across the site. Our explorations and testing consisted of the following elements:

- Visual surface reconnaissance of the site;
- Twenty-one borings (designated B-1 through B-21) advanced at strategic locations across the campus redevelopment footprint to depths ranging from 16.5 to 26.5 feet below ground surface (bgs);
- Five test pits (designated TP-1 and IT-1 through IT-4) advanced within the proposed infiltration facility area to depths of 10.5 to 14.25 feet bgs;
- Five hand borings (designated HB-1 through HB-5) advanced to depths of 2.75 to 4.3 feet bgs at strategic locations in the high school football field;
- Three observation well borings (designated OW-1 through OW-3) to depths of 21.5 to 36.5 feet bgs for installation of observation wells at the proposed infiltration facilities;
- Laboratory testing consisting of 28 grain-size distribution analyses, 12 fines analyses using the #200 wash procedure, 19 moisture content determinations, four organic content determinations, and four cation exchange capacity (CEC) analyses performed on selected soil samples;
- Review of boring and test pit logs from previous explorations conducted on the project site by Amec Foster Wheeler (AGRA, 1999; RZA, 1989, 1991; RZA AGRA, 1993, 1994); and
- Review of published geologic maps and seismic information in the vicinity of the site.

Figure 2 depicts the approximate locations of these explorations and our previous explorations overlain on a topographical survey of the existing site conditions conducted by AES Consultants, Inc. (AES). Figure 3 depicts exploration locations at proposed site features based on the redevelopment site plan provided by AHBL on April 4, 2017. Table 1 summarizes the approximate locations, surface elevations, and termination depths of our subsurface explorations for this investigation relative to proposed site features.

Table 1. Exploration Locations, Elevations, and Depths

Exploration	Location Relative to Proposed Site Features	Surface Elevation (feet)[1]	Termination Depth (feet)
B-1	Parking Lot – East of Tennis Court	183.5	16.5
B-2	Between High School Athletic Fields – East End	195.5	16.5
B-3	High School Football Field – West End	184.0	16.5
B-4	School Building Central Wing – West End	172.5	16.5
B-5	Main Parking Lot & Fire Lane Access Road	156.5	16.5
B-6	School Building East Wing – North End	173.5	16.5
B-7	Next to Bus Lane – School Building East Side	158.0	16.5
B-8	North Infiltration Pond	131.0	16.5
B-9	School Building Central Wing – South End	157.0	16.5
B-10	Next to Bus Lane – School Building East Side	150.0	16.5
B-11	Middle School Student Drop-Off/Visitor Parking Access Road	132.0	26.5
B-12	Roadways – School Building South Side	153.5	16.5
B-13	Middle School Athletic Field/Track – Northeast Corner	134.0	21.5
B-14	Tennis Courts – West Side	179.5	16.5
B-15	South Infiltration Pond	109.0	26.5
B-16	School Building – East Wing	172.0	15.5
B-17	School Building – Southeast Corner	152.5	18.0
B-18	School Building – South Side	154.0	15.5
B-19	School Building – West Wing/North End	159.0	18.0
B-20	School Building – West Wing/Central Area	157.0	18.0
B-21	School Building – Southwest Corner	154.0	19.0
OW-1	Central Infiltration Pond	121.0	31.5
OW-2	South Infiltration Pond	109.0	21.5
OW-3	North Infiltration Pond	127.0	36.5
IT-1	South Infiltration Pond	109.0	12.0
IT-2	North Infiltration Pond	127.0	14.2
IT-3	North Infiltration Pond	127.0	11.5
IT-4	Central Infiltration Pond	122.0	14.0
TP-1	Central infiltration Pond	122.0	10.5
HB-1	Middle School Football Field/Track – Field Northwest Corner	134.5	2.75
HB-2	Middle School Football Field/Track – Field Northeast Corner	134.5	2.75
HB-3	Middle School Football Field/Track - Center of Football Field	136.0	4.3
HB-4	Middle School Football Field/Track – Field Southwest Corner	134.5	3.0
HB-5	Middle School Football Field/Track – Field Southeast Corner	134.5	3.2

1. Elevations represent existing topography and are interpolated based on the topographic survey of the site's existing surface conditions, as provided by AES, dated June 16, 2016.

Appendix A presents the field exploration procedures and logs. The locations listed on each of the current and past exploration logs presented in Appendix A are contemporaneous site features existing at the time the exploration was advanced. Appendix B presents geotechnical laboratory testing procedures and results.

3.0 SITE CONDITIONS

This section presents our observations, measurements, findings, and interpretations regarding the surface, soil, groundwater, and seismic conditions at the project site.

3.1 SURFACE CONDITIONS

The surface conditions described below are based on our site visits from August 2016 through March 2017, our review of aerial photos, the topographic survey by AES, dated June 16, 2016, and the proposed site development plan provided by AHBL on April 4, 2017.

Topography: Existing topography across the school property primarily slopes downward from north to south over a series of graded benches. The slope grades separating the series of benches across the site generally range between 2H:1V to 3H:1V (horizontal:vertical). Cuts appear to have been performed on the upslope section of the ground surface, with fill placed on the downslope sections to raise grade and create the existing benches for the current topography. Situated along the majority of the eastern property line is a naturally vegetated strip of land that slopes down to the east. The existing topography is shown on Figure 2. The final site grades for the planned redevelopment are shown on Figure 3.

Surface drainage: Drainage across the site is generally from north to south-southwest following the site topography. However, the series of benches across the site appears to retain surface water within the benches, where the surface water appears to infiltrate into the ground or is collected by a series of catch basins. The collected stormwater is then discharged to the City of Silverdale stormwater system on Frontier Place NW and NW Anderson Hill Road. At the time of our site investigations in mid-August 2016, the ground surfaces we encountered were dry except for areas on the athletic fields that appeared to have been irrigated. During our December 2016 site investigation, the ground surface at the athletic fields where our explorations were advanced was soft from periods of heavy winter rainfall.

Surface cover: The predominant vegetation across open spaces on the site consists primarily of grass. However, mature fir and cedar trees intermixed with shrubbery and grasses grow within the southwest portion of the site surrounding the Alternative High School and Career and Technical Building, on the residential parcel north of the high school athletic field, on the vegetated slopes along the site's eastern property boundary, on the two parcels north of Central Kitsap Middle School, and around the perimeter of the bus facility. The site hardscape consists of asphalt parking lots, roadways, bus loops, and walkways leading from the buildings to parking lots. A combination of concrete or asphalt walkways were noted around the school building perimeter and for pedestrian access to the athletic fields.

3.2 Soil Conditions

According to the published geologic map for the area (Polenz et al., 2013), soil conditions at the site are characterized by Pleistocene Vashon Lodgment Till (Qgt) with Possession Advance Outwash (Qgap) along the site's western edge following NW Anderson Hill Road to the intersection of NW Anderson Hill Road and Frontier Place NW.

Vashon Lodgment Till (referred to in this report as glacial till) consists of a mixture of clay, silt, sand, gravel, cobbles, and isolated boulders, and can be brown in a weathered condition to gray in an unweathered condition. Glacial till soils tend to be very dense and exhibit high shear strength and low compressibility due to overconsolidation by ice during deposition. Glacial till soils can become soft and unworkable when disturbed by excavation, stockpiling, and backfilling, especially when wet.

Possession Advance Outwash (referred to in this report as advance outwash) consists predominantly of sand with some silt, clay, and pebbles. Occasional interbedded silt/clay layers may occur. Advance outwash is typically brown in a weathered condition to gray in an unweathered condition. Advance outwash is deposited via glacial meltwater in front of advancing glaciers that are subsequently glacially overridden. Advance outwash is typically dense with low compressibility due to overconsolidation by ice during deposition. The advance outwash encountered had a low to moderately high fines content. Advance outwash containing a high moisture with a moderately high to high fines content can be unworkable when disturbed by excavation, stockpiling, and backfilling.

Our on-site exploration encountered soils in general agreement with the geologic maps. The strata observed in our explorations are described below.

- Topsoil and Organics: In general, all explorations advanced in unpaved grass-covered areas encountered approximately 4 to 6 inches of grass/sod over topsoil at the surface. No explorations were advanced in the native vegetated slopes on the site's western and eastern edges or at the site's north end, and therefore topsoil and organic thicknesses in these areas have not been determined, but are probably thicker.
- Existing Fill: Fill soils were encountered in many of our borings due to previous grading of the site. The fill consisted of silty sand with some gravel derived from excavating glacial till soils from other locations on site, except the athletic field drainage sand layer. Most of the fill encountered was in a medium dense, moist condition, except for

loose soils in borings B-19 through B-21 in the west wing of the new school building footprint.

- Glacial Till: Glacial till, composed of dense, silty sand was encountered near the surface or under previously placed fill across most of the site, except for the southwest portion of the site where infiltration facilities are planned. No glacial till was encountered in the borings drilled near the central and south infiltration pond.

- Advance Outwash: Advance outwash composed of dense, sand with varying amounts of gravel and silt, and with some interbedded lenses of silt was encountered in the southwest portion of the site, in the vicinity of the proposed infiltration facilities.

Our geologic interpretations are displayed on the Geologic Cross-Sections A-A' and B-B', Figures 4 and 5, respectively. Exploration logs are presented in Appendix A for the most recent as well as previous explorations conducted at the site. Table 2 summarizes the approximate thicknesses and depths of the fill soils encountered from our recent explorations.

Select soil samples from our explorations were submitted for geotechnical laboratory testing. The laboratory testing sheets presented in Appendix B graphically present the results. The geotechnical test results produced the following key findings:

- The fill soils had a fines (silt and clay) content ranging from 17 to 28 percent, with a moisture content ranging from 5 to 13 percent. We interpret the fill soils to be derived from site glacial till soils.

- The glacial till soils have a measured fines content ranging from 14 to 37 percent and a moisture content ranging from 3 to 9 percent. We interpret the moisture content of glacial till soils to be near the optimum values for compaction, but will be difficult to compact at higher moisture contents.

- The advance outwash had a measured fines content ranging from 2 to 28 percent and a moisture content ranging from 1 to 19 percent. Many samples of the advance outwash had more fines than is typical for outwash, so these site souls may also be difficult to compact when wet.

- Selected samples of glacial till and advance outwash soils from test pits IT-1 through IT-4 and TP-1 at the infiltration facilities were tested for organic content and cation exchange capacity (CEC). Results show the organic content ranges between 0.5 and 1.1 percent, and CEC ranges between 1.2 and 6.7 milliequivalents per 100 grams (meq/100 g).

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Table 2 Soil Layer Thickness and Depth

Exploration ID	Planned Development Feature Locations	Sod/Topsoil Thickness (feet)	Fill Thickness (feet)	Depth to Native Soil (feet)
B-01	Parking Lot – East of Tennis Court	N/E	0.2	0.2
B-02	High School Athletic Fields – East End	0.5	7.5	8.0
B-03	High School Football Field – West End	0.5	4.0	4.5
B-04	School Building Central Wing – North End	0.5	N/E	0.5
B-05	Fire Access Road and Main Parking Lot	0.5	4.0	4.5
B-06	School Building East Wing – North End	N/E	0.2	0.2
B-07	Bus Lane – School Building East Side	0.5	N/E	0.5
B-08	North Infiltration Pond	N/E	0.2	0.2
B-09	School Building Central Wing – South End	N/E	0.7	0.7
B-10	Bus Lane – School Building East Side	0.5	4.0	4.5
B-11	Middle School Drop-Off Access Road	N/E	0.5	0.5
B-12	Roadway – School Building South Side	0.5	4.0	4.5
B-13	Middle School Football Field/Track – NE Corner	0.5	7.5	8.0
B-14	Tennis Courts – West Side	N/E	0.2	0.2
B-15	South Infiltration Pond	N/E	0.5	0.5
B-16	School Bldg. – East Wing	0.2	5.8	6.0
B-17	School Building – Southeast Corner	0.2	1.8	2.0
B-18	School Building – South End	N/E	1.7	2.0
B-19	School Building – West Wing/North End	0.3	11.2	11.5
B-20	School Building – West Wing/Central	0.3	6.7	7.0
B-21	School Building – Southwest Corner	N/E	8.0	8.0
OW-1	Central Infiltration Pond – Northwest Corner	0.25	13.75	14.0
OW-2	South Infiltration Pond	0.2	3.3	3.5
OW-3	North Infiltration Pond	N/E	8.5	8.5
IT-1	South Infiltration Pond	N/E	1.0	1.0
IT-2	North Infiltration Pond	N/E	1.75	1.75
IT-3	North Infiltration Pond	0.3	6.7	7.0
IT-4	Central Infiltration pond	N/E	4.5	4.5
TP-1	Central Infiltration Pond	0.5*	4.0	4.5
HB-1	Middle School Football Field – Northwest Corner	0.3	1.4	1.7
HB-2	Middle School Football Field – Northeast Corner	0.3	2.7	N/E
HB-3	Middle School Football Field – Center	0.5	1.5	2
HB-4	Middle School Football Field – SW Corner	0.3	3	N/E
HB-5	Middle School Football Field – SE Corner	0.3	2.8	N/E

Elevation datum: Depths are from existing surface conditions, as provided by AES, dated June 16, 2016.
N/E = Not Encountered
** Relic Topsoil Layer Encountered 4.0 to 4.5 feet bgs.

3.3 GROUNDWATER CONDITIONS

During our preliminary geotechnical exploration in August 2016, groundwater was encountered only at boring B-15 at the proposed infiltration facility in the southwest corner of the site, where it was encountered at 18 feet bgs (elevation 91 feet). To determine seasonal groundwater levels near the stormwater infiltration facilities, three observation wells (OW-1 through OW-3) were installed on December 7, 2016.

From December 19, 2016, to April 5, 2017, six periodic groundwater measurements were collected from OW-1 through OW-3. The highest groundwater measurements were:

- 16.7 feet bgs (elevation 109.3 feet) for OW-3 at the north infiltration pond;
- 13.7 feet bgs (elevation 107.3 feet) for OW-1 at the central infiltration pond; and
- 10.8 feet bgs (elevation 98.2 feet) for OW-2 at the south infiltration pond.

The groundwater flow direction appears to toward the south or southwest. The highest groundwater elevation readings, and soil types encountered within the infiltration facility area are displayed in Figure 4.

Some mottling and oxidation staining were observed in the native soils at the native/fill contact. We interpret the mottling and oxidation staining to have originated from groundwater infiltrating through the less dense fill, resting on the dense native soil temporarily before infiltrating into the native soil at a slower rate. The interbedded silt lenses could also reduce groundwater infiltration.

Perched water was noted during our explorations in the existing athletic fields, at the contact between the drainage sand and underlying soil subgrade, or above the topsoil layer directly below the grass surface. The perched water probably forms atop the underlying soil subgrade or topsoil due to field irrigation or periods of heavy rainfall.

Because our groundwater measurements were collected during a period of wet weather, the groundwater conditions may closely represent the yearly high levels; somewhat lower levels probably occur during the summer and early fall months. Throughout the year, groundwater levels would likely fluctuate in response to changing precipitation patterns, construction activities, irrigation, and site use.

3.4 SEISMIC CONDITIONS

The soils underlying the site consist of various thicknesses of medium dense fill placed during previous grading, overlying dense silty sand and sand (glacial till and advance outwash). Due to the previously placed fill, we interpret the site to be Site Class D, as defined in the 2012 International Building Code (IBC).

Seismic Design Parameters: The 2012 IBC requires use of risk-targeted maximum considered earthquake (MCE_R) ground motion response acceleration for design of structures. Based on detailed U.S. Geological Survey (USGS) hazard mapping for this site (USGS, 2015), we recommend the following parameters for structural design, based on a design earthquake with a 2 percent probability of occurrence in 50 years (return interval of 2,475 years):

Use IBC Soil Class D with:

- $S_S = 1.39$ g
- $F_a = 1.0$
- $S_{DS} = 0.93$ g
- $S_1 = 0.56\ g$
- $F_v = 1.5$
- $S_{D1} = 0.56\ g$

Where *g* is the acceleration due to gravity.

Liquefaction Evaluation: The soils underlying the site consist mainly of dense glacial till or advance outwash. Groundwater was encountered only in borings at the lowest point of the project footprint in the southwest corner of the site in dense sands at depths of 18 feet or greater at the time of drilling. Therefore, we conclude there is very low risk of soil liquefaction occurring at this site under the IBC 2012 design earthquake.

4.0 CONCLUSIONS AND RECOMMENDATIONS

This section presents our geotechnical engineering conclusions and recommendations concerning site preparation, foundations, floors, drainage systems, backfilled walls, utilities, stormwater infiltration, pavement, and structural fill. American Society for Testing and Materials International (ASTM) specification codes cited herein refer to the most current applicable ASTM manual. Washington State Department of Transportation (WSDOT) specification codes cited herein refer to the current WSDOT publication M41-10, *Standard Specifications for Road, Bridge, and Municipal Construction 2012* (WSDOT, 2012).

4.1 Site Preparation

Preparation of the project site for construction of the combined high school and middle school campus will include the following elements:

- Temporary erosion and sedimentation control;
- Removal of existing buildings;

- Removal or abandonment of utilities within the planned expansion footprint;
- Clearing, stripping, and grading; and
- Subgrade compaction.

The paragraphs below discuss our geotechnical comments and recommendations concerning site preparation.

Erosion Control Measures: Prior to disturbing the ground surface with earthwork, temporary erosion and sedimentation controls should be implemented, in accordance project plans and specifications, and the Kitsap County Standards, to prevent erosion and runoff during construction. The contractor will need to understand that design plans and specifications represent the minimum requirements, and additional measures and modifications may be needed to implement and maintain erosion and sedimentation control that are specific to the construction activities and the weather.

Demolition: One of the first steps in site preparation will likely consist of decommissioning some utilities, followed by demolition and removal of the existing building structures, as well as the surrounding pavement and curbs. Any associated underground structural elements or utilities, such as old footings, stem walls, catch basins, manhole structures, and drain pipes, should be exhumed as part of this demolition operation. Excavations created during demolition should be backfilled and compacted with structural fill in accordance with the recommendations contained herein. Pipes more than 2 feet below any future excavations could be filled with lean mix concrete and left in place. However, if any significant structure is planned over an abandoned utility line, the utility trench backfill should be evaluated and possibly replaced to meet structural requirements.

Clearing and Stripping: After surface and near-surface water sources have been controlled, the construction areas should be cleared and stripped of all trees, root balls, bushes, sod, topsoil, debris, asphalt, and concrete. Our explorations disclosed an estimated average of approximately 6 inches of sod and topsoil in the grassy areas across the site, but significant variations could exist. No explorations were advanced in areas of native vegetation to determine and evaluate clearing and stripping depths. If stripping operations proceed during wet weather, a generally greater stripping depth might be necessary to remove disturbed moisture-sensitive soils; therefore, stripping is best performed during a period of dry weather

Temporary Drainage: We recommend intercepting and diverting potential sources of surface or near-surface water within the construction zones before stripping begins. Because choosing an appropriate drainage system depends on water quantity, season, weather conditions, construction sequence, and contractor's methods, final decisions regarding temporary drainage systems are best made in the field at the time of construction. Nonetheless, we anticipate that curbs, berms, or ditches placed along the uphill side of the work areas will adequately intercept surface water runoff.

Dewatering: At the time of our explorations, some perched groundwater was found underlying the fill and resting on the dense glacial till. Perched groundwater seepage above the groundwater table should be expected for deeper excavations and during or after substantial periods of rainfall. If groundwater is encountered, we anticipate that an internal system of ditches, sumpholes, and pumps will be adequate to temporarily dewater the excavation.

Subgrade Compaction: Exposed subgrades for footings, floors, pavements, and other structures should be compacted to a dense, unyielding state. Loose granular soils observed within a subgrade should be compacted to meet the compaction criteria stated in Section 4.9. Because some of the on-site soils have a high percentage of fines (silt and clay), the contractor should protect exposed subgrades and limit construction traffic on wet subgrade surfaces.

Temporary Cut Slopes: All temporary soil cuts associated with site regrading or excavations should be adequately sloped to prevent sloughing and collapse. When workers will be below excavations, the appropriate U.S. Occupational Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Act regulations should govern. We recommend the following maximum inclinations for cut slopes to protect worker safety.

Soil Type	**WAC Soil Type**	**Maximum Inclination**
Existing and new fill, recessional outwash	C	1½H:1V
Advance outwash		
Glacial till	B	1H:1V
	A	3/4H:1V

However, appropriate inclinations will ultimately depend on actual soil and seepage conditions exposed in the cuts.

On-site Soils: We offer the following evaluation of the on-site soils relative to potential use as structural fill.

- *Surficial and Subsurface Organic Soils*: The sod, duff, and topsoil are *not* suitable for use as structural fill under any circumstances, due to their long-term compressibility. Consequently, these materials can be used only for non-structural purposes, such as landscaping.

- *Existing Fill Soils*: The fill soils appear suitable for reuse if the soil is near optimum moisture content, properly placed, and compacted to project specifications. However, fill soils can vary greatly in fines, organic, and moisture content and should be evaluated for suitability prior to use as structural fill. The fill soil will be difficult or impossible to reuse during wet weather due to the high silt content.

- *Glacial Till*: The glacial till soils underlying the site appear suitable for reuse if the soil is near optimum moisture content, properly placed, and compacted to project specifications. While dense in the undisturbed state, glacial till contains a high percentage of fines, and is highly sensitive to disturbance and softening in the presence of excess moisture, making reuse of these soils as structural fill difficult during wet weather conditions.

- *Advance Outwash*: The sands and gravelly sands were encountered only at the lower elevation portions of the site. These soils can be used in a broader range of weather conditions, however they may not be a readily accessible source for structural fill.

Adjusting Soil Moisture: Fill soils that are too wet to reuse as structural fill when excavated could possibly be reused after aerating the soil to remove excess moisture. Aeration involves spreading out and periodically turning the soils during warm weather to allow the soil to dry to acceptable moisture levels. This approach requires ample space and must be compatible with the construction schedule. If soils are too dry, water may need to be added to achieve near optimum moisture content for proper compaction.

Wet-Weather Considerations: As discussed above, most of the on-site soils will be difficult to use as structural fill during wet weather. Consequently, the project specifications should include provisions for importing clean, granular fill in case site filling must proceed during wet weather. For general structural fill purposes, we recommend using a well-graded sand or gravel, such as "Ballast" or "Gravel Borrow" per WSDOT Standard Specification 9-03.9(1) and 9-03.14, respectively, except that the percent passing the U.S. No. 200 Sieve should be less than 5 percent.

Permanent Slopes: All permanent cut slopes and fill slopes should be adequately inclined to minimize long-term raveling, sloughing, and erosion. We generally recommend that no slopes be steeper than 2H:1V. For all soil types, the use of flatter slopes (such as 3H:1V) would further reduce long-term erosion potential and facilitate vegetation growth.

Slope Protection: We recommend that a permanent berm, swale, or curb be constructed along the top edge of all permanent slopes to intercept surface flow. Also, a hardy vegetative groundcover should be established as soon as feasible to further protect the slopes from erosion due to runoff water.

4.2 FOUNDATIONS

To adequately support spread footings in the west wing, near borings B-19 to B-21, we recommend ground improvement by either over-excavation of loose fill soils, or aggregate piersTypical subgrade preparations is anticipated for spread footings in the northern portion of the buildings. At other locations, previously placed fill may require some over-excavation and re-compaction depending on the actual conditions encountered. We offer the following comments and recommendations for footing design and construction.

Bearing Subgrades: The following types of subgrade soils are anticipated, depending on location and elevation.

1. Unsuitable fill: Loose, soft, or unsuitable fill (with organics or other deleterious materials) encountered during earthwork should be overexcavated and replaced with properly placed and compacted structural fill to create a suitable subgrade. Boings B-19, B-20 and B-21 located in the southern half of the west wing of the new school building encountered approximately 7 to 8 feet of loose fill. We recommend that the existing fill soils in this area be overexcavated and replaced with properly compacted structural fill, or alternatively, the fill could be improved by installing aggregate piers. . Additional recommendations for overexcavation and aggregate piers are provided below.
2. Previously placed fill: Most of the previously placed fill on the site appears to have been compacted to a medium dense state. Any new footing subgrades in fill should be compacted to verify density and inspected by an Amec Foster Wheeler representative.
3. Structural fill: Newly placed structural fill that has been properly compacted, as described in Section 4.9, will provide a suitable subgrade.
4. Glacially consolidated soils: The intact, native, glacial till and glacial outwash soils are dense and will support higher bearing pressures than the fill.

Overexcavations: Loose, soft or unsuitable soils encountered below structures should be overexcavated and replaced with structural fill that has been properly placed and compacted, as described in Section 4.9. Because foundation stresses are transferred outward as well as downward into the bearing soils, overexcavation should extend horizontally outward from the edge of each footing a distance equal to the excavation depth, effectively creating a 1H:1V prism outward from all sides of the footing.

Aggregate Piers: Aggregate piers will improve the allowable bearing capacity of soils beneath spread footings. "Geopier" and "Vibro-Pier" are proprietary names for the most common types of aggregate pier, but others might be available. Aggregate piers are installed by drilling down to a suitable soil horizon or specified depth, and then backfilling the borehole with compacted angular gravel. This creates vertical columns of strong granular soils and densifies the soils surrounding each pier. Typical borehole diameters range from about 18 to 36 inches, and typical depths range from 5 to 30 feet. Higher spread footing bearing pressures could be utilized if supported by aggregate piers.

Bearing Capacities: For this report, we are providing general recommendations based on subgrade soil type. Once the locations, sizes, and elevations of foundations have been determined, we could provide more specific bearing pressures for specific footing locations.

1. Previously placed fill: Once suitable subgrade conditions have been confirmed, the foundations can be designed for an allowable bearing pressure of 2,500 pounds per square foot (psf).
2. Structural fill: Properly placed and compacted structural fill will also provide an allowable bearing pressure of 2,500 psf.
3. Aggregate Piers: Where the subgrade has been improved with aggregate piers, spread footings can be designed for an allowable bearing of at least 5,000 psf.
4. Glacial consolidated soils: The undisturbed glacial till and glacial outwash will provide an allowable bearing pressure of 5,000 psf.

For seismic design, these pressures may be increased by one third.

Footing Settlements: We estimate that total settlements of properly designed footings will be less than 1 inch, and differential settlement between two adjacent footings would be less than ¾ inch. Settlements would be reduced if the actual design bearing pressures are lower than our recommended allowable pressures.

Footing Depths and Widths: For frost and erosion protection, the bottoms of all exterior footings should bear at least 18 inches below adjacent outside grades, whereas the bottoms of interior footings need bear only 12 inches below the surrounding slab surface level. To minimize post-construction settlements, continuous (wall) and isolated (column) footings should be at least 18 inches and 24 inches wide, respectively. Greater depths may be considered to achieve higher soil bearing pressure and lateral resistance.

Subgrade Verification: We recommend footing subgrades be verified by an Amec Foster Wheeler representative before any concrete is placed. Footings should never be cast on loose, soft, or frozen soil; slough; debris; or surfaces covered by standing water.

Footing Subgrade Protection: To protect footing subgrades from disturbance during forming and rebar installation in wet weather, the contractor might consider placing a 2-inch protective cap of clean compacted crushed rock over the footing subgrades. Suitable cap material would include washed Crushed Rock Base Course, per WSDOT Standard Specification 9-03.9(3).

Footing and Stemwall Backfill: To provide erosion protection and lateral load resistance, we recommend all footing excavations be backfilled and compacted on both sides of the footings and stemwalls after the concrete has cured. The excavations should be backfilled with structural fill and compacted to a density of at least 90 percent (based on ASTM D-1557).

Lateral Resistance: Footings and stemwalls that have been properly backfilled as described above will resist lateral movements by means of passive earth pressure and base friction. We recommend using the following design parameters, which incorporate static and seismic safety factors of at least 1.5 and 1.1, respectively.

Design Parameter	Allowable Value
Static passive pressure	300 pcf
Seismic passive pressure	400 pcf
Base friction coefficient	0.4

Note: pcf = pounds per cubic foot

Base friction can be combined with the respective passive pressure to resist static and seismic loads.

4.3 Slab-on-Grade Floors

In our opinion, soil-supported slab-on-grade floors can be used in the proposed buildings if the subgrades are properly prepared. We offer the following comments and recommendations concerning slab-on-grade floors.

Floor Subgrade: All soil-supported slab-on-grade floors should bear on at least medium dense soils or structural fill. Localized overexcavation and replacement of loose soils may be needed, depending on the location of the floor slabs. The condition of subgrade soils should be evaluated by an Amec Foster Wheeler representative in case overexcavation of unsuitable soils is needed. Subsequent backfilling and compaction of the structural fill should be observed and verified by an Amec Foster Wheeler representative.

Capillary Break: To reduce the upward wicking of groundwater beneath the floor slab, we recommend a capillary break be placed over the subbase. This capillary break should consist of a 4-inch-thick layer of pea gravel or other clean, uniform gravel, such as "Gravel Backfill for Drains" per WSDOT Standard Specification 9-03.12(4).

Vapor Barrier: We recommend a vapor barrier at least 10 mil thick be placed directly between the capillary break and the floor slab to prevent moisture from migrating upward through the slab. During subsequent casting of the concrete slab, the contractor should exercise care to avoid puncturing this vapor barrier.

Vertical Deflections: Soil-supported slab-on-grade floors can deflect downward when vertical loads are applied due to elastic compression of the subgrade. In our opinion, a subgrade reaction modulus of 200 pounds per cubic inch can be used to estimate these deflections.

4.4 Drainage

The building should be provided with permanent drainage systems to minimize the risk of future moisture problems. We offer the following recommendations and comments for drainage design and construction.

Perimeter Drains: We recommend the new building structures be encircled with a perimeter drain system to collect possible seepage water. This drain should consist of a 4-inch-diameter perforated rigid pipe within an envelope of pea gravel or washed rock, extending at least 6 inches on all sides of the pipe. The gravel envelope should be wrapped with filter fabric to reduce the migration of fines from the surrounding soils. Ideally, the drain invert would be installed no more than 8 inches above or below the base of the perimeter footings.

Runoff Water: Roof-runoff and surface-runoff water should *not* be allowed to flow into the foundation drainage systems. Instead, these sources should flow into separate tightline pipes and be routed away from the buildings to an appropriate location. In addition, final site grades should slope downward away from buildings so that runoff water flows by gravity to suitable collection points, rather than ponding near buildings. Ideally, the area surrounding the buildings would be capped with concrete, asphalt, or low-permeability (silty) soils to minimize surface-water infiltration next to the footings.

Floor Slab Underdrains: Depending on site grading and building locations, floor slab underdrains may need to be considered. If subgrades intersect dense glacial soils, perched groundwater may need to be intercepted and drained.

Grading and Capping: Ideally, the area surrounding the building would be capped with concrete, asphalt, or low-permeability (silty) soils to preclude surface-water infiltration near buildings.

4.5 Backfilled Walls

We offer the following recommendations for backfilled cast-in-place concrete walls supporting grade changes at the site. Underground vaults could also be designed as backfilled walls.

Footing Depths: For frost and erosion protection, concrete retaining wall footings should bear at least 18 inches below the adjacent ground surface. However, greater depths might be necessary to develop adequate passive resistance and/or bearing resistance in certain cases.

Curtain Drains: To preclude development of hydrostatic pressure behind backfilled retaining walls, we recommend placing a curtain drain behind the walls. This curtain drain should consist of pea gravel, washed rock, or some other clean, uniform, well-rounded gravel, extending outward a minimum of 12 inches from the wall and extending upward from the footing drain to within about 12 inches of the ground surface. The curtain drain should connect to a 4-inch-diameter perforated drain pipe behind the heel of the wall, and the drain pipe should discharge away from the wall.

Backfill Soil: Ideally, all retaining wall backfill placed behind the curtain drain would consist of clean, free-draining, granular material, such as "Gravel Backfill for Walls," per WSDOT Standard Specification 9-03.12(2). Alternatively, on-site soils could be used as backfill if they are placed at a moisture content near optimum for compaction. If silty soils are used for backfill, then a geotextile separator should be place between the curtain drain and the backfill.

Backfill Compaction: Because soil compactors place significant lateral pressures on retaining walls, we recommend only small, hand-operated compaction equipment be used within 3 feet of a backfilled wall. In addition, all backfill should be compacted to a density as close as possible to 90 percent of the maximum dry density (based on ASTM D-1557); a greater degree of compaction closely behind the wall would increase the lateral earth pressure, whereas a lesser degree of compaction might lead to excessive post-construction settlements.

Grading and Capping: To retard infiltration of surface water into backfill soils, we recommend the backfill surface of exterior walls be adequately sloped to drain away from the wall. Ideally, the backfill surface directly behind the wall would be capped with asphalt, concrete, or 12 inches of low-permeability (silty) soils to minimize or preclude surface water infiltration.

Applied Loads: Overturning and sliding loads applied to retaining walls can be classified as static pressures and surcharge pressures. We offer the following specific values for design purposes:

- Static Pressures: Yielding (cantilever) retaining walls should be designed to withstand an appropriate active lateral earth pressure, whereas nonyielding (restrained) walls should be designed to withstand an appropriate at-rest lateral earth pressure. These pressures act over the entire back of the wall and vary with the backslope inclination. Assuming a level backslope, we recommend using active and at-rest pressures of 35 pcf and 55 pcf, respectively.

- Surcharge Pressures: Static lateral earth pressures acting on a retaining wall should be increased to account for surcharge loadings resulting from traffic, construction equipment, material stockpiles, or structures located within a horizontal distance equal to the wall height. For simplicity, a traffic surcharge can be modeled as a uniform horizontal pressure of 75 psf acting against the upper 6 feet of the wall.
- Seismic Pressures: Static lateral earth pressures acting on a retaining wall should be increased to account for seismic loadings. These pressures act over the entire back of the wall and vary with the backslope inclination, the seismic acceleration, and the wall height. We recommend these seismic loadings be modeled as a uniform *active* pressure of 10H psf (based on a wall height of "H" feet), assuming a level backslope and allowing some deformation during the earthquake.

Resisting Forces: Static pressures and surcharge pressures are resisted by a combination of passive lateral earth pressure, base friction, and subgrade bearing capacity. Passive pressure acts over the embedded front of the wall (neglecting the upper 1 foot for paved foreslopes, or the upper 2 feet for soil foreslopes) and varies with the foreslope declination, whereas base friction and bearing capacity act along the bottom of the footings. Assuming a level foreslope beyond the wall, the following design parameters can be used for preliminary design, which incorporate static and seismic safety factors of at least 1.5 and 1.1, respectively.

Design Parameter	Allowable Value
Static passive pressure	300 pcf
Seismic passive pressure	400 pcf
Base friction coefficient	0.4
Static bearing capacity	2,500 psf
Seismic bearing capacity	3,300 psf

Base friction can be combined with passive pressure to resist the applied loads.

4.6 Underground Utilities

We expect that underground utilities, such as waterlines, storm drains, sewer pipes, manholes, and catch basins, will be included in the school redevelopment. Our comments and recommendations concerning installation of utilities are presented below.

Bedding Soils: Utility pipes should be bedded on an appropriate material that extends at least 6 inches outward from the pipe in all directions. For level or gently sloping pipes, we recommend using a clean, uniform, well-rounded material, such as pea gravel or "Gravel Backfill for Pipe Bedding," per WSDOT Standard Specification 9-03.12(3).

Backfill Soils: The on-site soils will be difficult to compact as utility excavation backfill unless the moisture content is kept within a narrow range of the optimum moisture content. During the wet season or during rainy periods, backfill material used for utility trenches and other excavations may need to consist of clean, well-graded granular soils, such as "Gravel Borrow" per WSDOT Standard Specification 9-03.14, except with less than 5 percent passing the U.S. No. 200 sieve. Controlled-density fill (CDF) could be used as a more convenient, but also more expensive, alternative to backfill soil in any weather conditions.

Backfill Compaction: We recommend utility backfill soils be compacted to a density commensurate with surrounding fill or native soils within nonstructural locations. Within structural areas or overlying structures, we recommend backfill soils be compacted according to the compaction criteria given in Section 4.9. CDF backfill does not require compaction but should have a compressive strength commensurate with the application.

4.7 Stormwater Infiltration

Stormwater management will include three infiltration ponds to be constructed in the southwest portion of the site. Amec Foster Wheeler completed a stormwater infiltration study to estimate infiltration rates for design of the infiltration facility. The study followed the General Requirements for Infiltration Facilities specified in the Kitsap County Stormwater Design Manual (2010) which required testing procedures follow the Washington State Department of Ecology, 2005 Stormwater Management Manual for Western Washington guidelines. Please refer to our Geotechnical Supplement No. 1 (Amec Foster Wheeler, 2017) for detailed information. The following stormwater infiltration summary should be used only in conjunction with the full text of Geotechnical Supplement No. 1 (Amec Foster Wheeler, 2017).

