West Anchorage Snow Disposal Site

Design Study Report

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PROJECT MANAGEMENT & ENGINEERING
PM&E

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Executive Summary

Introduction

The Municipality of Anchorage (MOA) Maintenance and Operations Department (M&O) maintains the majority of the streets in the Anchorage Bowl. A major winter maintenance activity is the removal and disposal of snow from these streets. This removed snow is deposited in one of eight snow disposal sites strategically located throughout the city, each serving its adjacent area. The MOA has identified a need to replace the Northwood Snow Disposal Site (Northwood Site) that currently serves the West Anchorage snow service area. The MOA Project Management and Engineering (PM&E) Department is administering the West Anchorage Snow Disposal Project (Project) and has contracted with HDR to select a location for, permit, and design a replacement for the Northwood Site.

The Northwood Site is located on State of Alaska-owned land controlled by Ted Stevens Anchorage International Airport, adjacent to the M&O Kloep Station maintenance facility south of International Airport Road on Northwood Drive. Figure 1 shows the boundaries of the West Anchorage snow service area; M&O is responsible for snow collection on most neighborhood and collector streets within the area shown. The Anchorage School District also uses the Northwood Site for snow storage.

M&O leases the Northwood Site from Ted Stevens Anchorage International Airport (TSAIA) on a year-to-year basis. Because of increasingly stringent State of Alaska water quality regulations, a number of improvements to the Northwood Site are necessary for its long-term operation. To make these improvements, MOA must purchase or negotiate a long-term lease for the property; however, the lands containing the Northwood Site are not available to the MOA for long-term use.

This project will provide MOA with a permanent snow disposal site in West Anchorage sized to accommodate the expected snow storage needs for the next 50 years. The site will be designed to meet State of Alaska water quality standards for discharge.

Alternatives and Site Selection

Anchorage Municipal Code Title 21 sets criteria for both snow disposal sites and the public facility site selection processes. A site selection study in compliance with these criteria has been completed for the project, and a 32-acre parcel in the Northeast corner of Connor's Bog was selected as the preferred site alternative. The Final Site Selection Study is contained in Appendix A.

Connor's Bog Facility Permitting and Approvals

A robust permitting process will be followed for the proposed West Anchorage Snow Disposal Site in Connor's Bog. The first steps in the permitting process will deal with land management issues pertaining to the access road from Kloep Station, the land use designation provided in the Anchorage 2020 Comprehensive Plan within the project's selected parcel, and a change in zoning that is appropriate for siting a snow disposal site within the selected parcel. Once the site is approved by the Planning and Zoning Commission and the Assembly, there are a number of Title 21 and Design Criteria Manual variances that will be applied for through the Urban Design Commission. Finally, PM&E will apply for Conditional Use Permits for a new snow disposal site and for land reclamation activities, as required by Title 21. The approval of Conditional Use Permits for the snow disposal site will be contingent on the adherence of the project's design to requirements laid out in Municipal code and the Municipal Design Criteria Manual. The design must seek variances from the portions of these guidelines that cannot be

met due to site-specific conditions at the selected site. These conditions, most notably, are the presence of Class A wetlands, and the fact that the site is located within a self-contained drainage basin with no surface outflows.

Design Alternatives

The first alternative the design team considered was the standard V-Swale Design that the MOA uses for its snow disposal sites. These designs are a result of extensive study and work on existing upland snow sites and are the basis of the design parameters laid out in the Design Criteria Manual. They call for a gently sloping upland pad that drains south to north into gently sloping swales. These swales empty into a treatment and detention storage area that then discharges to a receiving water. Because of the wetland environment of the Connor's Bog site and operational considerations that will make the v-swale design impractical, strict adherence to the V-swale design was not recommended.

An alternative design that the team has selected as the proposed design takes advantage of the infiltration and treatment properties of the surrounding wetlands of Connor's Bog. Rather than excavating treatment and retention basins and creating constructed wetlands to process the water, the meltwater will be retained on the existing wetlands by a surrounding berm. The meltwaters can then be released into the larger wetland complex through three to four controllable weir structures.

Cost Estimates

HDR has prepared a preliminary estimate of probable construction costs. The construction cost estimate is meant to be a working document that will be updated as the design process progresses. Using conservative estimates of costs and quantities, the probable construction cost is approximately $8 million.

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Acronyms

AMC	Anchorage Municipal Code
AWWU	Anchorage Water and Wastewater Utility
DCM	Design Criteria Manual
DOT&PF	Alaska Department of Transportation and Public Facilities
LUP	Land Use Plan
mg/L	milligrams per liter
M&O	Maintenance and Operations Department
MOA	Municipality of Anchorage
PLI	Public Lands and Institutions
PM&E	Project Management and Engineering
ROW	right-of-way
TR	Transitional
TSAIA	Ted Stevens Anchorage International Airport

1 Introduction

1.1 Purpose and Goal

The Municipality of Anchorage (MOA) Maintenance and Operations Department (M&O) maintains the majority of the streets in the Anchorage Bowl. A major winter maintenance activity is the removal and disposal of snow from these streets. Snow removed from MOA-maintained streets is deposited in one of eight snow disposal sites strategically located throughout the city, each serving its adjacent area. Snow removed from roads and other infrastructure managed by the State of Alaska are not currently nor planned to be deposited in the Northwood snow disposal site managed by the MOA. ADOT maintains its own snow disposal site on and for the Ted Stevens Anchorage International Airport and surrounding areas. The MOA has identified a need to replace the Northwood Snow Disposal Site (Northwood Site) that serves the West Anchorage snow service area, which includes most of the western portion of the Anchorage Bowl. The MOA Project Management and Engineering (PM&E) Department is administering the West Anchorage Snow Disposal Project and has contracted with HDR to select a location for, permit, and design a replacement for the Northwood Site.

The existing Northwood Site is located on State of Alaska-owned land controlled by Ted Stevens Anchorage International Airport (TSAIA). It is situated adjacent to the M&O Kloep Station maintenance facility south of International Airport Road on Northwood Drive. Figure 1 shows the boundaries of the West Anchorage snow service area; M&O is responsible for snow collection on most neighborhood and collector streets within the area shown. Larger arterial roads such as Dimond Boulevard, Minnesota Drive, Jewel Lake Road, and International Airport Road are maintained by the State of Alaska Department of Transportation and Public Facilities (DOT&PF). In years when there is significant snowfall, the Anchorage School District also use the Northwood Site for snow storage. DOT&PF and private contractors do not use the site.

Figure 1. West Anchorage Snow Service Area

M&O leases the Northwood Site from TSAIA on a year-to-year basis. Because of increasingly stringent State of Alaska water quality regulations, PM&E has identified a number of improvements to the Northwood Site that are necessary for the long-term operation of the site. In order to make these improvements, the MOA must purchase or negotiate a long-term lease for the property. Unfortunately, because of TSAIA long-term needs, the lands containing the Northwood Site are not available to the MOA for long-term use.

This project will provide MOA with a permanent snow disposal site in West Anchorage sized to accommodate the expected snow storage needs for the next 50 years. The site will be designed to meet State of Alaska water quality standards for discharge.

1.2 Current Snow Disposal Site at Northwood

The Northwood Site contains 7 to 12.5 usable acres for snow storage, depending on TSAIA's alternative needs and the negotiated lease agreement. The West Anchorage service area is 14.4 square miles (Figure 1) and accepts 20 percent of the snow gathered from MOA-maintained streets in the Anchorage Bowl. The average annual snowfall in Anchorage is 74 inches.[1] In heavy snow years, 12.5 acres of storage is insufficient for the collection area, and 7 acres is inadequate even in light snow years. The target for the new facility is 14 acres of snow deposition area, as requested by M&O. This footprint is calculated to provide land for staging in the north west corner of the site and space to accommodate the expected increase in West Anchorage snow haul over the life of the facility.

Figure 2. Northwood Site in 2011–2012

In an average year, 10,500 truck truckloads of snow are brought to the Northwood Site. In extreme years, it can be substantially more. In 2011–2012, Anchorage received 175 percent of the average snowfall, and approximately 18,500 truckloads went to the Northwood Site. The result is shown in Figure 2.

2 Public Involvement

PM&E and their consultant, HDR, have carried out a robust public involvement process to gain public input on the selection of a preferred site, site design, and integration of the new site with the adjacent park lands. MOA will continue to provide opportunities for public involvement and input throughout the permitting and design phases as laid out in Title 21 of the Anchorage Municipal Code (AMC). The following is a list of the opportunities provided for public input in each project phase.

Phase One – Initial Project Outreach

- Community Council Presentations – March 5 and 16, 2020
- Email to all West Anchorage Community Councils – March 16, 2020
- Newspaper advertisements – March 16, 2020

[1] https://www.usclimatedata.com/climate/anchorage/alaska/united-states/usak0012

- Postcards to residents – March 20, 2020
- Facebook Posts and Nextdoor app messages – March 23, 2020
- Press Release to major new outlets – March 24, 2020
- Virtual Public Meeting/Live Chat – March 24, 2020
- Online Open House – March 24 through April 24, 2020

Phase Two – Site Selection Study

- Parks and Recreation Meeting – September 14, 2020
- Community Council Meetings – October 7, October 26, and November 5, 2020
- Flyers posted in project area and postcards mailed to residents – October 27, 2020
- Phone calls to Community Council Presidents – October 26, 2020
- Newspaper advertisements – October 29 and November 11, 2020
- Virtual Public Meeting/Live Chat – October 29, 2020
- Online Open House – October 29 through November 20, 2020
- Anchorage Transportation Fair – November 18, 2020

Phase Three – Rezone, Comp Plan, Conditional Use Permitting, Use of Dedicated Park Land Design Criteria and Related Variances

- The rezoning of the parcel to Public Lands and Institutions (PLI), modifications to the Comprehensive 2040 Land Use Map, Conditional Use Permits, and design are all parts of mandated public processes. The boards and commissions that oversee each authorization provide for public input and comments throughout these processes.

3 Site Selection Study

AMC Title 21 sets criteria for both snow disposal sites and public facility site selection processes. Section 21.03.140 of Title 21 governs public facility site selection, and Section B.1.f is specific to public snow disposal sites.

A site selection study in compliance with these requirements has been completed for the project, and a 32-acre parcel in the Northeast corner of Connor's Bog was selected as the preferred site alternative (see Figure 3). The Final Site Selection Study is contained in Appendix A.

Figure 3. Selected Parcel in Connor's Bog

4 Existing Conditions

4.1 Parcel Identification and Land Use

The selected Connor's Bog parcel is identified as the unsubdivided NW ¼ of the NW ¼ of Section 1, T12N, R4W, Municipal Parcel ID 012-571-01-000. The parcel is predominantly flat, slopes very slightly from northeast to southwest and contains Class A wetlands with low muskeg vegetation and several small areas of larger trees. There is currently no development of any kind on the parcel. It is bounded on the north by Javier de la Vega Park, on the east by Minnesota Drive, and on the south and west by undeveloped parkland wetland. Existing land use is park land and open space. It is shown on the 2040 Comprehensive Plan Land Use Plan map (LUP) and the West Anchorage District Plan as Park or Natural Area. An amendment will be required of the LUP to change use to Community Facility or Institution.

4.2 Zoning

Zoning for the Connor's Bog parcel is Transitional (TR). The parcel will be rezoned to Public Lands and Institutions (PLI) and the Anchorage Municipal Code AMC 21.05.060.E.4&6 Conditional Use permitting process will be followed for both Land Reclamation and Snow Storage Sites.

4.3 Recreation Use Status

The selected Connor's Bog parcel is managed by the Municipal Parks and Recreation Department as part of Connor's Bog Park but is not designated parkland. The adjacent parcels to the north (Javier de la Vega Park, softball and soccer fields) and west (Connor's Bog Park, open space recreation and off-leash dog area) are designated parkland. Park planning document shows proposed trails on the parcel, but there are currently no developed trails other than faint social trials through the wetland vegetation. The heavily used areas of the Connor's Bog off-leash dog area are to the west of the parcel along the Anchorage Water and Wastewater Utility (AWWU) corridor, on lands leased from TSAIA north of the lake and around Connor's Lake itself. Skijoring use of the area has left no established trails, and the local club confirmed that they are no longer maintaining winter trails in the area. There is a remnant low chain-link fence between the parcel and Javier de la Vega Park with openings near the east and west corners of the park parcel; these fence breaks tend to concentrate foot traffic in those areas.

4.4 Roadway Access

The site is bounded on the east by the DOT&PF right-of-way (ROW) for Minnesota Drive, but direct access from Minnesota Drive is not allowed per plat restrictions. Truck access is predominantly from the divided arterial of International Airport Road (see Figure 4). Truck traffic arriving on International Airport Road from the east have a designated left-turn lane, traffic from the west must make a right turn directly onto Northwood Drive, and both must cross the frontage road, Taft Street, which has stop signs on both the east and west sides. Trucks exiting Northwood Drive turn east into a merge lane on International Airport Road after first crossing Taft Street. There is no west access to International Airport Road; traffic must turn west on Taft Street and access Jewel Lake Road to the west. There is no direct

traffic access either north or south to Northwood Drive north of International Airport Road, which precludes snow haul truck traffic in the residential and school neighborhoods north of International.

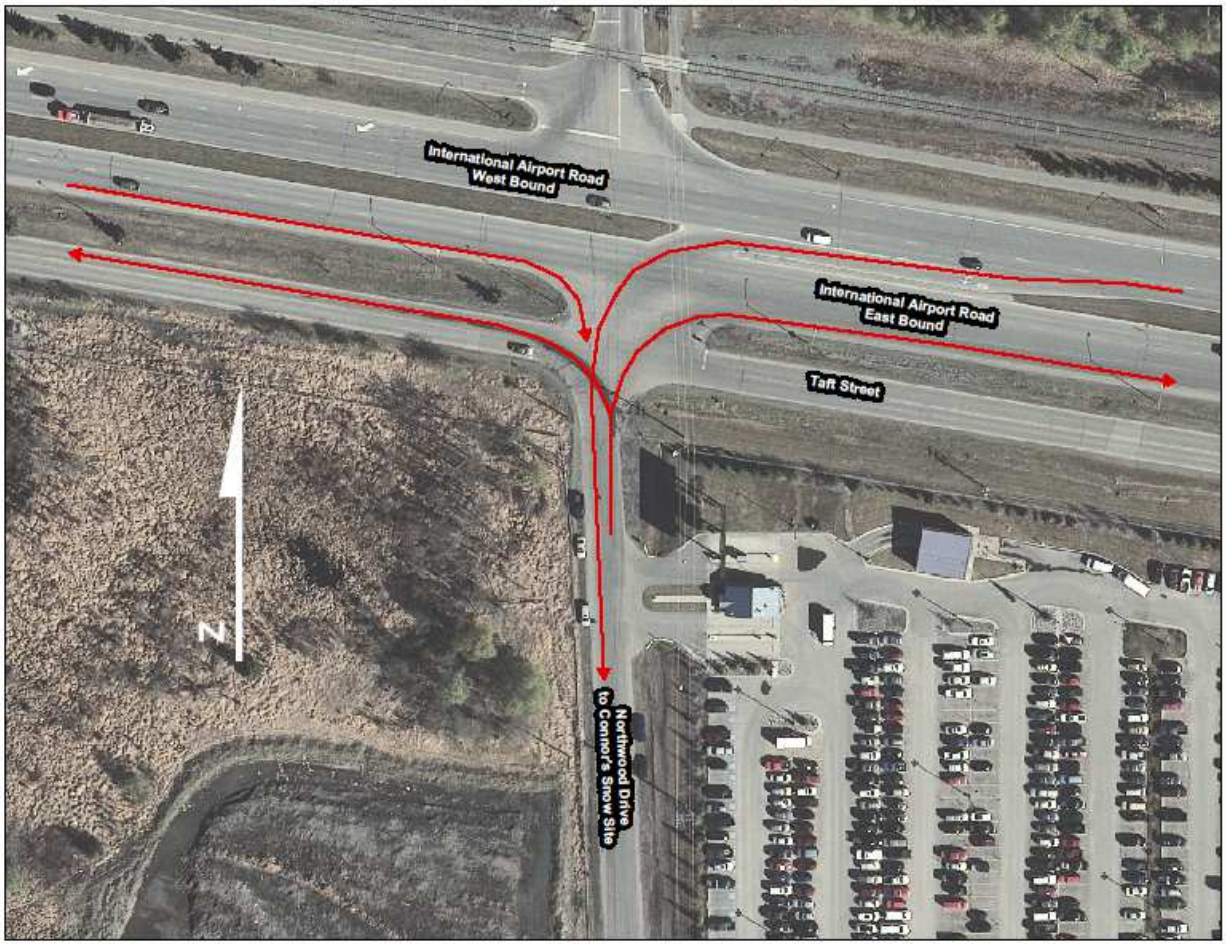

Figure 4. Truck Access to S. Northwood Drive

Access to the parcel will be via the 33-foot section line easements along the north side of the adjacent Connor's Bog park parcel from the Kloep Station operations area to the northwest. The Project will seek an additional 0.2-acre easement along the Connor's Bog Park parcel to accommodate the full 44-foot width of the access road.

4.5 Right-of-Way/Easements

The snow site parcel and the Connor's Bog Park parcel to the west contain a 33-foot section line easement along their north boundary. A 50-foot section line and natural gas easement runs north-south between these two parcels. Adjacent parcels to the north contain a 15-foot vegetation buffer within a 50-foot electrical transmission line ROW, parcels to the south contain a 110-foot telephone and electrical easement, and parcels to the west contain a 33-foot section line easement. The 50-foot section line easement to the north has been vacated in favor of the electrical transmission line ROW.

4.6 Soils

A synopsis of applicable Historic Bore Logs in Connor's Bog is attached as Appendix B. This geotechnical data indicates that the peat layer around the perimeter of the bog and along the AWWU corridor varies from 5 to 12 feet. This peat layer is underlain by a layer of medium dense sand and fine gravel. A detailed subsurface investigation along the access road alignment and on the interior of the parcel was done during spring 2021. The complete geotechnical report is contained in Appendix B. This report shows 5-7 feet of peat over most of the parcel.

4.7 Existing Drainage Patterns

On the north side of the proposed site is the raised area of the Kloep Maintenance Station on the west, and Javier de la Vega park on the east. The Kloep Station operations areas drain generally west, with some piping systems to the wetland on the west side. The Javier de la Vega ball fields drain by surface sheet flow from the high point in the center to ditches, and swales that encompass the fields. Half of this drainage trends north to the ditches along International Airport Road. It appears that this flow dead-ends in the wetland area north of the current Northwood Site.

The other half drains south along both sides of the property and through several swales off the south side. A single culvert under Minnesota Drive drains a small basin east of the separated roadway and discharges into the north east corner of the proposed site. All of these flows will end up in the area north of the new snow site. Once in the wetlands, the drainage trend is very slightly downhill toward the AWWU sewer line trail where there is a single culvert that moves water across to the west side. The entire area both east and west of the AWWU trail is very flat with little topography until farther west where the ground slopes gradually down to the shore of Connor's Lake. Other than the few area storm drains in the Kloep Station yards and some driveway culvert on properties north of Javier de la Vega Park, there is limited storm drain piping in the area.

Appendix C contains the Stormwater Management Report for the site as stipulated in the MOA's Development Services permitting requirements. A graphic of the existing drainage patterns can be found in this report.

4.8 Wetlands

The Connor's Bog site and surrounding park land to the south and west are dominated by Class A wetlands of the patterned bog type that were once abundant in the Anchorage lowlands. As with many of the historic Anchorage wetlands, these have been cut off from their historic water sources and are slowly drying out as the underlying water tables are lowered. This lowering of the water table also shows up in the local manifestation of the water table, Connor's Lake. Comparisons of the current to historic (1950s) outlines of Connor's Lake show a gradual shrinkage of water surface area. The existing Northwood Site drains to Connor's Lake and helps maintain the lake levels but has only a small effect on the intervening wetlands. The new site has the potential to increase water tables and rehydrate a larger portion of the remaining wetland as well as to help maintain the water surface elevation in Connor's Lake.

The low shrub wetland areas of the bog are interspersed with several stands of black spruce. The peat layer under these treed areas is shallower as seen in the soils report. If feasible, maintaining the existing shrubs and trees into the design will support visual screening and wildlife habitat diversity.

4.9 Utilities

There are several utility easements and ROWs that impact the new snow site. AWWU has a large sewer trunk that bisects the bog. There is a raised travel surface that serves for maintenance traffic and as a well-used trail corridor for the Connor's Bog off-leash dog park. The raised surface may not be directly over the trunk line and may be partially constructed of the spoils left after trenching for the line. Along much of the route it is offset northeast of the actual pipe. The sewer trunk is buried at a depth such that it should not be a factor if at-grade culverts are placed for wetlands connectivity under the raised surface. Chugach Electric Association has two high-voltage lines along the northern edge of the property: one within the 33-foot section line easement on the property and the other in a dedicated electrical ROW that replaced the 50-foot section line easement north of the property line. A lower-voltage electrical line and telephone lines also cross the bog in an easement south of the property. Clearance under and avoidance of the utility poles for the power transmission lines to the north will figure in the design of the access road. Wetland connectivity through the AWWU corridor will figure in drainage design for the snow site's meltwater. The southern power transmission line should not be a factor, as snow site development will be north of the line.

4.10 Proximity to Residential Properties

The closest residential properties are more than 2,000 feet from the proposed snow site perimeter in the south west corner of Connor's Bog. This puts the proposed site more than twice as far from residential properties as the current Northwood Site. The Northwood Site is 700–800 feet from the apartment buildings and hotel north of International Airport Road. The new site was chosen in part for its low impact on neighbors.

4.11 Airspace Height Restrictions

This parcel and adjacent parcels are directly under the approach path to TSAIA's East-West Runways and, as such, carry height airspace intrusion restrictions. Current utility poles along the north side of the parcel, also in the flight path of TSAIA, exceed 70 feet. The height of the warm-sand storage building on the Kloep Station is more directly under the approach path, located atop the raised fill area of Kloep Station, it extends to a height exceeding any expected snow mass fill height. Additionally, the existing snow facility is also directly under the flight approach path, is closer to the runway threshold, but has not experienced any conflicts with airport operation in over 40 years of use. Snow-haul trucks with their beds extended (20 feet) on top of accumulated snow stacking heights (30 feet) are not expected to exceed the height of the poles or the existing building. As such, height restrictions due to airspace incursion are not expected be a factor in design or storage capacity of the new facility.

5 Connor's Bog Facility Permitting

5.1 Rezone

The parcel will need to be rezoned from TR to PLI. This process is completed following AMC 21.03.160. The process required a preapplication meeting with the involved municipal departments, notification to nearby residents and meetings with the affected community council(s), as well as approval by the Planning and Zoning Commission and Anchorage Assembly. The preapplication and community council meetings (see Section 2) have taken place, the Planning and Zoning Commission application for rezoning has been submitted, and a hearing was held on July 19, 2021. The rezone was approved by the Planning and Zoning Commission and has been approved by the MOA Assembly.

5.2 Comprehensive Plan Land Use Map Amendment

For the parcel to be rezoned, the rezone had to be compatible with the existing 2040 Land Use Planning Mapping in the Comprehensive Plan documents. This process is regulated by AMC 21.03.070. The change to the mapping is from the current Park or Natural Area. to Community Facility or Institution. The hearing for the application to amend the 2040 Land Use Plan Map was also held on July 19, 2021. The application was approved by the Planning and Zoning Commission and also approved by the MOA Assembly.

5.3 Other Governmental Use of Dedicated Parklands

Access to the site from the operations area of the Kloep Station and east to the new site will require a small incursion outside the existing 33-foot section line easement into dedicated parklands on Tract B of the Connor's Lake Subdivision. This is necessary to avoid conflict with the power transmission poles in the north half of the easement. The incursion requires approximately 0.2 acre and required an application for Other Governmental Use of Dedicated Parkland. The width of this proposed incursion was estimated based on a road prism width of 40 feet from the base of the power poles. Nineteen feet of this footprint is within the section line easement and 21 feet will impinge on the dedicated park parcel.

The process for authorizing Municipal use of dedicated park land is governed by AMC 25.10.080C and requires approvals from the Parks and Recreation Commission, the Planning and Zoning Commission, and the MOA Assembly. The use of 464 feet by 21 feet of dedicated park land in Connor's Bog was authorized by the MOA Assembly on September 14, 2021 (AO No. 2021-77).

5.4 Conditional Use Permits

Two Conditional Use Permits will be required for the development of the snow site. The first is specific to the location and construction of Snow Disposal Sites and the second is for Land Reclamation, which is required for the importation of fill required to create the snow disposal pad. These permit applications are currently in preparation and the hearings are scheduled for the spring of 2022

5.4.1 Snow Disposal Site

AMC 21.05.060E.8 requires a Conditional Use Permit for new snow storage areas within PLI zoned parcels.

5.4.2 Land Reclamation

The fill to create a solid depositional surface will include both placement and partial removal of surcharge fills in excess of 50,000 cubic yards. Fills of this volume require a Conditional Use Permit for Land Reclamation. This Conditional Use Permit will be sought concurrently with the Snow Site Conditional Use Permit and must be pursued through the Planning and Zoning Commission and the Assembly.

AMC 21.05.060E.5 outlines the definition of and use-specific standards for Conditional Use Permitting for Land Reclamation. These requirements apply to fill operations at a scale involving more than 5,000 cubic yards of fill. If the land reclamation will take place over a period of less than 2 years and is in an industrial zoning district, a site plan review only is required. Fill on PLI zoned lands will require a Conditional Use Permit. A Land Use Permit (AMC 21.03.100 and 21.15.050) is required as part of the Land Reclamation Conditional Use Permit.

5.4.3 MOA Development Services Permitting

Development of a snow disposal site will require a range of permits administered by the Municipal Development Services Department. The need for these permits, plans, and reviews will be driven by the stipulations from the Planning and Zoning Commission and the MOA Assembly generated during the Conditional Use Permitting process for both the Snow Site and Land Reclamation Conditional Use Permits. Because this development does not involve a subdivision plan or any structures, the primary vehicle for this process is a Grading Permit as outlined in AMC 23.105. Due to the size of the fill pad, the grading designation will be Engineered Grading. The submittal requirements as listed below are outlined in AMC 23.105.105.2.

1. **Site Plan 23.105.105.2.1**
2. **Soils engineering report 23.105.105.2.2**
3. **Drainage and erosion control 23.105.112**

   Drainage Plan AMC 21.07.040 and the Design Criteria Manual (DCM) Chapter 3.2. The project classification will be a “large project.” A summary of Stormwater Standards and Requirements is given in DCM Table 3.2.1. To meet the requirements for the Drainage Plan the DCM stipulates 8 requirements of which the Stormwater Management Report is the most extensive. The requirements for the Stormwater Management Report are given in the DCM Section 3.4.2 and includes 11 Parts.

5.4.4 Alaska Department of Environmental Conservation (ADEC) Stormwater Review

Per the MOA’s Alaska Pollutant Discharge Elimination System permit, MOA is the sole entity responsible for stormwater plan review of both Municipal projects and privately owned projects within the MOA.

Stormwater plan review include review of project plans to ensure consistency with the requirements of this section prior to commencement of construction activities. Project plans shall not be submitted to ADEC for stormwater review.

6 Design Criteria Standards and Title 21 Requirements for Snow Sites

AMC Title 21 governs snow disposal site standards in Section 21.05.060E.8. Any new snow disposal site and its design must either conform to these regulations or apply for waivers of the specific regulations.

Approval of Conditional Use Permits for the snow disposal site will be contingent on the design's adherence to the requirements laid out in Municipal code and Municipal Design Criteria. The design must seek variances from the portions of these guidelines that cannot be met due to site-specific conditions at the selected site. The following is a list of criteria from which the design will or may seek variances; documents will be prepared to request waivers of requirements in these DCM and AMC Title 21 sections.

Municipal Design Criteria Manual Requirements:

The following list outlines the requirements of the DCM and summarizes how each will be addressed. The DCM Chapter 2, Vol. 1, Section 8, outlines requirements for snow melt runoff calculations, site selection, design, and operational practices. Paraphrased provisions of the DCM Snow Storage Requirements from which the new site may require variances are as follows:

- **Section 8.2.2 Site Selection, paragraph E**. Avoid areas with high potential for contaminating closed lake or wetland systems. Meltwater from snow disposal sites shall not be discharged to closed basin surface water features that have few or no surface water outlets.
    - Connor's Bog is a closed system with no surface water outlets. All drainage ultimately ends up in Connor's Lake. This wetland and lake system has been the receiving waters for the Northwood snow site for 40 years, and historic aerial photos also appear to show the south half of the Kloep facility in use for snow storage in 1988. Visually, lake vegetation and aquatic life appear to be unaffected by the current input, and the lake levels have remained stable at least in part from this meltwater input. Some areas of larger spruce and birch tress north and south of the existing Northwood Site show signs of die off. Aerial image analysis and an assessment by MOA landscape specialist indicate that these die offs are from two causes: A large stand of spruce that lies northwest of the Northwood site was killed by a brush fire in 2005-2006 and low-lying trees north and south of the site were inundated and killed by a combination of blocked drainage pathways and the large meltwater event following the record snow year of 2011-2012. High chloride concentrations in meltwater are not likely a factor as the MOA no longer uses chloride-based deicers in their winter operations except under extreme and very limited instances. Most of the magnesium chloride use, is applied during dry fall and spring weather as a dust suppressant tool and is not picked up in snow hauling operations.
    - The need for a variance is possible, pending Water Shed Management review.

- **Section 8.2.2 Site Selection, paragraph H,** Avoid Sanitary Landfills.
    - The proposed site is adjacent to the International Airport Landfill (IAL). IAL is no longer in use and is managed by Solid Waste Services (SWS). This should not require a variance. Historic aerials show that the land fill mass encompasses the entirety of the Kloep Station property, the Diamond Parking facility directly north of Kloep Station, and Javier de la Vega Park, the 1990 land fill map contained in a USKH report and based on earlier work by Montgomery Watson shows the landfill extending west of Northwood into the area of the current Northwood snow site, appearing to indicate that the existing site is at least partially atop the old land fill. At the new site snow will not be deposited on any part of the IAL. The access road will transition across the southern face of the landfill but will not penetrate into the land fill mass. SWS has been contacted to ensure that the access road will not have any impact on their current management of the land fill.
    - Requirement for a variance is slight.
- **Section 8.2.2 Site Selection, paragraph M**, Select sites that offer optimum opportunity for slope and aspect orientation. Sites shall be selected that are generally suitable for constructing storage pads that are sloped down from south to north.
    - The new bog site slopes northeast to southwest. Fill can be graded to force a gradient to the north, but because of the large area proposed for this site, a significant fill depth on the south end of the pad (7–9 feet) would be required to accommodate even a 0.5 percent sustained slope from south to north.
    - This is a recommendation and not a specific requirement; the new facility is being designed to meet water quality requirements through use of the surrounding wetland areas and vegetation.
    - No variance requirement is anticipated.
- **Section 8.2.4** Specific Design Criteria

  <u>Snow Storage Pads</u>
    - Paragraphs A and B address pad orientation and V-Swale design parameters. These requirements will be met with alternative design methods. See Section 8.2 (of this DSR) for a discussion.
    - Paragraphs C and D address berms and vegetation; these requirements will be met.
    - Paragraph E addresses armoring of flow surfaces. With no V-Swales and lower velocity flows, armoring will be kept to a minimum both to save cost and to reduce maintenance.

  <u>Meltwater Detention and Discharge</u>
    - Paragraphs A and B give requirements for detention ponds and outlet structures.
    - Design will address these requirements and no variances should be required.
- **Section 8.2.5** General Design Criteria

- Subsections address Traffic Access, Lighting, Landscaping, and Noise per AMC 15.70.080 (Property line noise emission standards).
- The proposed design will follow all these requirements. No variances are anticipated.

Municipal Code Title 21 Requirements:

AMC 21.05.060E.8b

i. Location, minimum 25 feet from class A or B wetlands. With the deposition pad surrounded by Class A wetlands, this will be a required waiver.

ii.

A. Minimum Lot Size shall be 36,000 square feet; the proposed new site is 32 acres, approximately 1.4 million square feet. This criterion is easily met.

B. Maximum Height of Snow Piles is 35 feet. This is an operational consideration, and given the proposed area of the new site, it should be reasonable to meet this requirement during all but the most extreme winters.

C. Minimum Setback Requirement. Snow pile setback must be 25 feet if adjacent to a public right-of-way, and 50 feet if adjacent to a non-industrial zoning district. The former will apply along the east side adjacent to Minnesota Drive and possibly along the north edge where the snow site will abut the 33-foot section line easement. The 50-foot setback will be required along the southern and western borders. Both will be met in design. A 25- to 50-foot detention and treatment area, in addition to the 25-foot landscaped berm, will meet both requirements.

iii. Snow storage area will be well defined to prevent storage of snow on adjacent properties or landscaped areas. Snow poles to define the extent of the snow piles will be included in the design to prevent snow deposition on the detention/ treatment pond or landscaped containment berms.

iv. Screening Fence or Berm. An earthen berm or a screening structure, either at least 6 feet high, shall be constructed within every setback adjacent to a public right-of-way or to a non-industrial zoning district. Site enhancement landscaping, or another ground cover acceptable to the Planning and Zoning Commission, shall be planted on the berm and within the area between the berm and the lot line for the site. The Planning and Zoning Commission may require construction of a berm or fence within other setback areas in order to restrict casual access, to confine the operations within the site, to reduce noise and glare, and to ensure compatibility of the operation with adjacent uses. A 6-foot-tall earthen berm is called for along Minnesota Drive and along the southern boundary, with fencing as required to limit access. A 6-foot-tall fence adjacent to a 3-foot-tall berm is specified along the west and north quadrants. These design features will meet the requirements of this section.

v. Drainage and Water Quality Facilities. The on-site and off-site drainage network shall handle water runoff and snow melt without impacting adjacent properties. Drainage and meltwater disposal shall comply with the municipal DCM sections regarding snow disposal sites and drainage. By design, the snow site will discharge

meltwater for absorption and dissipation onto wetlands that are contained on adjacent municipal park-controlled parcels. Discharge points from the bermed site will be located to prevent discharge to the north on the Javier de la Vega park parcel or east along Minnesota Drive. Wetland bogs on the adjacent properties to the south and west will be used for infiltration and transmission of meltwater. Additional culverts (one already exists) under the AWWU transmission line will allow meltwater to flow west into the areas around and into Connor's Lake. Impacts to the wetland and lake should be generally positive, although some low-lying social trails may be impacted.

vi. Noise, Dust, and Litter

A. Noise. If the level of noise from the activity at the snow disposal site measured at the property line of any residential or noise-sensitive use such as a public building, academic school, or other place of public assembly within one-half mile of the snow disposal site shall exceed the standards stated in AMC 15.70.080A, then the site plan shall identify mitigation measures.

The closest residential housing unit is 0.38 mile from the perimeter of the site, so AMC 15.70.080A will apply. AMC 15.70.080A specifies the nighttime allowable limit for noise at the property line, emitted by an Industrial property and received by residential properties as 65 (dB (A) Lmax).The nighttime limit for a commercial property emitter and residential receiver is 55 dBA, which is approximately equivalent to the noise emitted by a household refrigerator.

No noise abatement study has been done for the new snow site; analysis is based on a thorough study done for permitting of the Spruce Street snow disposal site in November 2010. For the Spruce Street study, snow site noise was measured at the 100th Avenue and Sitka Street snow sites during normal operations with a quantified peak value of 79 dBA. The study used FHWA's Traffic Noise modeling software to estimate noise levels at adjacent residential properties. Their analysis concluded that the noise levels at a point 0.17 mile from the source was reduced to 63 dBA. From these values and using inverse square law noise attenuation calculations, the expected noise level at the nearest residential property to the Connor's Bog site is estimated at 56 dBA. This calculation is in an unobstructed open-air path and does not account for berms, landscaping trees, or natural vegetation. Given this value and because the site will have a landscape berm, it is concluded that the noise level emitted from the site will comply with AMC 15.70.080A, and no further noise attenuation will be needed.

B. Dust and Litter Control. A dust control and litter plan shall be established and implemented. Trash collection/removal shall be done in a manner so that there are no dust or litter impacts to adjacent properties or public rights-of-way.

Dust and Litter Control will be/is specified in the municipal M&O Storm Water Pollution Prevention Plan (SWPPP) operational guidelines for each snow disposal site. The current site has had limited complaints of dust and litter even though the Connor's Bog off leash dog area is immediately downwind.

AMC 21.07.080 Landscaping, Screening, and Fencing

Table 21.07-2 specifies minimum site perimeter landscaping requirements.

A. For PLI zoned parcels abutting other PLI parcels, there are no landscaping requirements.

   The three sides of the property not abutting Minnesota Drive are adjacent to other PLI and therefore do not have Title 21 stipulated planting requirements. One parcel to the west is zoned TR, which is not specified in Table 21.07-2, so it assumed to not have landscaping requirements more stringent than those for the PLI parcels.

B. For PLI parcels abutting freeways (e.g., Minnesota Drive), Level 4 landscaping is required. Level 4 landscaping requires a 30-foot planting bed with three trees and 10 scrubs per 20 linear feet of property line, of which half shall be coniferous. Areas of existing trees and shrubs of sufficient size are counted three times the equivalent of new trees. Design will attempt to retain existing trees as screening along Minnesota Drive and supplement with additional landscaping to accommodate Level 4 landscaping requirements.

7 Snow Disposal Site and Water Quality Design Guidance

In addition to Title 21 and DCM requirements listed above, snow disposal site requirements are governed by the *2017 Anchorage Stormwater Manual* published by the Watershed Management Services. Additional documentation for management of snow disposal can be found in the *Anchorage Street Deicer and Snow Disposal: 2003 Best Management Practices Guidance* document published by Watershed Management Services, the *2013 Evaluation of Anchorage Snow Disposal Sites* prepared by Scott Wheaton and the Watershed Management Section, the *Anchorage Storm Water Treatment in Wetlands: 2001 Progress Report*, and other related publications from the MOA, State of Alaska, and research institutions. These documents guide both the site selection process and the design once a snow disposal site is selected. A list of documents used for reference or guidance in the site design, and conceptual layout process, including brief notes on the information provided in each document, is included in Appendix E.

7.1 Meltwater Discharge and Water Quality Targets

Water quality goals guide detention pond sizing. Ponds must be sized such that the initial meltwater with higher chloride concentrations are diluted by additional meltwater with lower chloride

concentrations before the water is discharged. The meltwater discharge profile used for design of water quality structures is the 5-year occurrence March 23, 1974, 40-hour Snow Melt Hyetograph available in Appendix D of the MOA *Drainage Design Criteria Manual*. Detention ponds should be sized such that the following water quality targets are met:

- The minimum latent storage volume of the pond at the beginning of the melt season will equal the volume of the total discharge from the site during the 40-hour melt cycle defined by the hyetograph.
- There should be a 7-day average concentration of 3,000 parts per million chloride in 1 cubic foot per second of meltwater.
- There should be a 30-day average concentration of 1,000 parts per million in 0.5 cubic foot per second of meltwater
- Control of sediment should be a secondary factor in detention pond sizing. Measured at the point of pond discharge, detention ponds should remove 95 percent of all particles greater than 100 micrometers in diameter.

8 Alternatives Discussion

8.1 Standard V-Swale Design

Many of the design parameters laid out in the MOA DCM are based on extensive studies of upland snow sites. At upland snow disposal sites, meltwaters from the snow masses are directed across a graded surface to one or several outfall points that are controlled by a weir structure. An excavated treatment pond is positioned before or after the weir to retain high chloride early meltwater for dilution by subsequent lower concentration meltwaters. The ponds also serve as a settlement area for suspended sediments. Ultimately, the treated meltwater is discharged to a receiving water in the form of a storm drain, lake, creek, or wetland. The pad is designed to slope north so that drainage from the southern melt face passes through the snow mass to the outfall. This allows the snow mass to act as a filter to capture and hold coarser sediments so that they do not enter the downstream settlement pond or receiving water.

There are several characteristics of the proposed Connor's Bog site that complicate adherence to these design parameters:

- Because the site is slightly higher in the northeast corner and the pad will be significantly larger than pads at all existing sites, the fill section needed to slope south to north at 1 percent gets quite deep and would be expensive to fill.
- The concentration of meltwater in the narrow V-swales over the required distances and gradients will result in higher velocity flows and require additional armoring to minimize scour of the pad.
- A north-sloping orientation will mean that outfalls from the V-swales will be on the north end against the electrical transmission easements, and Javier de la Vega Park. This would require all flows to be routed back to the west and south ends of the site for dissipation into the surrounding wetlands.

- Conversations with M&O personnel have exposed some weaknesses in the V-swale design. The deposition of snow grit sediments tends to fill in the armored channels, and they are difficult to maintain over time. Maintenance adds significantly to the cost of this design.

8.2 Proposed Modified Treatment Design

An alternative design would utilize a deposition pad with more gentle slopes (on the order of 0.5 percent) and slightly crowned pad center to drain in all directions. The gentler slopes and less concentrated flows will allow better settlement of sediments on the pad surface even without the northern orientation. Due to the shallow slope of the pad, fill depths and costs will be significantly reduced. After surcharge compression of the underlying peat, the pad surface will be graded down to match the elevation of the surrounding wetlands. There will be no steep, high-velocity flow channels off the pad surface, and no armoring will be required. No excavation will be required to create a treatment pond.

The surrounding berm, offset 50 feet or more from the depositional pad, will act as the treatment containment area. The much larger surface area of the containment area (compared to conventional settlement ponds) will capture finer suspended sediments and result in cleaner discharged water. Discharge from the site will be controlled by weirs at several points to increase dispersion and infiltration into the surrounding wetlands. The weirs will be fitted with stop logs to control water discharge. The stop logs will be removed after the snow melt season, and the ponded area will be allowed to completely drain for maintenance of the pad and removal of trash and litter. Geotechnical investigations indicate that the water table drops below the wetland surface after the spring breakup. Access routes will be provided to the weirs so the stop logs can be removed after the melt season and installed again before the following spring melt cycle.

During the snow melt period, the water inside the berm will slightly inundate the perimeter of the pad. At the edge of the pad the moving meltwater from the snow piles will encounter the quiescent water of the settlement area while still inside the perimeter of the pad. Most of the sediment deposition will occur at the edge of the pad where it can be regraded or removed without having to access the unstable peat areas of the water quality moat. Outside the berms, a narrow, rock-lined ditch will bracket each weir for a short distance to prevent erosion and disperse treated water into the surrounding wetland. These ditches will be slightly below the surface of the surrounding wetlands and only extensive enough to prevent erosion of the natural vegetation and substrate.

The modified treatment design is the proposed design for the West Anchorage Snow Disposal Site. Preliminary design drawings are in production. Figures 5-8 show the current concept design for the snow disposal site pad, the surrounding water quality treatment berms and control weirs.

Figure 5. Snow Disposal Pad Concept Design, Layout

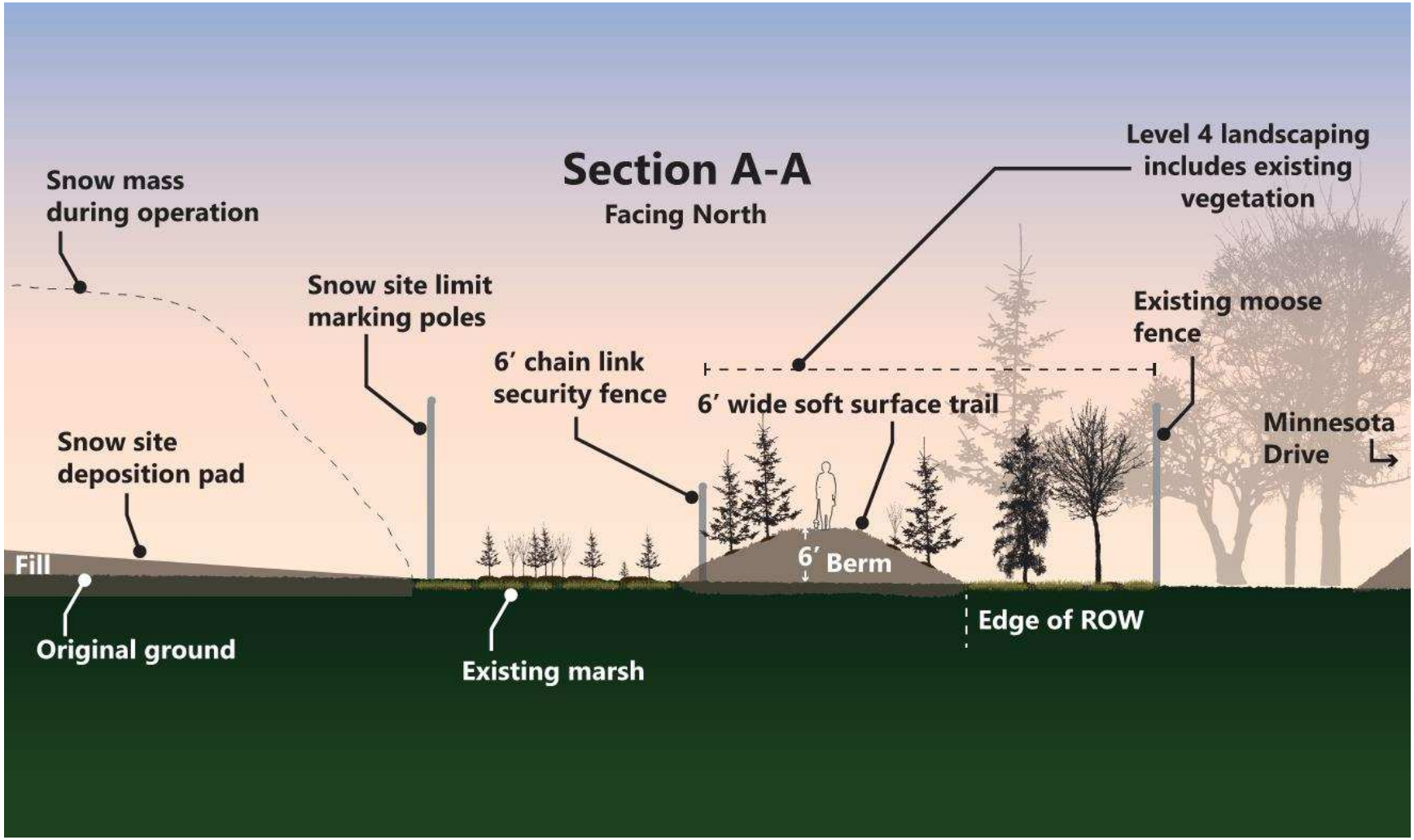

Figure 6. Snow Disposal Concept Design, Section A-A, 6-foot Landscaped Berm

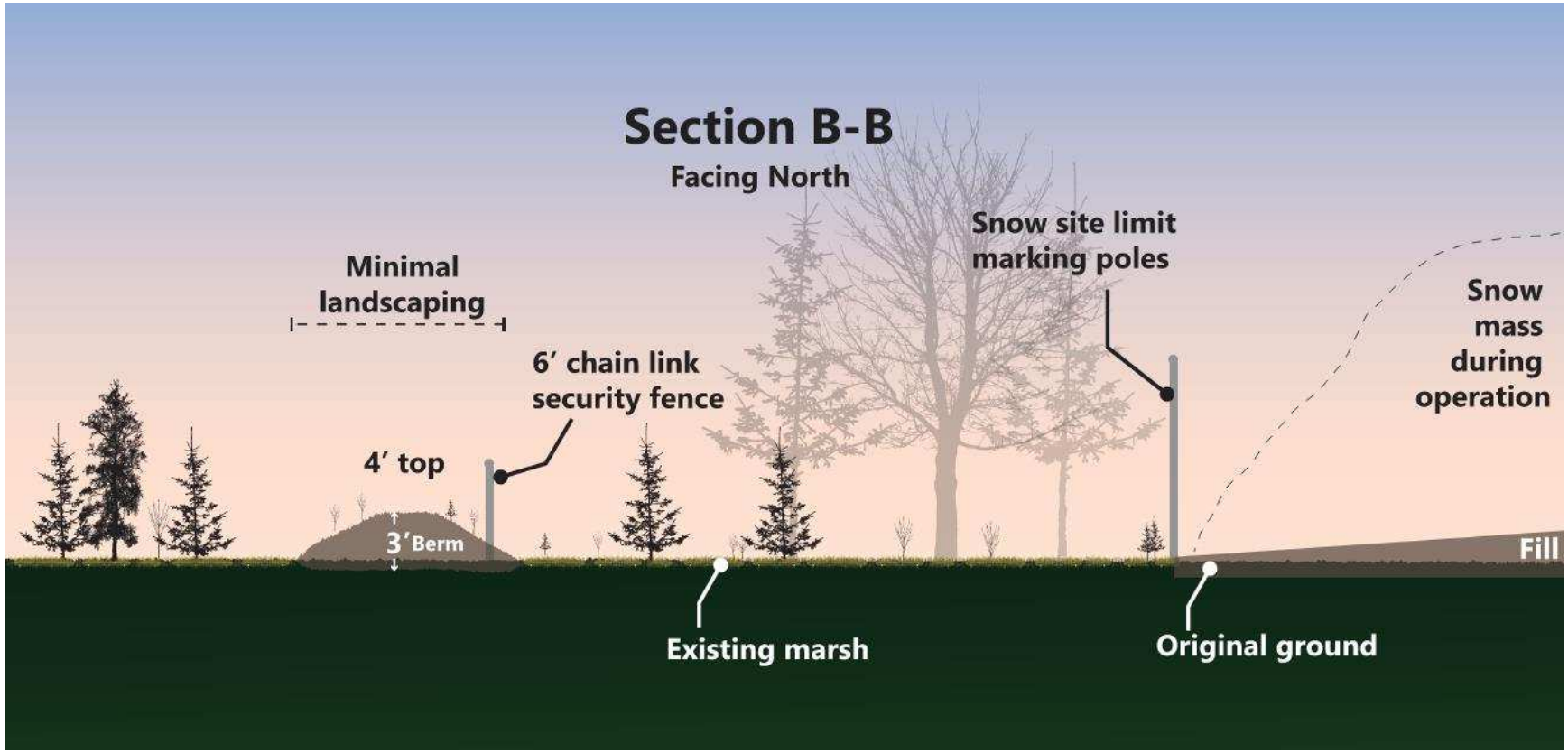

Figure 7. Snow Disposal Concept Design, Section B-B, 3 foot Berm

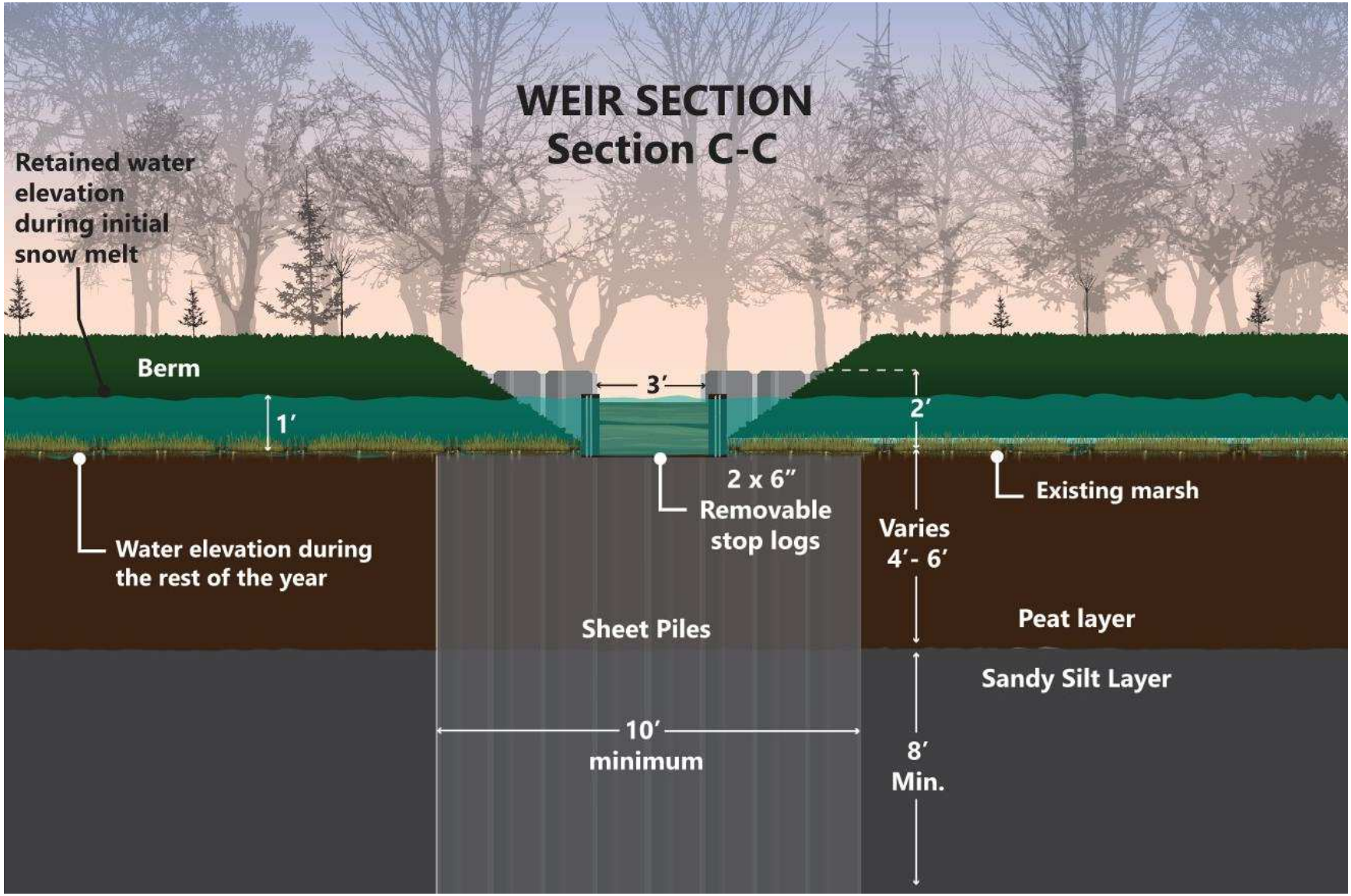

Figure 8. Snow Disposal Concept Design, Section C-C, Weirs, looking out of the site.

