KITSAP COUNTY PUBLIC WORKS
NORTH KITSAP SERVICE CENTER
Preliminary Geotechnical Engineering Report

Prepared for: Otak, Inc.

Project No. 200297 • July 19, 2021 • FINAL

Aspect CONSULTING

earth + water

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Aspect Consulting, LLC

7/19/2021

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Contents

List of Tables

List of Figures

List of Appendices

1 Introduction

This report presents the results of Aspect Consulting, LLC's (Aspect) subsurface investigation and geotechnical analysis for the preliminary design of the new Kitsap County Public Works North Kitsap Service Center (Project). The Project is located on an undeveloped property southeast of the intersection of NE Rova Road and Bond Road NE (SR 307) in northern Kitsap County, Washington (Site; Figure 1.) We performed our services in support of preliminary engineering studies for the Project being led by Otak, Inc. (Otak) and in accordance with our subconsultant agreement dated February 3, 2021.

1.1 Scope of Services

Our scope of work included conducting subsurface explorations, laboratory testing, and groundwater monitoring across the Site to characterize the geologic conditions and aquifer characteristics. This provides the baseline data for preliminary geotechnical recommendations for the Project and for developing a hydrogeologic conceptual model of the Site to inform infiltration feasibility and a future critical aquifer recharge area (CARA) report. Infiltration feasibility is more fully discussed under separate cover in the "Conceptual Hydrogeologic Model Report" (Aspect, 2021).

Our subsurface exploration program included eight test pit excavations, three drilled soil borings, laboratory testing, and installation of one groundwater monitoring well. This report includes:

- Site and Project descriptions
- Distribution and characteristics of subsurface soils and groundwater
- Description of the field work completed
- Seismic design criteria in accordance with the County's currently adopted version of the International Building Code (IBC)
- Shallow foundation design recommendations
- Lateral earth pressures for retaining wall design
- Subgrade parameters for concrete slab-on-grade
- Pavement section recommendations
- Earthwork and grading, cut, and fill recommendations

Copies of our subsurface investigation logs, and laboratory testing results are attached as Appendices A and B, respectively.

1.2 Project Understanding

The new facility will primarily occupy the southern and central parts of the Site and will provide:

- Administrative offices for three supervisory personnel

- Crew dispatch, training, locker, and washroom areas for thirty operation employees
- Vehicle maintenance bays
- Outdoor covered canopy parking for selected maintenance equipment and vehicles
- Uncovered parking for private vehicles
- Yard storage areas for maintenance materials
- Equipment and vehicle wash bay
- Above-ground propane tank
- 1,000-gallon septic and pump tanks
- Above-ground vehicle and equipment fueling station
- Moderate Risk Waste Facility (MRWF)
- Underground tank(s) for spill containment and fire suppression water from the MRWF
- Buried vaults for stormwater detention are anticipated

It is probable that additional office space for a Sheriff's Department employee will also be required. It is expected that, where feasible, use of common facilities will be considered.

Most utility services are available to the Site, including power, water, and cable; sewer and natural gas services are not, which will require design of an on-site septic system. Environmentally sensitive areas exist on or adjacent to the Site. Of the 16 acres, approximately 6 acres exist within critical area setbacks. There are small wetland areas at the Site including a small (0.34 acre) wetland in the southern portion of the Site that may require mitigation depending on the degree of impact from the Project.

Kitsap County recently completed preliminary programming for the Project, of which the following building space metrics were determined:

- Administration/Crew Space – 4,500 square feet
- Vehicle/Equipment Maintenance Bays – 14,000 square feet
- Covered Canopy Equipment/Vehicle Storage – 9,600 square feet
- Above ground Fueling Station/Vehicle Wash – 5,880 square feet
- Salt Storage – 2,520 square feet
- MRWF – 7,000 to 10,000 square feet

The structures listed above will be one- or two-story buildings. The facility will include pavements for access routes, parking areas, and material/equipment storage that will be subject to heavy truck and equipment loads.

We anticipate the Site will be graded relatively flat and/or terraced to accommodate the proposed structures and facilities. This will require some combination of retaining walls,

sloping grades, and placement of structural fill across the Site. We understand the structures for the Project will be designed in accordance with the 2018 International Building Code (IBC; ICC, 2018).

2 Site Conditions

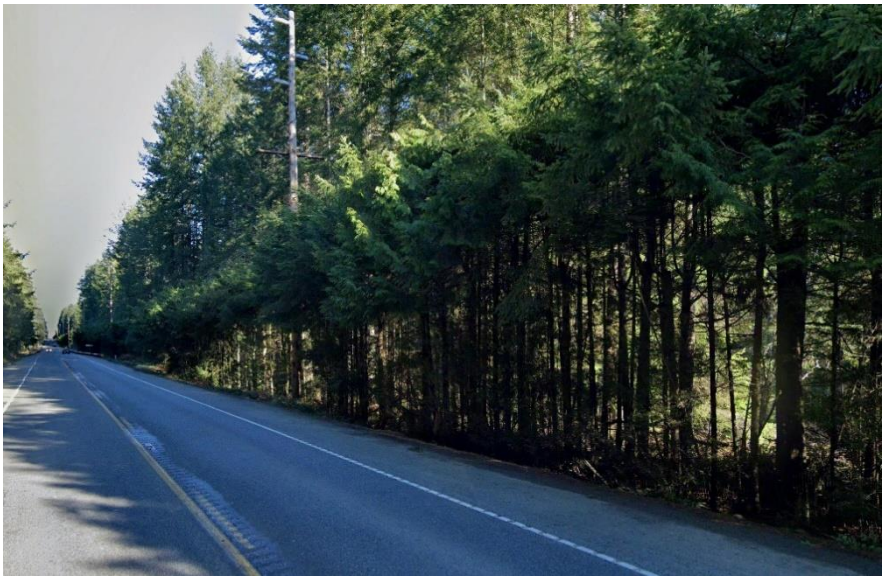
This section presents the Site conditions, including surface conditions, critical area mapping, geologic setting, and subsurface conditions encountered in our field investigation program. This information provides context for the discussion of types and distribution of geologic soil units and a basis for our geotechnical engineering recommendations.

2.1 Topography and Surface Conditions

The Site is comprised of two lots: a 0.68-acre lot (parcel number 062602-2-049-2007) along the western edge of the Site and a 15.64-acre lot (parcel number 062602-2-064-2007) that comprises most of the Site (Figure 2). The smaller lot is triangular in shape and bordered by Bond Road NE to the west and the 15.64-acre lot to the east and south. The larger lot is irregularly shaped and bordered by Bond Road NE and the 0.68-acre parcel to the west; Arness Tree Farms to the southwest and southeast; a single-family residence to the east; and NE Rova Road to the north.

The Site is generally flat to gently sloping with rolling hills typically inclined between 0 and 13 degrees from horizontal. Localized areas approach 25 degrees from horizontal (Figure 2). The topography within the northeast third of the Site gradually slopes to an existing drainage channel within the east wetland buffer. The drainage channel crosses the Site from north to south, beginning at NE Rova Road and extending to the eastern corner of the Site. The remaining Site area generally slopes south, to the 0.34-acre wetland. Ground surface elevations on Site range between 220 and 244 feet North American Vertical Datum of 1988 (ft NAVD88).

The Site is heavily vegetated and forested (Photograph 1) with young to mature conifers that are up to 44-inch diameter at breast height (DBH), young to mature deciduous trees ranging up to 45-inch DBH, and groundcover consisting of ferns, ivy, woody shrubs, and herbaceous ground cover.



Photograph 1. Southwest corner of Site, looking northeast.

2.2 Critical Areas

Based on the 2021 site and topographic survey results by Otak, Inc. (Figure 2), there are two wetland areas located on the Site. A 0.34-acre wetland is within the property limits on the south end of the Site. The east corner of the Site overlaps a second wetland area by about 0.04-acres. Additionally, Kitsap County maps an area coinciding with the small wetland at the south end of the Site as hydric soils (perennially wet soils). There are no landslide, erosion, flood hazard, or seismic hazard areas at or near the Site; however, the entire Site and surrounding area is mapped as a critical aquifer recharge area (County, 2021a).

2.3 Geologic Setting

The Site is located within the Puget Lowland, a broad area of tectonic subsidence flanked by two mountain ranges: the Cascades to the east and the Olympics to the west. The sediments within the Puget Lowland are the result of repeated cycles of glacial and nonglacial deposition and erosion. The most recent cycle, the Vashon Stade of the Fraser Glaciation (about 13,000 to 16,000 years ago), is responsible for most of the present day geologic and topographic conditions. During the Vashon Stade, the 3,000-foot-thick Cordilleran Glacier advanced into the Puget Lowland.

As the Cordilleran Glacier advanced southward, lacustrine and fluvial sediments were deposited in front of the glacier. Preglacial and proglacial sediments were overridden and consolidated by the advancing glacier, creating dense and hard soil deposits. At the interface between the advance soils and the glacial ice, the Cordilleran Glacier sculpted and smoothed the surface, and then deposited a consolidated basal till. As the Cordilleran Glacier retreated northward from the Puget Lowland to British Columbia, it left an unconsolidated sediment veneer over glacially consolidated deposits.

As shown on Figure 3, the available geologic mapping (Dragovich et al., 2002) indicates that subsurface conditions at the Site predominantly consist of Pleistocene-age, Vashon glacial till (Qgt). This glacial till was deposited as sub-glacial basal till of the Cordilleran Glacier and is generally described as a matrix-supported, very dense, poorly sorted diamict of silt and sand with gravel, cobbles, and scattered boulders. The till has been compressed and consolidated by glacial ice, creating a dense/hard configuration.

2.4 Subsurface Field Investigation

We completed eight test pit explorations, designated ATP-01 through ATP-08, at the Site on March 19, 2021. Excavation was performed by High Meadows Excavating, LLC subcontracted by Aspect using track-mounted excavator. The Site was also explored with three sonic borings (designated AB-01, AB-02, and AMW-01) on March 22 and 23, 2021 using a Sonic Geoprobe 8140LC track-mounted drill rig operated by Holocene Drilling, Inc. under subcontract to Aspect. The locations of the explorations were chosen to inform geotechnical analyses and recommendations for the proposed facilities and to investigate stormwater infiltration feasibility while also informing our conceptual hydrogeologic model of the Site.

The locations of our field explorations are presented on Figure 2. Detailed descriptions of our field explorations, geologic units, groundwater observations, and generalized engineering properties are presented in the following sections and in Appendix A.

2.4.1 Geotechnical Laboratory Testing

Samples collected from the test pits and soil borings were submitted for laboratory testing to characterize engineering and index properties of the Site soils. The laboratory testing reports are summarized in Table 1 (attached) and presented in Appendix B.

We subcontracted geotechnical laboratory tests that included determination of moisture content, fines content, grain-size distribution, liquid and plastic limits, and compaction characteristics (modified proctor). The laboratory tests were conducted in general accordance with appropriate ASTM test methods. Detailed descriptions of the tests and results are presented in Appendix B and were incorporated into the exploration logs in Appendix A.

2.4.2 Stratigraphy

Subsurface conditions at the Site were inferred from the completed field investigations, a review of applicable geologic literature, and our local geologic experience. The soils encountered in the borings (starting at the ground surface) include topsoil, fill, and Vashon Till. Detailed descriptions of these soils are included below.

Topsoil

Topsoil refers to a unit that contains a high percentage of organics, generally found at the ground surface and containing grass, mulch, and roots. We encountered up to 6 inches of topsoil within our explorations, except for AB-02 and ATP-07, where we observed topsoil thickness extending to 1.0 foot below ground surface (ft bgs) and 1.5 ft bgs, respectively.

Vashon Till

Below the topsoil in all explorations, we encountered sand with varying amounts of silt, gravel, and cobbles (SM) extending to the bottom of the explorations. The sand was interbedded with occasional silt (ML) lenses up to 6-inches thick except in ATP-02 through ATP-04, where 2- to 6-ft-thick silt layers were encountered at depths ranging between 3 and 10 ft bgs. We interpreted these sand and silt deposits to be weathered to unweathered Vashon Till.

The weathered Vashon till comprised the upper 18.0 to 26.5 feet of the unit and was generally medium dense to dense, slightly moist to wet, and gray-brown with occasional iron oxide staying. The upper 4 feet of the weathered till was light brown, highly weathered, and densely rooted (Photograph 2). The deeper unweathered Vashon till was generally dense to very dense, slightly moist, and gray to gray-brown.

Photograph 2. Test Pit ATP-03; showing transition from highly weathered Vashon till to weathered Vashon till.

The weathered Vashon till is anticipated to exhibit low compressibility moderate to high shear strength, very low permeability, and moderate to high moisture sensitivity due to its high percentage of silt and clay. The unweathered Vashon till is anticipated to exhibit very low compressibility, high shear strength, very low permeability (essentially impermeable), and moderate to high moisture sensitivity.

2.4.3 Groundwater

We encountered groundwater in the soil borings and test pits at the depths indicated in Table 2. Based on the soil boring results, static groundwater is anticipated to be near 18 feet bgs, which is below the depth of the work anticipated for the Project. Groundwater seepage was encountered in five of seven test pits between 2 and 8.5 feet bgs. We interpreted this seepage to be from a perched groundwater table. Seepage rates were moderately high, and water accumulated at the base of the five test pits (Photograph 3).

Table 2. Summary of Groundwater Depths During Field Investigation

Exploration Number	Ground Surface Elevation (ft NAVD88)	Depth to Water (ft bgs)	Approximate Water Elevation (ft NAVD88)	Water Level Description
AB-01	230.0	18.3	212.7	Static, at time of drilling
AB-02	232.1	18.2	213.9	Static, at time of drilling
AMW-01	226.4	18.5	207.9	Static, at time of drilling
ATP-01	233.8	6.0	227.8	Perched, seep
ATP-02	227.3	2.0	225.3	Perched, seep
ATP-03	228.0	8.5	219.5	Perched, seep
ATP-04	226.4	3.5	222.9	Perched, seep
ATP-05	237.9	Not encountered		
ATP-06	240.9	Not encountered		
ATP-07	222.5	2.0	220.5	Perched, seep
ATP-08	229.794	Not encountered		

Notes:
1. AB = Aspect boring; AMW = Aspect Monitoring Well; ATP = Aspect Test Pit;
ft bgs = feet below ground surface; ft NAVD88 = feet North American Vertical Datum of 1988.

Photograph 3. Test Pit ATP-02; showing groundwater seepage into the pit.

A perched groundwater condition occurs when water percolates into the shallow subsurface and collects on relatively impermeable materials. The topsoil and upper portion of the weathered till are considered low permeability, while the deeper, dense to very dense glacial till is essentially impermeable. Based on the relative moisture content of the underlying weathered and unweathered Vashon till deposits, we infer that the groundwater we encountered within the test pits was perched. We observed consistent iron-oxide staining within the weathered till deposits, indicating that the perched water is seasonally present and fluctuates throughout the year.

We installed a monitoring well at AMW-01 and have collected groundwater data since April 7, 2021. Monitoring results are presented in our Conceptual Hydrogeologic Model Report (Aspect, 2021). Groundwater levels will fluctuate seasonally with precipitation, as well as with changes in Site and near-Site usage.

3 Geologic Hazards

The following sections describe the geologic hazards pertinent to the Site and Project along with applicable design recommendations and considerations.

3.1 Seismic Design Considerations

In this section, we describe the relevant geologic hazards to the Site and the Project. This section provides context for the City's requirements related to the redevelopment of the Site given typical earthquake engineering considerations and mapped landslide hazard areas (a subset of critical areas) at the Site.

3.1.1 Earthquake Engineering

The Site is located within the Puget Lowland physiographic province, an area of active seismicity that is subject to earthquakes on shallow crustal faults and deeper subduction zone earthquakes. The Site area lies about 11 miles north of the Seattle fault zone and 14 miles southeast of the Whidbey Island fault zone, which consist of shallow crustal tectonic structures that are considered active (evidence for movement within the Holocene [since about 15,000 years ago]) and are believed to be capable of producing earthquakes of magnitude 7.3 or greater. The recurrence interval of earthquakes on these fault zones are believed to be on the order of 1,000 years or more. The most recent large earthquake on the Seattle fault occurred about 1,100 years ago (Pratt et al., 2015). There are also several other shallow crustal faults in the region capable of producing earthquakes and strong ground shaking.

The Site area also lies within the zone of strong ground shaking from earthquakes associated with the Cascadia Subduction Zone (CSZ). Subduction zone earthquakes occur due to rupture between the subducting oceanic plate and the overlying continental plate. The CSZ can produce earthquakes up to magnitude 9.3 and the recurrence interval is thought to be on the order of about 500 years. A recent study estimates the most recent subduction zone earthquake occurred around 1700 (Atwater et al., 2015).

Deep intraslab earthquakes, which occur from tensional rupture of the sinking oceanic plate, are also associated with the CSZ. An example of this type of seismicity is the 2001 Nisqually earthquake. Deep intraslab earthquakes typically are magnitude 7.5 or less and occur approximately every 10 to 30 years.

The following sections present descriptions of seismic design considerations for the Project.

3.1.2 Ground Response

The International Building Code (IBC) seismic design is based on the "Maximum Considered Earthquake (MCE)" with a 2 percent probability of exceedance (PE) in 50 years (2,475-year return period; ICC, 2018). Seismic design should be completed with the specific ground motion parameters listed in Table 3 below and assuming that the proposed structures are Risk Category IV.

Table 3. Seismic Design Parameters

Design Parameter	Recommended Value
Site Class	C
Site Adjusted Peak Ground Acceleration (PGA_m)	0.600g[(1)(2)]
Site Adjusted Peak Ground Acceleration (PGA)	0.170g[(3)]
Short Period Spectral Acceleration (S_s)	1.337g
1-Second Period Spectral Acceleration (S_1)	0.472g
Site Coefficient (F_a)	1.200
Site Coefficient (F_v)	1.500
Design Short Period Spectral Acceleration (S_{DS})	1.070g
Design 1-Second Period Spectral Acceleration (S_{D1})	0.472g

Notes:
1. g = gravitational force
2. PGA as determined by methods presented in Chapter 11 of ASCE 7-16
3. PGA as specified by Section 19.700.E.2 of the Kitsap County Code (County, 2021b)
4. Based on the latitude and longitude of the Site: 47.775739°N, 122.603298°W World Geodetic System 1984 (WGS84)
5. Based on the American Society of Civil Engineers (ASCE) hazard tool (ASCE, 2018)

3.1.3 Surficial Ground Rupture

A trace of an east-west trending thrust fault zone (Seattle fault zone) projects through Bainbridge Island, with the nearest known active fault trace (an unnamed fault) located approximately 11 miles south of the Site (Gower et al., 1985). Due to the suspected long recurrence interval and the proximity of the Site to the mapped fault trace, the potential for surficial ground rupture at the Site is considered low during the expected life of the Project.

3.1.4 Liquefaction

Liquefaction occurs when loose, saturated, and relatively cohesionless soil deposits temporarily lose strength from seismic shaking. The primary factors controlling the onset of liquefaction include intensity and duration of strong ground motion, characteristics of subsurface soil, *in situ* stress conditions, and the depth to groundwater.

The Washington Department of Natural Resources (DNR) maps the Site as having low to very low liquefaction susceptibility (DNR, 2004). Given the relative density, grain size distribution, and geologic origin of the soils at the Site, we do not consider liquefaction to be a significant hazard for the Project.

3.2 Landslide Hazard

The Site topography is typically flat to gently sloping with isolated areas that slope up to 25 degrees from horizontal. We did not observe any obvious indicators of incipient, recent, or historical landslide activity at the Site.

Additionally, the County (County, 2021a) does not map the Site as containing landslide hazard areas and recent LiDAR studies (McKenna et al., 2008) do not show any known landslides at the Site or in the surrounding areas. In our opinion, the landslide hazard at the Site is low in the context of the proposed Project.

3.3 Erosion Hazard

The County does not map the Site as an erosion hazard (County, 2021a). In our opinion, the Vashon till at the Site has a moderate erosion potential when exposed during construction due to the fines content (soil particles passing the No. 200 sieve, like silt and clay). The erosion risk increases on sloped areas, whether natural or excavated during construction. Based on our observation of the Site and subsurface conditions, it is our opinion that the erosion hazard at the Site is relatively low and can be addressed through standard temporary erosion and sedimentation control (TESC) and best management practices (BMPs) during construction.

4 Preliminary Geotechnical Engineering Conclusions and Recommendations

Based on our geotechnical evaluation of the Site that included data review, a Site reconnaissance, subsurface explorations, and preliminary geotechnical engineering analyses, the Project is feasible from a geotechnical perspective—provided the recommendations contained here are properly incorporated into the Project planning, concept development, design, and construction. The key findings and conclusions include:

- The proposed structures may be supported on conventional spread and strip footings and slabs-on-grade overlying the native Vashon till, or structural fill directly overlying Vashon till, that is properly prepared and compacted.
- Retaining walls may be used for grade control and in areas to provide flat terraces capable of accommodating the proposed structures and facilities. These retaining walls may consist of cantilevered, cast-in-place, concrete retaining walls, or modular block retaining walls that will retain compacted structural fill or native soils. Other types of retaining walls are feasible at the Site and may be evaluated during final design.
- The Vashon till underlying the Site is feasible for re-use as structural fill in grading of the Site; however, the Vashon till is moisture sensitive and will require dry season construction along with careful moisture control and conditioning. If strict material handling is undesirable and/or wet season construction is possible, we recommend importing structural fill that is less moisture sensitive.
- The Site subsurface conditions are not suitable for concentrated on-Site stormwater infiltration.

Preliminary design recommendations for foundations, slabs-on-grade, pavements, retaining walls, and detention vaults are presented in the following sections. Additional engineering analyses and evaluations may be required to support final design of the Project.

4.1 Shallow Foundation Design and Recommendations

Based on the subsurface conditions encountered at the Site, the proposed building may be supported using conventional spread or continuous (strip) footing foundations founded on undisturbed, firm and unyielding Vashon till (bearing stratum) or structural fill directly overlying Vashon till, that is properly prepared and compacted.

4.1.1 Minimum Footing Size and Embedment

Continuous strip footings should have a minimum width of 18 inches and individual spread footings should have a minimum width of 24 inches unless the structures are lightly loaded (requiring less than the bearing pressure recommendations provided in Section 4.1.3), in which case minimum footing dimensions in accordance with the 2018 IBC may be used. We recommend exterior footings be embedded a minimum of 18

inches below the lowest adjacent grade and interior footings be embedded a minimum of 12 inches below the top of the slab.

4.1.2 Depth to Bearing Stratum

The subsurface information at the Site suggests that the suitable bearing stratum for the new building foundations will generally be found within 4 feet of the ground surface, except in the wetland area (ATP-07) where the bearing stratum was encountered 5 ft bgs.

The approximate depth to the bearing stratum and respective elevations of the bearing stratum from our Site explorations are presented below in Table 4.

Table 4. Depth to Bearing Stratum by Exploration

Exploration	Ground Surface Elevation (ft NAVD88)	Approximate Depth of Bearing Stratum (ft bgs)	Approximate Elevation of Bearing Stratum (ft NAVD88)
AB-01	231.0	4.0	227.0
AB-02	232.1	4.0	228.1
AMW-01	226.4	3.0	223.4
ATP-01	233.8	3.0	230.8
ATP-02	227.3	3.0	224.3
ATP-03	228.0	3.5	224.5
ATP-04	226.4	3.0	223.4
ATP-05	237.9	3.5	234.4
ATP-06	240.9	3.0	237.9
ATP-07	222.5	5.0	217.5
ATP-08	229.8	4.0	225.8

Notes:
AB = Aspect boring; AMW = Aspect Monitoring Well; ATP = Aspect Test Pit; ft bgs = feet below ground surface; ft NAVD88 = feet North American Vertical Datum of 1988.