Based on soil and groundwater conditions encountered at the stormwater infiltration area, the results of pilot infiltration tests (PITs), laboratory test results, and engineering analysis for each infiltration pond location, we arrived at the following conclusions:

- North infiltration pond – Infiltration is feasible using a long-term design infiltration rate of 1 inch per hour. The vertical groundwater separation is 11 feet between the pond base and the highest groundwater reading from observation well OW-3. Because this pond is situated next to the top of a steep slope, we have recommended constructing a fill embankment to decrease the risk of seepage on the slope below the pond.

- Central infiltration pond – Low infiltration rates at this location yield a long-term design infiltration rate of 0.16 inch per hour. The vertical groundwater separation between the pond base and highest groundwater reading from OW-1 just west of the pond is 5.5 feet. Fill was encountered to 14 feet below the ground surface near the pond northwest corner. If fill is present at the pond subgrade, the fill should be overexcavated until the Advance Outwash soils are exposed.
- South infiltration pond – Infiltration is feasible using a long-term design infiltration rate of 0.84 inch per hour. The vertical groundwater separation is 4.5 feet between the pond base and the highest groundwater reading from observation well OW-2.

The south and central infiltration ponds will generally be constructed by cutting the existing subgrade at each location to design grade. Some minor structural fill placement is planned at the top of each pond location to reach final design grades.

The majority of the north infiltration pond will also be constructed by cutting the existing subgrade. However, an existing steep slope dips downward from the southwest and south edges of the north infiltration pond toward NW Anderson Hill Road. The slope in this area is a maximum of 55 percent for the first 10 vertical feet, and thereafter decreases to approximately 11 percent. Geologic cross section B-B' (Figure 5) illustrates the slope at the southwest corner of the north infiltration pond. Although slope stability is not a concern, there is a risk that water infiltrating into the pond could seep out onto the face of the slope. For this reason, we recommended constructing a fill embankment on the existing slope (Amec Foster Wheeler, 2017). A fill embankment would flatten the slope and increase separation between the pond and the ground surface. The fill slope embankment would meet Kitsap County guidelines that call for (1) pond setback from the top of the steep slope, and (2) preventing seepage on the slope face (Kitsap County, 2010, Section 7.3.4.1.N).

4.8 PAVEMENT

We understand new vehicle access roads, parking lots, and bus lanes with student loading/unloading areas will be constructed as part of the campus redevelopment work (Section 3.1). The following comments and recommendations are given for pavement design and construction.

Soil Design Values: Soil design values for subgrade conditions were determined based on field observations, visual classification, laboratory testing, and reference to typical values provided in the WSDOT *Pavement Guide*,[1] and *Kitsap County Road Standards*.[2] Based on grain size analyses performed on representative soil samples, we estimate a California Bearing Ratio (CBR) value of 20 for the underlying subgrade soils. We have interpreted the effective resilient subgrade modulus as 15,000 pounds per square inch (average to good subgrade).

1. https://www.wsdot.wa.gov/Research/Reports/300/335.1.htm.
2. https://spf.kitsapgov.com/pw/projects-construction/road-standards.

Traffic Design Values: The calculated pavement sections for the main driveway/bus loop and fire lanes are based on an assumed traffic loading of 35 bus trips per day for 200 school days over a 20-year design life. Sufficient car traffic volumes are included in the calculations. The calculated pavement section for car and light truck parking areas is based on light to moderate traffic.

Flexible Pavement Sections: A conventional pavement section typically comprises a hot-mix asphalt (HMA) pavement over a crushed rock base (CRB) course, over a suitable subgrade or subbase that consists of granular structural fill. Based on the estimated design values, the following minimum pavement sections are recommended:

	Minimum Thickness (inches)	
Flexible Pavement Section	**Passenger Car Only Areas**	**Heavy Vehicle (Bus) Driveways**
HMA Class ½ inch	3	4
CRB	4	6

These values represent the recommended minimum thickness of HMA Class ½-inch asphalt. Other combinations of pavement thickness could be considered upon request.

Rigid Pavement Section: A concrete pavement section typically consists of Portland cement concrete (PCC) pavement over CRB, over a suitable subgrade or subbase that consists of granular structural fill. Based on the estimated design values, the following minimum pavement sections are recommended:

	Minimum Thickness (inches)	
Rigid Pavement Section	**Passenger Car Only Areas**	**Heavy Vehicle (Bus) Driveways**
PCC	4	6
CRB	4	8

Pavement Materials: HMA should conform to WSDOT Standard Specification 5-04. PCC should conform to WSDOT Standard Specification 5-05. Granular structural fill should be an imported clean crushed rock meeting the requirements for "Crushed Surfacing Top and Base Course" (CSBC) per WSDOT Standard Specification 9-03.9(3).

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Subgrade Preparation: We anticipate cuts and/or fills will be performed to achieve pavement design grades. All pavement subgrades should be proof-rolled "wheel-to-wheel" with a loaded dump truck to verify the density. This proof-rolling is especially important for subgrade above areas where pre-existing fill soils will remain. The proof-rolling should be observed by a representative from Amec Foster Wheeler. Any areas of soft, yielding subgrade disclosed during this proof-rolling operation should be overexcavated and replaced with a suitable structural fill, as described in Section 4.9.

Fire Access Lane Subgrade Preparation: Loose to very loose fill was encountered near the planned fire access lane on the new school building west side in the vicinity of borings B-20 and B-21. We recommend that the loose and very loose fill be overexcavated and replaced with 2 feet of compacted structural fill, where necessary.

Compaction and Verification: Structural fill used to achieve subgrade, subbase material, and base course material should be compacted to at least 95 percent of the Modified Proctor maximum dry density (ASTM D-1557), and all asphalt concrete should be compacted to at least 92 percent of the Rice value (ASTM D-2041). We recommend an Amec Foster Wheeler representative be retained to verify compaction of the subgrade fill and base course before any overlying layer is placed. For the subgrade, compaction is best verified by means of frequent density testing; for the base course, methodology observations and hand-probing are more appropriate than density testing.

Pavement Life and Maintenance: It should be noted that no asphalt pavement is maintenance-free. The above-described pavement sections represent our minimum recommendations for an average level of performance during a 20-year design life; therefore, an average level of maintenance will likely be required. Furthermore, a 20-year pavement life typically assumes that an overlay will be placed after about 10 years. Thicker asphalt, base, and subbase courses would offer better long-term performance, but would cost more initially; thinner courses would be more susceptible to "alligator" cracking and other failure modes. However, pavement design can be considered a compromise between a high initial cost and low maintenance costs, versus a low initial cost and higher maintenance costs.

4.9 STRUCTURAL FILL

The term *structural fill* refers to any materials used for building pads, as well as materials placed under or against foundations and retaining walls; under slab-on-grade floors, sidewalks, and pavements; and for permanent fill slopes. Our comments, conclusions, and recommendations concerning structural fill are presented in the following paragraphs.

Materials: Typical structural fill materials include sand, gravel, crushed rock, quarry spalls, CDF, lean-mix concrete, well-graded mixtures of sand and gravel (commonly called "gravel borrow" or "pit-run"), and mixtures of silt, sand, and gravel. Soils used for structural fill should not contain any organic matter or debris, or any individual particles greater than approximately 6 inches in diameter, and should have no more than 20 percent fines (silt and clay that passes the U.S. No. 200 sieve).

Fill Placement: Structural fill should be placed in horizontal lifts not exceeding 8 inches in loose thickness, and each lift should be thoroughly compacted with a mechanical vibratory compactor. Other procedures may be appropriate for some materials.

Compaction Criteria: Using the Modified Proctor test (ASTM D1557) as the standard, we recommend structural fill be used for various on-site applications and compacted to the following minimum densities:

Fill Application	Minimum Compaction (percent)
Footing subgrade	95
Footing and stemwall backfill	90
Slab-on-grade floor subgrade	90
Slab on-grade sidewalk subgrade	90
Retaining wall subgrade	90
Retaining wall backfill	90
Asphalt or concrete pavement subgrade	95
Utility trench backfill under pavements/structures	95
Utility trench backfill in non-structural locations	90
Infiltration pond embankments/berms	90

Subgrade Verification and Compaction Testing: Regardless of material or location, all structural fill should be placed over dense, unyielding subgrades. The condition of all subgrades should be verified by an Amec Foster Wheeler representative before filling or construction begins. In addition, fill soil compaction should be verified by means of in-place density tests performed during fill placement so the adequacy of the soil compaction efforts may be evaluated as earthwork progresses.

Soil Moisture Considerations: The suitability of soils used for structural fill depends primarily on their grain-size distribution and moisture content when they are placed. As the "fines" content (the soil fraction passing the U.S. No. 200 sieve) increases, soils become more sensitive to small changes in moisture content. Soils containing more than about 5 percent fines (by weight) cannot be consistently compacted to a firm, unyielding condition when the moisture content is more than 2 percentage points above or below optimum. For fill placement during wet-weather site work, we recommend using "clean" fill, which refers to soils that have a fines content of 5 percent or less (by weight) based on the soil fraction passing the U.S. No. 4 sieve.

Import Fill and Wet Weather Fill Considerations: As discussed in Section 4.1, the on-site soils would be difficult to reuse as structural fill during wet weather because of high silt content and moisture sensitivity. Alternatively, we recommend using a well-graded sand and gravel, such as "Ballast" or "Gravel Borrow," per WSDOT Standard Specification 9-03.9(1) and 9-03.14, respectively, except that the percent passing the U.S. No. 200 sieve should be less than 5 percent.

Concrete and Pavement Recycling: It is anticipated that the project will produce asphalt and concrete rubble. These materials, or similar imported materials, can be considered for reuse as fill during project construction if they are pulverized to appropriate grain sizes. Recycled asphalt can be uniformly blended with pavement base course materials in accordance with WSDOT Standard Specification 9-03.21(1)E. Recycled concrete can substitute for up to 100 percent of base course materials below pavements, including CSBC and gravel base. Recycled concrete should be used in accordance with WSDOT Standard Specification 9-03.21(1)B.

5.0 CONSTRUCTION SERVICES

Because the future performance and integrity of the structural elements will depend largely on proper site preparation, drainage, fill placement, and construction procedures, monitoring and testing by experienced geotechnical personnel is an integral part of the construction process. Consequently, Amec Foster Wheeler has been retained to provide the services below for the project during construction.

(i) Review the final plans and specifications to verify that our geotechnical engineering recommendations have been incorporated properly.

(ii) Attend a pre-construction conference with the design team and contractor to discuss important geotechnical related construction issues.

(iii) Observe all exposed subgrades after completion of stripping and overexcavation to confirm that suitable soil conditions have been reached and to determine appropriate subgrade compaction methods.

(iv) Monitor the placement of all structural fill and test the compaction of structural fill soils to verify their conformance with the construction specifications.

(v) Monitor the installation of aggregate piers for ground improvement.

(vi) Check all completed subgrades for footings and slab-on-grade floors before concrete is poured, to verify their bearing capacity.

(vii) Observe the installation of all perimeter drains, wall drains, and capillary break layers to verify their conformance with the construction plans.

6.0 LIMITATIONS

This report has been prepared for the exclusive use of Central Kitsap School District #401 and their consultants for specific application to this project, in accordance with generally accepted geotechnical engineering practice. The conclusions, recommendations, and opinions presented in this report are based on our understanding of the CKHSMS redevelopment, as derived from verbal information and site plans provided by CKSD.

The explorations Amec Foster Wheeler performed and used for this study and on information provided for the proposed project. The explorations reveal subsurface conditions only at discrete locations across the project site, and actual conditions at other locations could vary. Furthermore, the nature and extent of these variations would not become evident until additional explorations are performed or until construction activities have begun. If significant variations are observed or proposed site features redesigned, we may need to modify the conclusions and recommendations contained in this geotechnical engineering report to reflect actual site conditions encountered.

We selected the specific number, locations, and depths of explorations with input from the project design team, based on locations of existing and proposed site features, under the constraints of surface access, underground utility conflicts, and budget. We estimated the location of each exploration by measuring the distance from existing features in the field using a tape measure and scaling these measurements onto the topographic survey supplied to us by AES. We then estimated boring ground surface elevations by interpolating between contour lines shown on the AES topographic survey. Consequently, the data listed in Table 1, the locations depicted on Figure 2 relative to existing site features, and the locations on Figure 3 relative to proposed site features should be considered accurate only to the degree permitted by our data sources and implied by our measurement methods.

7.0 REFERENCES

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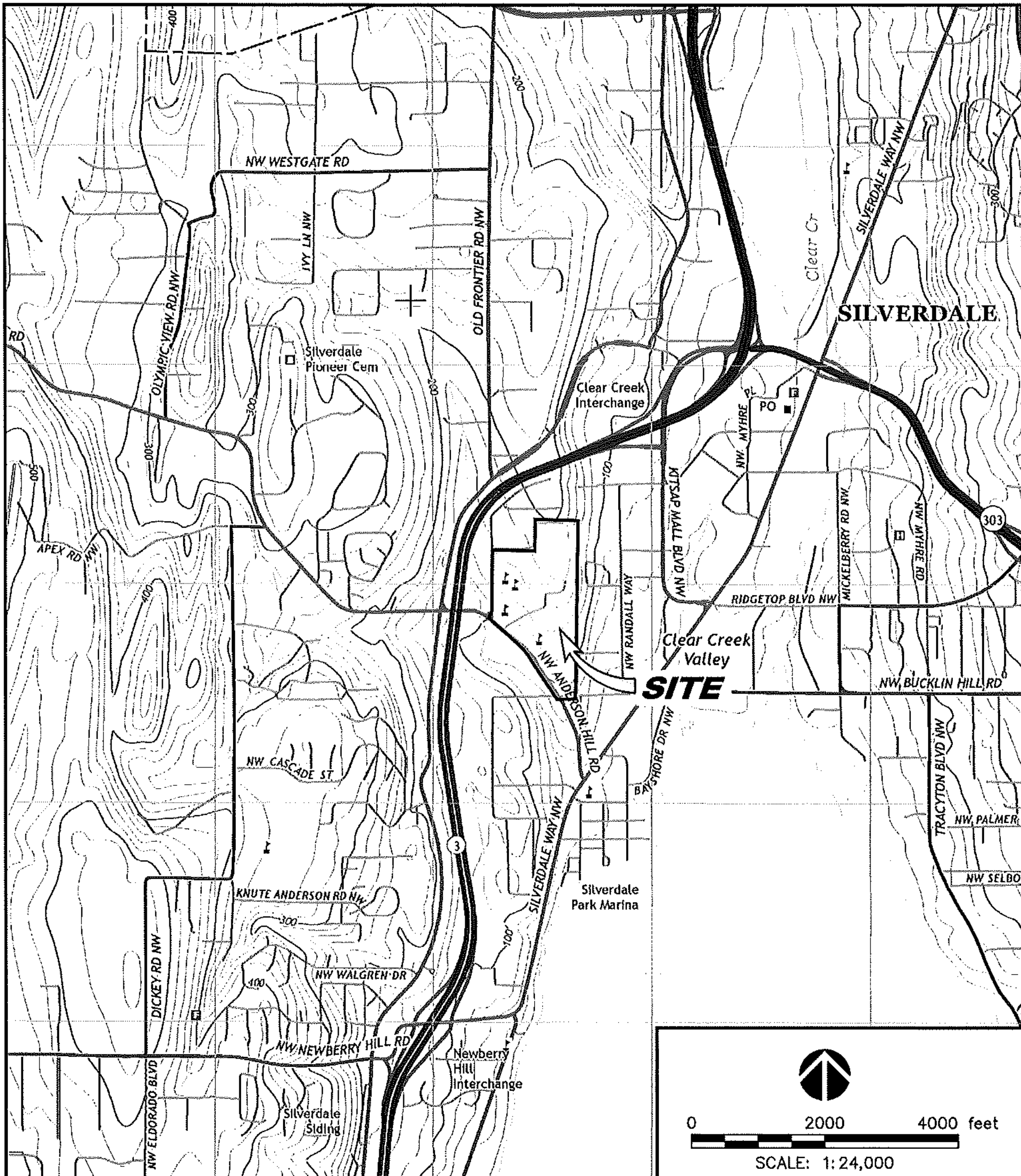
FIGURES

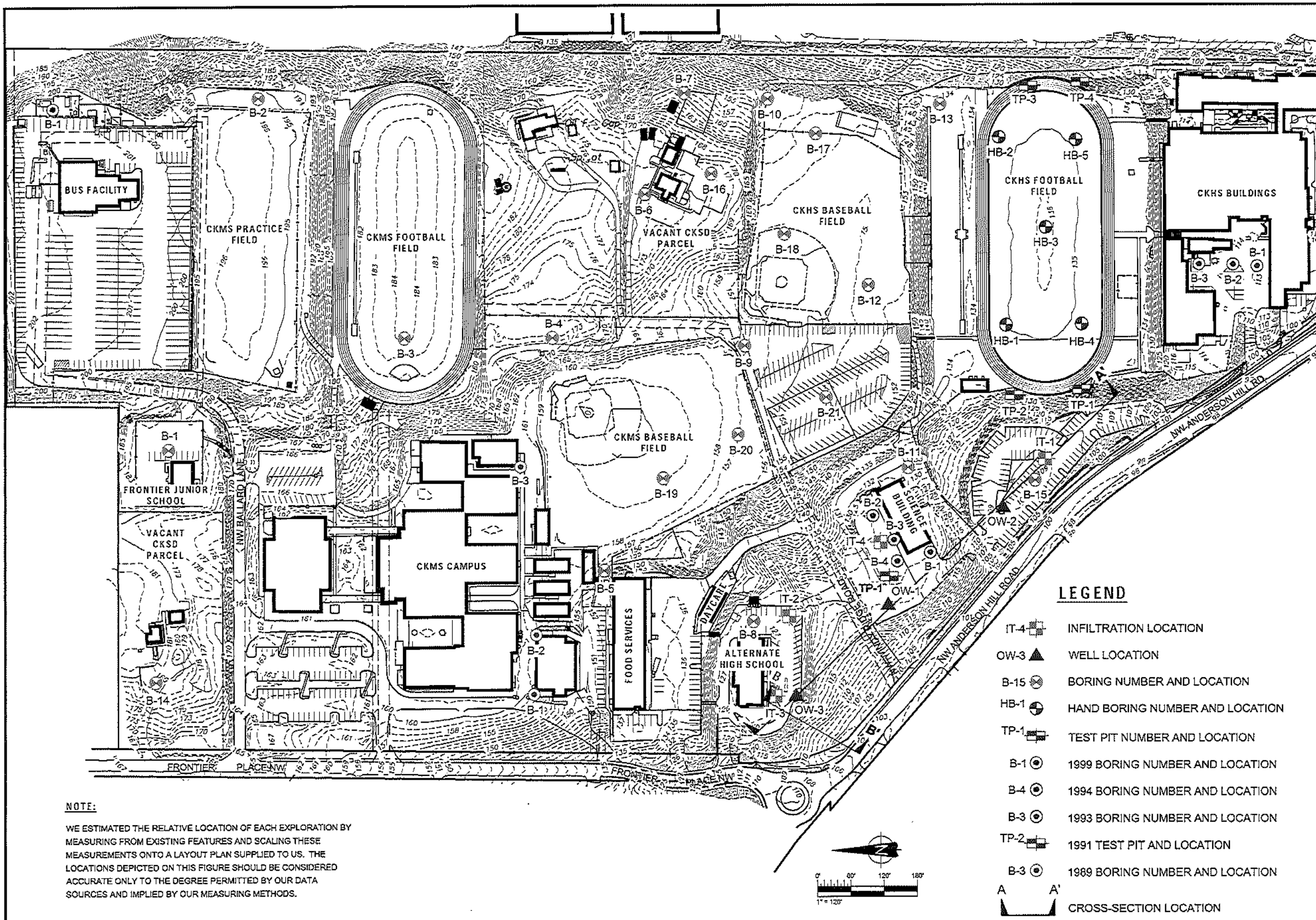


CENTRAL KITSAP SCHOOL DISTRICT	amec foster wheeler	CENTRAL KITSAP HIGH SCHOOL AND MIDDLE SCHOOL CAMPUS	DATE MARCH 2017
			SCALE 1" = 2,000'
Amec Foster Wheeler Environment & Infrastructure, Inc. 11810 North Creek Parkway North Bothell, WA 98011		SITE LOCATION MAP	PROJECT NO. 6-917-18096-0
			FIGURE 1

DRAWN BY: JRS CHECKED BY: KM

G:\91\18000\18096 — CKMS\18096-01a.dwg — Site — Mar. 06, 2017 10:10am — jeffrey.sanders

Permit Number: 20-03281



NOTE:

WE ESTIMATED THE RELATIVE LOCATION OF EACH EXPLORATION BY MEASURING FROM EXISTING FEATURES AND SCALING THESE MEASUREMENTS ONTO A LAYOUT PLAN SUPPLIED TO US. THE LOCATIONS DEPICTED ON THIS FIGURE SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE PERMITTED BY OUR DATA SOURCES AND IMPLIED BY OUR MEASURING METHODS.

NOTE:
SURVEY BASE IS "*TOPOGRAPHY MAP*" BY AES CONSULTANTS, INC., DATED JUNE 16th, 2016.

REV	DATE	MONTH	YEAR	REVISION DESCRIPTION	ENG.	APPR.

CENTRAL KITSAP SCHOOL DISTRICT

Amec Foster Wheeler
Environment & Infrastructure, Inc.
11810 North Creek Parkway North
Bothell, WA 98011

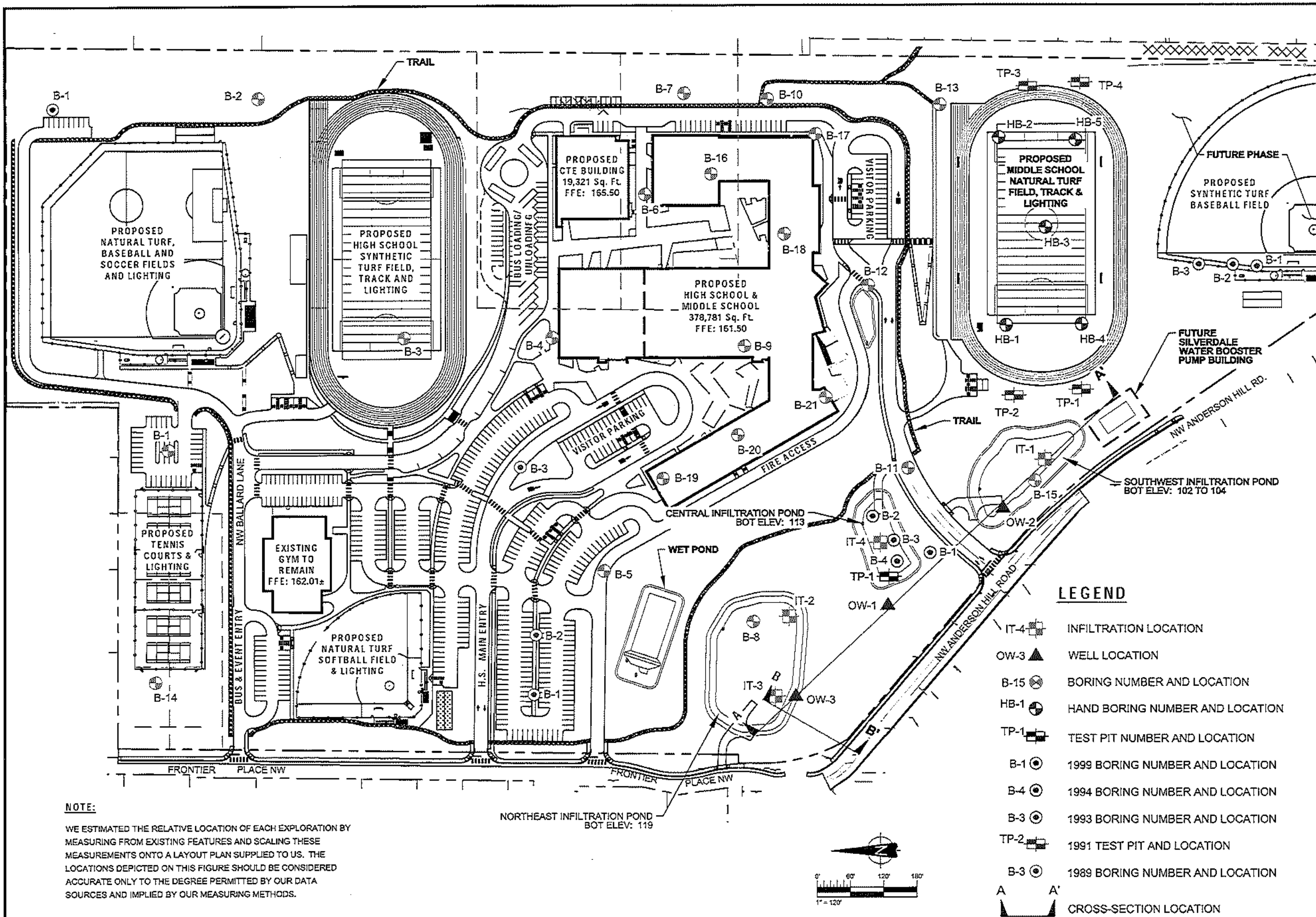
amec foster wheeler

CENTRAL KITSAP HIGH SCHOOL AND MIDDLE SCHOOL CAMPUS

SITE AND EXPLORATION PLAN (EXISTING FEATURES)

DATE	MARCH 2017
SCALE	1" = 120'
PROJECT NO.	6-917-18096-0
FIGURE	2

Permit Number: 20-03281



LEGEND

IT-4	INFILTRATION LOCATION
OW-3	WELL LOCATION
B-15	BORING NUMBER AND LOCATION
HB-1	HAND BORING NUMBER AND LOCATION
TP-1	TEST PIT NUMBER AND LOCATION
B-1	1999 BORING NUMBER AND LOCATION
B-4	1994 BORING NUMBER AND LOCATION
B-3	1993 BORING NUMBER AND LOCATION
TP-2	1991 TEST PIT AND LOCATION
B-3	1989 BORING NUMBER AND LOCATION
A — A'	CROSS-SECTION LOCATION

NOTE:

WE ESTIMATED THE RELATIVE LOCATION OF EACH EXPLORATION BY MEASURING FROM EXISTING FEATURES AND SCALING THESE MEASUREMENTS ONTO A LAYOUT PLAN SUPPLIED TO US. THE LOCATIONS DEPICTED ON THIS FIGURE SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE PERMITTED BY OUR DATA SOURCES AND IMPLIED BY OUR MEASURING METHODS.

NOTE:
SURVEY BASE IS "CKHSMS - GRADING" PROVIDED BY AHBL, INC., RECEIVED MARCH 2nd, 2017.

REV	DATE	MONTH	YEAR	REVISION DESCRIPTION	ENG.	APPR.

CENTRAL KITSAP SCHOOL DISTRICT

Amec Foster Wheeler
Environment & Infrastructure, Inc.
11810 North Creek Parkway North
Bothell, WA 98011

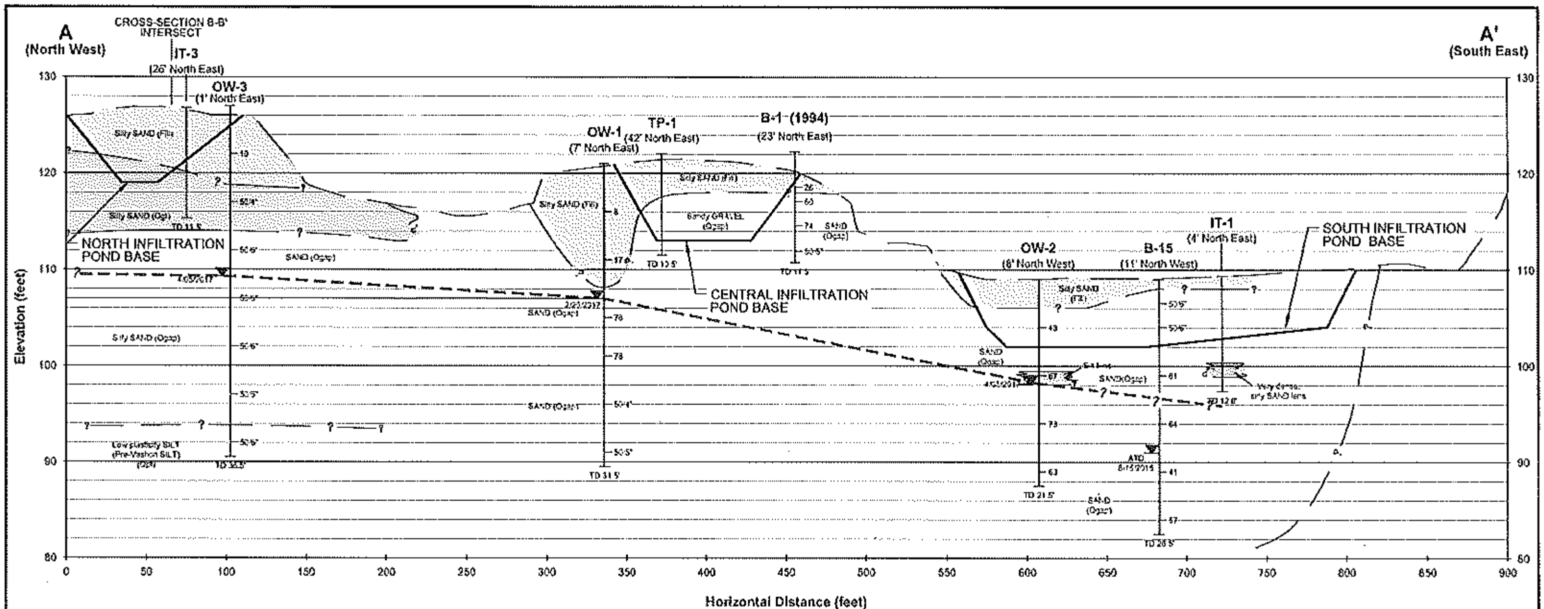
amec foster wheeler

CENTRAL KITSAP HIGH SCHOOL AND MIDDLE SCHOOL CAMPUS

SITE AND EXPLORATION PLAN (PROPOSED FEATURES)

DATE	MARCH 2017
SCALE	1" = 120'
PROJECT NO.	6-917-16096-0
FIGURE	3

Permit Number: 20-03281



LEGEND

OW-3
(1' North) — BORING NUMBER AND APPROXIMATE LOCATION OFFSET FROM SECTION LINE

STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT

GROUNDWATER LEVEL - HIGHEST ELEVATION DURING WINTER SEASON OR AT TIME OF DRILLING

TD 51.5' — TOTAL DEPTH OF BORING

VERTICAL SCALE: 1" = 10'

HORIZONTAL SCALE: 1" = 60'

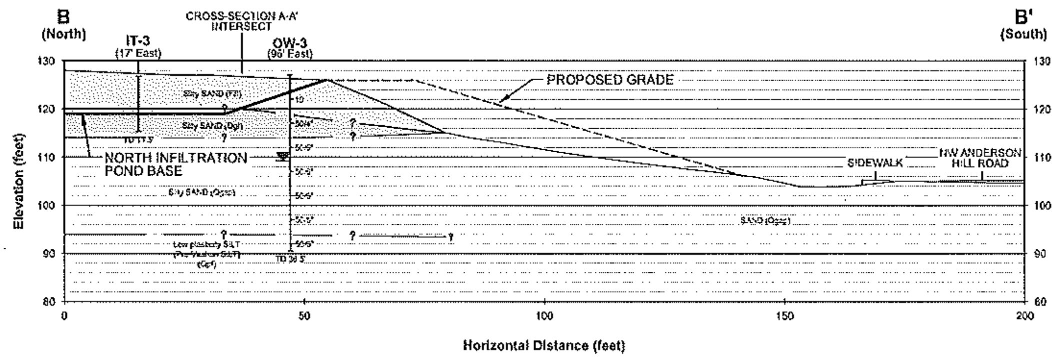
NOTES:

THE STRATA ARE BASED UPON INTERPOLATION BETWEEN EXPLORATIONS AND MAY NOT REPRESENT ACTUAL SUBSURFACE CONDITIONS.

SIMPLIFIED NAMES ARE SHOWN FOR SOIL DEPOSITS, BASED ON GENERALIZATIONS OF SOIL DESCRIPTIONS. SEE EXPLORATION LOGS AND REPORT TEXT FOR COMPLETE SOIL DESCRIPTIONS.

CENTRAL KITSAP SCHOOL DISTRICT	amec foster wheeler	CENTRAL KITSAP HIGH SCHOOL AND MIDDLE SCHOOL CAMPUS	DATE	MARCH 2017
			SCALE	1" = 60'
Amec Foster Wheeler Environment & Infrastructure, Inc. 11810 North Creek Parkway North Bothell, WA 98011		GEOLOGIC CROSS-SECTION A-A'	PROJECT NO.	6-917-16096-0
			FIGURE	4

Permit Number: 20-03281



LEGEND

OW-3 (96' East) — BORING NUMBER AND APPROXIMATE LOCATION OFFSET FROM SECTION LINE

5 — STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT

GROUNDWATER LEVEL - HIGHEST ELEVATION DURING WINTER SEASON OR AT TIME OF DRILLING

TD 36.5' — TOTAL DEPTH OF BORING

0' 10' 20' 30'

SCALE: 1" = 20'

NOTES:

THE STRATA ARE BASED UPON INTERPOLATION BETWEEN EXPLORATIONS AND MAY NOT REPRESENT ACTUAL SUBSURFACE CONDITIONS.

SIMPLIFIED NAMES ARE SHOWN FOR SOIL DEPOSITS, BASED ON GENERALIZATIONS OF SOIL DESCRIPTIONS. SEE EXPLORATION LOGS AND REPORT TEXT FOR COMPLETE SOIL DESCRIPTIONS.

CENTRAL KITSAP SCHOOL DISTRICT

Amec Foster Wheeler
Environment & Infrastructure, Inc.
11810 North Creek Parkway North
Bothell, WA 98011

amec foster wheeler

CENTRAL KITSAP HIGH SCHOOL AND MIDDLE SCHOOL CAMPUS

GEOLOGIC CROSS-SECTION B-B'

DATE	MARCH 2017
SCALE	1" = 20'
PROJECT NO.	6-917-16096-0
FIGURE	5

Permit Number: 20-03281

APPENDIX A

Field Exploration Procedures and Logs

APPENDIX A
FIELD EXPLORATION PROCEDURES AND LOGS
Central Kitsap High School and Middle School Campus Redevelopment
Silverdale, Washington

The following paragraphs describe the procedures used for field explorations and field tests that Amec Foster Wheeler conducted for this project. Descriptive logs of our explorations are enclosed in this appendix.

AUGER BORING PROCEDURES

Exploratory borings were advanced with a hollow-stem auger, using a trailer-mounted drill rig operated by an independent drilling firm working under subcontract to Amec Foster Wheeler. An engineering geologist from Amec Foster Wheeler continuously observed the borings, logged the subsurface conditions, and collected representative soil samples. All samples were stored in watertight containers and later transported to the laboratory for further visual examination and testing. After each boring was completed, the borehole was backfilled with a mixture of bentonite chips and soil cuttings, and the surface was patched with asphalt or concrete (where appropriate).

Throughout the drilling operation, soil samples were obtained at 2.5- or 5-foot depth intervals by means of the standard penetration test (SPT) per ASTM D-1586. This testing and sampling procedure consists of driving a standard 2-inch-diameter steel split-spoon sampler 18 inches into the soil with a 140-pound hammer free-falling 30 inches. The number of blows required to drive the sampler through each 6-inch interval was counted, and the total number of blows struck during the final 12 inches was recorded as the standard penetration resistance, or "SPT blow count." If a total of 50 blows were struck within any 6-inch interval, the driving was stopped and the blow count was recorded as 50 blows for the actual penetration distance. The resulting standard penetration resistance values indicate the relative density of granular soils and the relative consistency of cohesive soils.

The enclosed boring logs describe the vertical sequence of soils and materials encountered in each boring, based primarily on field classifications and supported by subsequent laboratory examination and testing. Where a soil contact was observed to be gradational, boring logs indicate the average contact depth. Where a soil type changed between sample intervals, we inferred the contact depth. The boring logs also graphically indicate the blow count, sample type, sample number, and approximate depth of each soil sample obtained from the borings, as well as results of laboratory tests performed on these soil samples. If groundwater was encountered in a borehole, the approximate groundwater depth is depicted on the boring log. Groundwater depth estimates are typically based on the moisture content of soil samples, the wetted height on the drilling rods, and the water level measured in the borehole after the auger has been extracted.