8.2.1 Traffic Access

Once on Northwood Drive, commercial truck access to the Connor's Bog Site is similar to access to the Northwood Snow Disposal Site, with some additional driving through the Kloep Station area. The existing security gate will continue to be used for both Kloep Station and the new snow site facilities as it is for the existing Northwood Snow Site. The additional routing will be on service roads with no public traffic. M&O has administrative offices, active operations, equipment storage and maintenance, sand and deicer storage, a grit facility, and other activities at their Kloep Station site. The new snow disposal site will be beyond the operations areas, and heavy trucks will have to be routed through or around the current facilities. At the entrance to the facility along Northwood Drive, truck traffic will be routed west of the administrative parking area, which will be moved slightly east, closer to the building. Additional fill along the parking area will provide for a separate 24-foot-wide truck route outside the parking area.

Beyond the water fill and storage tanks, truck traffic will continue on the existing gravel roadway alignment, passing under the Chugach Electric Association power lines to the southwest corner of the facility. At this point, trucks will turn east, split from the road to the warm sand storage building, descend the fill mass face, pass under the Chugach lines a second time, and travel east using the section line easement and a small incursion into park lands onto the northwest corner of the new snow site. In order to ensure that snow hauling trucks will have no possibility of impacting the Chugach Electric Association power lines, a structure will be placed at the Kloep Station entrance and at the exit from the snow disposal pad. The structure's height will not allow for trucks to pass under with their beds in the raised position.

The access road prism will be cut into the slope of the fill mass to the extent possible with 2:1 back and side slopes. Geotechnical borings show ample cover material over the landfill face to allow partial benching and avoidance of the overhead power lines. Further south the portions of the access road through the bog will be surcharged during construction. After settlement of the access road a single culvert west of the snow site pad will allow for cross-drainage in this area.

8.2.2 Fencing

Title 21 fencing requirements are more advisory than prescriptive. Perimeter fencing should be provided as needed to control access, catch windblown litter, and provide for safe operations. Most of the existing MOA snow disposal sites have some amount of fencing to prevent public access, but most do not have a continuous perimeter fence. Since the bermed area of the site will contain a large area of natural habitats, it may be appropriate to only partially fence the perimeter of the snow site to allow wildlife access to these habitat areas. At a minimum, fencing along the access road and north side of the snow site should block pedestrian access between Connor's Bog off-leash dog area and Javier de la Vega Park. An existing fence along this side could be reused for at least part of this requirement but may not be tall enough to block motivated trespassers. The preliminary designs show a complete fence enclosure along the inside of the berm and on both sides of the access road.

Recreational access between the parks will be provided by a trail connection along Minnesota Drive, east of the snow site. Therefore, it will be appropriate to provide a fence between this proposed trail and the snow site. Fencing of the south and west sides of the site should be open for discussion with M&O and Parks and Recreation Department input. These areas could contain discontinuous fencing with overlapping ends to allow wildlife access while still catching litter. Preliminary design shows the fencing

on the inside base of the 6-foot berm to reduce its visibility from the outside. The fencing should be a short distance from the toe of the berm slope to allow maintenance personnel to walk along the inside and remove litter.

8.2.3 Pad

The snow depositional pad will be constructed to provide a stable work area for winter and summer operations. At a minimum, the pad section will contain a geotextile layer for separation of the fill from the underlying peat; this will be followed by a minimum of 2 feet of structural fill. Surcharging of the pad is recommended over a 6-month period with 3 additional feet of fill. This surcharge material would be removed and used for other parts of the project or hauled off as excess. See the geotechnical report in Appendix B

The pad will slope slightly from a central high point to shed melt and precipitation waters into the surrounding wetland on all sides. Slopes will be slight, and it is assumed that some residual ponding is acceptable. Slopes will be regraded as required to maintain positive drainage.

The area of the pad is initially targeted at 14 acres and will be shaped to take advantage of existing sloped topography and to allow a consistent visual setback from the heavily used AWWU corridor.

The final pad will be seeded with an inundation and salt-tolerant seed mix as specified in the DCM. Snow deposition delineation poles will mark the perimeter of the pad to prevent snow deposition in the areas reserved for water treatment.

8.2.4 Water Quality Process Moat

The depositional pad will be surrounded by a variable-width area of undisturbed wetlands that will serve the meltwater processing functions for the site. This moat area will detain initial meltwaters with higher chloride concentrations for dilution by later, lower-concentration meltwaters, as described in Section 8.2. Water levels will be maintained in this area through the snow melt season to also capture suspended sediments in the meltwaters. Because the area will require only minimal development infrastructure, it can be enlarged beyond the minimum area specified in the DCM with small additional cost. This will serve the dual purpose of allowing a higher level of treatment with the capture of finer suspended sediments and serving as an overflow storage area in extreme snow years.

Due to the natural topography of the wetlands at the snow disposal site, meltwater will tend to flow south and west, pooling against the south and west berm areas. At these points in the berm, weirs will disperse it into the wetland. The width of the moat will vary depending on whether it is serving a primarily transmission function along the north and east faces of the pad or a primarily treatment function along the south and west sides. Any additional area for snow storage overflow will occur along the southern areas of the site.

Design peak snow melt flows are specified in the DCM as adhering to the 5-year snow melt hyetograph. Peak melt of this hyetograph is 0.29 inch per 4-hour period and 0.63 inch for a 24-hour period. For a 14-acre site, these flows equate to 1 cubic foot per second for the 4-hour peak and 0.37 cubic foot per second for the 24-hour period. The total 40-hour volume of this meltwater is 1.05 acre-feet.

Minimum detention pond design parameters, per the DCM, are as follows:

- Minimum detention storage of the pond at the beginning of the snow melt period should be equal to snow melt discharge volume of the 40-hour, 5-year meltwater hyetograph. The 40-hour melt is equal to 0.9 inch; applied over 14 acres, this equates to 45,738 cubic feet or 1.05 acre-feet of storage. Assuming a detention depth behind the weirs of 1 foot, approximately 1 acre of detention will be required. The moat along the south and west sides of the pad will easily meet this storage requirement.
    - Design values are given as follows for chloride concentrations
        A. 7-day average concentration of 3,000 parts per million (ppm) (milligrams per liter [mg/L]) chloride in 1 cubic foot per second of meltwater.
        B. 30-day average concentration of 1,000 ppm in 0.5 cubic foot per second of meltwater.
    - These projected numbers are compared against the DCM's Table 8.2-1 below. Neither value exceeds the allowable exposure limits for fish and invertebrates, and it is assumed that, other than the initial detention volume, chloride will not be a factor in design.

Table 1. Design Criteria Manual Recommended Thresholds for Chloride Exposure

Exposure Duration	Fish and Invertebrates	Vegetation
Acute (less than 1 week)	3,600 mg/L	6,400 mg/L
Acute (up to 30 days)	1,200 mg/L	3,200 mg/L
Chronic (continuous)	300 mg/L	640 mg/L

- The second parameter requires settlement of 95 percent of the 100-micrometer particles from the meltwater. Assuming that the maximum throughput of the detention facility will be driven by the 4-hour peak of the 5-year snow melt hyetograph, the surface area of the detention area will be sized to meet this requirement. This is a relatively low target requiring a settling pond area of less than 1000 square feet with a Factor of Safety of 2.
- Given the proposed shallow depth and large surface area of the detention pond, it appears that the volume parameter for detention storage will govern the settlement/detention pond design.

Vegetation in the moat area will be left natural and can be expected to change over time as less inundation and possibly chloride-tolerant plants are replaced with more adaptive varieties.

8.2.5 Surrounding Berm, Weirs, and Recreation Trail

The surrounding berm will be variable in design and serve multiple functions. It will be the base for foot access to the weirs in order to control water levels in the moat. It will also serve a landscape and screening function and as the planting base for larger upland tree species, and finally it will serve as a containment dike for the water quality impoundment. Three to four weirs will be fitted along the dike as discharge areas into the greater bog.

The berm surrounding the snow disposal pad will have different functions and design parameters depending on location. Along the north side, a low, non-landscaped berm is needed to separate and direct existing drainage from the north and from Minnesota Drive, to a culvert that passes under the snow disposal site access road. Drainage from the de la Vega fields and stormwater from the Minnesota Drive right-of-way should be separated from meltwater from the snow disposal site due to concerns with water quality and quantity from these sources. The edge of the raised fill area of Javier de la Vega

Park is nearby and will serve to contain drainage to the north. It is unlikely that a berm and landscaping along the north side will attain sufficient height to provide any screening when viewed through the existing vegetation from the Javier de la Vega ball fields at the top of the slope. No landscaping other than grass is provided in the cost estimate.

Along the east side, the berm will serve as the basis for Level 4 landscaping as specified in Title 21 as well as the foundation of a walking trail to connect Javier de la Vega field with the rest of Connor's Bog Park. This trail would likely run along the top of the berm and support foot traffic. There will be no weirs along this side, and vehicular access is not anticipated. As a park trail and the primary visual feature seen from Minnesota Drive, landscape features will be robust while taking advantage of the existing large tree stands at the north and south ends. As the berm wraps around the south side of the site, it will maintain its trail and landscape functions. Access to the single weir in the south east corner will be provided from the inside by placing the fence around the weir and displacing the trail around the weir with a short drainage culvert. The recreation trail will transition across the wetlands from the southwest corner to join the AWWU corridor to the west. This trail will remain entirely within the parcel and adjacent section line easements. This southwestern section of the trail will be only slightly elevated above the wetlands and may contain culverts for cross-drainage purposes.

Proximity to dense trees and brush either planted to fulfill landscaping requirements or naturally occurring, can have a negative impact on users' actual and perceived safety. An alternative would involve creating a trail alignment separated from landscaping to provide better sight distance and safety to park users and/or pruning of natural vegetation.

Along the west-facing side, the berm's primary function will be retention of meltwater, screening and access to the weir sites. No vehicular access will be provided. Existing copes of trees will be incorporated into the screening where possible. Although not primary, this berm could be used as a recreation trail with a possible connection to the AWWU corridor from the north end. The design of the recreational trails will be discussed with the Parks and Recreation Department.

8.2.6 Weirs

Three to four weirs will be provided for dispersion of meltwaters. These weirs need to be vertically stable and located at the same elevation to allow even distribution of water into a broad area of the bog. Preliminary design concepts show a short section of sheet piles driven through the peat layer and anchored in the underlying soil strata. The low nappe of all weirs will be set to match, allowing equal dispersion of flows from all weirs simultaneously. The nappe of the weirs will be fitted with adjustable stop logs that can be added or removed to allow complete drainage of the impoundment, to adjust for gradual sediment accumulation, and/or for adjustment of flow rates.

8.2.7 Surcharge Design

The surcharge of the pad will be based on recommendations of the final geotechnical report. Preliminary data recommends 3 feet of surcharge on the pad over a 6-month period to attain up to 40 percent compaction of the underlying peat layer. This compaction is estimated at 1.6 to 3 feet. These numbers are consistent with the design of a pad that will contain a minimum of 2 feet of fill at the edges, flush with the existing bog along the perimeter, and grade to drain from the center. The access road will also be surcharged where it crosses the wetlands. No surcharging of the berm areas is

recommended because these structures will be slightly over-built and landscaped. Settlement will be allowed and should not affect the containment properties or aesthetics of the features.

8.2.8 Slope/Aspect

The pad will be sloped slightly to each of the four quadrants to drain slowly, with some ponding allowed. The aspect with respect to southern sun exposure against the melt face will not be considered. The sedimentation targets addressed by this requirement will be achieved through the detention/settlement area in the moat (see Section 8.3.4).

8.2.9 Meltwater Routing

Once the meltwaters have settled in the moat area, the waters will be dispersed into the surrounding wetlands through the outfall weirs. The naturally terraced bog formation will further disperse flows as the waters make their way south and west to the AWWU corridor. There is currently a single culvert to pass water through the AWWU corridor. Snow site construction will provide three additional culverts to provide even dispersion into the western part of Connor's Bog. Any waters not already infiltrated into the wetlands will route along natural drainage pathways downslope to Connor's Lake. Connor's Lake has no overland drainage connection, but its surface elevation is significantly above other ponds and lakes to the west and north, most notably Lake Spenard. It is likely that the gradient drives groundwater flows from Connor's Lake in the direction of Lake Spenard, which in turn has surface connections with both Fish and Hood Creeks both controlled by outlet weirs at the east and west ends of the lake respective.

9 Property ROW Requirements

The project requires only minimal incursions and construction easements on adjacent properties. The most significant of these will be a permanent easement for the access road across the north end of the dedicated park parcel to the west. The use of this small sliver of land is necessary because of the placement of the Chugach Electric power poles within the existing section line easement. These power poles force the proposed access road south onto park property. A permit for Other Governmental Use of Dedicated Park Lands is required as part of the permitting process. This permitted use has been approved by the Anchorage Assembly at the time of this report.

The other easements required will be along the AWWU trail that bisects Connor's Bog. The trail is constructed of imported and side cast material from the sewer trunk construction and is slightly offset from the actual trunk line, which lies to the west. The snow site project proposes to put additional at-grade culverts through the trail corridor to allow unimpeded cross-drainage of the meltwater. This will require temporary construction access along the trail from the north and south ends as well as permanent drainage easements at each of the culvert crossings.

10 Geotechnical Report

The geotechnical investigation has been completed and the resulting report is included in Appendix B. Details of the soils investigation and recommendations for various components of the earthwork and surcharging design are included in the Geotechnical Report.

11 Maintenance and Operations Considerations

Maintenance of the new site is not anticipated to be significantly different than maintenance at existing snow sites across Anchorage. As with all snow sites, there is a gradual deposition of road grit that is left after the snow melts in late summer. The pad will occasionally need to be regraded to maintain the designed slopes for drainage. Differential settlement of the pad due to the weight of the large snow mass will have to be regraded as needed. Dust, litter control, maintenance of the access road, and other infrastructure will be similar to existing facilities.

The single significant difference in operations will be active management of the meltwater processing facilities. The proposed design will take advantage of the water processing functions of the existing wetland by enclosing a portion within a berm to serve as a detention, settlement, and infiltration area. During much of the year, from May through the following March, the stop logs at the weirs will be lowered to the base level of the wetland. This will allow the natural processes and ground water elevations of the wetland to be maintained in equilibrium with the surrounding marsh. Weir stop log elevations will be left low throughout the winter months to allow any significant rainfall or melt events to drain out of the bermed area. The stop logs will be installed in early March prior to the first spring snow melt to an elevation that will retain the first flush of meltwater. After this initial flush, the stop logs will be removed in May and the water levels allowed to return to basal levels during the growing season to prevent inundation and die off of the marsh vegetation. The stop logs will be stored for reinsertion the following spring. Wooden stop logs will be used because they are simple and lightweight for ease of handling. They will be secured in place to prevent possible floatation and leakage. This will need to be a scheduled maintenance item on M&O's calendar to ensure long term function. Foot access to each weir will be maintained from the interior of the fenced enclosure.

12 Cost Estimate

A cost estimate for the preliminary design is attached in Appendix D. This is a preliminary estimate of probable construction costs based on conservative bid tab pricing and estimated values where bid tabs are not available, quantities are approximate. It is noted that recent supply chain limitations are resulting in large fluctuations in bidding prices, the largest fluctuations are being seen in material pricing of fuel, lumber, metals and plastics. Several items are intentionally left conservative and there is potential for cost savings. The following is a partial list of potential variances:

- Initial schematic design of the parking area and truck bypass west of the Kloep Station shop and administrative building suggests that the required width is within the property boundary, but

this will be confirmed during final design. The cost estimate contains a line item to create a 36-inch retaining wall along the property line should that be needed. $276K item.

- It is assumed that the rebuilt parking area will extend into the area of the existing water-truck fill and that the tanks will need to be replaced. $165K item.
- Connor's Bog Dog Park improvements have been included as a place holder for possible kiosk or park benches. $50K item.
- Lighting for the required parking area upgrades at Kloep Station and the entire length of the access road is included, 10 poles and luminaire. The cost may be reduced based on requirements of the conditional use permitting process. $100K item.
- Unclassified Fill substituted for the Classified fill on pad construction. If off-spec material is available from another source or concurrent job this item could be reduced by as much as half. Potential $1.6M reduction.
- There is a significant amount of street sweeping material stored in berms around the west and south sides of the Kloep property. These materials could be used for the initial lower levels of the pad fill and are available directly adjacent to the new fill pad. Estimated quantity is 4,000 cubic yards. $60K item.
- Per conversations with geotechnical engineers, there is potential savings if the initial fill layers can be placed while the ground is still frozen in late spring. Filling over frozen ground would reduce construction costs; the potential savings are unknown.
- The landscaping requirements from the conditional use permitting process are unknown at this time. The existing cost estimate does not include berm plantings, except along a short section of Minnesota Drive, where Level 4 landscaping is required by code. This cost could be increased significantly by P&Z Commission or Assembly mandate in their approval of the Conditional Use Permit.

13 Project Schedule

The following is the general project schedule. Future dates are estimates only, based on expected review and permit approval timelines.

- **Site Selection Study**
  - Draft Site Selection Study (6/23/20 to 8/21/20)
  - Finalize Site Selection Study (2/12/21)
- **Design Study Report**
  - Draft Design Study Report (5/21 to 10/21)
  - Final Design Study Report (1/22)
- **Permitting**
  - U.S. Army Corps of Engineers

        - Approved Jurisdictional Determination Received (12/28/2020)[2]
    - Municipal Use of Dedicated Park Land
        - Parks and Recreation Commission Meeting (3/11/21)
        - Planning and Zoning Commission Hearing (6/7/21)
        - Assembly Hearing (9/14/21)
        - Assembly Approval (9/14/21)
    - Parcel Rezoning and Land Use Map Amendment
        - Pre-Application Conference (1/29/21)
        - Sand Lake Community Council Meeting (3/8/21)
        - Rezone and Land Use Map Amendment Application Submitted (3/17/21)
        - MOA Planning Prepares Public Notice (3/8/21 to 3/19/21)
        - Planning and Zoning Commission Hearing (7/19/21)
        - Assembly Hearings (10/21)
    - Design Variance Application
        - Prepare application form (Fall 2021)
        - Review by Urban Design Commission (Winter 2022)
    - Conditional Use Permit
        - Prepare Conditional Use Permit Package (Fall 2021)
        - Planning and Zoning Commission Hearing (Winter-Spring 2022)
        - Conditional Use Permit Approval (Winter Spring 2022)
        - Land Clearing and Fill and Grade Permit (Spring-2022)
        - Stormwater Management Report (Fall 2021)

- **Design**
    - Site Survey (12/28/20 to 10/1/21)
    - Geotechnical Report (10/21)
    - 35% Design and PM&E Review (Winter 2022)
    - 65% Design and PM&E Review (Winter Spring 2022)
    - 95% Design and PM&E Review (Spring 2022)
    - Final Design Contract Documents (Summer 2022)

[2] The Approved Jurisdictional Determination is good for five years from the date of issuance. Wetlands present within Connor's Bog were determined to be non-jurisdictional under the Navigable Waters Protection Rule, which was vacated on September 8, 2021.

- **Construction**
    - Project Advertising (Fall-Winter 2022-23)
    - Bidding, (Spring-Summer 2023)
    - Construction Notice to Proceed (Spring-Summer 2023)
    - Construction (Spring-Fall 2023)

Appendix A: Final Site Selection Study

West Anchorage Snow Disposal

Site Selection Study

February 2021

Executive Summary

The Municipality of Anchorage (MOA) has identified the need for a long-term, reliable solution to snow disposal for West Anchorage. This site selection study summarizes the process to identify a new snow disposal site, public involvement, site options, site screening criteria, and the reasoning behind the proposed site selection.

The snow disposal site that currently serves West Anchorage is located on land owned by the State of Alaska and managed by the Ted Stevens Anchorage International Airport (TSAIA). Snow storage needs often surpass site storage capabilities. Options to increase capacity at the existing site are limited and site improvements are necessary to meet current water quality standards. In order to make these improvements, MOA and PM&E need a long-term solution for snow storage in this area and a cost-effective alternative to the current ad hoc lease arrangement. This studies goal is to find a site that the Municipality can own, and where development and investment in state-of-the-art water treatment will pay off in perpetuity.

Three initial criteria were set for selection of a new snow disposal site based on research of existing MOA snow disposal sites, published regulatory legislation, guidance documents, and conversations with managers and operators at the Maintenance and Operations (M&O) and Project Management and Engineering (PM&E) Departments. The initial criteria were:

- A minimum of 10 acres of unused land, and ideally at least 15 acres;
- Located within the West Anchorage Snow Disposal Service Area; and
- Located on undeveloped, vacant land.

Nineteen sites within the West Anchorage Snow Disposal Area were found to meet these three basic criteria. Once these sites were identified, the following criteria were used to narrow the possible sites to those feasible for snow disposal:

- Located to allow 24-hours-a-day, 7-days-a-week (24/7) operation;
- Zoned in an area that will allow snow disposal;
- Provides site access along larger collector or arterial roads; and
- Available for long-term lease, purchase, or otherwise available for permanent use.

In addition to the initial site selection criteria, the following additional factors were considered in the final site selection evaluation:

- Receiving water capacity for snow melt runoff;
- Impacts on neighborhoods and surrounding residential areas;
- Impacts on wetlands;
- Impacts on park lands; and
- Permitting requirements.

After the secondary site evaluation, two primary sites were identified for further examination: Site 5 (Connor's Bog Site), and Site 9 (Strawberry Bog Site).

MOA conducted public outreach to engage, inform, and gather comments from the public about the Connor's Bog and Strawberry Bog sites as well as the site selection process. Comments from the public centered on adhering to zoning to minimize impacts to residential areas, as well as the visual and hydrological impacts of snow disposal.

After analysis of all factors, Site 5: Connor's Bog Site was determined to most closely meet the snow disposal site criteria for the future West Anchorage Snow Disposal location. Analysis findings included:

- The Connor's Bog Site would have minimal impacts on residents and neighbors, while allowing for 24/7 operation. This criterion is the most important aspect required for efficient snow disposal in West Anchorage.
- The estimated additional cost of day-restricted operations is $240,000 per year over the cost of unrestricted 24/7 operations.
- Both sites meet many of the criteria for selection: adequately sized, available for use, and adequate receiving water for snow melt runoff.
- Both sites are located within Class A wetlands, so an extensive permitting effort is expected.
- In contrast, the Strawberry Bog Site would be located near an existing and growing residential area. Truck routes to the Strawberry Bog Site may have to be routed through residential areas. The proximity to neighborhoods and access routes could require operational restrictions on the Strawberry Bog Site, making it less desirable for snow disposal use.

In conclusion, after detailed site analysis and public feedback, Connor's Bog has been identified as the more ideal snow disposal site.

The Conner's Bog site features minimal impacts to residential areas, operational advantages, suitability for storing snow and handling melt water, and fitness based on other factors. The site will be subject to a stringent permitting process and regulation driven design standards.

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Acronyms and Abbreviations

24/7	24-hours-a-day, 7-days-a-week
AMC	Anchorage Municipal Code
AWWU	Anchorage Water and Wastewater Utility
CWA	Clean Water Act
DOT&PF	Alaska Department of Transportation and Public Facilities
JD	Jurisdictional Determination
M&O	Maintenance and Operations
MOA	Municipality of Anchorage
PLI	Public Lands and Institutional (zoning)
PM&E	Project Management and Engineering
TR	Transition (zoning)
TSAIA	Ted Stevens Anchorage International Airport

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1. Introduction

The Municipality of Anchorage (MOA) Maintenance and Operations (M&O) Department maintains the majority of the streets in the Anchorage Bowl. A major winter maintenance activity is the removal and disposal of snow from these streets. Snow removed from streets is deposited in one of eight snow disposal sites scattered throughout the city, each serving its adjacent area. The MOA has identified a need to replace the Northwood Snow Disposal Site (Northwood Site) that currently serves the West Anchorage snow service area. The MOA Project Management and Engineering (PM&E) Department is administering the West Anchorage Snow Disposal Project and has contracted with HDR to select a location for, permit, and design a replacement for the Northwood Site. This site selection study identifies and makes recommendations of potential sites that meet M&O's needs for snow disposal.

The Northwood Site is located on State of Alaska-owned land controlled by Ted Stevens Anchorage International Airport (TSAIA) adjacent to the M&O Kloep Station maintenance facility south of International Airport Road on Northwood Drive. The Northwood Site serves most of the western portion of the Anchorage Bowl. Figure 1 shows the boundaries of the West Anchorage Snow Service Area (Service Area) as provided by M&O. M&O is responsible for snow collection on most neighborhood and collector streets within the area shown in red. Larger arterial roads such as Dimond Boulevard, Minnesota Drive, Jewel Lake Road, and International Airport Road are maintained by the State of Alaska Department of Transportation and Public Facilities (DOT&PF). In some years when there is a significant snowfall, Anchorage School District schools may also use the Northwood location for depositing snow.

The MOA currently rents the Northwood Site from TSAIA on a year-to-year basis. Because of increasingly stringent State of Alaska water quality regulations, PM&E has identified a number of improvements to the Northwood Site that are necessary for the long-term operation of the site. In order to make these improvements, the MOA must purchase or negotiate a long-term lease for the property. Unfortunately, the lands containing the Northwood Site are not available to the MOA for permanent use. As of June 2020, MOA PM&E and M&O began the process to identify the best alternative location for snow disposal in West Anchorage. This study is the culmination of that process.

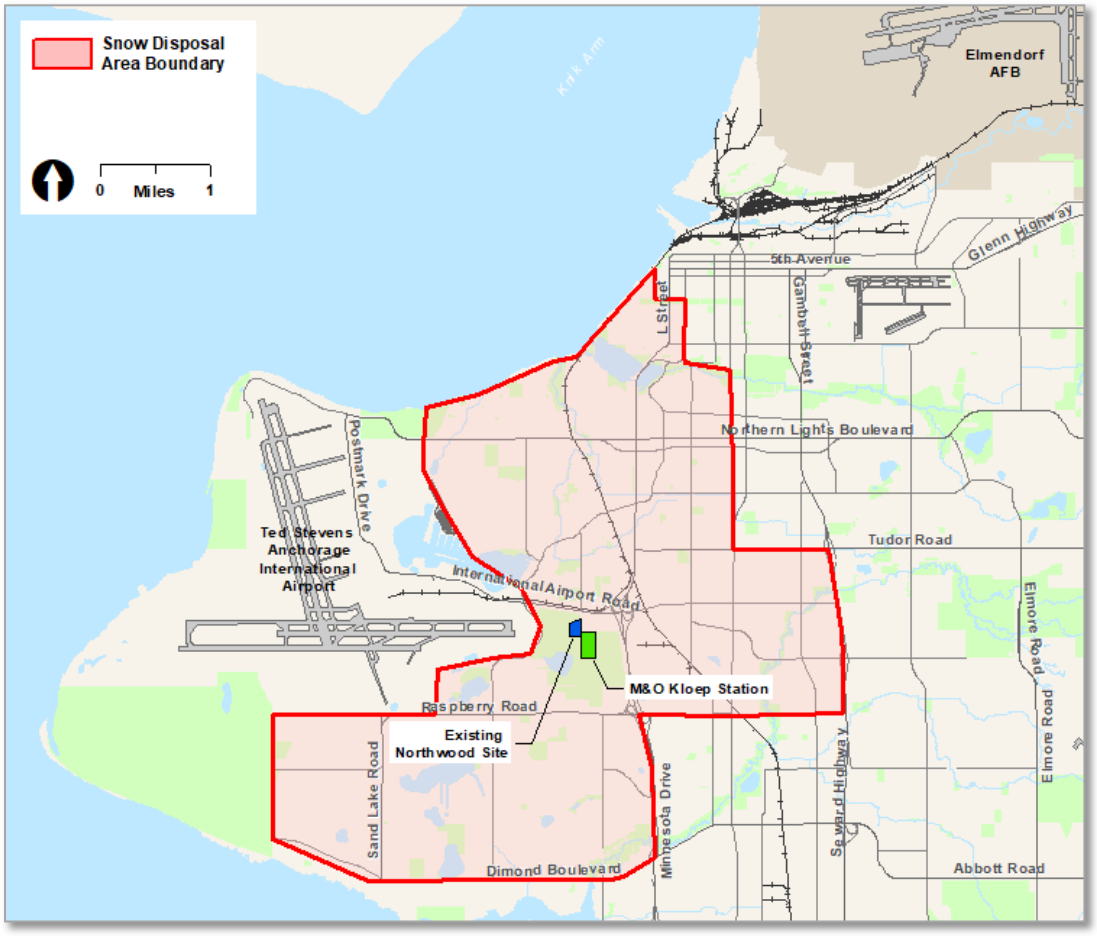


Figure 1. West Side Snow Disposal Service Area

2. Background

To guide the site selection, background information was gathered on the status of existing snow disposal sites in Anchorage, recent snow hauling data from all sites, detailed haul data from the Northwood Site, snowfall records, regulatory and guidance documents, and interviews with M&O and PM&E staff. This information was used to determine the priority site characteristics for a snow disposal site and develop criteria for the conceptual replacement design.

2.1 Snow Haul to the Existing Northwood Snow Disposal Site

The existing Northwood Site contains 9 to 12.5 usable acres depending on TSAIA's annual alternative needs for the site and the negotiated lease agreement. The West Anchorage service area is 14.4 square miles (Figure 1) and currently accepts approximately 20 percent of the snow gathered from MOA-maintained streets in the Anchorage Bowl. Conversations with M&O staff have indicated that in large snow years 12.5 acres is insufficient for the collection area, and 9 acres is inadequate even in low snow years. During the 2019–2020 snowfall season, with a 9-acre lease and 115 percent of normal snow fall, M&O was forced to truck West Anchorage snow to other sites. This resulted in additional trucking costs and decreased levels of service, which included snow hauling delays and additional snow left on the sides streets and in the middle of cul-de-sacs.

In an average snow year, approximately 10,500 truckloads of snow are brought to the Northwood Site. At the extreme, (2011–2012 had 175 percent of the average snowfall), approximately 18,500 truckloads went to the Northwood Site. The resultant snow pile was 40 feet high, 10 feet higher than the design height limitation dictated by water quality parameters. The result is shown in Figure 2. See Appendix A for snowfall records from 2004 to 2020 and the calculations for snow truckloads delivered to the Northwood Site.

Figure 2. Northwood Site in 2011–2012

2.2 Neighboring Snow Disposal Sites

The Northwood Site service area is bounded on the south and east by five other snow service areas, shown in Figure 3: Commercial Drive, Sitka Street, Tudor Road, Spruce Street, and C Street Site. All of these adjacent sites are already at or near capacity. This means that a loss or reduction in snow disposal capacity in West Anchorage cannot be adsorbed by the adjacent sites. A replacement site for West Anchorage needs to have capacity similar to or greater than the Northwood Site in order to effectively meet West Anchorage's snow disposal needs.

Figure 3. Anchorage Snow Disposal Service Areas

2.3 Site Design and Selection Guidance Documents

Anchorage Municipal Code (AMC) Title 21, Land Use Planning, sets criteria for public facility site selection in general and for snow disposal sites in specific. Section 21.03.140 governs public facility site selection, and snow disposal sites are identified as public facilities in Section 21.03.140B.1.f. Snow disposal site standards are found in Section 21.05.060E.8. New snow disposal sites must conform to these regulations or seek waivers.

In addition to Title 21, snow disposal requirements are governed by the *2017 Anchorage Stormwater Manual* published by the Watershed Management Services. Additional documentation for management of snow disposal can be found in the *Anchorage Street Deicer and Snow Disposal: 2003 Best Management Practices Guidance*, the *2013 Evaluation of Anchorage Snow Disposal Sites*, the *Anchorage Storm Water Treatment in Wetlands: 2001 Progress Report*, and other related publications from the MOA, State of Alaska, and research institutions. These documents guide both the site selection process and the design of snow sites. A list of documents used for reference and guidance in the site selection, design, and conceptual layout, with brief notes on the information provided, is included in Appendix B.

2.4 Site Characteristics and Site Requirements

Important characteristics and site requirements are determined based on population growth expectations, M&O operational needs, public input, regulatory legislation, and guidance documents. The primary guiding characteristics for site selection are location, operational flexibility, size, zoning/comprehensive planning, access, and availability.

2.4.1 Site Location

Based on conversations with PM&E and M&O, and the analysis of adjacent snow disposal sites discussed above, the site should be located within the Service Area. Snow haul to sites outside the service area has a significant impact on efficiency, costs, and level of service.

2.4.2 Operational Flexibility

M&O and PM&E emphasized the importance of 24-hours-a-day, 7-days-a-week (24/7) operations, especially in the West Anchorage Snow Disposal Service Area. Municipal sites with operational restrictions are difficult to use during periods of high snowfall, when night operations are limited because of noise impacts on adjacent neighborhoods. A lack of operational flexibility will hinder M&O's ability to move snow efficiently and is considered a major flaw of any potential new site. Night operations are preferable for hauling snow off main roads, as there is less traffic on the roads. This allows plows, rotaries, and trucks to operate with additional safety and efficiency. Night operations are more efficient for two reasons. The primary reason is the difficulty of closing off traffic to allow the use of rotary and haul equipment in the roadway. The other reason is that heavy day time traffic results in slower haul speeds and longer truck cycle times. Night operations are approximately 50 percent more efficient than daytime operations and many major streets can only be hauled at night. As part of the cost analysis that accompanied the selection process, it was

estimated that a site with day only operations restriction would require the rerouting of 55-60% of haul loads to a location with unrestricted operations. An equivalent number of loads would have to be rerouted from an adjacent snow site during day operations to balance snow storage capacity. The estimated cost of this redistribution of hauled loads is approximately $240,000 per year. This additional annual cost will have a serious impact on the Municipality's ability to clear snow and maintain transportation function.

2.4.3 Site Size

Based on the analysis of other Anchorage snow disposal sites, a full area replacement for the Northwood Site is desirable. Parcels of at least 15 acres are most desirable. Parcels smaller than 15 acres were considered, if adjacent parcels could be combined to reach a total of 15 acres. The 15-acre size leaves adequate area for access roads, berms, water quality structures, screening, and property line setbacks.

2.4.4 Site Zoning and Comprehensive Plan

The site must have appropriate zoning for a snow disposal site per Title 21. Many zoning districts allow snow disposal use with conditional use permitting or rezoning. Sites zoned for industrial, commercial, and public lands and institutional (PLI) use and transition zoning (TR) are preferred over residentially zoned areas. The Transitional zoning designation was originally applied to undeveloped parcels with unknown planned usage. It carries some flexibility and allow for rezoning once the use is determined. Sites with TR zoning will require rezoning to move to PLI designation and the current Title 21 conditional use approval process. This process must also look at the current West Anchorage Comprehensive Plan and meet or amend the plan as appropriate.

2.4.5 Site Access

Snow disposal generates a large volume of heavy truck traffic. Close access to collector roadways or higher classification is necessary for operation of the site. Lengthy access routes through residential or sound-sensitive areas need to be avoided for public safety and to minimize neighborhood impacts.

2.4.6 Site Availability and Acquisition

Any proposed site must be available for use by the MOA. MOA-owned properties are generally preferable over privately owned sites, as there is no direct site acquisition cost. While MOA-owned sites may also have value for alternative uses, some have lower suitability for other uses that include buildings or other facilities requiring foundations. Sites reserved for future use or with anticipated acquisition issues should be avoided.

3. Site Selection Process

The site selection process used the desired characteristics discussed above to identify possible snow disposal sites in West Anchorage. The first step in the process was to identify large vacant land parcels within the West Anchorage service area. Once an inventory was developed for initial site identification, each was evaluated based on desired characteristics to define the most suitable sites for further analysis. These were then evaluated at a deeper level, and a recommendation was made based on the relative merits and risks of each parcel.

Figure 4. Site Selection Process

3.1 Public Outreach Efforts

The project team used a variety of outreach methods to engage and inform the public regarding the West Anchorage Snow Disposal Project and to obtain feedback on the site selection process. Several opportunities for the public to provide input and feedback were provided as part of the selection process. An online open house with an opportunity to chat live with the project team was held to solicit and identity potential public concerns. Postcards were mailed to residents in the West Anchorage area notifying them of the opportunity to participate in the process. The public submitted comments by phone, email, during Community Council meetings, through the online open house, and during the virtual public meeting. Comments received focused on zoning guidelines and the site's aesthetic and environmental/hydrological impacts.

The Public Outreach Summary (Appendix C) includes a description of public outreach tools, implemented outreach strategies, outreach results, and comments received. This public input was taken into consideration during the development of site selection criteria and evaluation.

3.2 Potential Site Identification

Possible snow disposal sites were selected using the MOA Geographic Information System database by comparing available, undeveloped parcels within the snow disposal collection area with the site size and location requirements discussed in Section 2.4. A first round of 19 sites met the initial screening criteria. Figure 5 shows the locations and site numbers of these 19 initial sites. A full list of these sites is included in Appendix D.

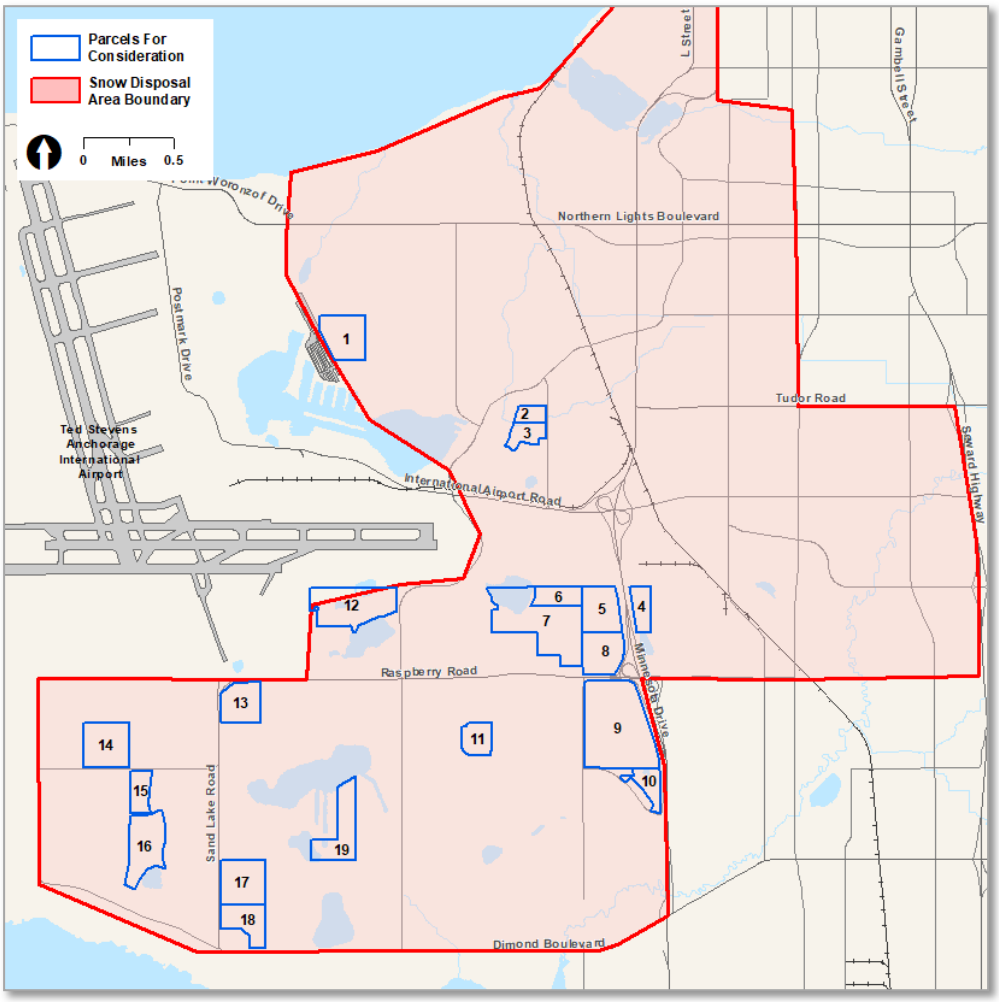


Figure 5. Initial Parcels Identified for Consideration

3.3 Initial Site Evaluation

After the initial identification, the 19 sites were further evaluated against four desired characteristics. Each site was given a rating of 1 through 3 for each characteristic:

- **1** = site was unacceptable for this characteristic
- **2** = site was neutral for this characteristic
- **3** = site was preferable for this characteristic

Sites with a rating of 1 for any of the four characteristics described below were eliminated from consideration.

- **Site Zoning**: Appropriate zoning for the subject lot and surrounding lots. Residentially zoned lots received a rating of 1. Sites that would likely require a conditional use permit received a

rating of 2. Lots with no restrictions were given a rating of 3. None of the initial sites were rated as 3.

- **Operational Flexibility**: Ability to operate 24 hours a day. Sites that were certain to have operational restrictions were rated as 1. Sites that had some risk of operational restrictions being put in place were rated as 2. Sites that would likely have zero operational restrictions were rated as 3. This parameter was guided to some extent by the results of public outreach feedback.
- **Site Access**: Access to collector or arterial roads. Sites with access routes that travel extensively through residential neighborhoods received a rating of 1. Sites with some access to collector or arterial roads were rated as 2. Sites that had good access to collector or arterial roads were given a rating of 3.
- **Site Availability**: Site owned by the Municipality or suitable for purchase or lease with no stated future plans for the parcel. Undeveloped parcels that appear to have current uses such as gravel pits or storage yards or had similar contractual concerns as the existing Northwood site received a rating of 1. Sites with some existing usage or that may have difficulty obtaining a lease or purchase were rated as 2. Sites with limited to no existing usage received a rating of 3.

Table 1 displays the results of the initial evaluation of the 19 parcels.

Table 1. Initial Site Evaluation Matrix

Site	Owner	Site Size (acres)	Zoning	Site Zoning	Operational Flexibility	Site Access	Site Availability	Reason For Elimination
1	State of Alaska - TSAIA	35.7	TR	2	3	1	1	Restricted Access
2	Universal Financing Corp	10.0	R-3 SL	1	1	2	2	Zoning Restrictions
3	MOA	15.1	R-1	1	1	2	2	Zoning Restrictions
4	Chugach Electric	15.4	TR	2	3	3	1	Site Unavailable
5	MOA MOA 5501	32.0	TR	2	3	3	3	
6	MOA MOA 5501	17.3	TR	2	3	2	3	
7	MOA Heritage Land Bank	86.8	PLI	2	3	2	2	
8	MOA Heritage Land Bank	31.8	PLI	2	3	2	3	
9	MOA Heritage Land Bank	108.9	PLI	2	2	3	3	
10	MOA Heritage Land Bank	15.4	R-4	1	1	2	2	Zoning Restrictions
11	MOA MOA 5501	18.1	PLI	2	1	1	1	Operational Issues
12	State of Alaska - TSAIA	57.2	PLI	2	2	2	1	Site Unavailable
13	State of Alaska - TSAIA	29.3	PLI	2	2	2	1	Site Unavailable
14	Opal Investments	38.5	R-1	1	1	2	2	Zoning Restrictions
15	MOA - Parks & Rec	16.5	R-2A SL	1	1	1	2	Zoning Restrictions
16	MOA School District	41.8	R-2A SL	1	1	1	1	Zoning Restrictions
17	Anchorage Sand & Gravel	39.0	R-1A	1	2	3	2	Zoning Restrictions
18	Anchorage Sand & Gravel	26.9	R-1A	1	2	3	2	Zoning Restrictions
19	MOA Heritage Land Bank	38.8	R-1	1	1	1	1	Zoning Restrictions

Legend:	Unacceptable Characteristics	Neutral Characteristics	Preferable Characteristics

Note: PLI = public lands and institutional; R = residential; TR = transition

3.4 Secondary Site Evaluation

After the initial site evaluation, five sites (Sites 5, 6, 7, 8, and 9) were identified for secondary evaluation. These five sites are all located west of Minnesota Drive on either side of Raspberry Road. Sites 5 through 8 are parcels within the Connor's Bog area and Site 9 is located in the Strawberry Bog area (Figure 6). All considered sites are shown in the West Anchorage District Plan, Anchorage 2020 Comprehensive Plan and the Anchorage 2040 Land Use plan as park and natural open space/resource land use. The secondary evaluation process narrowed the 5 remaining sites to 2 candidates based on impacts to current and planned park and open space uses as discerned from comprehensive planning, public input, and use patterns. Also considered are usable space and configuration considerations

- **Park and Open Space Impacts:** Sites 6 and 7 were eliminated from consideration due to the large number of official and social trails branching off of the Anchorage Water and Wastewater Utility (AWWU) sewer easement trail used as the main thoroughfare through Connor's Bog Park. Much of the recreational use of Connor's Bog Park is on the easement

trail and to the south and west of the trail. Development of either of these two sites would have a large impact on both the recreational users of Connors Bog and the wildlife in Connor's Lake. Both sites are on designated park lands. Sites 5 and 9 both have less recreational use and are not on designated park lands.

- **Parcel Configuration Considerations:** The sewer easement bisects Site 8, and the geometry of the lot and location of the easement within the lot would make access to a snow disposal area and security of the site difficult. Of the sites located within the Connors Bog area, a snow disposal site located at Site 5 is clearly the preferred option. Site 5 has little recreational traffic, offers straightforward site access through the M&O Kloep Station complex, and could be easily secured from unauthorized entry. Site 9 in Strawberry bog also has few configuration constraints and was also retained for final evaluation.