4.1.3 Design Bearing Pressure

For shallow spread footing foundations founded atop properly prepared weathered Vashon till, we recommend an ultimate bearing pressure of 12,000 pounds per square foot (psf). For footings founded atop compacted structural fill, we recommend an ultimate bearing pressure of 7,500 psf. We recommend applying a factor of safety of at least 3.0 in design to determine allowable values for bearing capacity.

The allowable soil bearing pressures may be increased by up to one-third for temporary loading conditions such as wind or seismic loading.

4.1.4 Estimated Settlement

For spread footing foundations, and assuming the subgrade conditions described in the introduction to Section 4.1 and prepared as described in Section 5.2, we estimate the applied loads discussed in Section 4.1.3 will result in maximum total settlement of about

1 inch and ½ inch of differential settlement over a 50-foot length. Foundation settlement is expected to occur as the loads are applied.

In situations where individual structures are supported by foundations placed atop Vashon till and structural fill, the potential for undesirable differential settlement exists. In these situations, the foundation design should be evaluated on a case-by-case basis to mitigate for the potential differential settlement. Mitigation may include overexcavating to ensure all structure foundations are bearing directly on Vashon till or the creation of 'fill cushions' beneath each foundation to ensure a uniform type/thickness of structural fill material below the foundations.

4.1.5 Lateral Resistance

Wind, earthquakes, and unbalanced earth loads will subject the proposed structure to lateral forces. Lateral forces on a structure will be resisted by a combination of sliding resistance of its base or footing on the underlying soil and passive earth pressure against the buried portions of the structure. For use in design, an ultimate coefficient of friction of 0.5 may be assumed along the interface between the base of the footing and subgrade soils.

An ultimate passive earth pressure of 450 pounds per cubic foot (pcf) may be assumed for compact structural fill or undisturbed native soils adjacent to below-grade elements. The upper 1 foot of passive resistance should be neglected in design, unless the adjacent ground is protected/surfaced by slabs or pavement. The recommended coefficient of friction and passive pressure value assume unsaturated conditions and level ground and are ultimate values that do not include a safety factor. We recommend applying a factor of safety of at least 1.5 in design to determine allowable values for coefficient of friction and passive pressure.

4.2 Concrete Slab-On-Grade

Slab-on-grade subgrade preparation should be completed same as shallow foundations described in Sections 4.1 and 5.2, except for interior slabs-on-grade beneath enclosed heated/air-conditioned interior spaces (such as those covered with flooring and carpet).

Due to the proposed grading for the Project, a mix of Vashon till and structural fill subgrade may be present beneath slabs and/or the structural fill thickness below slabs may be variable. Where slabs encounter these conditions, the potential for differential settlement exists. To mitigate this potential for differential settlement and to provide uniform bearing conditions below the slabs, we recommend uniform bearing materials and limiting the difference in thickness of structural fill to less than about 20 percent over the width and length of the slab. To further promote uniform bearing conditions for slabs overlying structural fill, the fill should be no less than 2 feet thick (vertical). This may require additional excavation on the upslope sides of some fill areas beneath slabs.

For interior slabs-on-grade, we recommend the uppermost 6 inches of the subgrade consist of compacted capillary break material to provide uniform support and moisture control. The capillary break material should consist of free-draining, clean, fine gravel and coarse sand with a maximum particle size of 1 inch and less than 3 percent material passing the U.S. No. 200 sieve by weight (fines). A crushed material is preferred to provide a subgrade surface that is not easily disturbed by workers laying steel rebar and

concrete formwork. The capillary break material should be compacted to relatively firm and unyielding condition and evaluated by Aspect prior to placement of steel rebar and formwork.

We recommend considering placement of a vapor barrier over the capillary break material where vapor intrusion mitigation and additional moisture control is desired. Detailed design and performance issues with respect to vapor intrusion and moisture control as it relates to the interior environment of the structure are beyond the expertise of Aspect. A building envelope specialist or contractor should be consulted to address these issues, as needed.

For slabs-on-grade designed as a beam on elastic foundation, we recommend using a vertical modulus (K_{v1}) of 150 pounds per cubic inch (pci) if bearing on the sequence of subgrade materials described above. Note that K_{v1} is appropriate for a 1-foot by 1-foot surface and the initial subgrade modulus used for design (K_s) will need to be adjusted based on the width of the slab considered using the following equation:

$$K_s = K_{v1}(B+1)^2/(4B^2),$$

where B = slab width (in feet).

4.3 Pavement Section Recommendations

We anticipate the pavements at the facility will receive a mix of light passenger vehicle loading (public access areas and parking areas) and heavier vehicle and equipment loading (access routes and material/equipment storage areas).

For parking areas subjected primarily to passenger vehicle traffic, we recommend a flexible (asphalt) pavement section consisting of a minimum of 3 inches of HMA overlying 6 inches of CSBC meeting the requirements of Section 9-03.9(3) of the Washington State Department of Transportation (WSDOT) Standard Specifications. Areas that will receive more frequent traffic (such as primary access routes) or will experience occasional heavy truck traffic (such as maintenance vehicles and/or equipment and material storage) will have better long-term performance with a more robust flexible pavement section of 4 inches of HMA over 8 inches of CSBC.

In our experience, long-term use of flexible pavement systems by heavy vehicles like maintenance vehicles will result in rutting of the pavement due to soil creep under the repeated loads. Maintenance asphalt overlays in areas that develop ruts may be required in the next 20 years to reestablish the desired serviceability of the flexible pavement system.

Rigid (concrete) pavement sections will provide greater resistance to rutting over time and improved reliability and serviceability. We recommend a rigid pavement section consisting of a minimum of 8 inches of concrete over 8 inches of CSBC. The concrete should have a minimum 28-day compressive strength of 4,000 pounds per square inch (psi).

If traffic data is made available, we can develop specific pavement section designs following the American Association of State Highway Transportation Officials (AASHTO) and WSDOT methods for pavement design.

4.4 Lateral Earth Pressures for Retaining Wall Design

We understand that retaining walls may be required for the Project and may consist of cantilevered, cast-in-place, concrete retaining walls or modular block retaining walls that will retain compacted structural fill as described in Section 5.3 or native soils in a level configuration, below are general recommendations for all retaining walls, and design parameters are provided in the following sections for each type of wall.

- Over-compaction of the backfill behind walls should be avoided. In this regard, we recommend compacting the backfill to about 90 percent of the maximum dry density (MMD) as determined by ASTM D1557 (modified proctor). Heavy compactors and large pieces of construction equipment should not operate within 5 feet of any embedded wall to avoid the buildup of excessive lateral pressures. Compaction close to the walls should be accomplished using hand-operated vibratory plate compactors.
- All walls should be provided with a subsurface drain, as described below in Section 5.8.
- We recommend seismic design for retaining walls that are taller than 10 feet and pose a direct risk to the public in the event of collapse.
- A vertical surcharge of 250 psf should be applied to the top of the walls to account for vehicular traffic, where applicable. Other lateral forces that may be induced on the walls due to other surcharge loads should be considered by the Project structural engineer.
- In general, for walls founded atop Vashon till, without significant surcharge loads, and without adverse backslope or foreslopes, global stability is not a critical design consideration. However, for other situations, global stability analyses of individual walls should be completed on a case-by-case basis.
- We are available to review retaining wall design plans if conditions or wall types differ from our assumptions.

4.4.1 Cantilevered, Cast-in-Place, Concrete Walls

Cantilevered, cast-in-place concrete walls may be designed using the following parameters.

- Active lateral earth pressures of 35 pcf, at-rest lateral earth pressures of 55 pcf, and ultimate passive lateral earth pressures of 450 pcf. We recommend applying a factor of safety of at least 1.5 in design to determine allowable values for the passive pressure.
- Active lateral earth pressures should be used to design retaining walls that will be allowed to yield laterally and at-rest lateral earth pressures should be used to design retaining walls that are not allowed to yield.
- Ultimate bearing capacity of foundation soil: same as described in Section 4.1.3. We recommend applying a factor of safety of at least 3.0 in design to determine allowable values for bearing capacity.

- Passive earth pressures should be neglected within the upper two feet of the ground surface in front of the wall.

4.4.2 Modular Block Wall Design Recommendations

The following parameters may be used to assess internal wall stability and perform detailed design of modular block retaining walls:

- Internal friction angle (φ) of retained soil:
  - φ = 42 degrees, assuming Vashon till
  - φ = 35 degrees, assuming structural fill
- Moist (effective) unit weight (γ) of retained soil: γ = 130 pounds pcf
- Coefficient of sliding resistance (μ) between bottom block and granular bearing pad: μ = 0.6
- Ultimate bearing capacity of foundation soil: same as described in Section 4.1.3. We recommend applying a factor of safety of at least 3.0 in design to determine allowable values for bearing capacity.

4.4.3 Seismic Wall Design Recommendations

For retaining walls that are taller than 10 feet and pose a direct risk to the public in the event of collapse, we recommend the following parameters for seismic design:

- An increase in the applicable ultimate bearing capacities shown in Section 4.1.3 of one-third under seismic conditions. We recommend applying a factor of safety of at least 3.0 in design to determine allowable values for bearing capacity.
- Design peak ground acceleration coefficient (As) for evaluation of seismic surcharge pressure: As = 0.170g based on Section 19.700.E.2 of the Kitsap County Code (County, 2021b).
- For seismic surcharge evaluation using Mononobe-Okabe method, a horizontal acceleration coefficient, kh, of one-half of the peak ground acceleration (kh = 0.085g) may be used.

4.5 Stormwater Infiltration

The presence of relatively impermeable Vashon till deposits indicates that concentrated stormwater infiltration is not practicable at the Site. We recommend stormwater management be accomplished using LID methods, such as dispersion, combined with conventional methods, including catch basins and storm drainpipes and detention facilities that discharge into an appropriate system.

Please refer to our Conceptual Hydrogeologic Model Report (Aspect, 2021) for additional details and recommendations.

4.6 Stormwater Vault Recommendations

The base of the buried stormwater detention vaults should be founded in relatively undisturbed Vashon till. We anticipate the dead load of the detention vaults will not be significantly greater than the weight of the soil that is excavated; therefore, bearing capacity will not be a significant design issue. For the purposes of evaluation and design,

an allowable bearing pressure of 4,000 psf may be used for vaults founded atop undisturbed Vashon till.

Assuming the foundation subgrade is properly prepared and accomplished as recommended herein, we estimate total settlement of less than about 1 inch and differential settlement between two adjacent load-bearing components supported on competent soil of less than about 0.5 inch. We anticipate that the majority of the estimated settlement will occur during construction as the loads are applied. The vault structures may also exhibit some of the anticipated settlement after construction as the structure is initially loaded with water and drained. This cyclic loading may result in minor structure rebound and re-settlement.

4.6.1 Permanent Earth Pressures

Permanent lateral earth pressure against the stormwater detention vault walls will depend upon the degree of wall restraint and magnitude and location of any surcharge loads. For the vault, we assume that the walls will be fixed, or restrained against lateral rotation resulting in the at-rest earth pressure condition. We recommend the vault walls also be designed for an equivalent fluid weight of 55 pcf. Due to the low permeability of the Vashon till and potential for perched groundwater conditions, drainage around the vault walls should be provided or the vault walls should be designed for hydrostatic pressure. To account for general traffic surcharge pressures, we also recommend including a uniform lateral pressure equal to 75 psf applied to the upper 15 feet of the structure, where applicable. Other specific surcharge loads should be accounted for in the design as needed.

5 Construction Recommendations

Detailed design and construction recommendations for the building foundations and slabs-on-grade, pavements, drainage, retaining walls, and key earthwork activities anticipated for the Project are presented in the following sections. Material specifications reference the current WSDOT Standard Specifications (WSDOT, 2020) unless otherwise noted.

5.1 General Earthwork Considerations

Based on the explorations performed across the Site and our understanding of the Project, it is our opinion that the Contractor can complete earthwork and excavations with standard construction equipment. The soils encountered at the Site contain a significant percentage of fines (particles passing the U.S. Standard No. 200 sieve), making them moisture sensitive and subject to disturbance when wet. We recommend planning the earthwork portions of the Project during the drier summer months.

We recommend that earthwork activities be specified in accordance with the following WSDOT Standard Specifications.

5.1.1 Temporary Erosion Control

To prevent Site erosion during construction, appropriate temporary erosion and sedimentation control (TESC) measures should be used in accordance with our recommendations and local best management practices (BMPs). Specific TESC measures may include appropriately placed silt fencing, straw wattles, rock check dams, and plastic covering of soil stockpiles.

5.2 Subgrade Preparation

Subgrade preparation within the proposed foundation areas, pavement areas, stormwater vaults, and areas to receive structural fill should include removal of all topsoil, debris, loose fill soils, roots, and any other deleterious materials. For the proposed foundations, we recommend that the bearing soils consist of structural fill or dense weathered Vashon till, provided it can be compacted to a relatively firm and unyielding condition. Based on our explorations, we estimate suitable, native bearing soils to be within about 4 feet bgs across the Site.

The on-Site soils contain variable amounts of fine-grained particles, which makes them moisture sensitive and subject to disturbance when wet. The Contractor must use care during Site preparation and excavation operations so that any bearing surfaces are not disturbed. If this occurs, the disturbed material should be removed to expose undisturbed material.

All bearing surfaces should be trimmed neat and carefully prepared. All loose or softened soil should be removed from the bearing surface or compacted in-place prior to placing concrete or structural fill. We recommend that all bearing surfaces be observed by Aspect to verify that the recommendations of this report have been followed.

If bearing surfaces are exposed during the winter season or periods of wet weather, it may be helpful to provide a layer of crushed rock or gravel to help preserve the subgrade. If

gravel is used to protect the bearing surfaces, it should meet the gradation requirements for Class A Gravel Backfill for Foundations, as described in Section 9-03.12(1)A of the Standard Specifications.

5.2.1 Stormwater Vault Foundation Subgrade Preparation

We recommend the stormwater vaults be underlain by a 12-inch minimum layer meeting the requirements for Class A Gravel Backfill for Foundations per Section 9-03.12(1)A of the Standard Specifications, compacted to at least 95 percent of the Modified Proctor maximum dry density (test method ASTM D1557). Structural fill used below the vaults, if needed, should also consist of Class A Gravel Backfill for Foundations per Section 9-03.12(1)A of the Standard Specifications or controlled density fill (CDF). A geotextile fabric should be placed at the interface between the subgrade soil and the Gravel Backfill. The geotextile should be a woven product meeting the requirements for Soil Stabilization as described in Table 3 in Section 9-33.2 of the WSDOT Standard Specifications.

5.3 Structural Fill

For purposes of this report, material placed under structures, pavement, sidewalks, as wall backfill, or as utility trench backfill, should be considered structural fill. We anticipate structural fill will be required primarily where overexcavation of existing nonengineered fill is required.

5.3.1 Reuse of Site Soils as Structural Fill

From a geotechnical standpoint, the existing native Vashon till soils appear suitable for reuse as structural fill, provided the materials are excavated during the dry season, are screened to ensure they are relatively free of organics and other deleterious debris, and can be moisture-conditioned for compaction requirements.

The moisture content during compaction is especially critical as structural fill derived from Vashon till can be prone to future settlement and/or reduced shear strength if placed without specific moisture control. Therefore, we recommend Vashon till re-used as structural fill be carefully controlled to meet a moisture content within +/- 2 percent of the optimum moisture content for compaction.

Based on laboratory testing, the Maximum Dry Density (MDD) and optimum moisture content of the native Vashon till are approximately 130 pcf and 7 percent, respectively. The natural moisture content of the Vashon till ranged from 7.1 to 23.8 percent with an average moisture content of 12.6 percent, indicating that drying of the Vashon till would be required for re-use as structural fill.

Excavated material should be visually inspected by Aspect to determine its potential use as structural fill. Excavated material that is unsuitable as structural fill may be suitable as backfill for unimproved areas (i.e., landscaped areas) that are not sensitive to differential settlement over time.

5.3.2 Imported Structural Fill

Imported structural fill should consist of relatively clean, free-draining, nonplastic, uniformly graded sand and gravel free from organic matter or other deleterious materials.

- For imported structural fill for general Site grading, Select Borrow, as specified in Section 9-03.14(2) of the Standard Specifications may be used in dry weather. In wet weather, Gravel Borrow, as specified in Section 9-03.14(1) of the Standard Specifications should be used.
- For imported structural fill beneath foundation elements, Class A Gravel Backfill for Foundations, as specified in Section 9-03.12(1)A of the Standard Specifications , is appropriate. Alternatively, controlled density fill (CDF) can be used.
- For imported structural fill beneath new pavements, Crushed Surfacing Base Course (CSBC), as specified in Section 9-03.9(3) of the Standard Specifications , is acceptable.
- For imported structural fill behind retaining walls, Gravel Backfill for Walls as specified in Section 9-03.912(2), is appropriate.

5.3.3 Compaction Requirements

Structural fill should be at or near optimum moisture content at the time of placement and should be compacted to a percentage of the MDD as determined by ASTM D1557, in accordance with the following recommendations:

- Structural fill beneath foundations, pavements, and hardscapes should be compacted to at least 95 percent of the MDD.
- In nonstructural areas, fill should be placed and compacted to a moderately firm/dense condition.
- Wall backfill compaction within 5 feet of any wall should be limited to 90 percent of the MDD to avoid damage to the structure. Compaction within 5 feet of a wall should be achieved using small hand-operated equipment in conjunction with thinner soil lifts to achieve the required compaction.

The procedure to achieve the specified minimum relative compaction depends on the size and type of compacting equipment, the number of passes, thickness of the layer being compacted, and certain soil properties. When the size of the excavation restricts the use of heavy equipment, smaller equipment can be used, but the soil must be placed in thin enough lifts to achieve the required compaction. A sufficient number of in-place density tests should be performed as the fill is placed to verify the required relative compaction is being achieved. The frequency of the in-place density testing can be determined at the time of final design, when more details of the Project grading and backfilling plans are available.

Generally, loosely compacted soils are a result of poor construction technique or improper moisture content. Soils with a high percentage of silt or clay are particularly susceptible to becoming too wet, and coarse-grained materials easily become too dry, for proper compaction. Silty or clayey soils with a moisture content too high for adequate compaction should be dried as necessary, or moisture conditioned by mixing with drier materials, or other methods. As stated above, the moisture content of re-used Vashon till should be carefully controlled to meet compaction requirements and prevent future settlement and/or loss of shear strength.

When the first fill is placed in a given area, and/or any time the fill material changes, the area should be considered a test section. The test section should be used to establish fill placement and compaction procedures required to achieve proper compaction. Aspect or qualified materials inspection personnel should observe placement and compaction of the test section to assist in establishing an appropriate compaction procedure. Once a placement and compaction procedure is established, the Contractor's operations should be monitored, and periodic density tests performed to verify that proper compaction is being achieved.

5.4 Temporary Excavations and Slopes

Maintenance of safe working conditions, including temporary excavation stability, is the responsibility of the Contractor. All temporary cuts in excess of 4 feet in height that are not protected by trench boxes or otherwise shored should be sloped in accordance with Part N of the Washington Administrative Code (WAC) 296-155 (WAC, 2021) as shown in the table below:

Table 5. Temporary Excavation Cut Slope Recommendations

Soil Unit	OSHA Soil Classification	Maximum Temporary Slope	Maximum Height (ft)
Highly Weathered Vashon Till	C	1.5H:1V	20
Weathered Vashon Till	B	1H:1V	20

Notes:
OSHA = Occupational Safety and Health Administration
H:V = Horizontal : Vertical

The estimated maximum cut slope inclinations are provided for planning purposes only and are applicable to excavations without groundwater seepage or runoff and assume dry to moist conditions. Flatter slopes will likely be necessary in areas where groundwater seepage exists, or where construction equipment surcharges are placed in close proximity with the crest of the excavation.

With time and the presence of seepage and/or precipitation, the stability of temporary unsupported cut slopes can be significantly reduced. Therefore, all temporary slopes should be protected from erosion by installing a surface water diversion ditch or berm at the top of the slope. In addition, the Contractor should monitor the stability of the temporary cut slopes and adjust the construction schedule and slope inclination accordingly. Vibrations created by traffic and construction equipment may cause caving and raveling of the temporary slopes. In such an event, lateral support for the temporary slopes should be provided by the Contractor to prevent loss of ground support.

5.5 Permanent Slopes

In our opinion, permanent cut and fill slopes within Vashon till deposits up to 2H:1V are possible provided best management practices are followed. We recommend that cut and fill slopes be permanently seeded or otherwise landscaped to provide for long-term erosion prevention. Permanent seeding may be native plants and grasses (applied by

hydroseed with tackifier) with a temporary biodegradable erosion control blanket to cover the hydroseed and provide temporary protection until the grasses grow through the blanket. Where possible, the native topsoil should be retained and incorporated into the slopes prior to seeding. The Washington State Department of Ecology (Ecology) *2019 Stormwater Management Manual for Western Washington* recommends permanent seeding and erosion control blankets be designed and installed in accordance with its Best Management Practices C120 and C122, respectively (Ecology, 2019).

5.6 Wet Weather Construction

The soils encountered across the Site are moisture sensitive and may be difficult to handle, prepare, or compact with construction equipment during periods of wet weather. Earthwork is typically most economical when performed under dry weather conditions. If earthwork is to be performed or fill is to be placed in wet weather or under wet conditions, the following recommendations should be incorporated into the contract specifications:

- Earthwork should be performed in small areas to minimize exposure to wet weather. Excavation or the removal of unsuitable soils should be followed promptly by the placement and compaction of clean structural fill. The size and type of construction equipment used may need to be limited to prevent soil disturbance.
- Materials used as structural fill should consist of clean, granular soil containing less than 7 percent fines, such as Gravel Borrow, as specified in Section 9-03.14(1) of the Standard Specifications. The fines should be nonplastic.
- The ground surface within the construction area should be sealed by a smooth drum vibratory roller (or equivalent) and under no circumstances should be left uncompacted and exposed to moisture. Soils which become too wet for compaction should be removed and replaced with clean granular materials.
- Excavation and placement of structural fill should be observed by Aspect to verify that all unsuitable materials are removed, and suitable compaction is achieved.
- Local BMPs for erosion protection should be strictly followed.

5.7 Construction Dewatering

Significant groundwater was not encountered in the Site explorations; however, minor seepage and surficial runoff may be encountered at shallow depths. The Contractor should be prepared to adequately dewater foundation subgrade and excavations. We anticipate that strategically placed sumps and pumps will sufficiently control water inflow. Sumps are often constructed by placing a short section of perforated corrugated steel pipe (or surplus 8- to 12-inch well screen) in a small hole excavated below the subgrade elevation/excavation. The annular space around the pipe is backfilled with drain rock, with several inches placed inside the casing to help control the pumping of fines. Submersible pumps (trash pumps) are then placed inside the casing and connected to a central discharge pipe.

The Contractor should be responsible for design, implementation, and any necessary permits associated with any construction dewatering system used for the Project.

5.8 Drainage Considerations

The outside edge of all perimeter footings and embedded walls should be provided with a drainage system consisting of a 4-inch-diameter (minimum), perforated, rigid pipe embedded in free-draining gravel meeting the requirements of Section 9-03.12(4) of the Standard Specifications, Gravel Backfill for Drains. The footing and wall drains should be a minimum of 1 foot thick, and a layer of low permeability soils should be used over the upper foot of the drain section to reduce the potential for surface water to enter the drain curtain. Prefabricated drain mats combined with relatively free-draining backfill may be used as an alternative to washed-rock footings and wall drains.

Final grades around the proposed structure should be sloped such that surface water drains away from the structures. Downspouts and roof drains should not be connected to the foundation drains in order to reduce the potential for flooding foundation drains and clogging. The footing drains should include cleanouts to allow for periodic maintenance and inspection.

Site grades should be sloped to discharge surface water away from slope faces and fill areas to suitable collection and disposal areas.

6 Recommended Additional Geotechnical Services

At the time of this report, Site grading, utilities, civil plans, and construction methods have not been finalized, and the recommendations presented herein are based on preliminary Project design information. If Project developments result in changes to the assumptions made herein, we should be contacted to determine if our recommendations should be revised.