HAND BORING PROCEDURES

Exploratory hand borings were advanced with a 3-inch-diameter hand auger operated by an Amec Foster Wheeler geotechnical specialist, who logged the subsurface conditions and obtained representative soil samples. All samples were stored in watertight containers and later transported to a laboratory for further visual examination and testing. After each hand boring was completed, we backfilled the borehole with soil cuttings and tamped the surface. The relative density of granular soils and relative consistency of cohesive soils were generally estimated according to the drilling resistance encountered in each borehole.

The enclosed hand boring logs describe the vertical sequence of soils and materials encountered in each hand boring, based primarily on field classifications and supported by subsequent laboratory examination and testing. Where a soil contact was observed to be gradational, the logs indicate the average contact depth. Our logs also indicate the approximate depth of groundwater encountered in the boreholes, as well as all sample numbers and sampling locations.

WELL INSTALLATION PROCEDURES

Groundwater observation wells consist of 1.5-inch-diameter polyvinyl chloride pipe, the lower 5 feet of which is finely slotted. The annular space around the slotted segment was backfilled with clean sand and gravel, and the upper portion of the annulus was sealed with bentonite chips and concrete. A flush-mounted monument was placed over the top of each wellhead for protection. The as-built configuration of each observation well is illustrated on the respective boring log. Our logs also show groundwater levels encountered at the time of our drilling.

TEST PIT PROCEDURES

Exploratory test pits were excavated with a track-mounted hoe operated by an independent firm working under subcontract to Amec Foster Wheeler. A geotechnical specialist from our firm continuously observed the test pit excavations, logged the subsurface conditions, and obtained representative soil samples. All samples were stored in watertight containers and later transported to a laboratory for further visual examination and testing. After we logged each test pit, the hoe operator backfilled it in lifts and compacted each lift to a firm or firm and unyielding condition. The upper 1 foot was backfilled with crushed rock and compacted to a firm/unyielding condition. Approximately 4 inches of asphalt was placed at the surface for any test pits excavated within paved areas.

The enclosed test pit logs indicate the vertical sequence of soils and materials encountered in each test pit, based primarily on field classifications and supported by subsequent laboratory examination and testing. Where a soil contact was observed to be gradational or undulating, our logs indicate the average contact depth. We estimated the relative density and consistency of the in situ soils by means of the excavation characteristics and the stability of the test pit sidewalls. Our logs also indicate the approximate depths of any sidewall caving or groundwater seepage observed in the test pits, as well as all sample numbers and sampling locations

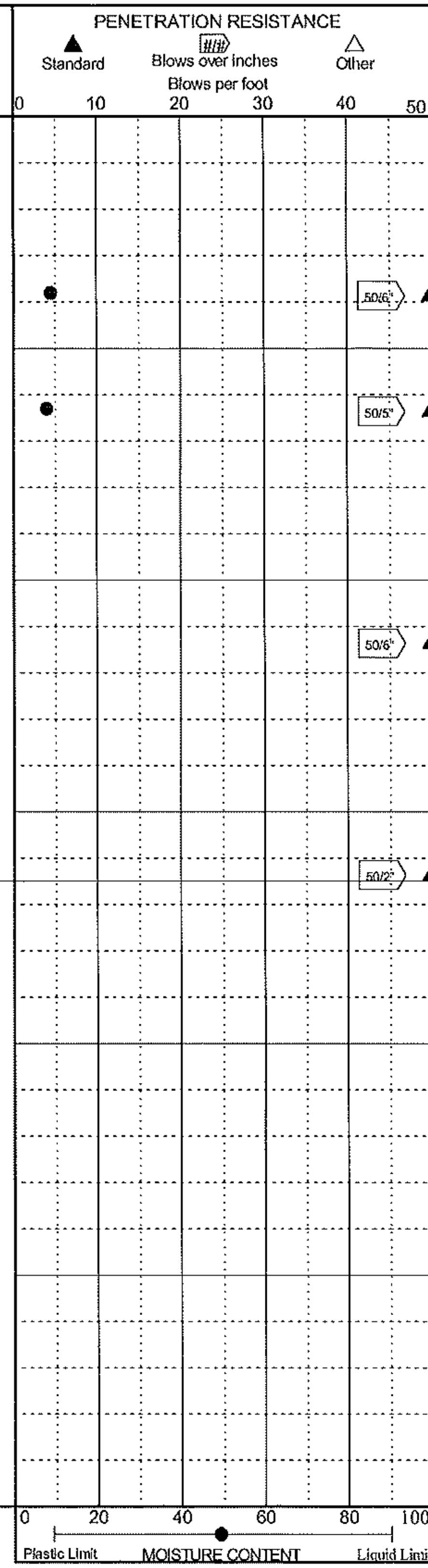
PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *1*

Soil Description

Location: New Frontier JR High Bldg Parking Lot

Approximate ground surface elevation: 183.5 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE	TESTING
0	2.5-inches Asphalt				N/E		
	Very dense, moist, brown, gravelly, silty SAND (Qvt - Glacial Till).		85%	S-1		50/6"	22
5	Becomes with brown mottling		50%	S-2		50/5"	
	Becomes gray with no mottling						
10			40%	S-3		50/6"	
15			30%	S-4		50/2"	
	Boring terminated at approximately 16.5 feet						
20							
25							
30							



LEGEND

- 2.00-inch OD split-spoon sampler
- N/E No groundwater encountered
- Grain Size Analysis (% fines shown)

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *August 15, 2016* Logged By: *FC*

Drilled by: *Boretec*

Permit Number: 20-03281

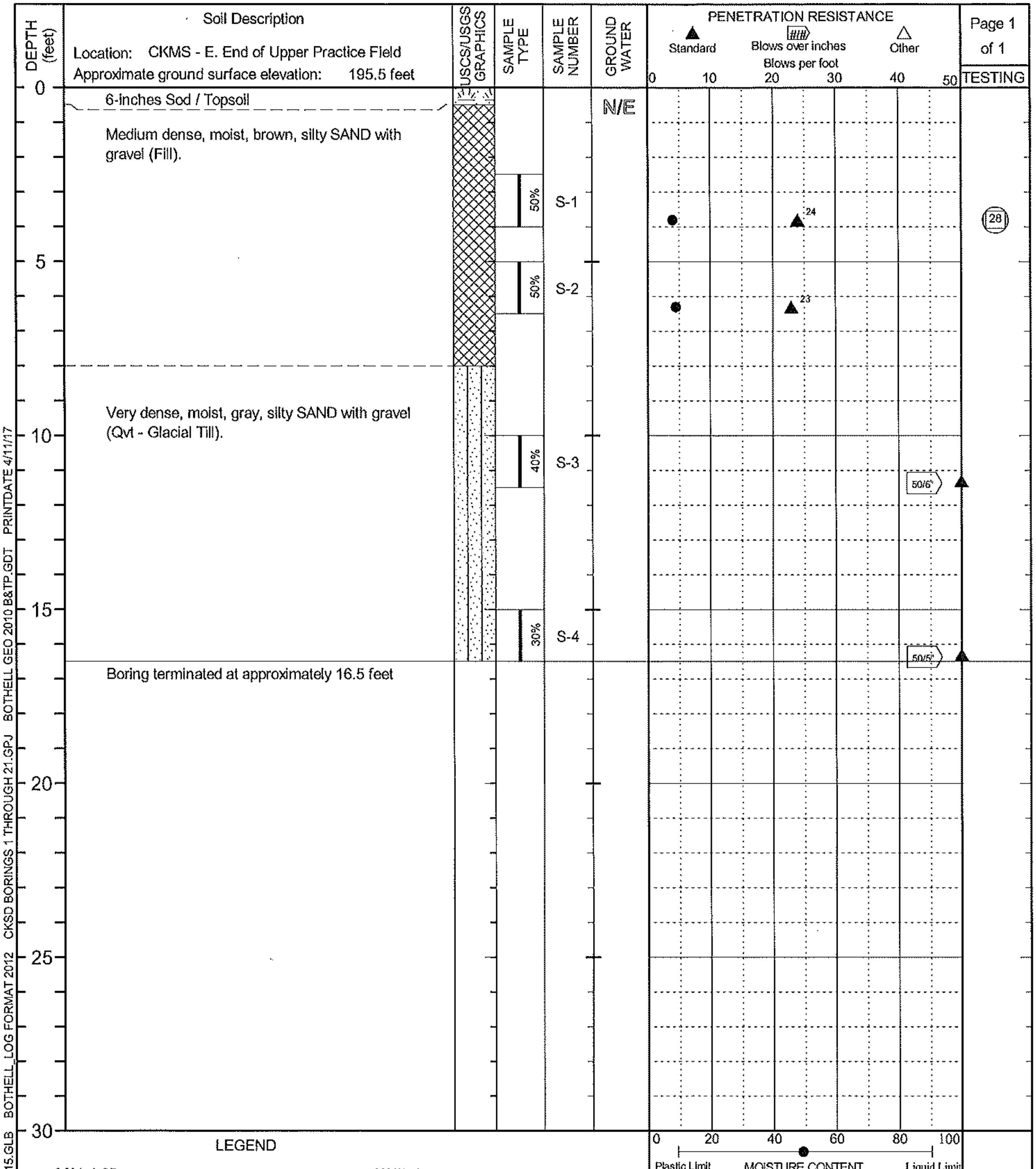
PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *2*

Soil Description

Location: CKMS - E. End of Upper Practice Field

Approximate ground surface elevation: 195.5 feet

DEPTH (feet)	Soil Description	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	6-inches Sod / Topsoil			N/E		
	Medium dense, moist, brown, silty SAND with gravel (Fill).					
~4		50%	S-1		24	28
~6		50%	S-2		23	
10	Very dense, moist, gray, silty SAND with gravel (Qvt - Glacial Till).	40%	S-3		50/6"	
15		30%	S-4		50/5"	
16.5	Boring terminated at approximately 16.5 feet					



Page 1 of 1

LEGEND

2.00-inch OD split-spoon sampler

N/E No groundwater encountered

200 Wash (% fines shown)

amec foster wheeler

11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *August 15, 2016* Logged By: *FC*

Drilled by: *Boretec*

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *3*

Page 1 of 1

Location: CKMS - Football Field W. Goal Post

Approximate ground surface elevation: 184.0 feet

DEPTH (feet)	Soil Description	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	6-inches Sod / Topsoil			N/E		
0.5–4.5	Medium dense, moist, brown, gravelly, silty SAND (Fill).	80%	S-1		10	21
4.5–8	Very dense, moist, gray with brown mottling, silty SAND with gravel (Qvt - Glacial Till).	70%	S-2		50/5"	
8	Becomes with no mottling					
10		90%	S-3		73	
15		30%	S-4		50/5"	
16.5	Boring terminated at approximately 16.5 feet					

Penetration resistance legend: ▲ Standard; Blows over inches; △ Other. Scale: 0, 10, 20, 30, 40, 50.

Moisture content scale: 0, 20, 40, 60, 80, 100 — Plastic Limit, MOISTURE CONTENT, Liquid Limit

LEGEND

- 2.00-inch OD split-spoon sampler
- N/E No groundwater encountered
- Grain Size Analysis (% fines shown)

amec foster wheeler

11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *August 15, 2016* Logged By: *FC*

Drilled by: *Boretec*

BOTHELL_GEO_2015.GLB BOTHELL_LOG FORMAT 2012 CKSD BORINGS 1 THROUGH 21.GPJ BOTHELL GEO 2010 B&TP.GDT PRINTDATE 4/11/17

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *4*

Location: CKMS - Top of Slope 65' E. of Base Ball Field Backstop

Approximate ground surface elevation: 172.5 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Standard ▲, Blows over inches, Other △; Blows per foot 0–50)	TESTING
0	6-inches Sod / Topsoil				N/E		
	Very dense, moist, grayish-brown, gravelly, silty SAND (Qvt - Glacial Till).						
			40%	S-1		50/6"	
5	Becomes gray		60%	S-2		50/6"	35
	Becomes with some gravel						
10			40%	S-3		50/5"	37
15			30%	S-4		50/4"	
	Boring terminated at approximately 16.5 feet						
20							
25							
30							

MOISTURE CONTENT: 0 20 40 60 80 100 — Plastic Limit, Liquid Limit

LEGEND

- 2.00-inch OD split-spoon sampler
- N/E No groundwater encountered
- Grain Size Analysis (% fines shown)

amec foster wheeler

11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *August 15, 2016* Logged By: *FC*

Drilled by: *Boretec*

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *5*

Location: CKMS - 43' East of Food Service Building NE Corner

Approximate ground surface elevation: 156.5 feet

Page 1 of 1

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	6-Inches Sod / Topsoil				N/E		
0.5–4.5	Dense, moist, reddish-brown, silty SAND with some gravel and scattered organics (Fill).		20%	S-1		39	17
4.5–8	Very dense, moist, brown, silty SAND with gravel (Qvt - Glacial Till).		60%	S-2		50/6"	
8–16.5	Becomes gray		70%	S-3		50/6"	34
			20%	S-4		50/5"	
16.5	Boring terminated at approximately 16.5 feet						

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 — Plastic Limit, Liquid Limit

LEGEND

- 2.00-inch OD split-spoon sampler
- N/E No groundwater encountered
- 200 Wash (% fines shown)
- Grain Size Analysis (% fines shown)

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *August 16, 2016* Logged By: *FC*

Drilled by: *Boretec*

Permit Number: 20-03281

BOTHELL_GEO_2015.GLB BOTHELL_LOG FORMAT 2012 CKSD BORINGS 1 THROUGH 21.GPJ BOTHELL GEO 2010 B&TP.GDT PRINTDATE 4/11/17

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *6*

Location: CKHS - 16' N. of Vacant Home within Driveway
Approximate ground surface elevation: 173.5 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	2.5-inches 5/8 inch Crushed Rock				N/E		
	Very dense, moist, gray, gravelly, silty SAND (Qvt - Glacial Till).						
~4			40%	S-1		50/6"	
~6			50%	S-2		50/3"	29
~11			30%	S-3		50/4"	
~16			15%	S-4		50/2"	
16.5	Boring terminated at approximately 16.5 feet						

PENETRATION RESISTANCE legend: ▲ Standard; Blows over inches; △ Other. Scale: 0, 10, 20, 30, 40, 50

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 — Plastic Limit, Liquid Limit

LEGEND

- 2.00-inch OD split-spoon sampler
- N/E No groundwater encountered
- 200 Wash (% fines shown)

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA | Hammer Type: Cathead | Date drilled: *August 15, 2016* | Logged By: *FC* | Drilled by: *Boretec*

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *7*

Location: CKHS - Vacant Home at NE Corner of Fenced Garden

Approximate ground surface elevation: 158.0 feet

Page 1 of 1

DEPTH (feet)	Soil Description	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Standard, Blows per foot)	TESTING
0	6-inches Sod / Topsoil			N/E		
0.5	Very dense, moist, tan with gray mottling, silty SAND with some gravel (Qvt - Glacial Till).					
2.5–4		40%	S-1		50/4"	
5	Becomes gray with brown mottling					
5–6.5		80%	S-2		50/6"	22
8	Becomes gray					
10–11.5		30%	S-3		50/5"	
15–16.5		0%	S-4		100/3"	
16.5	Blow Counts Overstated - Rock Boring terminated at approximately 16.5 feet					

LEGEND

- 2.00-inch OD split-spoon sampler
- N/E No groundwater encountered
- 200 Wash (% fines shown)

Plastic Limit — MOISTURE CONTENT — Liquid Limit (0 20 40 60 80 100)

BOTHELL_GEO_2015.GLB BOTHELL_LOG FORMAT 2012 CKSD BORINGS 1 THROUGH 21.GPJ BOTHELL GEO 2010 B&TP.GDT PRINTDATE 4/11/17

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *August 15, 2016* Logged By: *FC*

Drilled by: *Boretec*

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *8*

Page 1 of 1

Location: CKSD Alternative HS Bldg - 34' E. of Bldg E. Door

Approximate ground surface elevation: 127.0 feet

DEPTH (feet)	Soil Description	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	2.5-inches Asphalt			N/E		
	Very dense, moist, grayish-brown, silty SAND (Qgt - Sandy Till).	20%	S-1		50/4"	
5	Becomes gray	50%	S-2		50/6"	
10	Very dense, moist, gray, silty, gravelly SAND (Qgap - Advance Outwash).	50%	S-3		50/5"	15
15		50%	S-4		50/5"	
	Boring terminated at approximately 16.5 feet					

PENETRATION RESISTANCE: Standard; Blows over inches; Other

MOISTURE CONTENT: Plastic Limit — Liquid Limit (0, 20, 40, 60, 80, 100)

LEGEND

2.00-Inch OD split-spoon sampler

N/E No groundwater encountered

Grain Size Analysis (% fines shown)

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA | Hammer Type: Cathead | Date drilled: *August 15, 2016* | Logged By: *FC*

Drilled by: *Boretec*

BOTHELL_GEO_2015.GLB BOTHELL_LOG FORMAT 2012 CKSD BORINGS 1 THROUGH 21.GPJ BOTHELL GEO 2010 B&TP.GDT PRINTDATE 4/11/17

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *9*

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
	Location: CKHS Base Ball Field Parking Lot - 55' W. of Backstop Approximate ground surface elevation: 157.0 feet					▲ Standard; [##/#] Blows over inches; △ Other	Page 1 of 1
0	3-inches Asphlat over 5-Inches Base Course.				N/E		
	Very dense, moist, silty, gravelly SAND (Qvt - Glacial Till).		90%	S-1		58	
5			60%	S-2		50/5"	22
10			60%	S-3		50/6"	
15			30%	S-4		50/4"	
16.5	Boring terminated at approximately 16.5 feet						

MOISTURE CONTENT: Plastic Limit — Liquid Limit (0, 20, 40, 60, 80, 100)

LEGEND

2.00-inch OD split-spoon sampler

N/E No groundwater encountered

Grain Size Analysis (% fines shown)

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *August 15, 2016* Logged By: *FC*

Drilled by: *Boretec*

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *10*

Page 1 of 1

Soil Description
Location: CKHS - 41' E. from Baseball Field Fence at NE Corner.
Approximate ground surface elevation: 150.0 feet

DEPTH (feet)	Soil Description	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	6-inches Sod / Topsoil			N/E		
0.5–4.5	Medium dense, moist, brown, silty SAND (Fill).	20%	S-1		25	
4.5–16.5	Very dense, moist, gray, silty, SAND (Qvt - Glacial Till).	50%	S-2		50/6"	(14)
		30%	S-3		50/5"	
		40%	S-4		50/4"	
16.5	Boring terminated at approximately 16.5 feet					

PENETRATION RESISTANCE: ▲ Standard; Blows over inches; △ Other. Blows per foot: 0, 10, 20, 30, 40, 50

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 — Plastic Limit, Liquid Limit

LEGEND

2.00-inch OD split-spoon sampler
N/E No groundwater encountered
200 Wash (% fines shown)

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *August 15, 2016* Logged By: *FC*
Drilled by: *Boretec*

BOTHELL_GEO_2015.GLB BOTHELL_LOG FORMAT 2012 CKSD BORINGS 1 THROUGH 21.GPJ BOTHELL GEO 2010 B&TP.GDT PRINTDATE 4/11/17

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *11*

Location: 27' SE of Career & Technical Bldg SE Corner
Approximate ground surface elevation: 132.0 feet

DEPTH (feet)	Soil Description	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	2-inches Asphalt over 4-inches Base Course.			N/E		
	Very dense, moist, grayish-brown, silty SAND with some gravel (Qgt - Glacial Till).					
		40%	S-1		50/6"	
5		30%	S-2		50/6"	
	Becomes gray					
10		60%	S-3		50/6"	29
	Becomes brownish-gray					
15		30%	S-4		50/3"	
	Becomes gray, silty fine SAND					
20		50%	S-5		50/4"	
	Very dense, moist, gray, gravelly SAND with trace silt (Qgap - Advance Outwash).					
25		50%	S-6		50/6"	4
	Boring terminated at approximately 26.5 feet					
30						

PENETRATION RESISTANCE: ▲ Standard; Blows over inches; △ Other. Blows per foot: 0, 10, 20, 30, 40, 50

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 — Plastic Limit, Liquid Limit

LEGEND

- 2.00-inch OD split-spoon sampler
- N/E No groundwater encountered
- Grain Size Analysis (% fines shown)

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *August 16, 2016* Logged By: *FC*

Drilled by: *Boretec*

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *12*

Location: CKHS - Base Ball Field - 114' SE of 1st Base

Approximate ground surface elevation: 153.5 feet

DEPTH (feet)	Soil Description	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	6-inches Sod / Topsoil			N/E		
	Medium dense, moist, brown, silty SAND (Fill).	20%	S-1		12	23
5	Very dense, moist, gray with brown mottling, gravelly, silty SAND (Qvt - Glacial Till).	80%	S-2		50/6"	
	Becomes gray					
10		50%	S-3		50/5"	
15		20%	S-4		50/5"	
	Boring terminated at approximately 16.5 feet					

PENETRATION RESISTANCE: ▲ Standard; [##/#] Blows over inches; △ Other

MOISTURE CONTENT: 0–100 (Plastic Limit – Liquid Limit)

LEGEND

- 2.00-inch OD split-spoon sampler
- N/E No groundwater encountered
- 200 Wash (% fines shown)

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *August 15, 2016* Logged By: *FC*

Drilled by: *Boretec*

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *13*

Page 1 of 1

Location: CKHS - 70' NE. of Long Jump E. End

Approximate ground surface elevation: 134.0 feet

DEPTH (feet)	Soil Description	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	6-inches Sod / Topsoil			N/E		
	Medium dense, moist, brown, silty SAND (Fill).	15%	S-1		11	18
5	Becomes loose and gray	5%	S-2		5	
10	Very dense, moist, gray, gravelly, silty SAND (Qvt - Glacial Till).	70%	S-3		53	
15		30%	S-4		50/4"	
20		30%	S-5		50/5"	
	Boring terminated at approximately 21.5 feet					

PENETRATION RESISTANCE: ▲ Standard; Blows over inches; △ Other; Blows per foot: 0, 10, 20, 30, 40, 50

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 — Plastic Limit, Liquid Limit

LEGEND

- 2.00-inch OD split-spoon sampler
- N/E No groundwater encountered
- 200 Wash (% fines shown)

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *August 16, 2016* Logged By: *FC*

Drilled by: *Boretec*

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *14*

Page 1 of 1

Location: Vacant Parcel N. of CKMS - Driveway 43' W. of Bldg

Approximate ground surface elevation: 179.5 feet

DEPTH (feet)	Soil Description	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	2-inches of 5/8 inch Crushed Rock.			N/E		
	Very dense, moist, tan with gray mottling, silty SAND with some gravel (Qvt - Glacial Till).					
		30%	S-1		50/6"	25
5	Becomes gray with brown mottling					
		90%	S-2		50/6"	
	Becomes gray					
10		40%	S-3		50/5"	
15		30%	S-4		50/4"	
	Boring terminated at approximately 16.5 feet					
20						
25						
30						

PENETRATION RESISTANCE: ▲ Standard; Blows over inches; △ Other. Blows per foot: 0, 10, 20, 30, 40, 50

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 — Plastic Limit, Liquid Limit

LEGEND

- 2.00-inch OD split-spoon sampler
- N/E No groundwater encountered
- 200 Wash (% fines shown)

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *August 15, 2016* Logged By: *FC*

Drilled by: *Boretec*

Permit Number: 20-03281

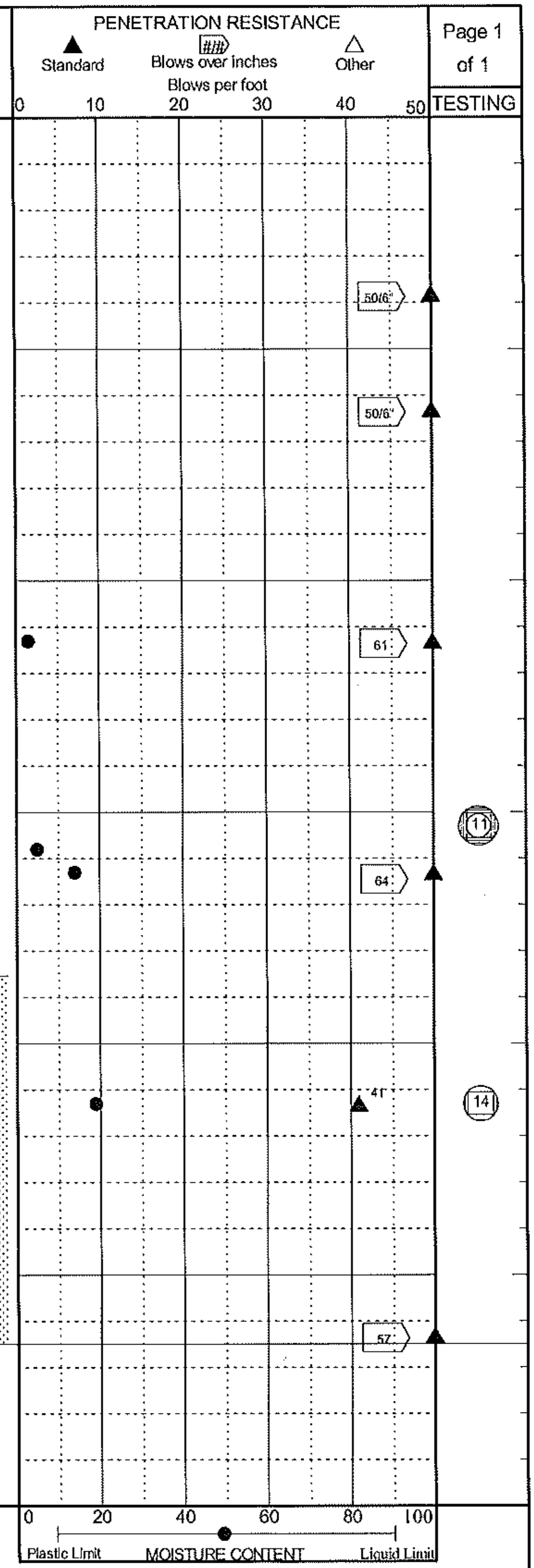
PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *15*

Page 1 of 1

Location: CKHS Parking Lot W. of Football Field by Anderson Hill Rd

Approximate ground surface elevation: 109.0 feet

Depth (feet)	Soil Description	Sample Type	Sample Number	Ground Water
0	2 inches Asphalt over 4-inches Base Course.			
	Very dense, moist, gray, SAND with some silt and gravel (Qgap - Advance Outwash).	70%	S-1	
5		80%	S-2	
10		70%	S-3	
	Becomes wet			
15		50%	S-4A	
	Becomes silty SAND	60%	S-4B	
	Becomes saturated and dense			ATD
20		60%	S-5	
	Becomes very dense			
25		80%	S-6	
	Boring terminated at approximately 26.5 feet			
30				



LEGEND

2.00-inch OD split-spoon sampler

ATD Groundwater level at time of drilling

Grain Size Analysis (% fines shown)

200 Wash (% fines shown)

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *August 16, 2016* Logged By: *FC*

Drilled by: *Boretec*

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *16*

Location: SW Corner of House on Vacant CKSD Parcel
Approximate ground surface elevation: 172.0 feet

DEPTH (feet)	Soil Description	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	Grass over 2.5-inches Topsoil.			N/E		
	Loose, moist, brown, gravelly, silty SAND (Fill)	50%	S-1		5	23
5	Becomes dense	33%	S-2		43	
	Dense, moist, grey, gravelly, silty SAND (Qvt - Glacial Till)					
	Becomes very dense					
10		100%	S-3		50/4"	
15		100%	S-4		50/5"	
15.5	Boring terminated at approximately 15.5 feet					

MOISTURE CONTENT: 0 20 40 60 80 100 (Plastic Limit – Liquid Limit)

LEGEND

- 2.00-inch OD split-spoon sampler
- N/E No groundwater encountered
- Grain Size Analysis (% fines shown)

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *December 19, 2016* Logged By: *KB*

Drilled by: *Geologic Dril*

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *17*

Location: West Side of CKHS Baseball Field near Scoreboard

Approximate ground surface elevation: 152.5 feet

DEPTH (feet)	Soil Description	SAMPLE NUMBER	SAMPLE TYPE	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	Grass over 2.5-inches Topsoil.			N/E		
	Brown, silty SAND with some gravel (Fill)					
2	Very dense, damp, tannish-gray, gravelly, silty SAND (Qvt - Glacial Till)	S-1	100%		50/5"	
4	Becomes gray					
5		S-2	100%		50/5"	28
8	Very dense, moist, gray, silty SAND with some gravel and interbedded 2-inch silt layers					
10		S-3	100%		50/5"	
13	Becomes without interbedded silt layers					
15		S-4	100%		50/2"	
17.5		S-5	100%		50/6"	
18	Boring terminated at approximately 18 feet					

Penetration resistance: ▲ Standard; ##/# Blows over inches; △ Other. Scale: 0, 10, 20, 30, 40, 50 blows per foot.

Moisture content scale: 0, 20, 40, 60, 80, 100 — Plastic Limit, MOISTURE CONTENT, Liquid Limit

Page 1 of 1

LEGEND

- 2.00-inch OD split-spoon sampler
- N/E No groundwater encountered
- Grain Size Analysis (% fines shown)

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *December 19, 2016* Logged By: *KB*

Drilled by: *Geologic Dril*

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *18*

Location: North Central Area of CKHS Baseball Field

Approximate ground surface elevation: 154.0 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	Brown, moist, medium SAND (Fill)				N/E		
	Becomes gray, gravelly, silty SAND						
	Very dense, damp, gray, gravelly, silty SAND (Qvt - Glacial Till)						
5			100%	S-1		50/4"	
	Becomes moist						
10			100%	S-2		50/3"	
15			100%	S-3		50/4"	
	Boring terminated at approximately 15.5 feet						
20							
25							
30							

PENETRATION RESISTANCE: ▲ Standard; Blows over inches; △ Other — Blows per foot: 0, 10, 20, 30, 40, 50

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 — Plastic Limit, Liquid Limit

LEGEND

2.00-inch OD split-spoon sampler

N/E No groundwater encountered

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *December 19, 2016* Logged By: *KB*

Drilled by: *Geologic Dril*

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *19*

Location: Middle Outfield CKMS Baseball Field

Approximate ground surface elevation: 159.0 feet

DEPTH (feet)	Soil Description	SAMPLE TYPE (recovery)	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	Topsoil			N/E		
0–4.5	Medium dense, moist, grayish-brown with oxidation staining, silty SAND with some angular gravel (Fill)	90%	S-1		14	
4.5	Becomes gravelly with scattered organics - wood	90%	S-2		14	26 (Grain Size Analysis)
10		100%	S-3		16	
~12	2" layer relic topsoil					
12	Very dense, gray, silty SAND with some gravel (Qvt - Glacial Till)	100%	S-4		50/3"	
		100%	S-5		50/3"	
18	Boring terminated at approximately 18 feet					

Penetration resistance: ▲ Standard; Blows over inches; △ Other. Scale: 0, 10, 20, 30, 40, 50

Moisture content scale: 0, 20, 40, 60, 80, 100 (Plastic Limit — MOISTURE CONTENT — Liquid Limit)

LEGEND

- 2.00-inch OD split-spoon sampler
- N/E No groundwater encountered
- Grain Size Analysis (% fines shown)

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *December 19, 2016* Logged By: *KB*

Drilled by: *Geologic Dril*

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *20*

Location: South Backfield of CKMS Baseball Field
Approximate ground surface elevation: 157.0 feet

DEPTH (feet)	Soil Description	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	Grass / Topsoil			N/E		
	Loose, damp, gray with oxidation staining, silty SAND with some gravel (Fill)	100%	S-1		5	
5	Becomes very loose, moist, reddish-brown with scattered organics	100%	S-2		3	
	Very dense, moist, gray with some oxidation staining, silty SAND with some gravel and 2-inch interbedded layers of SAND with some gravel (Qvt - Glacial Till)					
10	Change in drilling	90%	S-3		58	
	Becomes gravelly					
15		100%	S-4		50/3"	
		100%	S-5		50/6"	
18	Boring terminated at approximately 18 feet					

Penetration resistance legend: ▲ Standard; (##/#) Blows over inches; △ Other. Scale: 0, 10, 20, 30, 40, 50.