The elimination of Sites 6, 7, and 8 left two sites for analysis and evaluation:

- Site 5: NE Connor's Bog Site
- Site 9: NE Strawberry Bog Site

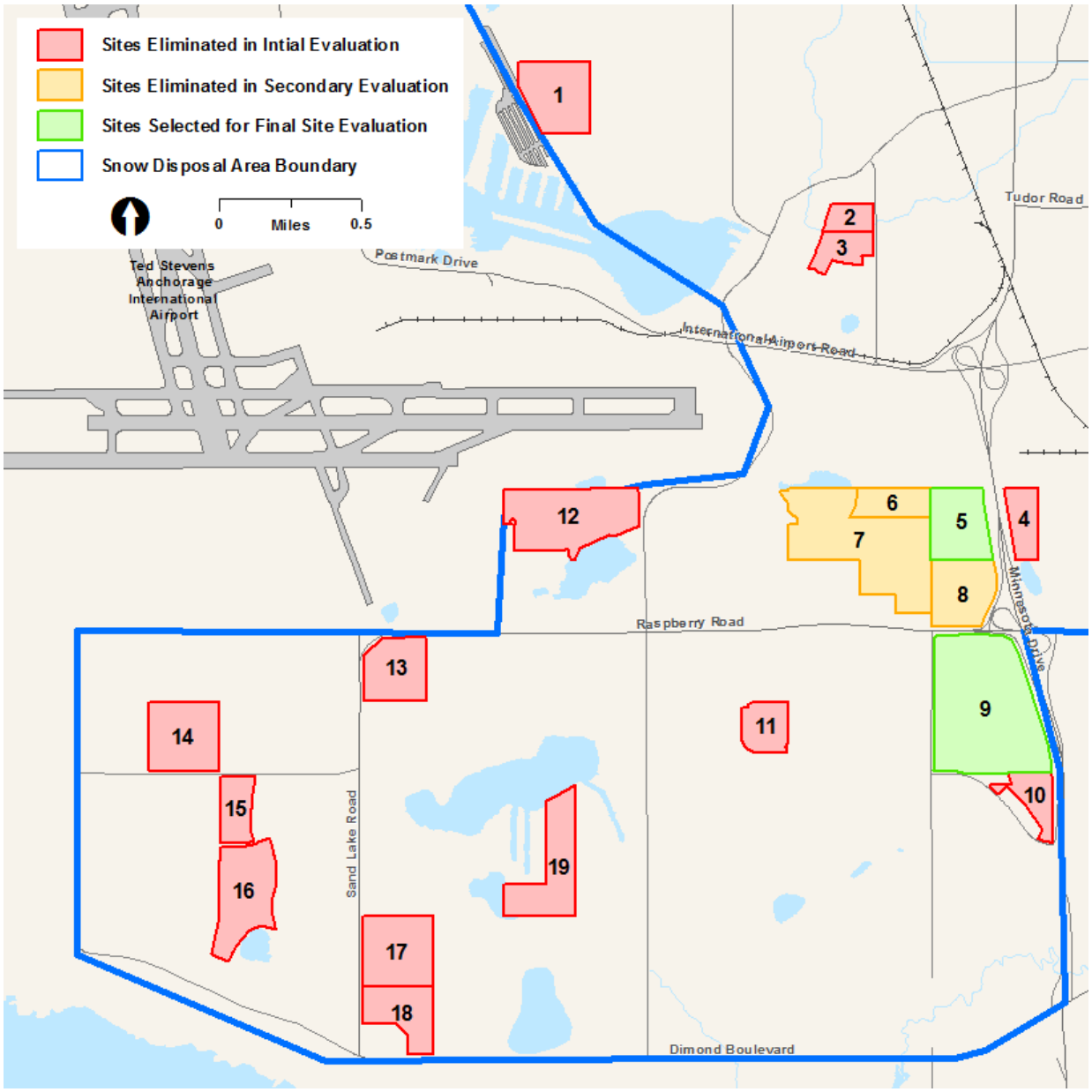


Figure 6. Final Site Evaluation Results

3.5 Final Site Evaluation

In order to make a final site selection recommendation, a thorough evaluation of the two remaining sites was performed that covered in more detail the factors considered in the initial evaluation: site zoning, operational flexibility, site access, and site availability (see Section 3.3); and secondary evaluation (see Section 3.4).

In addition to these four factors, five others were added to the final evaluation based on the public outreach feedback described in Section 3.1. The additional factors are described below.

- **Access to Appropriate Receiving Waters.** Snow disposal sites generate significant snow melt runoff that needs to be processed and disposed of into an appropriate receiving water. Any site selected for consideration should be able to receive a large amount of snow melt discharge. Sites should be avoided where snow melt runoff could raise water tables, impact existing infrastructure, or be deposited in areas that containing closed lakes or wetland systems unable to retain large amounts of water.
- **Potential Impacts to Neighborhoods and Residential Areas.** Snow disposal sites can have potential impacts to residents that include noise from snow dump trucks and machinery, nighttime glare from site lighting, air quality from dust, and visual impacts of the actual snow mounds and displaced trash. Some of these impacts can be mitigated with natural or constructed landscape buffers. Sites with numerous residents in proximity or trucking routes that pass through residential neighborhoods should be avoided to the maximum extent possible.
- **Potential Impacts to Wetlands.** Both potential sites are within mapped wetlands in the *Anchorage Wetlands Management Plan*. Both sites contain significant areas of Class "A" wetlands. Class A wetlands perform at least two significant wetland functions. The *Wetlands Management Plan* states that "'A' wetlands are considered most valuable in an undisturbed state, as most uses or activities, especially those requiring fill, negatively impact known wetland functions." Class A wetlands are not to be altered or otherwise disturbed in any manner, except for projects that are in the public interest. The site selection process must show that snow disposal is in the public's best interest and other large undeveloped upland parcels meeting the site facility requirements are not available.
- **Impacts to Park Land Use and Park Designations.** Sites located in designated park land would require approval from the Parks and Recreation Commission, Planning and Zoning and the Municipal Assembly prior to construction. Construction that limits current common park usage should be avoided.
- **Permitting Requirements.** Development of a snow disposal site requires extensive permitting from local, state, and, likely, national entities. Sites should have a clear path forward through permitting to be viable.

The following sections include an evaluation of the two remaining sites based on the above criteria. Conceptual layouts of snow disposal facilities on each site are also presented. Results and a summary of the comparison are provided in Section 4.

Conceptual designs were based on research of guidance documents and desired site characteristics. These conceptual layouts ensured that the sites have sufficient area and orientation for effective snow disposal. The layouts were developed using site area footprints for snow storage, water quality structures, access routes, required screening, and operations areas. They depict potential siting within the bounds of the individual parcels and are shown as concepts for planning purposes only. All are subject to further refinement based on delineation of wetlands, utility conflicts, traffic flow analysis, visual screening, and public input.

The Connor's Bog Site and the Strawberry Bog Site would both require the construction of a new snow disposal site of similar size with similar wetlands impacts. The total construction costs for both sites would be roughly similar. As both sites are on MOA-owned parcels, there would be no site acquisition costs. Since the total project costs for both sites would be similar, development, and operational costs, although considered, were not included in the evaluation below.

3.5.1 Site 5 – Connor's Bog Site

This site is located south of Javier De La Vega Park and west of Minnesota Drive. The land is owned by the MOA and currently managed by the Parks and Recreation Department. The total parcel size is 32 acres located in Class A wetlands. The snow disposal pad would be best located at the north end of the parcel where the elevation is slightly higher than at the south end, and access is feasible utilizing existing easements from the M&O Kloep Station facilities. Development would involve construction of a fill pad, improvements to the access road to separate snow haul truck traffic from the existing operations areas, extension of an access road along the section line easement, a perimeter berm, fencing, and water quality structures. Melt water would be discharged into the wetlands of Connor's Bog and Connor's Lake. Figure 7 shows a conceptual layout for Site 5. Details of the selection parameters are described here:

Site Access

Access to the site would be off International Airport Road, a designated expressway, and through the existing M&O Kloep Station facility. This is identical to the access route for the existing Northwood Site. Access to Site 5 would require an extension of the access road beyond the Kloep Station facility and would require to separation of snow hauling traffic from the Kloep Station employee parking areas. Small incursions into designated park land south of the Kloep parcel are anticipated to accommodate existing CEA power poles in the section line easement. The development of Site 5 will result in no change to the existing traffic flow on public streets.

Zoning

This site is zoned within the TR district. This designation was initially developed in the 1960s as the unrestricted zoning district for parcels that were not expected to be developed in the near future.

Development of Anchorage has filled in areas previously thought to be undevelopable and many of these lands have been rezoned over time. Parcels zoned TR as of January 1, 2014, are subject to the land use regulations in effect prior to the 2014 Title 21 rewrite until they become rezoned. As part of Connor's Bog, this site, although zoned as TR, is managed by the Parks and Recreation Department. The development of a snow disposal site in a TR-zoned parcel is allowed as a permitted use (AMC 21.40.240 of the old code). Should a rezone of this area occur, this land would likely be zoned within a PLI district, similar to the parcels to the south (Site 8), west (Site 7), and north (De La Vega Park). The development of a snow disposal site on a PLI-zoned land is allowed as a conditional use (AMC 21.05.010). Snow disposal sites, regardless of zoning district, must undergo a public facility site selection review (AMC 21.03.140).

In TR zoning districts, there is no height restriction for snow disposal. For PLI-zoned parcels, the maximum height is 45 feet (AMC 21.06.020.C). Conditional use standards for snow disposal sites set the maximum height of snow piles at 35 feet when within 500 feet of a residential district (AMC 21.05.060.E.8.b.II.B). As there are no residential areas within 500 feet of the proposed site location, this additional restriction does not apply. Based on past records of snowfall and snow disposal in West Anchorage, it is unlikely that a properly sized snow disposal site would exceed 35 feet of height in most snow years.

The parcel is large enough compared to the necessary site layout that most setback requirements (AMC 21.05.060.E.8.b.II.C) should not be an issue.

Operational Flexibility

Access to Site 5 is the same as access to the existing Northwood Site. As the new site is farther from residential areas or other noise-sensitive areas, it is unlikely that additional operational restrictions would be put in place on the site. This would allow for 24-hour operations, as are currently allowed at the Northwood Site.

Site Availability

This site is on land owned by the Municipality with relatively low public use. The land is not dedicated park land but is currently managed by the Parks and Recreation Department, which has been receptive to its utilization as a snow disposal site.

Access to Appropriate Receiving Waters

Snow melt from a snow disposal site at Site 5 would be retained within the watershed of Connor's Lake. Melt water would travel through several culverts under the AWWU sewer main easement and into Connor's Lake. Connor's Lake currently receives the melt water from the existing site and is sufficiently sized to receive melt water from a new site.

Potential Impacts to Neighborhoods and Residential Areas

Access to Site 5 would be similar to access to the existing Northwood Site, with some additional routing through the Kloep Station facility. The additional route would be on service roads with no

public traffic. Fencing would be necessary to limit pedestrian access to the disposal site both from Connor's Bog off-leash dog area and Javier De La Vega Park, and exposure of the public to noise or other nuisances would be similar to the present condition. There would be no change in existing traffic patterns during snow disposal, and there would be limited increased exposure of the public to noise or other nuisance.

Potential Impacts to Wetlands

Site 5 is located in mapped Class A wetlands and will impact those wetlands. The pad development, access road, perimeter berm, and water quality structures may require approximately 17.3 acres of fill in Class A wetlands. Class A wetlands are the highest value wetlands within the MOA (see Section 3.5).

The primary wetland functions and values that would be impacted at this site include storm water retention, nutrient retention and transport, wildlife and fish habitat, and recreation. Connor's Bog provides a significant source of storm water storage and water quality filtering in West Anchorage. This freshwater wetland and lake complex also provide an important habitat oasis in an otherwise urban landscape. The diversity of plant life at the site provides habitat for small mammals, moose, and many species of migratory birds. At least 83 species of birds have been recorded in the area, including nesting Pacific loons.

On the plus side these hydraulically disconnected wetlands and the included Connor's Lake accrue significant benefit from the existing Northwood snow site. Melt water from this facility have helped to maintain wetland and aquatic habitat function in this area for several decades. Melt waters from the proposed site will continue to provide this much needed hydration to maintain the wetland functions of the remaining areas of Connor's bog. This is not intended to downplay the impact of the new fill site, but many other wetland areas of the municipality are slowly reverting to upland vegetation and function as they become disconnected from historic water sources.

Impacts to Park Land Use and Park Designations

While Site 5 would be located on land managed by the Parks and Recreation Department, the site is not designated park land. However, a very small portion of the access road to Site 5 needs to be located on designated parkland and would require approval from the Parks and Recreation Commission, Planning and Zoning Commission, and the Municipal Assembly prior to construction.

Adjacent to Site 5 is Javier De La Vega Park, which hosts soccer and baseball games during summer, along with other park uses. Visual impacts to users of Javier De La Vega Park and drivers along Minnesota Drive would be partially mitigated by existing and project-installed buffers of trees to block the sightlines of the remnant melting snow. Javier De La Vega Park sees lower use in winter, so dumping and hauling activities would have less impacts on park users during that season.

Site visits after winter snowfall events suggest that the northeast corner of Connor's Bog has lighter use compared to the areas west of the AWWU corridor. Summer use is minimal due to the lack of trails and spongy wetland footing. In summary, the impacts to users of Connor's Bog, and Javier De La Vega Park while not insignificant is expected to be limited and efforts for mitigated will be

integrated into design features and other impact alleviations. The existing Northwood site is closely adjacent to the main corridor into Connor's Park. This intrusion will be removed or lessened by moving the snow site further from the more intense dog park use areas and providing vegetation buffers.

Permitting Requirements

The Connor's Bog Site is not located on designated park land and would not require Parks and Recreation Department approval. The municipal Planning and Zoning Department is recommending that the parcel if used be rezoned from TR to PLI and the Anchorage Comprehensive Plan be amended to allow the use of this parcel as a snow site. Development of this site will require a Municipal Conditional Use and Land Reclamation Permit, including waivers from several snow disposal site Design Criteria. This site would also require a Jurisdictional Determination (JD) from the U.S. Army Corps of Engineers under the Clean Water Act (CWA) Section 404 (outcome of JD would determine if wetlands permitting and mitigation would be required under the CWA), a Stormwater Discharge Permit from Alaska Department of Environmental Conservation, a sign-off from PM&E Watershed Management, fill and grade permits, and utility agreements. These permits will require significant effort, but all should be obtainable.

Site Summary

Site 5: Connor's Bog Site is a very desirable snow disposal site. It meets most of the criteria for a snow disposal site and has few drawbacks. The site would have low to no impact on residents and neighbors, is sufficiently sized and available for use, will have no operational restrictions, and has adequate receiving waters. The concerns pertaining to the Connor's Bog Site are the required changes to the Comprehensive Plan, rezoning requirements, park user impacts, wetlands fill and its location on Class A wetlands. Figure 7 shows a conceptual design drawing of the Connor's Bog Site.

Figure 7. Site 5: Connor's Bog Site Conceptual Design

3.5.2 Site 9 – Strawberry Bog Site

This site is located south of Raspberry Road and between Northwood Street and Minnesota Drive. It is owned by the MOA and managed by Heritage Land Bank. The total parcel size is 109 acres and consists mostly of Class A wetlands. Like Site 5, this site would involve the construction of a fill pad, perimeter berm, fencing, water quality structures, and a new access road. Figure 8 shows a conceptual layout for the site.

Site Access

Access would be from Northwood Drive south of Raspberry Road. All routes to the snow disposal site from the north could be made on collector and arterial routes. Traffic flow to the site may necessitate access from Strawberry Road exit off Minnesota Drive. Strawberry Road is a designated collector route and would require improvement prior to use as access to a snow disposal site. Development of this site will result in a significant change in the amount and flow of traffic in the neighborhood. The entrance to the site would be controlled with fencing and gates to restrict public access.

Zoning

Site 9 is zoned PLI, which allows snow disposal sites as a conditional use (AMC 21.05.010). Similar to Site 5, this site would require conditional use approval and public facility site selection plan approval (AMC 21.03.140). The site is bordered on the west by Northwood Street, which has areas of residential and business-zoned properties to the west. Land use is a mix of business, large apartment complexes, and single family and duplex homes. The placement of the snow disposal site would be outside of the 500-foot separation from residential districts. This would allow for no height restrictions from conditional use zoning regulations for snow disposal sites (AMC 21.05.060.E.8.b.II.B), but the site would be subject to the 45-foot limitation of PLI zoned parcels (AMC 21.06.020.C). As with Site 5, it is unlikely that the height of the snow pile would reach 35 feet.

As mentioned earlier the parcel is shown as park and natural open space in the Comprehensive Plan and change of land use will require an amendment to the Comprehensive Plan. As with Site 5, this parcel is large enough compared to the necessary site layout that most setback requirements (AMC 21.05.060.E.8.b.II.C) should not be an issue.

Operational Flexibility

Due to the proximity to both the residential development on the west side of Northwood Drive and potential trucking routes through a noise-sensitive residential area, as discussed below, operational restrictions may be placed on a snow disposal site at Site 9. The site could be restricted to daytime operations only, which is common at other municipal snow sites in residential settings. This would necessitate trucking night-hauled snow from larger arterial streets to the C Street Site and a similar volume of day-removed snow back to the Strawberry Bog Site. This process would increase the trucking cost and restrict the operational flexibility needed for efficient snow management by M&O.

Site Availability

Site 9 is located on Municipality-owned land outside of any designated park. There is low utilization of the Strawberry Bog area due to lack of trails and presence of wetlands. The site is available to use for a snow disposal site with the correct conditional use permits.

Access to Appropriate Receiving Waters

Snow melt from a snow disposal site at Site 9 would be retained within the watershed of Strawberry Lake. Comparison of historical satellite imagery from the 1950s to the present show that Strawberry Lake has decreased in size over time. Melt water from a snow disposal site at Site 9 could replenish the lake levels. Strawberry Lake eventually discharges into the Campbell Creek drainage. Site 9 has sufficient receiving waters for a snow disposal site.

Potential Impact to Neighborhoods and Residential Areas

The development of Site 9 would result in a major change to the traffic flow and volume in the area. Traffic flow to the site would have the highest impact on the high-density residential lots on the north end of Northwood Drive. More lots along Northwood Drive are slated for development in the future. Should traffic need to be routed through the Strawberry Road exit, trucks would travel through an established residential neighborhood and would have direct impacts on a large segment of residential properties fronting this route on the west. Large volumes of truck traffic and the noise from snow disposal operations would impact these residential neighborhoods no matter the direction of access. Installation of berms and landscaping trees may partially reduce noise and visual impacts on these neighborhoods, but public feedback indicates that this is a major concern.

Potential Impact to Wetlands

As with Site 5, Site 9 is also located in mapped Class A wetlands and would require wetland mitigation. The conceptual layout is similar to the Site 5 layout, but a more conventional V-Swale design is shown. The pad development, access road, perimeter berm, and water quality structures require a total of 17.4 acres of fill in Class A wetlands. Class A wetlands are the highest value wetlands within the MOA (see Section 3.5).

Strawberry Bog and Connor's Bog are part of the same original bog system now cut by Raspberry Road. Many of the potential impacts on wetland functions and values at the Site 9 would be similar to those at Site 5. The primary wetland functions and services that would be impacted at this site include flood water retention, nutrient retention and transport, wildlife and fish habitat, and recreation. The Strawberry Bog freshwater wetland and lake complex also provides important wildlife habitat in an otherwise urban landscape. The diversity of plant life at the site provides habitat for small mammals, moose, and many species of migratory birds.

Impacts to Park Land Use and Park Designations

This undesignated open land in Strawberry Bog has low use compared to Connor's Bog and other, more developed parks. The southern part of the parcel around Strawberry Lake has an ad hoc

network of boggy routes used by the local residents. These would be largely unaffected by the snow site. Development of Site 9 would have little to no impact on park land use or park designations.

Permitting Requirements

The Strawberry Bog area is not designated park land and would not require approval from the Parks and Recreation Commission. Development of this parcel would require a Municipal Conditional Use and Land Reclamation Permit to include waivers from several snow disposal site design criteria. This site would also require a JD from the U.S. Army Corps of Engineers under the Clean Water Act (CWA) Section 404 (outcome of JD would determine if wetlands permitting and mitigation would be required under the CWA), a Stormwater Discharge Permit from the Alaska Department of Environmental Conservation, a sign off from PM&E Watershed Management, fill and grade permits, and utility agreements. These permits would require significant effort, but all should be obtainable.

Site Summary

Site 9: Strawberry Bog Site is a moderately desirable snow disposal site. It meets some of the site selection criteria for a snow disposal site. The Strawberry Bog Site would be located on land that is sufficiently sized and available for use, it does not impact existing park use, and it has adequate receiving waters. However, there are several major concerns with respect to access and neighborhood impacts of the site. The site would be located near existing and growing residential areas, and access may have to be through a residential neighborhood. Operational restrictions, such as a restriction on nighttime operation, could be put in place due to this proximity. Any restrictions that do not allow for 24/7 operation would make this an undesirable snow disposal site. The site is also located on Class A wetlands, which would require additional fill and mitigation requirements. Figure 8 shows a conceptual design drawing of the Strawberry Bog Site.

Figure 8. Site 9: Strawberry Bog Site Conceptual Design

4. Site Selection Recommendations

Due to its limited overall impact on the community, Site 5 (Connor's Bog Site) is recommended. Both Site 5 and Site 9 are located in Class A wetlands and would require significant permitting efforts. Both will require a change to the Comprehensive Plans. Site 5 will require rezoning to PLI. Comments from public involvement efforts indicate that Site 5 is generally the preferred site, compared to Site 9.

Development of a snow disposal site on Site 9 (Strawberry Bog Site) would have significant community impacts on residential neighborhoods from traffic and noise associated with normal snow disposal operations. Development of Site 5 would not change the existing traffic flow for neighbors.

Operational flexibility also weighs heavily in favor of Site 5. The specter of operational restrictions due to residential impacts of night operations introduce an unacceptable risk for the development of Site 9. Second only to public impacts, operational efficiency is the most important driver for site selection. Environmental impacts also weigh in heavily but appear approximate equal for both sites.

Hearings with the MOA Planning and Zoning Commission would be required for approval of the site selection and for site plan review and conditional use permitting. A CWA Section 404 Permit from the U.S. Army Corps of Engineers may be required for the placement of fill in wetlands.

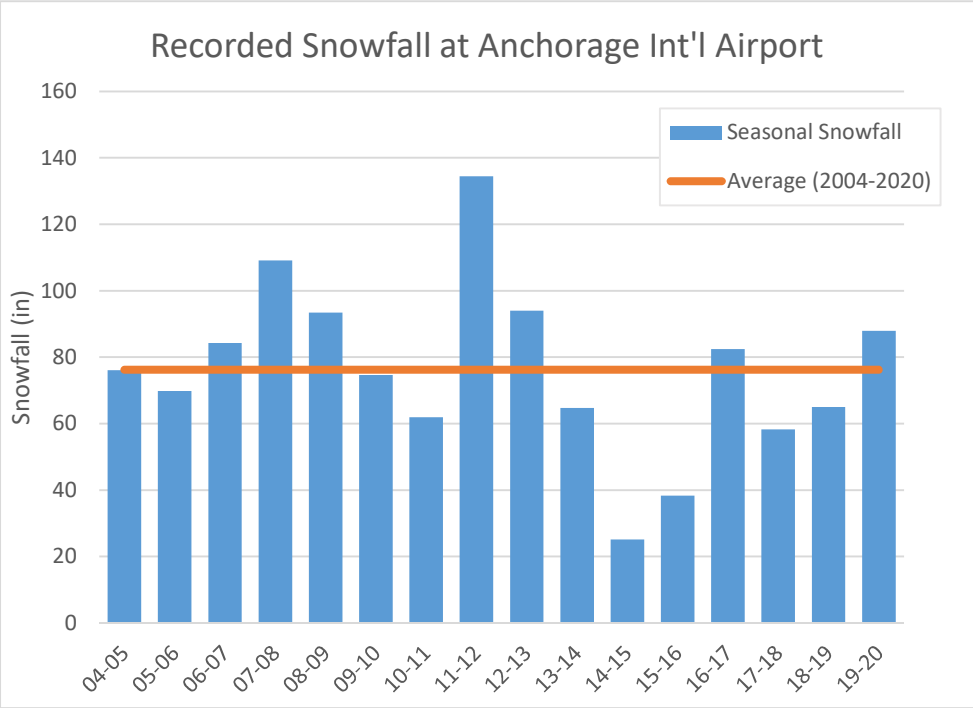
Table 2 provides a comparison summary of the two sites for each evaluation factor, with green symbolizing desirable, yellow symbolizing neutral, and red symbolizing undesirable characteristics.

Table 2. Final Site Selection Recommendations Comparison Table

Evaluation Factor	Site 5: Connor's Bog Site	Site 9: Strawberry Bog Site
Site Size	32.0 acres	108.96 acres
Site Access	International Airport Road (Expressway) through MOA Kloep Station	Off Northwood Drive (Arterial Road)
Zoning	TR – Transition will be rezoned to PLI	PLI – Public Lands and Institutions
Owner	MOA Parks & Recreation	MOA Heritage Land Bank
Acquisition Cost	None	None
Operational Flexibility	Likely no restrictions on operation	Likely restrictions on nighttime operations
Receiving Waters	Connor's Bog and Lake	Strawberry Bog and Lake
Neighborhood Impacts	None or reduced from existing	High impact on adjacent residential areas to the west and south
Wetlands Impacts	Extensive Class A wetlands	Extensive Class A wetlands
Park Land Impacts	Parcel Managed by Parks and Recreation, low utilization; Comprehensive Plan listed as park and natural open space. Access road would impact small area of designated parkland	No Designated park land impacts, Comprehensive Plan listed as park and open space.
Permitting Requirements	Extensive permitting: • Comp Plan Amendment • Rezoning • Conditional Use and Land Reclamation Permits • Title 21 snow site design waivers • ADEC Stormwater Discharge Permit • Misc. MOA Building Safety permits, PM&E Watershed Management sign off, and utility agreements	Extensive permitting: • Comp Plan Amendment required. • Conditional Use and Land Reclamation Permits, • Title 21 snow site design waivers • ADEC Stormwater Discharge Permit • Misc. MOA Building Safety permits, PM&E Watershed Management sign off, and utility agreements
Legend	**Undesirable Characteristics**	**Neutral Characteristics** / **Desirable Characteristics**

Appendix A:
Historical Anchorage Snowfall and Normalized Snow Truckload Calculations

Season	Snowfall (inches)
19-20	87.9
18-19	65.0
17-18	58.3
16-17	82.4
15-16	38.3
14-15	25.1
13-14	64.7
12-13	94.0
11-12	134.5
10-11	61.9
09-10	74.6
08-09	93.4
07-08	109.1
06-07	84.3
05-06	69.8
04-05	76.1
Average	**76.2**



Normalization of Snow TruckLoads Calculations	
Average Snowfall (inches)	76.2
2018-19 Snowfall (inches)	65.0
2018-19 % of Average	85%
2018-19 Snow Truckloads delivered to Northwood	8,879
Snow Truckloads Normalized to Average Year	10,411

Appendix B:
Selection of Snow Disposal Site Guidance Documents and General Relevant Contents

Document: Section 21 Title 21
Author/Source: Municipality of Anchorage
Outline of public facility site selection process Snow disposal site regulations Waiver process outline
Document: 2017 Anchorage Stormwater Manual
Author/Source: Municipality of Anchorage PM&E
Melt water discharge profile Site selection criteria
Document: Anchorage Street Deicer and Snow Disposal 2003 Best Management Practices Guidance
Author/Source: Watershed Management Program - WMP CPg02001
Documentation of management of snow disposal sites
Document: 2013 Evaluation of Anchorage Snow Disposal Sites
Author/Source: Watershed Management Program - WMP APr14002
V-Swale design guidance General site design guidance
Document: Anchorage Storm Water Treatment in Wetlands: 2001 Progress Report
Author/Source: Watershed Management Program - WMP APr01002
Wetlands status in Anchorage Potential benefits of snow melt water into wetlands
Document: Urban and Highway Snowmelt: Minimizing the Impact on Receiving Water
Author/Source: Water Environment Research Foundation: Project 94-IRM-2
Estimation of metals and salts in melt water discharge Evaluation of toxic effects of these contaniment
Document: Effects of Snow Dump Meltwater on Adjacent Black Spruce Bog Vegetation
Author/Source: Alaska Pacific University - Kristen Hansen
Effect of melt water from snow disposal sites on adjacent vegetation
Document: Proposed Eagle River Snow Disposal Site: Preliminary Review
Author/Source: Watershed Management Program
Snow disposal site characteristics and impacts Contaminent characterization of snow disposal melt water General melt water discharge volumes and impacts
Document: Synthesis of Best Management Practices for Snow Storage Areas
Author/Source: Alaska DOT&PF Research & Technology Transfer
General best practices around the state for snow disposal
Document: The Anchorage Debit-Credit Method
Author/Source: Heather Dean, April 2011 – USACOE, EPA, US Fish & Wildlife, MOA
Procedure for determining development debits and compensatory mitigation credits

Appendix C:
Public Outreach Summary

West Anchorage Snow Disposal Project

Project Management and Engineering No. 19-01

Phase One Public Outreach Summary

Municipality of Anchorage
Anchorage, Alaska
March 24, 2020 – April 24, 2020

Table of Contents

Attachments

Introduction

This public outreach summary is used for tracking and documenting public involvement activities for Phase One of the West Anchorage Snow Disposal Project (Snow Disposal Project). It outlines the Phase One public involvement strategies for the period of March 24 through April 24, 2020, and the methods used to engage and inform the public on the Snow Disposal Project. The summary includes a description of the online open house and virtual meeting, the tools used for implementation, and the results of the public outreach during Phase One.

Overview of Phase One Public Involvement Activities

The project team conducted a variety of public outreach tactics to engage and inform the public on the Snow Disposal Project. The tactics used in Phase One are described below.

Online Open House and Virtual Meeting

On Tuesday, March 24, 2020, the Snow Disposal Project team hosted an online, interactive, self-guided public open house on the project website that was available through Friday, April 24, 2020. The online open house consisted of a total of eight sections that outlined project information and one section that included ways to comment on the project. The purpose of the online open house was to inform the public of the Municipality of Anchorage's (MOA's) West Anchorage Snow Disposal Project and receive feedback on site selection criteria and potential locations to be considered.

Virtual Meeting – Project Team Live Chat

In addition to the online open house site, the project team hosted a virtual meeting on Tuesday, March 24, 2020, from 4:30pm to 6:30pm at which members of the public could interact with the project team through the online open house site via a live chat feature.

Attendance

A total of 35 visitors attended the online open house on Tuesday, March 24, 2020, from 4:30pm to 6:30pm, 8 of whom also participated in the virtual meeting live online chat. The live online open house was viewed 137 times from March 24, 2020, to April 24, 2020.

Advertising

The online public open house was advertised in the following ways:

- Meeting information on the project website: www.westanchoragesnow.com
- Postcard mailer to residents near the project area (total of 4,139; Attachment A)
- An advertisement in the *Anchorage Daily News* (Attachment B)
- Presentations at the Turnagain Community Council and Sand Lake Community Council meetings
- A press release sent out by PM&E (Attachment C)
- Postings to nextdoor.com
- Flyers posted around the project area (Attachment D)

Summary of Comments

The comments received during the online open house and the virtual public meeting (Attachment E) focused primarily on the snow disposal site selection process, the need for a new site location, the possible need for wetland permitting and mitigation, and communication with other agencies and organizations such as Anchorage Water and Wastewater Utility.

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Attachment A

Postcard

West Anchorage Snow Disposal Project

Online Open House & Virtual Public Meeting

Online Open House	Virtual Public Meeting
March 24 - April 24, 2020	Tuesday, March 24, 2020 from 4:30-6:30 pm

www.westanchoragesnow.com

West Anchorage
Snow Disposal Project
2525 C Street, Suite 500
Anchorage, Alaska 99503

West Anchorage Snow Disposal Project

Online Open House March 24 - April 24, 2020	Virtual Public Meeting Tuesday, March 24, 2020 from 4:30-6:30 pm

Visit westanchoragesnow.com

The Municipality of Anchorage is collecting information on potential locations for the placement of snow removed from West Anchorage streets during winter. Snow disposal location criteria and public feedback will be considered as part of a site selection process.

You are invited to attend an Online Open House to learn about the project and provide your feedback on site selection criteria and potential locations to be considered.

If you have any questions, please contact the project public involvement lead, Josie Wilson, at (907) 644-2030 or Josie.wilson@hdrinc.com.

Stay in-the-know

Sign up to receive email updates on our website at **www.westanchoragesnow.com**

Project Management and Engineering No. 19-01

Attachment B

Advertisement in the Anchorage Daily news

West Anchorage Snow Disposal Project

ONLINE MEETING DETAILS

Online Open House

Tuesday, March 24, 2020 | 4:30 pm – 6:30 pm

www.westanchoragesnow.com

The Municipality of Anchorage is collecting information on potential locations for the placement of snow removed from West Anchorage streets during winter. Snow disposal location criteria and public feedback will be considered as part of a site selection process.

You are invited to attend a Public Open House to learn about the project and provide your feedback on site selection criteria and potential locations to be considered.

Visit **westanchoragesnow.com** for project information or to submit comments. **Comment period from March 24 to April 24, 2020.**

If you have any questions, you may contact Josie Wilson at 907 644-2030.

Project Management and Engineering No. 19-01

Attachment C

Press Release

Municipality of Anchorage

Ethan Berkowitz, Mayor

Project Management & Engineering Department

FOR IMMEDIATE RELEASE
March 24, 2020

Municipality of Anchorage Goes "Virtual" for Project Management and Engineering Public Meeting for the West Anchorage Snow Disposal Project

The Municipality of Anchorage Project Management & Engineering Office is hosting an online open house and virtual public meeting for the West Anchorage Snow Disposal Site project. The public is invited to attend and participate in the virtual meeting on Tuesday, March 24 from 4:30-6:30 p.m. by visiting the project website: www.westanchoragesnow.com.

ANCHORAGE – In response to the "Hunker Down" order (EO-03) and guidance to avoid social gatherings, the Municipality of Anchorage shifted a previously planned in-person public meeting for the West Anchorage Snow Disposal Site Project to an online open house format with a live-chat virtual meeting.

The project team is offering a virtual meeting through a live-chat feature on the website on **Tuesday, March 24, 2020 from 4:30-6:30pm**. The Online Open House will be available **March 24 through April 24, 2020** for participants to learn about the project and to leave comments. Members of the public can visit the project website at www.westanchoragesnow.com and then chat online with project team members during the virtual meeting, similar to a traditional public meeting.

The Municipality of Anchorage is collecting information on potential locations for the placement of snow removed from West Anchorage streets during winter. The project is in the information-gathering phase and the public is invited to learn about the project and to provide feedback on the site selection requirements for a future potential site as part of the site selection study.

Please join the project team at 4:30pm on Tuesday, March 24 online at www.westanchoragesnow.com to interact with the project team, to learn about the project, and to provide feedback on site selection criteria for potential locations for the West Anchorage Snow Disposal Site Project.

All public comments received during the live chat and through the website will be considered by the project team. The public can also submit comments via email or mail by April 24, 2020 to info@westanchoragesnow.com or by visiting the project website at www.westanchoragesnow.com. People may also sign up for the project distribution list to have project updates sent right to their inbox.

# # #

Media contact: Chelsea Ward-Waller, 907.575.8583, chelsea.ww@anchorageak.gov

About Municipality of Anchorage (MOA) Project Management & Engineering Department (PM&E)

PM&E designs and builds public works projects that provide a safe, convenient, and efficient transportation network throughout Anchorage. Voter-approved bonds fund the majority of these projects, which include sidewalks, transit facilities, roads, trails, drainage, and other public facilities that support Municipal Maintenance and Operations.

Attachment D

Project Flyer

West Anchorage Snow Disposal Project

Project Management and Engineering No. 19-01

Please Join Us!

Online Open House

Tuesday
March 24, 2020 from
4:30 to 6:30

visit:
westanchoragesnow.com

The Municipality of Anchorage is collecting information on potential locations for the placement of snow removed from West Anchorage streets during winter. Snow disposal location criteria and public feedback will be considered as part of a site selection process.

You are invited to attend a Public Open House to learn about the project and provide your feedback on site selection criteria and potential locations to be considered.

Visit www.westanchoragesnow.com for project information or to submit comments.

Comment period from March 24 to April 24, 2020.
If you have any questions, contact Josie Wilson at (907) 644-2030.

Attachment E

Comment Log

West Anchorage Snow Disposal Project
Phase One Comment Log

Comment Number	Date	Comment Type	Commenter	Organization	Comment	Response Date	Responded By	Response
1	3/6/2020	In Person - Turnagain Community Council	John Johansen	AIA - Manager of engineering, environmental, and planning	Opinions on "why" this project is happening - meeting minutes reflect when he was speaking and his questions. Seretary will provide minutes.			
2	3/17/2020	Email	Frank Rast	Public	Hello Josie I am quite interested in this project as I have been lobbying for years to get the Northwood Snow dump leased at a more reasonable rate. I realize that keeping that site is a dead end. It would be nice if the public got a little more background on this rather than the "does not meet contracting requirements" description on the website. I understand that literally an act of congress would be required to lease the Northwood Site at a reasonable rate. Very unfortunate because the MOA taxpayers actually own the airport through the State. I understand that Northwood and Raspberry is the likely site and it is unfortunate that a HLB property listed as a future neighborhood town center will now be a snow dump. What a scenic welcome site for visitors traveling down Minnesota Drive on their way to Kenai. Similar to the snow dumps lining the Seward Highway. This site also has potential for development as affordable R2-M Housing. A developer across the street just got approval for the R2-M height variance. Looking at a snow dump instead of the Chugach Mountains will not help his development I hate to say this but the AS&G Fill site would be an option if the trucking costs are not too high and the airspace was cleared with FAA and the Airport. The fill site is 300 feet down at the end of my block on Seacliff. I really don't want to look at a snow dump for 6 months out of the year, but this may be a better community option than Northwood and Raspberry. I will be asking Sara and Mia if they can contact Senator's Murkowski and Sullivan to see if a more reasonable lease can be provided at the current Northwood site. Thanks in advance for considering my comments. Frank Rast			Hi Frank, Thank you for your comment. The project team is taking it into consideration as part of the site selection study. In this process the city is considering the long term lease of the existing site but development costs are high even to retrofit it for current water quality standards. These development costs would be lost at the end of the lease unless a more permanent land agreement can be reached. We are sensitive to the impacts on current and potential residents. It is understood that the Raspberry site will potentially have more of these impacts and that will be factored into the selection process. The project team has looked into the AS&G site and found that financially, it is not a viable option. Due to the distance, trucking costs would greatly increase and since MOA does not own the land there would be purchasing costs to overcome. We appreciate your involvement on the project and will keep you posted with the progress. Sincerely,
3	3/23/2020	Phone and Email	Judy See	Public	Hello - I live in SW Anchorage - 1 block over from Dimond HS track. We r a swamp in this area. Our house has 2 sump pumps. When Arlene Street was recently redone, a semi truck got stuck in the muck. In the easement behind our homes the electric box has been tipped over for years. Each spring our phone service is not usable for a few days due to high water. The returning fowl swim in these flooded areas. PLEASE do NOT even consider this area for snow dumping - should there be any room. Thank you for reading this request. Sincerely, Judy See	3/23/2020	Josie Wilson	Judy called the PI team before sending her email. Email does not need to be responded to. She just wanted her comment for the record.
4a	3/24/2020	Virtual Meeting Online Chat	*Name not given*	Public	Hello. Are the two potential sites shown on the webpage the only potential sites under consideration/that meet the criteria?	3/24/2020	Julie Makela	Hi! This is Julie Makela, Project Administrator. Those are the two potential sites at this point that we believe meet the criteria. We are open to considering other sites suggested by the public.
4b					Also, one of the several reasons the existing site no longer is viable is because it would need improvements to meet water quality standards. What improvements would need to be made to a new site to make either of them compliant with WQ standards?	3/24/2020	Julie Makela	Both of the potential sites would have to be fully upgraded to current snow disposal regulatory standards. The potential sites are large enough to have the WQ features necessary to meet water quality standards. One of the features would be settling ponds and periodic water quality monitoring.
5a	3/24/2020	Virtual Meeting Online Chat	Margaret Auth	Spendard Community Roadhouse - Member of the Executive Committee	I am most interested in keeping snow dumps away from residential neighborhoods. As someone who has lived near the current snow dump, I would like to say that the sounds from the trucks can be very loud and not just where they dump the snow. They also sometimes illegally use their air brakes on International. There's a reason it's illegal to use them in the city, but still, they do. . I do know there is a need for the snow dump as my husband was the chair of the Spenard Community Council and I know this has been an issue for the Muni for years because the land is State owned.	3/24/2020	Josie Wilson	Thank you for your comment. This is Josie, the public involvement lead. I am sorry to hear that. I appreciate you taking the time to provide your comments and feedback. We will add this comment to our public feedback. Thanks Margaret! Would it be okay if we got back to you on your question about the the design of the potential site and minimization of contamination?
5b					I also have a question: Because this will hopefully be a better planned snow dump than that currently used, will the Muni line the area to minimize contamination? I feel I have made all the comments I need to make at this time. I thank you for taking the time to do this presentation. I would appreciate more information on the design when you can get that information to me.			
6a					Just reread Connor's Bog "Advantages" list; not sure additional access to that area is necessarily a good thing. Connors Lake supports nesting loons as well as other bird and wildlife habitat. Current access seems to be adequate for those who enjoy this area. Improvements to the parking area off Jewel Lake would be interesting to see if those amenities would be viewed by users of the area as an acceptable trade off for loss of some of the parkland.	3/24/2020	Josie Wilson and Bill Spencer	We have several project team members online. Your questions are wonderful. We will answer as many as we can. We are also tracking all of these comments as part of the public involvement outreach. So, if we need to get back to you on a few of the questions, we will.
6b					This is Cathy Gleason, Turnagain CC President. I have several questions: 1) What zoning district/s would allow this proposed snow disposal facility?	3/24/2020	Bill Spencer	1)I will have to check on the specific zoning requirements for snow disposal sites, it is my understanding that these two parcels meet the required zoning criteria.
6c					2) Is the Municipality open to a rezoning process, if needed, to choose the best location?	3/24/2020	Bill Spencer	2) the Muni is open to rezoning if that is needed to use the best location

6d	3/24/2020	Virtual Meeting Online Chat	Cathy Gleason	Turnagain Community Council - President	3) What kind of Muni and Federal permitting would be required for a snow disposal facility?	3/24/2020	Bill Spencer	3)I believe the project will need a conditional use permit for the site, if we choose the site in Connors we will need approval from the Parks and Rec commission. Also needed will be a wetlands fill permit from the Army Corp of Engineers.
6e					4) Is the Connors Bog site dedicated parkland? If not, how close is the site to dedicated parkland and the portion of the park located on Airport property?	3/24/2020	Bill Spencer	4) yes I believe the north east corner of the bog is dedicated park land, currently lightly used
6f					5) Has the Strawberry Bog site been used as wetland mitigation for previous wetland fill projects elsewhere in Anchorage? 6) Is there any Conservation Easement designation on the Strawberry or Connors Bog sites? 7) Has the Heritage Land Bank identified either of the sites to be used as part of a Muni wetland mitigation bank?	3/24/2020	Bill Spencer	5,6,7) HLB has indicated that the answer to all of these is no.
6g					8) Based on the locations along Minnesota Dr. of both identified sites, visual mitigation would be needed at either site, so they would not be seen from the road. Any other land use proposed for dedicated park land would required a vote of the people to undedicate it.	3/24/2020 4/7/2020	Bill Spencer and Julie Makela Josie Wilson	8) We will maintain as much of the existing treeline as possible and then augment with berms and landscaping. Hi Cathy! It's Julie Makela, Project Administrator. You are correct there are municipal codes regarding dedicated parkland. I don't have the exact code in front of me but the code does allow for other muniicapl use of dedicated parkland. If the Connors Bog is our prefered alternative, we will need to get Parks and Rec commission approval, Planning and Zoning commission approval and Assembly approval. We can follow up later with the exact code that allows for other municipal use of dedicated parkland. AMC 25.10.080.C is the code that lays out the steps for other municipal use of dedicated park land
6h					Either of the two sites identified include wetlands, hydrology impacts to adjacent remaining, undisturbed wetlands as well as surrounding upland areas would need to be looked at as well. Just reread Connor's Bog "Advantages" list; not sure additional access to that area is necessarily a good thing. Connors Lake supports nesting loons as well as other bird and wildlife habitat. Current access seems to be adequate for those who enjoy this area. Improvements to the parking area off Jewel Lake would be interesting to see if those amenities would be viewed by users of the area as an acceptable trade off for loss of some of the parkland. Many thanks to all of you for making the best of the situation we find our city in right now! I really appreciate your prompt responses and look forward to participating as the project moves forward. Signing off — it's dinner time!	3/24/2020	Josie Wilson and Bill Spencer	Josie Wilson: Hi Cathy, you have a very good point. Some of the +/- were from an operational point of view and not an impact point of view. You bring up a good point. I'll take that down as a note and look into it. Thank you for your suggestion. Bill Spencer: We will be looking closely at environmental impacts as we move forward. Many of the water quality parameters can be overcome with design of appropriate treatment. Hydrology impacts can be both negative and positive and we will look at those impacts as well.
7	3/24/2020	Virtual Meeting Online Chat	Chris Conlon	Public	How about a cement pad with waste heat from the power plant across the highway piped underground just melted as the mountain grows. Then put a greenhouse on it and grow food during the rest of the year. Would you return current site back to recreation space? Ball fields, dog agility park etc?	3/24/2020	Josie Wilson, Bill Spencer, and Julie Makela	Now that is a creative idea, not sure my scope includes looking at that option but now you have my imagination going. We would have to see how the the BTUs penciled out and of course the melt water would just run off the pad and freeze creating a massive glacier. The heated greenhouse also has promise, we had hot house tomatoes in Kenai from the old diesel plant in the 60s. The current snow disposal site is owned by the airport. We currently rent the property on a short term basis. We're unsure of the airport's long term use plans are. The airport and muni were unable to reach an agreement on the land swap. All of the land around the airport is valuable to all parties. We will be taking all of the public comments from the virtual meeting today and creating a follow up communication and including the comments as part of the public record.
8	3/24/2020	Virtual Meeting Online Chat	Al	Public	What site locations meet your stated needs? Are both sites on city property? Are you desiring an Pkwy access for the Strawberry site? How do you desire to access the Strawberry site? Your map is useless, because of the chat page overlap. Perhaps you will consider a actual meeting with readable maps.	3/24/2020	Josie Wilson, Melinda Tso	We have two potential sites identified at this stage.We call these two sites: Strawberry Bog and Connor's Bog. Hello Al,Size of 14 acres or more of vacant land Centrally located to the current West Anchorage snow removal operations area to minimize haul times Allowance for 24/7 operations Allowance for operational lighting and sounds Minimized impacts to residents Economically viable development and operations cost Access from a collector roadway or higher roadway classification Able to be permitted for intended use (zoned appropriately). Yes, both sites are owned by the Municipality. The Connor's Bog site is Parks use and the Strawberry Bog site does not have any departmental use currently defined. Based on our concept look at the Strawberry site, there are restrictions for making an access off of Raspberry. The access would come off of Northwood Street south of Raspberry
9	3/24/2020	Virtual Meeting Online Chat	Jacki Armstrong		In my opinion the proposed Connor's Bog site appears to have fewer, and lesser, downsides-in particular the traffic impact. I do not however I ride my bike by the current snow dump several times a week and the traffic issue is re. Connor's Bog vs. Strawberry is significant. Access from International is, in my opinion, safer and less disruptive than would be Raspberry.	3/24/2020	Melinda Tsu	This is Melinda Tsu, Project Manager. We will add your feedback to all of our collected comments. Do you use the Connor's Bog area recreationally? We've looked at a concept access route to the Connor's Bog site and it would be off of the current access from International and Northwood St. For the Strawberry Bog site access would come off of Northwood south of Raspberry Road. In fact, there are restrictions to allow access off of Raspberry so the access would come off of Northwood, which would be a new impact. Your comments are noted and we appreciate this type of feedback on potential impacts to the public.
10	3/24/2020	Virtual Meeting Online Chat	Joe Sanks	AWWU	Hello all, AWWU here. Simple question. Both proposed site locations are near AWWU sewers. Access to the sewer mains will not be compromised? No encroachment into the sewer easement?	3/24/2020	Julie Makela, Josie Wilson,	Hi Joe! It's Julie Makela. We haven't looked too in detail to site details for either of the potential sites. As always we will work with AWWU on protecting facilities.

West Anchorage Snow Disposal Project

Project Management and Engineering No. 19-01

Phase Two Public Outreach Summary

Municipality of Anchorage
Anchorage, Alaska
October 16, 2020 – November 20, 2020

Table of Contents

Attachments

Attachment A: Postcard
Attachment B: Advertisements in the *Anchorage Daily News*
Attachment C: E-Blast
Attachment D: Project Flyer
Attachment E: Comment Log

Introduction

This public outreach summary is used for tracking and documenting the public involvement activities conducted for Phase Two of the West Anchorage Snow Disposal Project (Snow Disposal Project). It outlines the Phase Two public involvement strategies for the period of September 1 through December 1, 2020, and the methods used to engage and inform the public on the Snow Disposal Project. The summary includes a description of the October 2020 online open house and virtual meeting live chat and the other public involvement conducted to inform the public about the availability of the Draft Site Selection Study Report and the public comment period for the report.

Overview of Phase Two Public Involvement Activities

The project team conducted a variety of public outreach tactics to engage and inform the public on the Snow Disposal Project and the availability of the Draft Site Selection Study Report. The tactics used in Phase Two are described below.

Online Open House and Virtual Meeting

On Tuesday, October 16, 2020, the Snow Disposal Project team kicked off an online, interactive, self-guided public open house on the project website that was available through Friday, November 20, 2020. The online open house consisted of a total of 10 sections that outlined project information and one section that included ways to comment on the project. The purpose of the online open house was to inform the public about the progress of the project and provide feedback on the site selection study results that identify the proposed new snow disposal site location: the Connor's Bog site.

In conjunction with the online open house, the project team hosted a virtual meeting on Thursday, October 29, 2020, from 4:00pm to 6:00pm at which members of the public could interact with the project team through the online open house site via a live chat feature.

Attendance

A total of 23 visitors attended the online open house on Thursday, October 29, 2020, from 4:00pm to 6:00pm, 11 of whom also participated in the virtual meeting live online chat. During the duration of the comment period (October 16–November 20), the site was viewed 137 times.

Advertising

The online open house was advertised in the following ways:

- Meeting information on the project website: www.westanchoragesnow.com
- Postcard mailer to residents near the project area (total of 4,139; Attachment A)
- Two advertisements in the *Anchorage Daily News* (Attachment B)
- Presentation at the Turnagain Community Council Meeting
- E-Blast sent to the Project's distribution list (total of 29; Attachment C)
- Flyers posted around the project area by the Turnagain, Spenard, and Sand Lake Community Councils (Attachment D)
- At the Anchorage Transportation Fair on November 18, 2020

- Social media posts of the online open house flyer to the Sand Lake Neighborhood Watch, Turnagain Neighbors, Spenard Complete Streets Coalition, and Girl Scouts of Alaska Facebook pages

Summary of Comments

The comments received during the online open house and the virtual public meeting (see Attachment E) focused primarily on the details of the site selection process and how other agencies are included, the proposed location's land designation classification and size requirements, submission of the public's preference for specific locations, requests to be added to the E-Blast distribution list, and environmental impacts and mitigation.