Throughout this report, we have provided recommendations where we consider it would be appropriate for Aspect to provide additional geotechnical input to the design and construction process. Additional recommendations are summarized in this section.

6.1 Additional Design and Consultation Services

Before construction begins, we recommend that Aspect:

- Continue to meet with the design team as needed to address geotechnical questions that may arise throughout the remainder of the design process.
- Conduct additional geotechnical engineering investigations and analyses as needed to support the Project elements and final design.
- Review the geotechnical elements of the Project plans to see that the geotechnical engineering recommendations are properly interpreted.

6.2 Additional Construction Services

We are available to provide geotechnical engineering and monitoring services during construction. The integrity of the geotechnical elements depends on proper Site preparation and construction procedures. In addition, engineering decisions may have to be made in the field in the event that variations in subsurface conditions become apparent.

During the construction phase of the Project, we recommend that Aspect be retained to perform the following tasks:

- Review applicable submittals
- Observe and evaluate subgrade and structural fill placement for all footings, slabs-on-grade, retaining walls, and structural fill pads
- Attend meetings, as needed
- Address other geotechnical engineering considerations that may arise during construction

The purpose of our observations is to verify compliance with design concepts and recommendations and to allow design changes or evaluation of appropriate construction methods in the event that subsurface conditions differ from those anticipated prior to the start of construction.

7 References

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8 Limitations

Work for this project was performed for Otak, Inc. (Client), and this report was prepared consistent with recognized standards of professionals in the same locality and involving similar conditions, at the time the work was performed. No other warranty, expressed or implied, is made by Aspect Consulting, LLC (Aspect).

Recommendations presented herein are based on our interpretation of site conditions, geotechnical engineering calculations, and judgment in accordance with our mutually agreed-upon scope of work. Our recommendations are unique and specific to the project, site, and Client. Application of this report for any purpose other than the project should be done only after consultation with Aspect.

Variations may exist between the soil and groundwater conditions reported and those actually underlying the site. The nature and extent of such soil variations may change over time and may not be evident before construction begins. If any soil conditions are encountered at the site that are different from those described in this report, Aspect should be notified immediately to review the applicability of our recommendations.

Risks are inherent with any site involving slopes and no recommendations, geologic analysis, or engineering design can assure slope stability. Our observations, findings, and opinions are a means to identify and reduce the inherent risks to the Client.

It is the Client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, and agents, are made aware of this report in its entirety. At the time of this report, design plans and construction methods have not been finalized, and the recommendations presented herein are based on preliminary project information. If project developments result in changes from the preliminary project information, Aspect should be contacted to determine if our recommendations contained in this report should be revised and/or expanded upon.

The scope of work does not include services related to construction safety precautions. Site safety is typically the responsibility of the contractor, and our recommendations are not intended to direct the contractor’s site safety methods, techniques, sequences, or procedures. The scope of our work also does not include the assessment of environmental characteristics, particularly those involving potentially hazardous substances in soil or groundwater.

All reports prepared by Aspect for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect. Aspect’s original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to Appendix C titled “Report Limitations and Guidelines for Use” for additional information governing the use of this report.

We appreciate the opportunity to perform these services. If you have any questions please call Andrew J. Holmson, Senior Associate Geotechnical Engineer, 206.780.7731.

TABLES

Table 1. Summary of Geotechnical Laboratory Results

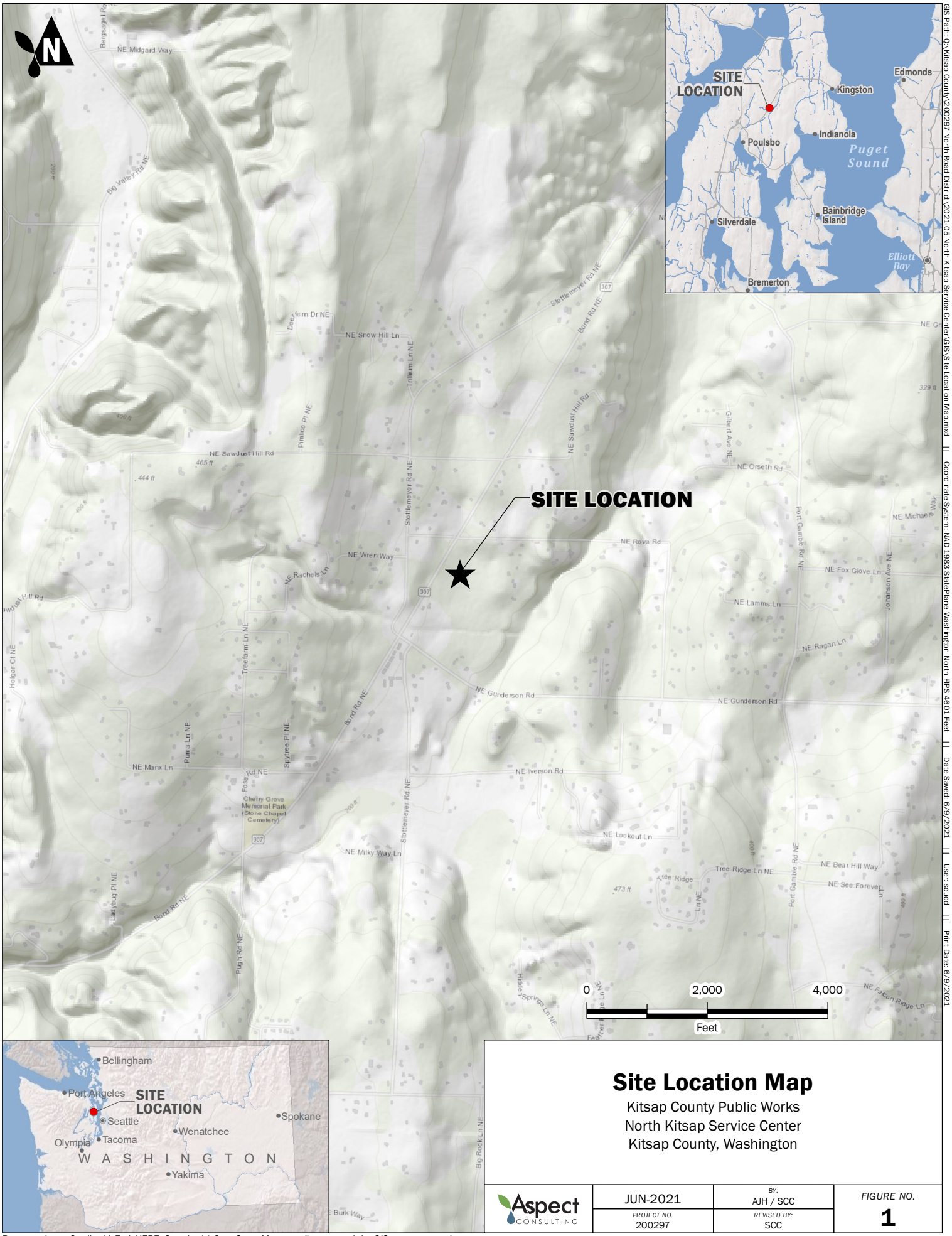
Project No. 200297 Kitsap County, Washington

Exploration	Sample ID	Depth (ft bgs)	MC (%)	Clay (%)	Silt (%)	Fines (%)	Sand (%)	Gravel (%)	Atterberg Limits	USCS Symbol	Description	Modified Proctor	
												Dry Unit Weight (pcf)	OMC (%)
AB-01	S1	5	10.0	4.8	37.6	42.4	50.8	6.8		SM	Silty Sand		
AB-01	S2	10	16.1			31.4	61.8	6.9		SM	Silty Sand		
AB-01	S3	15				20.4							
AB-01	S5	25	13.5										
AB-01	S6	30				17.0							
AB-01	S10	50	14.2			9.6	83.5	6.9		SW-SC	Well-graded Sand with Silty Clay		
AB-02	S2	10	13.6			33.6	60.8	5.5		SM	Silty Sand		
AB-02	S4	20				32.4							
AB-02	S6	30	12.7										
AB-02	S8	40	13.0			33.7	63.8	2.5		SM	Silty Sand		
AB-02	S10	50	10.7										
AMW-01	S1	5	8.5	6.5	48.3	54.7	36.1	9.2			Sandy Silt with Clay		
AMW-01	S3	15				64.5							
AMW-01	S5	25				19.7							
AMW-01	S6	30	19.5			40.2	58.9	1		SM	Silty Sand		
AMW-01	S7	35	13.6										
AMW-01	S9	45	12.1										
ATP-01	S2	7.5	19.1			12.9	78.6	8.5		SM	Silty Sand		
ATP-02	S2	8.0	23.8	2.0	97.4	99.4	0.6	0	Non-Plastic	ML	Silt		
ATP-03	S1	2.0	20.1										
ATP-03	S2	5.0	9.2			20.3	63.5	16.2		SM	Silty Sand with Gravel	126.6	7.4
ATP-04	S1	2.0	26.4										
ATP-04	S2	4.0				78.2							
ATP-05	S2	7.0	8.0			23	56.5	20.5		SM	Silty Sand with Gravel	132.8	6.8
ATP-05	S3	11.5	7.6										
ATP-06	S1	6.0				13.4							
ATP-07	S1	4.5	11.5	3.3	36.8	40.1	56.8	3.1		SM	Silty Sand		
ATP-08	S1	9.0	7.7	2.8	21.9	24.7	54.5	20.9		SM	Silty Sand with Gravel		
ATP-08	S3	11.5	7.1			22.5	63.4	14.1		SM	Silty Sand		

Abbreviations

% = percent
AB = Aspect geotechnical boring
AMW = Aspect monitoring well
ATP = Aspect test pit
ft bgs = feet below ground surface
MC = moisture content
ML = inorganic silt
OMC = optimum moisture content
pcf = pounds per cubic foot
SC = clayey sand
SM = silty sand
SW = well-graded sand
USCS = Unified Soil Classification System

FIGURES



Site Location Map

Kitsap County Public Works
North Kitsap Service Center
Kitsap County, Washington

Aspect CONSULTING	JUN-2021	BY: AJH / SCC	FIGURE NO. 1
	PROJECT NO. 200297	REVISED BY: SCC	

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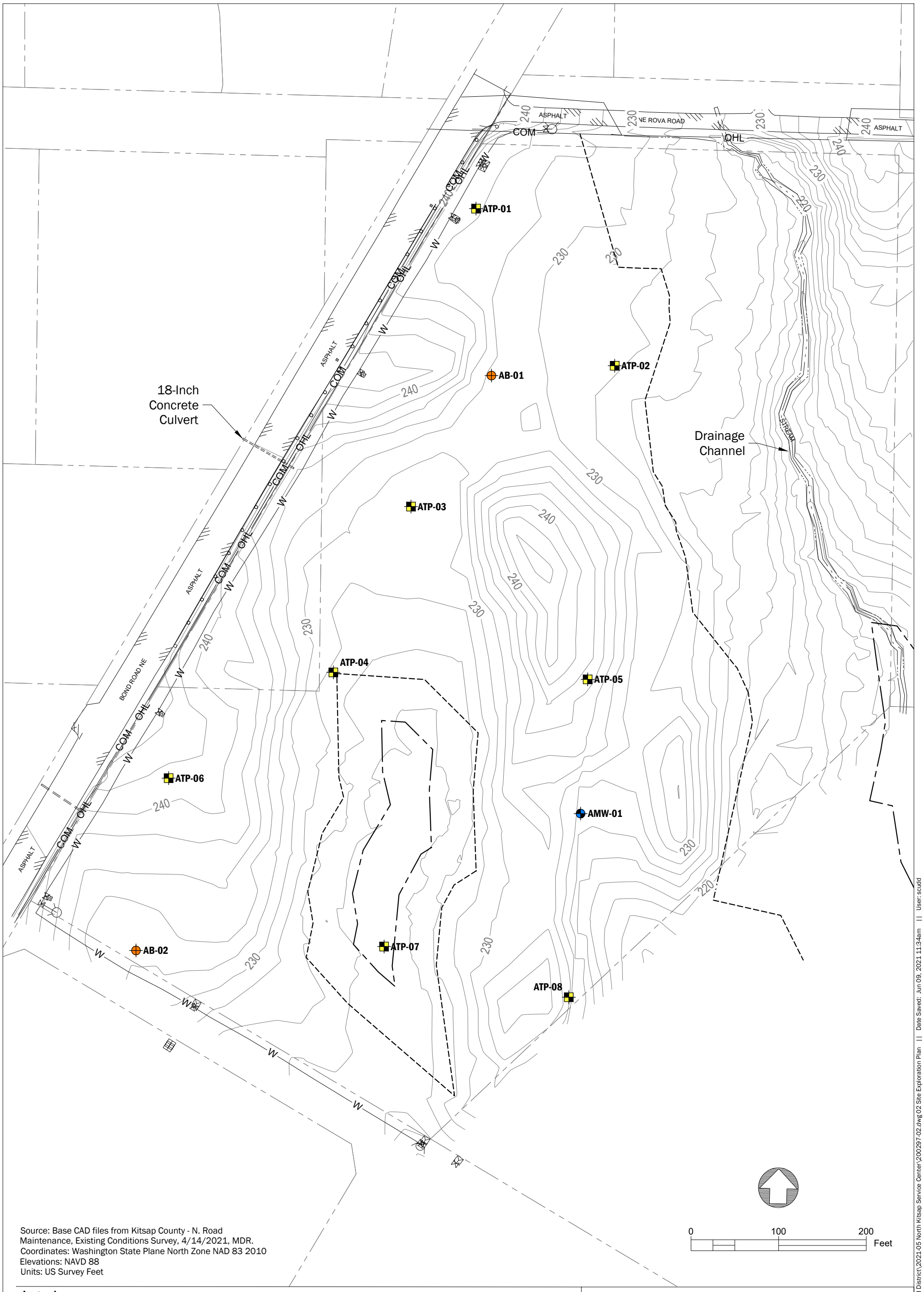
GIS Path: Q:\Kitsap County\200297 North Road District\2021-05 North Kitsap Service Center\GIS\Site Location Map.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 6/9/2021 || User: scudd || Print Date: 6/9/2021



Source: Base CAD files from Kitsap County - N. Road Maintenance, Existing Conditions Survey, 4/14/2021, MDR.
Coordinates: Washington State Plane North Zone NAD 83 2010
Elevations: NAVD 88
Units: US Survey Feet

Legend

- Boring Location
- Monitoring Well Location
- Test Pit Location
- Wetland Area
- Wetland Buffer
- Kitsap County Property Parcel
- 2 Foot Elevation Contour

Survey Bas Map Legend

- GAS LINE MARKER SIGN
- WATER VALVE
- FIRE HYDRANT
- FIRE DEPARTMENT CONNECTION
- WATER VAULT
- WATER METER
- COMMUNICATION RISER
- UTILITY POLE
- SIGN
- LINE CONTINUES
- OHL — OVER HEAD UTILITY LINE
- W — WATER LINE
- COM — COMMUNICATION LINE
- CULVERT PIPE

Site Exploration Plan

Kitsap County Public Works
North Kitsap Service Center
Kitsap County, Washington

Aspect Consulting	Jun-2021	BY: AJH/SCC	FIGURE NO. 2
	PROJECT NO. 200297	REVISED BY: -	

CAD Path: Q:\Kitsap County\200297 North Road District\2021-05 North Kitsap Service Center\200297-02.dwg 02 Site Exploration Plan || Date Saved: Jun 09, 2021 11:34am || User: scudd

Reference: Dragovich, J.D., et. al, 2002, Geologic Map of Washington Northwest Quadrant, Washington Division of Geology and Earth Resources, Geologic Map GM-50.

Glacial - Continental

Qgt

Till - Unsorted, unstratified, highly compacted mixture of clay, silt, sand, gravel, and boulders deposited by glacial ice; may contain interbedded stratified sand, silt, and gravel. *Includes part of the Vashon Drift undivided.*

Qga

Advance outwash - Glaciofluvial sand and gravel and lacustrine clay, silt, and sand deposited during the advance of glaciers; sandy units commonly thick, well sorted, and fine grained, with interlayered coarser sand, gravel, and cobbles; locally contains nonglacial sediments and deposits mapped as transitional between glacial and nonglacial. *Includes the Colvos and Esperance Sand Members of the Vashon Drift and part of the Vashon Drift undivided.*

0 8000 16000 Feet

Geologic Map

Kitsap County Public Works
North Kitsap Service Center
Kitsap County, Washington

Aspect Consulting	Jun-2021	BY: AJH/SCC	FIGURE NO. 3
	PROJECT NO. 200297	REVISED BY: -	

CAD Path: Q:\Kitsap County\200297 North Road District\2021-05 North Kitsap Service Center\200297-02.dwg 03 Geologic Map || Date Saved: Jun 09, 2021 11:51am || User: scudd

APPENDIX A

Subsurface Explorations

A. Subsurface Explorations Methodology

A field exploration program was performed to determine the geotechnical and hydrogeological properties of materials at the Site. An Aspect geologist was present throughout the program to observe the drilling procedure, assist in sampling, and to prepare descriptive logs of the exploration. Soils were classified in general accordance with ASTM D2488, *Standard Practice for Description and Identification of Soils* (Visual-Manual Procedure.) The summary exploration log represents our interpretation of the contents of the field logs. The stratigraphic contacts shown on the individual summary logs represent the approximate boundaries between soil types; actual transitions may be more gradual. The subsurface conditions depicted are only for the specific date and locations reported; therefore, they are not necessarily representative of other locations and times.

The exploration logs are provided within this appendix and locations of the test pits are shown on Figure 2. The explorations that were performed and the procedures followed are outlined below.

A.1 Test Pits

Test pits ATP-01 through ATP-08 were dug using a track-mounted excavator on April 27, 2020. The excavation was performed by High Meadows Excavating, an experienced and licensed local excavator under subcontract to Aspect. The test pits were advanced to depths ranging from 11 to 12.4 feet below ground surface (bgs). Disturbed soil samples were obtained by hand at select intervals.

Relative density/consistency of the soils was estimated using a dynamic cone penetrometer (DCP) test. DCP blow count refers to the number of blows required to achieve 1.75 inches of penetration with a 1.5-inch, 45-degree cone driven using a 15-pound mass falling 20 inches to strike an anvil. DCP blow counts have been calibrated with Standard Penetration Test (SPT) N-values to quantitively estimate relative density or consistency of soil. Additional relative density/consistency observations were made using a 0.5-inch-diameter steel T-probe and through visual observations (such as resistance of the soil to the excavator bucket and stand-up time of the test-pit sidewalls, etc.).

A.2 Sonic Borings

On March 22 and 23, 2021, Holocene Drilling, Inc. completed three borings, designated AB-01, AB-02, and AMW-01, to total exploration depths between 50.25 and 50.9 feet below ground surface (bgs). The exploration locations are shown on Figure 2 and the exploration logs are included in this appendix. All borings were drilled using sonic drilling techniques.

Soil sampling was completed at selected depth intervals using the Standard Penetration Test (SPT) in general accordance with ASTM International (ASTM) D1586, *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils*. The test involved driving a 2-inch-outside-diameter split-barrel sampler 18 inches into the soil

with a 140-pound automatic-trip hammer free falling from a distance of 30 inches. The number of blows for each 6-inch interval was recorded. The number of blows required to drive the sampler the final 12 inches is known as the Standard Penetration Resistance ("N") or blow count. The resistance, or N-value, provides a measure of the relative density of granular soils or the relative consistency of cohesive soils.

Upon completion, borings AB-01 and AB-02 were backfilled with hydrated 3/8-inch bentonite chips in accordance with requirements of the Washington State Department of Ecology. AMW-01 was equipped with a groundwater monitoring well installation consisting of 4-inch-diameter threaded Schedule 40, polyvinyl chloride (PVC) solid-wall casing and 0.020-inch (20 slot) screen for the screened interval. A sand filter pack was installed around the screened intervals. A concrete surface seal with a metal, flush-mount monument was installed at the ground surface to protect the well.

Coarse-Grained Soils - More than 50%[1] Retained on No. 200 Sieve	Gravels - More than 50%[1] of Coarse Fraction Retained on No. 4 Sieve	≤5% Fines	GW	Well-graded GRAVEL Well-graded GRAVEL WITH SAND
			GP	Poorly-graded GRAVEL Poorly-graded GRAVEL WITH SAND
		≥15% Fines	GM	SILTY GRAVEL SILTY GRAVEL WITH SAND
			GC	CLAYEY GRAVEL CLAYEY GRAVEL WITH SAND
	Sands - 50%[1] or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines	SW	Well-graded SAND Well-graded SAND WITH GRAVEL
			SP	Poorly-graded SAND Poorly-graded SAND WITH GRAVEL
		≥15% Fines	SM	SILTY SAND SILTY SAND WITH GRAVEL
			SC	CLAYEY SAND CLAYEY SAND WITH GRAVEL
Fine-Grained Soils - 50%[1] or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less than 50%		ML	SILT SANDY or GRAVELLY SILT SILT WITH SAND SILT WITH GRAVEL
			CL	LEAN CLAY SANDY or GRAVELLY LEAN CLAY LEAN CLAY WITH SAND LEAN CLAY WITH GRAVEL
			OL	ORGANIC SILT SANDY or GRAVELLY ORGANIC SILT ORGANIC SILT WITH SAND ORGANIC SILT WITH GRAVEL
	Silts and Clays Liquid Limit 50% or More		MH	ELASTIC SILT SANDY or GRAVELLY ELASTIC SILT ELASTIC SILT WITH SAND ELASTIC SILT WITH GRAVEL
			CH	FAT CLAY SANDY or GRAVELLY FAT CLAY FAT CLAY WITH SAND FAT CLAY WITH GRAVEL
			OH	ORGANIC CLAY SANDY or GRAVELLY ORGANIC CLAY ORGANIC CLAY WITH SAND ORGANIC CLAY WITH GRAVEL
Highly Organic Soils			PT	PEAT and other mostly organic soils

"WITH SILT" or "WITH CLAY" means 5 to 15% silt and clay, denoted by a "-" in the group name; e.g., SP-SM • "SILTY" or "CLAYEY" means >15% silt and clay • "WITH SAND" or "WITH GRAVEL" means 15 to 30% sand and gravel. • "SANDY" or "GRAVELLY" means >30% sand and gravel. • "Well-graded" means approximately equal amounts of fine to coarse grain sizes • "Poorly graded" means unequal amounts of grain sizes • Group names separated by "/" means soil contains layers of the two soil types; e.g., SM/ML.

Soils were described and identified in the field in general accordance with the methods described in ASTM D2488. Where indicated in the log, soils were classified using ASTM D2487 or other laboratory tests as appropriate. Refer to the report accompanying these exploration logs for details.

1. Estimated or measured percentage by dry weight
2. (SPT) Standard Penetration Test (ASTM D1586)
3. Determined by SPT, DCPT (ASTM STP399) or other field methods. See report text for details.