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 — Plastic Limit, Liquid Limit

LEGEND

2.00-inch OD split-spoon sampler

N/E No groundwater encountered

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *December 19, 2016* Logged By: *KB*

Drilled by: *Geologic Dril*

BOTHELL_GEO_2015.GLB BOTHELL_LOG FORMAT 2012 CKSD BORINGS 1 THROUGH 21.GPJ BOTHELL GEO 2010 B&TP.GDT PRINTDATE 4/11/17

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *21*

Location: CKHS Baseball Field Parking Lot

Approximate ground surface elevation: 154.0 feet

DEPTH (feet)	Soil Description	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	2-inches of Asphalt			N/E		
	Medium dense, damp, gray, silty SAND with some gravel (Fill)	90%	S-1		15	
5	Becomes loose, tannish-brown with scattered organics	90%	S-2		6	
	Becomes gray					
	Very dense, moist, gray with some oxidation staining, gravelly, silty SAND (Qvt - Glacial Till)					
10		100%	S-3		50/5"	31
	Becomes gray with no oxidation staining					
15		100%	S-4		50/3"	
	Very dense, moist, tannish-gray, fine to medium SAND with trace silt (Qgap - Advanced Outwash)	100%	S-5		85	
	Boring terminated at approximately 19 feet					

Penetration resistance: ▲ Standard; Blows over inches; △ Other. Blows per foot: 0, 10, 20, 30, 40, 50

Moisture content: 0, 20, 40, 60, 80, 100 (Plastic Limit — MOISTURE CONTENT — Liquid Limit)

LEGEND

- 2.00-inch OD split-spoon sampler
- N/E No groundwater encountered
- Grain Size Analysis (% fines shown)

amec foster wheeler

11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *December 19, 2016* Logged By: *KB*

Drilled by: *Geologic Dril*

Permit Number: 20-03281

BOTHELL_GEO_2015.GLB BOTHELL_LOG FORMAT 2012 CKSD BORINGS 1 THROUGH 21.GPJ BOTHELL GEO 2010 B&TP.GDT PRINTDATE 4/11/17

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *OW-1*

Location: NW Corner of Science Bldg Parking Lot

Approximate ground surface elevation: 121.0 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	3" crushed rock.						
	Loose, damp, gray-tan, silty SAND with trace gravel. (Fill)						
5			50%	S-1		8	
	Becomes medium dense, brown SAND with some silt and gravel (fill).						
10			35%	S-2		17	
	Very dense, moist, gray with orange mottling, fine to medium SAND with some silt and trace gravel (Qgap - Advance Outwash)						
15			80%	S-3		76	10
20					12/19/2016		

Penetration resistance: ▲ Standard; Blows over inches; △ Other. Blows per foot: 0, 10, 20, 30, 40, 50

Moisture content: 0, 20, 40, 60, 80, 100 — Plastic Limit, MOISTURE CONTENT, Liquid Limit

LEGEND

- 2.00-inch OD split-spoon sampler
- Observed groundwater level
- ATD Groundwater level at time of drilling
- Grain Size Analysis (% fines shown)

amec foster wheeler

11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *December 07, 2016* Logged By: *KB*

Drilled by: *Geologic Drill*

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *OW-1*

Soil Description

Location: NW Corner of Science Bldg Parking Lot

Approximate ground surface elevation: 121.0 feet

DEPTH (feet)	Soil Description	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
20	Becomes wet, fine SAND with some silt.	80%	S-4		78	
	3" silt lens					
25	Becomes saturated.	100%	S-5	ATD	50/4"	
30	Trace fine gravel	100%	S-6		50/5"	5
	Boring terminated at approximately 31.5 feet					
35						
40						

PENETRATION RESISTANCE: ▲ Standard; Blows over inches; △ Other; Blows per foot: 0, 10, 20, 30, 40, 50

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100; Plastic Limit, Liquid Limit

LEGEND

- 2.00-inch OD split-spoon sampler
- Observed groundwater level
- ATD Groundwater level at time of drilling
- Grain Size Analysis (% fines shown)

amec foster wheeler

11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *December 07, 2016* Logged By: *KB*

Drilled by: *Geologic Drill*

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *OW-2*

Location: North End of Planter in Staff Parking Lot
Approximate ground surface elevation: 109.0 feet

DEPTH (feet)	Soil Description	SAMPLE TYPE	SAMPLE NUMBER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	Vegetation/roots over 2" topsoil.				
	Damp, brown, silty SAND with some gravel (Fill).				
	Dense, moist, gray, fine to medium SAND with trace silt (Qgap - Advance Outwash).				
5		33%	S-1	43	
	Becomes very dense, silty SAND with trace gravel.				
10		50%	S-2A		
	Dense, wet, tannish grey low plasticity silt lens. Bottom 4" of samples	50%	S-2B	67	43
	Becomes wet, SAND with some silt and gravel.				
15		66%	S-3	73	8
20					

Groundwater: 12/19/2016

PENETRATION RESISTANCE: ▲ Standard; Blows over inches; △ Other; Blows per foot: 0, 10, 20, 30, 40, 50

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 — Plastic Limit, Liquid Limit

LEGEND
- 2.00-inch OD split-spoon sampler
- Observed groundwater level
- Grain Size Analysis (% fines shown)

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *December 07, 2016* Logged By: *KB*
Drilled by: *Geologic Drill*

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *OW-2*

Location: North End of Planter in Staff Parking Lot

Approximate ground surface elevation: 109.0 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
20	Becomes saturated fine SAND with some silt.		100%	S-4		63	
	Boring terminated at approximately 21.5 feet						
25							
30							
35							
40							

PENETRATION RESISTANCE: ▲ Standard; Blows over inches; △ Other. Blows per foot: 0, 10, 20, 30, 40, 50

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 — Plastic Limit, Liquid Limit

LEGEND

2.00-inch OD split-spoon sampler

Observed groundwater level

Grain Size Analysis (% fines shown)

BOTHELL_GEO_2015.GLB BOTHELL_LOG FORMAT 2012 CKSD OW 1 THROUGH 3.GPJ BOTHELL GEO 2010 B&TP.GDT PRINTDATE 3/28/17

amec foster wheeler

11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *December 07, 2016* Logged By: *KB*

Drilled by: *Geologic Drill*

Permit Number: 20-03281

PROJECT: *Central Kitsap HS & MS Campus* JOB No. *6-917-18096-0* BORING No. *OW-3*

Location: SW Corner of Alt. High School Parking Lot
Approximate ground surface elevation: 127.0 feet

DEPTH (feet)	Soil Description	SAMPLE TYPE	SAMPLE NUMBER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	1.5" Asphalt.				
	Loose, damp, brown, silty SAND with some angular gravel and trace cellulose organics (Fill).				
5		50%	S-1	10	
	Very dense, moist, tannish gray with some mottling, silty SAND with some gravel (Qgt - Sandy Till).				
10	Interbedded 2.5" silt lens	60%	S-2	50/4"	27
	Very dense, moist, gray with some mottling, fine SAND with trace silt (Qgap - Advance Outwash)				
15		80%	S-3	50/6"	
	Becomes silty SAND with no mottling.				
20					

PENETRATION RESISTANCE: ▲ Standard; Blows over inches; △ Other; Blows per foot: 0, 10, 20, 30, 40, 50

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 — Plastic Limit, Liquid Limit

LEGEND

- 2.00-inch OD split-spoon sampler
- Observed groundwater level
- P / ATD: Perched water level at time of drilling
- Grain Size Analysis (% fines shown)
- 200 Wash (% fines shown)

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *December 07, 2016* Logged By: *KB*

Drilled by: *Geologic Drill*

Permit Number: 20-03281

DEPTH (feet)	Soil Description Location: SW Corner of Alt. High School Parking Lot Approximate ground surface elevation: 127.0 feet	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Standard / Blows over inches / Other) Blows per foot	TESTING
20	Interbedded 2" sand with gravel lens	66%	S-4	12/19/2016	50/6"	21
	Becomes wet with some fine gravel.					
25		40%	S-5a			
	Interbedded gravel and coarse sand lens	20%	S-5b		50/6"	
30	Becomes saturated.	66%	S-6	P ATD	50/5"	23
	Hard, saturated gray, low plasticity SILT with some fine sand (Qpf - Pre Vashon Silt)					
35		33%	S-7		50/6"	
	Boring terminated at approximately 36.5 feet					
40						

Penetration resistance scale: 0 10 20 30 40 50

Moisture content scale: 0 20 40 60 80 100 — Plastic Limit, MOISTURE CONTENT, Liquid Limit

LEGEND

- 2.00-inch OD split-spoon sampler
- Observed groundwater level
- P / ATD Perched water level at time of drilling
- Grain Size Analysis (% fines shown)
- 200 Wash (% fines shown)

amec foster wheeler
11810 North Creek Parkway N
Bothell, WA 98011

Drilling Method: HSA Hammer Type: Cathead Date drilled: *December 07, 2016* Logged By: *KB*

Drilled by: *Geologic Drill*

Test Pit No.: IT-1

Location: High School - Staff Parking Lot
Approximate ground surface elevation: 109.0 feet

DEPTH (feet)	Soil Description	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit / Liquid Limit; 0–100)	TESTING
0	2.5" Asphalt over 2.5" Crush Rock over		NS	NC		
	Medium dense, moist, brown, gravelly, silty SAND (Fill)					
	Medium dense, moist, gray, mottled, silty fine to medium SAND with gravel (Qgap - Advance Outwash)					
	6-inch layer of brownish-gray, silty fine Sand					
	Becomes dense with trace gravel					
5	Becomes with trace silt					
		G-1			●	Grain Size Analysis (2)
10	Becomes very dense and silty; Very difficult to excavate	G-2			●	Organic Content (1); 200 Wash (18)
	Becomes gravelly with some silt	G-3			●	Grain Size Analysis (8)
		G-4				
	Test pit terminated at approximately 12 feet					
15						
20						

LEGEND

- ≀≀ Moderate Seepage
- NS no seepage observed
- NC no caving observed
- 200 Wash (% fines shown)
- Grain Size Analysis (% fines shown)
- Organic Content (% shown)

Excavation Method: Trackhoe

Date Excavated: *December 21, 2016*

Logged By: *KHM*

amec foster wheeler
11810 North Creek Parkway N
Bothell, Washington 98011

Permit Number: 20-03281

Test Pit No.: IT-2

Location: Alt. High School - Parking Lot East End
Approximate ground surface elevation: 127.0 feet

DEPTH (feet)	Soil Description	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT	TESTING
0	2-inches Asphalt over 4-inches Gravel over Dense, moist, light brownish-gray, gravelly, silty SAND with trace cobbles (Fill)		NS	NC		
	Medium dense, moist, gray, silty SAND with fine gravel (Qgt - Sandy Till)					
5	Becomes dense					
	Becomes very dense					
	Medium dense, moist, gray, fine to medium SAND with trace silt and gravel (Qgap - Advance Outwash)	G-1			●	3
10	Becomes intermixed with some silt lenses	G-2				1
	Hard, moist, gray, sandy SILT with trace gravel (Interbedded Silt Lense)	G-3			●	72
	Very dense, moist, gray, silty SAND with trace gravel (Qgap - Advance Outwash)	G-4				
	Test pit terminated at approximately 14.25 feet					
15						
20						

Moisture content scale: Plastic Limit — MOISTURE CONTENT — Liquid Limit; 0, 20, 40, 60, 80, 100

LEGEND

- Moderate Seepage
- NS no seepage observed
- NC no caving observed
- 200 Wash (% fines shown)
- Grain Size Analysis (% fines shown)
- Organic Content (% shown)

Excavation Method: Trackhoe

Date Excavated: *December 22, 2016*

Logged By: *CJ*

amec foster wheeler
11810 North Creek Parkway N
Bothell, Washington 98011

Permit Number: 20-03281

Test Pit No.: IT-3

Location: Alt. High School - Near Building SW Corner
Approximate ground surface elevation: 127.0 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit – Liquid Limit, 0–100)	TESTING
0	4-inches Topsoil over Loose to medium dense, moist, grayish-brown, silty SAND with gravel and scattered organics - roots (Fill)			NS	NC		
~7	Medium dense to dense, moist, light grayish-brown, gravelly, silty SAND (Qgt - Sandy Till) Relic topsoil layer horizon						
~9	Becomes very dense		G-1			●	(23) Grain Size Analysis
~11	Difficult excavating - Refusal		G-2			●	(1) Organic Content; (21) Grain Size Analysis
11.5	Test pit terminated at approximately 11.5 feet						

LEGEND

- Moderate Seepage
- NC – no caving observed
- NS – no seepage observed
- 200 Wash (% fines shown)
- Grain Size Analysis (% fines shown)
- Organic Content (% shown)

Excavation Method: Trackhoe

Date Excavated: *December 23, 2016*

Logged By: *CJ*

amec foster wheeler
11810 North Creek Parkway N
Bothell, Washington 98011

Test Pit No.: IT-4

Soil Description

Location: North Side of Science Building

Approximate ground surface elevation: 122.0 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit – Liquid Limit; 0, 20, 40, 60, 80, 100)	TESTING
0	5-inches Crushed Rock over Medium dense, moist, gray with oxidation staining, silty SAND with some gravel and scattard organics (roots) with layers of silty, gravelly SAND (Fill).				NC		
5	Very dense, wet, gray, sandy GRAVEL with some silt and interbedded cemented layers of gravelly silty SAND (Qgap - Advance Outwash)						
	Seepage 7 to 7.5 feet - North Sidewall			≀≀			
	4-inch cemented layer - N. half of Pit		G-1				
	Seepage - North Sidewall		G-2	≀≀			
	1.5" Cemented layer at 8.75 to 9 feet		G-3				
10			G-4			●	7 (200 Wash); 0.7 (Organic Content)
			G-5				
			G-6				
	Very dense, moist, gray, gravelly, silty SAND (Qgap - Advance Outwash)		G-7			●	28 (200 Wash)
	Test pit terminated at approximately 14 feet						
15							
20							

LEGEND

Symbol	Meaning
≀≀	Moderate Seepage
NC	no caving observed
NS	no seepage observed
▢	200 Wash (% fines shown)
◎	Grain Size Analysis (% fines shown)
⊗	Organic Content (% shown)

Excavation Method: Trackhoe

Date Excavated: *February 20, 2017*

Logged By: *KHM*

amec foster wheeler
11810 North Creek Parkway N
Bothell, Washington 98011

Test Pit No.: TP-1

Location: Science Building Between IT-4 and OW-1
Approximate ground surface elevation: 122.0 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit – Liquid Limit; 0–100)	TESTING
0	Loose, moist, gray, silty SAND with some gravel (Fill)			NS	NC		
4–5	Loose, moist, brown to dark brown, silty SAND with some gravel and intermixed with topsoil / roots (Relic Topsoil Horizon)						
5	Loose, moist, light brown, silty SAND, trace gravel (Qgap - Advance Outwash)		G-1				
	Becomes medium dense, gray with trace to some gravel and scattered organics - rootlets		G-2				
	Becomes very dense with oxidation staining, gravelly and intermixed with some cemented layers of very dense silty sand		G-3				
10			G-4				
10.5	Test pit terminated at approximately 10.5 feet						
15							
20							

LEGEND

-)) Moderate Seepage
- NC no caving observed
- NS no seepage observed
- 200 Wash (% fines shown)
- Grain Size Analysis (% fines shown)
- Organic Content (% shown)

Excavation Method: Trackhoe

Date Excavated: *February 20, 2017*

Logged By: *KHM*

amec foster wheeler
11810 North Creek Parkway N
Bothell, Washington 98011

Permit Number: 20-03281

Hand Boring No.: HB-01

Location: CKHS Football Field NW Corner - Goal Line
Approximate ground surface elevation: 135 feet

DEPTH (feet)	Soil Description	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit / Liquid Limit; 0-100)	TESTING
0	4-inches Grass / Topsoil					
	Drainage SAND	G-1				
	Medium dense, wet, gray, gravelly, silty SAND (Fill).	G-2	Seepage at contact			
	Dense, wet, gray, gravelly, silty SAND (Qvt - Glacial Till).	G-3				
	Test pit terminated at approximately 2.75 feet					
5						

Hand Boring No.: HB-02

Location: CKHS Football Field NE Corner - Goal Line
Approximate ground surface elevation: 135 feet

DEPTH (feet)	Soil Description	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit / Liquid Limit; 0-100)	TESTING
0	4-inches Grass / Topsoil					
	Drainage SAND	G-1				
	Loose, moist, brownish-gray, mottled, silty SAND with some gravel (Fill)	G-2				
	Obstruction at 2.75 Feet - End of Boring					
	Test pit terminated at approximately 2.75 feet					
5						

LEGEND

200 Wash (% fines shown)

Excavation Method: Hand Auger

Date Excavated: *August 16, 2016*

Logged By: *KHM*

amec foster wheeler
11810 North Creek Parkway N
Bothell, Washington 98011

BOTHELL_GEO_2015.GLB HAND BORING LOGS 2/PAGE HAND BORING LOGS.GPJ KIRKLAND 5-08 B&TP.GDT PRINTDATE 4/4/17

Hand Boring No.: HB-03

Location: CKHS Center of Football Field - 50yd Line
Approximate ground surface elevation: 136 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit – Liquid Limit; 0, 20, 40, 60, 80, 100)	TESTING
0	6-inches Grass / Topsoil intermixed with Drainage Sand		G-1				
	Topsoil saturated - Irregation water						
	Drainage SAND		G-2				
	Loose, moist, brownish-gray, silty SAND with some gravel (Fill)						
	Loose to medium dense, moist, gray, silty SAND with some gravel (Qvt - Glacial Till?)		G-3			●	
	Test pit terminated at approximately 4.3 feet						
5							

Hand Boring No.: HB-04

Location: CKHS Football Field SW Corner - Goal Line
Approximate ground surface elevation: 135 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit – Liquid Limit; 0, 20, 40, 60, 80, 100)	TESTING
0	4-inches Grass / Topsoil						
	Drainage SAND		G-1				
	Medium dense, gray, silty, gravelly SAND (Fill)		G-2				
	Seepage at contact						
	Becomes brownish-gray with occasional organics - rootlets / wood		G-3			●	18
	Test pit terminated at approximately 3 feet						
5							

LEGEND

200 Wash (% fines shown)

Excavation Method: Hand Auger

Date Excavated: *August 16, 2016*

Logged By: *KHM*

amec foster wheeler

11810 North Creek Parkway N
Bothell, Washington 98011

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Permit Number: 20-03281

Hand Boring No.: HB-05

Location: CKHS Football Field SE Corner - Goal Line
Approximate ground surface elevation: 135 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE NUMBER	SEEPAGE	CAVING	Plastic Limit — MOISTURE CONTENT — Liquid Limit (0, 20, 40, 60, 80, 100)	TESTING
0	4-inches Grass / Topsoil						
	Drainage SAND		G-1				
	Loose, moist, gray, gravelly, silty SAND (Fill)		G-2			● (~7)	
	Test pit terminated at approximately 3.2 feet						
5							

LEGEND

200 Wash (% fines shown)

Excavation Method: Hand Auger

Date Excavated: *August 16, 2016*

Logged By: *KHM*

amec foster wheeler

11810 North Creek Parkway N
Bothell, Washington 98011

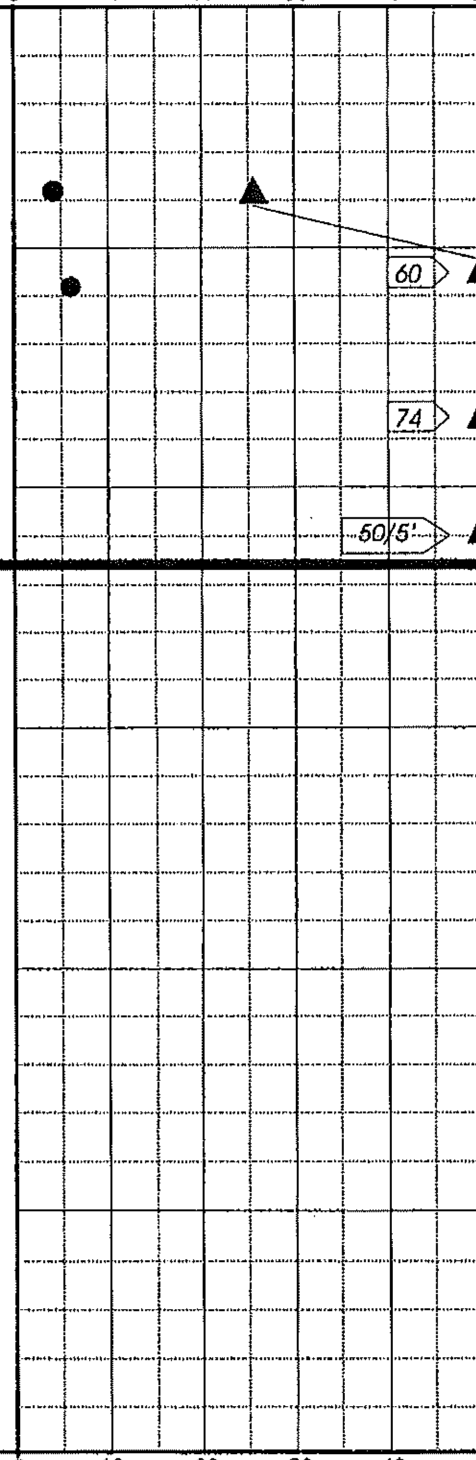
BOTHELL_GEO_2015.GLB HAND BORING LOGS_2/PAGE HAND BORING LOGS.GPJ KIRKLAND_5-08_B&TP.GDT PRINTDATE 4/4/17

Permit Number: 20-03281

PROJECT: Performing Arts Center Science Kit Center Site W.O. 11-09290-00 BORING NO. B-1

Page 1 of 1

DEPTH (feet)	SOIL DESCRIPTION Approximate ground surface elevation:	SAMPLE TYPE	SAMPLE NUMBER	OVM READING	GROUND WATER	STANDARD PENETRATION RESISTANCE (▲ Blows per foot)	TESTING
0	2" Asphalt paving						
	Medium dense, moist, tan, fine to medium SAND with trace silt						
		I	S-1	0.0			
5	Very dense, moist, tan to gray, medium to coarse SAND with some gravel and trace silt	I	S-2	0.0		60	
	Very dense, moist, gray, silty, fine to medium SAND with trace gravel	I	S-3	0.0		74	
10	Some gravel	I	S-4	0.0		50/5"	
	Boring terminated at approximately 11.5 feet						



MOISTURE CONTENT

Plastic limit — Natural — Liquid limit

LEGEND

I 2-inch OD split-spoon sample

RZA AGRA, Inc
Engineering & Environmental Services

11335 NE 122nd Way, Suite 100
Kirkland, Washington 98034-6918

Drilling started: 06 December 1993 Drilling completed: 06 December 1993 Logged by: KHM

Permit Number: 20-03281

PROJECT: Performing Arts Center Science Kit Center Site W.O. 11-09290-00 BORING NO. B-2

DEPTH (feet)	SOIL DESCRIPTION (Approximate ground surface elevation:)	SAMPLE TYPE	SAMPLE NUMBER	OVM READING	GROUND WATER	STANDARD PENETRATION RESISTANCE (▲ Blows per foot, 0–50)	TESTING
0	Very dense, moist, gray, silty, fine to medium SAND with some gravel						
		I	S-1	0.0		50/5"	
5		I	S-2	0.0		50/5"	
		I	S-3	0.0		50/5"	
10							
		I	S-4	*		50/5"	
	Boring terminated at approximately 11.5 feet						
15							
20							
25							
30							

MOISTURE CONTENT (0–50)

Plastic limit — Natural — Liquid limit

LEGEND

I 2-inch OD split-spoon sample

* Insufficent sample for OVM reading; however, no odor detected

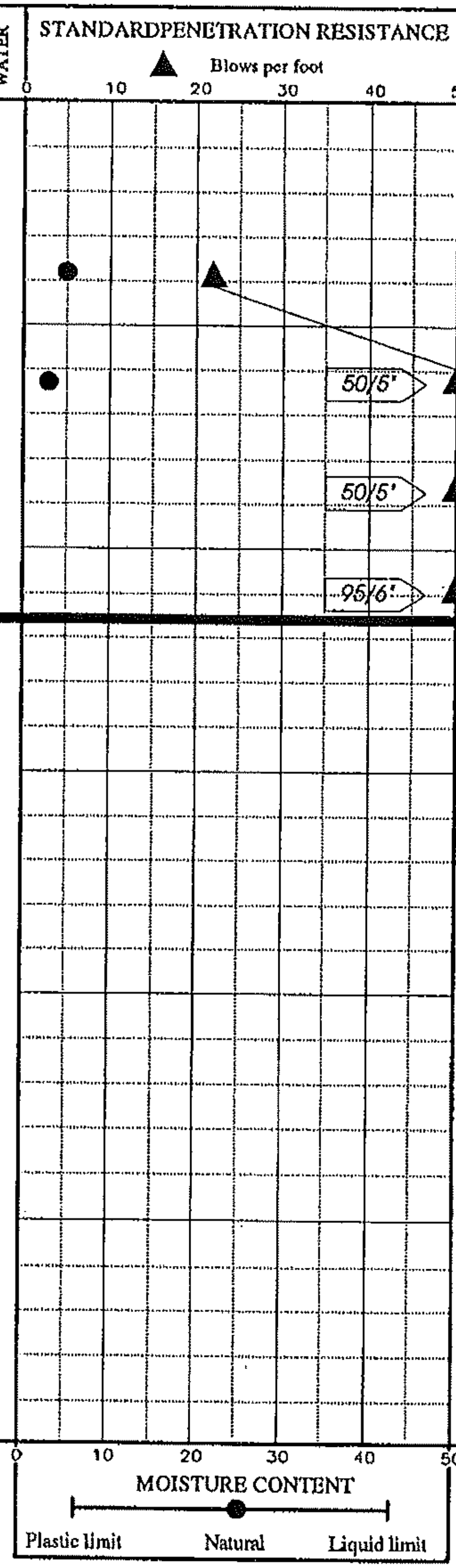
RZA AGRA, Inc
Engineering & Environmental Services
11335 NE 122nd Way, Suite 100
Kirkland, Washington 98034-6918

Drilling started: 06 December 1993 Drilling completed: 06 December 1993 Logged by: KHM

Permit Number: 20-03281

PROJECT: Performing Arts Center Science Kit Center Site W.O. 11-09290-00 BORING NO. B-3

DEPTH (feet)	SOIL DESCRIPTION Approximate ground surface elevation:	SAMPLE TYPE	SAMPLE NUMBER	OVM READING	GROUND WATER
0	Medium dense, moist, gray, fine to medium SAND with trace gravel and silt				
		I	S-1	*	
5	Very dense, moist, gray, silty, gravelly, fine to medium SAND	I	S-2	0.0	
		X	S-3		
10	Very dense, moist, gray, silty, fine to medium SAND with some gravel	I	S-4	*	
	Boring terminated at approximately 11.5 feet				
15					
20					
25					
30					



LEGEND

I 2-inch OD split-spoon sample

X Sample not recovered

* Insufficient sample for OVM reading; however, no odor detected

RZA AGRA, Inc
Engineering & Environmental Services
11335 NE 122nd Way, Suite 100
Kirkland, Washington 98034-6918

Drilling started: 06 December 1993 Drilling completed: 06 December 1993 Logged by: KHM

Permit Number: 20-03281

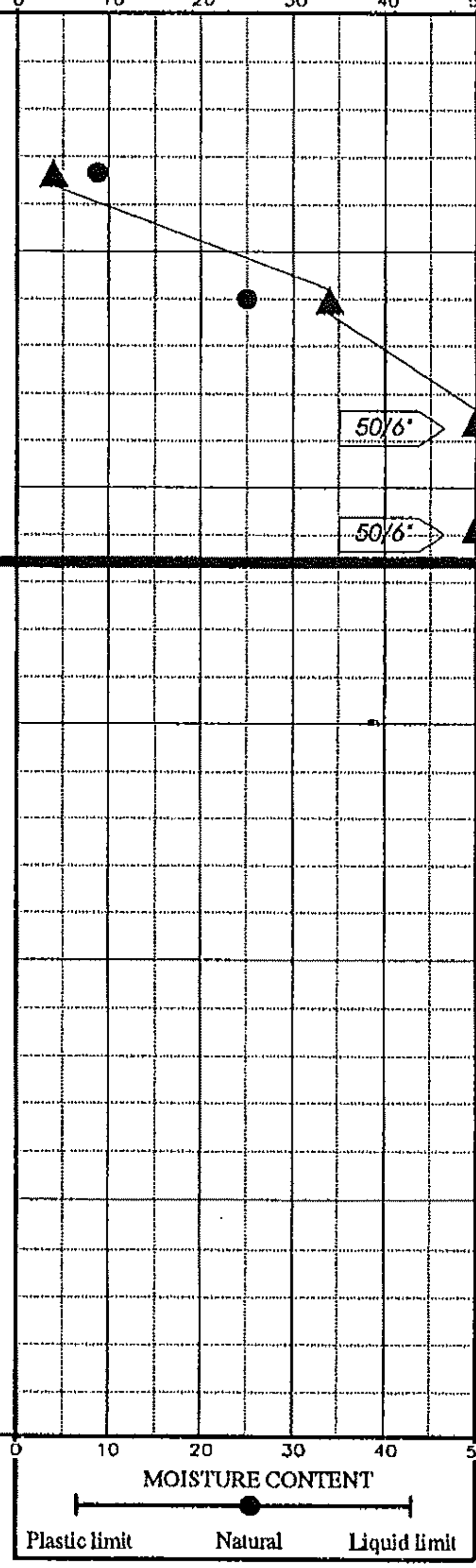
PROJECT: Performing Arts Center Science Kit Center Site   W.O. 11-09290-00   BORING NO. B-4

Page 1 of 1

Approximate ground surface elevation:

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	OVM READING	GROUND WATER
0–4.5	Loose, moist, tan, fine to medium SAND with trace silt (Possible Fill)	I	S-1	0.0	
4.5–7	Medium dense, moist, mottled gray, silty, fine SAND	I	S-2	0.0	
7–10	Very dense, gray, some gravel	I	S-3	0.0	
10–11.5	Becoming gravelly	I	S-4	*	
11.5	Boring terminated at approximately 11.5 feet				

STANDARD PENETRATION RESISTANCE ▲ Blows per foot (0–50); TESTING



LEGEND

I 2-inch OD split-spoon sample

* Insufficient sample for OVM reading; however, no odor detected

RZA AGRA, Inc
Engineering & Environmental Services

11335 NE 122nd Way, Suite 100
Kirkland, Washington 98034-6918

Drilling started: 06 December 1993   Drilling completed: 06 December 1993   Logged by: KHM

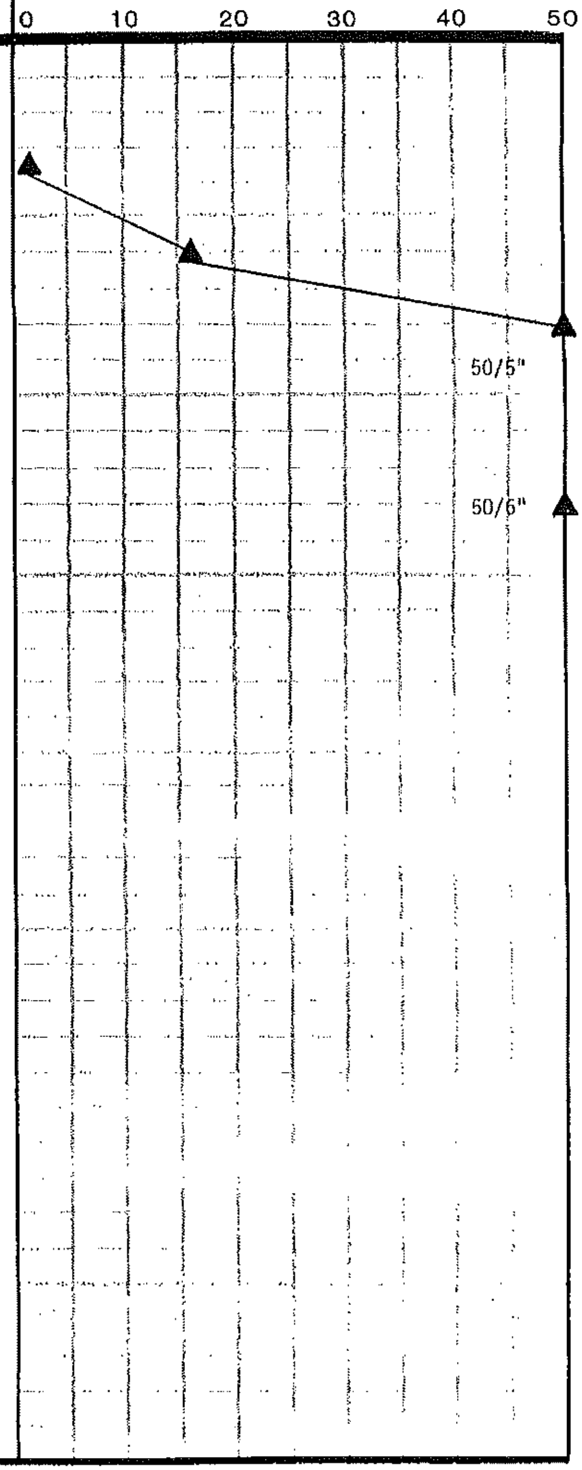
RZA *RITTENHOUSE-ZEMAN & ASSOC., INC.*
Geotechnical / Hydrogeological Consultants

BORING NUMBER B-1 W.O. W-6027

PROJECT NAME Central Kitsap Junior High School

SOIL DESCRIPTION Ground Surface Elevation Approximately Feet	DEPTH (FEET)	LAB TESTS	SAMPLING	GROUND WATER
Very loose to medium dense, moist, brown/gray, silty, fine to medium SAND, with some coarse sand and gravel, trace organics to 4 feet (FILL)	0–7		1, 2	
Very dense, moist, gray, silty, fine to medium SAND, with some coarse sand and gravel (GLACIAL TILL)	7–13		3, 4	
Completed 22 February 1989 Drilled to 13 feet				

STANDARD PENETRATION RESISTANCE
▲ BLOWS PER FOOT
(140 lb. hammer, 30 inch drop)



SAMPLING
- I 2" OD SPLIT SPOON SAMPLE
- II 3" OD SHELBY SAMPLE
- ⊠ 2.5" ID RING SAMPLE
- B BULK SAMPLE
- * SAMPLE NOT RECOVERED

GROUND WATER
- SEAL
- DATE
- WATER LEVEL AT TIME OF DRILLING (ATD)
- OBSERVATION WELL TIP

LABORATORY TESTS
- ● % WATER CONTENT
- NP NON PLASTIC
- LIQUID LIMIT
- NATURAL WATER CONTENT
- PLASTIC LIMIT

1991

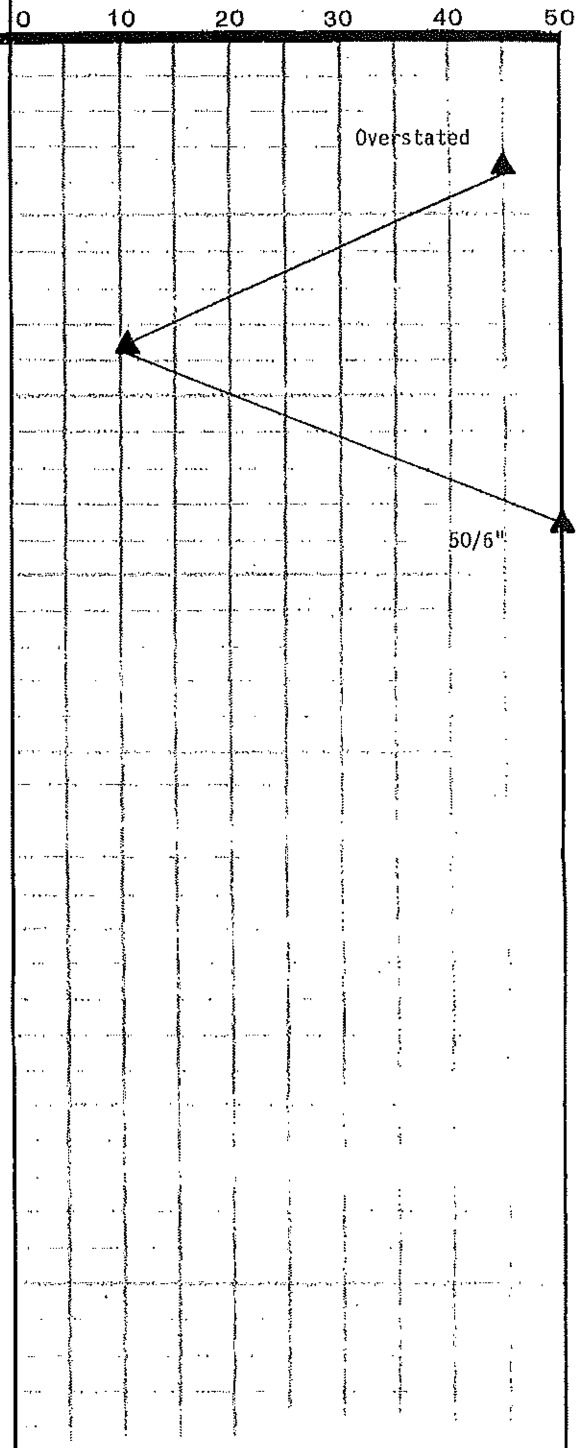
RZA *RITTENHOUSE-ZEMAN & ASSOC., INC.*
Geotechnical / Hydrogeological Consultants

BORING NUMBER B-2 W.O. W-6027
PROJECT NAME Central Kitsap Junior High School

SOIL DESCRIPTION Ground Surface Elevation Approximately Feet	DEPTH (FEET)	LAB TESTS	SAMPLING	GROUND WATER
Loose to medium dense, moist, brown to brown/gray, silty, fine to medium SAND, with some coarse snad and gravel, trace organics and wood fragments (FILL)	0 – 10		I (1), I	
Very dense, moist, gray/brown, silty, fine to medium SAND, with some coarse sand and gravel (GLACIAL TILL)	10 – 13.5		I	
Completed 22 February 1989 Drilled to 13.5 feet				

Depth scale: 0, 5, 10, 15, 20, 25, 30, 35, 40

STANDARD PENETRATION RESISTANCE
▲ BLOWS PER FOOT
(140 lb. hammer, 30 inch drop)



SAMPLING
- I 2" OD SPLIT SPOON SAMPLE
- II 3" OD SHELBY SAMPLE
- ⊠ 2.5" ID RING SAMPLE
- B BULK SAMPLE
- * SAMPLE NOT RECOVERED