Other Public Involvement and Outreach Activities

Anchorage Transportation Fair

On Wednesday, November 18, 2020, the Snow Disposal Project team hosted an online and interactive booth at the Anchorage Transportation Fair. The booth consisted of three posters that outlined project information and the Draft Site Selection Study process and results. Three interactive questions were also available for booth visitors to answer and submit in real time. One section of the booth included an invitation to the Fall 2020 Online Open House, information on ways to comment on the project, and an opportunity to sign up for periodic project updates via email.

Community Council Engagement

The engagement and feedback from the Spenard, Sand Lake, and Turnagain Community Councils have been instrumental to this project's success. On Thursday, November 5, 2020, Bill Spencer, HDR Project Manager was able to attend the Turnagain Community Council Meeting to deliver a short project update and answer questions from Community Council Board members and the public. To help advertise for the public meeting, the Turnagain, Spenard, and Sand Lake Community Councils posted flyers around the project area.

Summary

The feedback received through the Phase One and Phase Two public involvement activities helped the project team make an informed decision on the preferred location for the snow disposal site. The project team will utilize the information received from the public in the next stages of the site selection process and final site selection

.

Attachment A

Postcard

West Anchorage Snow Disposal Project Virtual Public Meeting

Online Open House
October 16 – November 20, 2020

Virtual Public Meeting
Thursday, October 29 2020
4:00 pm – 6:00 pm

www.westanchoragesnow.com

West Anchorage
Snow Disposal Project
2525 C Street, Suite 500
Anchorage, Alaska 99503

West Anchorage Snow Disposal Project
Virtual Public Meeting

PROJECT MANAGEMENT & ENGINEERING

Online Open House
October 16 – November 20, 2020

Join Us!

Virtual Public Meeting
Thursday, October 29 2020
4:00 pm – 6:00 pm

The Municipality of Anchorage has collected information on potential locations for the placement of snow removed from West Anchorage streets. The Draft Site Selection Study is now available and a preferred location has been identified. Public feedback is important and will be considered during the final site selection process.

You are invited to attend a Public Open House to provide your feedback regarding the Site Selection Study results and the preferred site location for the West Anchorage Snow Disposal Project.

Visit **westanchoragesnow.com** for project information, to sign up for project updates, and to submit comments. You can also contact the project team at **info@westanchoragesnow.com**.

Online open house available from **October 16 to November 20, 2020**.

If you have any questions, please contact the project public involvement lead, Josie Wilson, at (907) 644-2030 or Josie.Wilson@hdrinc.com.

Project Management and Engineering No. 19-01

Attachment B

Advertisement in the Anchorage Daily news

CRIME AND COURTS

2 charged with evidence tampering in Anchorage hotel killing

Tess Williams
Anchorage Daily News

Two people were arrested Tuesday in relation to a fatal shooting at the Chelsea Inn Hotel in Spenard, although neither is suspected of being the shooter, charges say.

Soo Seo, the owner of the Chelsea Inn Hotel, described a fight that broke out in the lobby of the hotel late on Oct. 21. During the altercation, a semi-automatic pistol dropped to the floor and was picked up by Sean Smith, 48, who was staying at the hotel, according to an affidavit filed by Detective Jeffrey Elbie. Smith grabbed the weapon and placed it in a room adjoining his, the charges said.

Seo said the man who started the fight left and later returned with another person. Shots were fired through the hotel window and fatally struck 48-year-old hotel employee Duane Fields.

Shannelle MacPherson, 34, told detectives she heard screams and saw Fields dead in the lobby. According to the charges, she grabbed two knives, two guns and a cellphone from the scene and brought them to Smith's room, which adjoined her own.

MacPherson was charged Monday with five charges of tampering with physical evidence, police wrote in an alert. Smith is facing charges of misconduct involving a weapon and tampering with evidence.

Police had not identified any suspects in Fields' death as of Wednesday afternoon, but said the "investigation is ongoing and more arrests may be forthcoming."

ALASKA LEGISLATURE

Attendance becomes the top campaign issue in a key state House district

James Brooks
Anchorage Daily News

The state House race in Anchorage's Sand Lake neighborhood is one of a few that could decide who controls the Alaska House of Representatives for the next two years.

But if you look at campaign ads in the district, the biggest issue in the race isn't the Permanent Fund dividend, school funding or the state budget — it's about the attendance of Rep. Sara Rasmussen, the Republican incumbent.

Rasmussen missed 168 of 481 votes in the 31st Alaska Legislature, the second-highest total of any lawmaker. More than 100 of the missed votes, including passage of the state budget, took place in March this year.

Rasmussen's independent challenger, Stephen Trimble, has criticized Rasmussen for those missed votes. So have third-party groups supporting Trimble's campaign.

"This is the only issue. They're sending out mailers and pushing videos into my district right now," Rasmussen said.

Rasmussen calls their approach a smear campaign that misses important context: She was prevented from returning to the Capitol because of quarantine rules added after she left Juneau to attend her great-grandfather's 100th birthday.

Attendance as a campaign issue

"I decided to run for state House when I saw that my current representative wasn't showing up for Alaska," Trimble said in a Sept. 2 video that launched his campaign.

Rasmussen issued a response two weeks later.

"I was barred from the Capitol because of COVID restrictions," she said, explaining that the video would be "the only time I'm going to talk about my opponent's purposeful and dishonest smear campaign."

But Trimble has continued to campaign on the issue, and Rasmussen has had to address it as she goes door to door. A Democratic campaign group has spent heavily on ads that feature it. One online ad says, "This November, let's elect someone who will actually show up and take care of business."

Attendance has been a key issue in at least one other race. Rep. Mark Neuman, R-Big Lake, was defeated in the Republican primary after local party officials endorsed his challenger. They said Neuman's absences, caused by health problems, had become a liability.

'Not in a normal world'

It's common for legislators to leave the Capitol during the Legislative session to visit their districts, take care of family, or deal with medical issues. When Rasmussen left Juneau on March 11, she had already missed about 60 votes, more than three-quarters of the House's 40 members.

On the day she left for a six-day family trip, Gov. Mike Dunleavy declared a statewide public health disaster.

Two days later, members of the House and Senate agreed to limit access to the state Capitol as a public health precaution. Lawmakers who traveled Outside were asked to quarantine themselves away from the Capitol for one week after returning.

While some lawmakers had left Juneau for weekend trips to their home districts, Rasmussen was the only lawmaker outside of the state at that time. Rep. Sharon Jackson, R-Eagle River, had returned to the state before the quarantine rules became effective.

On the day that Rasmussen posted a picture of herself in St. George, Utah, the Legislature extended the quarantine to two weeks.

"We're not in a normal world. It's turned upside-down," Speaker of the House Bryce Edgmon, I-Dillingham, said at the time.

After the Legislature's action, Rasmussen asked for a legal opinion. Legislative attorney Marie Marx said it wasn't clear whether Rasmussen could be forced to stay away.

In the end, she decided to quarantine for two weeks at home after returning to Anchorage on March 17.

"I appreciate that she's going to observe that, and she's really torn up," House Minority Leader Lance Pruitt, R-Anchorage, said at the time.

Rasmussen didn't exit quarantine until April 1. By then, the Legislature had passed the state budget, authorized a statewide COVID-19 emergency, and quit Juneau until May, setting a speed record for budgetary work.

At the time Rasmussen left, did anyone know the quarantine rule was coming?

"The short answer on that is no," said House Rules Committee Chairman Chuck Kopp, R-Anchorage.

"I don't think anybody could have seen it coming that early on in March," said House Majority Leader Steve Thompson, R-Fairbanks.

Kopp said that while no one in the Capitol foresaw a quarantine, "It was understood by every legislator and every staff member was that the situation was evolving dramatically."

Rasmussen said on Friday that the problem she faced is one that other lawmakers will deal with in 2021.

"The pandemic isn't over. We need to find ways that we can use technology to still be able to conduct policy for our state," she said.

With the benefit of hindsight, would she have still gone on the trip?

"I think that everything is always different when we can see outcomes that weren't expected," she said. "I didn't expect a shutdown at the levels we saw. We learned a lot about the virus in a short period of time, and information was changing sometimes hourly. I would never want to miss the ability to vote for two weeks. It's a commitment I take very seriously."

CRIME AND COURTS

2 Alaskans charged in violent crimes connected to white supremacist prison gang

Tess Williams
Anchorage Daily News

Two people were charged in connection with violent crimes tied to a prison-based white supremacist gang, the U.S. Attorney's Office for the District of Alaska said Wednesday.

The gang is known as the 1488s and members have been indicted on kidnapping, murder and assault charges during the last few years.

Justin Eaton, 45, of Anchorage and Felicia King, 55, of Wasilla joined several others in an indictment for what prosecutors say was a wide-ranging racketeering enterprise born out of an allegiance to the 1488 gang.

King was charged with accessory after the fact in connection with the beating, kidnapping and killing of 32-year-old gang member Michael Staton in August 2017, according to federal prosecutors.

Eaton, also known as "Skulls," was charged with racketeer influenced and corrupt organizations, or RICO, conspiracy, kidnapping and assault for his alleged role in the April 2017 beating of a former member.

Several defendants in the original indictment — including Filthy Fuhrer, who legally changed his name from Timothy Lobdell; Roy Naughton, known as "Thumper," 40; Glen Baldwin, known as "Glen Dog," 37; Craig King, referred to as "Oakie," 53; Colter O'Dell, 26; and Beau Cook, 32 — faced multiple racketeering-related charges, including murder, kidnapping and assault, tied to the killing of Staton.

Of the original defendants, all but Cook were charged in a RICO conspiracy. Naughton and Fuhrer additionally were charged with kidnapping and assault in aid of racketeering, in connection with incidents that happened in April 2017 and July 2017.

A joint investigation began in late 2017 and has resulted in 14 additional federal indictments related to the gang, according to Wednesday's statement from Alaska U.S. Attorney Bryan Schroder.

Fuhrer was a founding member of the group, which operated mainly out of the maximum-security Spring Creek Correctional Center, according to the indictment. The gang now operates in and out of prisons elsewhere in the country, investigators said.

Potential members are recruited and then required to serve a prison sentence before they can join the gang, according to the indictment. Members gain rank by committing crimes, the indictment said.

The group operates according to a widely distributed set of written rules that outline the structural order and rank of members, prosecutors said. Members identify through Nazi symbols and must commit violence on behalf of the gang before they're able to get a tattoo, or "patch," indicating that they're a high-ranking member.

The most serious crimes — murder in aid of racketeering and kidnapping resulting in death, in aid of racketeering — are punishable by mandatory life sentences.

Around 2016, Fuhrer became concerned that other members would disobey the rules while he was incarcerated, the indictment said. In order to enforce discipline within the gang, he allowed members to impose violent punishment on those who had disobeyed, the indictment said.

In 2017, Naughton had become upset with Staton, who also went by the name "Steak Knife," and asked Fuhrer for permission to "violently discipline Staton, because he had stolen from the Hells Angels and Naughton himself," the indictment said. Fuhrer agreed and gang members took him to an abandoned Wasilla home, where he was beaten and later shoved into the trunk of a car and taken to Craig and Felicia King's home, the indictment said.

Gang members had prepared an empty room with painting plastic in anticipation of beating Staton, according to the indictment. He was later wrapped in plastic and carpet, thrown in the trunk of a vehicle and taken to the woods, where O'Dell and Baldwin fatally shot him and burned his body, the indictment said.

Two other 1488 members, Nicholas M. Kozorra, 29, known as "Beast," and Dustin J. Clowers, 34, previously pleaded guilty to murder in aid of racketeering. Cook also pleaded guilty to kidnapping for his role in Staton's death.

The most serious crimes — murder in aid of racketeering and kidnapping resulting in death, in aid of racketeering — are punishable by mandatory life sentences, prosecutors said.

"Violent, race-motivated gangs don't belong in Alaska's communities, and those who engage in such violence will be aggressively pursued and held accountable," said Robert Britt, Special Agent in Charge of the FBI Anchorage Field Office. "Today's additional charges exemplify the FBI's commitment in using a task force approach to disrupt and dismantle criminal organizations wherever they may surface."

INTERIOR

Collision near Fairbanks leaves truck driver dead

Anchorage Daily News

A collision early Tuesday involving a water tanker and a volunteer fire department pickup along the snowy Parks Highway near Fairbanks left one man dead, Alaska State Troopers said.

An Ester Volunteer Fire Department pickup driven by 22-year-old Emma Ison of Fairbanks was northbound on the highway near Mile 354 around 8:30 a.m. when she started to pass a slower-moving vehicle in the other northbound lane, troopers said in an online statement. The pickup went out of control and crossed into oncoming traffic lanes, where it struck a Pioneer Wells water-hauling tanker.

Troopers said Ison tried to help the other driver, 36-year-old Dewey Frost of North Pole, after the crash. Frost was trapped inside the truck and died of his injuries, troopers said.

The highway remained dangerous Wednesday morning, and the state Department of Transportation said travel would be difficult in the area because of ice, packed snow and fresh snow on the roadway.

Troopers said the crash is under investigation.

ANCHORAGE

Assembly to consider special election for mayor at Nov. 4 meeting

Aubrey Wieber
Anchorage Daily News

The Anchorage Assembly plans to vote Nov. 4 on whether to hold a special election for mayor this winter.

A resolution sponsored by Assembly members Crystal Kennedy, Jamie Allard and Kameron Perez-Verdia would create a special election on Jan. 26.

The resolution was originally on this week's agenda, but the meeting ended before the body took it up.

Also on the Wednesday agenda is a public hearing for an ordinance from Assemblyman John Weddleton, which would have the winner of the April mayoral election take office upon certification of the results, rather than wait until July.

Acting Mayor Austin Quinn-Davidson was sworn into office Friday evening, after former Mayor Ethan Berkowitz resigned after acknowledging an "inappropriate messaging relationship" with a reporter.

After Berkowitz announced his resignation, the Assembly voted to reorganize the body, as the chair becomes acting mayor until a new one is elected. Quinn-Davidson was selected.

The next regularly scheduled mayoral election is in April, and the winner would normally take office in July. However, some felt that's too long to have an unelected mayor leading the city.

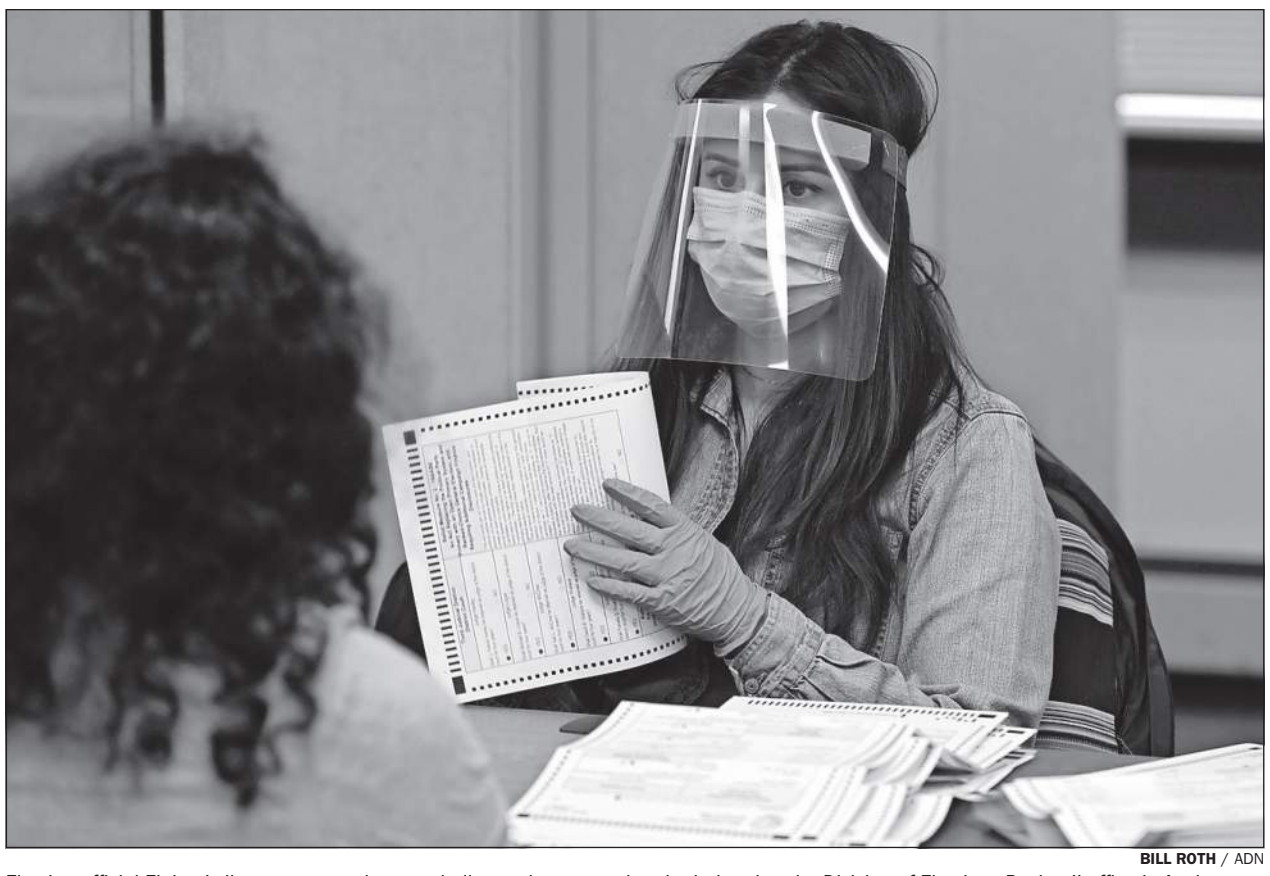
Any candidate eligible for the April election would be eligible for a special election, but like the regular election, the winner needs to get at least 45% of the vote.

More than 10 candidates have filed letters of intent with the state for that position, making a runoff for a special and general election likely.

City clerk Barbara Jones said the city estimated a special election to cost about $350,000 and a runoff could cost around another $323,000.

That candidate would have to win again in the April election to remain mayor.

The resolution to hold a special election needs six votes to pass, which is more difficult than usual since Quinn-Davidson, as acting mayor, will not vote. Neither will Forrest Dunbar, who is running for mayor. That would mean two-thirds of the voting members would need to support the resolution.



BILL ROTH / ADN

Election official Elaine Leibert prepares absentee ballots to be scanned and tabulated at the Division of Elections Region II office in Anchorage on Tuesday.

FROM PAGE A1

COUNT

independent challenger Alyse Galvin by 18 points, down from 26 on Election Day. U.S. Sen. Dan Sullivan led Democratic-endorsed independent Al Gross by 30 points on Election Day and now leads by 22 — 58% to 36%.

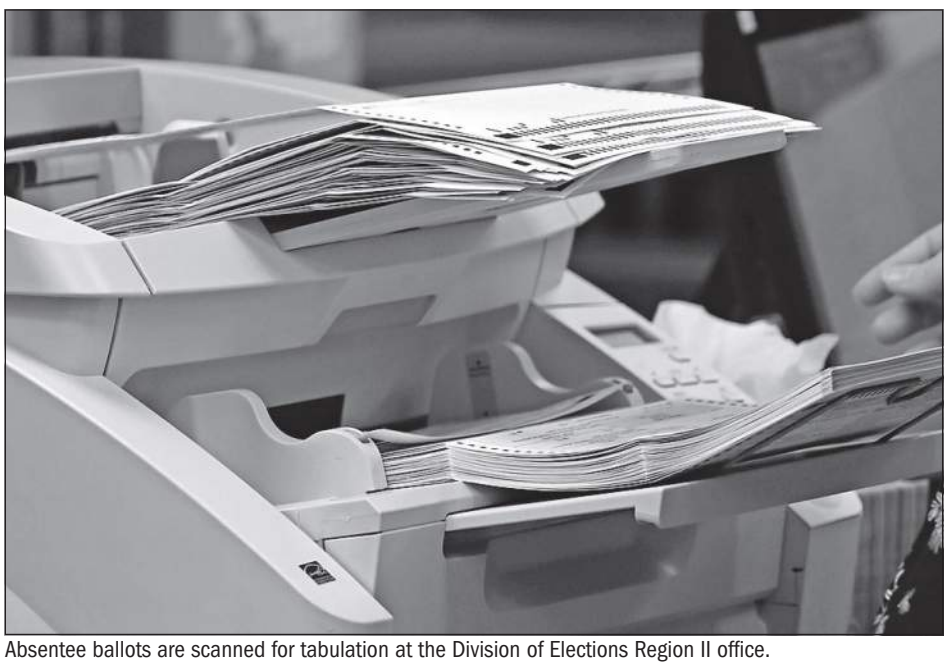
At the top of the ticket, President Donald Trump leads Democratic candidate Joe Biden by almost 20 points, or 58% to 38%, down from 29 points on Election Day.

Entering Tuesday, Gross, Galvin and Biden needed to win about 70% of all remaining votes in order to overcome Republican leads on Election Day. Instead, they won between 53% and 57%. That means they must win a much greater percentage of the remaining 100,000 or so uncounted ballots to win.

Following Tuesday's batch of results, the Gross campaign sent out a statement saying the race remains too close to call. When asked if he is confident that future batches will more heavily favor Democrats, Gross campaign manager David Keith said "absolutely."

Gross would have to win more than three-fourths of the remaining ballots to win the election.

Matt Shuckerow, Sullivan's campaign manager, said the numbers reflect what the campaign anticipated, and Sullivan continues to hold a strong lead. He said he doesn't want to be critical of the Gross campaign's optimism, but eventually the numbers are undeniable. "I think ultimately our opponent is going to begin being far more realistic at what is happening," Shuckerow said.



Absentee ballots are scanned for tabulation at the Division of Elections Region II office.

The Galvin campaign declined to immediately comment on the new batch of results.

All judges on the ballot are leading and on pace to be retained by voters.

Ballot Measure 1, the proposed oil tax increase, continues to trail by a wide margin. Down by over 29 percentage points on Election Day, it still trails by a 23-point margin.

The story is different for Ballot Measure 2, the three-part election-reform measure. Behind by 13 percentage points on Election Day, it now trails by fewer than 7 points. If the state's remaining uncounted ballots follow the same pattern as Tuesday's result, the measure would win by about 4,000 votes.

Few state legislative races received definitive results. In Fairbanks, House District 1 was a notable exception. Two years after winning by a single vote, Republican Rep. Bart LeBon has a 733-vote lead over Democratic challenger Christopher Quist. Estimates indicate about 500 votes remain to be counted there.

In Anchorage, several Democratic incumbents who trailed on Election Day now lead by significant margins. Rep. Ivy Spohnholz trailed Republican Paul Bauer on Election Day, but she now leads by 13 percentage points. About 1,100 votes are uncounted in that race, but the remaining votes are expected to lean Democratic.

Democratic Sen. Bill Wielechowski, whose Anchorage district covers Spohnholz's House district, trailed on Election Day but now leads Republican opponent Madeline Gaiser by 16 percentage points and appears on track for the largest victory in his political career. About 11,000 votes have been tallied, and about 2,100 remain.

Rep. Chris Tuck leads Republican Kathy Henslee by about 5 percentage points with 6,401 votes tallied. About 1,000 votes remain to be counted. Tuck trailed Henslee by 13 percentage points on Election Day.

Two Democratic incumbents in Fairbanks — Rep. Adam Wool and Rep. Grier Hopkins — also lead after trailing on Election Day.

Few votes were counted in the Anchorage House race between Republican incumbent Rep. Lance Pruitt and Democratic challenger Liz Snyder, or in the race between Anchorage Assemblywoman Suzanne LaFrance and Republican James Kaufman. The winner of the latter election will decide who replaces Rep. Jennifer Johnston.

Anchorage Republicans Mel Gillis and David Nelson saw their Election Day leads dwindle significantly. Nelson leads Democratic candidate Lyn Franks by only 126 votes with more than 1,000 to be counted. Both are seeking to replace Rep. Gabrielle LeDoux.

Gillis, an incumbent appointed by Gov. Mike Dunleavy, leads Democratic-endorsed independent Calvin Schrage by 166 votes with almost 1,900 still to be counted.

Statewide turnout is on pace to break the all-time record, with about 350,000 votes expected. The old record, set in 2008, saw 327,341 votes cast.

FROM PAGE A1

SLOW PACE

Alaska is the only state in the nation that delays the counting of absentee ballots until at least after Election Day.

the part of election workers. Alaska waits a week after Election Day to start counting absentee and some early voting ballots. With high absentee voting due to the COVID-19 pandemic, the number of unprocessed ballots has been placed under a microscope.

On Tuesday, several people questioned the Division of Elections on social media, asking officials to explain how the unique weeklong delay improves integrity.

"We can ask the appropriate people for that information and try to give you an explanation," the elections division responded on Twitter.

"More than anything, it's an inconvenience for folks who are trying to figure out if they're elected or not elected. But the real danger with a slow count is if the public feels there's something wrong with the process. And in my view, they're right. We do need to clarify this in the upcoming Legislature," Kawasaki said.

Alaska is the only state in the nation that delays the counting of absentee ballots until at least after Election Day. Gail Fenumiai, director of the Alaska Division of Elections, has previously said that delay is needed because the state compares signature books at Election Day polling stations with absentee ballots submitted by voters.

Until the books return from the state's 400-plus polling stations to regional counting facilities, absentee ballots can't be fully processed.

But in 2016 and 2018, Alaska used a different procedure common in other states. If someone requested an absentee ballot, their local poll book contained a warning label indicating that they had done so.

If they wanted to vote in person instead of through the mail, they either had to vote a questioned ballot — which would be subject to additional post-election review — or bring their blank absentee ballot to the polls as proof that they hadn't voted twice. Poll workers were instructed to tear up the absentee ballot in front of the voter to make sure.

That procedure allowed some absentee ballots to be counted on Election Day because officials could guarantee their validity ahead of time.

Alaska law also restricts the amount of pre-processing that can be done before Election Day. Some states allow election workers to examine absentee ballots three weeks before Election Day, according to analysis by the National Conference of State Legislatures. Alaska's absentee ballot review board isn't convened until a week before Election Day.

Pennsylvania, which similarly restricts absentee ballot review, hired multiple shifts of election workers to process ballots faster. Alaska did hire additional workers this year to deal with a record absentee turnout, but it does not appear to have done so to the extent that Pennsylvania did.

Lt. Gov. Kevin Meyer, the elected official in charge of the state's elections, has declined multiple interview requests from the Daily News, including one on Tuesday afternoon when his spokesperson said he was unavailable.

Meyer did give an interview on the election process on a conservative talk radio show Tuesday morning, saying his goal is to keep elections normal despite an abnormal year.

The Daily News sent a list of questions to Meyer and his staff, including whether Alaska's system provides more security than other states and whether Meyer is happy with how the election has been run. He did not respond.

While some have been quick to publicly voice frustration, Alaska's congressional campaigns have shown patience. Challengers Al Gross and Alyse Galvin are fighting the large leads that U.S. Sen. Dan Sullivan and U.S. Rep. Don Young secured on election night and the following day. Both the Gross and Galvin campaigns have said they believe early and absentee voting could favor them enough to come back and win.

Matt Shuckerow, Sullivan's campaign manger, said the campaign will look back at the process after the election, and said he expects the state and Legislature will do the same. But he has confidence in the integrity of the system.

"In a perfect world, we would have loved to have our results sooner, to have more clarity in this election, but we're patient," Shuckerow said.

David Keith, campaign manager for Al Gross, also said he is not frustrated with the delayed results. He characterized it as "enhanced anticipation."

Despite the state's slow start, Alaska law demands that the state finish counting no more than 15 days after Election Day, and the election is scheduled to be certified by Nov. 25. If it does so, the state will finish ahead of at least 19 others, which have later deadlines or none at all.

Cottage deep clean uncovers a relationship mess

AMY DICKINSON

ASK AMY

Q. Dear Amy: I have been with my partner for six years. We are both 30. We live together and own a small cottage together outside of the city.

His parents are very kind people, but they don't seem to want to allow my partner to grow up and be independent.

The most recent, and so far most aggravating aspect of this is that his parents were supposed to stay at our cottage over a long weekend. Instead of relaxing and enjoying themselves as they promised, they secretly went just to do a deep clean, started little projects around the house, and fixed up minor things, which we were preparing to do ourselves.

I felt guilty for the work they did, in addition to feeling like our place wasn't sufficiently clean for them.

This may seem like a dream to others, but to me, it is just another way which I feel my partner (who is the youngest of three), has shirked his responsibilities and failed to grow up!

I am the oldest of three, and I've always fixed things on my own.

Currently, we have a leaking faucet. Our own plumber said that we could do this on our own pretty easily.

I would like us to work together to fix it, but he just wants to call up his parents to have them come and take care of it.

How can I approach this situation (and future projects), without sounding selfish and ungrateful for their kind efforts to help? I've grown up faster than my partner has.

— Independent

A. Dear Independent: For many people, doing little jobs around a cottage is as restful and relaxed as they can handle.

However, while some people might interpret family members "deep cleaning" their home as a welcome gift, you don't like it (I wouldn't, either).

You seem to see this as an indictment of your partner and his parents; I see this as a boundary issue which you, as an independent person and homeowner, can address.

You could say to them, "Wow, you really did a deep clean when you stayed at the house. I honestly wish you hadn't. Also, I know it might be frustrating for you to see these little things around the house that need to be fixed, but we want to fix them on our own."

If you believe that fixing a leaky faucet on your own is a sign of adulthood, then fix it. There are plenty of YouTube videos available to demonstrate basic home repair (or you could ask your guy's mom to show you). It is a one-person job, so get started.

In many families, "acts of service" are how family members express their love. Letting these people be useful at things they are obviously good at might be a kindness to them. But you get to set the boundaries.

Q. Dear Amy: I'm sure you are getting a lot of mail about attending weddings in the time of COVID.

Here's my dilemma: My niece is getting married in May 2021 in another state. My husband and I are not sure that it will be safe for us to travel across the country to attend her wedding. My sister-in-law keeps talking about it as if it is a given that we'll be there. What should we tell her?

— Worried About Wedding

A. Dear Worried: You should tell your sister-in-law that you are crossing your fingers that you will be able to travel safely to this wedding, but that so far, you just don't know.

Ask her to be frank with you about the deadline for making your decision, and promise to let her know that until later.

— Supportive

A. Dear Supportive: True understanding most often appears in the rearview mirror.

Contact Amy Dickinson at askamy@amydickinson.com or Ask Amy, P.O. Box 194, Freeville, NY 13068. You can also follow her on Twitter @askingamy or "like" her on Facebook.

Attachment C

E-Blast

West Anchorage Snow Disposal Project

Please Join Us!
West Anchorage Snow Disposal Project

Virtual Public Meeting
Thursday, October 29, 2020
4:00 pm – 6:00 pm
www.westanchoragesnow.com

The Municipality of Anchorage has collected information on potential locations for the placement of snow removed from West Anchorage streets. The Draft Site Selection Study is now available and a preferred location has been identified. Public feedback is important and will be considered during the final site selection process.

You are invited to attend an Online Open House to provide your feedback regarding the Site Selection Study results and the preferred site location for the West Anchorage Snow Disposal Project.

Visit www.westanchoragesnow.com for project information or to submit comments. You can also contact the project team at info@westanchoragesnow.com

Project Management and Engineering No. 19-01

Attachment D

Project Flyer

West Anchorage Snow Disposal Project

Project Management and Engineering No. 19-01

Please Join Us!

Virtual Public Meeting

Thursday, October 29, 2020

4:00 pm – 6:00 pm

westanchoragesnow.com

Online open house will be available **October 16, 2020 to November 20, 2020.**

The Municipality of Anchorage has collected information on potential locations for the placement of snow removed from West Anchorage streets. The Draft Site Selection Study is now available and a preferred location has been identified. Public feedback is important and will be considered during the final site selection process.

You are invited to attend an Online Open House and Virtual Public Meeting to provide your feedback regarding the Site Selection Study results and the preferred site location for the West Anchorage Snow Disposal Project.

Visit www.westanchoragesnow.com for project information or to submit comments. You can also contact the project team at info@westanchoragesnow.com.

PROJECT MANAGEMENT & ENGINEERING

Attachment E

Comment Log

West Anchorage Snow Disposal Project Phase Two Comment Log									
Comment Number	Date	Comment Type	Commenter	Contact Information	Orgnaization	Comment	Respone Date	Responded By	Response
1	10/28/2020	Email to Melinda Tsu	Cathy Gelason	cathy.gleasontcc@yahoo.com	Public	Voicemail left for Melinda Tsu requesting a copy of the draft site selection study	10/28/2020	Melinda Tsu	Hello Cathy, I received your voice mail requesting a copy of the draft site selection study. If you can join our meeting tomorrow evening, that would be great. And if you are not able to join the meeting, please feel free to provide comments either through the project website comment or to PM&E by November 20th. Best Regards,
								Josie Wilson	Cathy – hope you can join us! All – the Site Selection Study is also available online at: https://www.westanchoragesnow.com/ Looking forward, ~Josie
2a	10/29/2020	Virtual Meeting	Chad Wilson	chadwilsoncar@aol.com	Public	How was the site decided?	10/29/2020	Bill Spencer	Chad, greeting this is Bill Spencer, Project lead at HDR, We went through a study and site selection process that produced Connor's as the preferred alternative. We are of course still collecting information and this meeting is part of that process. I could walk you through the reasoning, do you have any particular area of interest.
2b						Thanks. Cool. Yes, what goes into the process? I'm supportive, just curious.		Bill Spencer	If you have the time you can go to the site and have a look at the site selection study, it lists all the parameters we looked at and the winnowing down of possible sites to the preferred alternative. It is a gripping read, bring a cup of strong coffee.
2c						Haha!! I will. I was hoping to not have to read it and just ask . My wife, Josie, is on the project and I like to ask her questions. 😉		Bill Spencer	That would explain why she suggested that I answer you inquiry :), my wife would have probably done the same. The crux of it comes down to finding a site in the snow removal area to be serviced, that the city owned (low cost), with relatively low impacts to neighbors and agility to be operated at night when most of the snow removal operation take place.
2d						That's funny. :) thanks. That's all I really wanted to know. Have a good night. Tell Josie not to work too hard.		Bill Spencer	We'll try to get her freed up in time for dinner
3a						Will there be any kind of presentation or just Q&A chatting?		Josie Wilson	Hi Cathy! Thanks for joining us. This is Josie. We have the entire project team on this virtual chat available. No formal presentation. :)
3b						I haven't had a chance to read the site selection study, but looks like the recommended site is in Connors Bog just south of the ballfield area along Minnesota — correct?		Melinda Tsu	Hello Cathy! This is Melinda Tsu. Thanks for joining us tonight! To answer your question, yes the preferred site is the Connor's Bog site south of Dela Vega field. -- Melinda
3c						Even though this parcel is not technically dedicated parkland (and thus reduces Parks and Recreation Department approval, has the Parks Dept. been included in the site selection process to-date and aware of the recommended site?		Melinda Tsu	True that the site is not dedicated parkland as you noted. PM&E and the project team has involved Parks and Rec in the site selection process. We also provided an information item about the preferred site, Connor's Bog, to the Parks Commission and the Parks provided a staff report confirming their support of the identified site.
3d						When did this go before the Parks Commission? Did the Commission (or just staff) provide support of the site for snow disposal use?		Melinda Tsu	It was on the September 10, 2020 Parks Commission meeting. There was no formal action item, but the Commission did not express any objection and just asked to be kept informed.
3e						Wish public had been notified about that meeting to provide input to the Commission. The West Anchorage District Plan does designate this area as "Parks and Natural Resource," so surprised the Park Dept. supports this Class A Wetland being used for the snow dump.		Melinda Tsu	The Parks Commission does not have a formal role in this project and therefore this item was not advertised to the public. However, when PM&E attended the meeting, we did specify that PM&E has a public involvement process and we will be collecting input and feedback that we receive about the site selection process and the preferred site identified.
3f						That's unfortunate. Does the Site Selection Study make reference to the WADP and its land use designation? (Sorry, again, that I have not looked through it, yet). If not, that's a big omission in the study; if so, how does it justify an incompatible use, i.e., the snow disposal site, based on the "Parks and Natural Areas" land use desigation?		Josie Wilson	Hi Cathy! This is Josie. I wanted to also let you know that the meeting today is being recorded as part of the public record. We will make sure your comments and questions are represented as the project goes through the process. :) So, thank you! We appreciate you participating.
3g								Julie Makela	Hello! This is Julie Makela. I'm the project administrator. We recognize this is a valuable park and natural area. We explored to the maximum extent possible site location that meet Street Maintenance's criteria for a cost effective operation. We know there are pros and cons to the preferred site.
3h						Is the WADP land use designation of this parcel addressed in the study?		Julie Makela	I don't believe we mentioned it in the draft but this is a great point. We will include this in our analysis and final version.
3i						Thank you — I was heavily involved as one of two Turnagain Community Councils representatives in the development of the WADP, so when something is proposed to counter this Plan (which took 2-3 years for completion!), it definitely gets my attention. Is mitigation for filled 32 acres of Class A wetlands been addressed, yet? I would think the most appropriate path to for the Corps fill permit would be to create permanent protection for the remaining MOA-owned wetlands contiguous to this parcel.		Julie Makela	After finalizing the Site Selection Study, our next step is to go to the USACE to get a jurisdictional determination and lay out a path for permitting (if required).
3j						Definitely would like to see the public involved in that discussion, to ensure the remaining wetlands in this are will not be subject to future 'industrial' type of uses.			

3k	10/29/2020	Virtual Meeting	Cathy Gleason	cathy.gleasontcc@yahoo.com	Turnagain Community Council	Would any 'treatment' of snow melt runoff be required before it is discharged into remaining Connor's Bog/Lake?	10/29/2020	Bill Spencer	Cathy, this is Bill Spencer water resource engineering lead for HDR. Unlike the current site this new site will be designed with treatment structures. The primary pollutants that come out of meltwater are chloride and sediment (turbidity). We have Scott Wheaton (MOA's retired watershed scientist) on our team and will take a close look at the ADEC requirements for discharge and how to meet them. Settlement and detention ponds will be part of the mix as will structures to disperse the meltwater into the wetlands to help with continued hydration or the remaining wetlands. The current site also discharges into these wetlands but without extensive treatment. Most of that water flows directly downslope to the lake and has limited positive impact on the wetlands. While we definitely will have a negatively impact on the wetlands where the snow is deposited we are hoping to have a positive affect on the remaining wetlands.
3l						Thank you — lack of appropriate treatment and cost of installation at the Airport snow disposal site (as well as no long-term lease) seemed to be the tipping point for the Muni to find a new disposal site. Having said that, though, TCC has received an Airport lease application notice from the Muni to use the Airport snow disposal site for this winter season (Nov. 1, 2020 through June 30, 2021). Are you aware of this lease proposal? I'm assuming the Muni is not planning to spend capital for any treatment operations that supposedly was being required for this site, since it is seems to be a short-term lease. Do you have info. on this? It's a little confusing from a public perspective that public comment is occurring for two different Muni snow disposal projects at the same time.		Melinda Tsu	This is Melinda Tsu again. Very relevant question Cathy. PM&E is aware that the Real Estate Department is pursuing a short term lease for use of the Airport property for the municipality to continue to use that site for snow disposal use. This is necessary for the interim until a permanent site that is owned by the MOA. This project still has many steps to work through beyond confirming the final site selection, including agency permitting and design. Therefore this short term lease is needed until the permanent site is constructed and ready for operation, which is not anticipated until 2021 or 2022 depending on the development process and method of construction.
3m								Josie Wilson	Hi Cathy, this is Josie again. I was honestly unaware about the other public comment period on the other snow project. Thanks for letting me know. I really appreciate it. I think it could be confusing so any advice is appreciated on how to make it more clear. I know the team wanted to release the draft site selection study as soon as possible. Hopefully, with the Online Open House being available for a while, that will help. If you have any thoughts to clarify or help communication for this project, I welcome your advice. :)
3n						Back to the Connor's Bog recommended snow disposal site: The criteria for a new site includes "a minimum of 10 acres of unused land, ideally at least 15 acres." The recommended Connor's Bog site is 32 acres, which is way over this criteria acreage footprint. What is the justification for this large of a disposal site, when recommended site size in the study is far smaller. Reducing the site footprint to, say 20 acres, would still be much larger that the size criteria identified in the site study. This would result in a lower project cost and reduced the environmental impact on on high-value Class A wetlands.Unless the public is provided reasonable justification to increase the site acreage criteria, I see no reason for filling/developing 32 acres for this project — just because the land mass exists..		Bill Spencer	Cathy, Bill again, the actual depositional area is proposed to be 10-15 acres, there will be a small additional footprint for access roads, berms and water quality structures. The site selection study chose the 32 acre parcel as the recommended site but the actual snow disposal infrastructure will only utilize about half of the parcel as shown on the site selection graphic. Creating the fill pad for the snow deposition area will be the major cost of creating the site and will be kept to the minimum needed by street maintenance. We will need to clarify that point in the document. Thanks for pointing out that inconsistency.
3o						Thanks, Bill. A more detailed breakdown and site development graphic would be beneficial to understand the acreage usage for the project. Since we're at the 30,000-foot level of the design in what's provided in this site study, it will be important to see more detail ASAP, so that public comment can address specifics. One thing I think will be important from a purely aesthetic perspective is preserving a large area of wetlands/upland vegetation between the disposal development and Minnesota Dr. — essentially making it 'invisible' from this main thoroughfare. Preserving a natural buffer would definitely be preferable to more wetland filling and building a large, artificially-looking landscaped berm along Minnesota.		Julie Makela	Hi this is Julie again. Great point! We can clarify in the final site selection study the impact won't be to the entire 32 acre parcel. These are great points for the design consideration. We will be starting the design after USACE permitting.
3p						I see it's 6:00 p.m. — time to figure out what we're having for dinner! Thank you, very much, for your time and providing important feedback to my questions and comments. Will both Qs and As of this chat be available on the project website soon (i.e., before the comment deadline)? Again, many thanks!		Josie Wilson	Hi Cathy, this is Josie. From the project team, we all want to thank you. Your questions and comments have been helpful and insightful. We do intend to post the comment spreadsheet. And based on your suggestion, the team is going to post something online. So, thank you! :) Take care. :)
4a	11/2/2020	Email	Shaun Debenham	2960 C Street, Suite 202 Anchorage, AK 99503 P: (907) 562-9330 E: shaun@debenhamproperties.com	Debenham Properties	Josie, I just got a postcard in the mail looking for feedback on a site selection for the new snow disposal site. I do not support the Strawberry Bog site. We own the multi-family complex directly west of this site (The Residences at Northwood) and having a 24/7 snow disposal site adjacent to our apartments would adversely affect our tenants. Many of our tenants select our apartments due to the quiet area that they are in. In addition to this, we are in the process of developing another 150+ units of housing in this area which would also be adversely affected by a loud, ugly 24/7 snow dump. Please do not select the Strawberry Bog site. I do favor the Connon's Bog site. This is better because it is not near developed areas. Thank you, Shaun Debenham Shaun T. Debenham Debenham Properties President 2960 C Street, Suite 202 Anchorage, AK 99503 P: (907) 562-9330 E: shaun@debenhamproperties.com	11/5/2020	Josie Wilson	Greetings Mr. Debenham, Thank you for taking the time to provide comments. The Draft Site Selection Study does identify Connor's Bog as the preferred site. Public comment is an important part of the selection process and your preference has been documented. If you are interested in being added to the project list and receive email updates, please let us know. Updates will also be posted to the project website at www.westanchoragesnow.com. Again, thank you for your involvement and input. We appreciate it. Thank you, Josie Wilson

4b	11/5/2020					Thank you Josie. Yes, if you could add me to the email updates, that would be awesome. Thanks. Shaun T. Debenham Debenham Properties President 2960 C Street, Suite 202 Anchorage, AK 99503 P: (907) 562-9330 E: shaun@debenhamproperties.com			No response required
5	11/2/2020	Email	Jana Barlow			Hi. I would just like to comment on the snow "removal". I live in a cul de sac on Borland Circle in West Anchorage. The snow is rarely, if ever removed from the cul de sacs. We are treated as second class citizens. The snow mountains in the middle of our cul de sacs makes it difficult to back out of our driveways and can possibly impede any fire trucks or ambulances that might have to come through especially if someone is parked outside of their driveways. There are five homes with elderly people here. Neighbors add to the giant mountain of snow when shoveling and one set of kids drive their four wheelers over it and play on it. It is maddening to have these giant mountains of snow and one of the reasons that I would love to leave here. Can you please consider adding the cul de sacs to the list of removal to the snow dumps? Very few people will see the ad for this project in the newspaper as it is small and people don't pay attention. Thank you, Jana Barlow	11/6/2020	Josie Wilson	Greetings Jana, Thank you for taking the time to notify the Project Management and Engineering Department (PM&E) about your concerns. We are so sorry to hear about the snow plowing issues. At PM&E, we take every public comment and feedback as valuable. We will share your concerns and frustrations with the Operations and Maintenance team to see if there is anything that can be done. We also wanted you to be aware of the Municipality of Anchorage's Street Maintenance Dispatch Center at 343-8277. We encourage you to call them when snow plowing is needed on your street during winter. If you have any questions on the West Anchorage Snow Disposal Site Selection Project, please let us know. We would be happy to add your email to the project list for receiving email updates on this project if you desire to be kept informed. All emails are kept confidential and used for this project only. Updates will also be posted to the project website at www.westanchoragesnow.com. Again, thank you for your involvement and input. We appreciate it. Thank you, Josie Wilson
6	11/11/2020	Email	Karen Cody	theavery12@gmail.com	Public	I am completely supportive of snow removal placement at Connors bog. For 5+ years I have been part of a nationwide project to track existence and numbers of vulnerable bird species in wetlands. This past year I was shocked at the low low level of the water and talked with a knowledgeable person in the muni about it. The bog apparently is not stream fed but derives it's water from rainfall and snow removal piles. Two years of low rainfall and snow took a toll on a very special much loved lake that supports an amazing variety of wildlife including vulnerable bird species. The snow removal piles may very well make a huge difference in the survival of Connors bog. I so thank you for selecting it. Not to dramatize but this is an answer to one of my prayers. My gratitude to you Karen Coady 602-3111 6521 Bridget circle 99502	11/17/2020	Josie Wilson	Greetings Karen, Thank you for taking the time to provide a comment on the Draft Site Selection Study. Your comment really means a lot to us and we are glad that the preferred site location identified could be a potential blessing for vulnerable bird species. We certainly hope this to be the case! Public comment is an important part of the process and your comment will be included in our documentation. If you are interested in being added to the project list and receive email updates, please let us know. Updates will also be posted to the project website at https://www.westanchoragesnow.com/. We also welcome any information you can share on how this project could benefit sensitive bird populations. Again, thank you for your involvement and input. We appreciate it. Thank you, Josie Wilson
7	11/17/2020	Email	Karen Cody	theavery12@gmail.com	Public	Yes I would be so grateful to be added to your update list and I thank you for your considerate and sensitive response to my email Karen Coady		Josie Wilson	Hi Karen, We added you to the project email list. Again, please do not hesitate to reach out with any future comments or questions. We appreciate you. Thank you for your kind words. All the best, Project Team
8	11/20/2020	Email	Karen Cody	theavery12@gmail.com	Public	And I am so grateful to you for using Connor bog. Now the special and vulnerable birds who have thrived there including red necked grebe couples will have a chance. In a bleak year you have been a huge beam of sunlight			No response required
9	11/20/2020	Email	Cherie Northon	cherie@anchoragecreeks.org	Anchorage Waterways Council	Hello, Attached is a copy of our comment letter for this proposed project. Thank you, Cherie Letter: To whom it may concern, AWC is committed to the protection of the waterways and wetlands within the MOA, and therefore has some strong concerns about the proposed "preferred alternative" known as Site 5 in the West Anchorage Snow Disposal - Draft Site Selection Study. It is agreed by AWC and the West Anchorage Snow Disposal Site team that this site, specifically, and Connors Bog, in general, are the highest value Class A wetlands. Accordingly, there is the utmost need for them to be protected and carefully considered for impacts. 1. AWC believes that it would first be prudent to continue negotiations with the Ted Stevens International Airport in regard to a longer-term lease with the MOA for the existing "Northwood Site". 2. Although we disagree with the path forward, if the preferred site were to be developed, we would like to ensure that proper permitting and mitigation are completed pursuant to Section 404 of the Clean Water Act through the U.S. Army Corps of Engineers. Most sincerely, Isaac Watkins AWC Board President			Greetings Cherie, Thank you for sending us the letter from Isaac Watkins and the Anchorage Waterways Council. We appreciate the Anchorage Waterways Council's feedback concerning the preferred alternative site location of Connor's Bog. The Municipality of Anchorage's goal is to have the ability to own the land that the new site will be located on. This will increase the site's longevity and best serve the West Anchorage Communities during the winter months. As you mentioned, the existing site is located on land owned by Ted Stevens International Airport. Due to future plans for the site, however, a long-term lease or purchase option is not available. If the Connor's Bog site it chosen in the final Site Selection Study the needed and required permitting and mitigation will take place. Again, thank you for your involvement and input. All the best, West Anchorage Snow Disposal Project Team