GEOTECHNICAL LAB TESTS

MC	=	Natural Moisture Content
PS	=	Particle Size Distribution
FC	=	Fines Content (% < 0.075 mm)
GH	=	Hydrometer Test
AL	=	Atterberg Limits
C	=	Consolidation Test
Str	=	Strength Test
OC	=	Organic Content (% Loss by Ignition)
Comp	=	Proctor Test
K	=	Hydraulic Conductivity Test
SG	=	Specific Gravity Test

CHEMICAL LAB TESTS

Organic Chemicals

BTEX	=	Benzene, Toluene, Ethylbenzene, Xylenes
TPH-Dx	=	Diesel and Oil-Range Petroleum Hydrocarbons
TPH-G	=	Gasoline-Range Petroleum Hydrocarbons
VOCs	=	Volatile Organic Compounds
SVOCs	=	Semi-Volatile Organic Compounds
PAHs	=	Polycyclic Aromatic Hydrocarbon Compounds
PCBs	=	Polychlorinated Biphenyls

Metals

RCRA8	=	As, Ba, Cd, Cr, Pb, Hg, Se, Ag, (d = dissolved, t = total)
MTCA5	=	As, Cd, Cr, Hg, Pb (d = dissolved, t = total)
PP-13	=	Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, Zn (d=dissolved, t=total)

FIELD TESTS

PID	=	Photoionization Detector
Sheen	=	Oil Sheen Test
SPT[2]	=	Standard Penetration Test
NSPT	=	Non-Standard Penetration Test
DCPT	=	Dynamic Cone Penetration Test

COMPONENT DEFINITIONS

Descriptive Term		*Size Range and Sieve Number*
Boulders	=	Larger than 12 inches
Cobbles	=	3 inches to 12 inches
Coarse Gravel	=	3 inches to 3/4 inches
Fine Gravel	=	3/4 inches to No. 4 (4.75 mm)
Coarse Sand	=	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	=	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	=	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	=	Smaller than No. 200 (0.075 mm)

ESTIMATED[1] PERCENTAGE

% by Weight		*Modifier*	*% by Weight*		*Modifier*
<1	=	Subtrace	15 to 25	=	Little
1 to <5	=	Trace	30 to 45	=	Some
5 to 10	=	Few	>50	=	Mostly

MOISTURE CONTENT

Dry	=	Absence of moisture, dusty, dry to the touch
Slightly Moist	=	Perceptible moisture
Moist	=	Damp but no visible water
Very Moist	=	Water visible but not free draining
Wet	=	Visible free water, usually from below water table

RELATIVE DENSITY

Non-Cohesive or Coarse-Grained Soils

Density[3]		*SPT*[2] *Blows/Foot*	*Penetration with 1/2" Diameter Rod*
Very Loose	=	0 to 4	≥ 2'
Loose	=	5 to 10	1' to 2'
Medium Dense	=	11 to 30	3" to 1'
Dense	=	31 to 50	1" to 3"
Very Dense	=	> 50	< 1"

CONSISTENCY

Cohesive or Fine-Grained Soils

Consistency[3]		*SPT*[2] *Blows/Foot*	*Manual Test*
Very Soft	=	0 to 1	Penetrated >1" easily by thumb. Extrudes between thumb & fingers.
Soft	=	2 to 4	Penetrated 1/4" to 1" easily by thumb. Easily molded.
Medium Stiff	=	5 to 8	Penetrated >1/4" with effort by thumb. Molded with strong pressure.
Stiff	=	9 to 15	Indented ~1/4" with effort by thumb.
Very Stiff	=	16 to 30	Indented easily by thumbnail.
Hard	=	> 30	Indented with difficulty by thumbnail.

GEOLOGIC CONTACTS

Observed and Distinct — Observed and Gradual — Inferred

Aspect CONSULTING

Exploration Log Key

Aspect CONSULTING	North Kitsap Service Center - 200297		Geotechnical Exploration Log	
	Project Address & Site Specific Location Parcel No. 062602-2-064-2007, Kitsap County, Site North		*Coordinates (SPN NAD83 ft)* E:1205300 N:288330 (est)	*Exploration Number* **ATP-01**
Contractor High Meadows Excavating	*Equipment* Hitachi ZAXIS 85USB	*Sampling Method* Grab	*Ground Surface Elev.* 233.8' (est)	
Operator David	*Exploration Method(s)* Test Pit	*Work Start/Completion Dates* 3/19/2021	*Top of Casing Elev.* NA	*Depth to Water (Below GS)* 6' (Seep)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
0	233	Backfilled with the excavated material tamped into place.						**TOPSOIL** SANDY SILT (ML); very soft, moist, dark brown; non-plastic; fine to coarse sand; abundant organics.	0
1						DCPT =4,5,8		**WEATHERED VASHON TILL** SILTY SAND (SM); dense, moist, light brown; fine to medium sand; few fine gravel; dense roots.	1
2	232								2
3	231					DCPT =12,12/1"		SILTY SAND WITH GRAVEL (SM); very dense, moist, gray brown with iron oxide staining; coarse sand; fine to coarse gravel. Becomes gray brown without iron oxide staining.	3
4	230		S1						4
5	229								5
6	228	3/19/2021 Perched							6
7	227							3" Silt (ML) lense, very stiff, moist, gray with iron oxide staining; medium plasticity.	7
8	226		S2	●		PS FC=12.9%		SILTY SAND (SM); very dense, moist, dark gray; fine to medium sand; few fine to coarse gravel.	8
9	225								9
10	224								10
11	223							SAND WITH SILT (SP-SM); very dense, moist, gray; fine sand.	11
12	222		S3						12
13	221							Bottom of exploration at 12.5 ft. bgs. Note: Test pit terminated per plan.	13
14	220								14
	219								

Legend

Sample Type: Grab sample

Plastic Limit ⊢⊣ Liquid Limit

Water Level: Water Level (Seepage)

See Exploration Log Key for explanation of symbols

Logged by: JRG
Approved by: AJH

Exploration Log ATP-01
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KITSAP NORTH MAINTENANCE FACILITY - 200297 - ATP.GPJ July 19, 2021

Aspect CONSULTING	North Kitsap Service Center - 200297		Geotechnical Exploration Log	
	Project Address & Site Specific Location Parcel No. 062602-2-064-2007, Kitsap County, Site Northeast		*Coordinates (SPN NAD83 ft)* E:1205400 N:288150 (est)	*Exploration Number* **ATP-02**
Contractor High Meadows Excavating	*Equipment* Hitachi ZAXIS 85USB	*Sampling Method* Grab	*Ground Surface Elev.* 227.3' (est)	
Operator David	*Exploration Method(s)* Test Pit	*Work Start/Completion Dates* 3/19/2021	*Top of Casing Elev.* NA	*Depth to Water (Below GS)* 4' (Seep)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
0	227	Backfilled with the excavated material tamped into place.						**TOPSOIL** SANDY SILT (ML); very soft, moist, dark brown; non-plastic; fine to coarse sand; abundant organics.	0
1	226					DCPT =4,4,5		**WEATHERED VASHON TILL** SILTY SAND (SM); dense, moist, light brown; fine to medium sand; few fine gravel; some organics.	1
2	225								2
3	224					DCPT =5,9,12/1"		SILTY SAND (SM); very dense, moist, gray brown; fine sand; trace fine gravel.	3
4	223	3/19/2021 Perched							4
5	222		S1					SILT (ML); very stiff, moist, gray brown; non-plastic; trace fine gravel.	5
6	221								6
7	220								7
8	219		S2	●		MC, GH, AL FC=99.4%		SILT (ML); medium stiff; light brown; low to medium plasticity; trace gravel; trace 3" cobbles.	8
9	218								9
10	217								10
11	216							SILTY SAND WITH GRAVEL AND COBBLES (SM); very dense, moist, gray brown; fine to medium sand; fine to coarse gravel; 3" cobbles.	11
12	215								12
13	214							Bottom of exploration at 12.5 ft. bgs. Note: Test pit terminated per plan.	13
14	213								14

Legend

Sample Type: Grab sample

Plastic Limit ⊢⟶⊣ Liquid Limit

Water Level: Water Level (Seepage)

See Exploration Log Key for explanation of symbols

Logged by: JRG
Approved by: AJH

Exploration Log ATP-02
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KITSAP NORTH MAINTENANCE FACILITY - 200297 - ATP.GPJ July 19, 2021

Aspect CONSULTING	North Kitsap Service Center - 200297		Geotechnical Exploration Log	
	Project Address & Site Specific Location Parcel No. 062602-2-064-2007, Kitsap County, Site Center		*Coordinates (SPN NAD83 ft)* E:1205200 N:287990 (est)	*Exploration Number* **ATP-03**
Contractor High Meadows Excavating	*Equipment* Hitachi ZAXIS 85USB	*Sampling Method* Grab	*Ground Surface Elev.* 228' (est)	
Operator David	*Exploration Method(s)* Test Pit	*Work Start/Completion Dates* 3/19/2021	*Top of Casing Elev.* NA	*Depth to Water (Below GS)* 8.5' (Seep)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
0	228							**TOPSOIL** SANDY SILT (ML); very soft, moist, dark brown; non-plastic; fine to coarse sand; abundant organics.	0
1	227	Backfilled with the excavated material tamped into place.				DCPT =8,12/1"		**WEATHERED VASHON TILL** SAND WITH SILT (SP-SM); dense, moist, light brown with iron oxide staining; fine to medium sand; few fine gravel; some organics.	1
2	226		S1	●		MC			2
3	225					DCPT =12/1"			3
4	224							SILT (ML); very stiff, moist, gray with iron oxide staining; medium plasticity.	4
5	223	Bucket sample.	S2	●		MC, MP FC=20.3%		SILTY SAND WITH GRAVEL AND COBBLES (SM); very dense, moist, gray brown; fine to coarse sand; fine to coarse gravel; 3" to 5" cobbles.	5
6	222								6
7	221								7
8	220	▽ 3/19/2021							8
9	219								9
10	218		S3					Becomes with 3" to 12" cobbles.	10
11	217								11
12	216							Bottom of exploration at 12 ft. bgs. Note: Test pit terminated per plan.	12
13	215								13
14	214								14

Legend

Sample Type: ☑ Grab sample

Plastic Limit ⊢⊣ Liquid Limit

Water Level: ▽ Water Level (Seepage)

See Exploration Log Key for explanation of symbols

Logged by: JRG
Approved by: AJH

Exploration Log ATP-03
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KITSAP NORTH MAINTENANCE FACILITY - 200297 - ATP.GPJ July 19, 2021

Aspect CONSULTING	North Kitsap Service Center - 200297		Geotechnical Exploration Log	
	Project Address & Site Specific Location Parcel No. 062602-2-064-2007, Kitsap County, Site Center		*Coordinates (SPN NAD83 ft)* E:1205100 N:287800 (est)	*Exploration Number* **ATP-04**
Contractor High Meadows Excavating	*Equipment* Hitachi ZAXIS 85USB	*Sampling Method* Grab	*Ground Surface Elev.* 226.4' (est)	
Operator David	*Exploration Method(s)* Test Pit	*Work Start/Completion Dates* 3/19/2021	*Top of Casing Elev.* NA	*Depth to Water (Below GS)* 3.5' (Seep)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
0	226	Backfilled with the excavated material tamped into place.						**TOPSOIL** SANDY SILT (ML); very soft, moist, dark brown; non-plastic; fine to coarse sand; abundent organics.	0
1	225							**WEATHERED VASHON TILL** SILTY SAND (SM); dense, moist, light brown; fine to medium sand; few fine gravel; some roots.	1
2	224		S1	●		DCPT =2,12/0.5" MC			2
3	223	▽ 3/19/2021 Perched						SANDY SILT (ML); very stiff, moist, light gray with iron oxide staining; medium plasticity; fine sand.	3
4	222		S2			FC FC=78.2%			4
5	221							SILTY SAND WITH GRAVEL (SM); very dense, moist, gray brown; fine sand; fine gravel.	5
6	220								6
7	219							3" Silt (ML) lense, very stiff, moist, gray with iron oxide staining; medium plasticity. Becomes wet.	7
8	218							Sand becomes fine to coarse.	8
9	217								9
10	216								10
11	215								11
12	214		S3					Bottom of exploration at 12.5 ft. bgs. Note: Test pit terminated per plan.	12
13	213								13
14	212								14

Legend

Sample Type: Grab sample

Plastic Limit ⊢⟶⊣ Liquid Limit

Water Level: ▽ Water Level (Seepage)

See Exploration Log Key for explanation of symbols

Logged by: JRG
Approved by: AJH

Exploration Log ATP-04
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KITSAP NORTH MAINTENANCE FACILITY - 200297 - ATP.GPJ July 19, 2021

Aspect CONSULTING	North Kitsap Service Center - 200297		Geotechnical Exploration Log	
	Project Address & Site Specific Location Parcel No. 062602-2-064-2007, Kitsap County, Site East		*Coordinates (SPN NAD83 ft)* E:1205400 N:287790 (est)	*Exploration Number* **ATP-05**
Contractor High Meadows Excavating	*Equipment* Hitachi ZAXIS 85USB	*Sampling Method* Grab	*Ground Surface Elev.* 237.9' (est)	
Operator David	*Exploration Method(s)* Test Pit	*Work Start/Completion Dates* 3/19/2021	*Top of Casing Elev.* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
0	237	Backfilled with the excavated material tamped into place.						**TOPSOIL** SANDY SILT (ML); very soft, moist, dark brown; non-plastic; fine to coarse sand; abundant organics.	0
								WEATHERED VASHON TILL SILTY SAND WITH GRAVEL (SM); medium dense, moist, light brown; coarse sand; fine to coarse gravel; some roots.	
2	236					DCPT =3,6,10			2
3	235					DCPT =3,5,9			3
4	234		S1					SILTY SAND WITH GRAVEL AND COBBLES (SM); very dense, moist, gray brown; fine to coarse sand; fine to coarse gravel; 3" to 5" cobble.	4
5	233								5
6	232								6
7	231	Bucket sample.	S2	● I		MC, MP LL=23%			7
8	230	Operator reports hard digging.							8
9	229								9
10	228								10
11	227								11
12	226		S3	●		MC		Bottom of exploration at 12 ft. bgs. Note: Test pit terminated per plan.	12
13	225								13
14	224								14
	223								

Legend

Sample Type: Grab sample

Plastic Limit ⊢⊣ Liquid Limit

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: JRG
Approved by: AJH

Exploration Log ATP-05

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KITSAP NORTH MAINTENANCE FACILITY - 200297 - ATP.GPJ July 19, 2021

Aspect CONSULTING	North Kitsap Service Center - 200297		Geotechnical Exploration Log	
	Project Address & Site Specific Location Parcel No. 062602-2-064-2007, Kitsap County, Site Southwest		*Coordinates (SPN NAD83 ft)* E:1204900 N:287680 (est)	*Exploration Number* **ATP-06**
Contractor High Meadows Excavating	*Equipment* Hitachi ZAXIS 85USB	*Sampling Method* Grab	*Ground Surface Elev.* 240.9' (est)	
Operator David	*Exploration Method(s)* Test Pit	*Work Start/Completion Dates* 3/19/2021	*Top of Casing Elev.* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
1	240	Backfilled with the excavated material tamped into place.				DCPT =2,2,3		**TOPSOIL** SANDY SILT (ML); very soft, moist, dark brown; non-plastic; fine to coarse sand; abundant organics; some roots.	1
								WEATHERED VASHON TILL SILTY SAND WITH GRAVEL (SM); medium dense, moist, light brown; fine to coarse sand; fine to coarse gravel; some roots and organics.	
2	239								2
3	238								3
								SILTY SAND WITH GRAVEL AND COBBLES (SM); very dense, moist, gray brown; fine to coarse sand; fine to coarse gravel; 3" to 5" cobbles	
4	237								4
5	236								5
6	235		S1			FC FC=13.4%			6
7	234							Becomes 3" to 8" cobbles.	7
8	233								8
9	232								9
10	231								10
11	230		S2						11
12	229							Bottom of exploration at 12 ft. bgs. Note: Test pit terminated per plan.	12
13	228								13
14	227								14
	226								

Legend

Sample Type: Grab sample

Plastic Limit ⊢⊣ Liquid Limit

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: JRG
Approved by: AJH

Exploration Log ATP-06
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KITSAP NORTH MAINTENANCE FACILITY - 200297 - ATP.GPJ July 19, 2021

Aspect CONSULTING	North Kitsap Service Center - 200297		Geotechnical Exploration Log	
	Project Address & Site Specific Location Parcel No. 062602-2-064-2007, Kitsap County, Site South		*Coordinates (SPN NAD83 ft)* E:1205200 N:287490 (est)	*Exploration Number* **ATP-07**
Contractor High Meadows Excavating	*Equipment* Hitachi ZAXIS 85USB	*Sampling Method* Grab	*Ground Surface Elev.* 222.5' (est)	
Operator David	*Exploration Method(s)* Test Pit	*Work Start/Completion Dates* 3/19/2021	*Top of Casing Elev.* NA	*Depth to Water (Below GS)* 2' (Seep)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
0	222	Backfilled with the excavated material tamped into place.						**TOPSOIL** SANDY SILT (ML); very soft, moist, dark brown; non-plastic; fine to coarse sand; abundant organics. Becomes wet.	0
1	221					DCPT =6,5,8			1
2	220	3/19/2021 Perched						**WEATHERED TILL** SILTY SAND (SM); medium, wet, light brown; fine to medium sand; trace fine gravel.	2
3	219					DCPT =8,7,8			3
4	218		S1	●		MC, GH FC=40.1%			4
5	217							SILTY SAND WITH GRAVEL AND COBBLES (SM); dense, moist, gray brown; fine to coarse sand; fine to coarse gravel; 3" to 5" cobble.	5
6	216								6
7	215								7
8	214								8
9	213		S2						9
10	212								10
11	211								11
12	210							Bottom of exploration at 11.5 ft. bgs. Note: Test pit terminated per plan.	12
13	209								13
14	208								14

Legend

Sample Type: Grab sample

Plastic Limit ⊢⊣ Liquid Limit

Water Level: Water Level (Seepage)

See Exploration Log Key for explanation of symbols

Logged by: JRG
Approved by: AJH

Exploration Log ATP-07
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KITSAP NORTH MAINTENANCE FACILITY - 200297 - ATP.GPJ July 19, 2021

Aspect CONSULTING	North Kitsap Service Center - 200297		Geotechnical Exploration Log	
	Project Address & Site Specific Location Parcel No. 062602-2-064-2007, Kitsap County, Site Southeast		*Coordinates (SPN NAD83 ft)* E:1205400 N:287430 (est)	*Exploration Number* **ATP-08**
Contractor High Meadows Excavating	*Equipment* Hitachi ZAXIS 85USB	*Sampling Method* Grab	*Ground Surface Elev.* 229.8' (est)	
Operator David	*Exploration Method(s)* Test Pit	*Work Start/Completion Dates* 3/19/2021	*Top of Casing Elev.* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
0	229	Backfilled with the excavated material tamped into place.						**TOPSOIL** SANDY SILT (ML); very soft, moist, dark brown; non-plastic; fine to coarse sand; abundant organics.	0
1	229					DCPT =5,5,7		**WEATHERED VASHON TILL** SILTY SAND WITH GRAVEL (SM); dense, moist, light brown; fine to coarse sand; fine gravel; dense roots.	1
2	228		S1						2
3	227					DCPT =7,12,12/0.5"			3
4	226							SILTY SAND WITH GRAVEL AND COBBLES (SM); very dense, moist, gray brown; fine to coarse sand; fine to coarse gravel; 3" cobbles.	4
5	225	Operator reports hard digging.							5
6	224								6
7	223								7
8	222								8
9	221	Bucket sample.	S2	●		MC, GH FC=24.7%			9
10	220							Becomes few gravel.	10
11	219								11
12	218		S3	●		PS FC=22.5%			12
13	217							Bottom of exploration at 12.5 ft. bgs. Note: Test pit terminated per plan.	13
14	216								14
	215								

Legend

Sample Type: Grab sample

Plastic Limit ⊢⊣ Liquid Limit

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: JRG
Approved by: AJH

Exploration Log ATP-08

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KITSAP NORTH MAINTENANCE FACILITY - 200297 - ATP.GPJ July 19, 2021

Aspect CONSULTING	North Kitsap Service Center - 200297		Geotechnical Exploration Log	
	Project Address & Site Specific Location Parcel No. 062602-2-064-2007, Kitsap County, Site North		*Coordinates (SPN NAD83 ft)* E:1205300 N:288140	*Exploration Number* **AB-01**
Contractor Holocene	*Equipment* Sonic Geoprobe 8140LC	*Sampling Method* Autohammer; 140 lb hammer; 30" drop	*Ground Surface Elev. (NAVD88)* 230'	
Operator Corey Thrash	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 3/22/2021	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* 18.3' (ATD)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
		Backfilled with 3/8" bentonite chips and capped with topsoil.						**TOPSOIL** SANDY SILT WITH GRAVEL (ML); loose, moist, dark brown; non-plastic; fine to coarse sand; fine to coarse gravel; abundant organics.	
								WEATHERED VASHON TILL SILTY SAND WITH GRAVEL (SM); very dense, moist, light brown; fine to coarse sand; fine gravel; few roots.	
								Becomes gray brown without organics at 4 ft bgs.	
5	225		S1	● ▲	39 30 30	MC, GH FC=42.4%			5
								Iron oxide staining from 9.5 to 10.5 ft bgs.	
10	220	Low recovery due to coarse gravel in shoe.	S2	● ▲	26 36 40	PS FC=31.4%			10
								Becomes with 3" to 6" cobbles at 12 ft bgs.	
15	215	▽ 3/22/2021 10:26am	S3	● ▲	9 19 28	FC FC=20.4%			15
								Becomes wet at 16 ft bgs.	
		▽ 3/22/2021 10:18am						**VASHON TILL** SILTY SAND WITH GRAVEL AND COBBLES (SM); very dense, moist, gray brown; fine to coarse sand; fine to coarse gravel; 3" to 4" cobbles; irregularly scattered silt (ML) lenses.	
20	210		S4	▲	41 50/4"				20
25	205		S5	● ▲	39 50/4"	MC			25

Legend

Sample Type
- ◯ No Soil Sample Recovery
- ◧ Continuous core 5" ID
- ◪ Split Barrel 2" X 1.375" (SPT)

Plastic Limit ⊢⊣ Liquid Limit

Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: JRG
Approved by: AJH

Exploration Log AB-01
Sheet 1 of 2

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KITSAP NORTH MAINTENANCE FACILITY - 200297 - AB_AMW.GPJ July 19, 2021

Aspect CONSULTING	North Kitsap Service Center - 200297		Geotechnical Exploration Log	
	Project Address & Site Specific Location Parcel No. 062602-2-064-2007, Kitsap County, Site North		*Coordinates (SPN NAD83 ft)* E:1205300 N:288140	*Exploration Number* **AB-01**
Contractor Holocene	*Equipment* Sonic Geoprobe 8140LC	*Sampling Method* Autohammer; 140 lb hammer; 30" drop	*Ground Surface Elev. (NAVD88)* 230'	
Operator Corey Thrash	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 3/22/2021	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* 18.3' (ATD)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
			S6		12 10 30	FC FC=17%		**VASHON TILL** SILTY SAND WITH GRAVEL AND COBBLES (SM); very dense, moist, gray brown; fine to coarse sand; fine to coarse gravel; 3" to 4" cobbles; irregularly scattered silt (ML) lenses. (continued) Sand becomes coarse at 30 ft bgs.	
35	195		S7		17 38 50/5"			Trace iron oxide staining at 38 ft bgs.	35
40	190	Low continuous core recovery due to seepage.	S8		15 26 37				40
45	185		S9		12 30 36				45
50	180		S10		24 50/5"	PS FC=9.6%		Bottom of exploration at 50.9 ft. bgs. Note: Boring terminated per plan. Gravel content in the labs is typically less than 15% but may not be representative of the unit due to sampling limitations (2" sampler). These samples are limited for representing larger particle sizes.	50
55	175								55

Legend

Sample Type
- ◯ No Soil Sample Recovery
- ◧ Continuous core 5" ID
- ◪ Split Barrel 2" X 1.375" (SPT)

Plastic Limit ⊢—⊣ Liquid Limit

Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: JRG
Approved by: AJH

Exploration Log AB-01
Sheet 2 of 2

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KITSAP NORTH MAINTENANCE FACILITY - 200297 - AB_AMW.GPJ July 19, 2021