GROUND WATER
- SEAL
- DATE
- WATER LEVEL AT TIME OF DRILLING ▽ ATD
- OBSERVATION WELL TIP

LABORATORY TESTS
- ● % WATER CONTENT
- NP NON PLASTIC
- LIQUID LIMIT
- NATURAL WATER CONTENT
- PLASTIC LIMIT

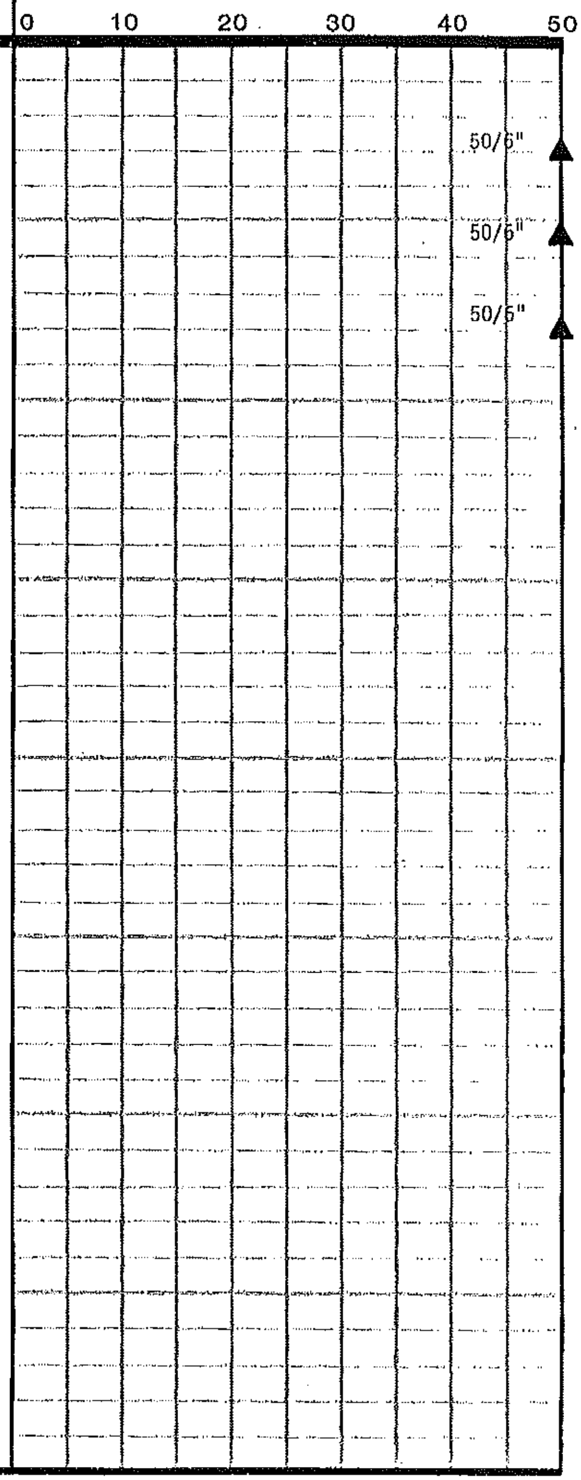
RZA

RITTENHOUSE-ZEMAN & ASSOC., INC.
Geotechnical / Hydrogeological Consultants

BORING NUMBER B-3 W.O. W-6007
PROJECT NAME Central Kitsap Junior High School

SOIL DESCRIPTION Ground Surface Elevation Approximately Feet	DEPTH (FEET)	LAB TESTS	SAMPLING	GROUND WATER
Medium dense, moist, brown, silty, gravelly, fine to medium SAND, with some coarse sand (Fill)	0			
Very dense, moist, brown/gray, silty, gravelly, fine to medium SAND with some coarse sand (GLACIAL TILL)			1	
	5		2	
			3	
Completed 22 February 1989 Derilled to 8 feet	10			
	15			
	20			
	25			
	30			
	35			
	40			

STANDARD PENETRATION RESISTANCE
▲ BLOWS PER FOOT
(140 lb. hammer, 30 inch drop)



SAMPLING
- Ɪ 2" OD SPLIT SPOON SAMPLE
- Ⅱ 3" OD SHELBY SAMPLE
- ⊠ 2.5" ID RING SAMPLE
- B BULK SAMPLE
- * SAMPLE NOT RECOVERED

GROUND WATER
- SEAL
- DATE
- WATER LEVEL AT TIME OF DRILLING ATD
- OBSERVATION WELL TIP

LABORATORY TESTS
- ● % WATER CONTENT
- NP NON PLASTIC
- LIQUID LIMIT
- NATURAL WATER CONTENT
- PLASTIC LIMIT

PROJECT: Central Kitsap High School Library Addition

W.O. W-8871

BORING NO. B-1

DEPTH (feet)	SOIL DESCRIPTION Approximate ground surface elevation:	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	STANDARD PENETRATION RESISTANCE ▲ Blows per foot (0 10 20 30 40 50)	TESTING
0	5 inch concrete slab overlying a medium dense, damp to moist, light brown, silty, gravelly, SAND with some brick fragments (Fill)					
	Boring terminated at approximately 2 feet atop buried concrete					
5						
10						
15						
20						
25						
30						

MOISTURE CONTENT (0 10 20 30 40 50)

Plastic limit — Natural — Liquid limit

LEGEND

I 2-inch OD split-spoon sample

RZA AGRA, Inc
Engineering & Environmental Services

11335 NE 122nd Way, Suite 100
Kirkland, Washington 98034-6918

Drilling started: 06 April 1993   Drilling completed: 06 April 1993   Logged by: KSS

PROJECT: Central Kitsap High School Library Addition

W.O. W-8871

BORING NO. B-2

Page 1 of 1

DEPTH (feet)	SOIL DESCRIPTION Approximate ground surface elevation:	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	STANDARD PENETRATION RESISTANCE (▲ Blows per foot)	TESTING
0	Medium dense, moist, brown, silty GRAVEL					
	Medium dense, damp, orangish tan, silty, gravelly SAND	I	S-1			
5	Dense to very dense, damp, gray, gravelly, silty, SAND with occassional sand lense	I	S-2		94/9"	42
10	Very dense, damp, tan-gray, silty, fine SAND with some gravel	I	S-3		89/11"	
	Boring terminated at approximately 11.5 feet					
15						
20						
25						
30						

Scale: 0 10 20 30 40 50

MOISTURE CONTENT

Plastic limit — Natural — Liquid limit

LEGEND

I 2-inch OD split-spoon sample

17 200 wash (percent fines shown)

RZA AGRA, Inc
Engineering & Environmental Services
11335 NE 122nd Way, Suite 100
Kirkland, Washington 98034-6918

Drilling started: 06 April 1993 Drilling completed: 06 April 1993 Logged by: KSS

PROJECT: Central Kitsap High School Library Addition — W.O. W-8871 — BORING NO. B-3

DEPTH (feet)	SOIL DESCRIPTION (Approximate ground surface elevation:)	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	STANDARD PENETRATION RESISTANCE (▲ Blows per foot)	Page 1 of 1 TESTING
0	5 inch concrete slab over a medium dense, damp, tan, gravelly SAND, some silt to silty (Fill)					
	Medium dense, damp, brown, silty, gravelly SAND	I	S-1		75/11"	
5	Very dense, damp, gray, silty, gravelly SAND	I	S-2		50/5"	
	Very dense, damp, tan-gray, silty, fine SAND with some gravel					
10		I	S-3		61	19
	Boring terminated at approximately 11.5 feet					
15						
20						
25						
30						

Standard penetration resistance scale: 0, 10, 20, 30, 40, 50

MOISTURE CONTENT: 0, 10, 20, 30, 40, 50 — Plastic limit, Natural, Liquid limit

LEGEND

I 2-inch OD split-spoon sample

[17] 200 wash (percent fines shown)

RZA AGRA, Inc
Engineering & Environmental Services
11335 NE 122nd Way, Suite 100
Kirkland, Washington 98034-6918

Drilling started: 06 April 1993 Drilling completed: 06 April 1993 Logged by: KSS

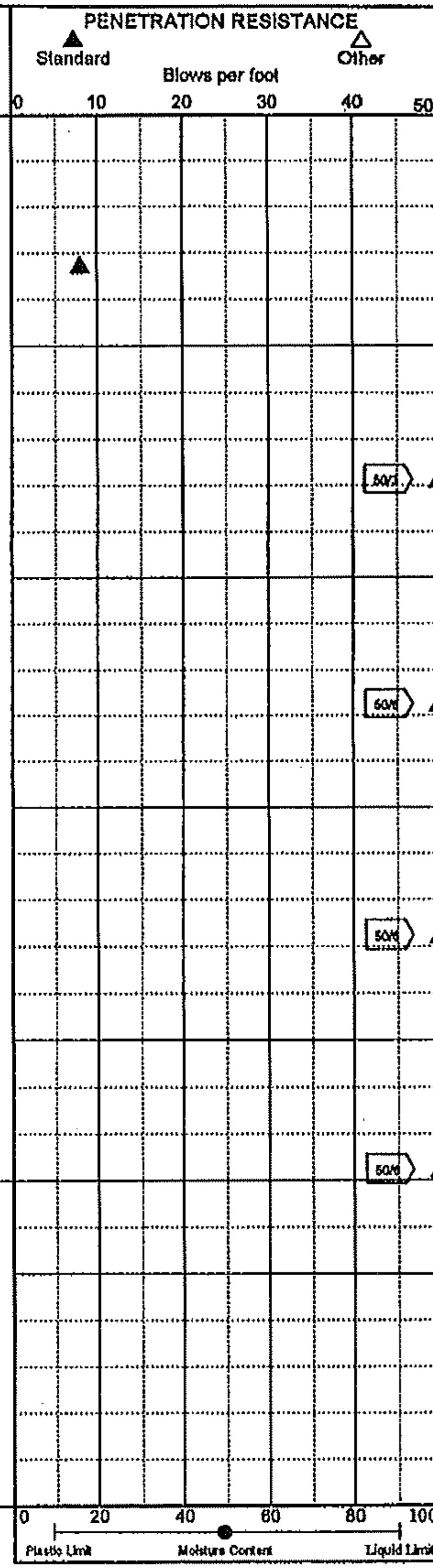
PROJECT: *Nextel Silverdale WA0285-3* W.O. *9-91M-12987-0* BORING No. *B-1*

Soil Description

Location: Approx. center of lease parcel

Approximate ground surface elevation: 180 ft

DEPTH (feet)	Soil Description	USCS GRAPHICS	SAMPLE TYPE (percent recovery)	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
0	Medium dense to dense, damp, tan silty gravelly SAND (Fill)				N/E		
	Loose, moist, brown silty gravelly SAND		33	S-1			
	Very dense, moist, gray silty gravelly SAND (Glacial Till)						
5							
			67	S-2		50/3	
10							
			60	S-3		50/6	
15							
			50	S-4		50/6	23
20							
			100	S-5		50/6	15
	Boring terminated at approximately 23 feet						
25							
30							



LEGEND

2.00-inch OD split-Spoon sampler (percent recovery shown)

200 Wash

N/E No groundwater encountered

AGRA
ENGINEERING GLOBAL SOLUTIONS
11335 N.E. 122nd Way Suite 100
Kirkland, Washington 98034-6913

Drilling Method: HSA Hammer type: Automatic Date drilled: *18 June 1999* Logged By: *JFV*

TEST PIT LOGS

Depth (feet)	Soil Classification	W-7726
	Test Pit TP-1	
0.0 - 1.0	Topsoil	
1.0 - 3.5	Medium dense, dry to damp, light brown, fine SAND with some silt and gravel	
3.5 - 7.0	Dense, damp, grey, gravelly SAND with trace silt	
7.0 - 8.0	Dense, dry to damp, grey, fine to medium SAND	
	No Seepage	
	No Caving	
	Test Pit TP-2	
0.0 - 1.0	Topsoil with roots	
1.0 - 2.5	Dense, damp, grey, gravelly SAND	
2.5 - 7.0	Dense, damp, grey, interbedded fine SAND to medium and coarse SAND with trace gravel	
	No seepage	
	No caving	
	Test Pit TP-3	
0.0 - 5.0	Dense, damp, grey, silty SAND with some gravel and pockets of organics and roots (Fill)	
5.0 - 7.5	Dense, damp, light brown, fine SAND with some silt	
7.5 - 8.0	Very dense, damp, grey, silty SAND with some gravel (Glacial Till)	
	No seepage	
	No caving	
	Test Pit TP-4	
0.0 - 5.5	Dense, damp, grey, silty SAND with some gravel (Fill)	
5.5 - 7.0	Dense, damp, light brown, silty SAND with trace roots	
7.0 - 8.0	Very dense, damp, grey, silty SAND with some gravel (Glacial Till)	
	No seepage	
	No caving	

APPENDIX B

Geotechnical Laboratory Testing Procedures and Results

APPENDIX B
GEOTECHNICAL LABORATORY TESTING PROCEDURES AND RESULTS
Central Kitsap High School and Middle School Campus Redevelopment
Silverdale, Washington

The following paragraphs describe procedures associated with the laboratory tests conducted for this project. Graphical results of certain laboratory tests are enclosed in this appendix.

VISUAL CLASSIFICATION PROCEDURES

Visual soil classifications were conducted on all samples in the field and on selected samples in the laboratory. All soils were classified in general accordance with the Unified Soil Classification System, which includes color, relative moisture content, primary soil type (based on grain size), and any accessory soil types. The resulting soil classifications are presented on the exploration logs contained in Appendix A.

MOISTURE CONTENT DETERMINATION PROCEDURES

Moisture content determinations were performed on representative samples to aid in identification and correlation of soil types. All determinations were made in general accordance with ASTM D-2216. The results of these tests are shown on the exploration logs contained in Appendix A.

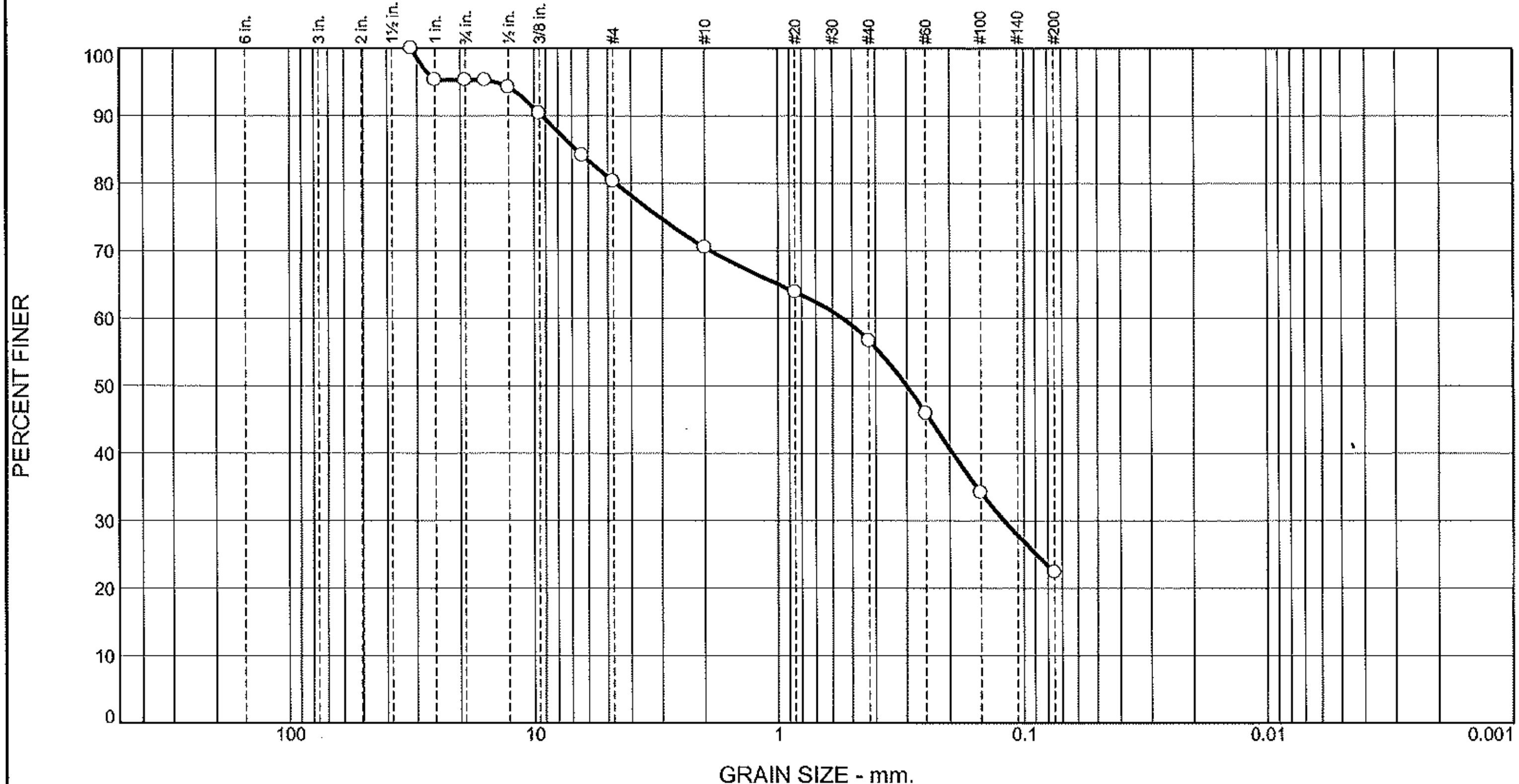
GRAIN-SIZE ANALYSIS PROCEDURES

A grain-size analysis indicates the range of soil particle diameters included in a particular sample. Grain-size analyses were performed on representative samples in general accordance with ASTM D-422. The results of these tests are presented on the enclosed grain-size distribution graphs and were used in soil classifications shown on the exploration logs contained in Appendix A.

200-WASH PROCEDURES

A 200-wash is a procedure in which the fine-grained soil fraction is separated from the sand and gravel by washing the soil on a U.S. No. 200 Sieve. A 200-wash was performed on selected soil samples obtained from our borings in general accordance with ASTM D-1140, Test Method for Amount of Material in Soils Finer than the No. 200 (75-µm) Sieve. The results of these analyses were used in soil classifications shown on the exploration logs presented in Appendix A.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.7	15.0	9.8	13.8	34.3	22.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.25"	100.0		
1"	95.3		
3/4"	95.3		
5/8"	95.3		
1/2"	94.3		
3/8"	90.4		
1/4"	84.2		
#4	80.3		
#10	70.5		
#20	63.9		
#40	56.7		
#60	45.9		
#100	34.2		
#200	22.4		

* (no specification provided)

Soil Description

Silty sand with gravel
As Received Moisture: 9.2%

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 9.2904 D_{85}= 6.7329 D_{60}= 0.5449
D_{50}= 0.2996 D_{30}= 0.1206 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

ASTM: C136, D1140, D2216
Sampled: 8/31/16
Sampled By: Konrad M. & Frank C.

Location: B-1, S-1
Depth: 2.5-4.0

Date: 9/14/2016

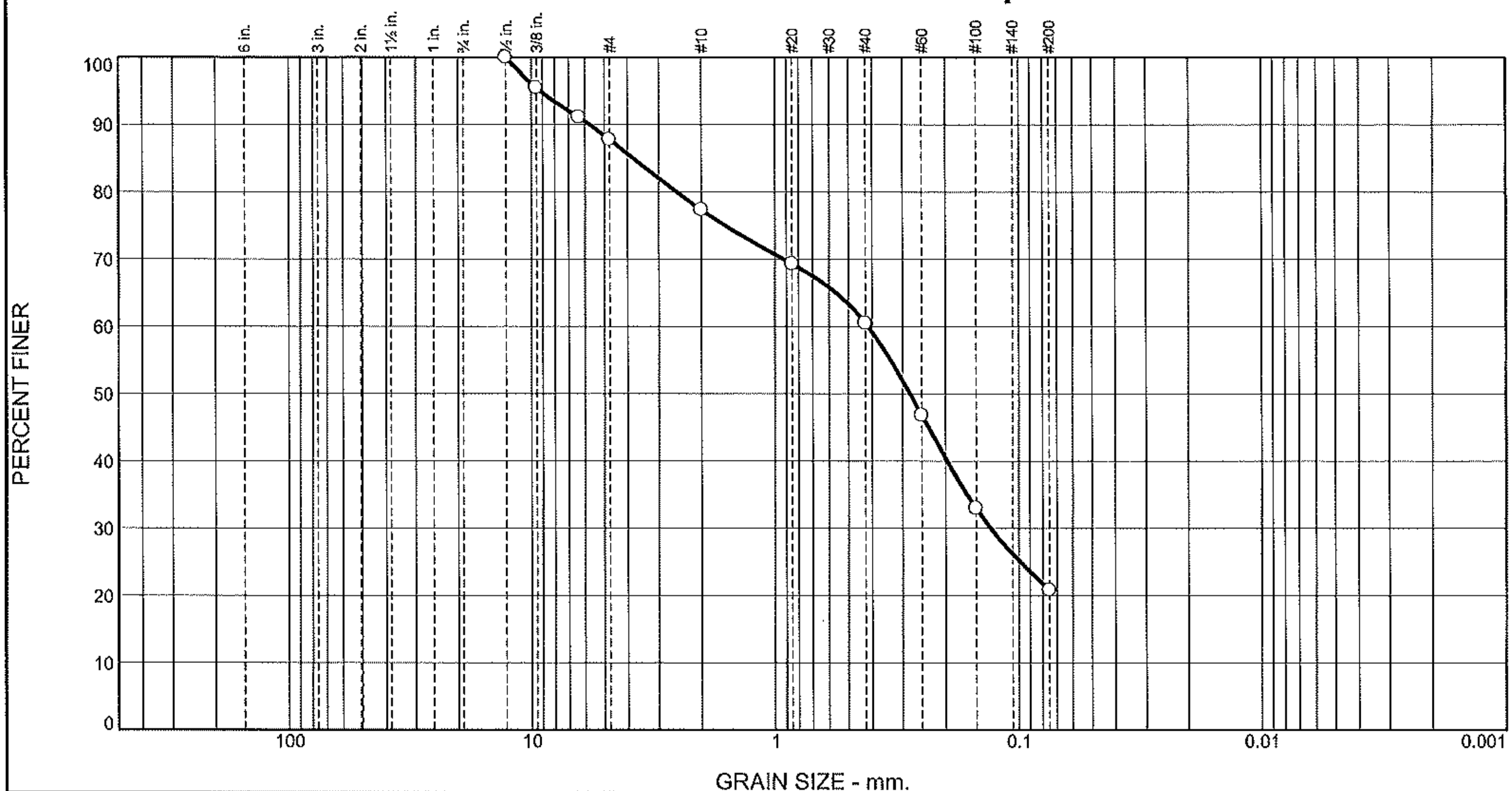
Terracon Consultants, Inc.

Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS
Project No: 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	12.2	10.5	16.8	39.7	20.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	95.5		
1/4"	91.1		
#4	87.8		
#10	77.3		
#20	69.3		
#40	60.5		
#60	46.8		
#100	33.0		
#200	20.8		

* (no specification provided)

Soil Description

Silty sand
As Received Moisture: 12.1%

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 5.7417 D_{85}= 3.7952 D_{60}= 0.4153
D_{50}= 0.2796 D_{30}= 0.1306 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

ASTM: C136, D1140, D2216
Sampled: 8/31/16
Sampled By: Konrad M. & Frank C.

Location: B-3, S-1
Depth: 2.5-4.0

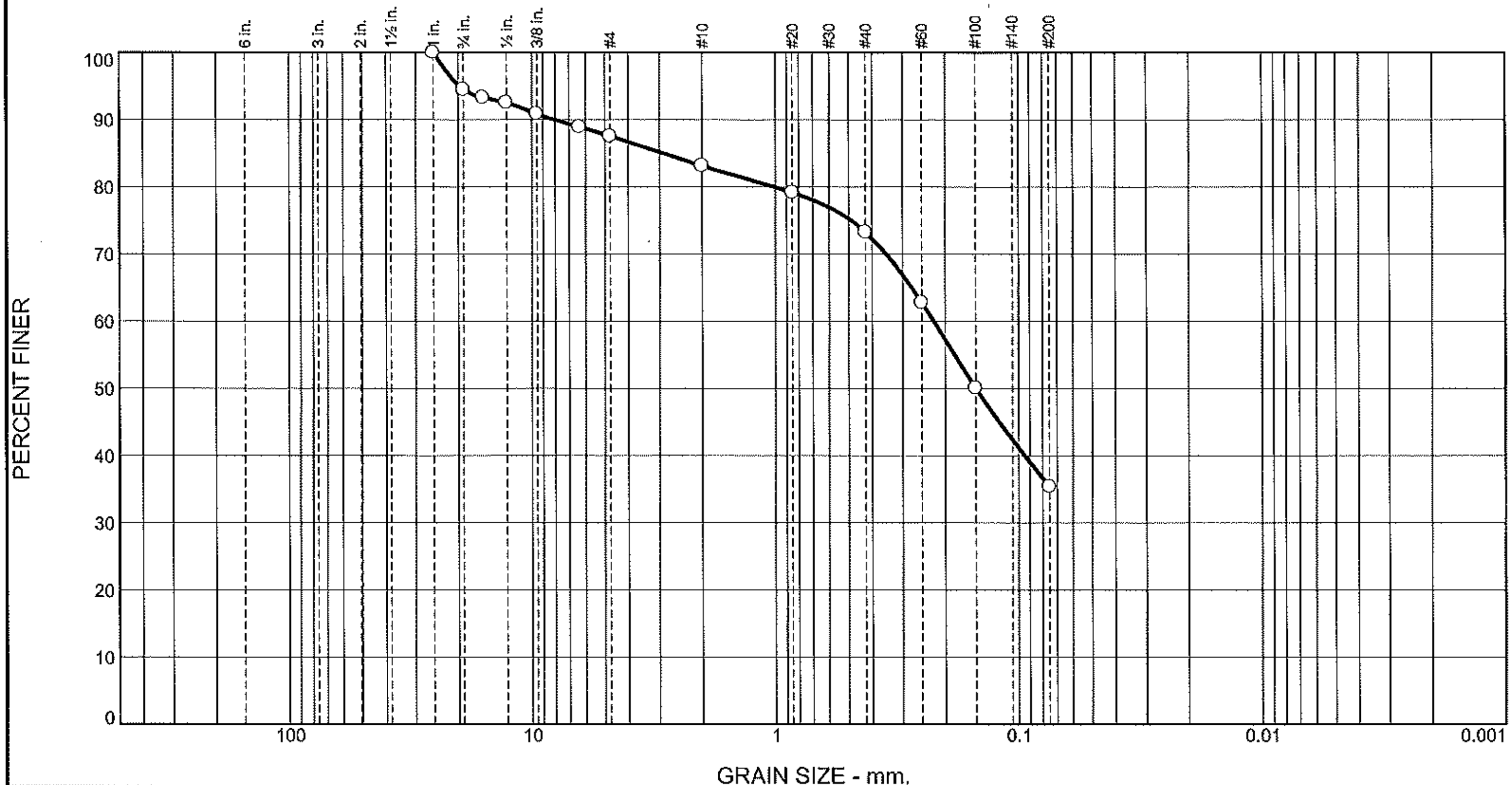
Date: 9/14/2016

Terracon Consultants, Inc.
Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS
Project No: 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.5	6.9	4.5	9.9	37.8	35.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	94.5		
5/8"	93.3		
1/2"	92.5		
3/8"	90.8		
1/4"	88.9		
#4	87.6		
#10	83.1		
#20	79.1		
#40	73.2		
#60	62.8		
#100	50.1		
#200	35.4		

* (no specification provided)

Soil Description

Silty sand
As Received Moisture: 7.0%

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 8.0922 D_{85}= 2.8948 D_{60}= 0.2231
D_{50}= 0.1495 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

ASTM: C136, D1140, D2216
Sampled: 8/31/16
Sampled By: Konrad M. & Frank C.

Location: B-4, S-2
Depth: 5-6.5

Date: 9/14/2016

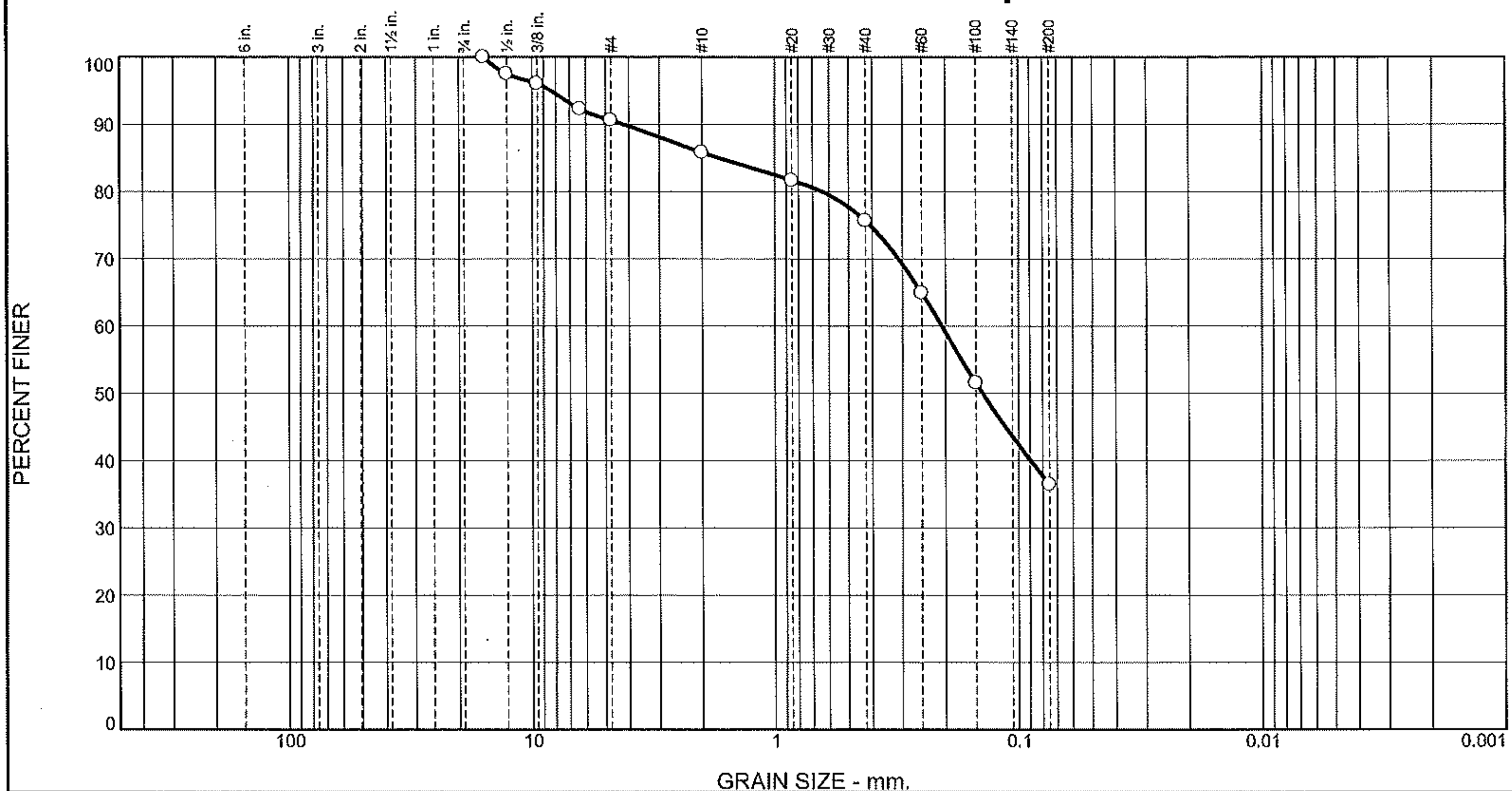
Terracon Consultants, Inc.

Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS
Project No: 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.4	4.8	10.1	39.2	36.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
5/8"	100.0		
1/2"	97.5		
3/8"	96.0		
1/4"	92.3		
#4	90.6		
#10	85.8		
#20	81.7		
#40	75.7		
#60	64.9		
#100	51.5		
#200	36.5		

* (no specification provided)

Soil Description

Silty sand
As Received Moisture: 7.7%

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 4.2216 D_{85}= 1.7052 D_{60}= 0.2069
D_{50}= 0.1408 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

ASTM: C136, D1140, D2216
Sampled: 8/31/16
Sampled By: Konrad M. & Frank C.

Location: B-4, S-3
Depth: 10-11.5

Date: 9/14/2016

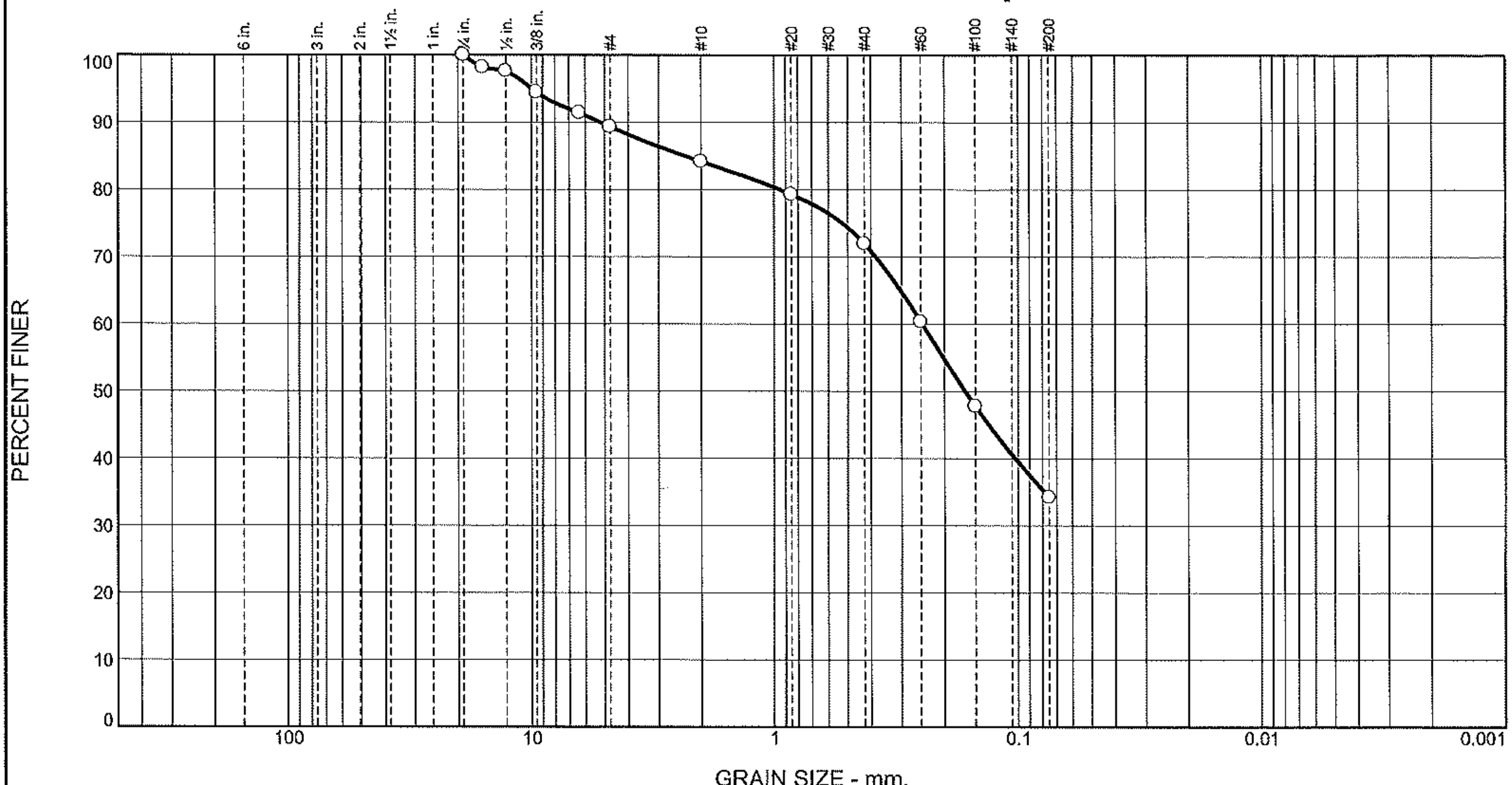
Terracon Consultants, Inc.

Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS
Project No: 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	10.7	5.1	12.2	37.8	34.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
5/8"	98.2		
1/2"	97.6		
3/8"	94.5		
1/4"	91.4		
#4	89.3		
#10	84.2		
#20	79.3		
#40	72.0		
#60	60.4		
#100	47.8		
#200	34.2		

* (no specification provided)

Soil Description

Silty sand
As Received Moisture: 8.5%

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 5.2014 D_{85}= 2.3313 D_{60}= 0.2464
D_{50}= 0.1649 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

ASTM: C136, D1140, D2216
Sampled: 8/31/16
Sampled By: Konrad M. & Frank C.

Location: B-5, S-3
Depth: 10-11.5

Date: 9/14/2016

Terracon Consultants, Inc.