10a						West Anchorage Snow Disposal Site Project Team, Please accept the attached comments from Turnagain Community Council. Thank you, Josie, for allowing me to submit them beyond the stated deadline of last Friday. We hope to receive serious consideration of our letter, as the importance of Connor's Bog Class A wetlands to the West Anchorage community is significant. Don't hesitate to contact me, if you have any questions or need clarification on our input. Thank you, Cathy L. Gleason Turnagain Community Council President 248-0442			
10b						RE: West Anchorage Snow Disposal DRAFT Site Selection Study Dear West Anchorage Snow Disposal Site Project Team: Thank you for the opportunity to provide input on the West Anchorage Snow Disposal Draft Site Selection Study (Draft Study) prepared for the Municipality of Anchorage (MOA) Project Management and Engineering Department (PM& E). Turnagain Community Council (TCC) has reviewed this document and is respectfully requesting consideration of the following comments.			
10c						Review/Compliance of Municipal Planning Documents Lacking in Draft Study After initially considering 19 potential sites for a MOA snow disposal site in West Anchorage, the Site Selection Process outlined on page 7 of the Draft Study states, "Once an inventory was developed for initial site identification, each site was evaluated based on desired site characteristics to define the most suitable for further analysis." The Draft Study ultimately recommends Site #5: Connor's Bog for a West Anchorage snow disposal facility (pages ii & 22). However, this process did not include a very important step: with the exception of selective reference to the Anchorage Wetlands Management Plan, the process did not include assessment of the sites for compliance/conflicts with adopted Municipal land use/planning documents. Specifically, when evaluating Site #5: Connor's Bog for a West Anchorage snow disposal facility, the Draft Study did not determine whether this site is compatible with multiple adopted Municipal land use planning and policy documents that generally fall under the umbrella of the 2020 Anchorage Bowl Comprehensive Plan. While acknowledging that this site is located in Class A wetlands, the Draft Study comes to the conclusion that "#5: Connor's Bog Site is a very desirable snow disposal site… and has few drawbacks." (page 15). TCC strongly disagrees with this conclusion, based on important Municipal plans that clearly identify Connor's Bog as a high value natural open space that provides important values and functions for the west area of our community — and that these Class A wetlands should be preserved in their current, undeveloped state. These documents include:			
10d						2020 Anchorage Bowl Comprehensive Plan (adopted 2001) o Conceptual Natural Open Space Map identifies area of Site #5: Connor's Bog as "Community Preference for Natural Open Space," (identified by the public) and "Important Wildlife Habitat" (identified by local wildlife experts and scientific reports) (page 63)			
10e						Anchorage Park, Natural Resource & Recreation Facility Plan (adopted 2006) o Map 6: Natural Resource Use Areas designates area of Site #5: Connor's Bog area as "Municipal Park Lands" o Appendix B (pages 10-11): Class A wetlands are included in the category of "Natural Resource Preservation Land," and are defined as "Those areas that perform important environmental functions and have high ecological values" and "…should be permanently dedicated as NR Preservation Lands that can only be altered by a 60 percent vote of the community."			
10f						West Anchorage District Plan (WADP) (adopted 2012) o Exhibit 2-13: Parks and Open Space map designates Site #5: Connor's Bog area as "Parks" o Exhibit 2-14: Wetlands Classifications and Coastal Zone Boundary map designates Site #5: Connor's Bog area as "Class A (High Value)" o 2.5 Park, Recreation, and Open Space section states, "The Southwest Parks District…has a large concentration of Natural Resource Use areas (areas designated for preservation rather than public use)." This includes the Site #5 Connor's Bog area (page 49) o Exhibit 4-1b: Sand Lake Land Use Detail designates area of Site #5: Connor's Bog area as "Class A (High Value)" o Under "Parks Objective #4 Manage, protect and enhance municipal parks, greenbelts and natural open space areas (including riparian and wildlife corridors) that support fish and wildlife habitats and wetland functions." This section states, "The WADP recommends that high-value wetland parcels to be retained or acquired for permanent protection. Wetlands owned by the Municipality [which includes Site #5: Connor's Bog], should be preserved with a conservation easement or transferred to an appropriate public agency for long-term preservation and management."			
10g						Anchorage Wetlands Management Plan (adopted 2014) o Figure 4: Wetlands Designations/Anchorage Bowl – Southwest designates Site #5: Connor's Bog area located within Parcel #34 as Class "A" Wetlands o Table 4.1 Anchorage Bowl Wetland Designations, Enforceable and Administrative Policies, and Management Strategies states as an Enforceable Policy for Site #34 CONNOR'S-STRAWBERRY BOG: "Municipal lands within Connor's-Strawberry bog shall be managed for open space, wildlife habitat, and wetland functions." It also scores this wetland high in Hydrology (114); Habitat (138); Species (98); Social Function (80), and describes the area as "Significant waterbird migratory and nesting habitat complex." (page 52)			

10h	11/23/2020	Email	Cathy Gleason	tccpresident@yahoo.com	Turnagain Community Council	2040 Anchorage Land Use Plan (adopted 2017) o Anchorage 2040 Land Use Plan Map identifies Site #5 Connor's Bog area as "Park or Natural Area" (Not "Community Facility or Institutions") o Park or Natural Area section of Plan states this land designation "provides for active and passive outdoor recreation needs, conservation of natural areas and greenbelts and trail connections." (page 51) o The Anchorage 2040 Land Use Plan Gallery Community Natural Assets identifies Site #5 Connor's Bog area as part of a "Natural Asset Hub" (one of 6 Hubs within the Anchorage Bowl), "Class A Wetlands," and an "Open Space and Important Habitat Intersect" (MOA website)		Greetings Turnagain Community Council, Thank you for providing public comment on the West Anchorage Snow Disposal Site Selection Study Draft report. Hearing from community councils, like yours, helps us to make informed decisions. It also assists in making the best decision possible for this process. Thank you. We have fully documented your comment for the public record and sincerely appreciate the time you took in gathering and siting municipal plans and documents. We will review each one and discuss how to include and consider in the final site selection report. We will also include and convey this information as part of the decision-making process. It is our intent to find the best solution in accordance with the long-term Municipal plans. At this time, the Anchorage International Airport has expressed confirmation to the Municipality of Anchorage that it is appropriate to consider a new snow disposal site and not to plan on continued long-term use at the current Northwood site. Please be assured that if the proposed location of Connor's Bog is selected and a project progresses, all appropriate permitting and mitigation measures for protection of wetlands and wildlife will be followed as part of the project. Again, thank you for taking the time to submit your concerns and for your involvement. We sincerely appreciate the knowledge that the Turnagain Community Council brings to our community and this project. Sincerely, West Anchorage Snow Disposal Project Team
10i						Over the years, TCC provided significant input during the development of each of the above specific Municipal plans. These important land use planning documents reflect expectation by the public, including TCC, that important natural open spaces, including the municipally-owned portions of Connor's Bog, would be permanently protected. At no time during the development of the above plans was construction of any Municipal or private facility that would significantly and negatively impact this area ever proposed or considered. Lack of any reference in the Draft Study to Municipal planning, implementation, and enforcement policies outlined above raises serious questions about the Draft Study's methodology and evaluation as to whether Site #5: Connor's Bog is an appropriate, or even allowable, location for a snow disposal facility. Unfortunately, the Draft Study minimizes significant development impacts, which results in delegitimizing the Draft Study's conclusion that Site #5: Connor's Bog "has few drawbacks."		
10j						Long-Term MOA Use of Snow Disposal Site at the Airport As referenced in the Draft Study (pages 1 & 3), the existing snow disposal site located on state land managed by the Ted Stevens Anchorage International Airport (Airport) has been used for West Anchorage Snow Service Area snow storage under short-term leases between MOA and the Airport. In the past, the MOA was unable to negotiate a long-term lease agreement that would allow the city to make required operational improvements, including those related to treatment of discharge from the site and water quality requirements due to its location in the area hydrologically connected to the Connor's Bog wetlands and drainage into those wetlands. This unresolved Airport-MOA long-term land use agreement has now resulted in the need for a new snow disposal facility site selection study. Unfortunately, the Draft Study did not put more emphasis on potential resolution of this issue before dismissing the option of a long-term Airport-MOA agreement and focusing on potential sites for a new facility. Despite its shortcomings, the MOA has applied for another short-term lease with the Airport for use of the existing snow disposal facility (ADA32308). Assuming this lease is approved, the city will have the use of this Airport snow disposal site for the 2020-2021 winter season.		
10k						While the Airport-owned site is located in the Connor's Bog area, there are two important distinctions with regard to the use of it as a snow disposal facility by the Municipality: 1) MOA land use documents do not have the same natural resource preservation directives on the state-owned snow facility area within the Airport boundaries. For example, it is designated as "Major Transportation Facility" (the general category for all Airport property) in the WADP. 2) More significantly, contrary to the Draft Study's assertion that, "Due to future plans for the site, a long-term lease or purchase option [with the Airport] is not available" (page i), the Ted Stevens Anchorage International Airport 2014 Master Plan, Appendix K – Airport Layout Plan, does not indicate any future plans for this site — other than the existing snow disposal facility. There also appears to be adequate land for enlarging the site to the required snow disposal facility acreage identified in the Draft Study (page 6). 3) And most importantly, the "ON-AIRPORT LAND USE PLAN (Appendix K, page 32 of 34) designates the larger Airport land parcel east of Runway 7L-25R as "Non-Aeronautical." This important designation allows for Municipal uses, including the existing snow disposal facility and Connor's Lake Park area for passive public recreational use.		
10l						Instead of moving forward with developing a new snow disposal facility in Site #5: Connor's Bog, TCC requests that the MOA and the Airport revisit executing a long-term lease that will enable continued MOA use and needed improvements of the existing snow disposal site. This much-preferred option would allow for needed MOA operational improvements in a manner that meets water quality regulations and other requirements, while eliminating the need to develop an additional snow disposal site in MOA-owned Connors Bog Class A wetlands, and avoiding significant and cumulative negative impacts to water quality, hydrology, natural open space and wildlife habitat in the larger Connor's Bog area owned by the Municipal.		
10m						How might that be accomplished? Having been part of previous discussions regarding Municipal use of Airport lands, key individuals were not part of the process, including the current Alaskan governor or our U.S. Congressional delegates. TCC recommends prompt Airport, Municipal and community engagement with these individuals (as well as West Anchorage State legislative officials), who have the influence and ability to direct the Airport sign a long-term lease with the Municipality for use of the current snow disposal facility, with required improvements) on State land. This "non-aeronautical" use would: 1) Conform to the Airport Land Use Plan; 2) Is permitted by FAA regulations; and 3) Would meet the needs of the MOA to provide an important snow disposal service for the West Anchorage community.		

10n						Mitigation Requests If Site #5: Connor's Bog is Developed If TCC's request and recommendations are not acted upon, and the MOA moves forward with selecting Site #5 Connor's Bog for development of a snow storage site — despite nonconformance with multiple Municipal land use documents — TCC is concerned about potential water quality, hydrology, wildlife habitat, aesthetics, and other impacts to the Connor's Bog complex. The below (and potentially other) measures would be far more appropriate for mitigating the snow disposal facility on Municipal lands than improving the Connor's Bog Dog Park parking area, which is referenced as mitigation on page 22. While it's something to consider, this alone would be completely inadequate to compensate for impacts that would be sustained on Class A wetlands, if the snow disposal site is developed at Site #5: Connor's Bog.			
10o						If Site #5: Connor's Bog is developed, TCC recommends comprehensive mitigation be required, including the following: • Reduce overall acreage footprint of facility, as the Draft Study does not provide justification for use of 32 acres of Connor's Bog wetlands when it states, "The 15-acre size leaves adequate area for access roads, berms, water quality structures, screening, and property line setbacks." •Limit fencing and other constrictions that inhibit wildlife movement •Provide for visual buffering from Minnesota Dr. that does not impede appropriate hydrology •Require measures that would maintain natural drainage patterns and all other enforceable policies in the Anchorage Wetlands Management Plan •Permanently preserve as a condition of developing Site #5: Connor's Bog all remaining Municipally-owned Class A wetlands tracts within the Connor's Bog wetlands through dedicated parkland status or other appropriate measures, such as conservation easements, that would restrict future development — and concurrently rezone this land to PR District o This would specifically conform to Municipal planning management strategies for remaining MOA-owned Connor's Bog Class A wetlands referenced above in our comments •Conduct ongoing monitoring of remainder of the Connor's Bog wetland complex as part of the conditional use permit, to ensure operations of the snow disposal facility are not adversely affecting bird nesting, wildlife movement, hydrology/water quality of wetlands, etc. in the remainder wetlands complex. •Provide an opportunity to address the Parks and Recreation Advisory Commission regarding this project proposal, as West Anchorage community councils were not notified of this item on their September 10, 2020, agenda. TCC feels it was premature for the Commission to support use of Site #5: Connor's Bog for a snow disposal facility without public input/testimony on this significant proposal on Municipally-owned Class A wetlands.			
10p						Turnagain Community Council sincerely appreciates the work done to-date on the West Anchorage Snow Disposal Draft Site Selection Study — and the generous timeline provided to submit our comments. We hope you seriously consider the above comments, recommendations and requests before finalizing the document. Please let us know if you have any questions or need clarification about our comment letter. Best Regards, Cathy Gleason Turnagain Community Council President			

Appendix D:
Parcels Considered For Site Selection

Site Number	Parcel ID	Legal Description	Owner	Square Footage	Acres	Zoning
1	N/A	N/A East of Lake Hood Runway 14/32	State of Alaska - TSAIA	1,553,010	35.7	TR
2	010-244-28	Boettcher TR 3	Universal Financing Corp	434,009	10.0	R-3 SL
3	010-244-02	T13N R4W SEC 35 Parcel 10	MOA	656,483	15.1	R-1
4	012-571-02	T12N R4W SEC 1 W2NE4NW4	Chugach Electric Association	670,824	15.4	TR
5	012-571-01	T12N R4W SEC 1 NW4NW4 PTN	MOA MOA 5501	1,393,484	32.0	TR
6	012-041-07	Connors Lake TR B	MOA MOA 5501	751,410	17.3	TR
7	012-041-06	Connors Lake TR A1	MOA Heritage Land Bank	3,781,879	86.8	PLI
8	012-581-13	Raspberry Road Muni Land Sel LT 1 ASLS 97-10	MOA Heritage Land Bank	1,386,950	31.8	PLI
9	012-591-07	Raspberry Road Muni Land Sel LT 2 ASLS 97-10	MOA Heritage Land Bank	4,745,426	108.9	PLI
10	012-553-03	Strawberry Meadows TR G-1D	MOA Heritage Land Bank	671,875	15.4	R-4
11	012-151-59	Gladys Wood Park Tr 1	MOA MOA 5501	787,656	18.1	PLI
12	011-011-45	N/A - Area North of Delong Lake	State of Alaska - TSAIA	2,491,634	57.2	PLI
13	011-061-02	Sand Lake School Site TR A	State of Alaska - TSAIA	1,277,615	29.3	PLI
14	011-052-03	T12N R4W SEC 4 LT 8	Opal Investments	1,676,400	38.5	R-1
15	011-313-02	Westpark School Addition TR 7A	MOA - Parks & Rec	719,782	16.5	R-2A SL
16	011-321-73	Southwest Anchorage School Site TR 1	MOA School District	1,822,527	41.8	R-2A SL
17	011-162-42	Lancaster TR A	Anchorage Sand & Gravel Co	1,699,711	39.0	R-1A
18	011-201-92	Polen Park TR 1	Anchorage Sand & Gravel Co	1,170,181	26.9	R-1A
19	011-142-45	Mike Beirne Tr C	MOA Heritage Land Bank	1,689,431	38.8	R-1

Appendix B: Geotechnical Report and Historic Soils Data

SUBMITTED TO:
HDR Engineering, Inc.
2525 C Street, Suite 500
Anchorage, Alaska 99503

BY:
Shannon & Wilson, Inc.
5430 Fairbanks Street, Suite 3
Anchorage, Alaska 99518

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AECC 125

GEOTECHNICAL ENGINEERING REPORT

West Anchorage (Connor's Bog) Snow Disposal Site

ANCHORAGE, ALASKA

Prepared for:
Municipality of Anchorage
Project Management & Engineering

MOA Project Number: 20-17

SHANNON & WILSON

September 2021

Shannon & Wilson No: 106424-001

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Submitted To: HDR Engineering, Inc.
2525 C Street, Suite 500
Anchorage, Alaska 99503
Attn: Bill Spencer, PE

Subject: GEOTECHNICAL ENGINEERING REPORT, WEST ANCHORAGE SNOW DISPOSAL SITE, ANCHORAGE, ALASKA

Shannon & Wilson prepared this report and participated in this project as a consultant to the Municipality of Anchorage (MOA). Our work was authorized in Purchase Order Number 2021000725 with MOA dated March 9, 2021 and our scope of work is described in our proposal. This report presents the results of subsurface explorations, laboratory testing, and geotechnical engineering studies conducted by Shannon & Wilson, Inc. for the proposed relocation of the West Anchorage Snow Disposal Site in Anchorage, Alaska. This geotechnical engineering report was prepared by the undersigned.

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report, or we may be of further service, please contact us.

Sincerely,

SHANNON & WILSON, INC.

Russell Hepner, E.I.T.
Geotechnical Engineering Staff

Kyle Brennan, PE
Vice President

RCH:SKD/klb

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1 INTRODUCTION

This report presents the results of subsurface explorations, laboratory testing, and geotechnical engineering studies conducted by Shannon & Wilson for the proposed relocation of the West Anchorage snow disposal site. The purpose of this geotechnical study was to gather subsurface geotechnical information and provide geotechnical engineering recommendations needed to design and construct the proposed snow disposal site, access road, and other improvements near the existing Municipality of Anchorage (MOA) Northwood Maintenance Facility. To accomplish this, 14 soil borings and 13 peat probes were advanced near the proposed new snow disposal site and access road. Soil samples recovered from the borings were tested in our geotechnical laboratory. Presented in this report are descriptions of the site and project, subsurface explorations and laboratory test procedures, an interpretation of subsurface conditions, and conclusions and recommendations from our engineering studies.

Authorization to proceed with this work was received in the form of a Purchase Order (PO Contract No. 4400000636) requested by Mr. Ernest Gray III and approved by Mr. Ronald S. Hadden, both from MOA, dated March 9, 2021. Our work was conducted in general accordance with our January 22, 2021 proposal. This report is intended for use by the project design engineering staff, the MOA, and their representatives.

2 SITE AND PROJECT DESCRIPTION

According to parcel information available on the MOA GIS mapping website, the Connor's Bog site is located on an unsubdivided portion of the northwest ¼ of the northwest ¼ of Section 1 of Township 12 North, Range 4 West, in Anchorage, Alaska. The site is on an undeveloped bog located south of the existing MOA Northwood Maintenance Facility and Javier de la Vega Park, east of Connor's Lake, and west of Minnesota Boulevard in Anchorage, Alaska. The property adjacent to the existing access road was previously developed as a municipal landfill and currently houses the MOA Northwood Maintenance station, including several structures, paved and unpaved parking and driving areas, and storage for a variety of construction related materials. The site proposed for the snow disposal site is covered with tall grasses, shrubs, and spruce trees. There are overhead transmission lines running along the northern side of the site. Additionally, standing water was observed at the surface in some areas during spring and summer-time field activities. Telephone, electric, and natural gas easements are located within approximately 100 feet of the west and/or south property lines of the site.

Except for several small, vegetated mounds, the site is generally flat though the area of the proposed pad. The existing access road at the facility is relatively flat, but gently slopes down to the north and west. The proposed access road is approximately 9 to 21 feet above the surface of Connor's Bog. A vicinity map indicating the general project location is presented as Figure 1. The site plan, included as Figure 2, shows prominent site features and the approximate boring and probe locations.

We understand that the project consists of constructing an approximately 14-acre gravel pad on which snow will be stored seasonally from snow removal work conducted within the western portion of the MOA. We also understand that a containment berm with up to four weirs will be constructed around the gravel pad. Improvements to existing infrastructure near the Northwood facility include a reconfigured parking area, a truck bypass route to the west of the reconfigured parking area, and other potential improvements to the existing access road. Development of a new access road approaching the pad from the northwest, from the southwest corner of the existing access road, will connect the new snow pad to the western boundary of the Northwood facility.

3 SUBSURFACE EXPLORATIONS

Subsurface explorations for this study consisted of drilling and sampling 14 borings, designated Borings B-01 through B-14, and 13 peat probes, designated Probes P-01 through P-13, in the project area from March 29 through April 5 and on April 30, 2021. The general boring and probe locations were selected to provide relatively even coverage of subsurface data across the undeveloped site and at road and parking improvement areas. The boring and probe locations, shown on Figure 2, were recorded with a handheld global positioning system (GPS) capable of horizontal accuracies of ±20 feet. It should be noted that GPS accuracy may be affected by tree canopies, geographic features, and other atmospheric anomalies. Elevations shown on the boring logs were extrapolated from topographic contours provided by the MOA GIS department. Therefore, the boring locations shown on the site plan and the elevations reported on the boring and probe logs should be considered approximate.

Drilling services for this project were provided by Discovery Drilling of Anchorage, Alaska, using a track-mounted, 6712DT Geoprobe and Nodwell CME-850 drill rigs. A geotechnical professional from our firm was present during drilling to locate the borings and probes, observe drill action, collect samples, log subsurface conditions, and observe groundwater conditions. We coordinated with the Call Locate Center for buried public utility locating services prior to drilling.

The borings were advanced with 3 ¼-inch inner diameter (ID), continuous flight, hollow-stem augers to a depth of between 16.5 and 31.5 feet below ground surface (bgs). As the borings were advanced, samples were recovered using standard penetration test (SPT) methods at 2.5-foot intervals to 10 feet bgs and at 5-foot intervals after that to the bottom of the borings. In the SPT method, samples are recovered by driving a 2-inch outer diameter (OD) split-spoon sampler into the bottom of the advancing hole with blows of a 140-pound hammer free falling 30 inches onto the drill rod. For each sample, the number of blows required to drive the sampler the final 12 inches of an 18-inch penetration into undisturbed soil is recorded. Blow counts are shown graphically on the boring log figures as "penetration resistance" and are displayed adjacent to sample depth. Where the sampler did not penetrate the full 18 inches, our log reports sampler refusal as the blow count and corresponding penetration in inches. The penetration resistance values give a measure of the relative density (compactness) or consistency (stiffness) of cohesionless or cohesive soils, respectively. In addition to the split spoon samples, a grab sample of the near-surface soils was collected from the auger cuttings in the upper 2 feet of borings advanced through suspected fill materials.

The peat probes were advanced to a depth of between 5.5 and 9 feet bgs. They were advanced by using the drill rig to push 2 ¾-inch drill rod from the ground surface to refusal. The rods were over-drilled with augers to the depth of probe refusal and a sample of the soil layer that caused refusal was recovered using SPT sampling techniques.

The soil samples recovered during drilling were observed and described in the field in general accordance with the classification system described by ASTM International (ASTM) D2488. Selected samples recovered during drilling were tested in our laboratory to refine our soil descriptions in general accordance with the Unified Soil Classification System (USCS) described in Appendix A, Figure A-1 (3 sheets). Frost classifications were also estimated for samples based on laboratory testing (sieve analyses and percent passing the No. 200 sieve) and are shown on the boring logs. The frost classification system is presented in Appendix A as Figure A-2 and summary logs of the borings and probes are presented in Appendix A as Figures A-3 through A-29.

At the completion of Borings B-03, B-06, B-09, B-10, B-11, B-13, and B-14; 1-inch, polyvinyl chloride (PVC) casing with hand-slotted sections was installed in the open borehole to facilitate observation of groundwater levels at a later date. The annular space between the borehole wall and casing was backfilled with cuttings produced during drilling and the PVC was allowed to stick up. The remaining borings were backfilled with cuttings produced during drilling. The ground surface surrounding Boring B-02 was repaired with asphalt cold patch.

4 LABORATORY TESTING

Laboratory tests were performed on selected soil samples recovered from the borings to confirm our field classifications and to estimate the index properties of the typical materials encountered at the site. The laboratory testing was formulated with emphasis on determining gradation properties, natural water content, and frost characteristics.

Water content tests were performed in general accordance with ASTM D2216. The results of the water content measurements are presented graphically on the boring logs in Appendix A.

Grain size classification (gradation) testing was performed to estimate the particle size distribution of selected samples from the borings. The gradation testing generally followed the procedures described in ASTM C136. The test results are presented in Appendix A as Figure A-30 (10 sheets) and summarized on the boring logs as percent gravel, percent sand, and percent fines. Percent fines on the boring logs are equal to the sum of the silt and clay fractions indicated by the percent passing the No. 200 sieve. Note that gradation testing indicates particle size only and visual classification under USCS designates the entire fraction of soil finer than the No. 200 sieve as silt. Plasticity characteristics (Atterberg Limits results) are required to differentiate between silt and clay soils under USCS.

5 SUBSURFACE CONDITIONS

The subsurface conditions encountered in our explorations are presented graphically on the summary logs in Appendix A. In general, our borings encountered peat and/or granular fill soils overlying native granular and occasional fine-grained material. Peat was generally encountered at the surface to depths of between 4 and 7.5 feet bgs. Borings B-01 through B-05 were advanced through an existing fill pad around the MOA Northwood Maintenance facility. These borings generally encountered between approximately 4.5 and 9.5 feet of fill material above the peat and/or native soils; however, Boring B-04, advanced through the top of an existing berm along the south side of the access road, found fill material throughout its depth (16.5 feet). Based on penetration resistance values ranging from 2 to 47 blows per foot (bpf) in samples where the ground was not frozen and our observations of drill action, the fill soils encountered during drilling are considered loose to dense. Note that soft to medium stiff, intermingled peat, wood, silt, and sand were encountered within the fill material, between roughly 4.5 and 9.5 feet bgs, in Boring B-05. Based on our laboratory testing, estimated fines contents of the fill material ranged from approximately 17 to 21 percent. Moisture contents of the fill material ranged from about 5 to 35 percent, with the

highest moisture contents found within the intermingled soil and organics observed in Boring B-05.

Native soils encountered beneath the fill and peat generally consisted of sands with varying amounts of fines and occasional gravels. However, fine-grained soils were encountered at varying depths in Borings B-01, B-08, B-13, and B-14. Native sands contained approximately 4 to 46 percent fines, with an average of about 10 percent, and the one silt sample tested was found to contain approximately 85 percent fines. Moisture contents of the granular native soils encountered above the groundwater table ranged from about 4 to 21 percent, with the higher percentages generally found in the soils with higher fines contents. Fine-grained materials encountered across the site generally consisted of silt to sandy silt with rapid dilatancy. Penetration resistance values ranged from 9 to 65 bpf where sampler refusal or significant heaving sand was not encountered. However, it is possible that some of the higher blow count samples may have been effected by heave that wasn't obvious during sampling. Based on our observations during drilling and the depositional environment, it is our opinion that native soils are, on average, medium dense or stiff to very stiff for granular and fine-grained soils, respectively. Isolated areas of loose and dense soils also likely exist.

Based on our probes and borings, peat depths in the area of the snow disposal pad vary between approximately 4 (Probe P-09) and 7.5 (Probes P-02 and P-05) feet, with an average of approximately 6 feet in depth. Figure 3 presents a peat thickness contour map that shows the approximate distribution of peat thickness across the site based on our borings and probes. The contours indicate that peat is thickest on the east side of the site with thinner peat soils in the southwest portion of the site.The peat and organic soils had moisture contents ranging from approximately 21 to 126 percent where underlying existing fill soils, and about 150 to 517 percent where exposed at the ground surface. The peat was predominantly very soft to soft where it wasn't frozen.

Groundwater, where observed, was encountered during drilling at depths ranging between approximately 12 and 25.5 feet bgs in borings advanced through the existing fill pad around the MOA Northwood Maintenance facility, and at depths ranging between approximately 7 and 10 feet bgs in borings advanced in Connor's Bog. On April 13, 2021, approximately two weeks after our initial drilling, water was measured at depths ranging between 6.3 and 9.6 feet bgs in the observation wells installed in Borings B-06, B-09, B-10, B-11, B-13, and B-14. Groundwater was again measured on July 11, 2021, approximately 3.5 months after drilling, and water was measured at depths ranging between 5.2 and 8.1 feet bgs. The groundwater level was also measured in Boring B-03, advanced through the fill pad, on April 13 and July 11, 2021, and water was measured at 25.6 and 24.3 feet bgs, respectively. Note that measured groundwater levels were approximately 1 to 1.5 feet shallower when measured in

July as compared to April. Also note that water levels may fluctuate by several feet seasonally and may vary during periods of high precipitation and rapid snow melt.

6 ENGINEERING RECOMMENDATIONS

Geotechnical considerations for this project include developing an appropriate structural section for the gravel access road, truck bypass route, and new gravel snow disposal pad. We assume that the truck bypass route, access road, and gravel pad will not need to meet the MOA Design Criteria Manual (DCM) requirements, but will need to support truck traffic throughout the year. We understand that the snow pad will need to support snow piles that may be more than 30 feet high, and that some differential settlements are tolerable for the pad. We also understand that a containment berm is planned to be constructed around the snow disposal pad and that preliminary plans call for up to four weirs to be constructed within the berm to control water going from the snow disposal pad area to the surrounding Connor's Bog. The approximate locations of these weirs are shown on our site plan, presented as Figure 2.

Design of the gravel access road must consider the support capabilities of the underlying materials. The new access road and snow pad will be developed atop existing organic material at the site. Peat depths in the area of the snow disposal pad vary between approximately 4 (Probe P-09) and 7.5 (Probes P-02 and P-05) feet, with an average of approximately 6 feet in depth. Underlying soils generally consist of medium dense to dense sands with varying amounts of fines. Groundwater depths generally ranged between approximately 6 and 9 feet bgs when encountered during our explorations.

In general, we understand that the snow disposal pad will be constructed with an approximately 0.5 percent crown with the high point in the approximate center of the pad to allow water to drain off in all directions. We understand that the crown will be on the order of 3 to 4 feet above the outer edges of the pad. We also understand that the containment berm will be constructed to an approximate height of 4 to 6 feet above the surrounding ground surface, and that the height will likely vary around the berm (i.e., there will not be a consistent design height and the berm is not planned to be surcharged). Note that, depending on project schedule, the area that will receive the new gravel access road and snow pad is well suited for a portion of the work to be constructed during winter/frozen ground conditions.

6.1 Gravel Access Road, Snow Pad, and Containment Berm

We understand that embankment fills will be floated over the existing surface organic soils and peat for the new access road, gravel snow disposal pad, and containment berm. We

also understand that the road and pad will be able to tolerate differential movements with maintenance as needed as peat consolidates. The sections below describe general embankment development which consists of the following three components: an embankment base resting on the existing ground surface, a base structural section to establish the new working surface, and embankment fill between the base and surface structural section.

The access road construction will likely require excavation through the existing berm on the north side of the snow dump site. Our borings indicate that the material that will likely be exposed will consist of a mixture of silty sand and silty gravel down to approximate elevation 87 feet. Below this elevation we encountered mineral soil mixed with peat and other debris. Cut slopes in these materials should be established at slopes no steeper than 3 horizontal (H) to 1 vertical (V). Care should be taken to not undermine overhead power line poles with road excavations in this area. The pole foundations in this area are unknown, but if cut slopes are maintained at not steeper than 3H to 1V, undermining should not be an issue as long as the top of slope cut line is greater than 20 feet from the base of the overhead utility tower base. We recommend that an experienced geotechnical engineer be present on site to confirm these conditions during construction and help adjust the design if necessary.

6.1.1 Embankment Base Preparation

Initial site preparation of the existing grade for development of embankments (i.e., access road, snow pad, and containment berm) over surface organics should disturb the organic surface as little as possible. Trees and shrubs should be cut approximately 6 inches above the ground surface, leaving the surface mat largely intact. After the cut vegetation has been removed, embankments can be developed as recommended below. Note that if surcharging is to occur, settlement plates should be installed as described in Section 6.1.3 after placement of geofabric and prior to placement of fill materials.

6.1.1.1 Summer Construction

After the base has been prepared as described above, the fill areas should be overlain by a separation geofabric (see Section 6.1.6.1) placed on the organic surface. The fabric should extend a minimum of 2 feet beyond the outer edge of the toe of the embankment. After the fabric is in place, we recommend that at least 18 inches of Type II material be placed and compacted by tracking with equipment and static rollers. After the initial lift is placed, a layer of biaxial geogrid should be placed within the access road and snow pad embankments as described in Section 6.1.6.2. If the grade is firm and workable, an additional 18 inches of Type II fill should be placed and compacted with moisture/density control as described in Section 6.3. If the grade experiences significant rutting and pumping

under construction traffic, additional material can be placed until a firm, unyielding surface is achieved.

Filling over soft organic soils with unfrozen ground conditions will require a systematic approach to reduce the risk of developing mud waves (upheaval of organic soils at the toe of an advancing fill) and shearing failure of the organic mat beneath the fill. Mud waves in the subgrade can form if the fill pad is advanced uniformly in one direction over the pad limits. The initial lift of fill should be placed in a staggered manner using a combination of excavators to drop fill on the prepared surface ahead of the advancing fill front and pushing/spreading fill with a light weight/low ground pressure dozer. If a mud wave begins to form, the fill pad should be advanced in a different area to approach the mud wave with the fill from a different direction. To avoid shearing of the organic mat, fill should be placed at a metered rate. We recommend limiting the rate fill such that the elevation of the pad does not increase more than 2 feet every two weeks. Once the base is established, embankment construction can continue as described in Section 6.1.2.

6.1.1.2 Winter Construction

The embankment base may be constructed in the winter months to take advantage of firm ground conditions. We believe that this is a viable approach as long as the conditions described in this section are met during construction. Preparation of the ground surface should be carried out as described in Section 6.1.1 and should include snow removal. Snow should be removed from the ground surface to the extent practicable so as not to disturb the organic mat. No more than 6 inches of loose or packed snow should be left on the ground surface prior to embankment development. If ice is present, the snow should be cleared to the ice surface. We recommend drilling through the ice in a few locations to establish an average ice thickness in areas where ice is on top of the ground surface. If the ice thickness is greater than 1 foot, effort should be undertaken to remove the ice so there is not more than 1 foot of ice over organic surface materials.

After snow is removed, a woven geotextile should be spread on the ground surface as recommended in Section 6.1.6.1. The base of the embankment fill should then be constructed as described above in Section 6.1.1.1 for summer construction. The final lift of Type II material should be placed over the geogrid and crowned/graded to drain water off the embankment. A smooth drum roller should be used to condition the surface to as smooth a state as practicable. Snow can fall and accumulate on the resultant embankment surface over the winter months, but it should be removed prior to breakup to encourage thawing of the embankment base fill and subgrade. After the upper 2 feet of fill has thawed, the embankment surface should be bladed to a relatively smooth and level state and compacted with moisture density control as described in Section 6.3. From this point,

embankment construction may commence as recommended in Section 6.1.2. Note that if winter construction is conducted, peat consolidation and settlement will be spread over a longer period of time as the materials thaw. As such, the contractor should be prepared to accommodate additional re-leveling of the embankment surface as it is developed.

6.1.2 Embankment Construction

The new embankments for the access road, the snow pad, and containment berm should provide a stable, supportive subgrade for the structural section of the new surface. Embankment fills above the base described in Section 6.1.1 should generally consist of Type III or better material that is placed and compacted as described below in Section 6.3. However, we understand that the MOA plans to utilize unclassified fill soils within the embankments for this project. This may be acceptable between the embankment base (see Section 6.1.1) and the structural section described in Section 6.1.4 for the access road and snow pad provided that the unclassified material can be placed and compacted with moisture density control as described in Section 6.3. However, we recommend concentrating the unclassified fill soils within the containment berms to the extent practicable since they will not need to support truck traffic. Additionally, unclassified fills typically contain elevated fines, which can make them difficult to compact with moisture density control during wet conditions.

In order to estimate fill quantities, it will be important to account for consolidation of the peat soils under fill loading. Embankment settlement and total expected settlement under fills is discussed in Section 6.1.5. It is important to note that consolidation of the peat soils will begin as soon as filling occurs and a substantial of consolidation may occur before the filling activities are complete.

6.1.2.1 Access Road and Snow Pad Embankment Construction

Embankment fill slopes of the access road and snow disposal pad should be established at angles not steeper than 2H to 1V. The thickness of the embankment will vary (thicker near the crowned center of the roadway and pad) and should accommodate for settlement described in Section 6.1.5 as well as the desired final grade of the roadway and pad. As filling takes place, the surface grade should maintain a crown to allow for drainage of surface water off of the fill/embankment surface.

We understand that the planned crown slopes of the snow pad are on the order of 0.5 percent to limit the volume of fill material needed for the project. We typically recommend establishing the embankment surface crown slopes at a minimum of 2 percent; however, we believe that the 0.5 percent slope will be sufficient for this project since truck traffic over the embankments will generally be conducted during the winter months, after the road and pad

surfaces are partially frozen. Note that the shallower crown slope will likely result in a wet embankment during times of heavy precipitation and snow melting, so a soft driving surface and rutting should be anticipated when travelling over the embankments during the summer and fall months. It is likely that re-grading on a seasonal basis will be needed to re-establish the crown and maintain the desired drainage off the pad surface.

6.1.2.2 Containment Berm Embankment Construction

Embankment fill slopes of the containment berm should also be established an angle not steeper than 2H to 1V but may need to be flatter depending on the quality of the unclassified fill soils. We understand that the thickness of the berm will vary along its length, but that it will generally be about 4 (north and west berms) to 6 (south and east) feet above the surrounding ground surface. While we understand that berms will not necessarily be surcharged as described in Section 6.1.3, construction should accommodate for settlement described in Section 6.1.5 by adding embankment fill material above the desired final height of the berm during initial construction. Likewise, the surface grade should maintain a crown to allow for drainage of surface water off the top of the berm as filling takes place. Since unclassified soils are anticipated to be used to construct a significant portion of the containment berm and the berms will be allowed to settle as the underlying peat consolidates, we recommend that all exposed surfaces of the berm are constructed with a minimum crowned slope of 5 percent to drain water off the likely silty material.

While unclassified soils are generally acceptable overlying the embankment base for the berms, we recommend that Type II/IIA classified soils are used within approximately 10 feet of the sheet pile weirs that are planned to be installed in up to four locations around the site. We understand that a critical design component of the project is to keep each of the weirs at the same elevation to encourage excess water to drain evenly around the sides of the snow disposal site. The relatively high fines contents of unclassified soils typically make them more frost susceptible than the non frost susceptible Type II/IIA soils. Therefore, unclassified soils would likely add frost jacking forces to the sheet piles used to construct the weirs and increase the risk of frost related movements that would result in differential movements (i.e., different weir elevations) between the individual weirs.

6.1.3 Embankment Surcharging

Based on our borings and probes, peat depths at the site vary between approximately 4 (Probe P-09) and 7.5 feet (Probes P-02 and P-05), with an average of approximately 6 feet in depth. Native soils underlying the Peat generally consisted of medium dense to dense sands with varying amounts of fines. The magnitude of the settlements that will develop at the site are dependent upon the applied loads and density of the support material. If a

surcharge load significantly higher than expected operational loads is stored on the site as described below, much of the primary settlement could be achieved such that additional settlements would be comparatively small, depending on the existing surcharged soil thickness, surcharge load, and length of time surcharged.

The purpose of preloading is to consolidate the compressible peat soils before the access road, snow pad, and containment berm are constructed. Surcharge loads are generally applied by placing a fill embankment over the site to a load greater than will be expected to be constructed on the site. This will produce, in a shorter period of time, a large amount of settlement that would have occurred under the lighter long-term, design loads. Post-construction differential settlements, with the use of a properly completed preload program, should be more uniform across the site. These differential settlements should also be relatively small and within tolerable limits for the project; with the amount generally depending upon the degree of surcharging and the variability in pre-surcharge site conditions.

6.1.3.1 Surcharging Access Road and Snow Pad Areas

In developing surcharge embankments over surface organics, the surcharge fill should be a minimum of 3 feet thick (relative to the proposed final elevation). We expect total settlements will be on the order of 40 percent of the peat layer thickness, which varies between approximately 4 and 7.5 feet across the site. With preloading, additional settlements after the surcharge is removed should be small, probably less than 3 to 4 inches, and the settlement pattern should be more uniform across the site to reduce the frequency of maintenance. Note that consolidation of the peat soils will begin as soon as fills are placed on top of them and will likely continue for up to approximately 6 months after filling is complete.

We recommend that Type II/IIA material be used to surcharge the access road and snow pad areas so that it can be used on other projects as the excess material is removed. We recommend that the crown slope should be maintained at the ground surface during surcharging. The surcharge fill should be allowed to stay in place for at least 6 months, at which point it can be removed and the structural section graded to develop final grade. A shorter surcharge time length may be possible, which could be determined with settlement and pore pressure monitoring. This program would include installation settlement plates that are monitored to detect stabilization and transition from primary to secondary consolidation in the organic soils, as described in Section 6.1.3.3.

6.1.3.2 Surcharging Containment Berm Areas

We understand that the containment berm will generally not be surcharged, per se, the settlement results of surcharging will still be experienced by the berm. We also understand that a uniform height is not necessary around the perimeter of the berm and that the final height of the berm will generally vary between about 4 and 6 feet, with the highest points generally being in the southern and eastern berms. Therefore, we assume that an unclassified surcharge fill will generally remain in place (i.e., fill will not be removed, and the berm will not be constructed to a design shape), although landscaping vegetation may be placed over the berm after construction. As such, the surcharge fill thickness may vary along the berm, depending on the peat layer thickness around the site, which varies between approximately 4 and 7.5 feet across the site. In our opinion, a minimum of 2 feet of additional unclassified fill (relative to the proposed final elevation) should be placed over the berms during construction. We expect total settlements of the berm to be on the order of 40 percent of the peat layer thickness. With modified preloading, additional settlements after site construction is complete should be small to moderate, likely less than roughly 6 inches.

While most of the berm will not be surcharged, we recommend that the areas around the weirs are surcharged as recommended in Section 6.1.3.1. The surcharge fill area should extend out the full width of the berm or a minimum of 10 feet from the outer edges on all sided of the sheet pile weirs. We recommend that Type II/IIA classified soils are used to construct the full height of the containment berm embankment, including the surcharge load, in these areas to reduce the risk of frost jacking and/or downdrag forces that could lead to differential settlements between the drain height of the individual weirs. A surcharge monitoring program is also recommended at the weir locations to detect stabilization and transition from primary to secondary consolidation in the organic soils, as described in Section 6.1.3.3.

6.1.3.3 Surcharge Monitoring

As part of an effort to monitor the consolidation of the peat soil under the surcharge placed, we recommend installing settlement plates to monitor consolidation of the compressible peat soils under fill soils loads. These plates should be installed and monitored by a professional surveyor. The locations of the settlement monitoring points should be laid out on an approximate 200-foot grid within the area of the snow disposal pad and along the length of the access road. We also recommend that monitoring points are installed adjacent to each of the proposed weirs. PVC casing to house a thermistor string is recommended at occasional locations in the embankment to monitor ground temperatures where the ground was frozen at the time of fill placement. This would be the case within embankment bases that are constructed using winter construction recommendations (see Section 6.1.1.2).

Settlement plates should be installed on top of the ground surface and surveyed prior to placement of fill to establish the baseline condition. Rods extending up from the settlement plates should be extended up vertically as the fill is placed so that continued monitoring can be conducted after filling is completed. After filling, we recommend surveying the vertical locations once per week for the first month and then once every month after that.

Data from surveying elevation changes in the settlement plates and the ground temperatures (if the embankment base is initiated in the winter season) should be used to analyze the progress of the surcharge load. Note that since water must be removed from the soil for consolidation to occur, frozen grounds will not consolidate until thawed. Additionally, as thawing of the ground under the fill will not occur in a homogenous manner, soils near the edge of the fill will likely thaw faster than those in the center. The thawing and consolidation process of soil under a fill will behave in a somewhat unpredictable manner.

The rate of settlement will decrease over time and become linear at a relatively slow rate, indicative of primary consolidation being achieved. Once it is determined that primary consolidation of the peat has been achieved, the surcharge fill can be removed.

6.1.4 Structural Section

We understand that the access road and pad will remain gravel surfaced (i.e., paving is not planned for this project). The design of the driving surface for the road improvements should take into account the traffic loading and subgrade characteristics. We understand that the access road and gravel pad will likely experience loads from heavy equipment and dump trucks carrying loads of snow. The structural section to be constructed on top of the embankment should consist of at least 18 inches of Type IIA and 6 inches of E-1 surface course. Note that we recommend using Type IIA to surcharge the embankment, as described in Section 6.1.3, so that as it is removed to final elevation, the Type IIA layer is already in place. We also recommend placing the E-1 surface course layer at the end of the project to allow the embankment materials and subgrade to consolidate and settle as much as practicable from the surcharge. Prior to placement of the structural section, the embankment surface should be graded and compacted with the appropriate crown slope for drainage.

The performance of the road and snow disposal pad will be controlled by the details of construction and by the quality (gradation and durability characteristics) of the materials that are placed and compacted to develop the needed structural section. Fill placement and compaction procedures are described in Section 6.3. Quality control inspection is strongly recommended when placing structural support soils. To reduce the maintenance needed after construction, we recommend including strict quality control/assurance provisions in

the construction specifications. If constructed as recommended, we anticipate the road will require periodic maintenance including grading and pothole repair (depending on traffic loading/volume and weather conditions).

6.1.5 Embankment Settlement

Constructing the new access road, snow disposal pad, and containment berm over peat will result in measurable consolidation of the soft, organic material. This will result in differential settlement as the filled is placed and from secondary consolidation, after surcharging is complete. The actual magnitude of settlement of peat soils is difficult to estimate due to material variability and is dependent on the preloaded degree of consolidation, nature of the peat soils, and the amount of fill placed over the peat. For rough estimating purposes, the total settlement of new embankments over peat soils can be up to 40 percent of the original peat thickness under the fill. Based on the peat thicknesses encountered by our borings and probes, we estimate that the amount of primary settlement that the embankments could experience will likely be on the order of 1.6 to 3 feet, with an average of about 2.5 feet. Consolidation will take place over the life of the embankments and will begin during fill placement, but the rate of consolidation will be highest within approximately six months of construction (i.e., surcharging), depending on loading and traffic volume. Secondary settlements would likely be on the order of 3 to 4 inches for the access road and snow disposal pad; depending on the existing surcharged soil thickness, surcharge load, and length of time that the surcharge load remains in place.

It should be noted that as the embankments settle, they will likely need additional fill material to achieve a final grade above the existing ground surface and the desired crown slopes. Embankment material should be allowed to settle as much as practicable before development of the structural section to mitigate additional fill placement for maintenance of the desired road and pad grades.

6.1.6 Reinforcing Geofabric and Geogrid

Generalized guidelines for construction and recommended material types are listed above. Note that the recommended applications of these materials are to be used as guidelines in the final design. The manufacturer of the product selected can provide additional use and design guidelines for the specific product and application.

6.1.6.1 Geofabric

The geotextile recommended within the structural section should increase the strength and stability of the supporting material. By increasing the tensile strength of the soils, differential settlement should be decreased both longitudinally and laterally from the center

to the edges of the road and pad section. We recommend using Mirafi RS580i or equivalent for the applications described above.

Sections of geotextile should be unrolled smoothly and perpendicular to the access road alignment on the grade surface so that it covers the entire exposed grade evenly. Geofabric should extend beyond the toe of the embankment slopes at least 2 feet to accommodate for future settlement. Alternatively, the geofabric may be wrapped in a perpendicular fashion around the bottom layer of fill to provide additional support and reduce lateral loss of material into the existing peat. There should also be at least 3 feet of overlap between grid sheets, with seams sewn as recommended in the standard specifications from the product manufacturer. Traffic on top of the initial lift over the geotextile should travel in straight lines to prevent damage.

6.1.6.2 Geogrid

The geogrid recommended within the structural section should increase the strength and stability of the embankment bases. By increasing the tensile strength of the soils, differential settlement should be decreased both longitudinally and laterally from the center to the edges of the road and pad sections. We recommend using a Type B Geotextile grid as specified in the Municipality of Anchorage Standard Specifications (MASS).

Sections of geogrid should be unrolled smoothly on the grade surface so that it covers the entire exposed grade evenly. There should also be at least 3 foot of overlap between grid sheets, with seams sewn as recommended in the standard specifications from the product manufacturer. Traffic on top of the initial lift over the geogrid should travel in straight lines to prevent damage.

6.2 Sheet Pile Weirs

Based on the subsurface conditions encountered near the planned weir locations (see Borings B-07, B-10, B-13, B-14, and Probe P-13), it is our opinion that sheet pile weir structures are appropriate for this project. Design of the sheet pile weirs must consider the depth of retained water, embedment depth of the sheet pile, pile section strength, effects on the containment berm due to seepage around the sheets, and constructability. We understand that the weirs will generally be designed by others; therefore, the discussions included in this report are primarily focused on embedment depths and constructability aspects of the design.

6.2.1 Design Considerations

We understand that sheet pile weirs will be installed at up to four locations within the containment berm (see site plan for approximate locations), and that a uniform height is not necessary around the perimeter of the berm. The final height of the berm will generally vary between about 4 and 6 feet, with the highest points generally being in the southern and eastern berms. We also understand that a critical design component of the project is to keep each of the weirs at the same elevation to encourage excess water to drain evenly around the snow disposal site.

While unclassified soils are generally acceptable overlying the embankment base for the berms, we recommend that Type II/IIA classified soils are used within approximately 10 feet of each of the proposed sheet pile weirs. The relatively high fines contents of unclassified soils make them much more frost susceptible than the generally non frost susceptible Type II/IIA soils. Therefore, unclassified soils would likely add frost jacking forces to the sheet piles used to construct the weirs and greatly increase the risk of frost related movements that would result in differential movements (i.e., different weir elevations) between the individual weirs.

Due to the sensitive nature of the weirs to movement, we recommend that sheet piles be driven to a depth of at least 18 feet below the surrounding ground surface, or to a minimum of 10 feet into the medium dense to dense native sands underlying the peat at the site. Additionally, sheet piles for the weirs should not be driven until primary consolidation of the eat has taken place to reduce the downdrag forces on the sheet piles. Based on the peat thicknesses observed in our borings, the anticipated surcharge settlements, and the containment berm heights; we believe that sheet piles may need to be driven on the order of 18 to 20 feet below the top of the containment berm.

6.2.2 Weir Materials

Based on preliminary design conversations, we understand that fiberglass or PVC sheet piles are being considered for the project to reduce the risk of corrosion due to the potentially high chloride content of the snow melt water. While we believe that either material would be viable for the project, we recommend using fiberglass. We believe that fiberglass is a stronger material than PVC, so it would likely provide more lateral resistance and may be easier to install without damaging the sheet pile. Our primary concerns with using either fiberglass or PVC is that they may require special driving equipment/considerations to install them properly. A special driving shoe/pad may be needed to drive these types of sheet piles without damaging the weaker materials (as compared to steel). Additionally, finding a skilled contractor to do the work could increase construction costs of the project.

6.2.3 Pile Driving

The contractor should be responsible for developing a pile driving plan that will achieve the goals of the project. This plan should include a list of the equipment that is to be used and general procedures for conducting the pile driving, particularly if fiberglass or PVC sheet piles are selected. Axial loads will generally not be applied to the proposed sheet pile weirs, so the depth that the piles are driven into the medium dense to dense soils beneath the existing peat will be the driving criteria during construction. Based on the subsurface conditions and our analyses, the following criteria and procedures should be established for sheet pile driving:

- The sheet piles should be driven to a minimum depth of 18 feet below the surrounding ground surface, or at least 10 feet below the bottom of the surcharged peat soils.
- A continuous driving record, including the depth of the bottom of the peat soils encountered, should be taken for the entire depth of the sheet piles.
- Acceptance criteria should be based on achieving target tip embedment.