Aspect CONSULTING	North Kitsap Service Center - 200297		Geotechnical Exploration Log	
	Project Address & Site Specific Location Parcel No. 062602-2-064-2007, Kitsap County, Site South		*Coordinates (SPN NAD83 ft)* E:1204900 N:287480	*Exploration Number* **AB-02**
Contractor Holocene	*Equipment* Sonic Geoprobe 8140LC	*Sampling Method* Autohammer; 140 lb hammer; 30" drop	*Ground Surface Elev. (NAVD88)* 232.1'	
Operator Corey Thrash	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 3/23/2021	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* 18.25' (ATD)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
0	232	Backfilled with 3/8" bentonite chips and capped with topsoil.						**TOPSOIL** SANDY SILT WITH GRAVEL (ML); loose, moist, dark brown; non-plastic; fine to coarse sand; fine to coarse gravel; abundant organics.	0
								WEATHERED VASHON TILL SILTY SAND WITH GRAVEL AND COBBLES (SM); very dense, moist, light brown; fine to coarse sand; fine to coarse gravel; 3" to 4" cobbles; trace organics. Iron oxide staining from 3.0 to 24.0 ft bgs at irregular intervals Becomes gray brown without organics at 4 ft bgs. Blows/foot overstate the soil density due to the presence of gravel and cobbles.	
5	230		S1	▲	24 26 30				5
10	225		S2	● ▲	6 6 9	PS FC=33.6%		SILTY SAND (SM); medium dense, moist, gray brown; fine to medium sand; few fine to coarse gravel; trace 3" to 4" cobbles.	10
15	220	▽ 3/23/2021 1:12pm	S3	▲	10 10 12			SILTY SAND WITH GRAVEL AND COBBLES (SM); medium dense, wet, gray brown; coarse sand; fine to coarse gravel; 3" to 4" cobbles.	15
	215	▽ 3/23/2021 1:08pm						Becomes moist; sand becomes fine to medium at 19 ft bgs.	
20	210		S4	▲	6 10 20	FC FC=32.4%			20
								VASHON TILL SILTY SAND WITH GRAVEL AND COBBLES (SM); very dense, moist, gray brown; fine to medium sand; fine to coarse gravel; 3" to 4" cobbles.	
25	205		S5	▲	50/6"				25

Legend

Sample Type
- Continuous core 5" ID
- Split Barrel 2" X 1.375" (SPT)

Plastic Limit ⊢⊣ Liquid Limit

Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: JRG
Approved by: AJH

Exploration Log AB-02
Sheet 1 of 2

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KITSAP NORTH MAINTENANCE FACILITY - 200297 - AB_AMW.GPJ July 19, 2021

Aspect CONSULTING	North Kitsap Service Center - 200297		Geotechnical Exploration Log	
	Project Address & Site Specific Location Parcel No. 062602-2-064-2007, Kitsap County, Site South		*Coordinates (SPN NAD83 ft)* E:1204900 N:287480	*Exploration Number* **AB-02**
Contractor Holocene	*Equipment* Sonic Geoprobe 8140LC	*Sampling Method* Autohammer; 140 lb hammer; 30" drop	*Ground Surface Elev. (NAVD88)* 232.1'	
Operator Corey Thrash	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 3/23/2021	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* 18.25' (ATD)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
			S6		50/3"	MC		**VASHON TILL** SILTY SAND WITH GRAVEL AND COBBLES (SM); very dense, moist, gray brown; fine to medium sand; fine to coarse gravel; 3" to 4" cobbles. (continued)	
	200							SILTY GRAVEL WITH SAND AND COBBLES (GM); very dense, wet, dark gray; coarse sand; fine to coarse gravel; 3" to 4" cobbles.	
35			S7		50/5"			SILTY SAND WITH GRAVEL (SM); very dense, moist, gray brown; fine to medium sand; fine to coarse gravel.	35
	195								
40			S8		9 24 50/4"	PS FC=33.7%		Becomes with 3" cobbles.	40
	190							Sand becomes coarse.	
45			S9		40 50/2"			Sand becomes fine to medium.	45
	185								
50			S10		22 50/3"	MC		Bottom of exploration at 50.75 ft. bgs. Note: Boring terminated per plan. Gravel content in the labs is typically less than 15% but may not be representative of the unit due to sampling limitations (2" sampler). These samples are limited for representing larger particle sizes.	50
	180								
55									55
	175								

Legend

Sample Type
- Continuous core 5" ID
- Split Barrel 2" X 1.375" (SPT)

Plastic Limit ⊢⊣ Liquid Limit

Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: JRG
Approved by: AJH

Exploration Log AB-02
Sheet 2 of 2

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KITSAP NORTH MAINTENANCE FACILITY - 200297 - AB_AMW.GPJ July 19, 2021

Aspect CONSULTING	North Kitsap Service Center - 200297		Geotechnical Exploration Log	
	Project Address & Site Specific Location Parcel No. 062602-2-064-2007, Kitsap County, Site East		*Coordinates (SPN NAD83 ft)* E:1205400 N:287640	*Exploration Number* **AMW-01**
Contractor Holocene	*Equipment* Sonic Geoprobe 8140LC	*Sampling Method* Autohammer; 140 lb hammer; 30" drop	*Ground Surface Elev. (NAVD88)* 226.4'	
Operator Corey Thrash	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 3/22/2021	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* 18.5' (ATD)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
		Flush monument set in concrete.						**TOPSOIL** SILTY SAND WITH GRAVEL (SM); loose, moist, dark brown; fine to coarse sand; fine to coarse gravel; abundant organics.	
	225	Locked expansion plug. 0 to 15 ft. bgs, 4" Schedule 40 PVC casing. 3 to 13 ft. bgs, bentonite chips.						**WEATHERED VASHON TILL** SILTY SAND WITH GRAVEL AND COBBLES (SM); very dense, moist, light brown; fine to medium sand; fine to coarse gravel; 3" cobbles; few organics. Becomes gray brown without organics.	
5			S1	● ▲	21 32 37	MC, GH FC=54.7%		Trace iron oxide staining from 5.0 to 6.5 ft bgs.	5
	220								
10			S2	▲	14 19 20			Trace iron oxide staining at 11 ft bgs.	10
	215	13 to 25 ft. bgs, silica sand pack.						SILTY GRAVEL WITH SAND AND COBBLES (GM); dense, moist, dark gray; coarse sand; medium to coarse gravel; 3" cobbles.	
15		15 to 25 ft. bgs, 4" slotted Schedule 40 PVC casing.	S3	▲	18 30 32	FC FC=64.5%		SILT WITH GRAVEL (ML); hard, moist, gray brown; low plasticity; fine sand; medium gravel.	15
	210	▽ 3/22/2021						SILTY SAND WITH GRAVEL (SM); very dense, moist, gray brown with iron oxide staining at irregular intervals.; fine to coarse sand; medium gravel.	
20			S4	▲	20 30 43			Becomes wet.	20
	205								
25		Low continuous core recovery due to seepage. 25 to 28 ft. bgs, bentonite chips.	S5	▲	7 14 26	FC FC=19.7%			25
	200	28 to 50.25 ft. bgs, collapsed native fill.						**VASHON TILL** SILTY SAND WITH GRAVEL (SM); very dense, moist, gray brown; fine to medium sand; fine to coarse gravel.	

Legend

Sample Type
- ◯ No Soil Sample Recovery
- ◧ Continuous core 5" ID
- ◪ Split Barrel 2" X 1.375" (SPT)

Plastic Limit ⊢⊣ Liquid Limit

Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: JRG
Approved by: AJH

Exploration Log AMW-01
Sheet 1 of 2

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KITSAP NORTH MAINTENANCE FACILITY - 200297 - AB_AMW.GPJ July 19, 2021

Aspect CONSULTING	North Kitsap Service Center - 200297		Geotechnical Exploration Log	
	Project Address & Site Specific Location Parcel No. 062602-2-064-2007, Kitsap County, Site East		*Coordinates (SPN NAD83 ft)* E:1205400 N:287640	*Exploration Number* **AMW-01**
Contractor Holocene	*Equipment* Sonic Geoprobe 8140LC	*Sampling Method* Autohammer; 140 lb hammer; 30" drop	*Ground Surface Elev. (NAVD88)* 226.4'	
Operator Corey Thrash	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 3/22/2021	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* 18.5' (ATD)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
			S6		18 30 50/5"	PS FC=40.2%		**VASHON TILL** SILTY SAND WITH GRAVEL (SM); very dense, moist, gray brown; fine to medium sand; fine to coarse gravel. (continued) Becomes with 3" to 4" cobbles.	
35	195		S7		43 50/4"	MC			35
	190								
40			S8		50/3"				40
	185								
45			S9		50/3"	MC			45
	180								
50			S10		50/3"			Bottom of exploration at 50.25 ft. bgs. Note: Boring terminated per plan. Gravel content in the labs is typically less than 15% but may not be representative of the unit due to sampling limitations (2" sampler). These samples are limited for representing larger particle sizes.	50
	175								
55									55
	170								

Legend

Sample Type
- ◯ No Soil Sample Recovery
- ◧ Continuous core 5" ID
- ◩ Split Barrel 2" X 1.375" (SPT)

Plastic Limit ⊢⊣ Liquid Limit

Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: JRG
Approved by: AJH

Exploration Log AMW-01
Sheet 2 of 2

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KITSAP NORTH MAINTENANCE FACILITY - 200297 - AB_AMW.GPJ July 19, 2021

APPENDIX B

Geotechnical Laboratory Testing

B. Geotechnical Laboratory Testing

A geotechnical laboratory testing program was developed to determine index and engineering properties of materials at the Site. Soil samples used in the testing program were collected from the test pits and borings. The tests that were performed and the procedures followed are outlined below.

B.1 Soil Classification

Soil samples from the explorations were visually classified in the field and then taken to our office where the classifications were verified in a relatively controlled environment. Field and laboratory observations include density/consistency, moisture condition, and grain-size and plasticity estimates. The classifications of selected samples were checked by grain-size analysis and plasticity index testing. Classifications were made in general accordance with the Unified Soil Classification System (USCS) according to ASTM D2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)*, and ASTM D2487, *Standard Practice for Classification of Soils for Engineering Purposes* (Unified Soil Classification System).

B.2 Moisture-Content Determination

Moisture contents were determined for samples recovered in the explorations in general accordance with ASTM D2216, *Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass*, as soon as possible following their arrival to the laboratory. Moisture contents are shown on the exploration logs and shown in this appendix.

B.3 Atterberg Limits

Select subsurface soil samples from the soil borings were submitted for analysis of plasticity index by the ASTM D4318 test method, *Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils*. This test method allows for the laboratory determination of the liquid limit and the plastic limit of the fines in a soil sample. Test results are shown in this appendix.

B.4 Modified Proctor

The compaction characteristics of select soil samples were determined in general accordance with ASTM D1557, *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))*. The results of the tests are presented graphically in this appendix.

B.5 Grain-Size Analysis

Grain-size analysis was performed on selected soil samples in general accordance with:

- ASTM D6913, *Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis*
- ASTM C136, *Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates*

- ASTM D7928, *Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis*

The results of the tests are presented in this appendix showing percent finer by weight versus grain size.

B.6 Fines Content

Fines-content analyses were performed on selected soil samples in general accordance with ASTM C117, *Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing*, and ASTM D1140, *Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing*. The results of the tests are presented in this appendix showing percent passing the No. 200 sieve by weight.

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client:	Aspect Consulting	**Date:**	April 8, 2021
Address:	3201 Martin Luther King Jr. Way S	**Project:**	Q.C. - KCPW N. Rd Maintenance Facility
	Seattle, WA 98144	**Project #:**	21B077-04
Attn:	Jane Gregg	**Sample #:**	B21-0333
Date Revised:		**Date Sampled:**	April 6, 2021

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	See Report		Sulfate Soundness	
X	Proctor	126.6 pcf at 7.4%		Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count				
X	Moisture Content	9.2%			
	Specific Gravity, Coarse				
	Specific Gravity, Fine				
	Hydrometer Analysis				
	Atterberg Limits				
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,
Meghan Blodgett-Carrillo
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: Q.C. - KCPW N. Rd Maintenance Facility
Project #: 21B077-04
Client: Aspect Consulting
Source: ATP-03, S-2 @ 5 ft
Sample#: B21-0333

Date Received: 5-Apr-21
Sampled By: Client
Date Tested: 6-Apr-21
Tested By: K. Mendez

ASTM D-2487 Unified Soils Classification System
SM, Silty Sand with Gravel
Sample Color:
gray

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

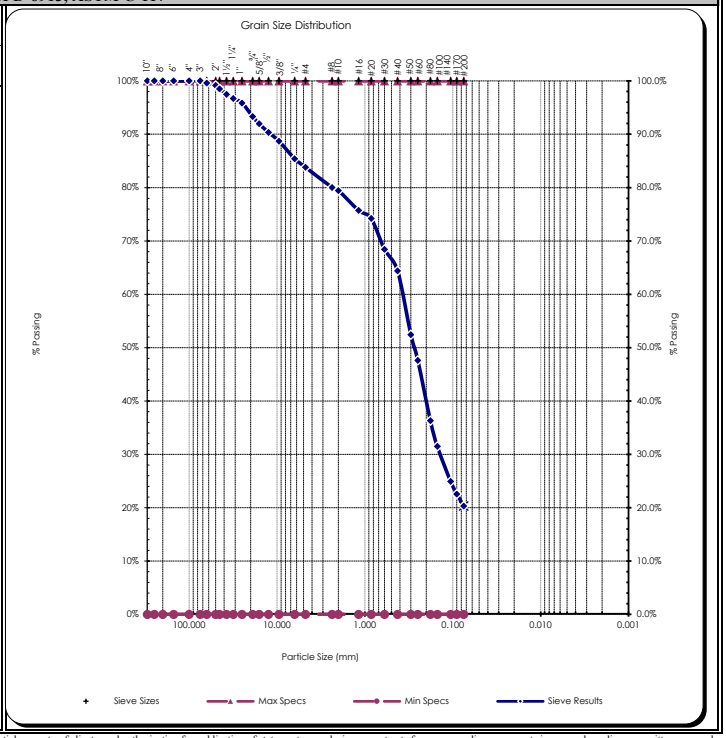
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.018 mm	% Gravel =	16.2%	Coeff. of Curvature, C_C =	1.40
$D_{(10)}$ =	0.037 mm	% Sand =	63.5%	Coeff. of Uniformity, C_U =	10.27
$D_{(15)}$ =	0.055 mm	% Silt & Clay =	20.3%	Fineness Modulus =	2.27
$D_{(30)}$ =	0.140 mm	Liquid Limit =	n/a	Plastic Limit =	n/a
$D_{(50)}$ =	0.275 mm	Plasticity Index =	n/a	Moisture %, as sampled =	9.2%
$D_{(60)}$ =	0.379 mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =	
$D_{(90)}$ =	11.860 mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =	
Dust Ratio =	6/19	Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =	

ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00	100%	100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	99%	99%	100.0%	0.0%
1.75"	45.00		99%	100.0%	0.0%
1.50"	37.50		98%	100.0%	0.0%
1.25"	31.50		97%	100.0%	0.0%
1.00"	25.00	96%	96%	100.0%	0.0%
3/4"	19.00	93%	93%	100.0%	0.0%
5/8"	16.00		92%	100.0%	0.0%
1/2"	12.50	90%	90%	100.0%	0.0%
3/8"	9.50	89%	89%	100.0%	0.0%
1/4"	6.30		85%	100.0%	0.0%
#4	4.75	84%	84%	100.0%	0.0%
#8	2.36		80%	100.0%	0.0%
#10	2.00	79%	79%	100.0%	0.0%
#16	1.18		76%	100.0%	0.0%
#20	0.850	74%	74%	100.0%	0.0%
#30	0.600		68%	100.0%	0.0%
#40	0.425	64%	64%	100.0%	0.0%
#50	0.300		52%	100.0%	0.0%
#60	0.250	48%	48%	100.0%	0.0%
#80	0.180		36%	100.0%	0.0%
#100	0.150	31%	31%	100.0%	0.0%
#140	0.106		25%	100.0%	0.0%
#170	0.090		23%	100.0%	0.0%
#200	0.075	20.3%	20.3%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Proctor Report

Q.C. - KCPW N. Rd Maintenance

Project: Facility
Project #: 21B077-04
Client: Aspect Consulting
Source: ATP-03, S-2 @ 5 ft
Sample#: B21-0333

Date Received: 5-Apr-21
Sampled By: Client
Date Tested: 6-Apr-21
Tested By: K. Mendez

Unified Soils Classification System, ASTM D-2487
SM, Silty Sand with Gravel
Sample Color
gray

Sample Prepared: Moist: X Dry: | Manual: Mechanical: X

Test Standard: ASTM D698: | AASHTO T 99: | Method A
ASTM D 1557: X | AASHTO T 180:

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

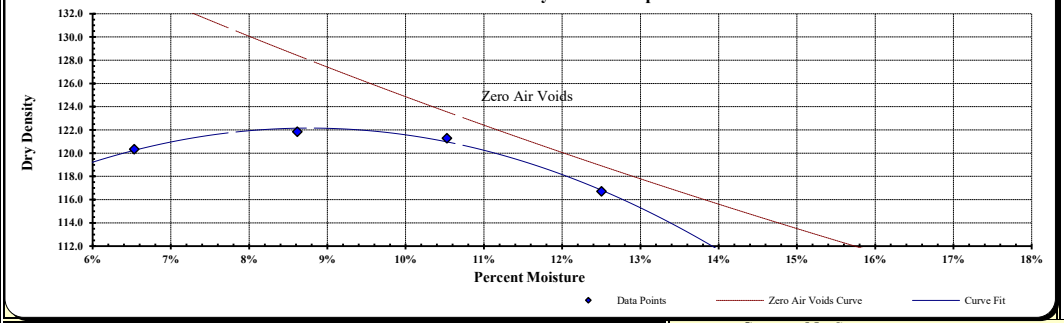
Assumed Sp. Gr.	Point Number	Percent Moisture	Dry Density
2.50	1	6.5 %	120.3
	2	8.6 %	121.9
	3	10.5 %	121.3
	4	12.5 %	116.7

Uncorrected Proctor Value

Max. Dry Density		Optimum Moist
122.2	**lbs/ft³**	**8.7 %**

Value w/ Oversize Correction Applied

Max. Dry Density		Optimum Moist
126.6	**lbs/ft³**	**7.4%**



ASTM C-136

Sieve US	Size mm	Percent Passing	Specifications Max	Specifications Min
12.00"	300.00		100.0 %	0.0 %
10.00"	250.00		100.0 %	0.0 %
8.00"	200.00		100.0 %	0.0 %
6.00"	150.00		100.0 %	0.0 %
4.00"	100.00		100.0 %	0.0 %
3.00"	75.00	100 %	100.0 %	0.0 %
2.50"	63.00		100.0 %	0.0 %
2.00"	50.00	99 %	100.0 %	0.0 %
1.75"	45.00		100.0 %	0.0 %
1.50"	37.50		100.0 %	0.0 %
1.25"	31.50		100.0 %	0.0 %
1.00"	25.00	96 %	100.0 %	0.0 %
3/4"	19.00	93 %	100.0 %	0.0 %
5/8"	16.00		100.0 %	0.0 %
1/2"	12.50	90 %	100.0 %	0.0 %
3/8"	9.50	89 %	100.0 %	0.0 %
1/4"	6.30		100.0 %	0.0 %
#4	4.75	84 %	100.0 %	0.0 %
#8	2.36		100.0 %	0.0 %
#10	2.00	79 %	100.0 %	0.0 %
#16	1.18		100.0 %	0.0 %
#20	0.850	74 %	100.0 %	0.0 %
#30	0.600		100.0 %	0.0 %
#40	0.425	64 %	100.0 %	0.0 %
#50	0.300		100.0 %	0.0 %
#60	0.250	48 %	100.0 %	0.0 %
#80	0.180		100.0 %	0.0 %
#100	0.150	31 %	100.0 %	0.0 %
#140	0.106		100.0 %	0.0 %
#170	0.090		100.0 %	0.0 %
#200	0.075	20.3 %	100.0 %	0.0 %

ASTM D-4718, Misc. Oversize Correction Values

% Oversize Mat'l: 16%

% Oversize Retained	Corrected Density	Optimum Moisture
5%	123.5	8.3%
10%	124.9	7.9%
15%	126.3	7.5%
20%	127.7	7.1%
25%	129.2	6.7%
30%	130.7	6.3%

Specs: No Specs **Meets Specs? N/A**

% Gravel: 16.2%	C_C: 1.40	$D_{(10)}$: 0.037
% Sand: 63.5%	C_U: 10.27	$D_{(30)}$: 0.140
% Silt&Clay: 20.3%	FM: 2.27	$D_{(60)}$: 0.379
LL: n/a	PL: n/a	PI: n/a
Sand Equivalent: n/a	Req'd Sand Equivalent:	
Fracture %, 1 Face: n/a	Req'd Fracture %, 1 Face:	
Fracture %, 2+ Faces: n/a	Req'd Fracture %, 2+ Faces:	

Comments: _____

Reviewed by: _____
Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client:	Aspect Consulting	**Date:**	April 8, 2021
Address:	3201 Martin Luther King Jr. Way S	**Project:**	Q.C. - KCPW N. Rd Maintenance Facility
	Seattle, WA 98144	**Project #:**	21B077-04
Attn:	Jane Gregg	**Sample #:**	B21-0334
Date Revised:		**Date Sampled:**	April 6, 2021

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	See Report		Sulfate Soundness	
X	Proctor	132.8 pcf at 6.8%		Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count				
X	Moisture Content	8.0%			
	Specific Gravity, Coarse				
	Specific Gravity, Fine				
	Hydrometer Analysis				
	Atterberg Limits				
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,
Meghan Blodgett-Carrillo
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: Q.C. - KCPW N. Rd Maintenance Facility
Project #: 21B077-04
Client: Aspect Consulting
Source: ATP-05, S-2 @ 7 ft
Sample#: B21-0334

Date Received: 5-Apr-21
Sampled By: Client
Date Tested: 6-Apr-21
Tested By: K. Mendez

ASTM D-2487 Unified Soils Classification System
SM, Silty Sand with Gravel
Sample Color:
gray

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

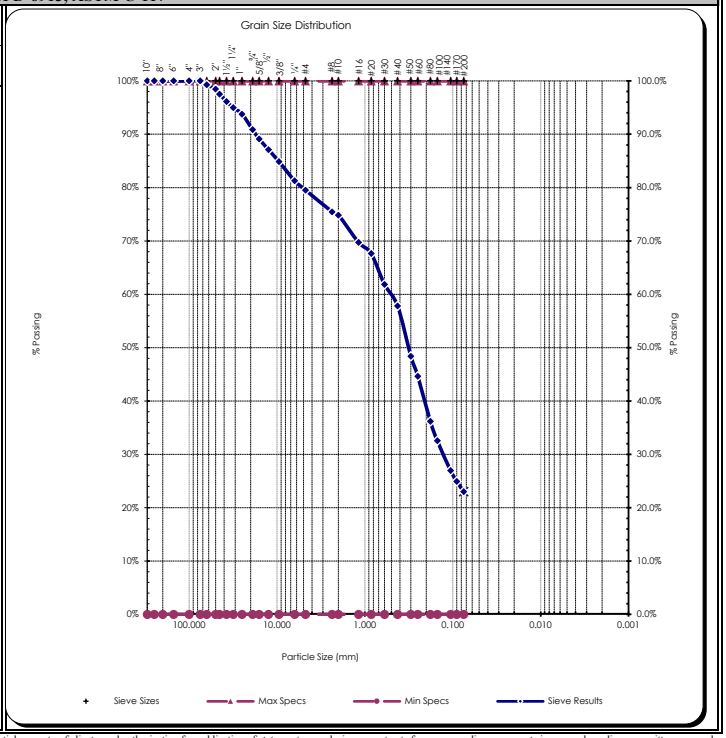
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.016 mm	% Gravel =	20.5%	Coeff. of Curvature, C_C =	1.00
$D_{(10)}$ =	0.033 mm	% Sand =	56.5%	Coeff. of Uniformity, C_U =	15.93
$D_{(15)}$ =	0.049 mm	% Silt & Clay =	23.0%	Fineness Modulus =	2.58
$D_{(30)}$ =	0.130 mm	Liquid Limit =	n/a	Plastic Limit =	n/a
$D_{(50)}$ =	0.321 mm	Plasticity Index =	n/a	Moisture %, as sampled =	8.0%
$D_{(60)}$ =	0.519 mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =	
$D_{(90)}$ =	17.493 mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =	
Dust Ratio =	2/5	Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =	

ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00	100%	100%	100.0%	0.0%
2.50"	63.00		99%	100.0%	0.0%
2.00"	50.00	98%	98%	100.0%	0.0%
1.75"	45.00		98%	100.0%	0.0%
1.50"	37.50		96%	100.0%	0.0%
1.25"	31.50		95%	100.0%	0.0%
1.00"	25.00	94%	94%	100.0%	0.0%
3/4"	19.00	91%	91%	100.0%	0.0%
5/8"	16.00		89%	100.0%	0.0%
1/2"	12.50	87%	87%	100.0%	0.0%
3/8"	9.50	85%	85%	100.0%	0.0%
1/4"	6.30		81%	100.0%	0.0%
#4	4.75	80%	80%	100.0%	0.0%
#8	2.36		75%	100.0%	0.0%
#10	2.00	75%	75%	100.0%	0.0%
#16	1.18		70%	100.0%	0.0%
#20	0.850	68%	68%	100.0%	0.0%
#30	0.600		62%	100.0%	0.0%
#40	0.425	58%	58%	100.0%	0.0%
#50	0.300		48%	100.0%	0.0%
#60	0.250	45%	45%	100.0%	0.0%
#80	0.180		36%	100.0%	0.0%
#100	0.150	33%	33%	100.0%	0.0%
#140	0.106		27%	100.0%	0.0%
#170	0.090		25%	100.0%	0.0%
#200	0.075	23.0%	23.0%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Proctor Report

Q.C. - KCPW N. Rd Maintenance

Project: Facility
Project #: 21B077-04
Client: Aspect Consulting
Source: ATP-05, S-2 @ 7 ft
Sample#: B21-0334

Date Received: 5-Apr-21
Sampled By: Client
Date Tested: 6-Apr-21
Tested By: K. Mendez

Unified Soils Classification System, ASTM D-2487
SM, Silty Sand with Gravel
Sample Color
gray

Sample Prepared:	Moist: X		Manual:	
	Dry:		Mechanical: X	
Test Standard:	ASTM D698:		AASHTO T 99:	Method
	ASTM D 1557: X		AASHTO T 180:	A

Assumed Sp. Gr. 2.60

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

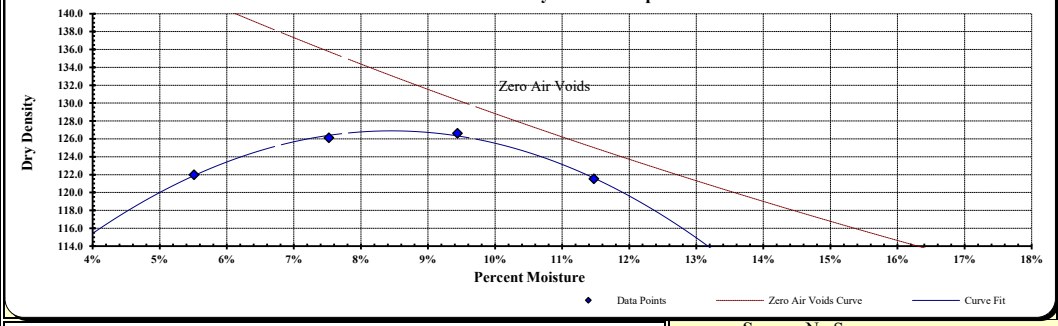
Point Number	Percent Moisture	Dry Density
1	5.5 %	122.0
2	7.5 %	126.1
3	9.4 %	126.6
4	11.5 %	121.5

Uncorrected Proctor Value

Max. Dry Density		Optimum Moist
126.9	**lbs/ft³**	**8.4 %**

Value w/ Oversize Correction Applied

Max. Dry Density		Optimum Moist
132.8	**lbs/ft³**	**6.8%**



ASTM C-136

Sieve US	Size mm	Percent Passing	Specifications Max	Specifications Min
12.00"	300.00		100.0 %	0.0 %
10.00"	250.00		100.0 %	0.0 %
8.00"	200.00		100.0 %	0.0 %
6.00"	150.00		100.0 %	0.0 %
4.00"	100.00		100.0 %	0.0 %
3.00"	75.00	100 %	100.0 %	0.0 %
2.50"	63.00		100.0 %	0.0 %
2.00"	50.00	98 %	100.0 %	0.0 %
1.75"	45.00		100.0 %	0.0 %
1.50"	37.50		100.0 %	0.0 %
1.25"	31.50		100.0 %	0.0 %
1.00"	25.00	94 %	100.0 %	0.0 %
3/4"	19.00	91 %	100.0 %	0.0 %
5/8"	16.00		100.0 %	0.0 %
1/2"	12.50	87 %	100.0 %	0.0 %
3/8"	9.50	85 %	100.0 %	0.0 %
1/4"	6.30		100.0 %	0.0 %
#4	4.75	80 %	100.0 %	0.0 %
#8	2.36		100.0 %	0.0 %
#10	2.00	75 %	100.0 %	0.0 %
#16	1.18		100.0 %	0.0 %
#20	0.850	68 %	100.0 %	0.0 %
#30	0.600		100.0 %	0.0 %
#40	0.425	58 %	100.0 %	0.0 %
#50	0.300		100.0 %	0.0 %
#60	0.250	45 %	100.0 %	0.0 %
#80	0.180		100.0 %	0.0 %
#100	0.150	33 %	100.0 %	0.0 %
#140	0.106		100.0 %	0.0 %
#170	0.090		100.0 %	0.0 %
#200	0.075	23.0 %	100.0 %	0.0 %

ASTM D-4718, Misc. Oversize Correction Values

% Oversize Mat'l: 20%

% Oversize Retained	Corrected Density	Optimum Moisture
5%	128.3	8.0%
10%	129.7	7.6%
15%	131.2	7.2%
20%	132.7	6.8%
25%	134.2	6.4%
30%	135.8	6.0%

Specs: No Specs **Meets Specs? N/A**

% Gravel: 20.5%	C_C: 1.00	$D_{(10)}$: 0.033
% Sand: 56.5%	C_U: 15.93	$D_{(30)}$: 0.130
% Silt&Clay: 23.0%	FM: 2.58	$D_{(60)}$: 0.519
LL: n/a	PL: n/a	PI: n/a
Sand Equivalent: n/a	Req'd Sand Equivalent:	
Fracture %, 1 Face: n/a	Req'd Fracture %, 1 Face:	
Fracture %, 2+ Faces: n/a	Req'd Fracture %, 2+ Faces:	

Comments: _____

Reviewed by: _____
Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client:	Aspect Consulting	**Date:**	April 9, 2021
Address:	3201 Martin Luther King Jr. Way S.	**Project:**	Q.C. - KCPW N Rd Maintenance Facility
	Seattle, WA 98144	**Project #:**	21B077-04
Attn:	Jane Gregg	**Sample #:**	B21-0335-0361 (0355 & 0356 on separate proc reports)
Date Revised:		**Date Sampled:**	March 22, 2021

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	Please See Attached Reports		Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count		X	% Passing #200 Sieve	Please See Attached Report
X	Moisture Content	Please See Attached Report			
	Specific Gravity, Coarse				
	Specific Gravity, Fine				
X	Hydrometer Analysis	Please See Attached Reports			
X	Atterberg Limits	Please See Attached Report			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,
Meghan Blodgett-Carrillo
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Q.C. - KCPW N Rd Maintenance Facility
Project #: 21B077-04
Date Received: April 5, 2021
Date Tested: April 7, 2021

Client: Aspect Consulting
Sampled by: Client
Tested by: A. Eifrig

Amount of Materials Finer Than #200 Sieve - ASTM C-117, ASTM D-1140 & AASHTO T-11

Sample #	Location	Tare	Before Wash + Tare	After Wash + Tare	Amount of Loss	% -#200
B21-0337	AB-01 S-3 @ 15 ft	583.9	995.7	911.8	83.9	20.4%
B21-0339	AB-01, S-6 @ 30 ft	501.9	1141.0	1032.5	108.5	17.0%
B21-0342	AB-02, S-4 @ 20 ft	497.9	1670.4	1290.7	379.7	32.4%
B21-0347	AMW-01, S-3 @ 15 ft	600.1	1293.0	846.1	446.9	64.5%
B21-0348	AMW-01, S-5 @ 25 ft	497.4	1672.6	1440.6	232.0	19.7%
B21-0356	ATP-04, S-4 @ 4 ft	601.3	1652.3	830.5	821.8	78.2%
B21-0358	ATP-06, S-1 @ 6 ft	500.5	1840.2	1660.5	179.7	13.4%

Reviewed by: Meghan Blodgett-Carrillo

Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980
Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6111 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974
Visit our website: www.mtc-inc.net

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Q.C. - KCPW N Rd Maintenance Facility
Project #: 21B077-04
Date Received: April 5, 2021
Date Tested: April 7, 2021

Client: Aspect Consulting
Sampled by: Client
Tested by: C. Kriss

Moisture Content - ASTM C-566, ASTM D-2216 & AASHTO T-265

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B21-0338	AB-01, S-5 @ 25 ft	424.2	1567.0	1431.1	135.9	1006.9	13.5%
B21-0343	AB-02, S-6 @ 30 ft	394.7	813.8	766.5	47.3	371.8	12.7%
B21-0345	AB-02, S-10 @ 50 ft	414.1	916.3	867.9	48.4	453.8	10.7%
B21-0350	AMW-01, S-7 @ 35 ft	378.7	1303.1	1192.6	110.5	813.9	13.6%
B21-0351	AMW-01, S-9 @ 45 ft	423.8	774.2	736.4	37.8	312.6	12.1%
B21-0354	ATP-03, S-1 @ 2 ft	417.5	2084.5	1805.9	278.6	1388.4	20.1%
B21-0355	ATP-04, S-1 @ 2 ft	415.3	1864.1	1561.8	302.3	1146.5	26.4%
B21-0357	ATP-05, S-3 @ 11.5 ft	379.6	1471.3	1393.9	77.4	1014.3	7.6%

Reviewed by: Meghan Blodgett-Carrillo

Meghan Blodgett-Carrillo

Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980

Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6111 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974

Visit our website: www.mtc-inc.net

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: Q.C. - KCPW N Rd Maintenance Facility
Project #: 21B077-04
Client: Aspect Consulting
Source: AB-01, S-1 @ 5 ft
Sample#: B21-0335

Date Received: 5-Apr-21
Sampled By: Client
Date Tested: 7-Apr-21
Tested By: C. Kriss

ASTM D-2487 Unified Soils Classification System
SM, Silty Sand
Sample Color:
gray

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

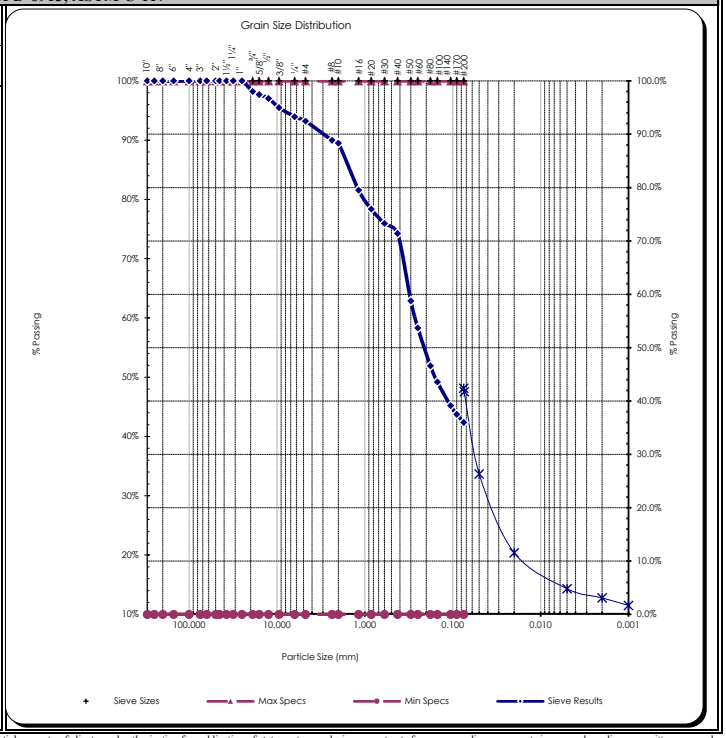
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.009 mm	% Gravel =	6.8%	Coeff. of Curvature, C_C =	0.59
$D_{(10)}$ =	0.018 mm	% Sand =	50.8%	Coeff. of Uniformity, C_U =	15.17
$D_{(15)}$ =	0.027 mm	% Silt & Clay =	42.4%	Fineness Modulus =	1.53
$D_{(30)}$ =	0.053 mm	Liquid Limit =	n/a	Plastic Limit =	n/a
$D_{(50)}$ =	0.159 mm	Plasticity Index =	n/a	Moisture %, as sampled =	10.0%
$D_{(60)}$ =	0.268 mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =	
$D_{(90)}$ =	2.374 mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =	
Dust Ratio =	4/7	Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =	

ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	98%	98%	100.0%	0.0%
5/8"	16.00		98%	100.0%	0.0%
1/2"	12.50	97%	97%	100.0%	0.0%
3/8"	9.50	95%	95%	100.0%	0.0%
1/4"	6.30		94%	100.0%	0.0%
#4	4.75	93%	93%	100.0%	0.0%
#8	2.36		90%	100.0%	0.0%
#10	2.00	89%	89%	100.0%	0.0%
#16	1.18		82%	100.0%	0.0%
#20	0.850		78%	100.0%	0.0%
#30	0.600		76%	100.0%	0.0%
#40	0.425	74%	74%	100.0%	0.0%
#50	0.300		63%	100.0%	0.0%
#60	0.250		58%	100.0%	0.0%
#80	0.180		52%	100.0%	0.0%
#100	0.150		49%	100.0%	0.0%
#140	0.106		45%	100.0%	0.0%
#170	0.090		44%	100.0%	0.0%
#200	0.075	42.4%	42.4%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Hydrometer Report

Project:	Q.C. - KCPW N Rd Maintenance Facility	**Date Received:**	5-Apr-21
Project #:	21B077-04	**Sampled By:**	Client
Client :	Aspect Consulting	**Date Tested:**	7-Apr-21
Source:	AB-01, S-1 @ 5 ft	**Tested By:**	C. Kriss
Sample#:	B21-0335		

ASTM D 2487 Soils Classification
SM, Silty Sand
Sample Color
gray

ASTM D-422, HYDROMETER ANALYSIS

Assumed Sp Gr :	2.65	
Sample Weight:	75.22	grams
Hydroscopic Moist.:	0.67%	
Adj. Sample Wgt :	74.72	grams

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

Hydrometer Reading Minutes	Corrected Reading	Percent Passing	Soils Particle Diameter
2	14.5	17.4%	0.0361 mm
5	10.5	12.6%	0.0234 mm
15	8	9.6%	0.0137 mm
30	6.5	7.8%	0.0097 mm
60	4	4.8%	0.0070 mm
250	4	4.8%	0.0034 mm
1440	2	2.4%	0.0014 mm

% Gravel:	6.8%	**Liquid Limit:**	n/a
% Sand:	50.8%	**Plastic Limit:**	n/a
% Silt:	37.6%	**Plasticity Index:**	n/a
% Clay:	4.8%		

ASTM C-136

Sieve Analysis
Grain Size Distribution

Sieve Size	Percent Passing	Soils Particle Diameter
3.0"	100%	75.000 mm
2.0"	100%	50.000 mm
1.5"	100%	37.500 mm
1.25"	100%	31.500 mm
1.0"	100%	25.000 mm
3/4"	98%	19.000 mm
5/8"	98%	16.000 mm
1/2"	97%	12.500 mm
3/8"	95%	9.500 mm
1/4"	94%	6.300 mm
#4	93%	4.750 mm
#10	89%	2.000 mm
#20	78%	0.850 mm
#40	74%	0.425 mm
#100	49%	0.150 mm
#200	42.4%	0.075 mm
Silts	41.7%	0.074 mm
	26.3%	0.050 mm
	11.5%	0.020 mm
Clays	4.8%	0.005 mm
	3.1%	0.002 mm
Colloids	1.7%	0.001 mm

USDA Soil Textural Classification

	Particle Size
% Sand:	2.0 - 0.05 mm
% Silt:	0.05 - 0.002 mm
% Clay:	< 0.002 mm

USDA Soil Textural Classification
Sandy Loam

Comments:

Reviewed by: Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: Q.C. - KCPW N Rd Maintenance Facility
Project #: 21B077-04
Client: Aspect Consulting
Source: AB-01, S-2 @ 10 ft
Sample#: B21-0336

Date Received: 5-Apr-21
Sampled By: Client
Date Tested: 7-Apr-21
Tested By: C. Kriss

ASTM D-2487 Unified Soils Classification System
SM, Silty Sand
Sample Color:
gray

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

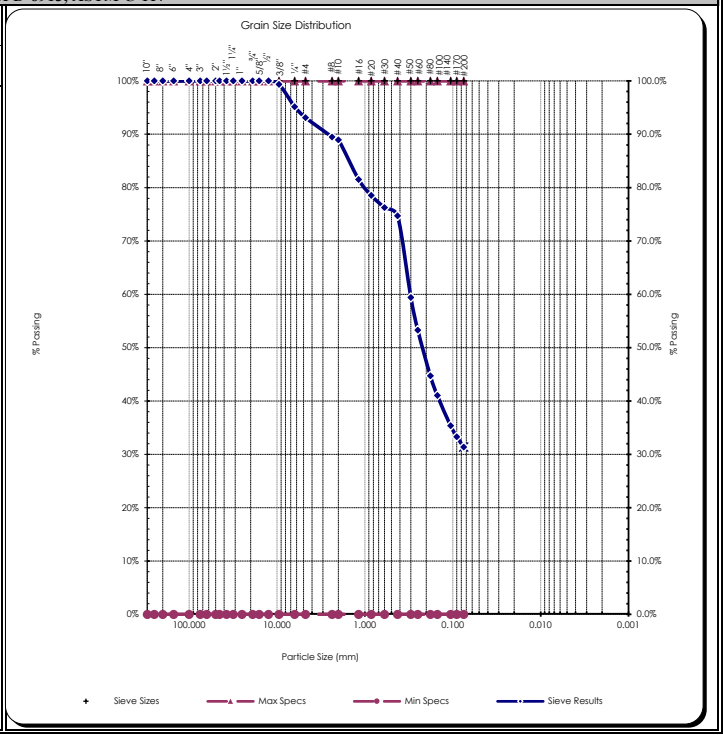
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.012 mm	% Gravel =	6.9%	Coeff. of Curvature, C_C =	0.71
$D_{(10)}$ =	0.024 mm	% Sand =	61.8%	Coeff. of Uniformity, C_U =	12.75
$D_{(15)}$ =	0.036 mm	% Silt & Clay =	31.4%	Fineness Modulus =	1.60
$D_{(30)}$ =	0.072 mm	Liquid Limit =	n/a	Plastic Limit =	n/a
$D_{(50)}$ =	0.223 mm	Plasticity Index =	n/a	Moisture %, as sampled =	16.1%
$D_{(60)}$ =	0.305 mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =	
$D_{(90)}$ =	2.685 mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =	
Dust Ratio =	21/50	Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =	

ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	99%	99%	100.0%	0.0%
1/4"	6.30		95%	100.0%	0.0%
#4	4.75	93%	93%	100.0%	0.0%
#8	2.36		90%	100.0%	0.0%
#10	2.00	89%	89%	100.0%	0.0%
#16	1.18		82%	100.0%	0.0%
#20	0.850		79%	100.0%	0.0%
#30	0.600		76%	100.0%	0.0%
#40	0.425	75%	75%	100.0%	0.0%
#50	0.300		59%	100.0%	0.0%
#60	0.250		53%	100.0%	0.0%
#80	0.180		45%	100.0%	0.0%
#100	0.150	41%	41%	100.0%	0.0%
#140	0.106		35%	100.0%	0.0%
#170	0.090		33%	100.0%	0.0%
#200	0.075	31.4%	31.4%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980
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Visit our website: www.mtc-inc.net

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: Q.C. - KCPW N Rd Maintenance Facility
Project #: 21B077-04
Client: Aspect Consulting
Source: AB-01, S-10 @ 50 ft
Sample#: B21-0340

Date Received: 5-Apr-21
Sampled By: Client
Date Tested: 7-Apr-21
Tested By: C. Kriss

ASTM D-2487 Unified Soils Classification System
SW-SC, Well-graded Sand with Silty Clay
Sample Color:
gray

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

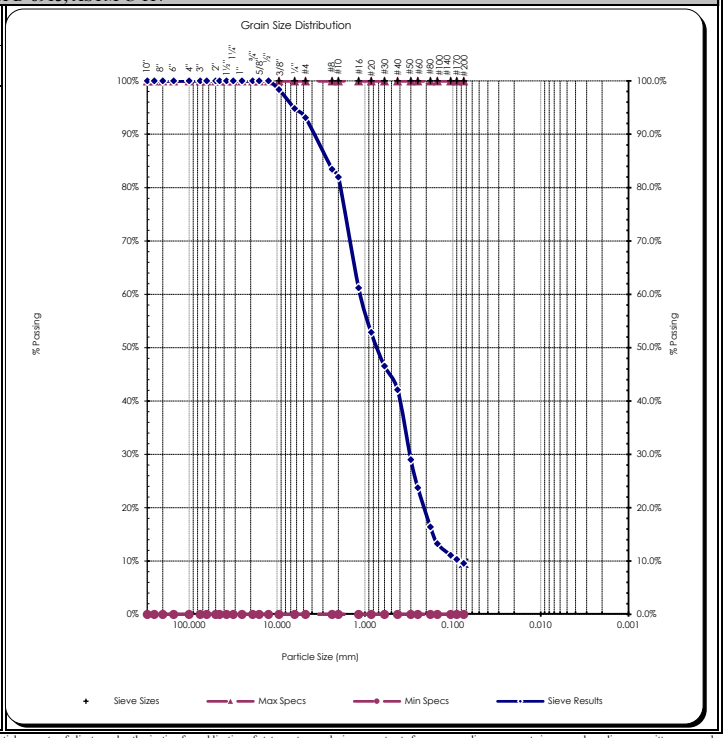
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.039 mm	% Gravel =	6.9%	Coeff. of Curvature, C_C =	1.01
$D_{(10)}$ =	0.084 mm	% Sand =	83.5%	Coeff. of Uniformity, C_U =	13.55
$D_{(15)}$ =	0.167 mm	% Silt & Clay =	9.6%	Fineness Modulus =	2.75
$D_{(30)}$ =	0.310 mm	Liquid Limit =	n/a	Plastic Limit =	n/a
$D_{(50)}$ =	0.736 mm	Plasticity Index =	n/a	Moisture %, as sampled =	14.2%
$D_{(60)}$ =	1.132 mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =	
$D_{(90)}$ =	3.978 mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =	
Dust Ratio =	5/22	Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =	

ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	98%	98%	100.0%	0.0%
1/4"	6.30		95%	100.0%	0.0%
#4	4.75	93%	93%	100.0%	0.0%
#8	2.36		83%	100.0%	0.0%
#10	2.00	82%	82%	100.0%	0.0%
#16	1.18		61%	100.0%	0.0%
#20	0.850		53%	100.0%	0.0%
#30	0.600		47%	100.0%	0.0%
#40	0.425	42%	42%	100.0%	0.0%
#50	0.300		29%	100.0%	0.0%
#60	0.250		24%	100.0%	0.0%
#80	0.180		16%	100.0%	0.0%
#100	0.150	13%	13%	100.0%	0.0%
#140	0.106		11%	100.0%	0.0%
#170	0.090		10%	100.0%	0.0%
#200	0.075	9.6%	9.6%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: Q.C. - KCPW N Rd Maintenance Facility
Project #: 21B077-04
Client: Aspect Consulting
Source: AB-02, S-2 @ 10 ft
Sample#: B21-0341