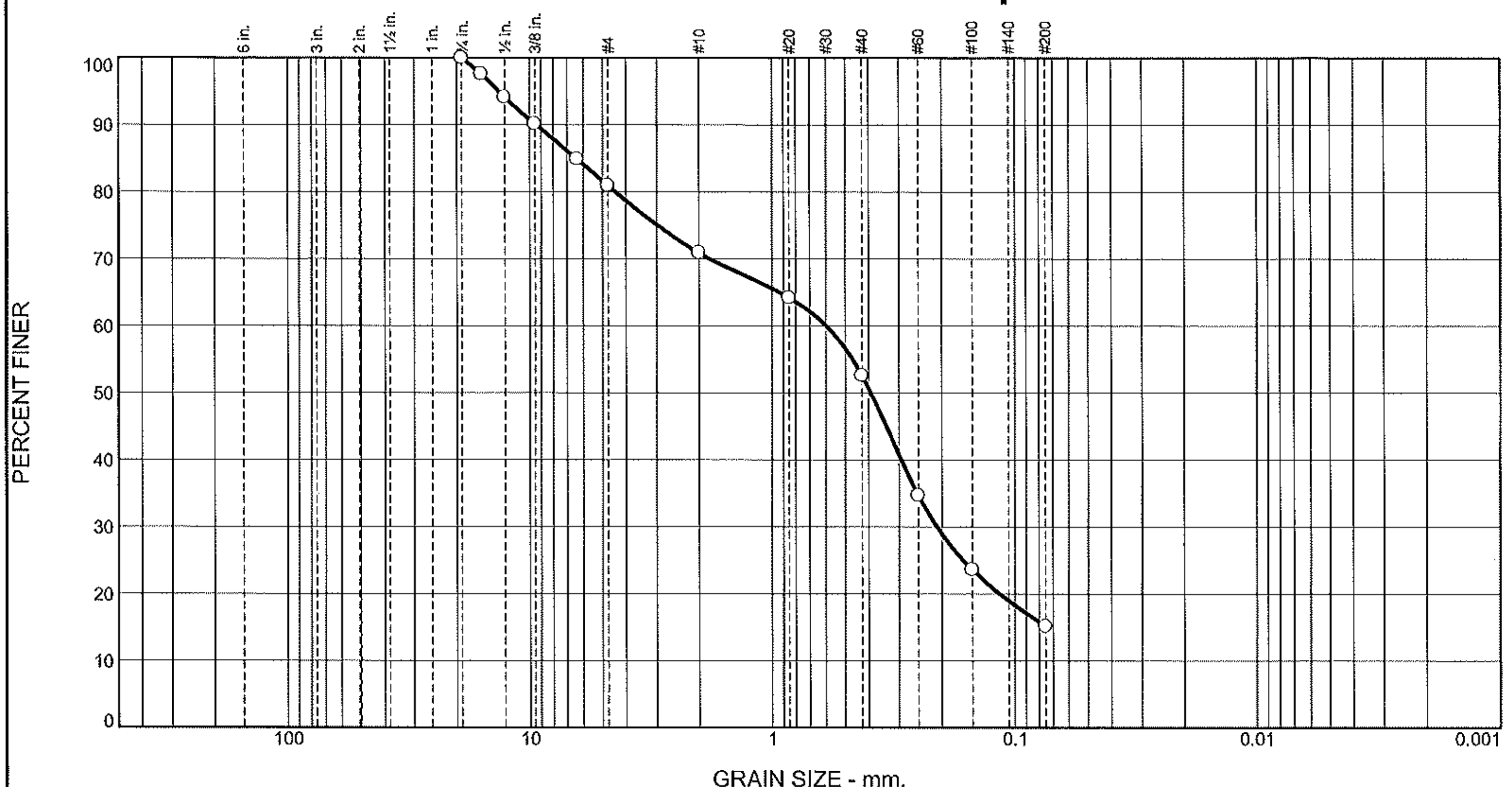
Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS

Project No: 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	19.1	10.0	18.3	37.4	15.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
5/8"	97.6		
1/2"	94.1		
3/8"	90.2		
1/4"	84.9		
#4	80.9		
#10	70.9		
#20	64.2		
#40	52.6		
#60	34.7		
#100	23.6		
#200	15.2		

* (no specification provided)

Soil Description

Silty sand with gravel
As Received Moisture: 4.7%

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 9.4027 D_{85}= 6.4033 D_{60}= 0.5973
D_{50}= 0.3909 D_{30}= 0.2098 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

ASTM: C136, D1140, D2216
Sampled: 8/31/16
Sampled By: Konrad M. & Frank C.

Location: B-8, S-3
Depth: 10-11.5

Date: 9/14/2016

Terracon Consultants, Inc.

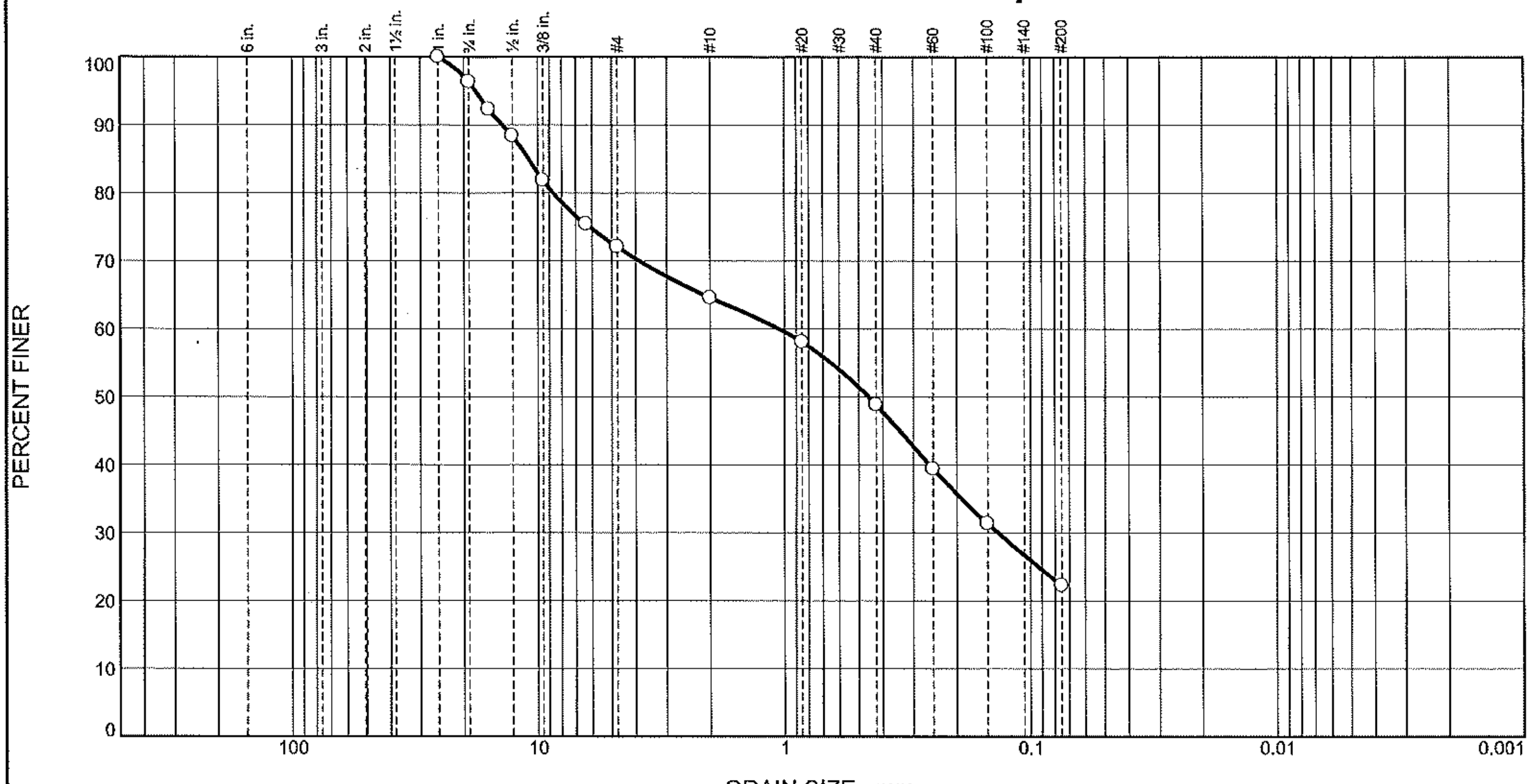
Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS

Project No: 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.6	24.3	7.5	15.8	26.5	22.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	96.4		
5/8"	92.3		
1/2"	88.4		
3/8"	81.9		
1/4"	75.4		
#4	72.1		
#10	64.6		
#20	58.1		
#40	48.8		
#60	39.4		
#100	31.4		
#200	22.3		

* (no specification provided)

Soil Description

Silty sand with gravel
As Received Moisture: 5.8%

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 13.9253 D_{85}= 10.9039 D_{60}= 1.0531
D_{50}= 0.4562 D_{30}= 0.1360 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

ASTM: C136, D1140, D2216
Sampled: 8/31/16
Sampled By: Konrad M. & Frank C.

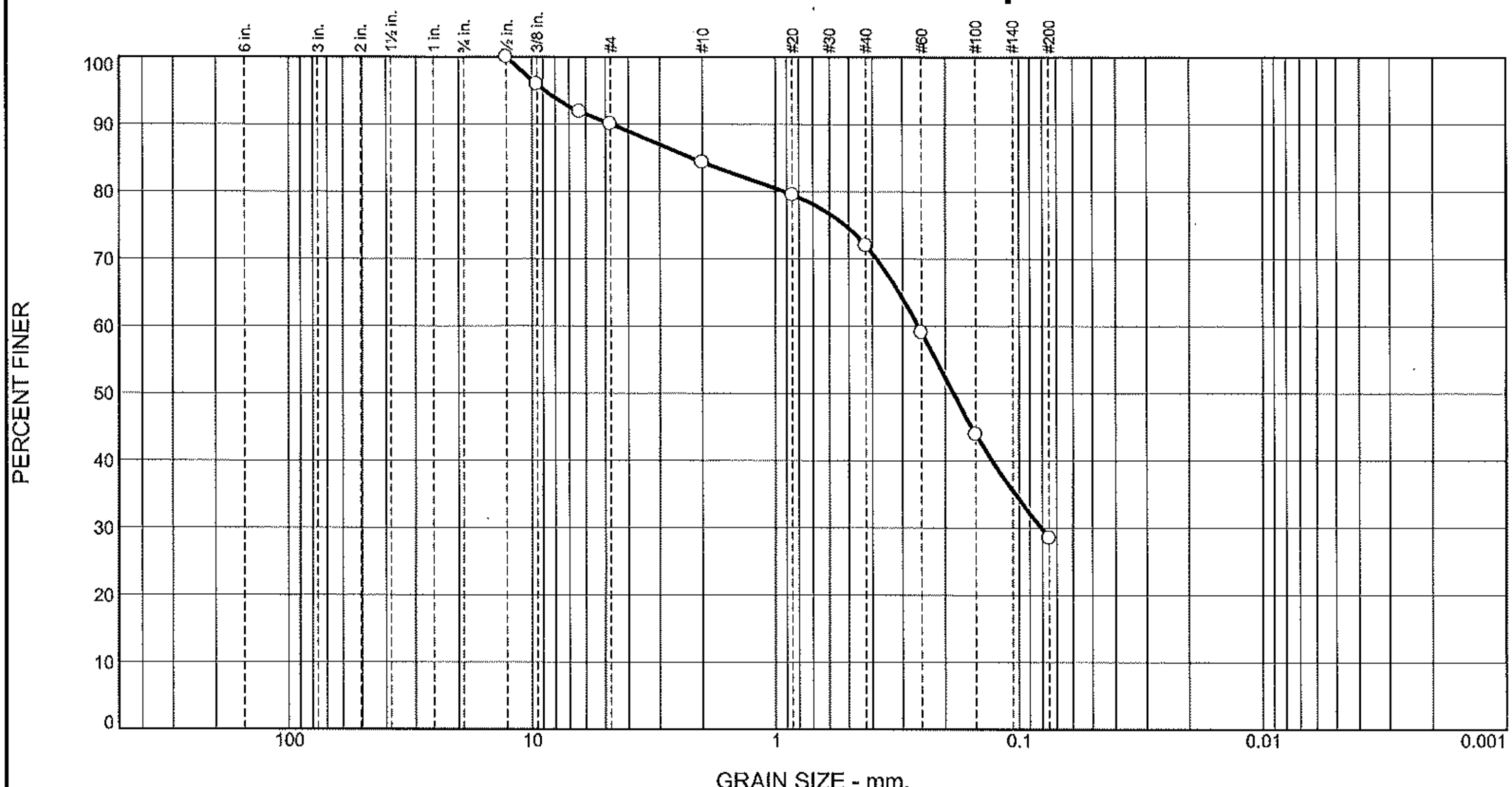
Location: B-9, S-2
Depth: 5-6.5

Date: 9/14/2016

Terracon Consultants, Inc. **Mountlake Terrace, WA**	**Client:** Central Kitsap School District **Project:** Central Kitsap HS/MS **Project No:** 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	10.0	5.7	12.3	43.5	28.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	95.9		
1/4"	91.9		
#4	90.0		
#10	84.3		
#20	79.5		
#40	72.0		
#60	59.1		
#100	43.9		
#200	28.5		

* (no specification provided)

Soil Description

Silty sand
As Received Moisture: 6.6%

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 4.7143 D_{85}= 2.2209 D_{60}= 0.2581
D_{50}= 0.1851 D_{30}= 0.0809 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

ASTM: C136, D1140, D2216
Sampled: 8/31/16
Sampled By: Konrad M. & Frank C.

Location: B-11, S-3
Depth: 10-11.5

Date: 9/14/2016

Terracon Consultants, Inc.

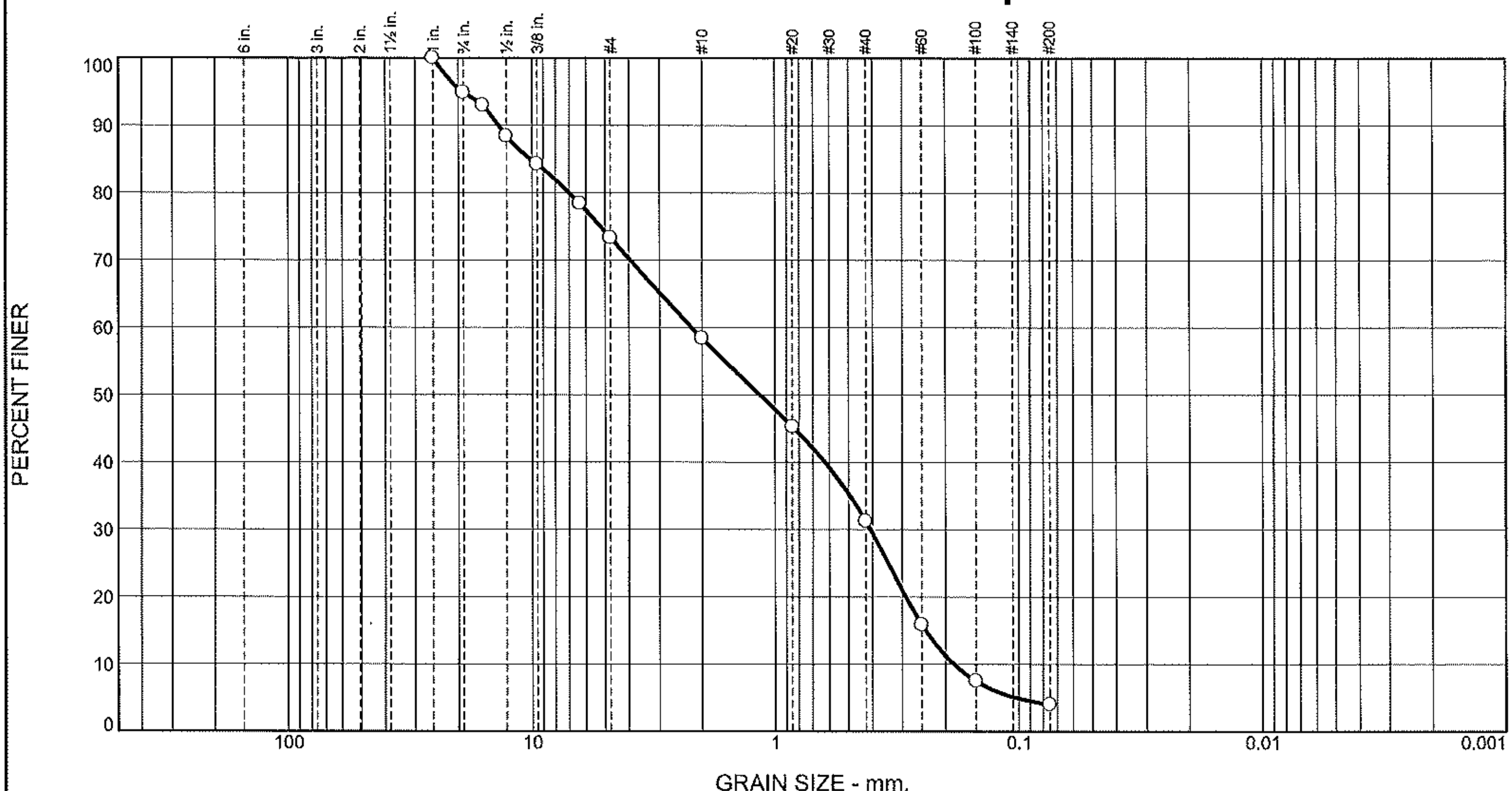
Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS

Project No: 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.1	21.6	14.9	27.2	27.2	4.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	94.9		
5/8"	93.0		
1/2"	88.4		
3/8"	84.3		
1/4"	78.4		
#4	73.3		
#10	58.4		
#20	45.3		
#40	31.2		
#60	15.9		
#100	7.5		
#200	4.0		

* (no specification provided)

Soil Description

Poorly graded sand with gravel
As Received Moisture: 0.6%

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 13.6798 D_{85}= 10.1238 D_{60}= 2.2101
D_{50}= 1.1544 D_{30}= 0.4064 D_{15}= 0.2409
D_{10}= 0.1846 C_u= 11.97 C_c= 0.40

Classification

USCS= SP AASHTO= A-1-b

Remarks

ASTM: C136, D1140, D2216
Sampled: 8/31/16
Sampled By: Konrad M. & Frank C.

Location: B-11, S-6
Depth: 25-26.5

Date: 9/14/2016

Terracon Consultants, Inc.

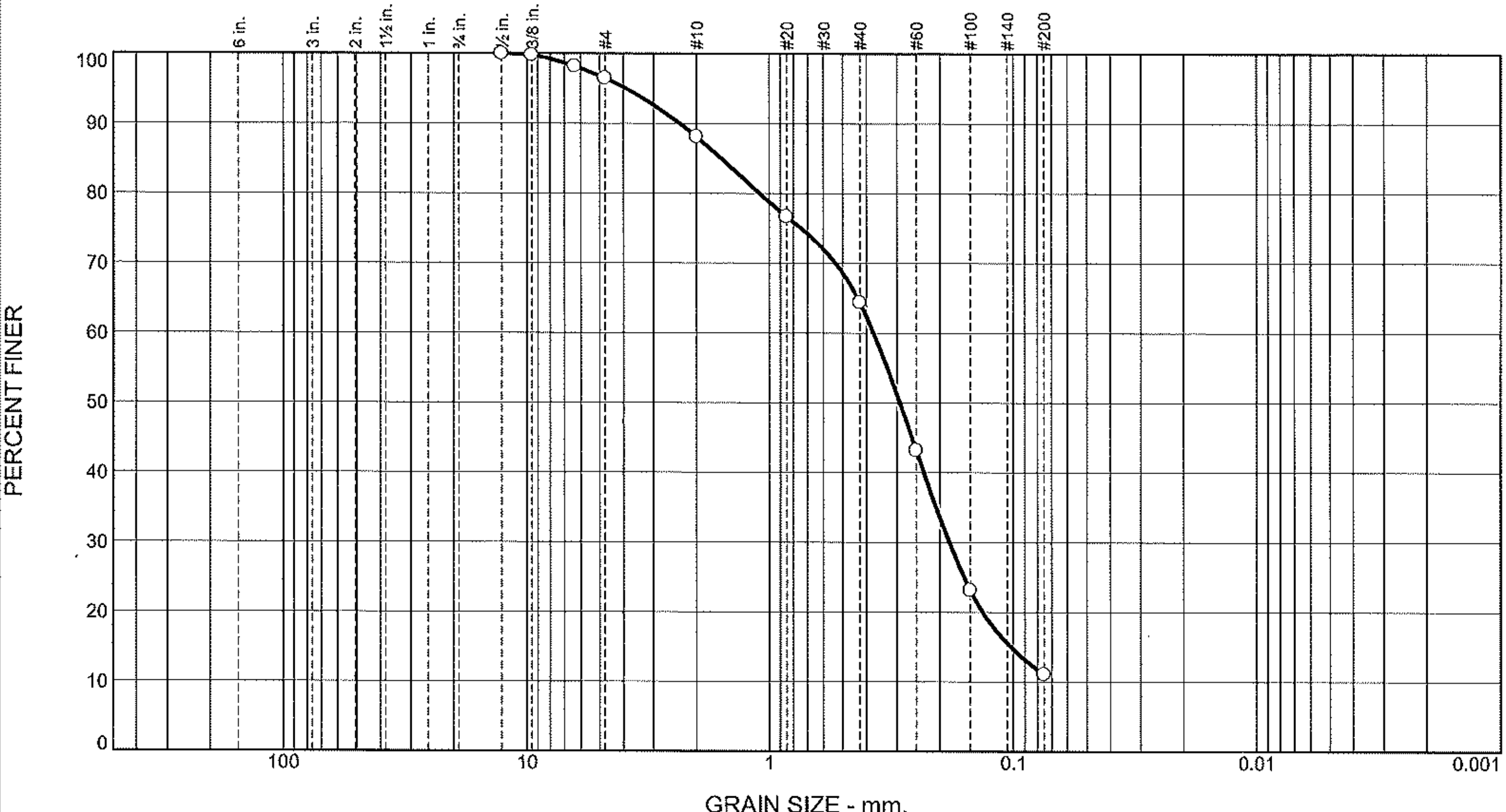
Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS

Project No: 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.5	8.4	23.7	53.3	11.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	99.8		
1/4"	98.2		
#4	96.5		
#10	88.1		
#20	76.6		
#40	64.4		
#60	43.2		
#100	23.1		
#200	11.1		

* (no specification provided)

Soil Description

Poorly graded sand with silt
As Received Moisture: 5.2%

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 2.3471 D_{85}= 1.5800 D_{60}= 0.3733
D_{50}= 0.2919 D_{30}= 0.1830 D_{15}= 0.1027
D_{10}= C_u= C_c=

Classification

USCS= SP-SM AASHTO= A-2-4(0)

Remarks

ASTM: C136, D1140, D2216
Sampled: 8/31/16
Sampled By: Konrad M. & Frank C.

Location: B-15, S-4A
Depth: 15-16

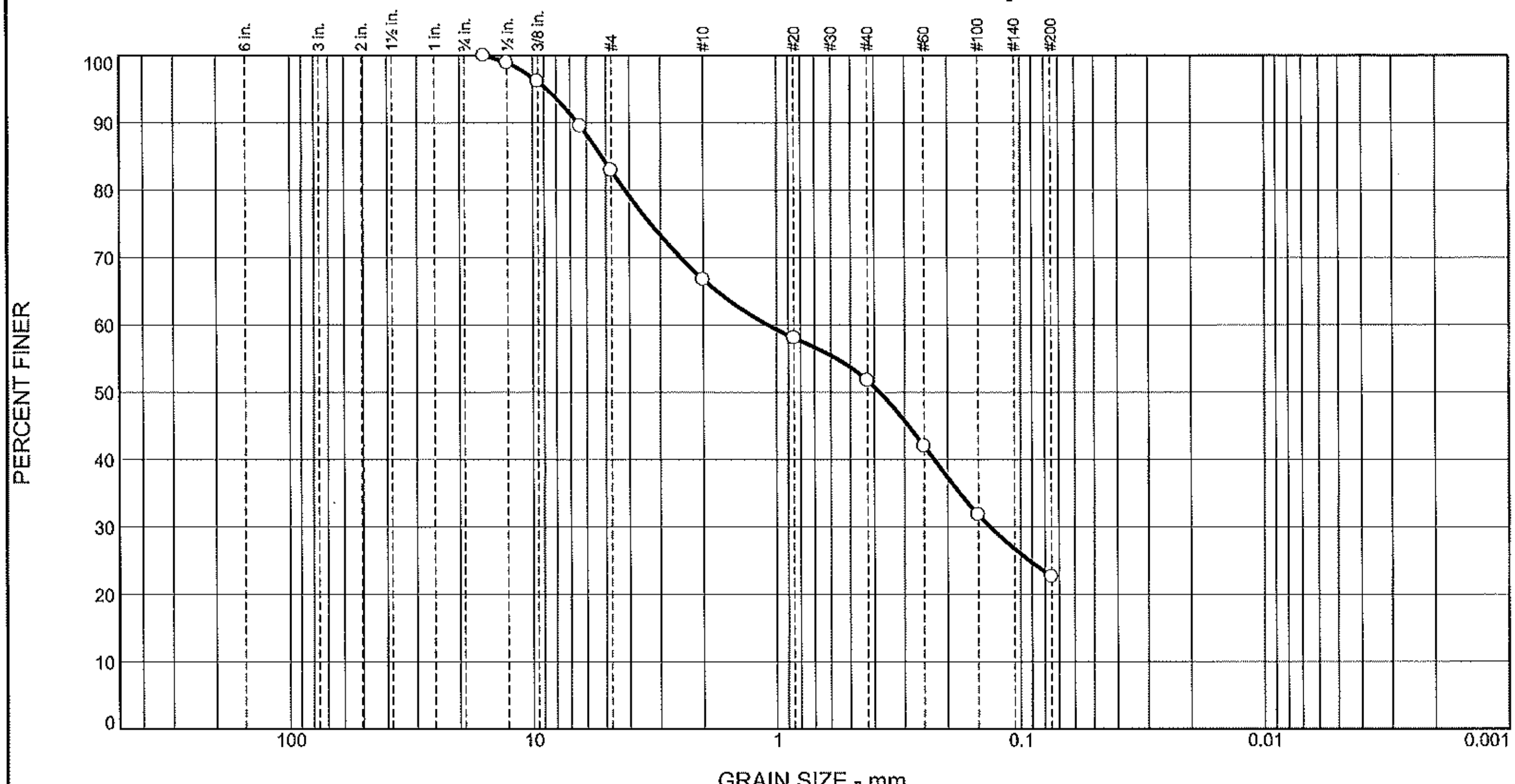
Date: 9/19/2016

Terracon Consultants, Inc.

Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS
Project No: 6-917-18096-0 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	17.1	16.2	15.0	29.1	22.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
5/8"	100.0		
1/2"	98.9		
3/8"	96.2		
1/4"	89.5		
#4	82.9		
#10	66.7		
#20	58.1		
#40	51.7		
#60	42.0		
#100	31.8		
#200	22.6		

* (no specification provided)

Material Description

Silty sand with gravel
As Received Moisture: 13.0%

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 6.4968 D_{85}= 5.1892 D_{60}= 1.0865
D_{50}= 0.3792 D_{30}= 0.1340 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

ASTM: C136, D1140, D2216
Sampled: 12/19/16
Sampled By: Kori B.

Location: B-16, S-1
Sample Number: 7244.1 **Depth:** 2.5' **Date:** 12/28/2016

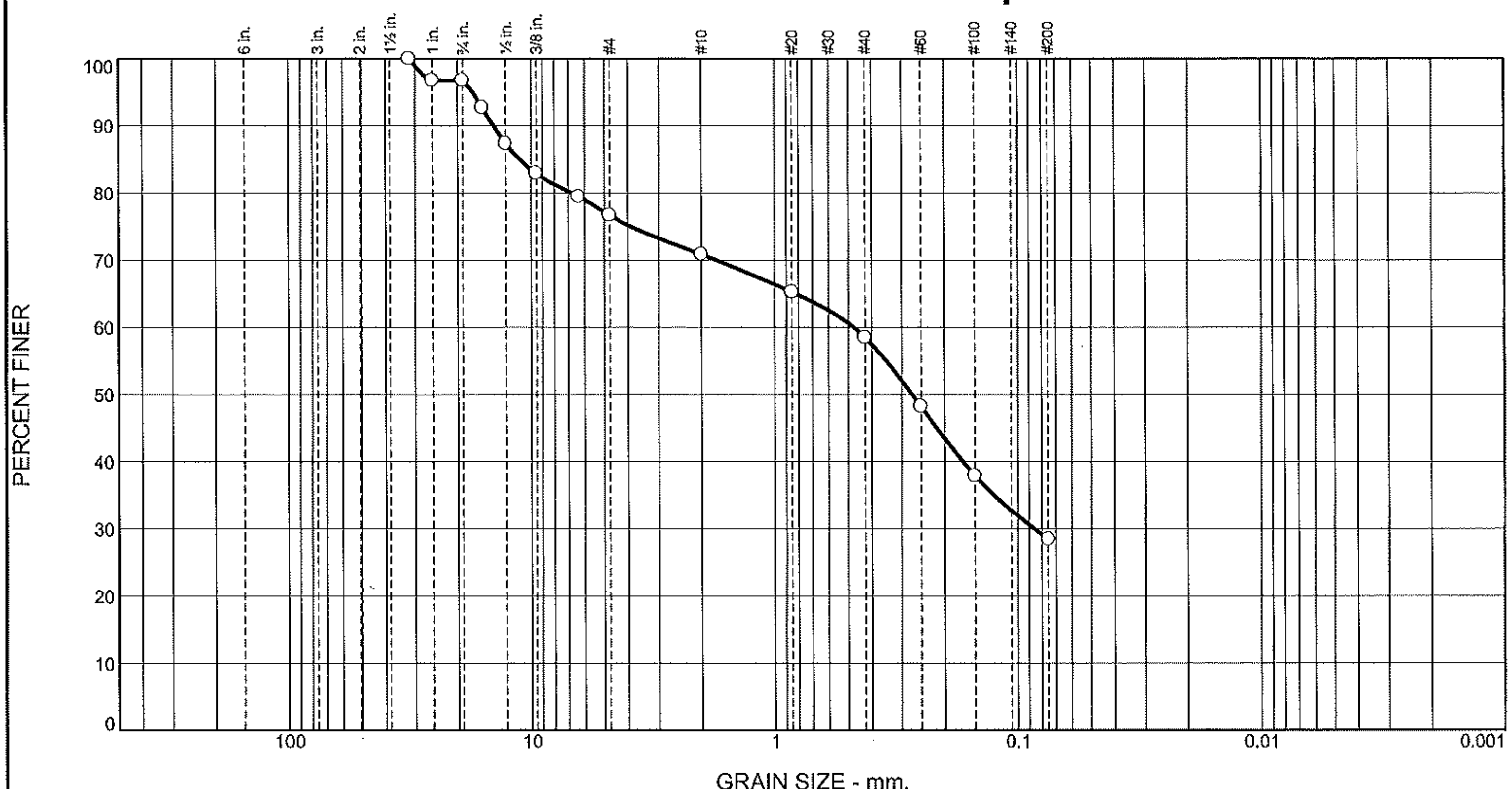
Terracon Consultants, Inc.

Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS
Project No: 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.2	20.1	5.9	12.3	30.1	28.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.25"	100.0		
1"	96.8		
3/4"	96.8		
5/8"	92.8		
1/2"	87.4		
3/8"	82.9		
1/4"	79.5		
#4	76.7		
#10	70.8		
#20	65.2		
#40	58.5		
#60	48.2		
#100	37.9		
#200	28.4		

* (no specification provided)

Material Description

Silty sand with gravel
As Received Moisture: 7.9%

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 14.2667 D_{85}= 11.1477 D_{60}= 0.4742
D_{50}= 0.2718 D_{30}= 0.0856 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

ASTM: C136, D1140, D2216
Sampled: 12/19/16
Sampled By: Kori B.

Location: B-17, S-2
Sample Number: 7244.2 **Depth:** 5" **Date:** 12/28/2016

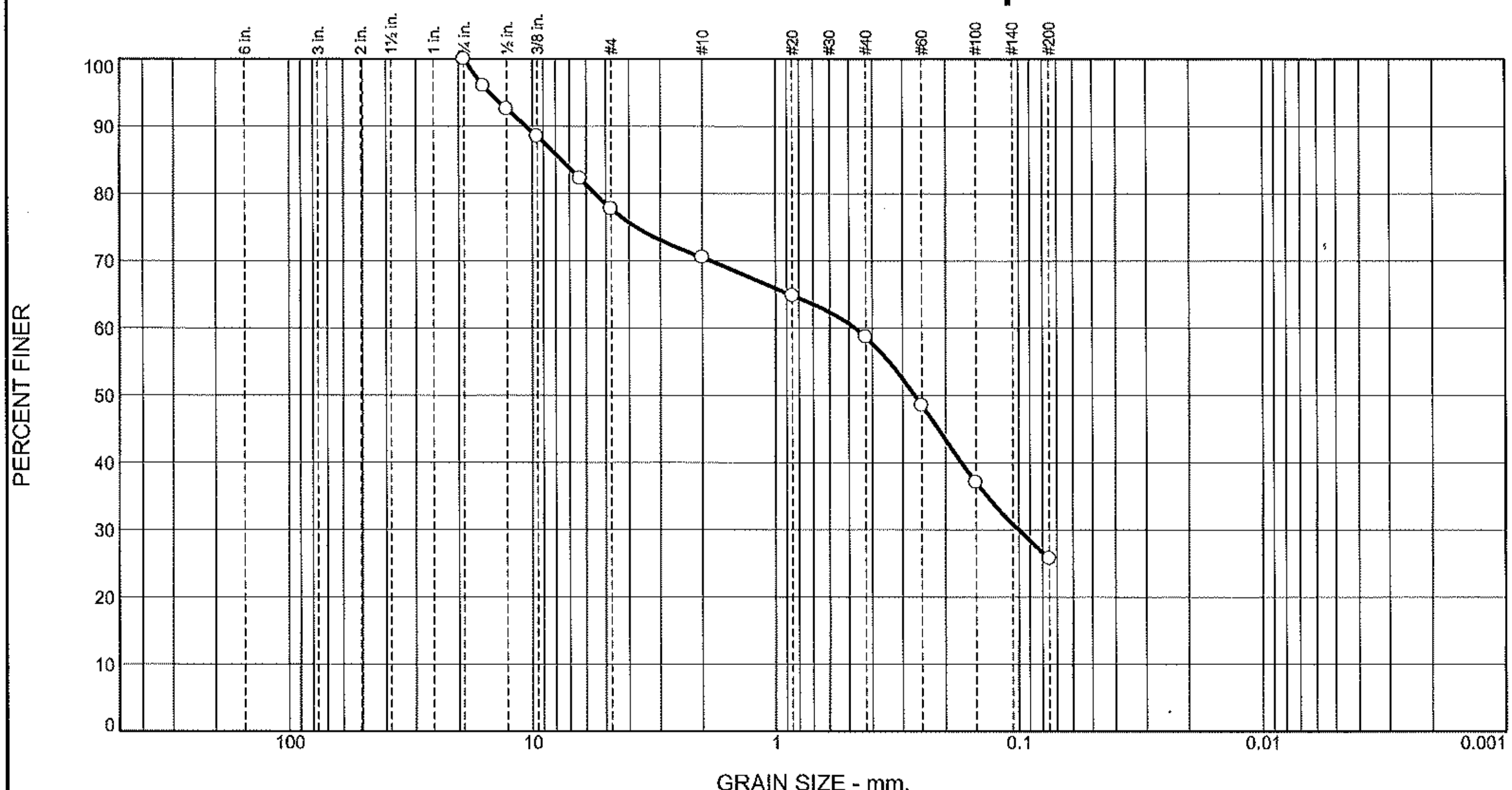
Terracon Consultants, Inc.

Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS
Project No: 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	22.3	7.2	11.8	33.0	25.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
5/8"	96.0		
1/2"	92.5		
3/8"	88.5		
1/4"	82.2		
#4	77.7		
#10	70.5		
#20	64.8		
#40	58.7		
#60	48.5		
#100	37.1		
#200	25.7		

* (no specification provided)

Material Description

Silty sand with gravel
As Received Moisture: 10.7%

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 10.5885 D_{85}= 7.5589 D_{60}= 0.4709
D_{50}= 0.2672 D_{30}= 0.1002 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

ASTM: C136, D1140, D2216
Sampled: 12/19/16
Sampled By: Kori B.

Location: B-19, S-2
Sample Number: 7244.3 **Depth:** 5' **Date:** 12/28/2016

Terracon Consultants, Inc.

Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS
Project No: 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.6	14.1	5.4	9.0	29.8	31.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	89.4		
5/8"	88.2		
1/2"	85.0		
3/8"	80.7		
1/4"	78.0		
#4	75.3		
#10	69.9		
#20	65.5		
#40	60.9		
#60	52.7		
#100	42.4		
#200	31.1		

* (no specification provided)

Material Description

Silty sand with gravel
As Received Moisture: 7.5%

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 19.6156 D_{85}= 12.7329 D_{60}= 0.3935
D_{50}= 0.2185 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

ASTM: C136, D1140, D2216
Sampled: 12/19/16
Sampled By: Kori B.