During driving, the contractor should be made responsible for keeping pile driving records to include pile location, penetration rates, time of driving, length of driving, length of pile, and the finish tip elevation. The records should highlight problems or difficulties encountered during driving and the methods or measures taken to overcome the issues. We recommend that a qualified geotechnical engineer be on site during pile installation to observe the construction effort on behalf of the project owner to verify that the construction is carried out per plan and the actual sheet pile design.

6.3 Structural Fill and Compaction

Structural fill will be needed to construct a new access road, snow disposal pad, and portions of the containment berm. Structural fill that is imported should be clean, granular soil free of organic material and meet the gradation properties for Type II/IIA as specified by the MASS, which is presented as Figure 3. We also understand that unclassified fill materials will also be imported to construction portions of the embankments and a large portion of the containment berm. While these unclassified materials are not necessarily subject to gradation specifications, they must be able to be placed and compacted as follows.

We understand that existing soils from the project area will likely not be excavated during construction activities. If minor grading is conducted along the existing access road and parking area, the granular soils do not meet the gradation requirements for Type II/IIA fill based on the results of our laboratory testing. In our opinion, these materials are unsuitable

for reuse in the pavement structural section but may be reused as unclassified fill in areas of the embankments and containment berm that will receive unclassified fills, provided the contractor can demonstrate the ability to place and compact the material with proper moisture density control.

Structural fills below roadways should be placed in lifts not to exceed 10 to 12 inches loose thickness, and compacted to at least 95 percent of the maximum dry density as determined by the Modified Proctor compaction procedure (ASTM D1557). Non-structural fills, including portions of the containment that are not subject to traffic loads or adjacent to weirs, should be compacted to at least 90 percent of the Modified Proctor optimum dry density. Bulking of backfill should be discouraged as this can cause voids and lead to large future surface settlements. During fill placement, we recommend that large cobbles or boulders with dimensions in excess of 8 inches be removed from any structural fills.

7 CLOSURE AND LIMITATIONS

This report was prepared for the exclusive use of our client and their representatives for evaluating the site as it relates to the geotechnical aspects discussed herein. The conclusions and interpretation contained in this report are based on site conditions as they presently exist. It is assumed that the exploratory borings are representative of the subsurface conditions throughout the site, i.e., the subsurface conditions everywhere are not significantly different from those disclosed by the explorations.

If there is a substantial lapse of time between the submittal of this report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, it is recommended that this report be reviewed to determine the applicability of the conclusions considering the changed conditions and time lapse. Unanticipated soil conditions are commonly encountered and cannot fully be determined by merely taking soil samples or advancing test holes. Please read the Important Information section at the back of this report to reduce your project risks.

Copies of documents that may be relied upon by our client are limited to the printed copies (also known as hard copies) that are signed or sealed by Shannon & Wilson with a wet, blue ink signature. Files provided in electronic media format are furnished solely for the convenience of the client. Any conclusion or information obtained or derived from such electronic files shall be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, or you question the authenticity of the report please contact us.

Map adapted from files provided by the Alaska Department of Natural Resources

N

0 1.5 3

Miles

Connor's Bog Snow Dump
Anchorage, Alaska

VICINITY MAP

September 2021 106424-001

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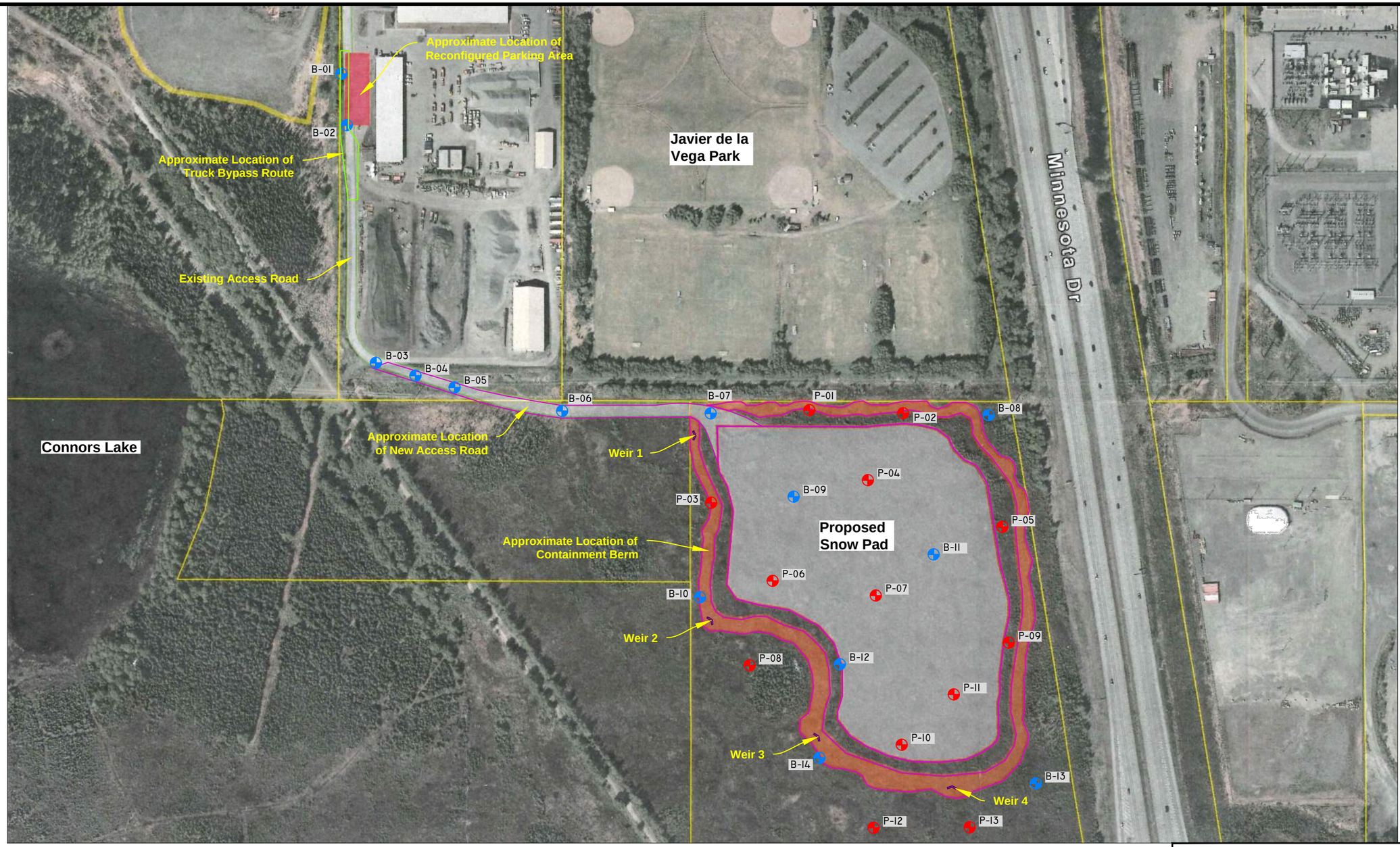
FIG. 1



LEGEND

P-01 — Approximate Location of Geotechnical Probe P-01, Advanced by Shannon & Wilson, March and April 2021.

B-01 — Approximate Location of Geotechnical Boring B-01, Advanced by Shannon & Wilson, March and April 2021.

NOTES

1. Base map adapted from aerial imagery provided by Google Earth Pro, reproduced by permission granted by Google EarthTM/ Mapping Service.

0 150 300 600

APPROXIMATE SCALE IN FEET

Connor's Bog Snow Dump
Anchorage, Alaska

SITE PLAN

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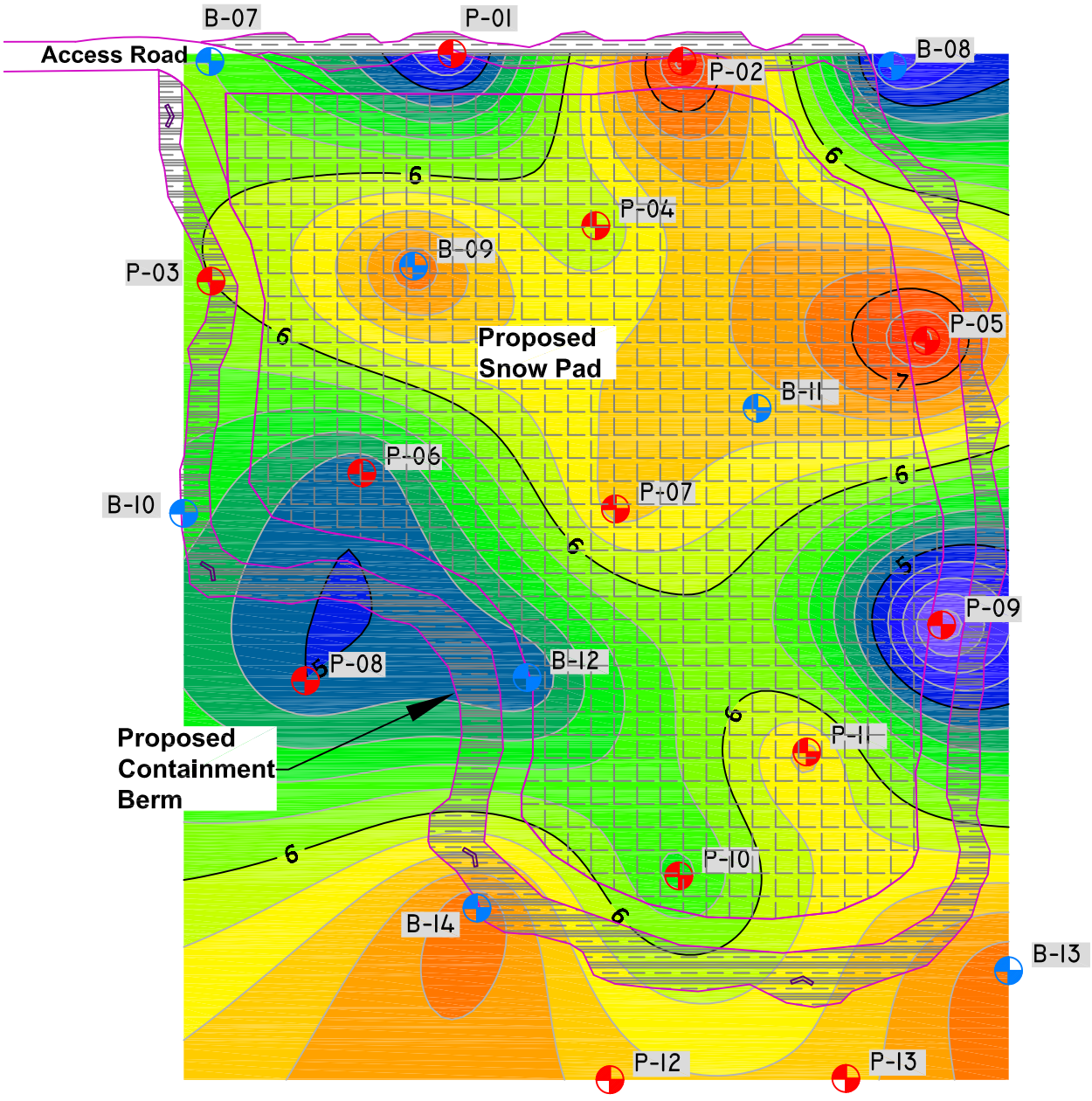
FIG. 2



LEGEND

P-01 — Approximate Location of Geotechnical Probe P-01, Advanced by Shannon & Wilson, March and April 2021.

B-01 — Approximate Location of Geotechnical Boring B-01, Advanced by Shannon & Wilson, March and April 2021.

5 6 7 — Peat thickness in feet. Cooler blue colors indicate thinner peat deposits, warmer red colors indicate thicker peat deposits.

N

0 100 200 400
APPROXIMATE SCALE IN FEET

NOTES

1. Major peat thickness contour intervals = 1 foot.
2. Peat contours taken from peat thicknesses provided in boring and probe logs.

Connor's Bog Snow Dump
Anchorage, Alaska

PEAT CONTOUR MAP

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FIG. 3

GRADATION REQUIREMENTS

(Adapted from Municipality of Anchorage Standard Specifications, 2015)

LEVELING COURSE

U.S. STANDARD SIEVE SIZE		PERCENT PASSING BY WEIGHT
English	Metric	
1 in.	25.0 mm	100
3/4 in.	19.0 mm	70 - 100
3/8 in.	9.5 mm	50 - 80
No. 4	4.75 mm	35 - 65
No. 8	2.36 mm	20 - 50
No. 50	0.30 mm	8 - 28
No. 200	0.075 mm	0 - 6*

TYPE II BACKFILL

U.S. STANDARD SIEVE SIZE		PERCENT PASSING BY WEIGHT
8 in.	-	100
3 in.	75 mm	70 - 100
1-1/2 in.	37.5 mm	55 - 100
3/4 in.	19.0 mm	45 - 85
No. 4	4.75 mm	20 - 60
No. 10	2.00 mm	12 - 50
No. 40	0.425 mm	4 - 30
No. 200	0.075 mm	2 - 6**

TYPE IIA BACKFILL

U.S. STANDARD SIEVE SIZE		PERCENT PASSING BY WEIGHT
3 in.	75 mm	100
3/4 in.	19.0 mm	50 - 100
No. 4	4.75 mm	25 - 60
No. 10	2.00 mm	15 - 50
No. 40	0.425 mm	4 - 30
No. 200	0.075 mm	2 - 6***

TYPE III BACKFILL

U.S. STANDARD SIEVE SIZE		PERCENT PASSING BY WEIGHT
8 in.	-	100
No. 200	0.075 mm	10 max.

E-1 SURFACE COURSE

(Adapted from Alaska DOT Standard Specifications, 2017)

U.S. STANDARD SIEVE SIZE		PERCENT PASSING BY WEIGHT
1 in.	25 mm	100
3/4 in.	19 mm	70-100
3/8 in.	9.5 mm	50 - 85
No. 4	4.75 mm	35 - 65
No. 8	2.36 mm	20 - 50
No. 50	0.30 mm	15 - 30
No. 200	0.075 mm	8 - 15

* The fraction passing the No. 200 sieve shall not exceed 75 percent of the fraction passing the No. 50 sieve.

** The fraction passing the No. 200 sieve shall not exceed 15 percent of the fraction passing the No. 4 sieve.

*** The fraction passing the No. 200 sieve shall not exceed 20 percent of the fraction passing the No. 4 sieve.

Connor's Bog Snow Dump
Anchorage, Alaska

GRADATION REQUIREMENTS

September 2021 106424-001

SHANNON & WILSON, INC.
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FIG. 4

Appendix A

Boring Logs and Laboratory Test Results

Subtitle if Applicable

APPENDIX A: BORING LOGS AND LABORATORY TEST RESULTS

CONTENTS

Shannon & Wilson, Inc. (S&W), uses a soil identification system modified from the Unified Soil Classification System (USCS). Elements of the USCS and other definitions are provided on this and the following pages. Soil descriptions are based on visual-manual procedures (ASTM D2488) and laboratory testing procedures (ASTM D2487), if performed.

S&W INORGANIC SOIL CONSTITUENT DEFINITIONS

CONSTITUENT[2]	FINE-GRAINED SOILS (50% or more fines)[1]	COARSE-GRAINED SOILS (less than 50% fines)[1]
Major	***Silt, Lean Clay, Elastic Silt,*** or ***Fat Clay***[3]	***Sand*** or ***Gravel***[4]
Modifying (Secondary) Precedes major constituent	30% or more coarse-grained: ***Sandy*** or ***Gravelly***[4]	More than 12% fine-grained: ***Silty*** or ***Clayey***[3]
Minor Follows major constituent	15% to 30% coarse-grained: ***with Sand*** or ***with Gravel***[4]	5% to 12% fine-grained: ***with Silt*** or ***with Clay***[3]
	30% or more total coarse-grained *and* lesser coarse-grained constituent is 15% or more: ***with Sand*** or ***with Gravel***[5]	15% or more of a second coarse-grained constituent: ***with Sand*** or ***with Gravel***[5]

[1]All percentages are by weight of total specimen passing a 3-inch sieve.
[2]The order of terms is: *Modifying Major with Minor*.
[3]Determined based on behavior.
[4]Determined based on which constituent comprises a larger percentage.
[5]Whichever is the lesser constituent.

MOISTURE CONTENT TERMS

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

STANDARD PENETRATION TEST (SPT) SPECIFICATIONS

Hammer:	140 pounds with a 30-inch free fall. Rope on 6- to 10-inch-diam. cathead 2-1/4 rope turns, > 100 rpm NOTE: If automatic hammers are used, blow counts shown on boring logs should be adjusted to account for efficiency of hammer.
Sampler:	10 to 30 inches long Shoe I.D. = 1.375 inches Barrel I.D. = 1.5 inches Barrel O.D. = 2 inches
N-Value:	Sum blow counts for second and third 6-inch increments. Refusal: 50 blows for 6 inches or less; 10 blows for 0 inches.

NOTE: Penetration resistances (N-values) shown on boring logs are as recorded in the field and have not been corrected for hammer efficiency, overburden, or other factors.

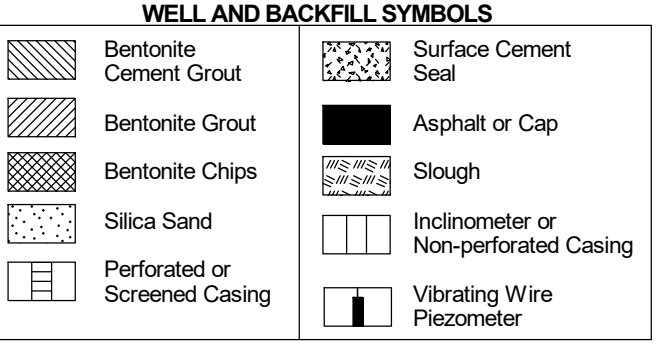
PARTICLE SIZE DEFINITIONS

DESCRIPTION	SIEVE NUMBER AND/OR APPROXIMATE SIZE
FINES	< #200 (0.075 mm = 0.003 in.)
SAND	
Fine	#200 to #40 (0.075 to 0.4 mm; 0.003 to 0.02 in.)
Medium	#40 to #10 (0.4 to 2 mm; 0.02 to 0.08 in.)
Coarse	#10 to #4 (2 to 4.75 mm; 0.08 to 0.187 in.)
GRAVEL	
Fine	#4 to 3/4 in. (4.75 to 19 mm; 0.187 to 0.75 in.)
Coarse	3/4 to 3 in. (19 to 76 mm)
COBBLES	3 to 12 in. (76 to 305 mm)
BOULDERS	> 12 in. (305 mm)

RELATIVE DENSITY / CONSISTENCY

COHESIONLESS SOILS		COHESIVE SOILS	
N, SPT, BLOWS/FT.	RELATIVE DENSITY	N, SPT, BLOWS/FT.	RELATIVE CONSISTENCY
< 4	Very loose	< 2	Very soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium dense	4 - 8	Medium stiff
30 - 50	Dense	8 - 15	Stiff
> 50	Very dense	15 - 30	Very stiff
		> 30	Hard

WELL AND BACKFILL SYMBOLS



PERCENTAGES TERMS[1, 2]

Trace	< 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

[1]Gravel, sand, and fines estimated by mass. Other constituents, such as organics, cobbles, and boulders, estimated by volume.

[2]Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

Connor's Bog Snow Dump
Anchorage, Alaska

SOIL DESCRIPTION AND LOG KEY

September 2021 106424-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-1
Sheet 1 of 3

2013 BORING CLASS1 GINT TEMPLATE7.GPJ SWNEW.GDT 8/9/21

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)
(Modified From USACE Tech Memo 3-357, ASTM D2487, and ASTM D2488)

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL		TYPICAL IDENTIFICATIONS
COARSE-GRAINED SOILS *(more than 50% retained on No. 200 sieve)*	Gravels *(more than 50% of coarse fraction retained on No. 4 sieve)*	Gravel *(less than 5% fines)*	GW		Well-Graded Gravel; Well-Graded Gravel with Sand
			GP		Poorly Graded Gravel; Poorly Graded Gravel with Sand
		Silty or Clayey Gravel *(more than 12% fines)*	GM		Silty Gravel; Silty Gravel with Sand
			GC		Clayey Gravel; Clayey Gravel with Sand
	Sands *(50% or more of coarse fraction passes the No. 4 sieve)*	Sand *(less than 5% fines)*	SW		Well-Graded Sand; Well-Graded Sand with Gravel
			SP		Poorly Graded Sand; Poorly Graded Sand with Gravel
		Silty or Clayey Sand *(more than 12% fines)*	SM		Silty Sand; Silty Sand with Gravel
			SC		Clayey Sand; Clayey Sand with Gravel
FINE-GRAINED SOILS *(50% or more passes the No. 200 sieve)*	Silts and Clays *(liquid limit less than 50)*	Inorganic	ML		Silt; Silt with Sand or Gravel; Sandy or Gravelly Silt
			CL		Lean Clay; Lean Clay with Sand or Gravel; Sandy or Gravelly Lean Clay
		Organic	OL		Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
	Silts and Clays *(liquid limit 50 or more)*	Inorganic	MH		Elastic Silt; Elastic Silt with Sand or Gravel; Sandy or Gravelly Elastic Silt
			CH		Fat Clay; Fat Clay with Sand or Gravel; Sandy or Gravelly Fat Clay
		Organic	OH		Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
HIGHLY-ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT		Peat or other highly organic soils (see ASTM D4427)

NOTE: No. 4 size = 4.75 mm = 0.187 in.; No. 200 size = 0.075 mm = 0.003 in.

NOTES

1. Dual symbols *(symbols separated by a hyphen, i.e., SP-SM, Sand with Silt)* are used for soils with between 5% and 12% fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart. Graphics shown on the logs for these soil types are a combination of the two graphic symbols (e.g., SP and SM).

2. Borderline symbols *(symbols separated by a slash, i.e., CL/ML, Lean Clay to Silt; SP-SM/SM, Sand with Silt to Silty Sand)* indicate that the soil properties are close to the defining boundary between two groups.

Connor's Bog Snow Dump
Anchorage, Alaska

SOIL DESCRIPTION AND LOG KEY

September 2021 106424-001

SHANNON & WILSON, INC.
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FIG. A-1
Sheet 2 of 3

GRADATION TERMS

Poorly Graded	Narrow range of grain sizes present or, within the range of grain sizes present, one or more sizes are missing (Gap Graded). Meets criteria in ASTM D2487, if tested.
Well-Graded	Full range and even distribution of grain sizes present. Meets criteria in ASTM D2487, if tested.

CEMENTATION TERMS[1]

Weak	Crumbles or breaks with handling or slight finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

PLASTICITY[2]

DESCRIPTION	VISUAL-MANUAL CRITERIA	APPROX. PLASITICTY INDEX RANGE
Nonplastic	A 1/8-in. thread cannot be rolled at any water content.	< 4
Low	A thread can barely be rolled and a lump cannot be formed when drier than the plastic limit.	4 to 10
Medium	A thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. A lump crumbles when drier than the plastic limit.	10 to 20
High	It take considerable time rolling and kneading to reach the plastic limit. A thread can be rerolled several times after reaching the plastic limit. A lump can be formed without crumbling when drier than the plastic limit.	> 20

ADDITIONAL TERMS

Mottled	Irregular patches of different colors.
Bioturbated	Soil disturbance or mixing by plants or animals.
Diamict	Nonsorted sediment; sand and gravel in silt and/or clay matrix.
Cuttings	Material brought to surface by drilling.
Slough	Material that caved from sides of borehole.
Sheared	Disturbed texture, mix of strengths.

PARTICLE ANGULARITY AND SHAPE TERMS[1]

Angular	Sharp edges and unpolished planar surfaces.
Subangular	Similar to angular, but with rounded edges.
Subrounded	Nearly planar sides with well-rounded edges.
Rounded	Smoothly curved sides with no edges.
Flat	Width/thickness ratio > 3.
Elongated	Length/width ratio > 3.

ACRONYMS AND ABBREVIATIONS

ATD	At Time of Drilling
Diam.	Diameter
Elev.	Elevation
ft.	Feet
FeO	Iron Oxide
gal.	Gallons
Horiz.	Horizontal
HSA	Hollow Stem Auger
I.D.	Inside Diameter
in.	Inches
lbs.	Pounds
MgO	Magnesium Oxide
mm	Millimeter
MnO	Manganese Oxide
NA	Not Applicable or Not Available
NP	Nonplastic
O.D.	Outside Diameter
OW	Observation Well
pcf	Pounds per Cubic Foot
PID	Photo-Ionization Detector
PMT	Pressuremeter Test
ppm	Parts per Million
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
rpm	Rotations per Minute
SPT	Standard Penetration Test
USCS	Unified Soil Classification System
q_u	Unconfined Compressive Strength
VWP	Vibrating Wire Piezometer
Vert.	Vertical
WOH	Weight of Hammer
WOR	Weight of Rods
Wt.	Weight

STRUCTURE TERMS[1]

Interbedded	Alternating layers of varying material or color with layers at least 1/4-inch thick; singular: bed.
Laminated	Alternating layers of varying material or color with layers less than 1/4-inch thick; singular: lamination.
Fissured	Breaks along definite planes or fractures with little resistance.
Slickensided	Fracture planes appear polished or glossy; sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps that resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay.
Homogeneous	Same color and appearance throughout.

[1]Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.
[2]Adapted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

Connor's Bog Snow Dump
Anchorage, Alaska

SOIL DESCRIPTION AND LOG KEY

September 2021 106424-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-1
Sheet 3 of 3

2013 BORING CLASS3 GINT TEMPLATE7.GPJ SWNEW.GDT 8/9/21

FROST CLASSIFICATION

(after Municipality of Anchorage, 2007)

GROUP		0.02 Mil.	P-200*	USC SYSTEM (based on P-200 results)
NFS	Sandy Soils	0 to 3	0 to 6	SW, SP, SW-SM, SP-SM
	Gravelly Soils	0 to 3	0 to 6	GW, GP, GW-GM, GP-GM
F1	Gravelly Soils	3 to 10	6 to 13	GM, GW-GM, GP-GM
F2	Sandy Soils	3 to 15	6 to 19	SP-SM, SW-SM, SM
	Gravelly Soils	10 to 20	13 to 25	GM
F3	Sands, except very fine silty sands**	Over 15	Over 19	SM, SC
	Gravelly Soils	Over 20	Over 25	GM, GC
	Clays, PI>12			CL, CH
F4	All Silts	Over 15	Over 19	ML, MH
	Very fine silty sands**			SM, SC
	Clays, PI<12			CL, CL-ML
	Varved clays and other fined grained, banded sediments			CL and ML CL, ML, and SM; SL, SH, and ML; CL, CH, ML, and SM

PI = Plasticity Index
P-200 = Percent passing the number 200 sieve
0.02 Mil. = Percent material below 0.02 millimeter grain size

*Approximate P-200 value equivalent for frost classification. Value range based on typical, well-graded soil curves.

** Very fine sand : greater than 50% of sand fraction passing the number 100 sieve

Connors Bog Snow Dump
Anchorage, Alaska

FROST CLASSIFICATION LEGEND

August 2021 106424-001

SHANNON & WILSON, INC.
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FIG. A-2

MATERIAL DESCRIPTION

Lat.: 61.16909 N Long.: 149.9278 W

Approx. Elevation: 83 Ft. Datum: WGS 84

Depth, Ft.	Material Description
0.5	Medium stiff, dark brown, *Organic Silt (OL)*; moist [Organic Mat]
4.5	Loose to medium dense, dark brown, *Silty Sand with Gravel (SM)*; moist; few organics [FILL?]
7.0	Medium dense, brown, interbedded *Silt (ML)* and *Poorly Graded Sand with Silt (SP-SM)*; moist
	S4: 11% Gravel, 84% Sand, 5% Fines (NFS)
13.0	Dense, gray-brown to brown, *Poorly Graded Sand (SP)* to *Poorly Graded Sand with Silt and Gravel (SP-SM)*; moist to wet
16.5	Stiff, gray *Silt with Sand (ML)*; wet
	Bottom of Boring Boring Completed 4/30/2021

Symbol

Samples: S1, S2 *, S3, S4, S5, S6

Ground Water Depth, Ft.: 4/30/21

Penetration Resistance
(140 lb. weight, 30" drop)
▲ Blows per foot
● Water Content (%)

0 25 50 75 100

5 10 15 20 25 30 35 40 45

LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample
Ground Water Level At Time Of Drilling

● Water Content (%)
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF BORING B-01

September 2021 106424-001

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FIG. A-3

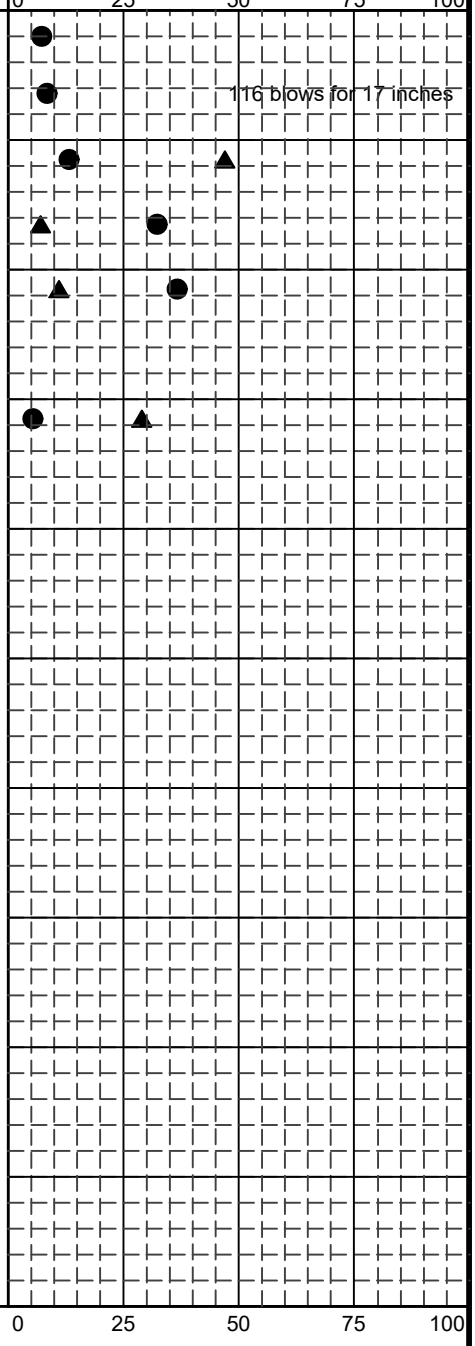
REV 3 - Approved for Submittal

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

MATERIAL DESCRIPTION	Depth, Ft.	Symbol	Samples
Lat.: 61.16865 N Long.: 149.9278 W Approx. Elevation: 91 Ft. Datum: WGS 84			
2 inches Asphalt	0.2		S1
S2: 34% Gravel, 49% Sand, 17% Fines (F2) Frozen, gray to dark brown, *Silty Sand with Gravel (SM)*; moist; trace organics from approximately 4.5 to 7 feet bgs [FILL]			S2, S3
Medium stiff, brown, *Organic Soil with Sand (OL)*; moist	7.0		S4
Stiff, brown *Peat (PT)*; moist; occasional granular soil pockets	9.5		S5
Medium dense, gray-brown, *Poorly Graded Sand with Silt (SP-SM)*; moist	12.0		S6
Bottom of Boring Boring Completed 4/5/2021	16.5		

Ground Water Depth, Ft.: Groundwater not encountered during drilling on 4/5/2021

Penetration Resistance
(140 lb. weight, 30" drop)
▲ Blows per foot
● Water Content (%)



LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample

Frozen

● Water Content (%)
Plastic Limit — Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF BORING B-02

September 2021 106424-001

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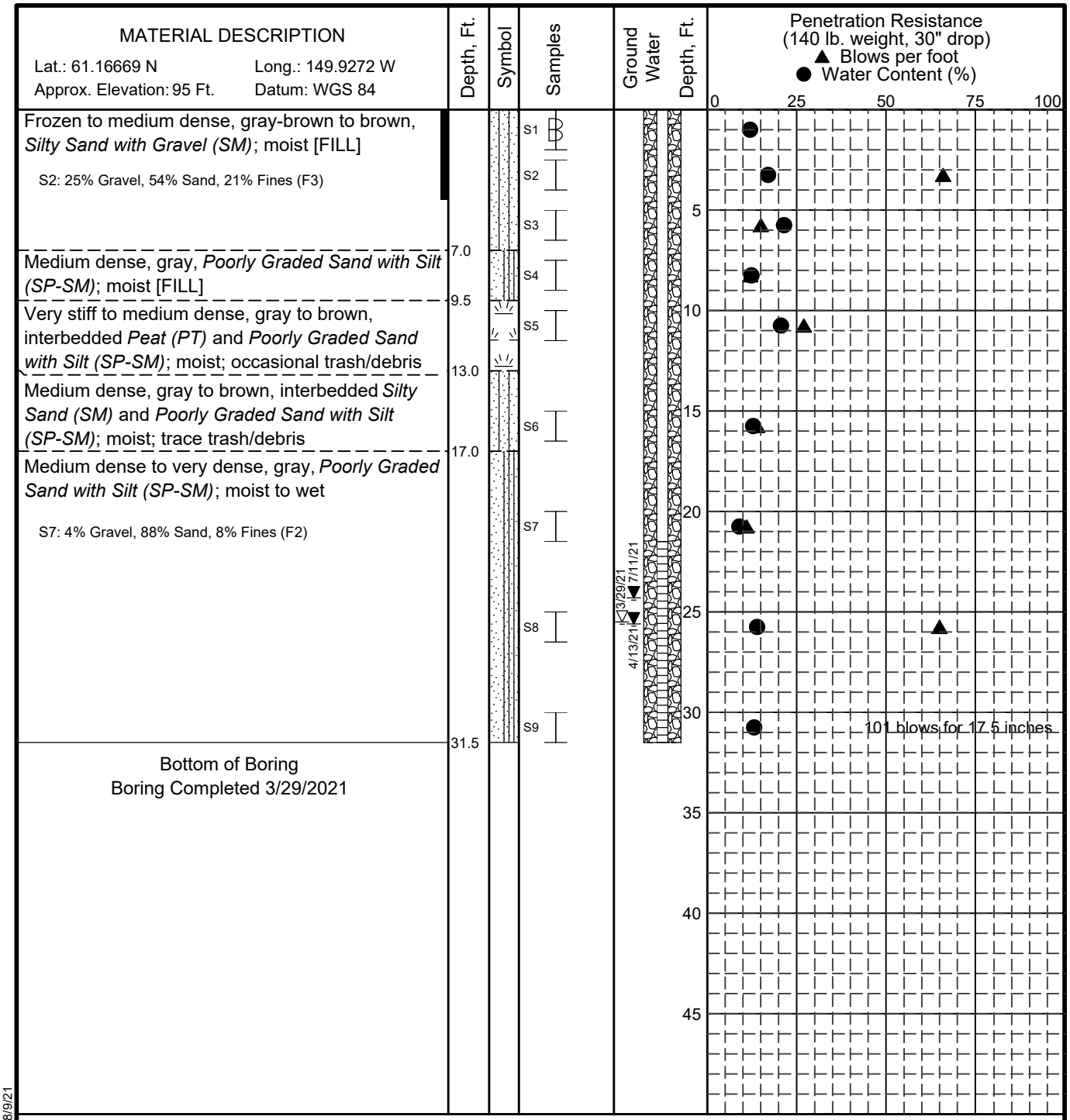
FIG. A-4

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal



LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample
Frozen
Ground Water Level At Time Of Drilling
Static Water Level
Blank Section, Cuttings Backfill
Slotted Section, Cuttings Backfill

Water Content (%)
Plastic Limit — Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF BORING B-03

September 2021 106424-001

SHANNON & WILSON, INC.
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FIG. A-5

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal

MATERIAL DESCRIPTION	Depth, Ft.	Symbol	Samples
Lat.: 61.1666 N Long.: 149.9266 W Approx. Elevation: 103 Ft. Datum: WGS 84			
Stiff, brown, *Sandy Silt (ML)*; moist; trace organics [FILL]			S1
	2.2		
S2: 7% Gravel, 73% Sand, 20% Fines (F3)			S2
Medium dense to dense, brown to dark gray, *Silty Sand* to *Silty Sand with Gravel (SM)*; moist; trace organics [FILL]			S3
			S4
	9.5		
Loose, gray, *Silty Sand (SM)*; moist [FILL]			S5
	13.0		
Loose, gray, *Silty Sand with Gravel (SM)*; moist; few organics [FILL]			S6
	16.5		
Bottom of Boring Boring Completed 4/30/2021			

Ground Water Depth, Ft.

Groundwater not encountered during drilling on 4/30/2021

Penetration Resistance
(140 lb. weight, 30" drop)
▲ Blows per foot
● Water Content (%)

0 25 50 75 100

5 10 15 20 25 30 35 40 45

0 25 50 75 100

● Water Content (%)
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF BORING B-04

September 2021 106424-001

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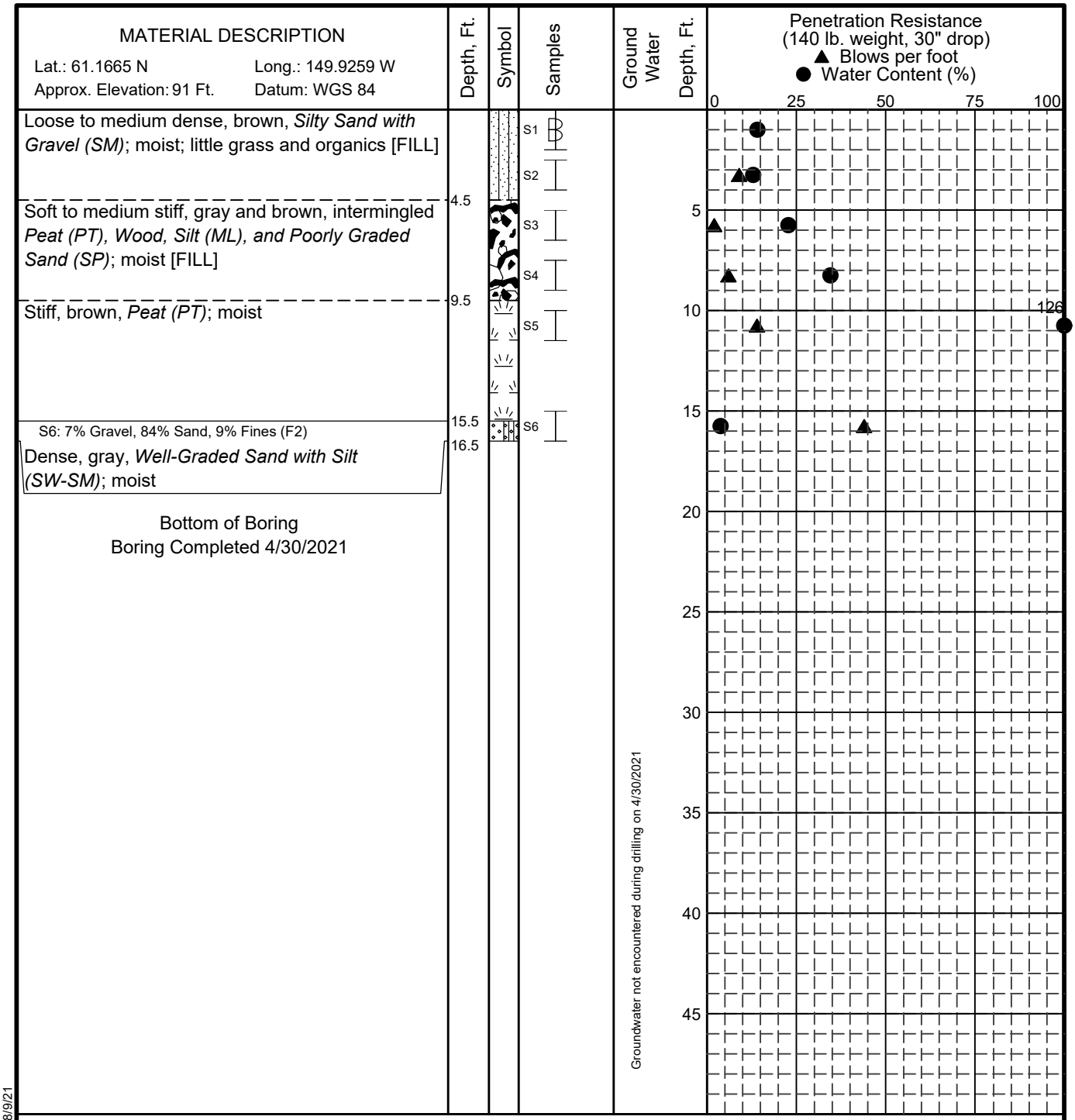
FIG. A-6

REV 3 - Approved for Submittal

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21



LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample

Water Content (%)
Plastic Limit — Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF BORING B-05

September 2021 106424-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-7

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal

MATERIAL DESCRIPTION

Lat.: 61.16631 N Long.: 149.9241 W

Approx. Elevation: 82 Ft. Datum: WGS 84

Frozen to soft, brown *Peat (PT)*; moist

5.5

Medium dense to dense, gray, *Poorly Graded Sand with Silt (SP-SM)* to *Poorly Graded Sand (SP)*; moist to wet

S5: 10% Gravel, 85% Sand, 5% Fines (NFS)

16.5

Bottom of Boring
Boring Completed 3/30/2021

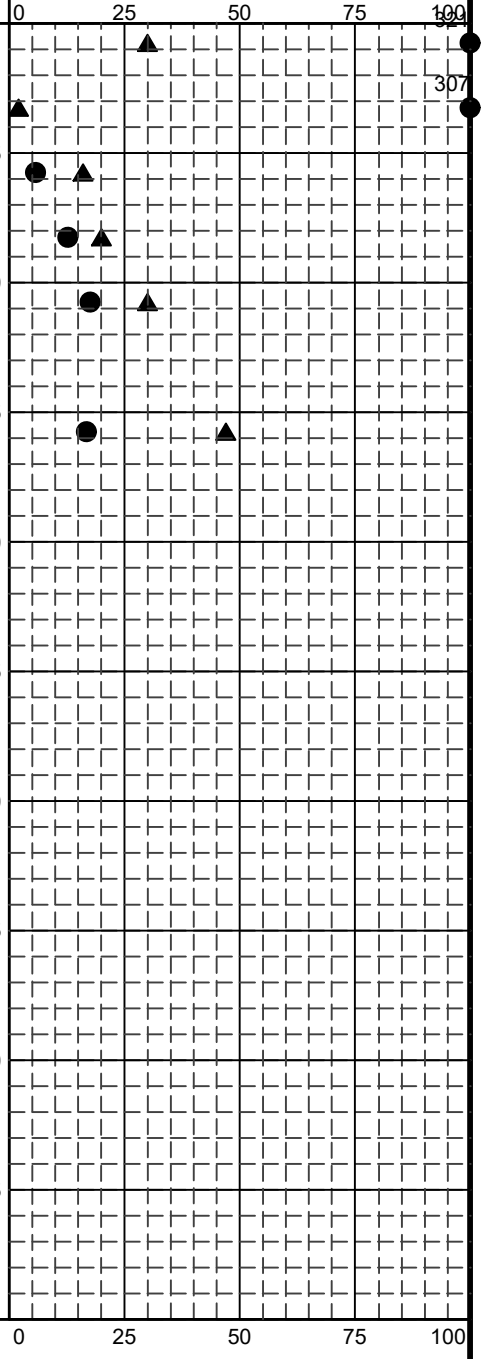
Depth, Ft.