Date Received: 5-Apr-21
Sampled By: Client
Date Tested: 7-Apr-21
Tested By: C. Kriss

ASTM D-2487 Unified Soils Classification System
SM, Silty Sand
Sample Color:
grayish-brown

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

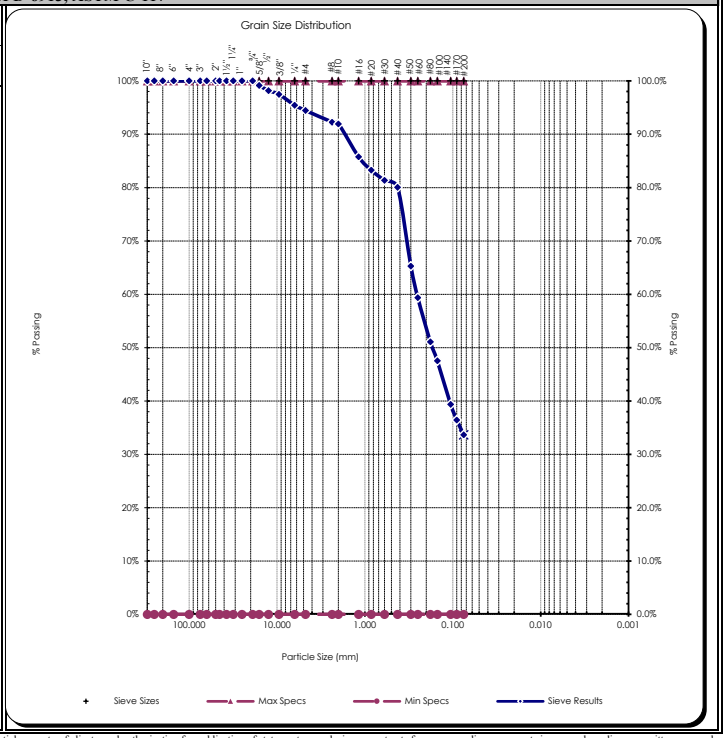
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.011 mm	% Gravel =	5.5%	Coeff. of Curvature, C_C =	0.79
$D_{(10)}$ =	0.022 mm	% Sand =	60.8%	Coeff. of Uniformity, C_U =	11.46
$D_{(15)}$ =	0.033 mm	% Silt & Clay =	33.6%	Fineness Modulus =	1.36
$D_{(30)}$ =	0.067 mm	Liquid Limit =	n/a	Plastic Limit =	n/a
$D_{(50)}$ =	0.171 mm	Plasticity Index =	n/a	Moisture %, as sampled =	13.6%
$D_{(60)}$ =	0.255 mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =	
$D_{(90)}$ =	1.741 mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =	
Dust Ratio =	29/69	Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =	

ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		99%	100.0%	0.0%
1/2"	12.50	98%	98%	100.0%	0.0%
3/8"	9.50	97%	97%	100.0%	0.0%
1/4"	6.30		95%	100.0%	0.0%
#4	4.75	94%	94%	100.0%	0.0%
#8	2.36		92%	100.0%	0.0%
#10	2.00	92%	92%	100.0%	0.0%
#16	1.18		86%	100.0%	0.0%
#20	0.850		83%	100.0%	0.0%
#30	0.600		81%	100.0%	0.0%
#40	0.425	80%	80%	100.0%	0.0%
#50	0.300		65%	100.0%	0.0%
#60	0.250		59%	100.0%	0.0%
#80	0.180		51%	100.0%	0.0%
#100	0.150	48%	48%	100.0%	0.0%
#140	0.106		39%	100.0%	0.0%
#170	0.090		36%	100.0%	0.0%
#200	0.075	33.6%	33.6%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

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Sieve Report

Project: Q.C. - KCPW N Rd Maintenance Facility
Project #: 21B077-04
Client: Aspect Consulting
Source: AB-02, S-8 @ 40 ft
Sample#: B21-0344

Date Received: 5-Apr-21
Sampled By: Client
Date Tested: 7-Apr-21
Tested By: C. Kriss

ASTM D-2487 Unified Soils Classification System
SM, Silty Sand
Sample Color:
gray

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

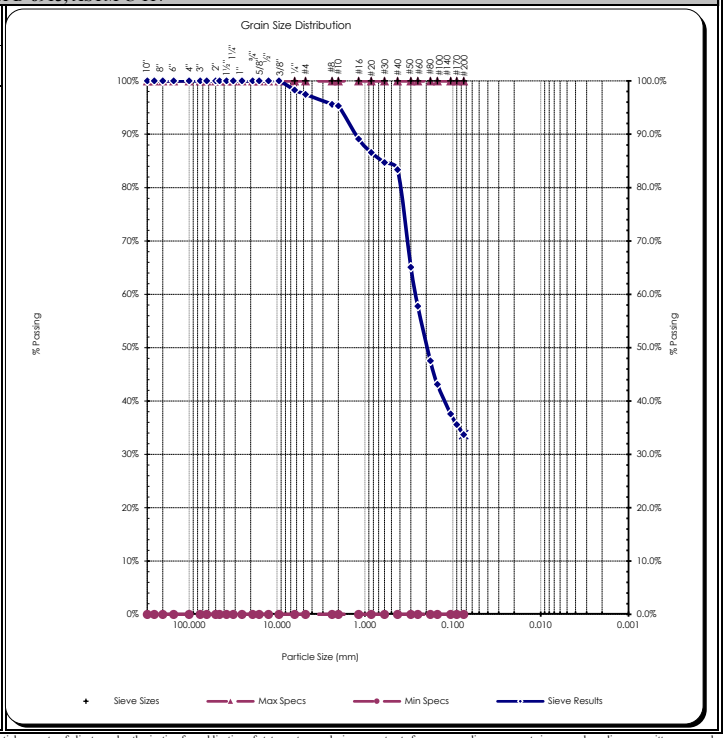
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.011 mm	% Gravel =	2.5%	Coeff. of Curvature, C_C =	0.76
$D_{(10)}$ =	0.022 mm	% Sand =	63.8%	Coeff. of Uniformity, C_U =	11.91
$D_{(15)}$ =	0.033 mm	% Silt & Clay =	33.7%	Fineness Modulus =	1.25
$D_{(30)}$ =	0.067 mm	Liquid Limit =	n/a	Plastic Limit =	n/a
$D_{(50)}$ =	0.197 mm	Plasticity Index =	n/a	Moisture %, as sampled =	13.0%
$D_{(60)}$ =	0.265 mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =	
$D_{(90)}$ =	1.296 mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =	
Dust Ratio =	40/99	Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =	

ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		98%	100.0%	0.0%
#4	4.75	97%	97%	100.0%	0.0%
#8	2.36		96%	100.0%	0.0%
#10	2.00	95%	95%	100.0%	0.0%
#16	1.18		89%	100.0%	0.0%
#20	0.850		87%	100.0%	0.0%
#30	0.600		85%	100.0%	0.0%
#40	0.425	83%	83%	100.0%	0.0%
#50	0.300		65%	100.0%	0.0%
#60	0.250		58%	100.0%	0.0%
#80	0.180		48%	100.0%	0.0%
#100	0.150	43%	43%	100.0%	0.0%
#140	0.106		38%	100.0%	0.0%
#170	0.090		36%	100.0%	0.0%
#200	0.075	33.7%	33.7%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: Q.C. - KCPW N Rd Maintenance Facility
Project #: 21B077-04
Client: Aspect Consulting
Source: AMW-01, S-1 @ 5 ft
Sample#: B21-0346

Date Received: 5-Apr-21
Sampled By: Client
Date Tested: 7-Apr-21
Tested By: C. Kriss

Visual Identification
Sandy Silt with Clay
Sample Color:
gray

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

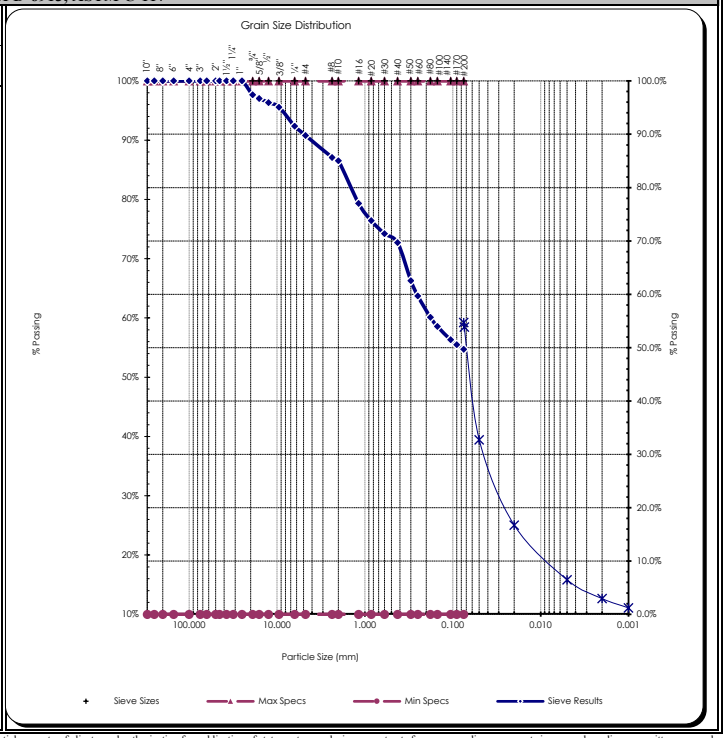
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.007 mm	% Gravel =	9.2%	Coeff. of Curvature, C_C =	0.69
$D_{(10)}$ =	0.014 mm	% Sand =	36.1%	Coeff. of Uniformity, C_U =	12.96
$D_{(15)}$ =	0.021 mm	% Silt & Clay =	54.7%	Fineness Modulus =	1.50
$D_{(30)}$ =	0.041 mm	Liquid Limit =	n/a	Plastic Limit =	n/a
$D_{(50)}$ =	0.069 mm	Plasticity Index =	n/a	Moisture %, as sampled =	8.5%
$D_{(60)}$ =	0.178 mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =	
$D_{(90)}$ =	4.226 mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =	
Dust Ratio =	67/89	Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =	

ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	98%	98%	100.0%	0.0%
5/8"	16.00		97%	100.0%	0.0%
1/2"	12.50	96%	96%	100.0%	0.0%
3/8"	9.50	96%	96%	100.0%	0.0%
1/4"	6.30		92%	100.0%	0.0%
#4	4.75	91%	91%	100.0%	0.0%
#8	2.36		87%	100.0%	0.0%
#10	2.00	87%	87%	100.0%	0.0%
#16	1.18		79%	100.0%	0.0%
#20	0.850		76%	100.0%	0.0%
#30	0.600		74%	100.0%	0.0%
#40	0.425	73%	73%	100.0%	0.0%
#50	0.300		66%	100.0%	0.0%
#60	0.250		64%	100.0%	0.0%
#80	0.180		60%	100.0%	0.0%
#100	0.150		59%	100.0%	0.0%
#140	0.106		56%	100.0%	0.0%
#170	0.090		56%	100.0%	0.0%
#200	0.075	54.7%	54.7%	100.0%	0.0%



Comments:

Reviewed by:

Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Hydrometer Report

Project:	Q.C. - KCPW N Rd Maintenance Facility	**Date Received:**	5-Apr-21
Project #:	21B077-04	**Sampled By:**	Client
Client :	Aspect Consulting	**Date Tested:**	7-Apr-21
Source:	AMW-01, S-1 @ 5 ft	**Tested By:**	C. Kriss
Sample#:	B21-0346		

Visual Identification
Sandy Silt with Clay
Sample Color
gray

ASTM D-422, HYDROMETER ANALYSIS

Assumed Sp Gr :	2.65	
Sample Weight:	50.07	grams
Hydroscopic Moist.:	0.56%	
Adj. Sample Wgt :	49.79	grams

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

Hydrometer Reading Minutes	Corrected Reading	Percent Passing	Soils Particle Diameter
2	12	20.9%	0.0365 mm
5	10.5	18.2%	0.0234 mm
15	8	13.9%	0.0137 mm
30	6.5	11.3%	0.0097 mm
60	4	7.0%	0.0070 mm
250	3.5	6.1%	0.0034 mm
1440	1	1.7%	0.0014 mm

% Gravel:	9.2%	**Liquid Limit:**	n/a
% Sand:	36.1%	**Plastic Limit:**	n/a
% Silt:	48.3%	**Plasticity Index:**	n/a
% Clay:	6.5%		

ASTM C-136

Sieve Analysis
Grain Size Distribution

Sieve Size	Percent Passing	Soils Particle Diameter
3.0"	100%	75.000 mm
2.0"	100%	50.000 mm
1.5"	100%	37.500 mm
1.25"	100%	31.500 mm
1.0"	100%	25.000 mm
3/4"	98%	19.000 mm
5/8"	97%	16.000 mm
1/2"	96%	12.500 mm
3/8"	96%	9.500 mm
1/4"	92%	6.300 mm
#4	91%	4.750 mm
#10	87%	2.000 mm
#20	76%	0.850 mm
#40	73%	0.425 mm
#100	59%	0.150 mm
#200	54.7%	0.075 mm
Silts	53.9%	0.074 mm
	32.7%	0.050 mm
	16.7%	0.020 mm
Clays	6.5%	0.005 mm
	3.0%	0.002 mm
Colloids	1.2%	0.001 mm

USDA Soil Textural Classification

	Particle Size
% Sand:	2.0 - 0.05 mm
% Silt:	0.05 - 0.002 mm
% Clay:	< 0.002 mm

USDA Soil Textural Classification
Sandy Loam

Comments:

Reviewed by:
Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: Q.C. - KCPW N Rd Maintenance Facility
Project #: 21B077-04
Client: Aspect Consulting
Source: AMW-01, S-6 @ 30 ft
Sample#: B21-0349

Date Received: 5-Apr-21
Sampled By: Client
Date Tested: 7-Apr-21
Tested By: C. Kriss

ASTM D-2487 Unified Soils Classification System
SM, Silty Sand
Sample Color:
gray

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

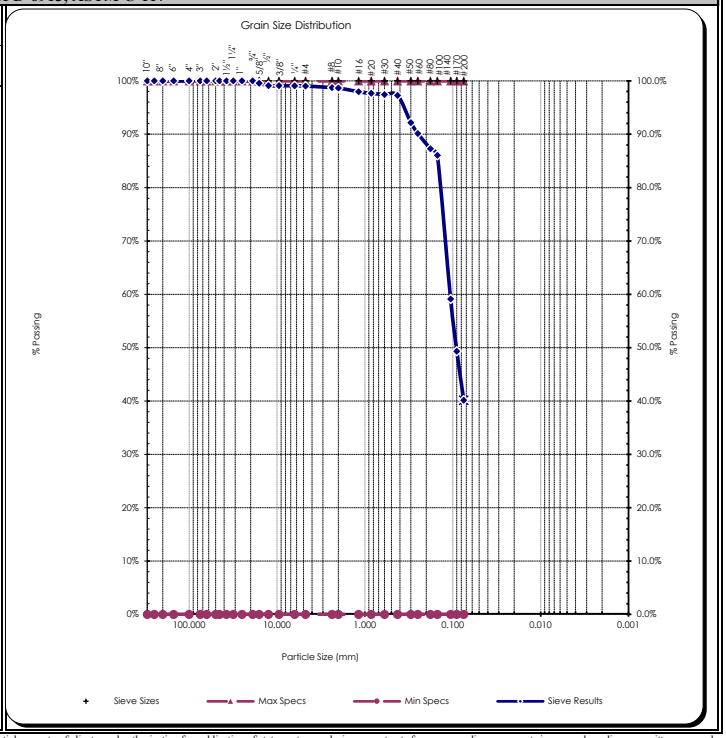
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.009	mm	% Gravel =	1.0%	Coeff. of Curvature, C_C =	1.56
$D_{(10)}$ =	0.019	mm	% Sand =	58.9%	Coeff. of Uniformity, C_U =	5.75
$D_{(15)}$ =	0.028	mm	% Silt & Clay =	40.2%	Fineness Modulus =	0.29
$D_{(30)}$ =	0.056	mm	Liquid Limit =	n/a	Plastic Limit =	n/a
$D_{(50)}$ =	0.091	mm	Plasticity Index =	n/a	Moisture %, as sampled =	19.5%
$D_{(60)}$ =	0.107	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =	
$D_{(90)}$ =	0.246	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =	
Dust Ratio =	26/63		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =	

ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	99%	99%	100.0%	0.0%
3/8"	9.50	99%	99%	100.0%	0.0%
1/4"	6.30		99%	100.0%	0.0%
#4	4.75	99%	99%	100.0%	0.0%
#8	2.36		99%	100.0%	0.0%
#10	2.00	99%	99%	100.0%	0.0%
#16	1.18		98%	100.0%	0.0%
#20	0.850		98%	100.0%	0.0%
#30	0.600		97%	100.0%	0.0%
#40	0.425	97%	97%	100.0%	0.0%
#50	0.300		92%	100.0%	0.0%
#60	0.250		90%	100.0%	0.0%
#80	0.180		87%	100.0%	0.0%
#100	0.150	86%	86%	100.0%	0.0%
#140	0.106		59%	100.0%	0.0%
#170	0.090		49%	100.0%	0.0%
#200	0.075	40.2%	40.2%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: Q.C. - KCPW N Rd Maintenance Facility
Project #: 21B077-04
Client: Aspect Consulting
Source: ATP-01, S-2 @ 7.5 ft
Sample#: B21-0352

Date Received: 5-Apr-21
Sampled By: Client
Date Tested: 7-Apr-21
Tested By: C. Kriss

ASTM D-2487 Unified Soils Classification System
SM, Silty Sand
Sample Color:
gray

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

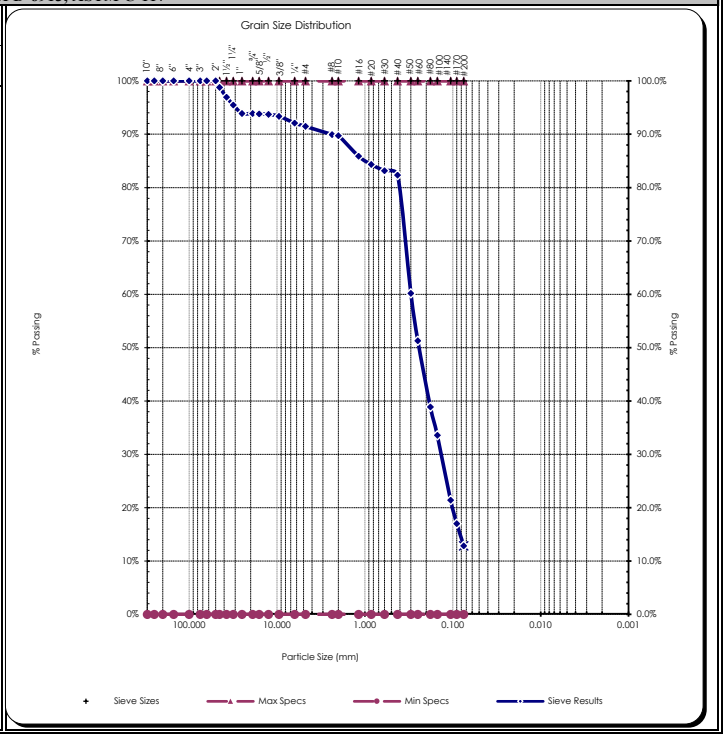
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.029 mm	% Gravel =	8.5%	Coeff. of Curvature, C_C =	1.08
$D_{(10)}$ =	0.058 mm	% Sand =	78.6%	Coeff. of Uniformity, C_U =	5.13
$D_{(15)}$ =	0.083 mm	% Silt & Clay =	12.9%	Fineness Modulus =	1.69
$D_{(30)}$ =	0.137 mm	Liquid Limit =	n/a	Plastic Limit =	n/a
$D_{(50)}$ =	0.243 mm	Plasticity Index =	n/a	Moisture %, as sampled =	19.1%
$D_{(60)}$ =	0.299 mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =	
$D_{(90)}$ =	2.443 mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =	
Dust Ratio =	5/32	Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =	

ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		99%	100.0%	0.0%
1.50"	37.50		97%	100.0%	0.0%
1.25"	31.50		95%	100.0%	0.0%
1.00"	25.00	94%	94%	100.0%	0.0%
3/4"	19.00	94%	94%	100.0%	0.0%
5/8"	16.00		94%	100.0%	0.0%
1/2"	12.50	94%	94%	100.0%	0.0%
3/8"	9.50	93%	93%	100.0%	0.0%
1/4"	6.30		92%	100.0%	0.0%
#4	4.75	91%	91%	100.0%	0.0%
#8	2.36		90%	100.0%	0.0%
#10	2.00	90%	90%	100.0%	0.0%
#16	1.18		86%	100.0%	0.0%
#20	0.850		84%	100.0%	0.0%
#30	0.600		83%	100.0%	0.0%
#40	0.425	82%	82%	100.0%	0.0%
#50	0.300		60%	100.0%	0.0%
#60	0.250		51%	100.0%	0.0%
#80	0.180		39%	100.0%	0.0%
#100	0.150	34%	34%	100.0%	0.0%
#140	0.106		21%	100.0%	0.0%
#170	0.090		17%	100.0%	0.0%
#200	0.075	12.9%	12.9%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: Q.C. - KCPW N Rd Maintenance Facility
Project #: 21B077-04
Client: Aspect Consulting
Source: ATP-02, S-2 @ 8 ft
Sample#: B21-0353

Date Received: 5-Apr-21
Sampled By: Client
Date Tested: 7-Apr-21
Tested By: C. Kriss

ASTM D-2487 Unified Soils Classification System
ML, Silt
Sample Color:
brown

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

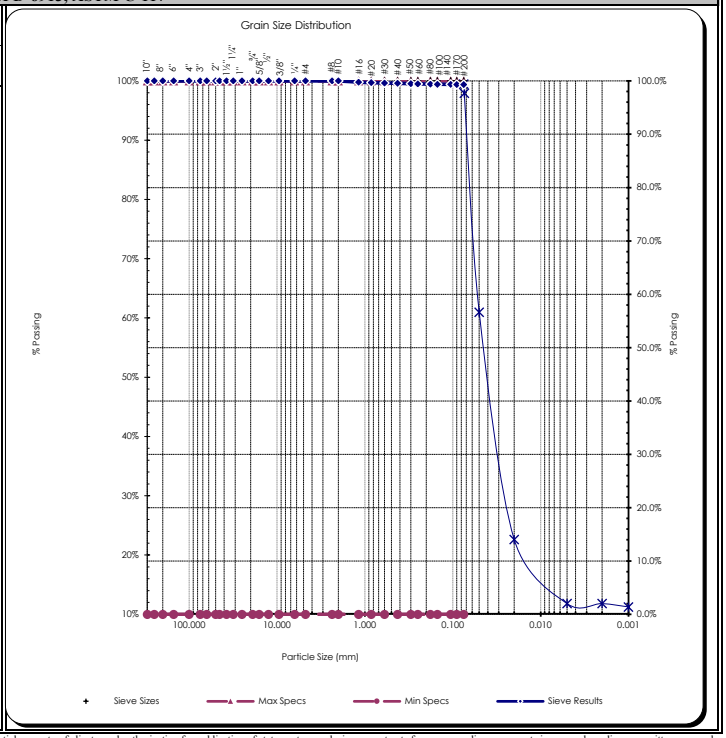
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.004	mm	% Gravel =	0.0%	Coeff. of Curvature, C_C =	1.50
$D_{(10)}$ =	0.008	mm	% Sand =	0.6%	Coeff. of Uniformity, C_U =	6.00
$D_{(15)}$ =	0.011	mm	% Silt & Clay =	99.4%	Fineness Modulus =	0.02
$D_{(30)}$ =	0.023	mm	Liquid Limit =	0.0%	Plastic Limit =	0.0%
$D_{(50)}$ =	0.038	mm	Plasticity Index =	0.0%	Moisture %, as sampled =	23.8%
$D_{(60)}$ =	0.045	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =	
$D_{(90)}$ =	0.068	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =	
Dust Ratio =	#		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =	

ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00		100%	100.0%	0.0%
3/4"	19.00		100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		100%	100.0%	0.0%
#20	0.850		100%	100.0%	0.0%
#30	0.600		100%	100.0%	0.0%
#40	0.425	100%	100%	100.0%	0.0%
#50	0.300		100%	100.0%	0.0%
#60	0.250		100%	100.0%	0.0%
#80	0.180		99%	100.0%	0.0%
#100	0.150		99%	100.0%	0.0%
#140	0.106		99%	100.0%	0.0%
#170	0.090		99%	100.0%	0.0%
#200	0.075	99.4%	99.4%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Hydrometer Report

Project:	Q.C. - KCPW N Rd Maintenance Facility	**Date Received:**	5-Apr-21
Project #:	21B077-04	**Sampled By:**	Client
Client :	Aspect Consulting	**Date Tested:**	7-Apr-21
Source:	ATP-02, S-2 @ 8 ft	**Tested By:**	C. Kriss
Sample#:	B21-0353		

ASTM D 2487 Soils Classification
ML, Silt
Sample Color
brown

ASTM D-422, HYDROMETER ANALYSIS

Assumed Sp Gr :	2.65	
Sample Weight:	50.09	grams
Hydroscopic Moist.:	0.79%	
Adj. Sample Wgt :	49.70	grams

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

Hydrometer Reading Minutes	Corrected Reading	Percent Passing	Soils Particle Diameter
2	16	32.2%	0.0357 mm
5	9	18.1%	0.0235 mm
15	3.5	7.0%	0.0140 mm
30	1.5	3.0%	0.0100 mm
60	1	2.0%	0.0071 mm
250	1	2.0%	0.0035 mm
1440	1	2.0%	0.0014 mm

% Gravel:	0.0%	**Liquid Limit:**	0.0 %
% Sand:	0.6%	**Plastic Limit:**	0.0 %
% Silt:	97.4%	**Plasticity Index:**	0.0 %
% Clay:	2.0%		

ASTM C-136

Sieve Analysis
Grain Size Distribution

Sieve Size	Percent Passing	Soils Particle Diameter
3.0"	100%	75.000 mm
2.0"	100%	50.000 mm
1.5"	100%	37.500 mm
1.25"	100%	31.500 mm
1.0"	100%	25.000 mm
3/4"	100%	19.000 mm
5/8"	100%	16.000 mm
1/2"	100%	12.500 mm
3/8"	100%	9.500 mm
1/4"	100%	6.300 mm
#4	100%	4.750 mm
#10	100%	2.000 mm
#20	100%	0.850 mm
#40	100%	0.425 mm
#100	99%	0.150 mm
#200	99.4%	0.075 mm
Silts	97.7%	0.074 mm
	56.6%	0.050 mm
	14.0%	0.020 mm
Clays	2.0%	0.005 mm
	2.0%	0.002 mm
Colloids	1.4%	0.001 mm

USDA Soil Textural Classification

	Particle Size
% Sand:	2.0 - 0.05 mm
% Silt:	0.05 - 0.002 mm
% Clay:	< 0.002 mm

USDA Soil Textural Classification
Silt Loam

Comments:

Reviewed by: Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project:	Q.C. - KCPW N Rd Maintenanc	**Date Received:**	5-Apr-21
Project #:	21B077-04	**Sampled By:**	Client
Client:	Aspect Consulting	**Date Tested:**	7-Apr-21
Source:	ATP-02, S-2 @ 8 ft	**Tested By:**	C. Kriss
Sample #:	B21-0353		

Unified Soils Classification System, ASTM D-2487
ML, Silt
Sample Color
brown

Liquid Limit Determination

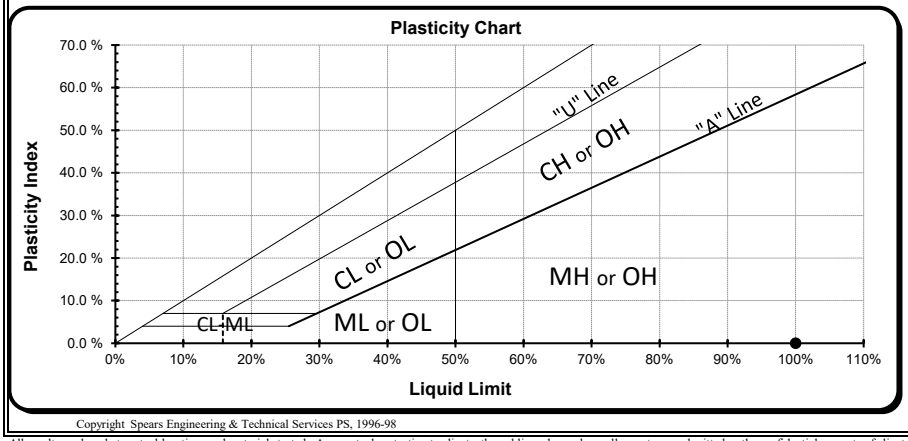
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:	Unable to establish liquid limit					
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						
Number of Blows:						

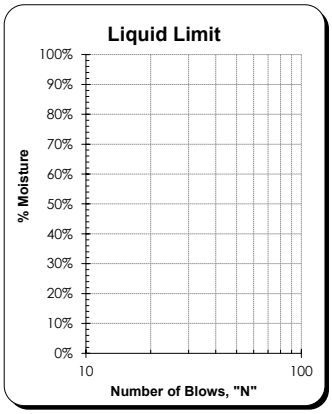
Liquid Limit @ 25 Blows: N/A
Plastic Limit: N/A
Plasticity Index, I_P: N/A

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:	Unable to determine plastic limit					
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: Liquid limit cannot be established as the material displays rapid dilation. At lower moisture the material does not spread into the cup without breaking the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by: Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: Q.C. - KCPW N Rd Maintenance Facility
Project #: 21B077-04
Client: Aspect Consulting
Source: ATP-07, S-1 @ 4.5 ft
Sample#: B21-0359

Date Received: 5-Apr-21
Sampled By: Client
Date Tested: 7-Apr-21
Tested By: C. Kriss

ASTM D-2487 Unified Soils Classification System
SM, Silty Sand
Sample Color:
gray

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

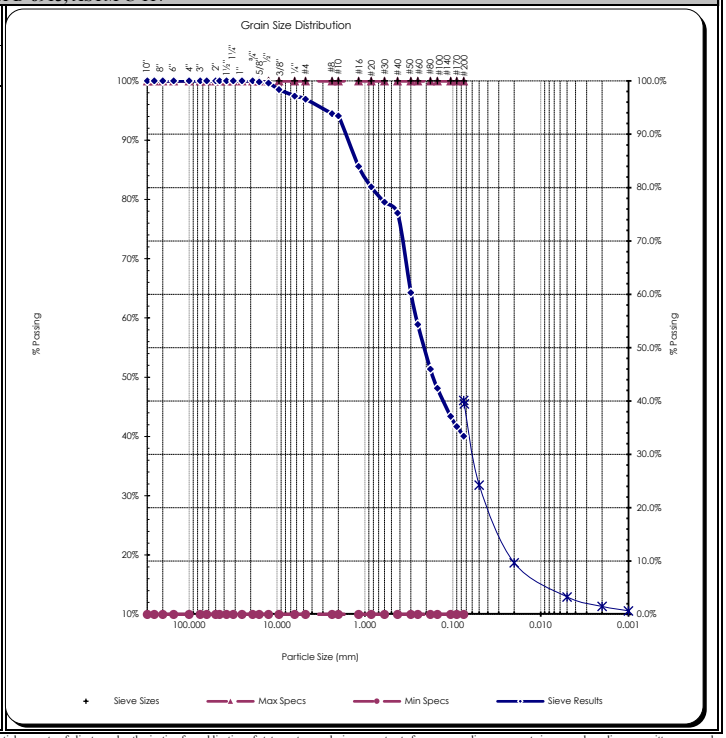
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.009	mm	% Gravel =	3.1%	Coeff. of Curvature, C_C = 0.65
$D_{(10)}$ =	0.019	mm	% Sand =	56.8%	Coeff. of Uniformity, C_U = 13.91
$D_{(15)}$ =	0.028	mm	% Silt & Clay =	40.1%	Fineness Modulus = 1.32
$D_{(30)}$ =	0.056	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	0.167	mm	Plasticity Index =	n/a	Moisture %, as sampled = 11.5%
$D_{(60)}$ =	0.260	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	1.605	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	49/95		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	99%	99%	100.0%	0.0%
1/4"	6.30		97%	100.0%	0.0%
#4	4.75	97%	97%	100.0%	0.0%
#8	2.36		94%	100.0%	0.0%
#10	2.00	94%	94%	100.0%	0.0%
#16	1.18		86%	100.0%	0.0%
#20	0.850		82%	100.0%	0.0%
#30	0.600		80%	100.0%	0.0%
#40	0.425	78%	78%	100.0%	0.0%
#50	0.300		64%	100.0%	0.0%
#60	0.250		59%	100.0%	0.0%
#80	0.180		51%	100.0%	0.0%
#100	0.150		48%	100.0%	0.0%
#140	0.106		43%	100.0%	0.0%
#170	0.090		42%	100.0%	0.0%
#200	0.075	40.1%	40.1%	100.0%	0.0%



Comments:

Reviewed by:

Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Hydrometer Report

Project:	Q.C. - KCPW N Rd Maintenance Facility	**Date Received:**	5-Apr-21
Project #:	21B077-04	**Sampled By:**	Client
Client :	Aspect Consulting	**Date Tested:**	7-Apr-21
Source:	ATP-07, S-1 @ 4.5 ft	**Tested By:**	C. Kriss
Sample#:	B21-0359		

ASTM D-2487 Unified Soils Classification System
SM, Silty Sand
Sample Color
gray

ASTM D-422, HYDROMETER ANALYSIS

Assumed Sp Gr :	2.65	
Sample Weight:	100.00	grams
Hydroscopic Moist.:	0.95%	
Adj. Sample Wgt :	99.06	grams

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

Hydrometer Reading Minutes	Corrected Reading	Percent Passing	Soils Particle Diameter
2	16	15.2%	0.0357 mm
5	11	10.4%	0.0232 mm
15	8.5	8.1%	0.0137 mm
30	6.5	6.2%	0.0097 mm
60	4	3.8%	0.0070 mm
250	3	2.8%	0.0034 mm
1440	1	0.9%	0.0014 mm

% Gravel:	3.1%	**Liquid Limit:**	n/a
% Sand:	56.8%	**Plastic Limit:**	n/a
% Silt:	36.8%	**Plasticity Index:**	n/a
% Clay:	3.3%		

ASTM C-136

Sieve Analysis
Grain Size Distribution

Sieve Size	Percent Passing	Soils Particle Diameter
3.0"	100%	75.000 mm
2.0"	100%	50.000 mm
1.5"	100%	37.500 mm
1.25"	100%	31.500 mm
1.0"	100%	25.000 mm
3/4"	100%	19.000 mm
5/8"	100%	16.000 mm
1/2"	100%	12.500 mm
3/8"	99%	9.500 mm
1/4"	97%	6.300 mm
#4	97%	4.750 mm
#10	94%	2.000 mm
#20	82%	0.850 mm
#40	78%	0.425 mm
#100	48%	0.150 mm
#200	40.1%	0.075 mm
Silts	39.5%	0.074 mm
	24.2%	0.050 mm
	9.6%	0.020 mm
Clays	3.3%	0.005 mm
	1.5%	0.002 mm
Colloids	0.7%	0.001 mm

USDA Soil Textural Classification

	Particle Size
% Sand:	2.0 - 0.05 mm
% Silt:	0.05 - 0.002 mm
% Clay:	< 0.002 mm

USDA Soil Textural Classification
Loamy Sand

Comments:

Reviewed by:
Meghan Blodgett-Carrillo

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Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: Q.C. - KCPW N Rd Maintenance Facility
Project #: 21B077-04
Client: Aspect Consulting
Source: ATP-08, S-1 @ 9.0 ft
Sample#: B21-0360

Date Received: 5-Apr-21
Sampled By: Client
Date Tested: 7-Apr-21
Tested By: C. Kriss

ASTM D-2487 Unified Soils Classification System
SM, Silty Sand with Gravel
Sample Color:
brown

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

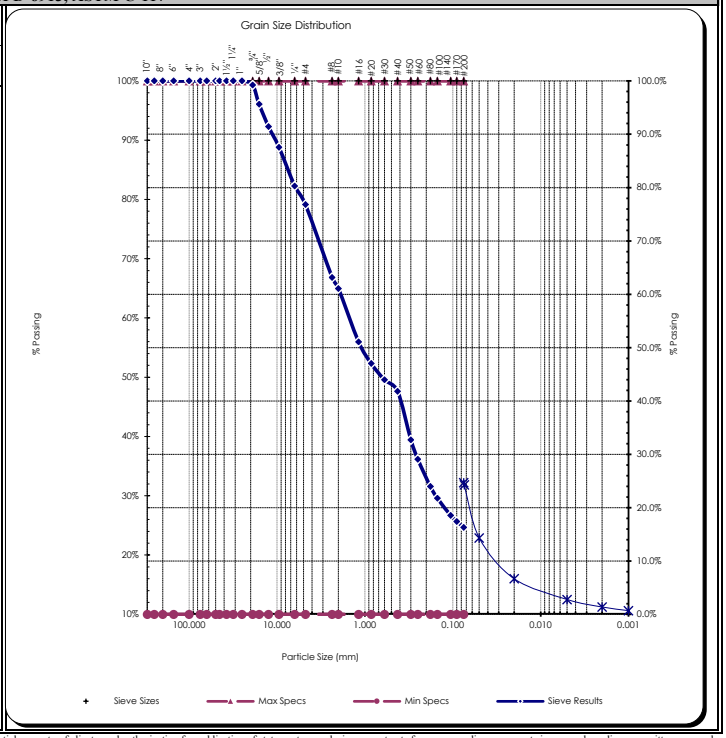
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.015 mm	% Gravel =	20.9%	Coeff. of Curvature, C_C =	0.52
$D_{(10)}$ =	0.030 mm	% Sand =	54.5%	Coeff. of Uniformity, C_U =	50.90
$D_{(15)}$ =	0.046 mm	% Silt & Clay =	24.7%	Fineness Modulus =	2.91
$D_{(30)}$ =	0.156 mm	Liquid Limit =	n/a	Plastic Limit =	n/a
$D_{(50)}$ =	0.638 mm	Plasticity Index =	n/a	Moisture %, as sampled =	7.7%
$D_{(60)}$ =	1.547 mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =	
$D_{(90)}$ =	10.529 mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =	
Dust Ratio =	29/56	Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =	

ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	99%	99%	100.0%	0.0%
5/8"	16.00		96%	100.0%	0.0%
1/2"	12.50	92%	92%	100.0%	0.0%
3/8"	9.50	89%	89%	100.0%	0.0%
1/4"	6.30		82%	100.0%	0.0%
#4	4.75	79%	79%	100.0%	0.0%
#8	2.36		67%	100.0%	0.0%
#10	2.00	65%	65%	100.0%	0.0%
#16	1.18		56%	100.0%	0.0%
#20	0.850		52%	100.0%	0.0%
#30	0.600		50%	100.0%	0.0%
#40	0.425	48%	48%	100.0%	0.0%
#50	0.300		39%	100.0%	0.0%
#60	0.250		36%	100.0%	0.0%
#80	0.180		32%	100.0%	0.0%
#100	0.150		30%	100.0%	0.0%
#140	0.106		27%	100.0%	0.0%
#170	0.090		26%	100.0%	0.0%
#200	0.075	24.7%	24.7%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Hydrometer Report

Project:	Q.C. - KCPW N Rd Maintenance Facility	**Date Received:**	5-Apr-21
Project #:	21B077-04	**Sampled By:**	Client
Client :	Aspect Consulting	**Date Tested:**	7-Apr-21
Source:	ATP-08, S-1 @ 9.0 ft	**Tested By:**	C. Kriss
Sample#:	B21-0360		

ASTM D-2487 Unified Soils Classification System
SM, Silty Sand with Gravel
Sample Color
brown

ASTM D-422, HYDROMETER ANALYSIS

Assumed Sp Gr :	2.65	
Sample Weight:	100.12	grams
Hydroscopic Moist.:	2.81%	
Adj. Sample Wgt :	97.38	grams

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

Hydrometer Reading Minutes	Corrected Reading	Percent Passing	Soils Particle Diameter
2	13	8.7%	0.0364 mm
5	11	7.3%	0.0232 mm
15	8	5.3%	0.0137 mm
30	6	4.0%	0.0097 mm
60	5	3.3%	0.0069 mm
250	3.5	2.3%	0.0034 mm
1440	1.5	1.0%	0.0014 mm

% Gravel:	20.9%	**Liquid Limit:**	n/a
% Sand:	54.5%	**Plastic Limit:**	n/a
% Silt:	21.9%	**Plasticity Index:**	n/a
% Clay:	2.8%		

ASTM C-136

Sieve Analysis
Grain Size Distribution

Sieve Size	Percent Passing	Soils Particle Diameter
3.0"	100%	75.000 mm
2.0"	100%	50.000 mm
1.5"	100%	37.500 mm
1.25"	100%	31.500 mm
1.0"	100%	25.000 mm
3/4"	99%	19.000 mm
5/8"	96%	16.000 mm
1/2"	92%	12.500 mm
3/8"	89%	9.500 mm
1/4"	82%	6.300 mm
#4	79%	4.750 mm
#10	65%	2.000 mm
#20	52%	0.850 mm
#40	48%	0.425 mm
#100	30%	0.150 mm
#200	24.7%	0.075 mm
Silts	24.3%	0.074 mm
	14.3%	0.050 mm
	6.7%	0.020 mm
Clays	2.8%	0.005 mm
	1.4%	0.002 mm
Colloids	0.7%	0.001 mm

USDA Soil Textural Classification

	Particle Size
% Sand:	2.0 - 0.05 mm
% Silt:	0.05 - 0.002 mm
% Clay:	< 0.002 mm

USDA Soil Textural Classification
Loamy Sand

Comments:

Reviewed by:
Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc.

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Sieve Report

Project: Q.C. - KCPW N Rd Maintenance Facility
Project #: 21B077-04
Client: Aspect Consulting
Source: ATP-08, S-3 @ 11.5 ft
Sample#: B21-0361

Date Received: 5-Apr-21
Sampled By: Client
Date Tested: 7-Apr-21
Tested By: C. Kriss

ASTM D-2487 Unified Soils Classification System
SM, Silty Sand
Sample Color:
gray

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

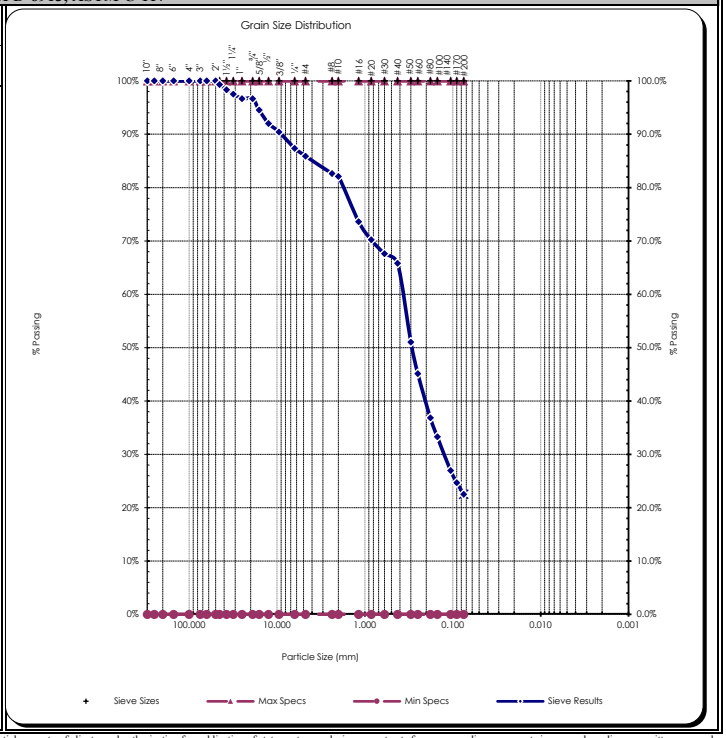
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.017 mm	% Gravel =	14.1%	Coeff. of Curvature, C_C =	1.29
$D_{(10)}$ =	0.033 mm	% Sand =	63.4%	Coeff. of Uniformity, C_U =	11.29
$D_{(15)}$ =	0.050 mm	% Silt & Clay =	22.5%	Fineness Modulus =	2.19
$D_{(30)}$ =	0.127 mm	Liquid Limit =	n/a	Plastic Limit =	n/a
$D_{(50)}$ =	0.291 mm	Plasticity Index =	n/a	Moisture %, as sampled =	7.1%
$D_{(60)}$ =	0.376 mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =	
$D_{(90)}$ =	9.043 mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =	
Dust Ratio =	13/38	Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =	

ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		99%	100.0%	0.0%
1.50"	37.50		98%	100.0%	0.0%
1.25"	31.50		98%	100.0%	0.0%
1.00"	25.00	97%	97%	100.0%	0.0%
3/4"	19.00	97%	97%	100.0%	0.0%
5/8"	16.00		95%	100.0%	0.0%
1/2"	12.50	92%	92%	100.0%	0.0%
3/8"	9.50	90%	90%	100.0%	0.0%
1/4"	6.30		87%	100.0%	0.0%
#4	4.75	86%	86%	100.0%	0.0%
#8	2.36		83%	100.0%	0.0%
#10	2.00	82%	82%	100.0%	0.0%
#16	1.18		74%	100.0%	0.0%
#20	0.850		70%	100.0%	0.0%
#30	0.600		68%	100.0%	0.0%
#40	0.425	66%	66%	100.0%	0.0%
#50	0.300		51%	100.0%	0.0%
#60	0.250		45%	100.0%	0.0%
#80	0.180		37%	100.0%	0.0%
#100	0.150	33%	33%	100.0%	0.0%
#140	0.106		27%	100.0%	0.0%
#170	0.090		25%	100.0%	0.0%
#200	0.075	22.5%	22.5%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

APPENDIX C

Report Limitations and Guidelines for Use

REPORT LIMITATIONS AND GUIDELINES FOR USE

Geoscience is Not Exact

The geoscience practices (geotechnical engineering, geology, and environmental science) are far less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or property, you should contact Aspect Consulting, LLC (Aspect).

This Report and Project-Specific Factors

Aspect's services are designed to meet the specific needs of our clients. Aspect has performed the services in general accordance with our agreement (the Agreement) with the Client (defined under the Limitations section of this project's work product). This report has been prepared for the exclusive use of the Client. This report should not be applied for any purpose or project except the purpose described in the Agreement.

Aspect considered many unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you;
- Not prepared for the specific purpose identified in the Agreement;
- Not prepared for the specific subject property assessed; or
- Completed before important changes occurred concerning the subject property, project, or governmental regulatory actions.

If changes are made to the project or subject property after the date of this report, Aspect should be retained to assess the impact of the changes with respect to the conclusions contained in the report.

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual limitations. Within the limitations of scope, schedule, and budget, our services have been executed in accordance with our Agreement with the Client and recognized geoscience practices in the same locality and involving similar conditions at the time this report was prepared.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope instability, or groundwater fluctuations. If any of the described events

may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Geotechnical, Geologic, and Environmental Reports Are Not Interchangeable

The equipment, techniques, and personnel used to perform a geotechnical or geologic study differ significantly from those used to perform an environmental study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions, or recommendations (e.g., about the likelihood of encountering underground storage tanks or regulated contaminants). Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

We appreciate the opportunity to perform these services. If you have any questions, please contact the Aspect Project Manager for this project.