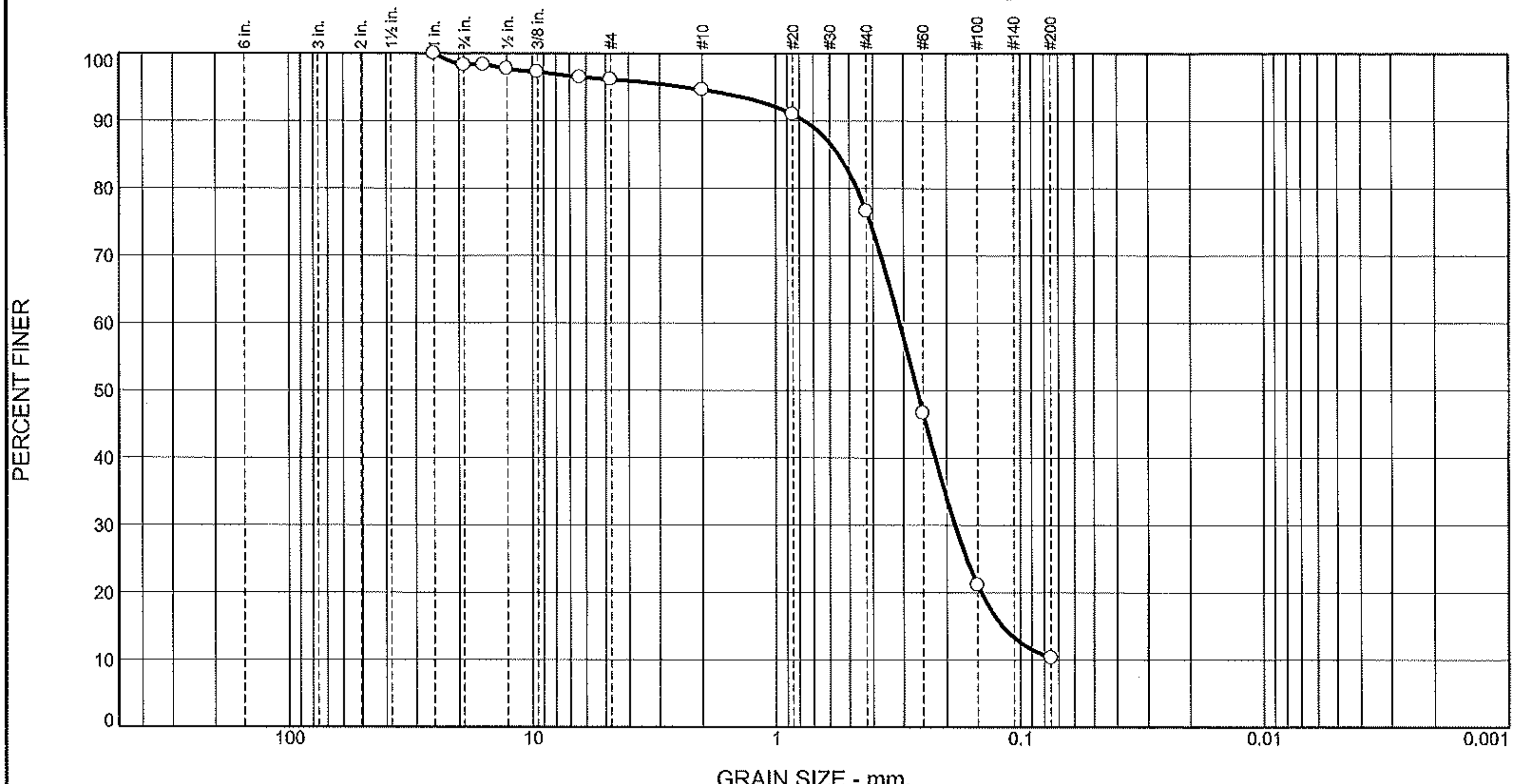
Location: B-21, S-3
Sample Number: 7244.4 **Depth:** 10' **Date:** 12/28/2016

Terracon Consultants, Inc.
Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS
Project No: 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.7	2.1	1.6	18.0	66.3	10.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	98.3		
5/8"	98.3		
1/2"	97.7		
3/8"	97.2		
1/4"	96.5		
#4	96.2		
#10	94.6		
#20	91.0		
#40	76.6		
#60	46.6		
#100	21.1		
#200	10.3		

* (no specification provided)

Material Description

Poorly graded sand with silt
As Received Moisture: 8.3%

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 0.7599 D_{85}= 0.5511 D_{60}= 0.3110
D_{50}= 0.2641 D_{30}= 0.1852 D_{15}= 0.1182
D_{10}= C_u= C_c=

Classification

USCS= SP-SM AASHTO= A-3

Remarks

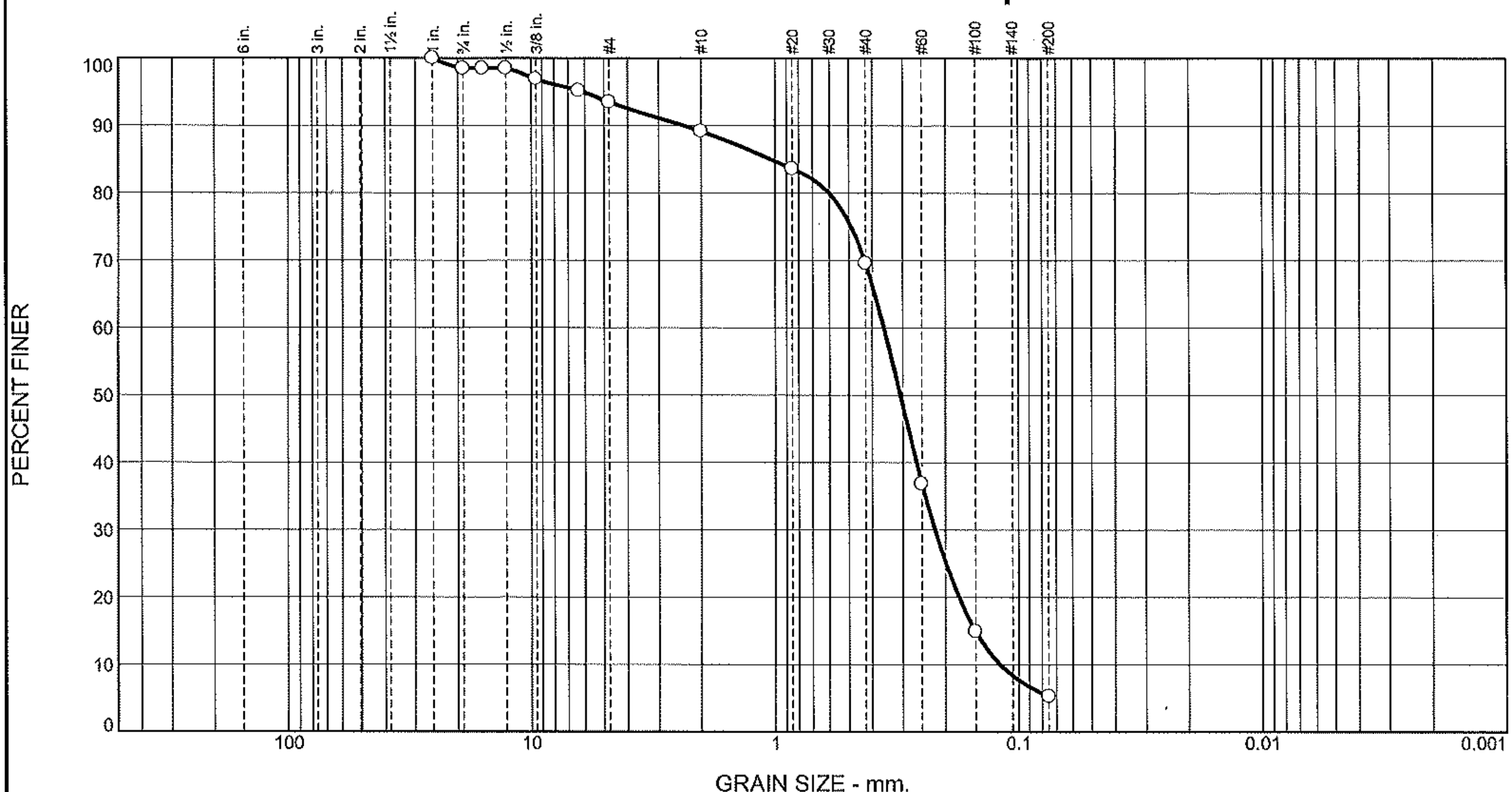
ASTM: C136, D1140, D2216
Sampled: 12/7/16
Sampled By: Kori B.

Location: OW-1 / S-3
Sample Number: 7240.1 **Depth:** 16' **Date:** 12/19/2016

Terracon Consultants, Inc. Mountlake Terrace, WA	**Client:** Central Kitsap School District **Project:** Central Kitsap HS/MS **Project No:** 6-917-18096-0 **Figure**

Tested By: Jeff W **Checked By:** Dave D

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.5	5.0	4.3	19.6	64.3	5.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	98.5		
5/8"	98.5		
1/2"	98.5		
3/8"	96.9		
1/4"	95.2		
#4	93.5		
#10	89.2		
#20	83.6		
#40	69.6		
#60	36.9		
#100	14.9		
#200	5.3		

* (no specification provided)

Material Description

Poorly graded sand with silt
As Received Moisture: 14.6%

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 2.3533 D_{85}= 1.0400 D_{60}= 0.3577
D_{50}= 0.3067 D_{30}= 0.2209 D_{15}= 0.1504
D_{10}= 0.1190 C_u= 3.01 C_c= 1.15

Classification

USCS= SP-SM AASHTO= A-3

Remarks

ASTM: C136, D1140, D2216
Sampled: 12/7/16
Sampled By: Kori B.

Location: OW-1 - S-6
Sample Number: 7240.2 **Depth:** 30' **Date:** 12/19/2016

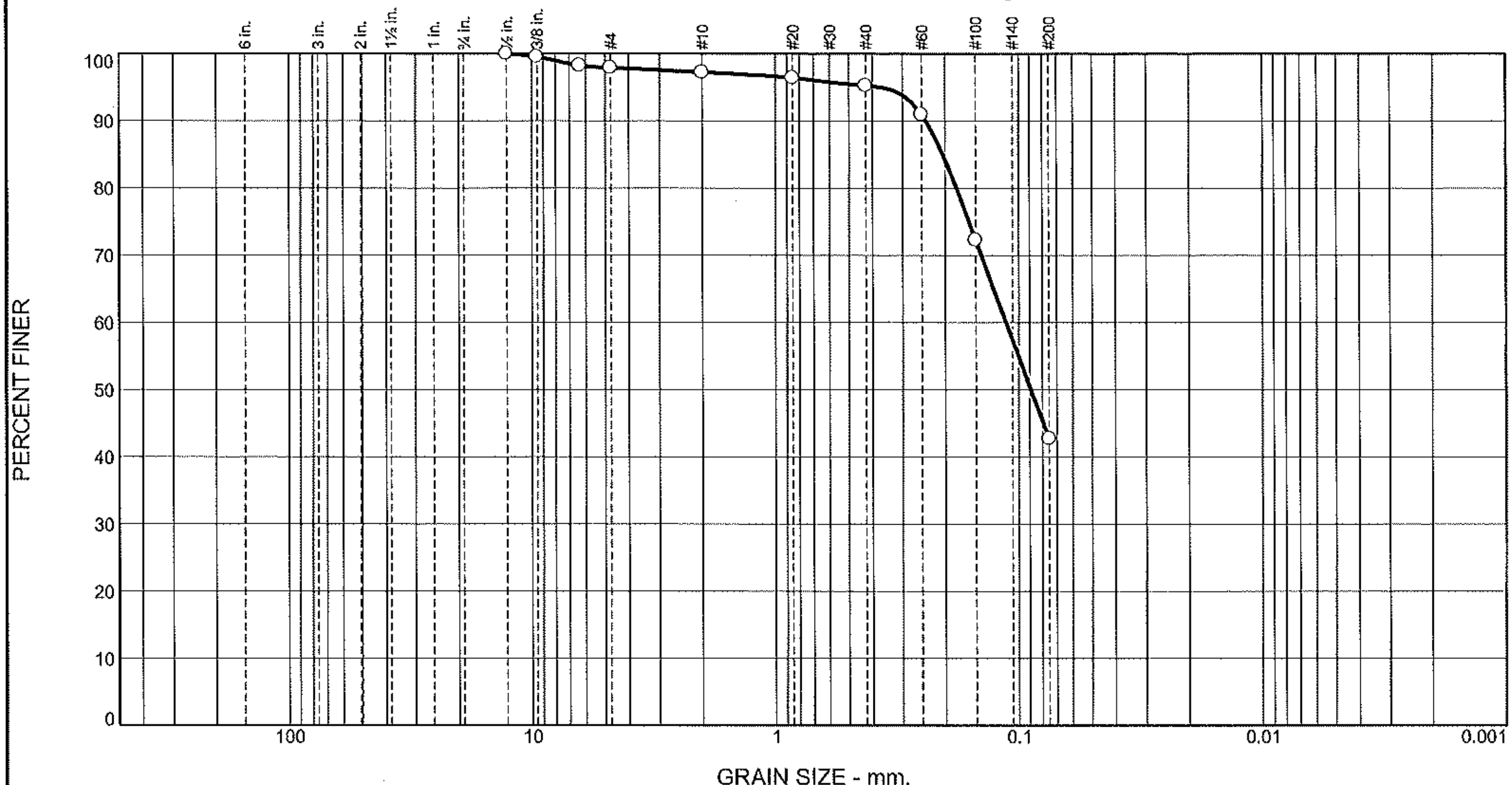
Terracon Consultants, Inc.

Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS
Project No: 6-917-18096-0 **Figure**

Tested By: Jeff W **Checked By:** Dave D

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.1	0.7	2.0	52.5	42.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	99.5		
1/4"	98.2		
#4	97.9		
#10	97.2		
#20	96.4		
#40	95.2		
#60	91.0		
#100	72.3		
#200	42.7		

* (no specification provided)

Material Description

Silty sand
As Received Moisture: 12.4%

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.2404 D_{85}= 0.2047 D_{60}= 0.1127
D_{50}= 0.0891 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

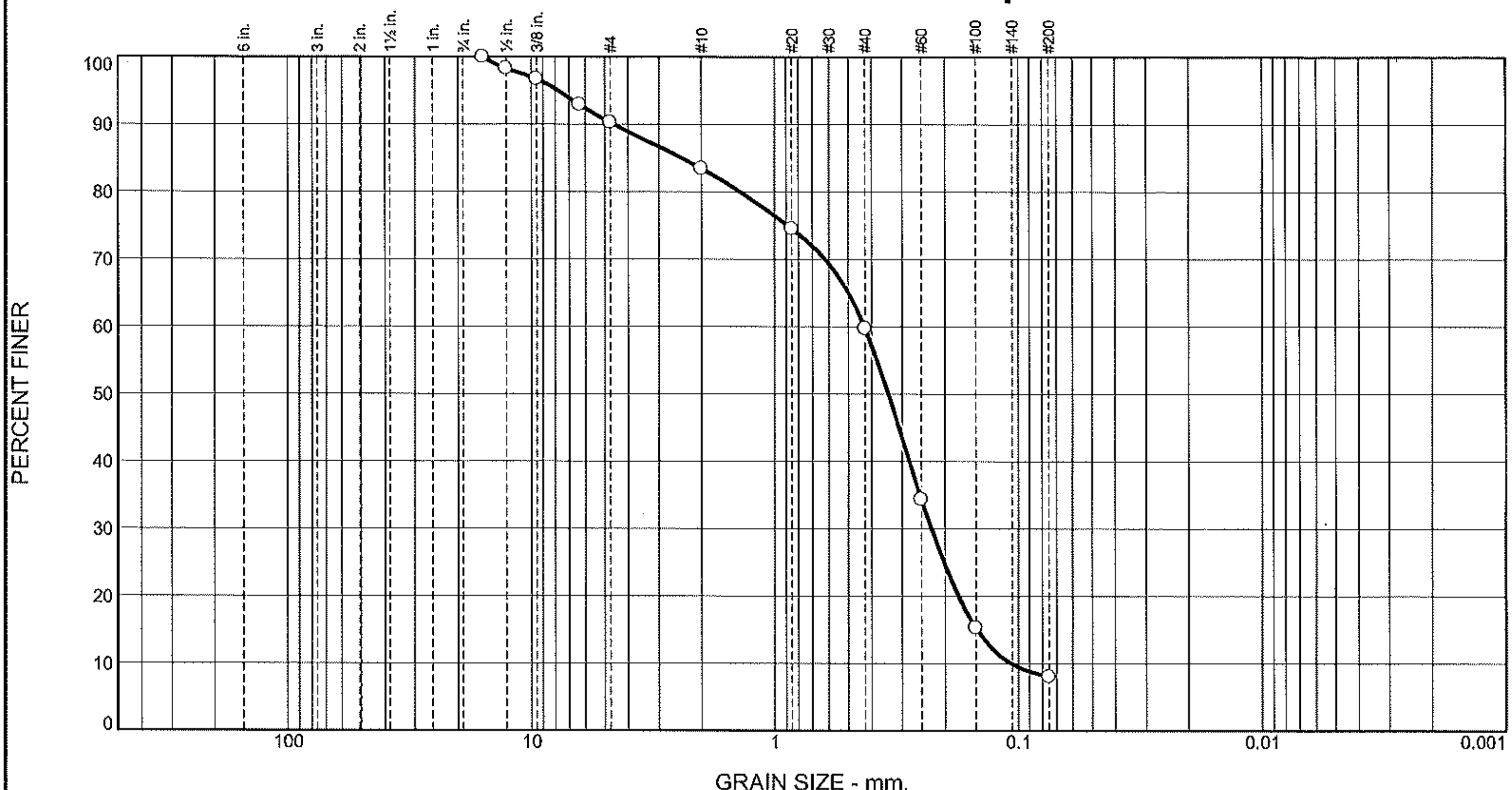
ASTM: C136, D1140, D2216
Sampled: 12/7/16
Sampled By: Kori B.

Location: OW-2 / S-2B
Sample Number: 7240.3 **Depth:** 11' **Date:** 12/19/2016

Terracon Consultants, Inc. Mountlake Terrace, WA	**Client:** Central Kitsap School District **Project:** Central Kitsap HS/MS **Project No:** 6-917-18096-0 **Figure**

Tested By: Jeff W **Checked By:** Dave D

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.7	6.9	23.7	51.6	8.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
5/8"	100.0		
1/2"	98.3		
3/8"	96.8		
1/4"	92.9		
#4	90.3		
#10	83.4		
#20	74.5		
#40	59.7		
#60	34.4		
#100	15.3		
#200	8.1		

* (no specification provided)

Material Description

Poorly graded sand with silt
As Received Moisture: 12.5%

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 4.5965 D_{85}= 2.4125 D_{60}= 0.4280
D_{50}= 0.3414 D_{30}= 0.2276 D_{15}= 0.1479
D_{10}= 0.1070 C_u= 4.00 C_c= 1.13

Classification

USCS= SP-SM AASHTO= A-3

Remarks

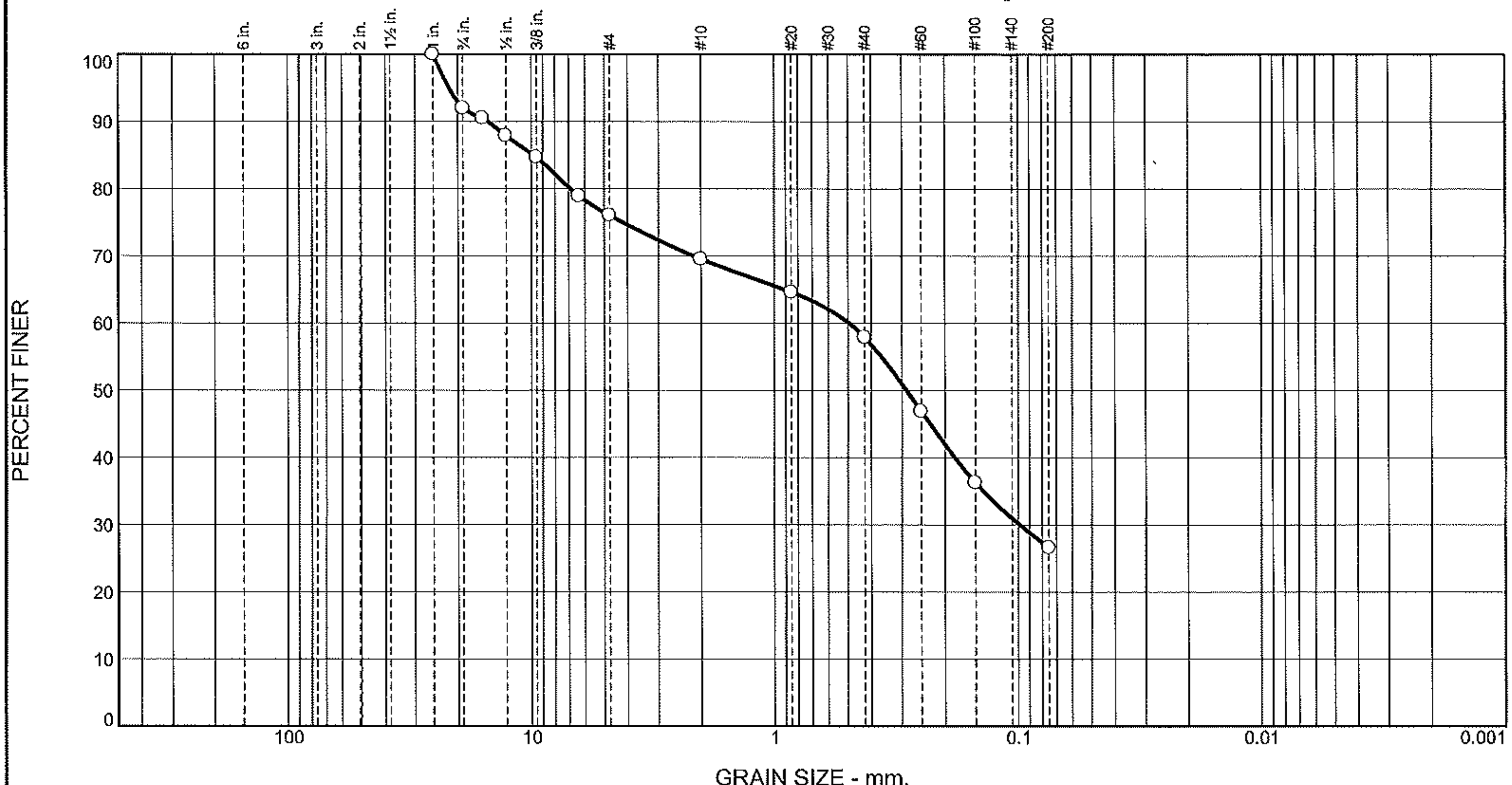
ASTM: C136, D1140, D2216
Sampled: 12/7/16
Sampled By: Kori B.

Location: OW-2 / S-3
Sample Number: 7240.4 **Depth:** 15' **Date:** 12/19/2016

Terracon Consultants, Inc. **Mountlake Terrace, WA**	**Client:** Central Kitsap School District **Project:** Central Kitsap HS/MS **Project No:** 6-917-18096-0 **Figure**

Tested By: Jeff W **Checked By:** Dave D

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.0	15.9	6.6	11.6	31.3	26.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	92.0		
5/8"	90.5		
1/2"	87.9		
3/8"	84.7		
1/4"	78.9		
#4	76.1		
#10	69.5		
#20	64.6		
#40	57.9		
#60	46.9		
#100	36.3		
#200	26.6		

* (no specification provided)

Material Description

Silty sand with gravel
As Received Moisture: 7.4%

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 15.0401 D_{85}= 9.7663 D_{60}= 0.4928
D_{50}= 0.2869 D_{30}= 0.0987 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

ASTM: C136, D1140, D2216
Sampled: 12/7/16
Sampled By: Kori B.

Location: OW-3 / S-2
Sample Number: 7240.5 **Depth:** 10' **Date:** 12/19/2016

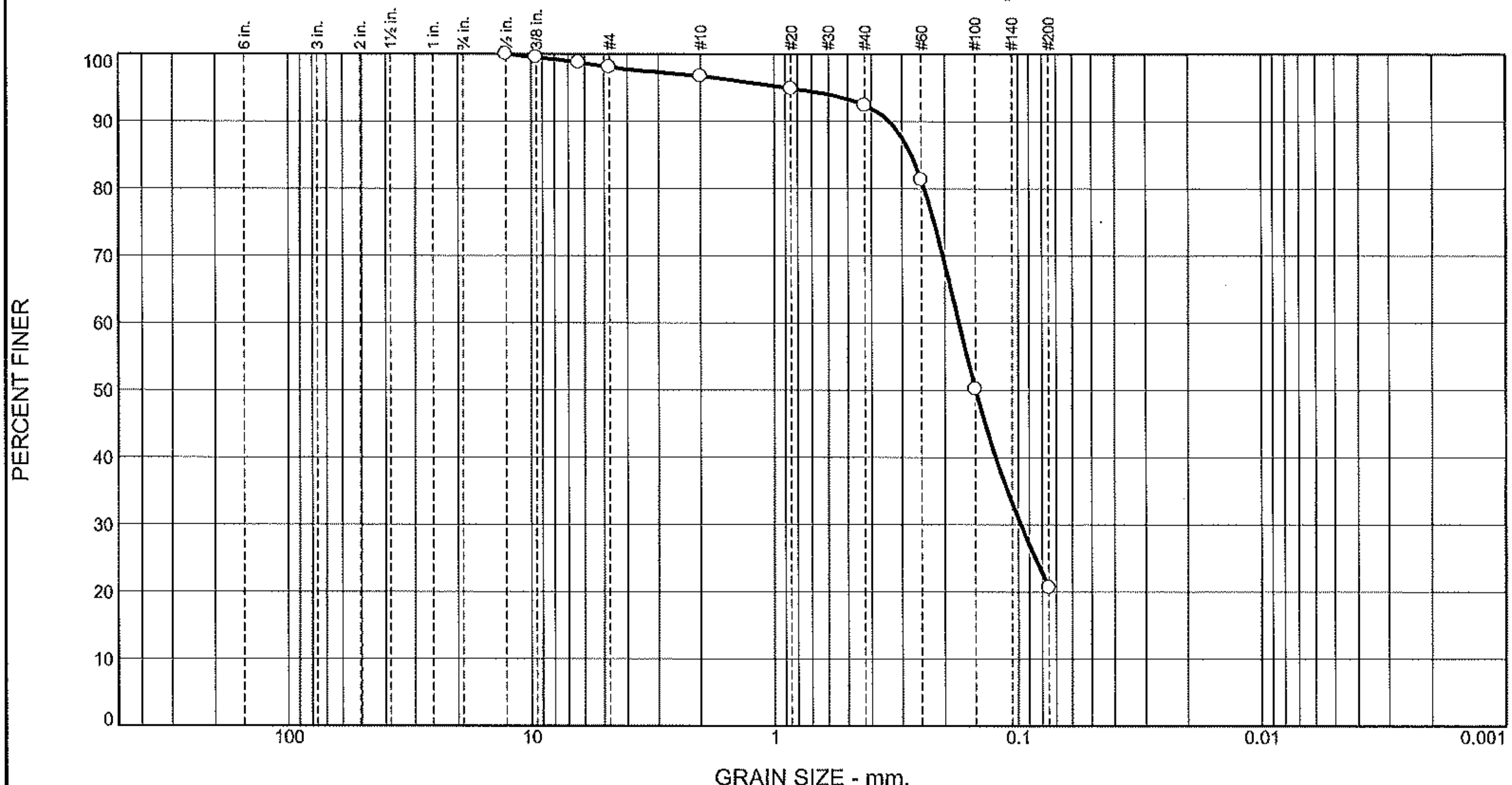
Terracon Consultants, Inc.

Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS
Project No: 6-917-18096-0 **Figure**

Tested By: Jeff W **Checked By:** Dave D

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.9	1.4	4.3	71.7	20.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	99.5		
1/4"	98.8		
#4	98.1		
#10	96.7		
#20	94.9		
#40	92.4		
#60	81.4		
#100	50.2		
#200	20.7		

* (no specification provided)

Material Description

Silty sand
As Received Moisture: 7.5%

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 0.3373 D_{85}= 0.2743 D_{60}= 0.1749
D_{50}= 0.1495 D_{30}= 0.0976 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

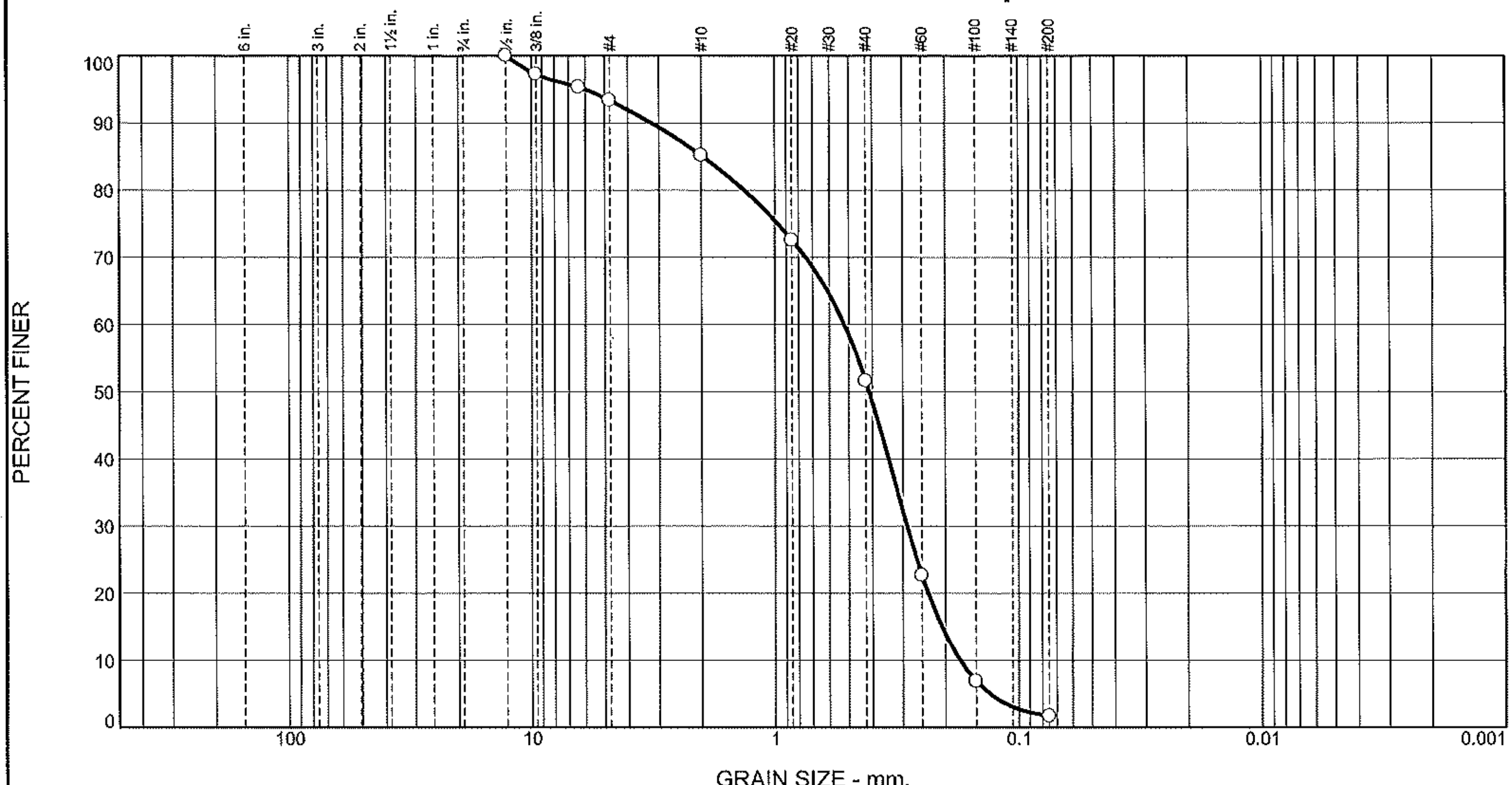
ASTM: C136, D1140, D2216
Sampled: 12/7/16
Sampled By: Kori B.

Location: OW-3 / S-4
Sample Number: 7240.6 **Depth:** 20' **Date:** 12/19/2016

Terracon Consultants, Inc.	**Client:** Central Kitsap School District
	Project: Central Kitsap HS/MS
Mountlake Terrace, WA	**Project No:** 6-917-18096-0 **Figure**

Tested By: Jeff W **Checked By:** Dave D

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.6	8.2	33.6	49.9	1.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	97.3		
1/4"	95.3		
#4	93.4		
#10	85.2		
#20	72.6		
#40	51.6		
#60	22.7		
#100	6.9		
#200	1.7		

* (no specification provided)

Material Description

Poorly graded sand
As Received Moisture: 4.7%

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 3.2043 D_{85}= 1.9723 D_{60}= 0.5197
D_{50}= 0.4114 D_{30}= 0.2880 D_{15}= 0.2070
D_{10}= 0.1742 C_u= 2.98 C_c= 0.92

Classification

USCS= SP AASHTO= A-3

Remarks

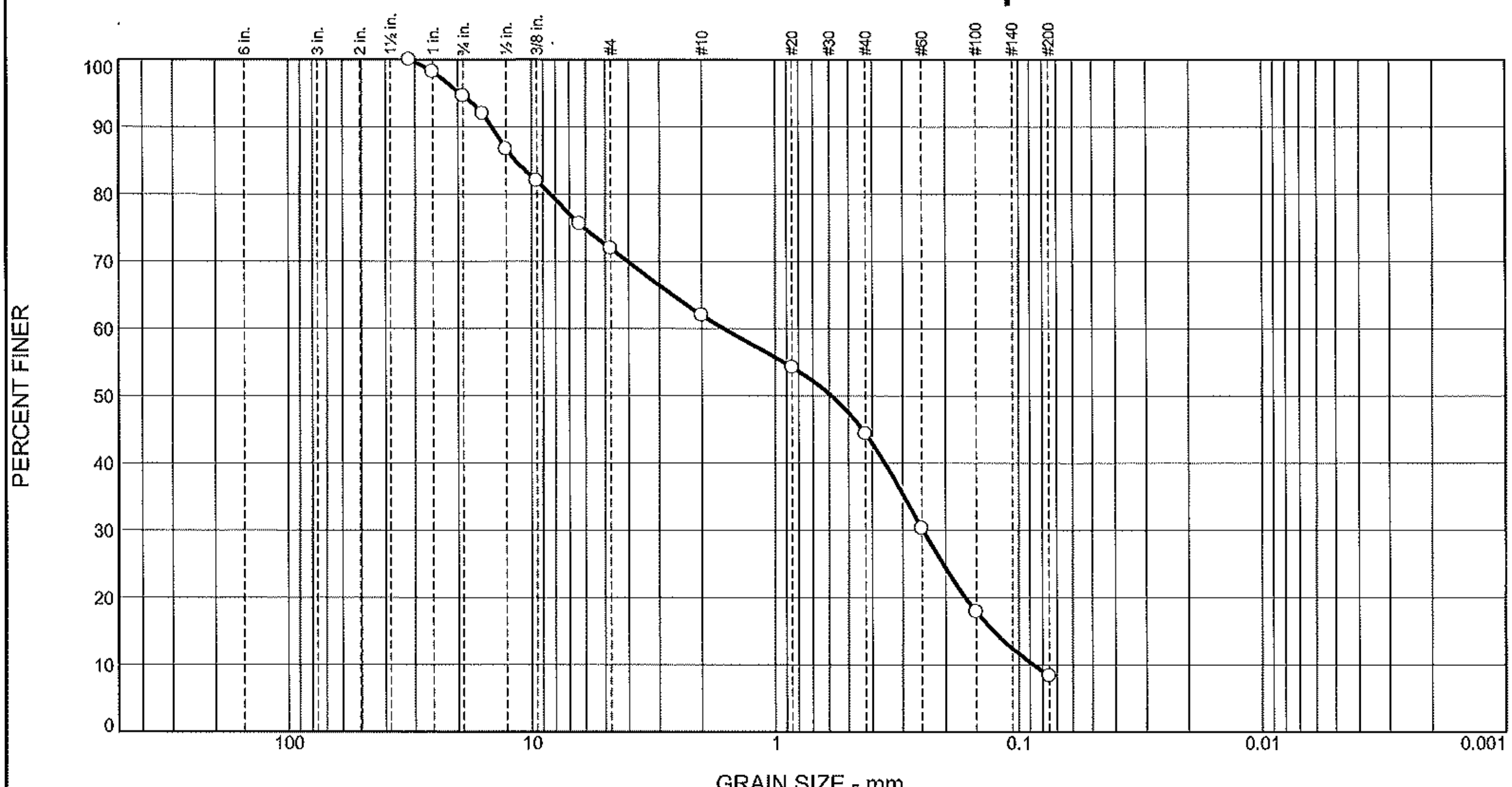
ASTM: C136, D1140, D2216
Sampled: 12/29/16
Sampled By: Konrad M.