Symbol

Samples: S1, S2, S3, S4, S5, S6

Ground Water Depth, Ft.: 7/11/21; 3/30/21; 4/13/21

Penetration Resistance
(140 lb. weight, 30" drop)
▲ Blows per foot
● Water Content (%)



LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample
Frozen
Ground Water Level At Time Of Drilling
Static Water Level
Blank Section, Cuttings Backfill
Slotted Section, Cuttings Backfill
● Water Content (%)
Plastic Limit — Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF BORING B-06

September 2021 106424-001

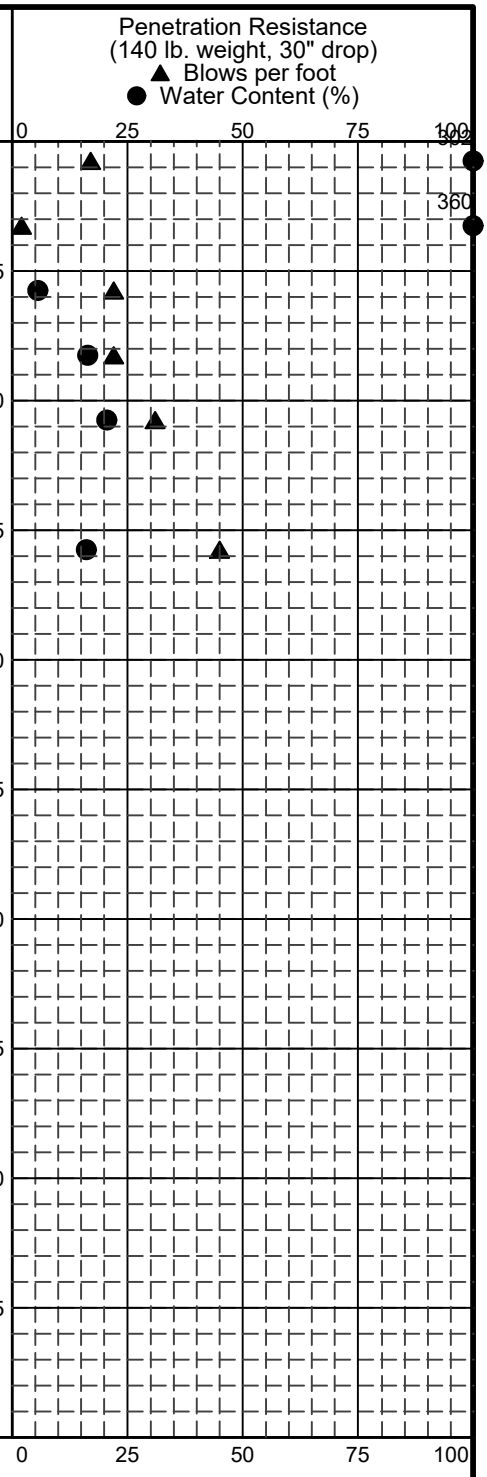
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-8

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal

MATERIAL DESCRIPTION	Depth, Ft.	Symbol	Samples	Ground Water Depth, Ft.
Lat.: 61.16629 N Long.: 149.9217 W Approx. Elevation: 82 Ft. Datum: WGS 84				
Frozen to soft, brown *Peat (PT)*; moist			S1, S2	3/30/21 ▽
Medium dense to dense, gray to black, *Poorly Graded Sand with Silt and Gravel (SP-SM)* to *Poorly Graded Sand (SP)*; moist to wet S4: 15% Gravel, 79% Sand, 6% Fines (F2)	5.8		S3, S4, S5	
Bottom of Boring Boring Completed 3/30/2021	16.5		S6	



LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample
▽ Ground Water Level At Time Of Drilling
Frozen

● Water Content (%)
Plastic Limit — Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF BORING B-07

September 2021 106424-001

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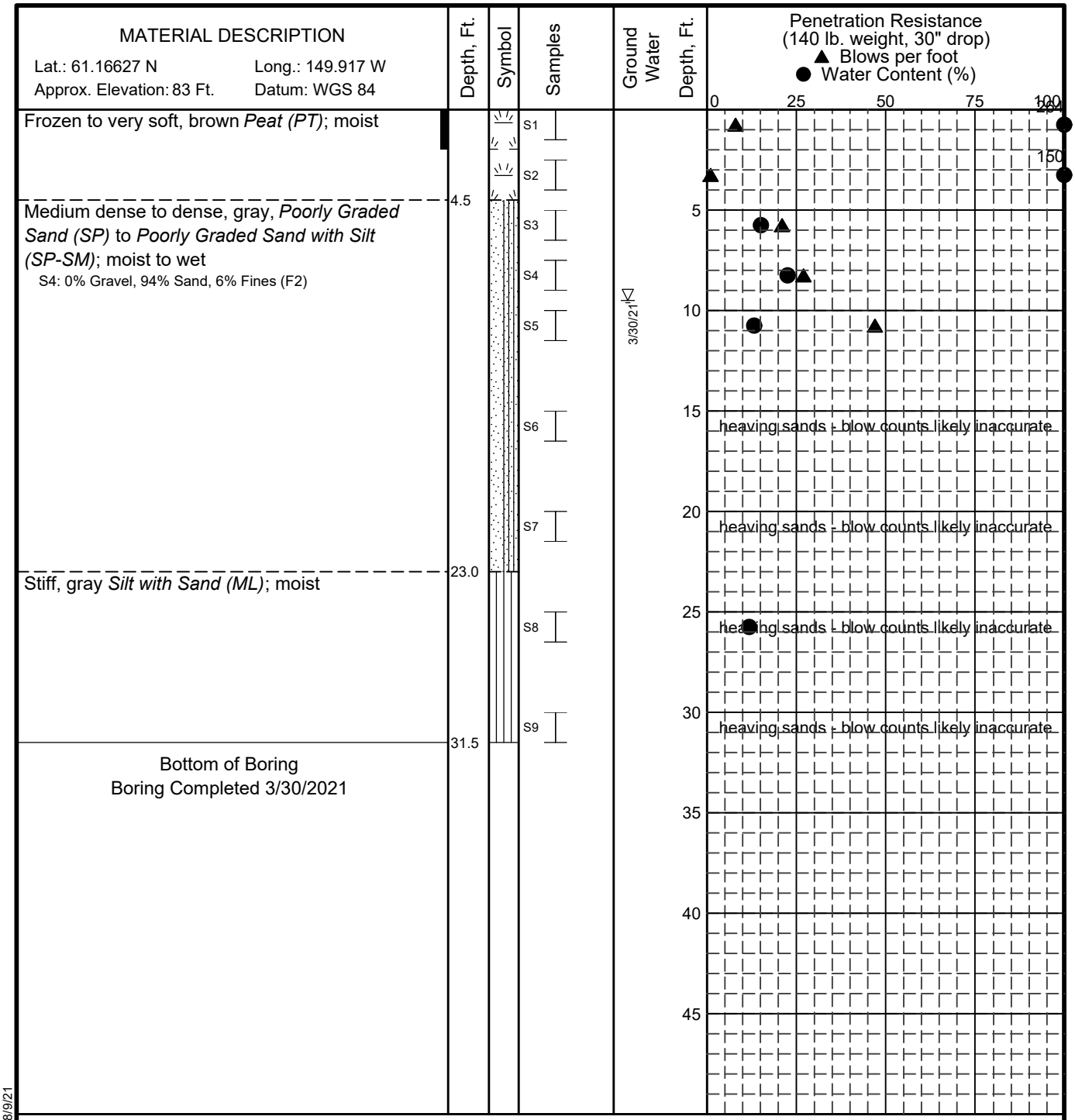
FIG. A-9

REV 3 - Approved for Submittal

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21



LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample
Frozen
Ground Water Level At Time Of Drilling
Water Content (%)
Plastic Limit — Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF BORING B-08

September 2021 106424-001

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FIG. A-10

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

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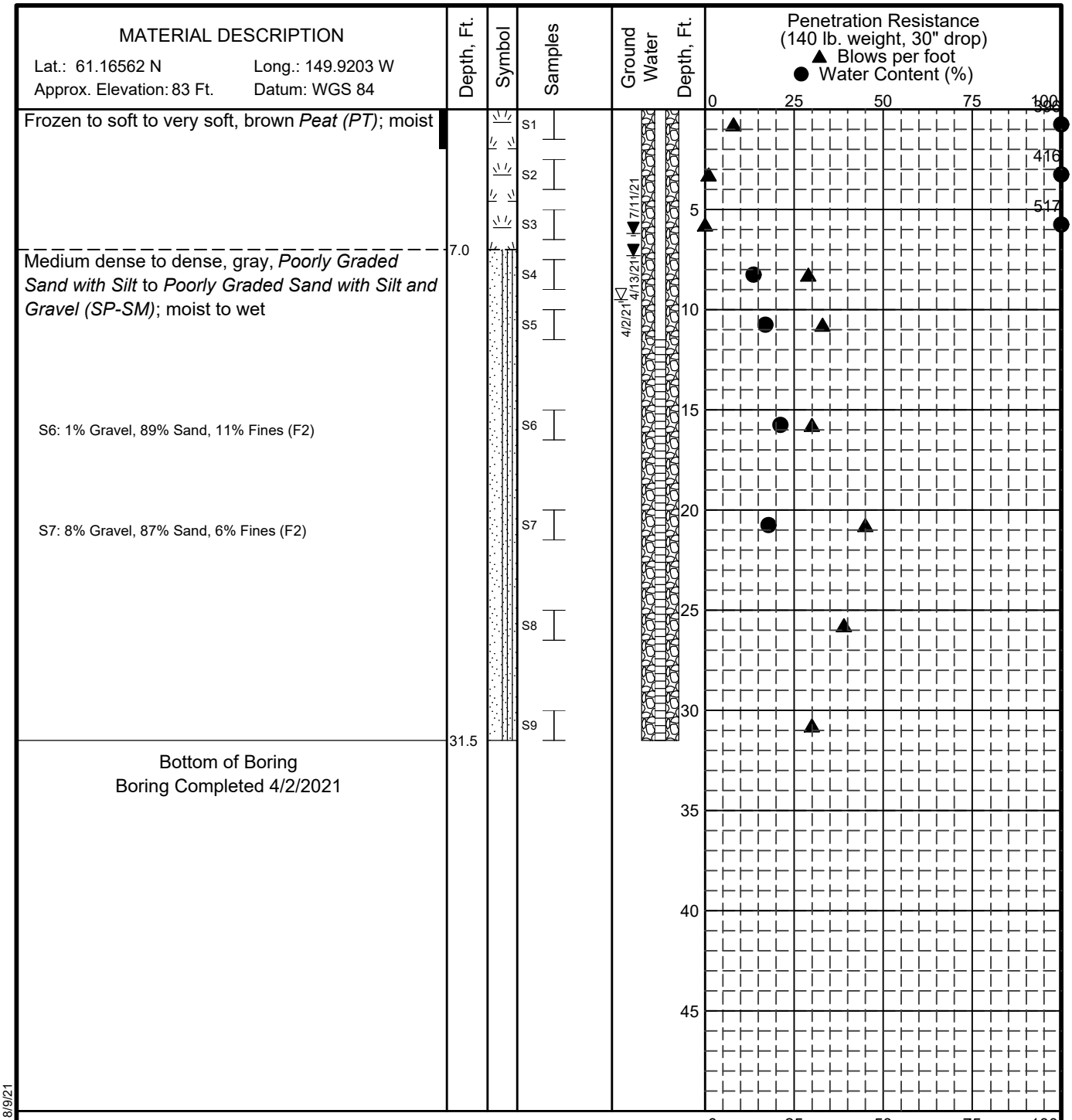

LEGEND

- * Sample Not Recovered
- 2" O.D. Split Spoon Sample
- Grab Sample
- Frozen
- Ground Water Level At Time Of Drilling
- Static Water Level
- Blank Section, Cuttings Backfill
- Slotted Section, Cuttings Backfill
- Water Content (%)
- Plastic Limit — Liquid Limit
- Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF BORING B-09

September 2021 106424-001

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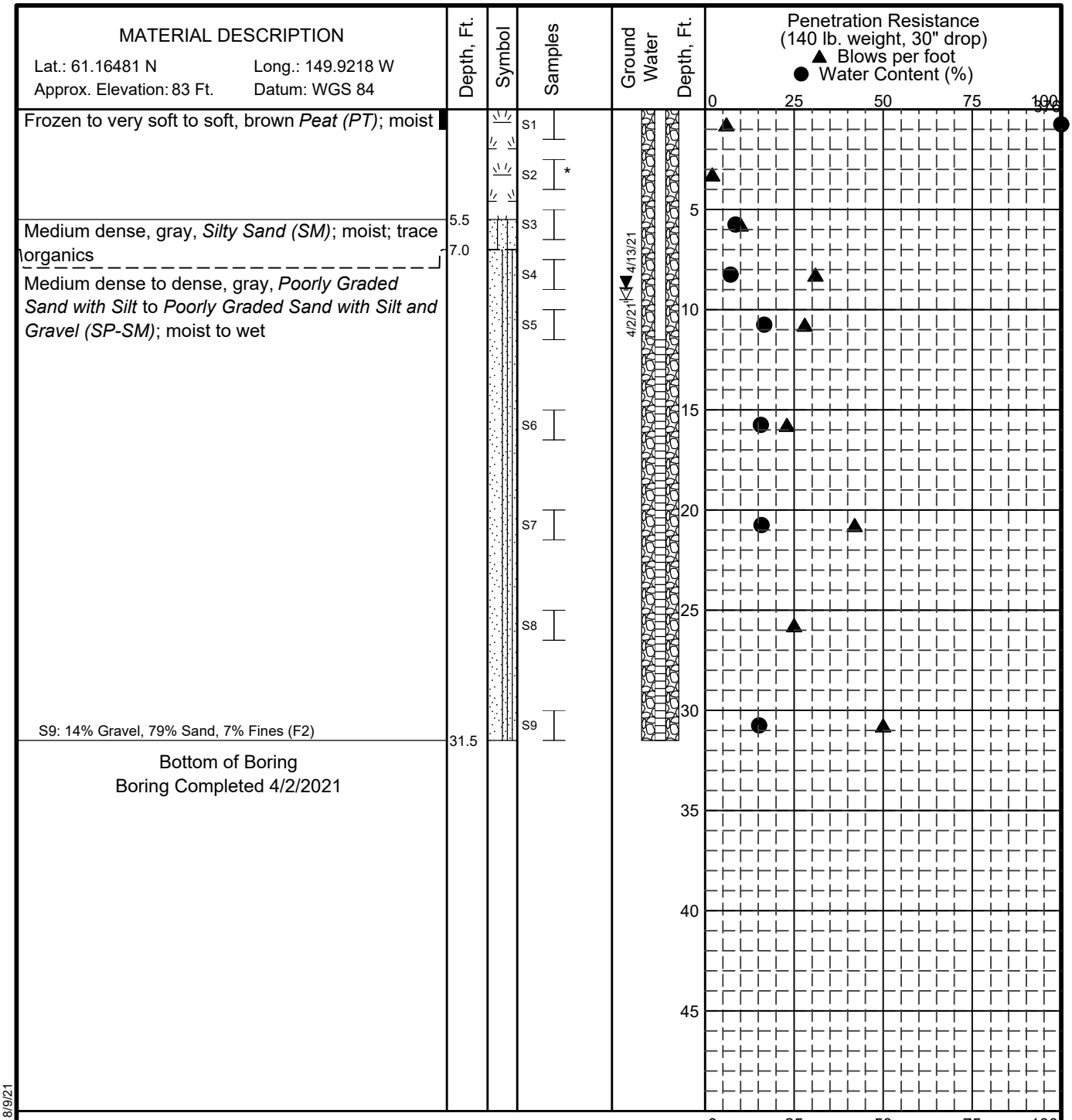
FIG. A-11

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal



LEGEND

- * Sample Not Recovered
- 2" O.D. Split Spoon Sample
- Grab Sample
- Frozen
- Ground Water Level At Time Of Drilling
- Static Water Level
- Blank Section, Cuttings Backfill
- Slotted Section, Cuttings Backfill
- Water Content (%)
- Plastic Limit — Liquid Limit
- Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF BORING B-10

September 2021 106424-001

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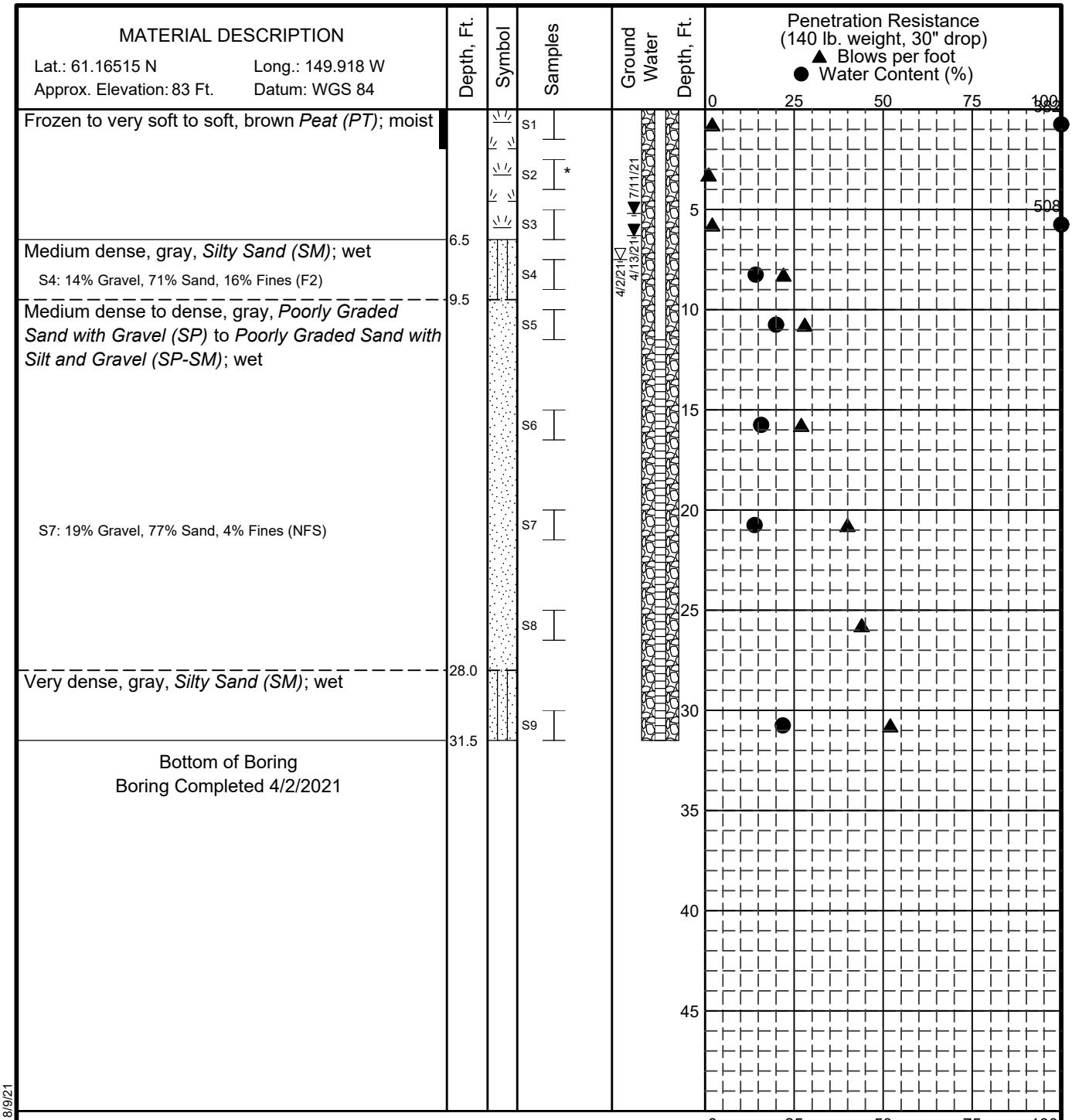
FIG. A-12

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal



LEGEND

- * Sample Not Recovered
- 2" O.D. Split Spoon Sample
- Grab Sample
- Frozen
- Ground Water Level At Time Of Drilling
- Static Water Level
- Blank Section, Cuttings Backfill
- Slotted Section, Cuttings Backfill
- Water Content (%)
- Plastic Limit — Liquid Limit
- Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF BORING B-11

September 2021 106424-001

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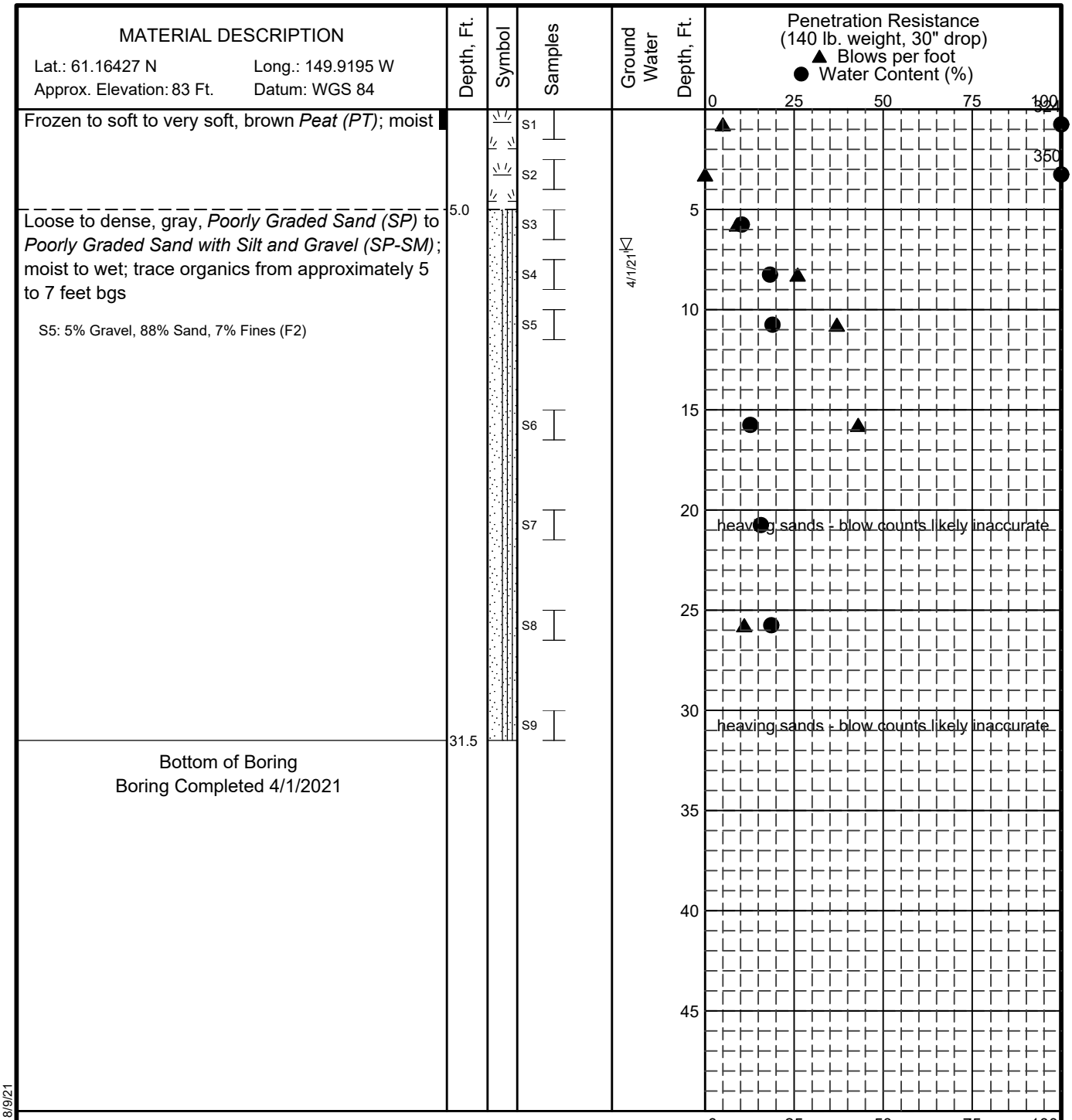
FIG. A-13

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal



LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample
Ground Water Level At Time Of Drilling
Frozen
Water Content (%)
Plastic Limit — Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF BORING B-12

September 2021 106424-001

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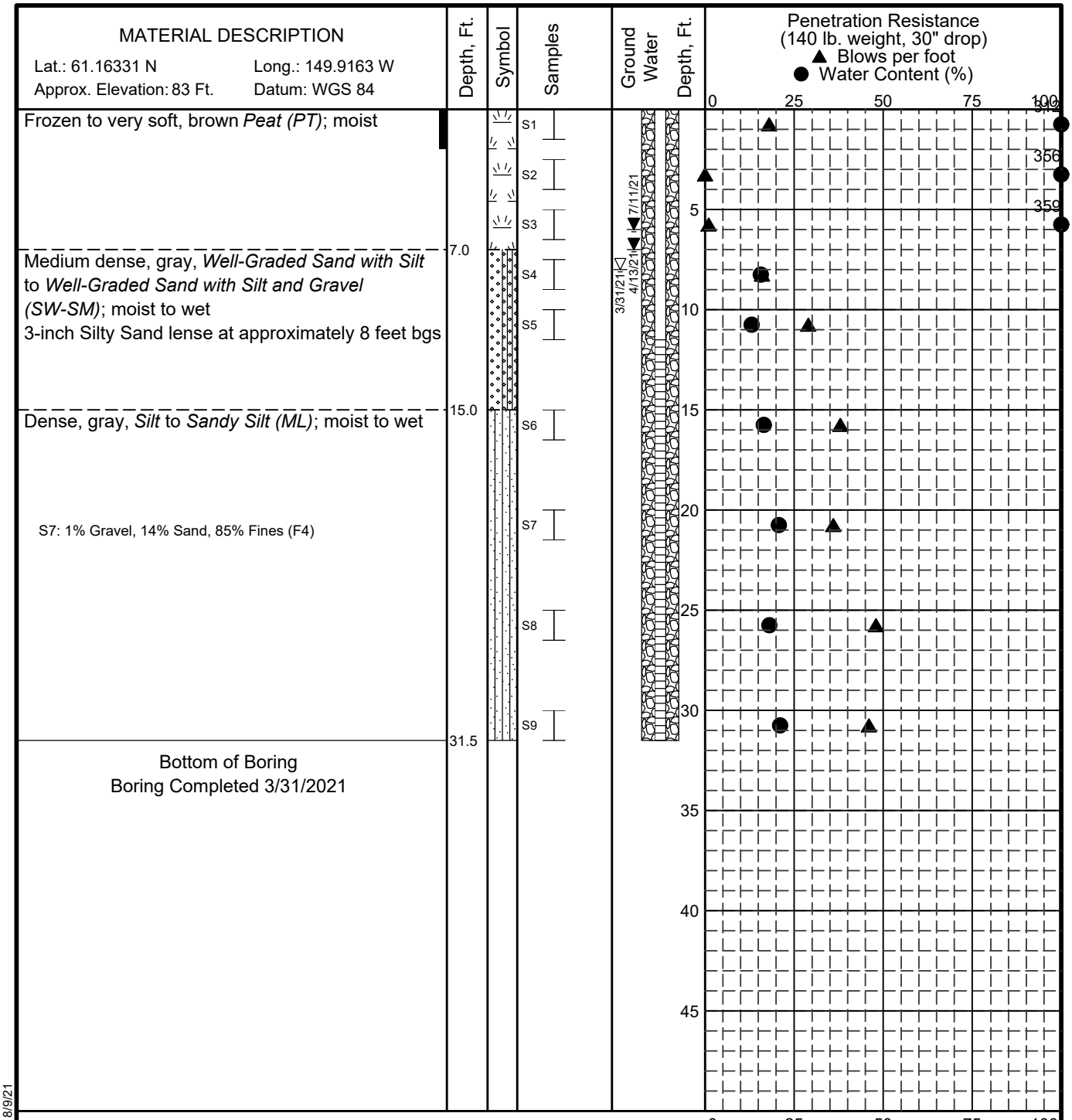
FIG. A-14

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal



LEGEND

- * Sample Not Recovered
- 2" O.D. Split Spoon Sample
- Grab Sample
- Frozen
- Ground Water Level At Time Of Drilling
- Static Water Level
- Blank Section, Cuttings Backfill
- Slotted Section, Cuttings Backfill

● Water Content (%)
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF BORING B-13

September 2021 106424-001

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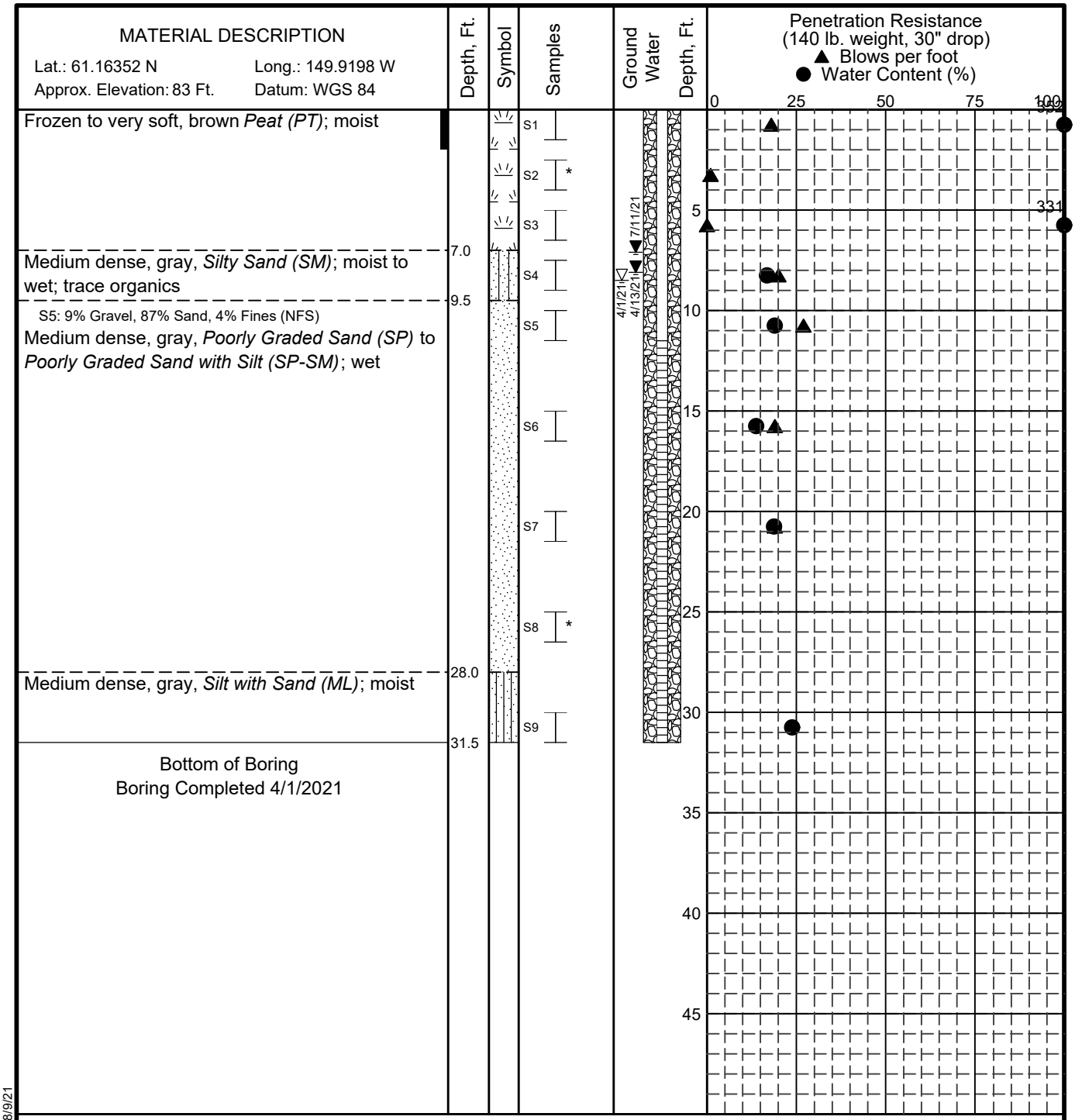
FIG. A-15

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal



LEGEND

- * Sample Not Recovered
- 2" O.D. Split Spoon Sample
- Grab Sample
- Frozen
- Ground Water Level At Time Of Drilling
- Static Water Level
- Blank Section, Cuttings Backfill
- Slotted Section, Cuttings Backfill
- Water Content (%)
- Plastic Limit — Liquid Limit
- Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF BORING B-14

September 2021 106424-001

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FIG. A-16

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal

MATERIAL DESCRIPTION	Depth, Ft.	Symbol	Samples
Lat.: 61.16631 N Long.: 149.92 W Approx. Elevation: 83 Ft. Datum: WGS 84			
Frozen to very soft to soft, brown *Peat (PT)*; moist			
	4.5		
S1: 4% Gravel, 91% Sand, 5% Fines (NFS) Medium dense, dark gray, *Poorly Graded Sand with Silt (SP-SM)*; moist			S1
	6.5		
Bottom of Boring Boring Completed 3/30/2021			

Ground Water Depth, Ft.

Groundwater not encountered during drilling on 3/30/2021

Penetration Resistance
(140 lb. weight, 30" drop)
▲ Blows per foot
● Water Content (%)

0 25 50 75 100

5 10 15 20 25 30 35 40 45

0 25 50 75 100

● Water Content (%)
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample

Frozen

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF PROBE P-01

September 2021 106424-001

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FIG. A-17

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal

MATERIAL DESCRIPTION	Depth, Ft.	Symbol	Samples	Ground Water Depth, Ft.
Lat.: 61.16628 N Long.: 149.9185 W Approx. Elevation: 83 Ft. Datum: WGS 84				
Frozen to very soft to soft, brown *Peat (PT)*; moist				
S1: 3% Gravel, 92% Sand, 5% Fines (NFS) Medium dense, gray, *Poorly Graded Sand with Silt (SP-SM)*; moist	7.5 9.0		S1	
Bottom of Boring Boring Completed 3/30/2021				

Groundwater not encountered during drilling on 3/30/2021

Penetration Resistance
(140 lb. weight, 30" drop)
▲ Blows per foot
● Water Content (%)

0 25 50 75 100

5 10 15 20 25 30 35 40 45

0 25 50 75 100

● Water Content (%)
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample

Frozen

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF PROBE P-02

September 2021 106424-001

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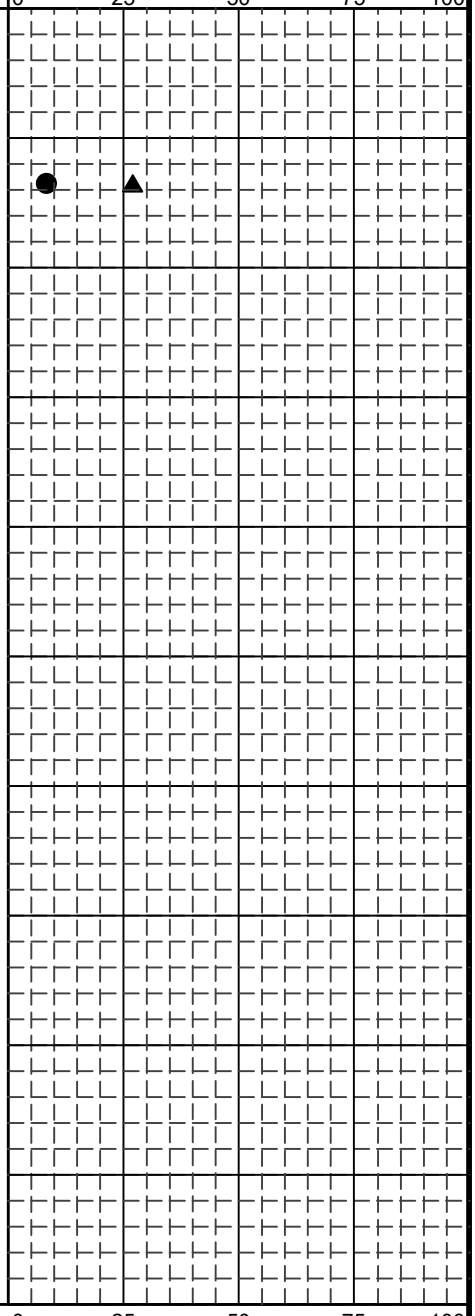
FIG. A-18

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal

MATERIAL DESCRIPTION	Depth, Ft.	Symbol	Samples	Ground Water Depth, Ft.
Lat.: 61.16557 N Long.: 149.9216 W Approx. Elevation: 83 Ft. Datum: WGS 84				
Frozen to very soft to soft, brown *Peat (PT)*; moist				
	6.0			
S1: 13% Gravel, 82% Sand, 5% Fines (NFS) Medium dense, gray, *Poorly Graded Sand with Silt (SP-SM)*; moist	7.5		S1	
Bottom of Boring Boring Completed 4/5/2021				

Groundwater not encountered during drilling on 4/5/2021



LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample

Frozen

● Water Content (%)
Plastic Limit — Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF PROBE P-03

September 2021 106424-001

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FIG. A-19

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal

MATERIAL DESCRIPTION	Depth, Ft.	Symbol	Samples
Lat.: 61.16575 N Long.: 149.9191 W Approx. Elevation: 83 Ft. Datum: WGS 84			
Frozen to very soft to soft, brown *Peat (PT)*; moist			
	6.0		
S1: 6% Gravel, 84% Sand, 10% Fines (F2) Medium dense, gray, *Well-Graded Sand with Silt (SW-SM)*; moist	7.5		S1
Bottom of Boring Boring Completed 4/5/2021			

Ground Water Depth, Ft.: Groundwater not encountered during drilling on 4/5/2021

Penetration Resistance
(140 lb. weight, 30" drop)
▲ Blows per foot
● Water Content (%)

0 25 50 75 100

5 10 15 20 25 30 35 40 45

0 25 50 75 100

● Water Content (%)
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample

Frozen

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF PROBE P-04

September 2021 106424-001

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FIG. A-20

REV 3 - Approved for Submittal

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

MATERIAL DESCRIPTION	Depth, Ft.	Symbol	Samples	Ground Water Depth, Ft.
Lat.: 61.16537 N Long.: 149.9168 W Approx. Elevation: 83 Ft. Datum: WGS 84				
Frozen to very soft to soft, brown *Peat (PT)*; moist				
	7.5			
S1: 9% Gravel, 86% Sand, 4% Fines (NFS) Medium dense, gray, *Poorly Graded Sand (SP)*; moist	9.0		S1	
Bottom of Boring Boring Completed 3/31/2021				

Groundwater not encountered during drilling on 3/31/2021

Penetration Resistance
(140 lb. weight, 30" drop)
▲ Blows per foot
● Water Content (%)

0 25 50 75 100

5 10 15 20 25 30 35 40 45

0 25 50 75 100

● Water Content (%)
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample

Frozen

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF PROBE P-05

September 2021 106424-001

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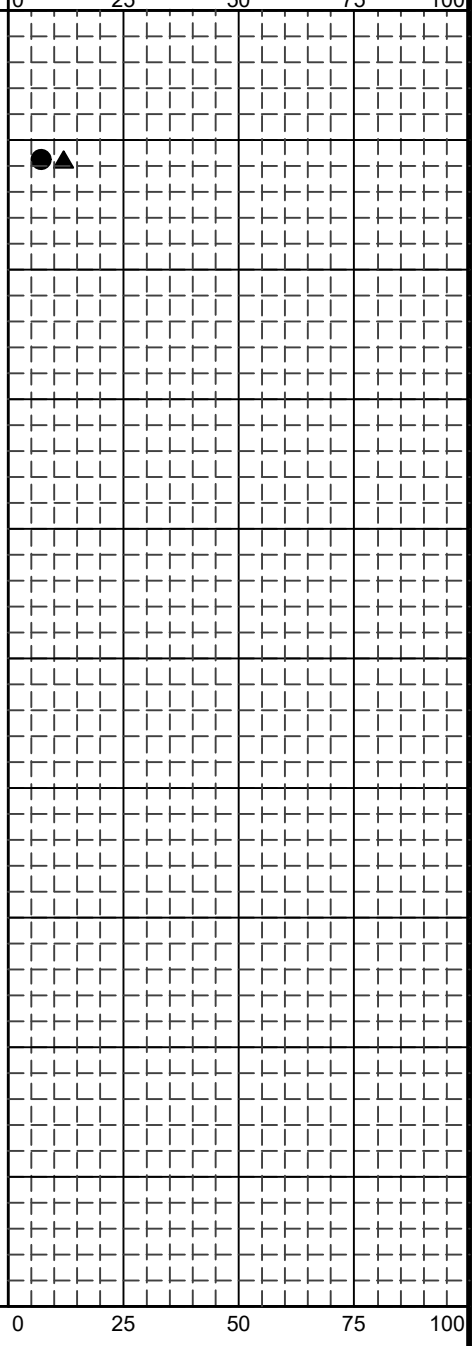
FIG. A-21

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal

MATERIAL DESCRIPTION	Depth, Ft.	Symbol	Samples	Ground Water Depth, Ft.
Lat.: 61.16495 N Long.: 149.9206 W Approx. Elevation: 83 Ft. Datum: WGS 84				
Frozen to very soft to soft, brown *Peat (PT)*; moist				
	5.0			
S1: 14% Gravel, 79% Sand, 7% Fines (F2) Medium dense, gray, *Poorly Graded Sand with Silt (SP-SM)*; moist	6.5		S1	
Bottom of Boring Boring Completed 4/5/2021				

Groundwater not encountered during drilling on 4/5/2021



LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample

Frozen

● Water Content (%)
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF PROBE P-06

September 2021 106424-001

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FIG. A-22

REV 3 - Approved for Submittal

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

MATERIAL DESCRIPTION	Depth, Ft.	Symbol	Samples
Lat.: 61.16482 N Long.: 149.9189 W Approx. Elevation: 83 Ft. Datum: WGS 84			
Frozen to very soft to soft, brown *Peat (PT)*; moist			
	6.5		
S1: 3% Gravel, 74% Sand, 23% Fines (F3) Medium dense, gray, *Silty Sand (SM)*; moist	8.0		S1
Bottom of Boring Boring Completed 4/5/2021			

Ground Water Depth, Ft.: Groundwater not encountered during drilling on 4/5/2021

Penetration Resistance
(140 lb. weight, 30" drop)
▲ Blows per foot
● Water Content (%)

0 25 50 75 100

5 10 15 20 25 30 35 40 45

0 25 50 75 100

● Water Content (%)
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample

Frozen

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF PROBE P-07

September 2021 106424-001

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FIG. A-23

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal

MATERIAL DESCRIPTION

Lat.: 61.16426 N Long.: 149.921 W

Approx. Elevation: 83 Ft. Datum: WGS 84

Frozen to very soft to soft, brown *Peat (PT)*; moist

5.0

S1: 13% Gravel, 81% Sand, 6% Fines (F2)

Medium dense, gray, *Poorly Graded Sand with Silt (SP-SM)*; moist; trace organics

6.5

Bottom of Boring

Boring Completed 4/5/2021

Depth, Ft.

Symbol

Samples

S1

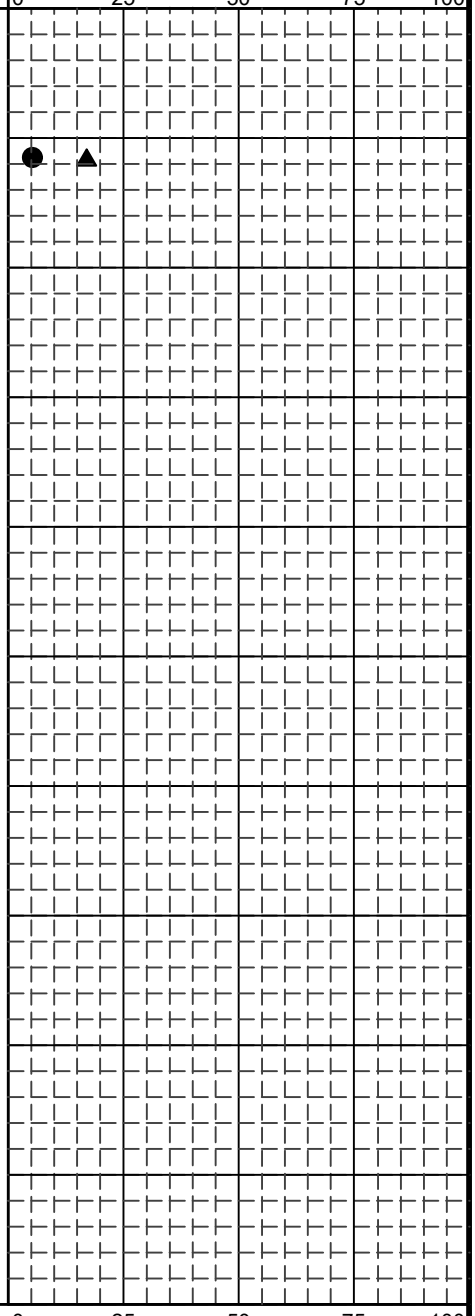
Ground Water Depth, Ft.

Groundwater not encountered during drilling on 4/5/2021

Penetration Resistance
(140 lb. weight, 30" drop)
▲ Blows per foot
● Water Content (%)

0 25 50 75 100

5 10 15 20 25 30 35 40 45



0 25 50 75 100

● Water Content (%)

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

LEGEND

* Sample Not Recovered

2" O.D. Split Spoon Sample

Grab Sample

Frozen

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF PROBE P-08

September 2021 106424-001

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FIG. A-24

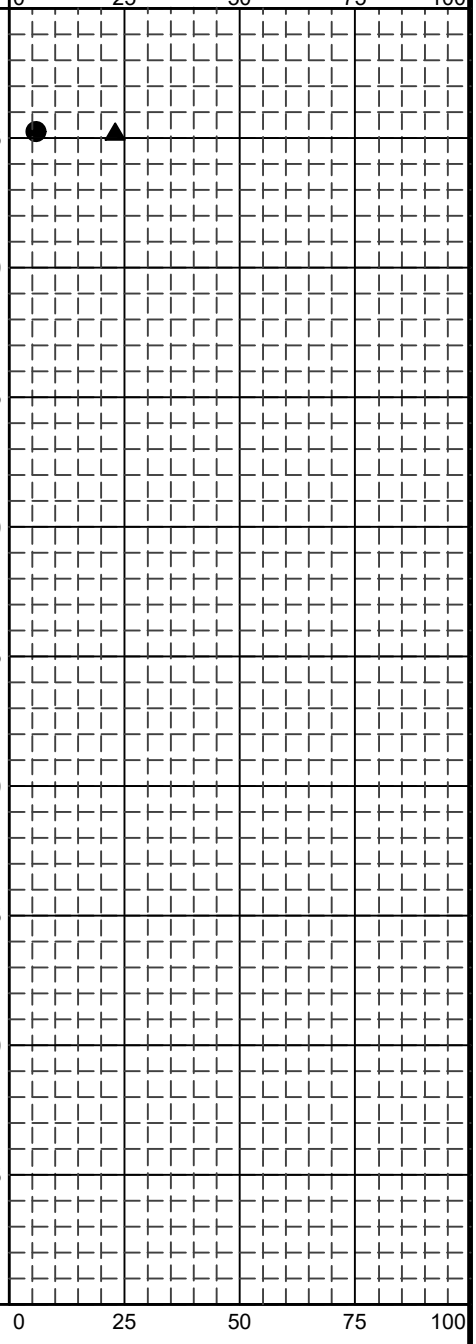
REV 3 - Approved for Submittal

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

MATERIAL DESCRIPTION	Depth, Ft.	Symbol	Samples	Ground Water Depth, Ft.
Lat.: 61.16444 N Long.: 149.9167 W Approx. Elevation: 83 Ft. Datum: WGS 84				
Frozen to very soft to soft, brown *Peat (PT)*; moist				
	4.0			
S1: 10% Gravel, 83% Sand, 7% Fines (F2) Medium dense, dark gray, *Poorly Graded Sand with Silt (SP-SM)*; moist	5.5		S1	
Bottom of Boring Boring Completed 3/31/2021				

Groundwater not encountered during drilling on 3/31/2021

Penetration Resistance
(140 lb. weight, 30" drop)
▲ Blows per foot
● Water Content (%)



LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample

Frozen

● Water Content (%)
Plastic Limit — Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
Anchorage, Alaska

LOG OF PROBE P-09

September 2021 106424-001

SHANNON & WILSON, INC.
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FIG. A-25

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal

MATERIAL DESCRIPTION	Depth, Ft.	Symbol	Samples
Lat.: 61.16364 N Long.: 149.9185 W Approx. Elevation: 83 Ft. Datum: WGS 84			
Frozen to very soft to soft, brown *Peat (PT)*; moist			
	5.5		
S1: 5% Gravel, 71% Sand, 24% Fines (F3) Medium dense, gray, *Silty Sand (SM)*; moist	7.0		S1
Bottom of Boring Boring Completed 3/31/2021			

Ground Water Depth, Ft.

Groundwater not encountered during drilling on 3/31/2021

Penetration Resistance
(140 lb. weight, 30" drop)
▲ Blows per foot
● Water Content (%)

0 25 50 75 100

5 10 15 20 25 30 35 40 45

0 25 50 75 100

● Water Content (%)
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample

Frozen

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
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LOG OF PROBE P-10

September 2021 106424-001

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FIG. A-26

REV 3 - Approved for Submittal

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

MATERIAL DESCRIPTION

Lat.: 61.1641 N Long.: 149.9176 W

Approx. Elevation: 83 Ft. Datum: WGS 84

Frozen to very soft to soft, brown *Peat (PT)*; moist

6.5

S1: 7% Gravel, 88% Sand, 5% Fines (NFS)

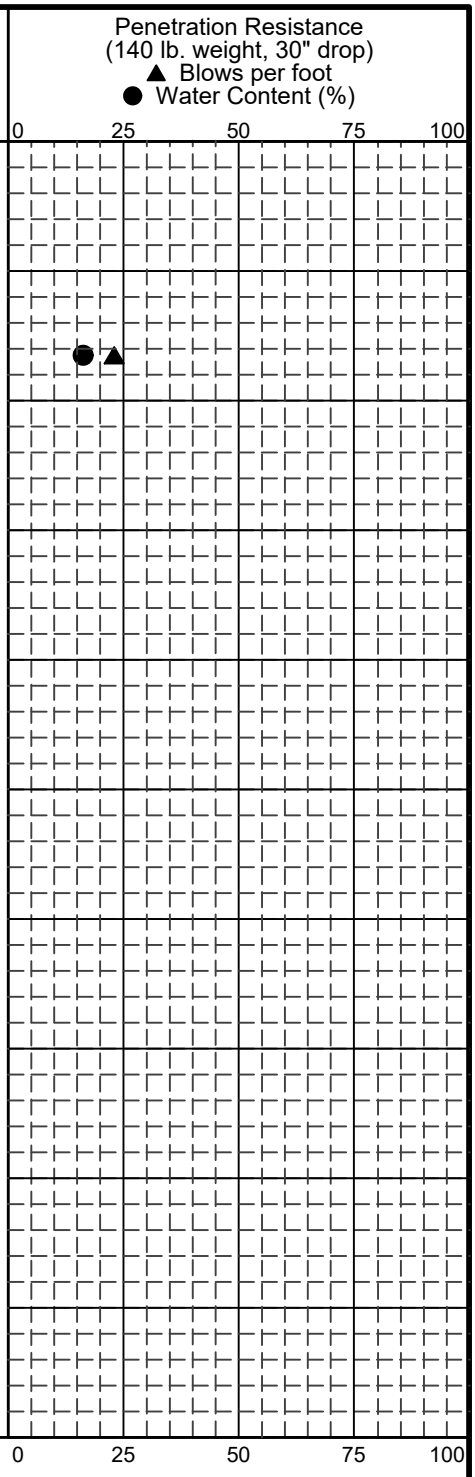
Medium dense, gray, *Poorly Graded Sand with Silt (SP-SM)*; wet

9.0

Bottom of Boring

Boring Completed 4/5/2021

Groundwater not encountered during drilling on 4/5/2021



LEGEND

* Sample Not Recovered

2" O.D. Split Spoon Sample

Grab Sample

Frozen

● Water Content (%)

Plastic Limit — Liquid Limit

Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

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FIG. A-27

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal

MATERIAL DESCRIPTION

Lat.: 61.16296 N Long.: 149.9189 W

Approx. Elevation: 83 Ft. Datum: WGS 84

Frozen to very soft to soft, brown *Peat (PT)*; moist

6.5

S1: 5% Gravel, 76% Sand, 19% Fines (F2)

Medium dense, gray, *Silty Sand (SM)*; moist

8.5

Bottom of Boring

Boring Completed 3/31/2021

Depth, Ft.

Symbol

Samples

S1

Ground Water Depth, Ft.