Location: IT-1, G-1
Sample Number: 7248.1 **Depth:** 7' **Date:** 1/9/2017

Terracon Consultants, Inc.	**Client:** Central Kitsap School District
	Project: Central Kitsap HS/MS
Mountlake Terrace, WA	**Project No:** 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.4	22.7	9.9	17.6	36.0	8.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.25"	100.0		
1"	98.2		
3/4"	94.6		
5/8"	92.0		
1/2"	86.7		
3/8"	82.0		
1/4"	75.6		
#4	71.9		
#10	62.0		
#20	54.2		
#40	44.4		
#60	30.3		
#100	17.9		
#200	8.4		

* (no specification provided)

Material Description

Poorly graded sand with silt and gravel
As Received Moisture: 5.6%

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 14.5441 D_{85}= 11.6485 D_{60}= 1.6266
D_{50}= 0.5853 D_{30}= 0.2474 D_{15}= 0.1270
D_{10}= 0.0869 C_u= 18.73 C_c= 0.43

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

ASTM: C136, D1140, D2216
Sampled: 1/3/17
Sampled By: Konrad M.

Location: IT-1, G-3
Sample Number: 7250.1 **Depth:** 11.5' **Date:** 1/9/2017

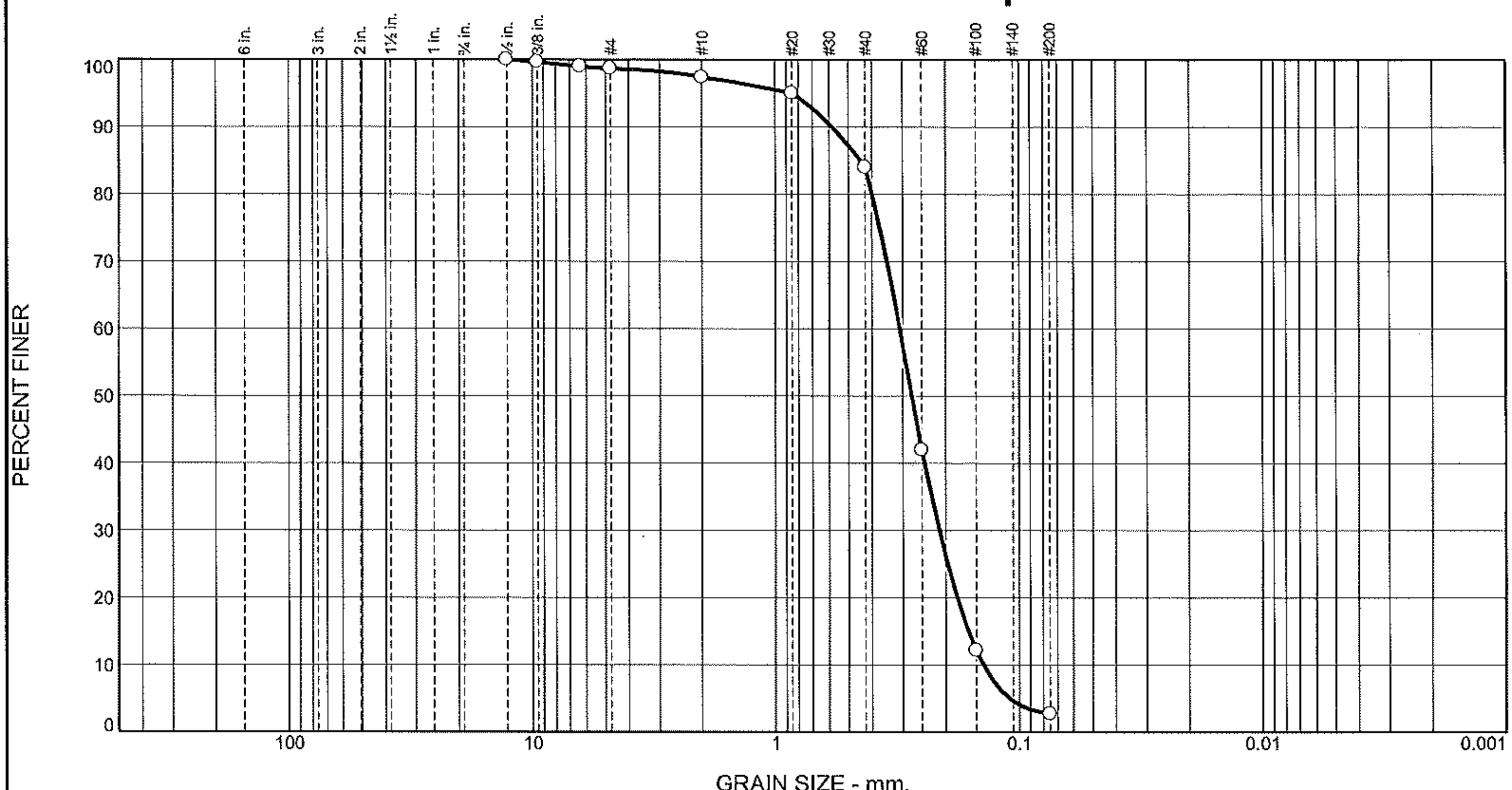
Terracon Consultants, Inc.

Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS
Project No: 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.3	1.3	13.4	81.2	2.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	99.7		
1/4"	99.0		
#4	98.7		
#10	97.4		
#20	95.0		
#40	84.0		
#60	42.0		
#100	12.2		
#200	2.8		

* (no specification provided)

Material Description

Poorly graded sand
As Received Moisture: 5.1%

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.5817 D_{85}= 0.4453 D_{60}= 0.3088
D_{50}= 0.2752 D_{30}= 0.2124 D_{15}= 0.1613
D_{10}= 0.1401 C_u= 2.20 C_c= 1.04

Classification

USCS= SP AASHTO= A-3

Remarks

ASTM: C136, D1140, D2216
Sampled: 12/29/16
Sampled By: Konrad M.

Location: IT-2, G-1
Sample Number: 7248.2 **Depth:** 9' **Date:** 1/9/2017

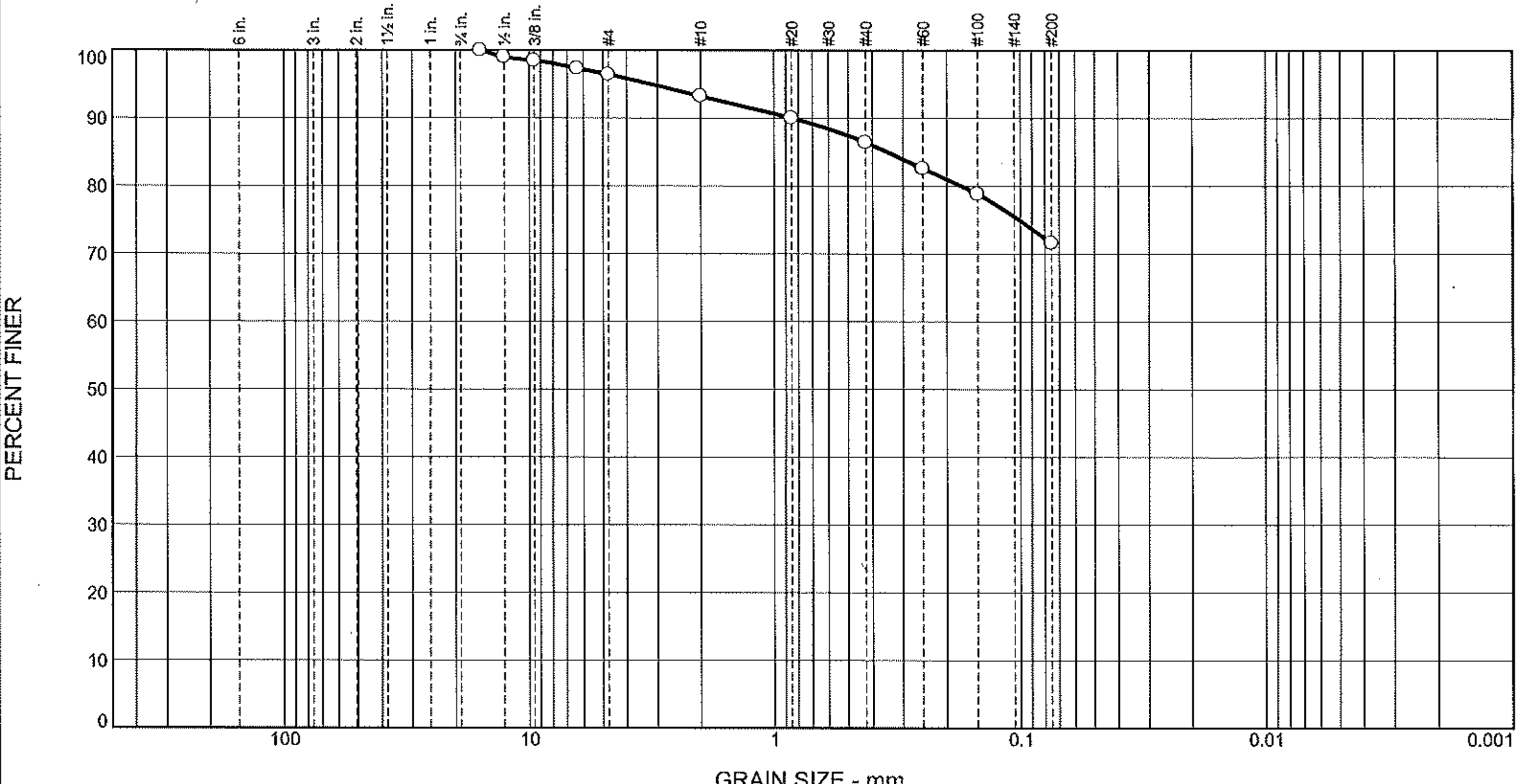
Terracon Consultants, Inc.

Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS
Project No: 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.6	3.2	6.8	14.8	71.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
5/8"	100.0		
1/2"	99.0		
3/8"	98.5		
1/4"	97.3		
#4	96.4		
#10	93.2		
#20	90.0		
#40	86.4		
#60	82.6		
#100	78.8		
#200	71.6		

* (no specification provided)

Material Description

Silt with sand
As Received Moisture: 18.1%

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 0.8500 D_{85}= 0.3468 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

ASTM: C136, D1140, D2216
Sampled: 1/3/17
Sampled By: Konrad M.

Location: IT-2, G-3
Sample Number: 7250.2 **Depth:** 12.5' **Date:** 1/9/2017

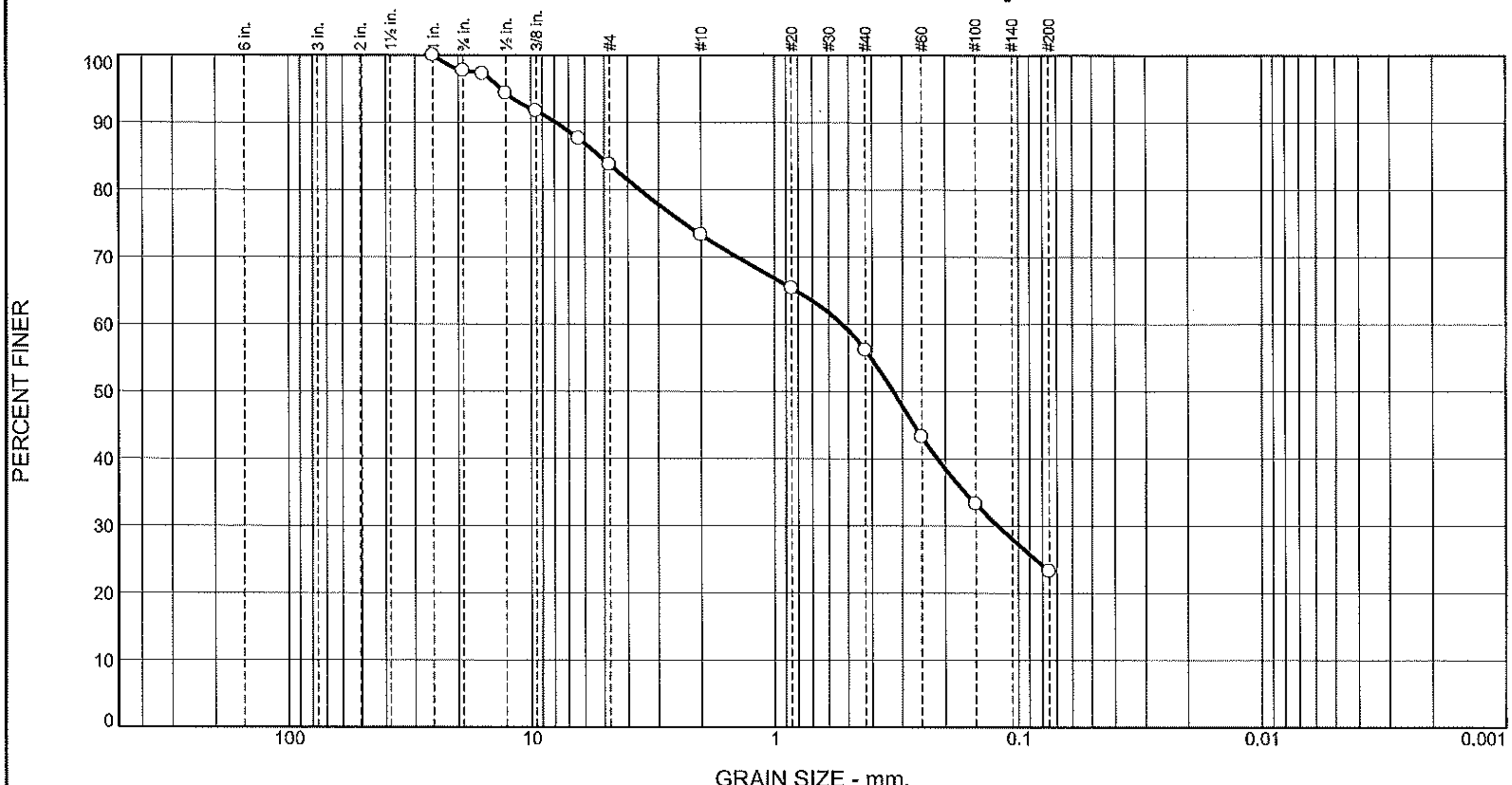
Terracon Consultants, Inc.

Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS
Project No: 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.3	14.0	10.4	17.1	32.9	23.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	97.7		
5/8"	97.3		
1/2"	94.3		
3/8"	91.7		
1/4"	87.6		
#4	83.7		
#10	73.3		
#20	65.4		
#40	56.2		
#60	43.3		
#100	33.3		
#200	23.3		

* (no specification provided)

Material Description

Silty sand with gravel
As Received Moisture: 9.1%

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 7.8644 D_{85}= 5.2095 D_{60}= 0.5290
D_{50}= 0.3272 D_{30}= 0.1215 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

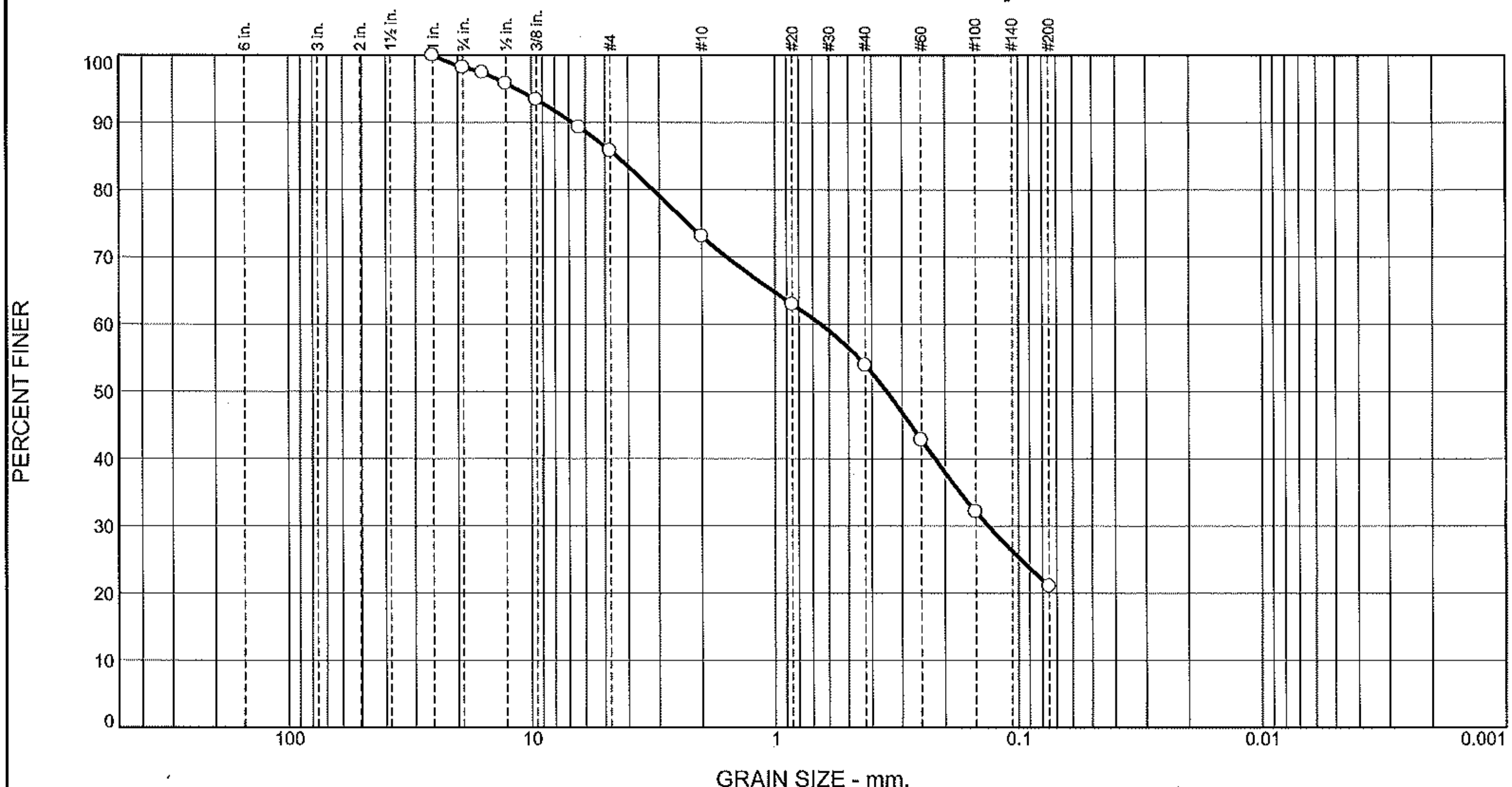
ASTM: C136, D1140, D2216
Sampled: 12/29/16
Sampled By: Konrad M.

Location: IT-3, G-1
Sample Number: 7248.3 **Depth:** 9' **Date:** 1/9/2017

Terracon Consultants, Inc.	**Client:** Central Kitsap School District
	Project: Central Kitsap HS/MS
Mountlake Terrace, WA	**Project No:** 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.8	12.4	12.7	19.2	32.8	21.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	98.2		
5/8"	97.4		
1/2"	95.8		
3/8"	93.4		
1/4"	89.3		
#4	85.8		
#10	73.1		
#20	63.0		
#40	53.9		
#60	42.8		
#100	32.1		
#200	21.1		

* (no specification provided)

Material Description

Silty sand
As Received Moisture: 9.6%

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 6.7671 D_{85}= 4.4703 D_{60}= 0.6502
D_{50}= 0.3470 D_{30}= 0.1332 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

ASTM: C136, D1140, D2216
Sampled: 1/3/17
Sampled By: Konrad M.

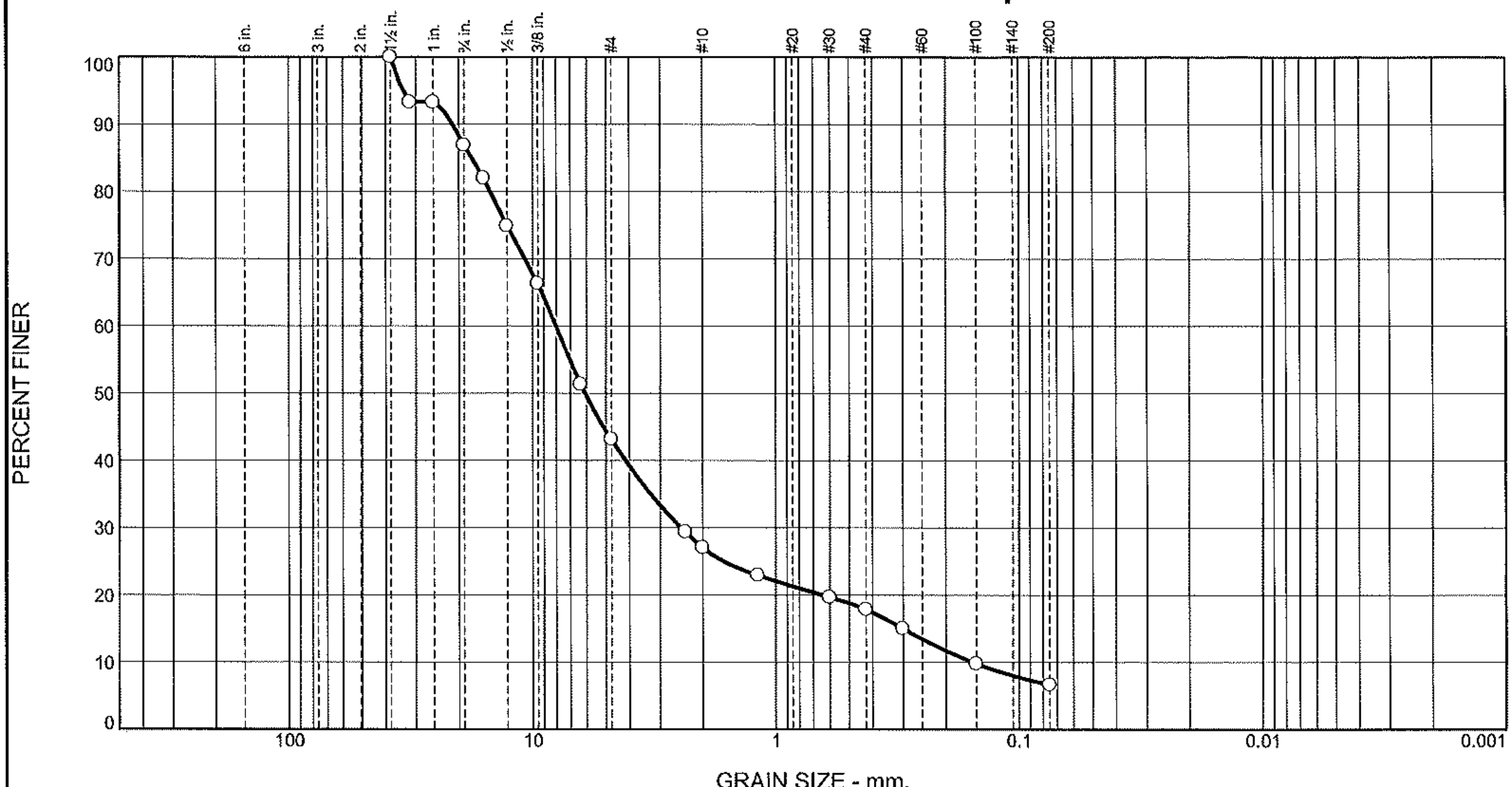
Location: IT-3, G-2
Sample Number: 7250.3 **Depth:** 11.25' **Date:** 1/9/2017

Terracon Consultants, Inc.
Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS
Project No: 6-917-18096-0 **Figure**

Tested By: Ryan G **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.1	43.8	16.1	9.1	11.3	6.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1.25"	93.3		
1"	93.3		
3/4"	86.9		
5/8"	82.0		
1/2"	74.8		
3/8"	66.3		
1/4	51.3		
#4	43.1		
#8	29.4		
#10	27.0		
#16	22.9		
#30	19.7		
#40	17.9		
#50	15.0		
#100	9.8		
#200	6.6		

* (no specification provided)

Material Description

Poorly graded gravel with silt and sand
As Received Moisture: 5.9%

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 21.2355 D_{85}= 17.7658 D_{60}= 8.0122
D_{50}= 6.0980 D_{30}= 2.4585 D_{15}= 0.2994
D_{10}= 0.1551 C_u= 51.67 C_c= 4.87

Classification

USCS= GP-GM AASHTO= A-1-a

Remarks

ASTM: C136, D1140, D2216
Sampled: 2/21/17
Sampled by: Konrad M.

Location: IT-4, G-4
Sample Number: 9919 **Depth:** 9-10' **Date:** 3/1/2017

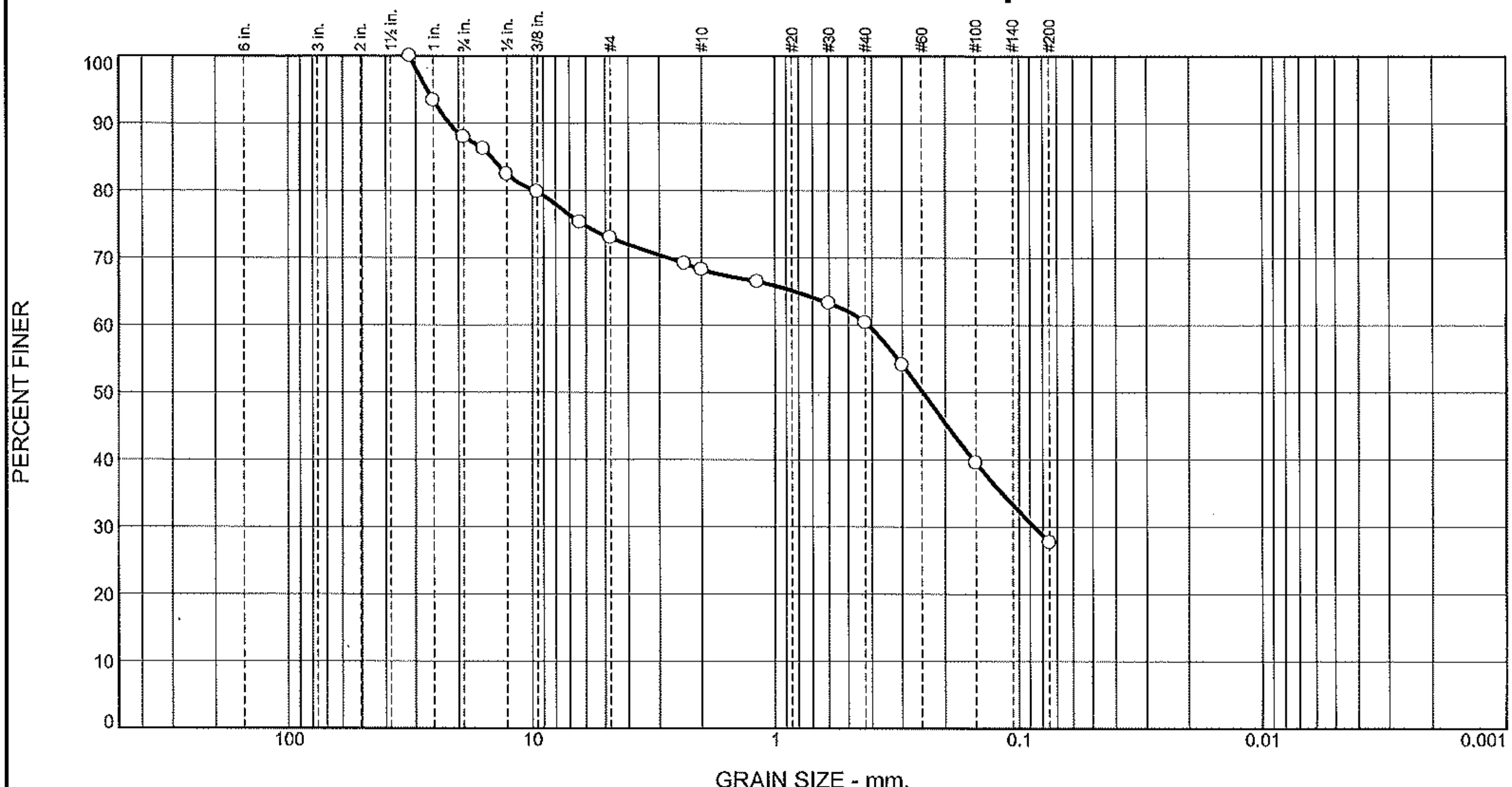
Terracon Consultants, Inc.

Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS
Project No: 6-917-18096-0 **Figure**

Tested By: Kinsey B **Checked By:** Jeff W

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.1	14.9	4.7	7.9	32.7	27.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.25"	100.0		
1"	93.4		
3/4"	87.9		
5/8"	86.2		
1/2"	82.4		
3/8"	79.8		
1/4	75.3		
#4	73.0		
#8	69.2		
#10	68.3		
#16	66.5		
#30	63.3		
#40	60.4		
#50	54.1		
#100	39.5		
#200	27.7		

* (no specification provided)

Material Description

Silty sand with gravel
As Received Moisture: 10.5%

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 21.8880 D_{85}= 14.7151 D_{60}= 0.4137
D_{50}= 0.2472 D_{30}= 0.0866 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

ASTM: C136, D1140, D2216
Sampled: 2/21/17
Sampled by: Konrad M.

Location: IT-4, G-7
Sample Number: 9920 **Depth:** 13-14' **Date:** 3/1/2017

Terracon Consultants, Inc.

Mountlake Terrace, WA

Client: Central Kitsap School District
Project: Central Kitsap HS/MS
Project No: 6-917-18096-0 **Figure**

Tested By: Kinsey B **Checked By:** Jeff W

MOISTURE CONTENT AND MINUS 200 WASH
ASTM: D2216 D1140

Job Name: Central Kitsap HS/MS	Client: Central Kitsap School District
Job Number: 6-917-18096-0	Sample Date: 8/31/2016
Date: 9/14/2016	Sampled By: Frank C. & Konrad M.

Exploration:	B-1	B-2	B-2	B-3	B-5	B-5	B-6	B-6	B-7	B-7
Sample Number:	S-2	S-1	S-2	S-2	S-1	S-2	S-1	S-2	S-1	S-2
Depth:	5-6.5	2.5-4	5-6.5	5-6.5	2.5-4	5-6.5	2.5-4	5-6.5	2.5-4	5-6.5
% Moisture	7.6%	7.6%	9.0%	8.6%	6.2%	5.8%	6.1%	7.5%	3.0%	4.7%
% -200 Wash	N/A	27.65%	N/A	N/A	17.10%	N/A	N/A	29.09%	N/A	21.80%

Exploration:	B-10	B-11	B-12	B-12	B-13	B-13	B-14	B-14	B-15	B-15
Sample Number:	S-2	S-1	S-1	S-2	S-1	S-2	S1	S-2	S-3	S-4B
Depth:	5-6.5	2.5-4	2.5-4	5-6.5	2.5-4	5-6.5	2.5-4	5-6.5	10-11.5	15-16.5
% Moisture	3.2%	4.5%	10.1%	9.2%	6.6%	8.5%	6.0%	7.2%	3.3%	14.1%
% -200 Wash	13.59%	N/A	23.02%	N/A	17.69%	N/A	24.94%	N/A	N/A	N/A

Exploration:	B-15	HB-3	HB-4	HB-5
Sample Number:	S-5	G-3	G-3	G-2
Depth:	20-21.5	2-4.0	2.5-3	2-3.0
% Moisture	18.7%	5.2%	13.0%	7.4%
% -200 Wash	13.97%	N/A	17.95%	N/A

Tested By: Jeff W.
Reveiwed By: Dave D.
Respectfully submitted,

By: Jeff Ward

Terracon
Consulting Engineers & Scientists

MOISTURE CONTENT AND MINUS 200 WASH
ASTM: D2216 D1140

Job Name: Central Kitsap HS/MS	Client: Central Kitsap School District
Job Number: 6-917-18096	Sample Date: 12/7/2016
Date: 12/19/2016	Sampled By: Kori B.

Exploration:	OW-1	OW-1	OW-2	OW-2	OW-3	OW-3
Sample Number:	S-4	S-5	S-2B	S-4	S-5A	S-6
Depth:	20'	25'	11.5'	20'	25'	30'
% Moisture	18.7%	19.2%	18.2%	17.4%	10.3%	9.8%
% -200 Wash	N/A	N/A	N/A	N/A	N/A	23.14%

Tested By: Jeff W.
Reveiwed By: Dave D.
Respectfully submitted,

By: Jeff Ward

Terracon
Consulting Engineers & Scientists

MOISTURE CONTENT AND MINUS 200 WASH
ASTM: D2216 D1140

Job Name: Central Kitsap High School/Middle School	Client: Central Kitsap School District
Job Number: 6-917-18096-0	Sample Date: 1/3/2017
Date: 1/9/2017	Sampled By: Konrad M.

Exploration:	IT-1
Sample Number:	G-2
Depth:	9.5'
% Moisture	9.6%
% -200 Wash	17.96%

Tested By: Jeff W.
Reveiwed By: Dave D.
Respectfully submitted,

By: Jeff Ward

Terracon
Consulting Engineers & Scientists

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664
www.amtestlab.com

AMTEST LABORATORIES

Professional Analytical Services

ANALYSIS REPORT

AMEC FOSTER WHEELER
11810 NORTH CREEK PKWY N
BOTHELL, WA 98011
Attention: KONRAD MOELLER/TODD WENTWORTH
Project Name: CENTRAL KITSAP HS/MS
All results reported on an as received basis.

Date Received: 01/06/17
Date Reported: 1/13/17

AMTEST Identification Number **17-A000151**
Client Identification **IT-1**
Sampling Date

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Cation Exchange Capacity	2.6	meq/100g		0.5	SW-846 9081	AY	01/12/17
Organic Matter	0.7	%		0.1	ASTM D 2974	SW	01/10/17

AMTEST Identification Number **17-A000152**
Client Identification **IT-2**
Sampling Date

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Cation Exchange Capacity	1.9	meq/100g		0.5	SW-846 9081	AY	01/12/17
Organic Matter	0.5	%		0.1	ASTM D 2974	SW	01/10/17

AMTEST Identification Number **17-A000153**
Client Identification **IT-3**
Sampling Date

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Cation Exchange Capacity	6.7	meq/100g		0.5	SW-846 9081	AY	01/12/17
Organic Matter	1.1	%		0.1	ASTM D 2974	SW	01/10/17

Aaron W. Young
Laboratory Manager

Am Test Inc.
13600 NE 126th PL
Suite C
Kirkland, WA, 98034
(425) 885-1664
www.amtestlab.com

AMTEST LABORATORIES

Professional Analytical Services

QC Summary for sample numbers: 17-A000151 to 17-A000153

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
17-A000153	Organic Matter	%	1.1	1.5	31.

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Cation Exchange Capacity	meq/100g	4.0	4.0	100. %

BLANKS

ANALYTE	UNITS	RESULT
Cation Exchange Capacity	meq/100g	< 0.5

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AMTEST LABORATORIES

Professional Analytical Services

ANALYSIS REPORT

AMEC FOSTER WHEELER
11810 NORTH CREEK PKWY N
BOTHELL, WA 98011
Attention: KONRAD MUELLER/TODD WENTWORTH
Project Name: CENTRAL KITSAP HS/MS
Project #: 6-917-180960
All results reported on an as received basis.

Date Received: 02/22/17
Date Reported: 3/ 1/17

AMTEST Identification Number **17-A002444**
Client Identification **IT-4/G-4E-9**
Sampling Date **02/20/17**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Cation Exchange Capacity	1.2	meq/100g		0.5	SW-846 9081	AY	03/01/17
Organic Matter	0.7	%		0.1	ASTM D 2974	SW	02/24/17

Aaron W. Young
Laboratory Manager

Am Test Inc.
13600 NE 126th PL
Suite C
Kirkland, WA, 98034
(425) 885-1664
www.amtestlab.com

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Professional Analytical Services

QC Summary for sample number: 17-A002444

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
17-A002492	Cation Exchange Capacity	meq/100g	3.1	2.7	14.
17-A002444	Organic Matter	%	0.7	0.6	15.

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Cation Exchange Capacity	meq/100g	4.0	3.9	97.5 %

BLANKS

ANALYTE	UNITS	RESULT
Cation Exchange Capacity	meq/100g	< 0.5
Organic Matter	%	< 0.1