Groundwater not encountered during drilling on 3/31/2021

Penetration Resistance
(140 lb. weight, 30" drop)
▲ Blows per foot
● Water Content (%)

0 25 50 75 100

5 10 15 20 25 30 35 40 45

0 25 50 75 100

● Water Content (%)

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

LEGEND

* Sample Not Recovered

2" O.D. Split Spoon Sample

Grab Sample

Frozen

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Connor's Bog Snow Dump
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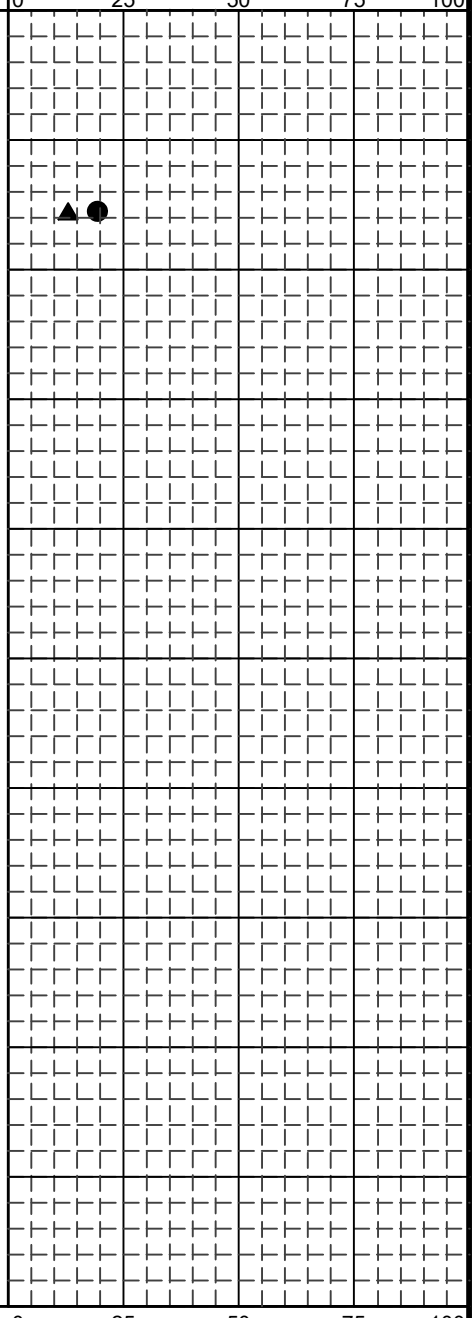
FIG. A-28

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21

REV 3 - Approved for Submittal

MATERIAL DESCRIPTION	Depth, Ft.	Symbol	Samples	Ground Water Depth, Ft.
Lat.: 61.16297 N Long.: 149.9174 W Approx. Elevation: 83 Ft. Datum: WGS 84				
Frozen to very soft to soft, brown *Peat (PT)*; moist				
	6.5			
S1: 0% Gravel, 53% Sand, 46% Fines (F3) Medium dense, gray, *Silty Sand (SM)*; moist; trace organics	8.5		S1	
Bottom of Boring Boring Completed 3/31/2021				

Groundwater not encountered during drilling on 3/31/2021



LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample

Frozen

● Water Content (%)
Plastic Limit — Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

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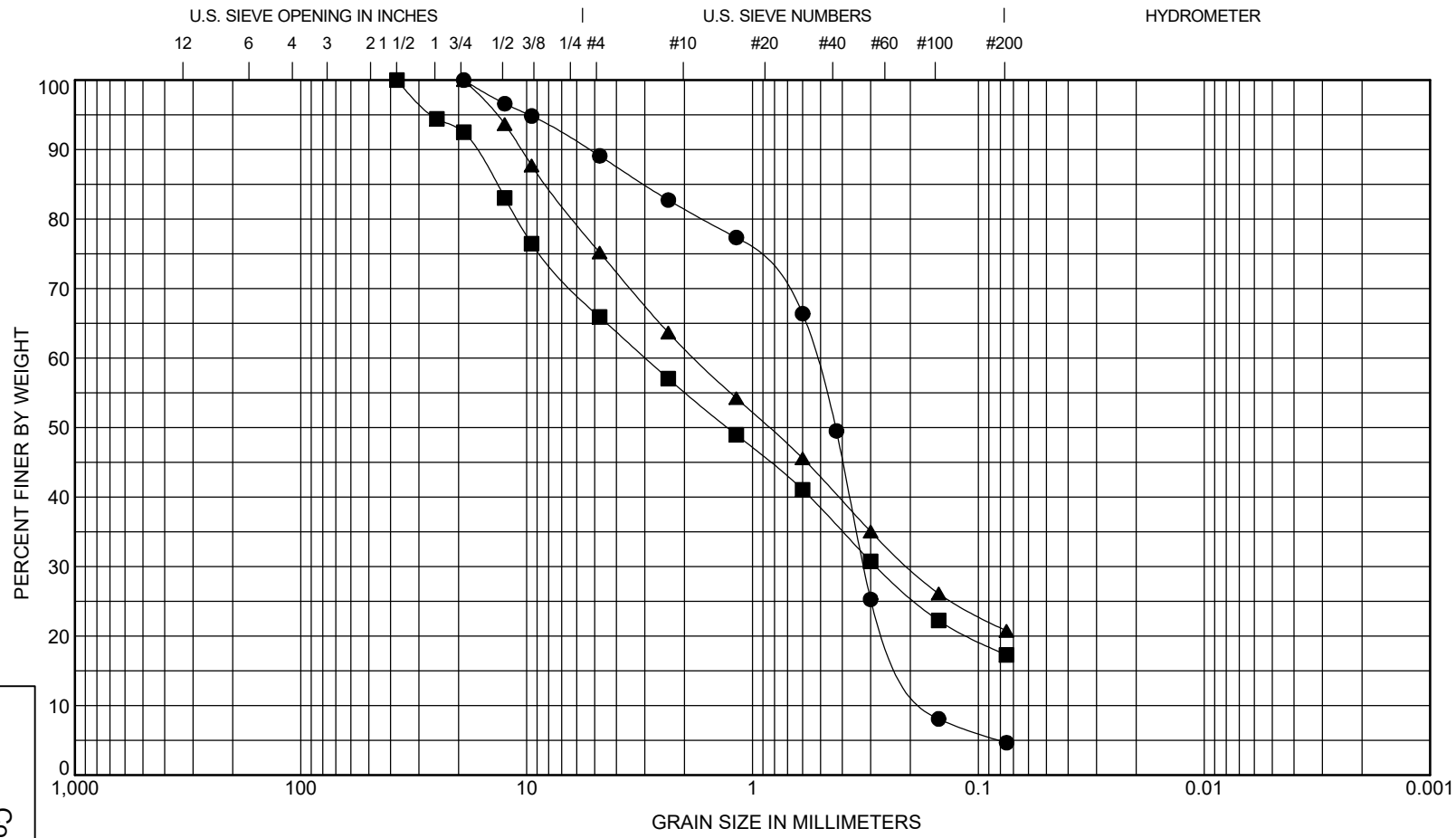
FIG. A-29

REV 3 - Approved for Submittal

GEOTECHNICAL LOG GINT TEMPLATE7.GPJ S&W GEO1.GDT 8/9/21



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample	Depth, Ft	USCS Classification	LL	PL	PI	Cc	Cu
●	B-01 S4	7.5 - 9.0	**Poorly Graded Sand (SP)**				**1.2**	**3.2**
■	B-02 S2	2.5 - 4.0	**Silty Sand with Gravel (SM)**					
▲	B-03 S2	2.5 - 4.0	**Silty Sand with Gravel (SM)**					

	Sample	Depth, Ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-01 S4	7.5 - 9.0	**19**	**0.53**	**0.32**	**0.16**	**11**	**84**	**5**	
■	B-02 S2	2.5 - 4.0	**37.5**	**2.98**	**0.28**		**34**	**49**	**17**	
▲	B-03 S2	2.5 - 4.0	**19**	**1.8**	**0.2**		**25**	**54**	**21**	

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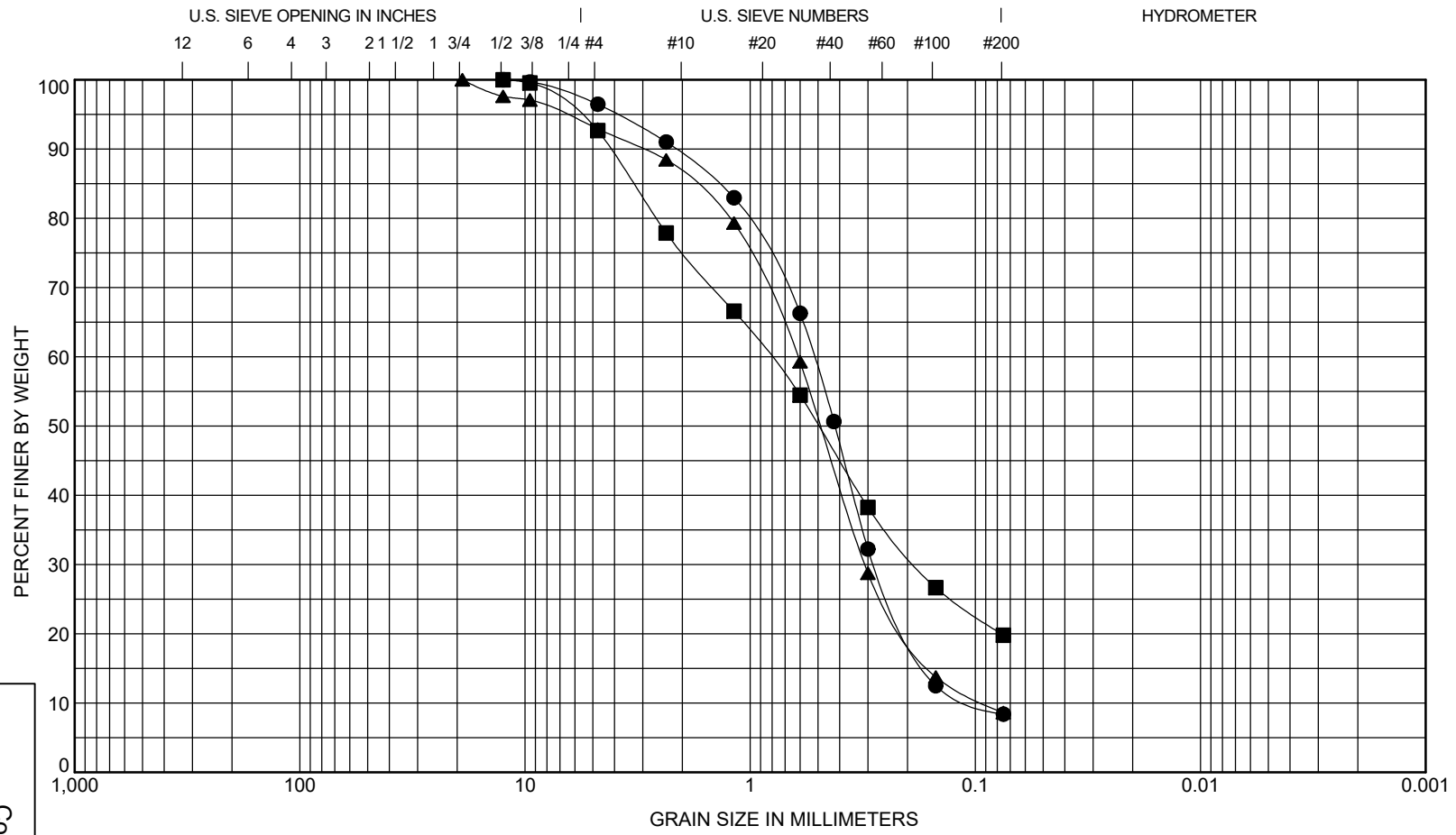
FIG. A-30
Sheet 1 of 10



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample	Depth, Ft	USCS Classification	LL	PL	PI	Cc	Cu
●	B-03 S7	20.0 - 21.5	**Poorly Graded Sand with Silt (SP-SM)**				**1.5**	**5.3**
■	B-04 S2	2.5 - 4.0	**Silty Sand (SM)**					
▲	B-05 S6	15.0 - 16.5	**Well-Graded Sand with Silt (SW-SM)**				**1.7**	**6.8**

	Sample	Depth, Ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-03 S7	20.0 - 21.5	**12.5**	**0.52**	**0.28**	**0.1**	**4**	**88**	**8**	
■	B-04 S2	2.5 - 4.0	**12.5**	**0.82**	**0.18**		**7**	**73**	**20**	
▲	B-05 S6	15.0 - 16.5	**19**	**0.61**	**0.31**	**0.09**	**7**	**84**	**9**	

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FIG. A-30
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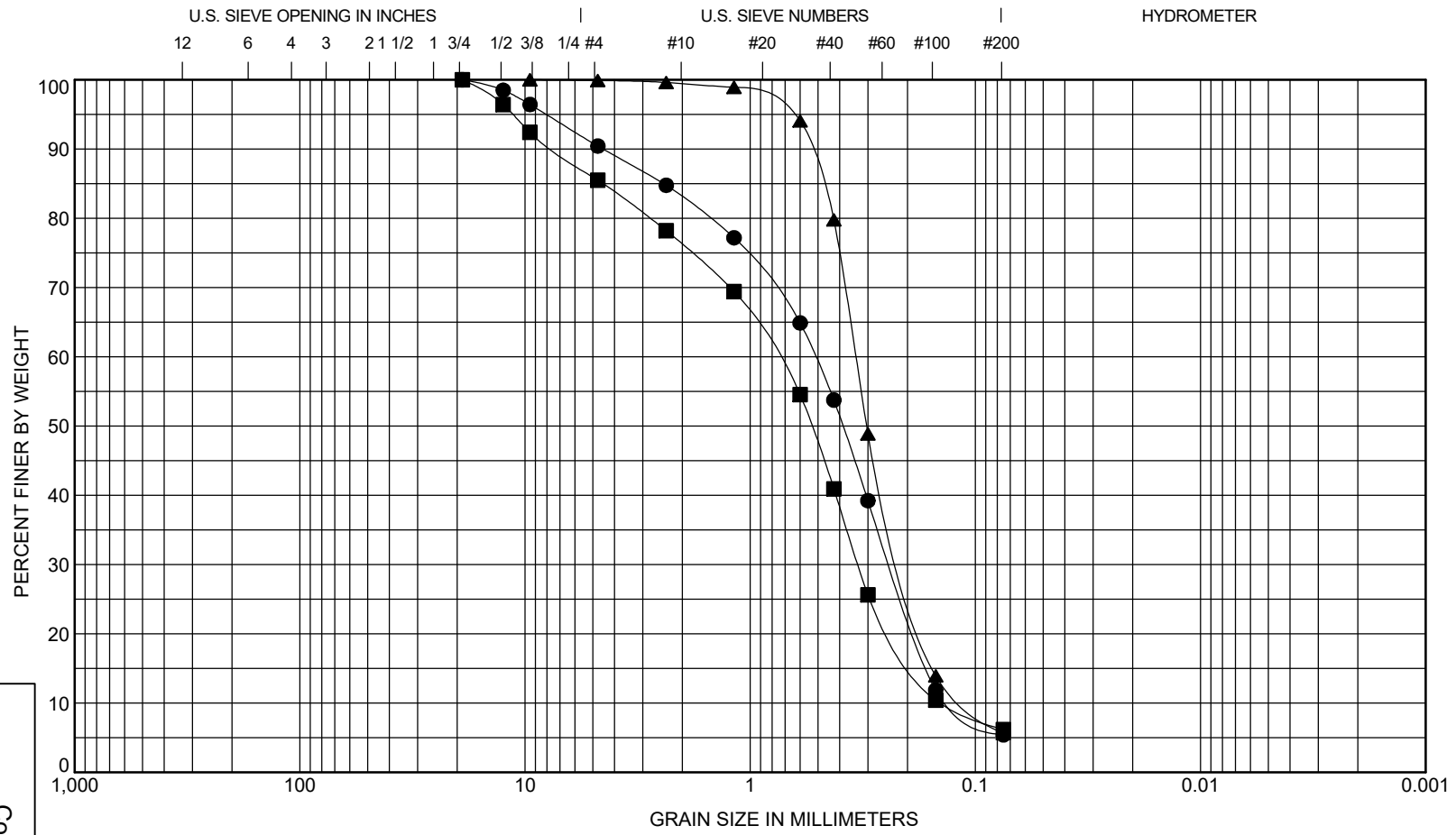

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample		Depth, Ft	USCS Classification	LL	PL	PI	Cc	Cu
●	B-06 S5	10.0 - 11.5	**Poorly Graded Sand with Silt (SP-SM)**				**0.9**	**4.2**
■	B-07 S4	7.5 - 9.0	**Poorly Graded Sand with Silt (SP-SM)**				**1.0**	**5.5**
▲	B-08 S4	7.5 - 9.0	**Poorly Graded Sand with Silt (SP-SM)**				**1.2**	**3.1**

Sample		Depth, Ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-06 S5	10.0 - 11.5	**19**	**0.52**	**0.24**	**0.12**	**10**	**85**	**5**	
■	B-07 S4	7.5 - 9.0	**19**	**0.77**	**0.33**	**0.14**	**15**	**79**	**6**	
▲	B-08 S4	7.5 - 9.0	**9.5**	**0.34**	**0.21**	**0.11**	**0**	**94**	**6**	

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FIG. A-30
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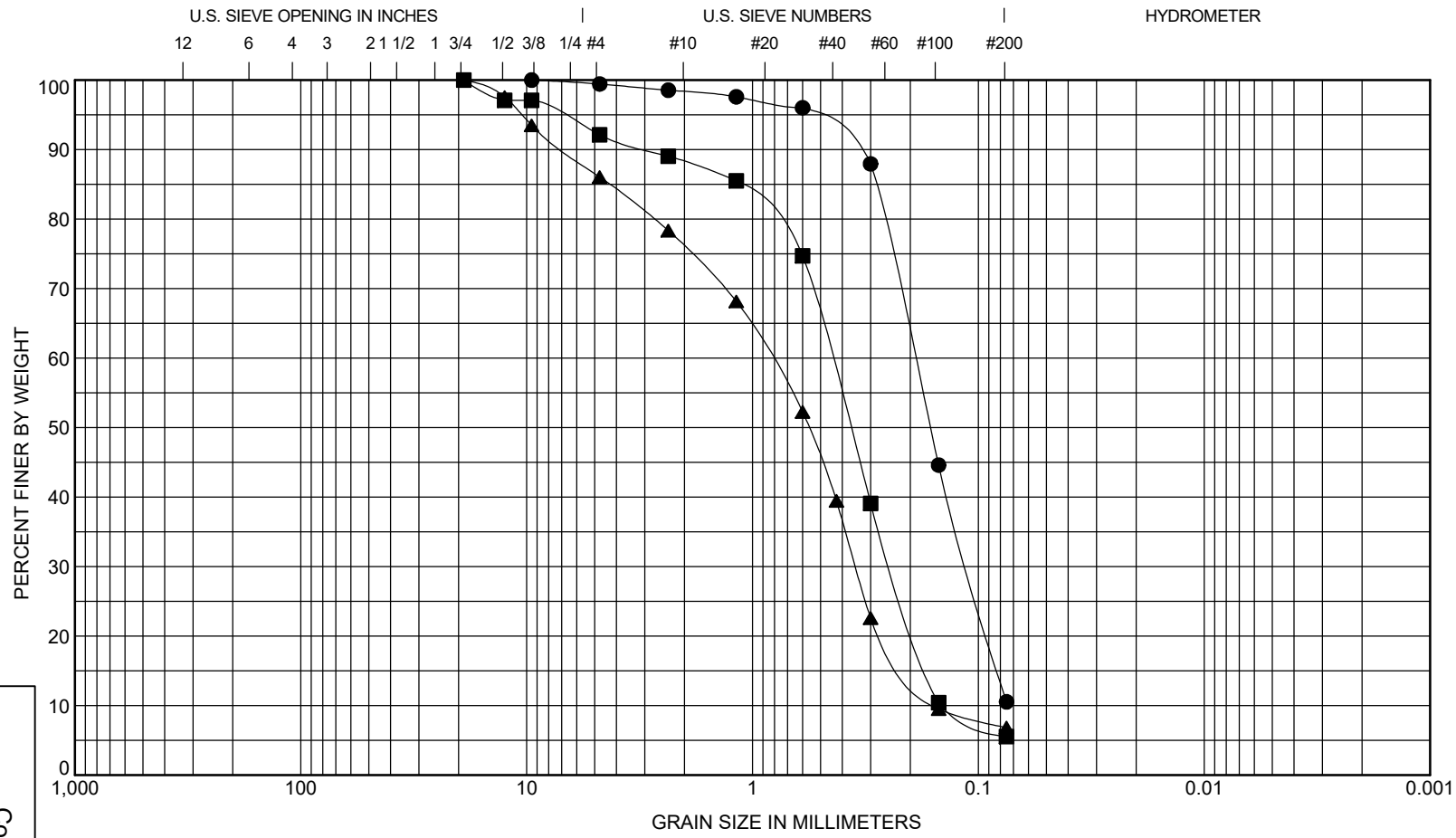

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample		Depth, Ft	USCS Classification	LL	PL	PI	Cc	Cu
●	B-09 S6	15.0 - 16.5	**Poorly Graded Sand with Silt (SP-SM)**				**0.9**	**2.6**
■	B-09 S7	20.0 - 21.5	**Poorly Graded Sand with Silt (SP-SM)**				**0.9**	**3.2**
▲	B-10 S9	30.0 - 31.5	**Poorly Graded Sand with Silt (SP-SM)**				**1.0**	**5.4**

Sample		Depth, Ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-09 S6	15.0 - 16.5	**9.5**	**0.19**	**0.11**		**1**	**89**	**11**	
■	B-09 S7	20.0 - 21.5	**19**	**0.45**	**0.24**	**0.14**	**8**	**87**	**6**	
▲	B-10 S9	30.0 - 31.5	**19**	**0.83**	**0.35**	**0.15**	**14**	**79**	**7**	

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FIG. A-30
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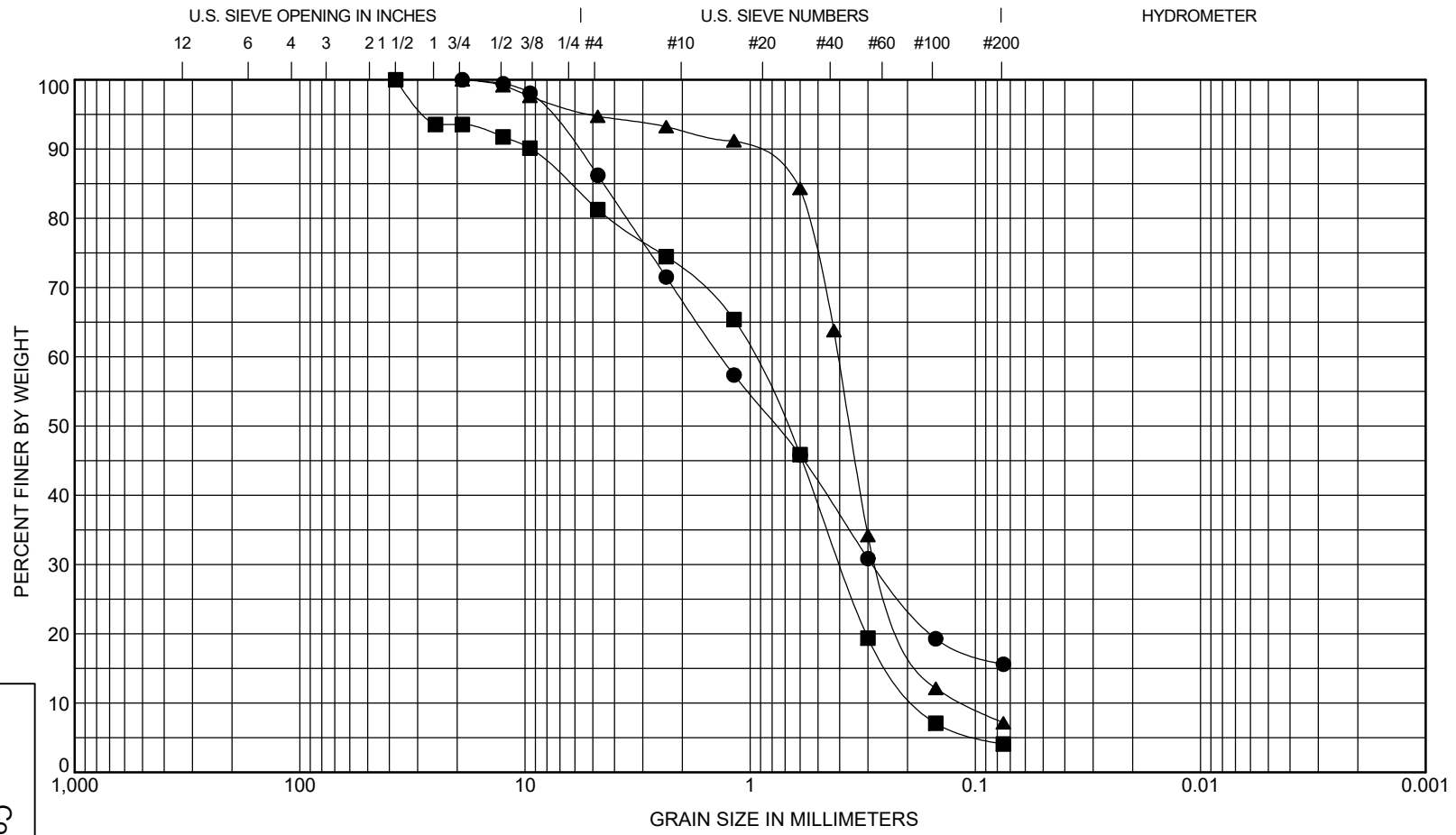

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample		Depth, Ft	USCS Classification	LL	PL	PI	Cc	Cu
●	B-11 S4	7.5 - 9.0	**Silty Sand (SM)**					
■	B-11 S7	20.0 - 21.5	**Poorly Graded Sand with Gravel (SP)**				**0.9**	**5.5**
▲	B-12 S5	10.0 - 11.5	**Poorly Graded Sand with Silt (SP-SM)**				**1.5**	**3.6**

Sample		Depth, Ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-11 S4	7.5 - 9.0	**19**	**1.34**	**0.28**		**14**	**71**	**16**	
■	B-11 S7	20.0 - 21.5	**37.5**	**0.98**	**0.4**	**0.18**	**19**	**77**	**4**	
▲	B-12 S5	10.0 - 11.5	**19**	**0.41**	**0.26**	**0.11**	**5**	**88**	**7**	

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FIG. A-30
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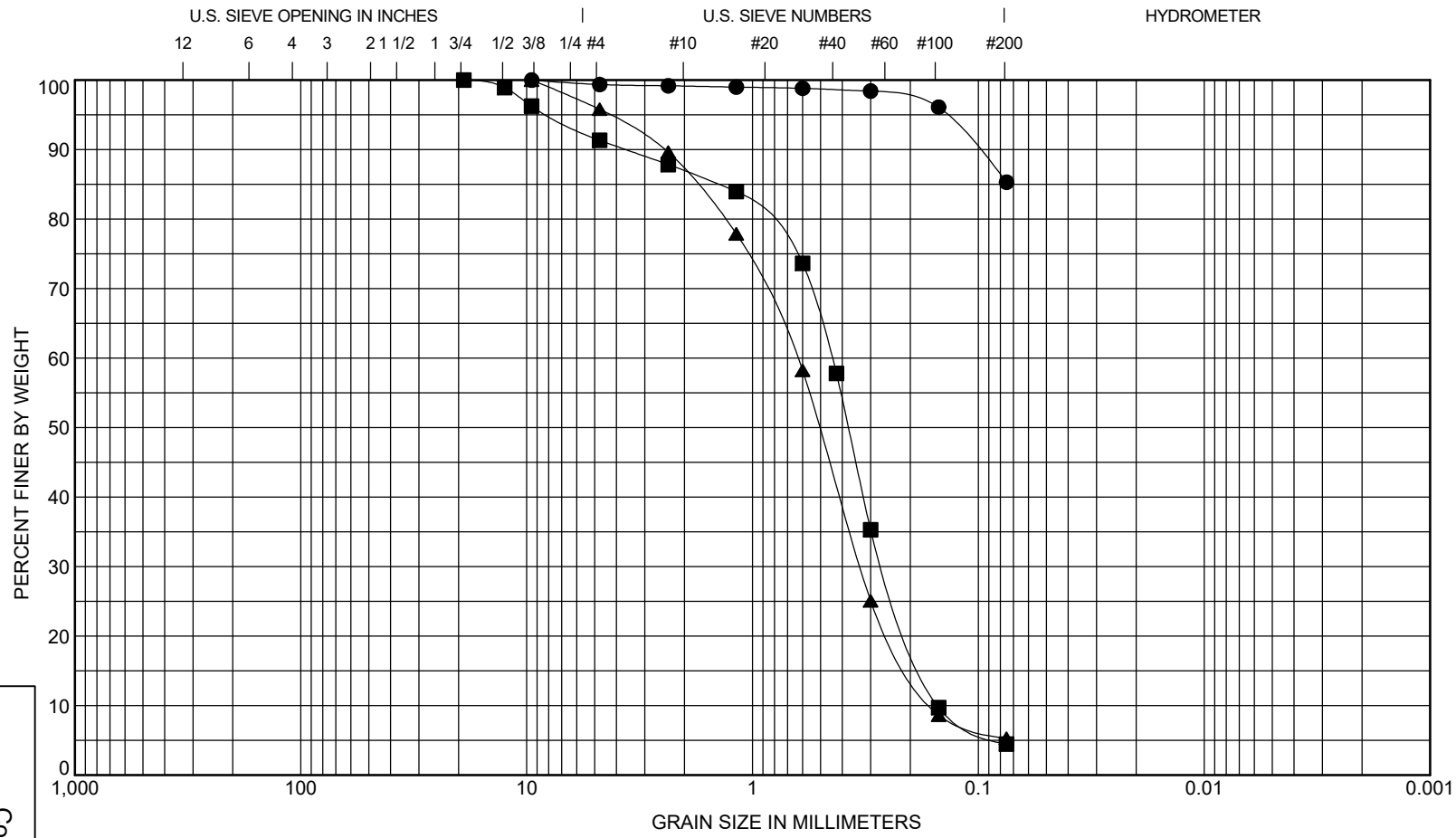

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample	Depth, Ft	USCS Classification	LL	PL	PI	Cc	Cu
●	B-13 S7	20.0 - 21.5	**Silt (ML)**					
■	B-14 S5	10.0 - 11.5	**Poorly Graded Sand (SP)**				1.0	3.0
▲	P-01 S1	5.0 - 6.5	**Poorly Graded Sand with Silt (SP-SM)**				1.1	4.0

	Sample	Depth, Ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-13 S7	20.0 - 21.5	9.5				1	14	85	
■	B-14 S5	10.0 - 11.5	19	0.45	0.26	0.15	9	87	4	
▲	P-01 S1	5.0 - 6.5	9.5	0.64	0.33	0.16	4	91	5	

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FIG. A-30
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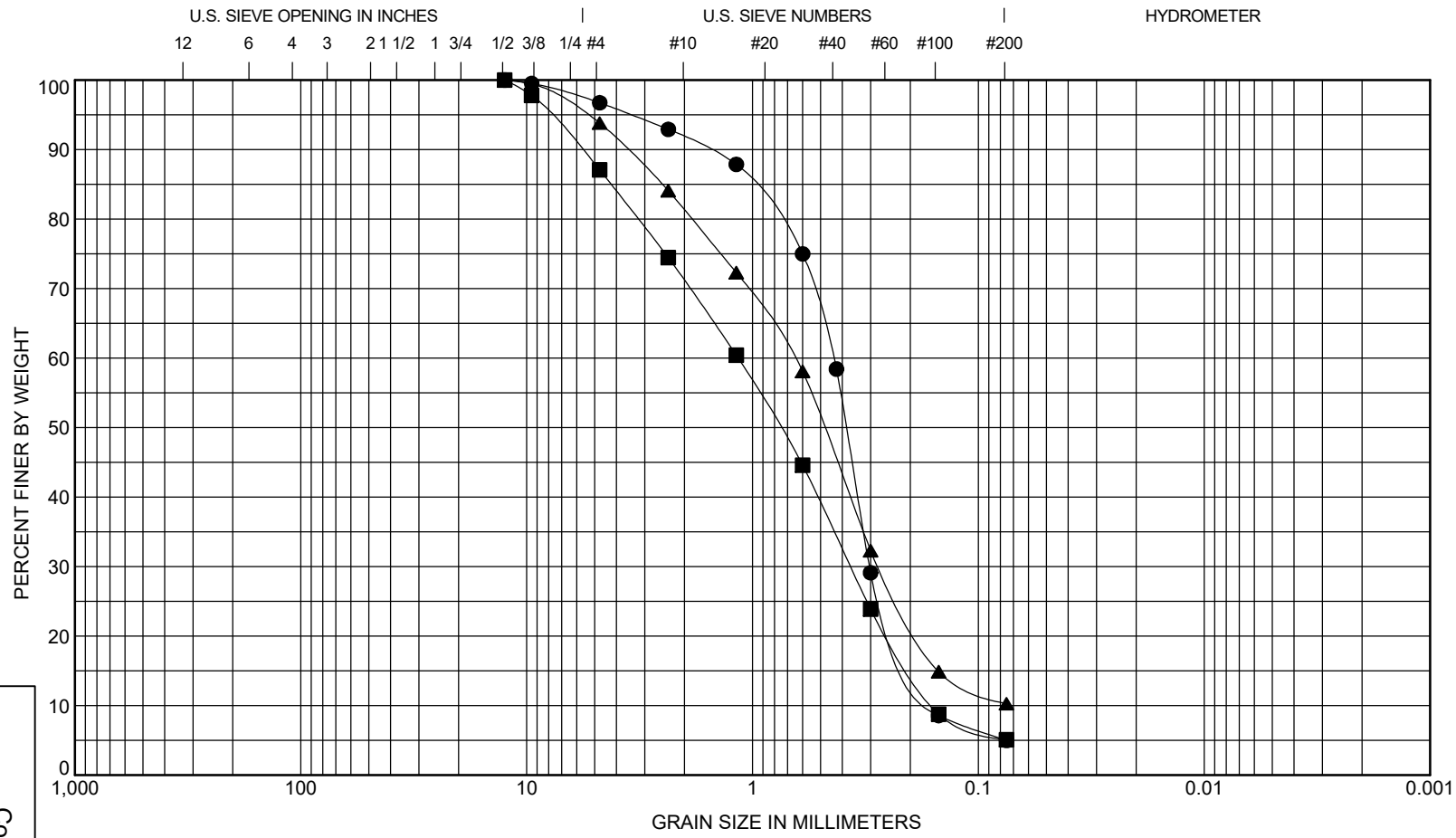

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample		Depth, Ft	USCS Classification	LL	PL	PI	Cc	Cu
●	P-02 S1	7.5 - 9.0	**Poorly Graded Sand with Silt (SP-SM)**				**1.3**	**2.8**
■	P-03 S1	6.0 - 7.5	**Poorly Graded Sand with Silt (SP-SM)**				**0.7**	**7.3**
▲	P-04 S1	6.0 - 7.5	**Well-Graded Sand with Silt (SW-SM)**				**1.6**	**9.1**

Sample		Depth, Ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	P-02 S1	7.5 - 9.0	**12.5**	**0.44**	**0.3**	**0.16**	**3**	**92**	**5**	
■	P-03 S1	6.0 - 7.5	**12.5**	**1.16**	**0.37**	**0.16**	**13**	**82**	**5**	
▲	P-04 S1	6.0 - 7.5	**12.5**	**0.66**	**0.27**		**6**	**84**	**10**	

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FIG. A-30
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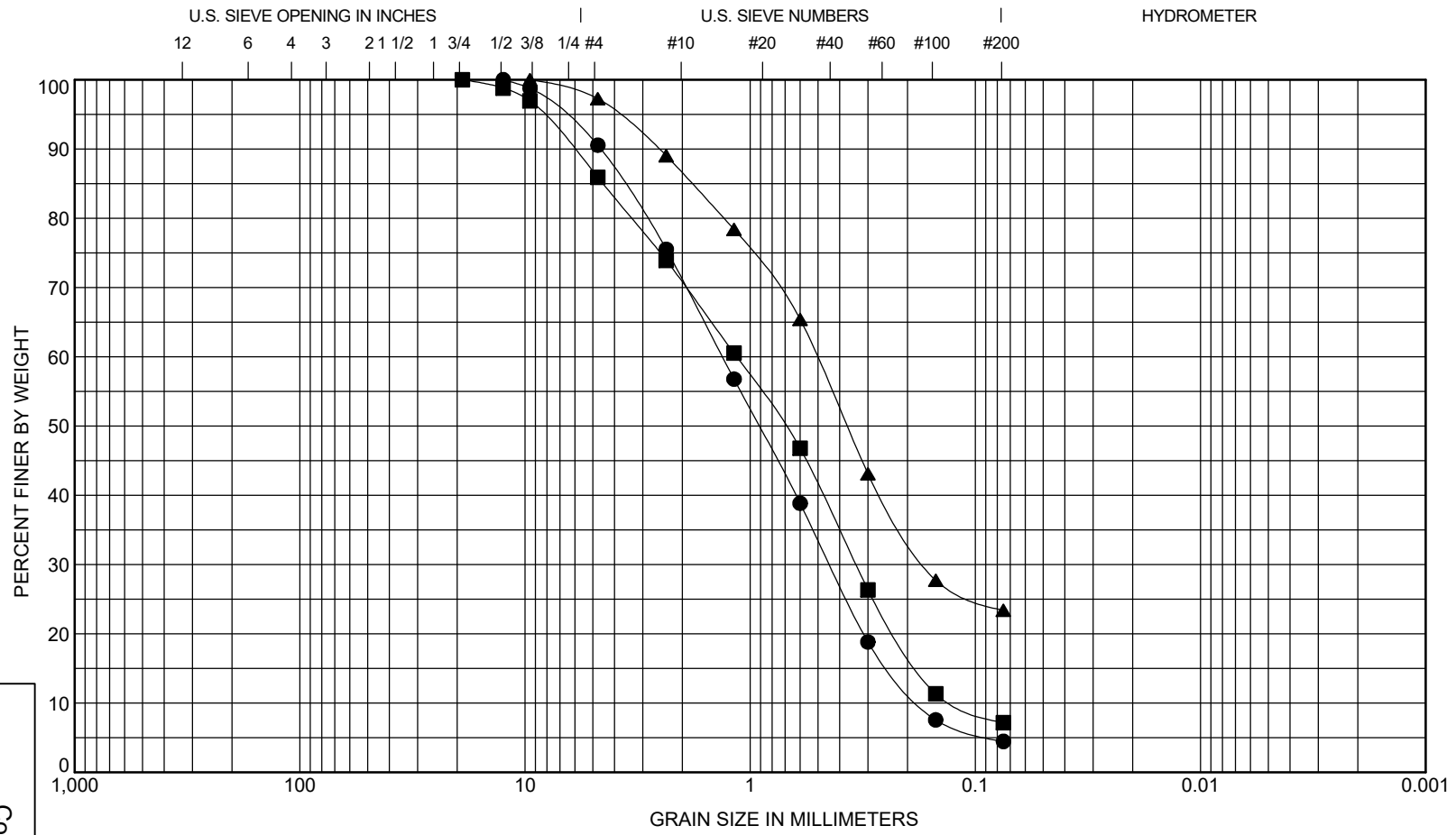

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample		Depth, Ft	USCS Classification	LL	PL	PI	Cc	Cu
●	P-05 S1	7.5 - 9.0	**Poorly Graded Sand (SP)**				**0.8**	**7.6**
■	P-06 S1	5.0 - 6.5	**Poorly Graded Sand with Silt (SP-SM)**				**0.8**	**9.6**
▲	P-07 S1	6.5 - 8.0	**Silty Sand (SM)**					

Sample		Depth, Ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	P-05 S1	7.5 - 9.0	**12.5**	**1.33**	**0.44**	**0.17**	**9**	**86**	**4**	
■	P-06 S1	5.0 - 6.5	**19**	**1.15**	**0.34**	**0.12**	**14**	**79**	**7**	
▲	P-07 S1	6.5 - 8.0	**9.5**	**0.51**	**0.17**		**3**	**74**	**23**	

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FIG. A-30
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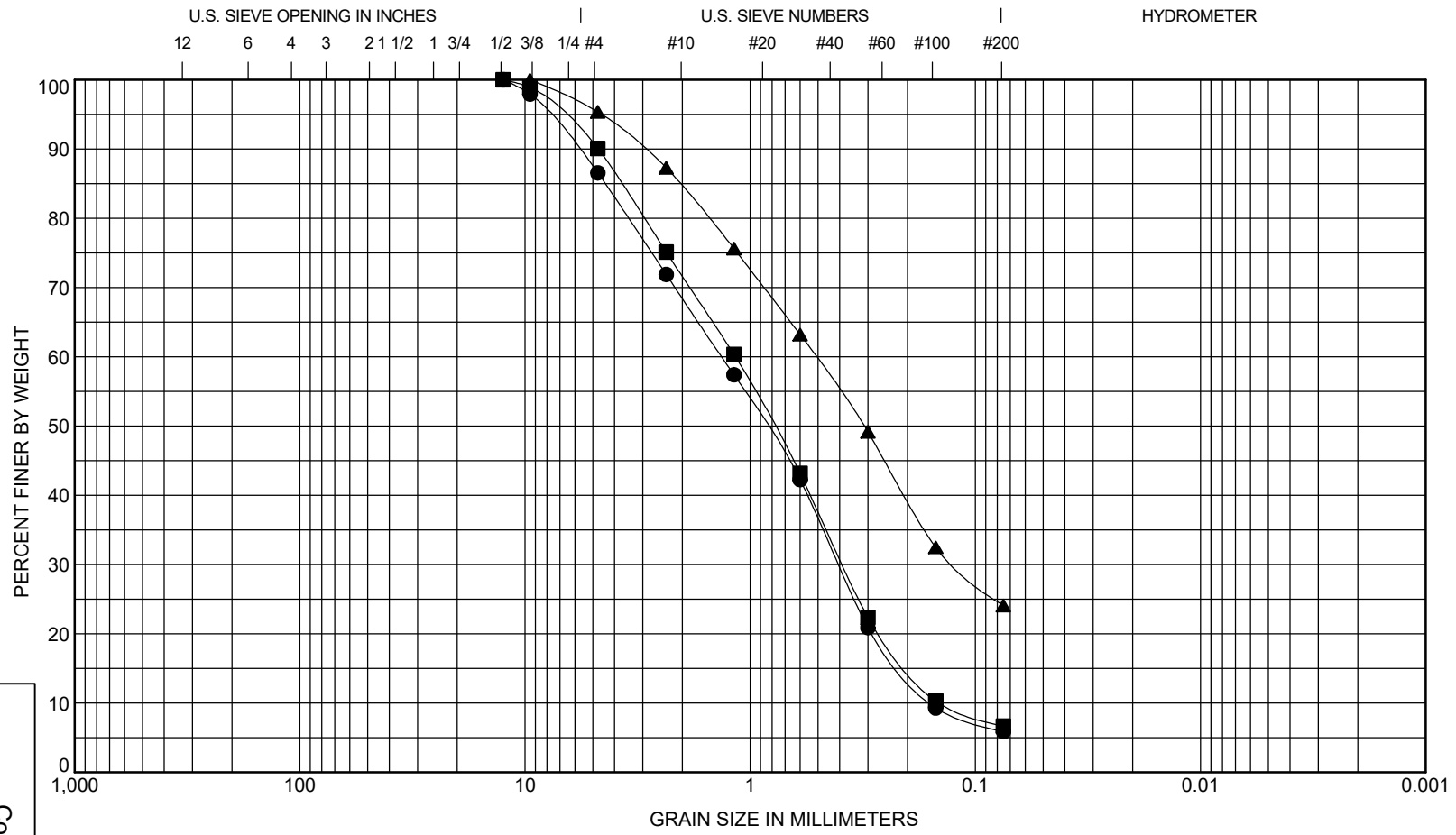

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample	Depth, Ft	USCS Classification	LL	PL	PI	Cc	Cu
●	P-08 S1	5.0 - 6.5	**Poorly Graded Sand with Silt (SP-SM)**				**0.8**	**8.5**
■	P-09 S1	4.0 - 5.5	**Poorly Graded Sand with Silt (SP-SM)**				**0.9**	**8.2**
▲	P-10 S1	5.5 - 7.0	**Silty Sand (SM)**					

	Sample	Depth, Ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	P-08 S1	5.0 - 6.5	**12.5**	**1.34**	**0.4**	**0.16**	**13**	**81**	**6**	
■	P-09 S1	4.0 - 5.5	**12.5**	**1.17**	**0.39**	**0.14**	**10**	**83**	**7**	
▲	P-10 S1	5.5 - 7.0	**9.5**	**0.51**	**0.12**		**5**	**71**	**24**	

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FIG. A-30
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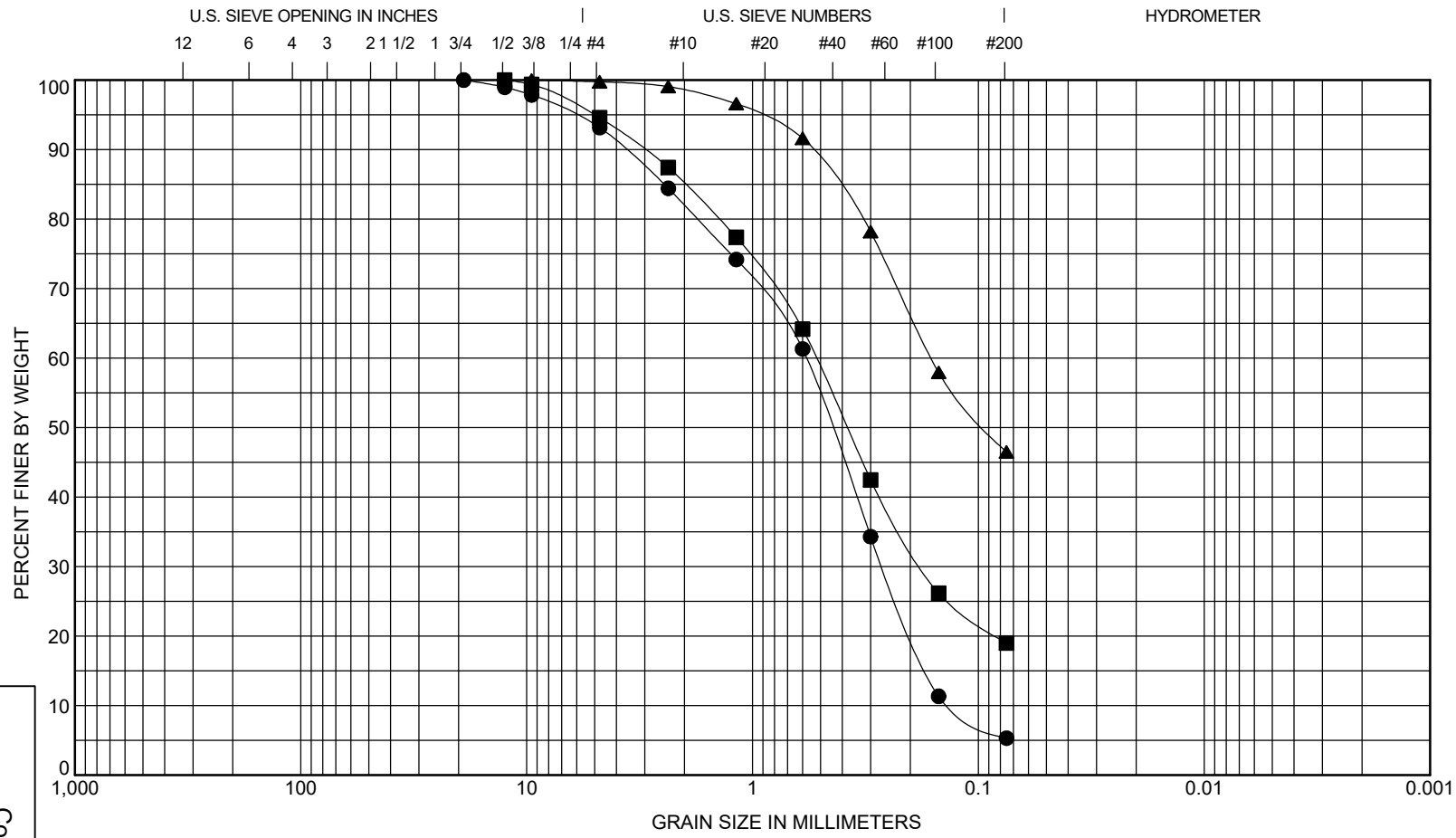

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample		Depth, Ft	USCS Classification	LL	PL	PI	Cc	Cu
●	P-11 S1	7.5 - 9.0	**Poorly Graded Sand with Silt (SP-SM)**				**0.9**	**4.5**
■	P-12 S1	7.0 - 8.5	**Silty Sand (SM)**					
▲	P-13 S1	7.0 - 8.5	**Silty Sand (SM)**					

Sample		Depth, Ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	P-11 S1	7.5 - 9.0	**19**	**0.58**	**0.26**	**0.13**	**7**	**88**	**5**	
■	P-12 S1	7.0 - 8.5	**12.5**	**0.53**	**0.18**		**5**	**76**	**19**	
▲	P-13 S1	7.0 - 8.5	**9.5**	**0.16**			**0**	**53**	**46**	

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FIG. A-30
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IMPORTANT INFORMATION

Important Information

About Your Geotechnical/Environmental Report

IMPORTANT INFORMATION

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors that were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining

IMPORTANT INFORMATION

your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims

being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

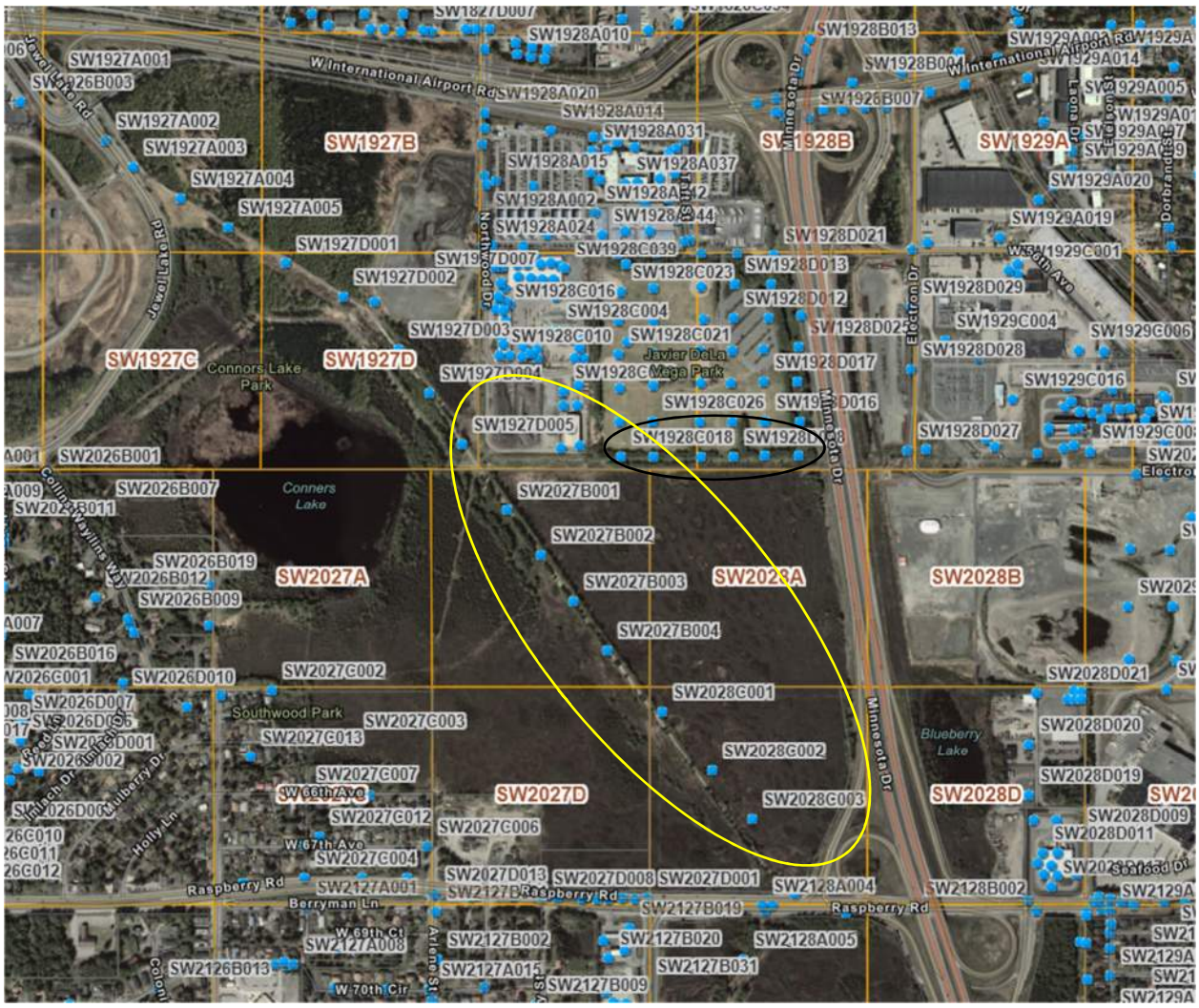
Obtained 01/23/2020 by K. Grundhauser

MOA Soil Bore Logs for Connor's Bog

Source: MOA Soil Boring App

Link:
https://muniorg.maps.arcgis.com/apps/webappviewer/index.html?id=ff7c8f704663452096705a716c14b1f3

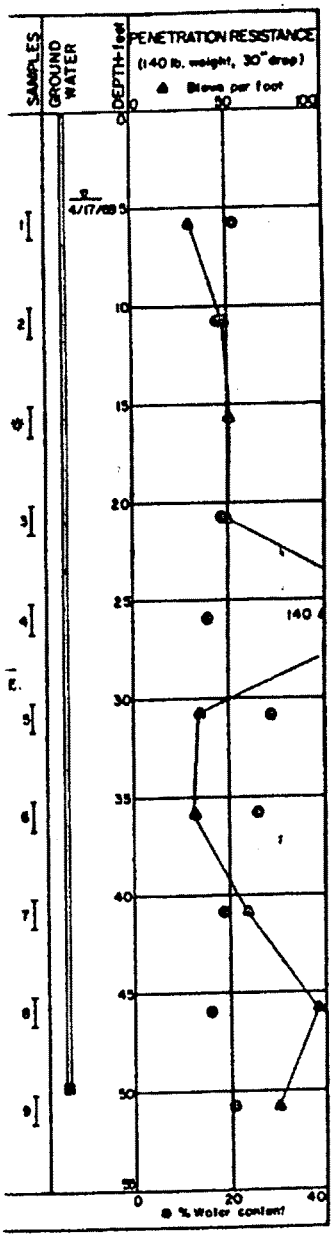
North to South Bore Holes



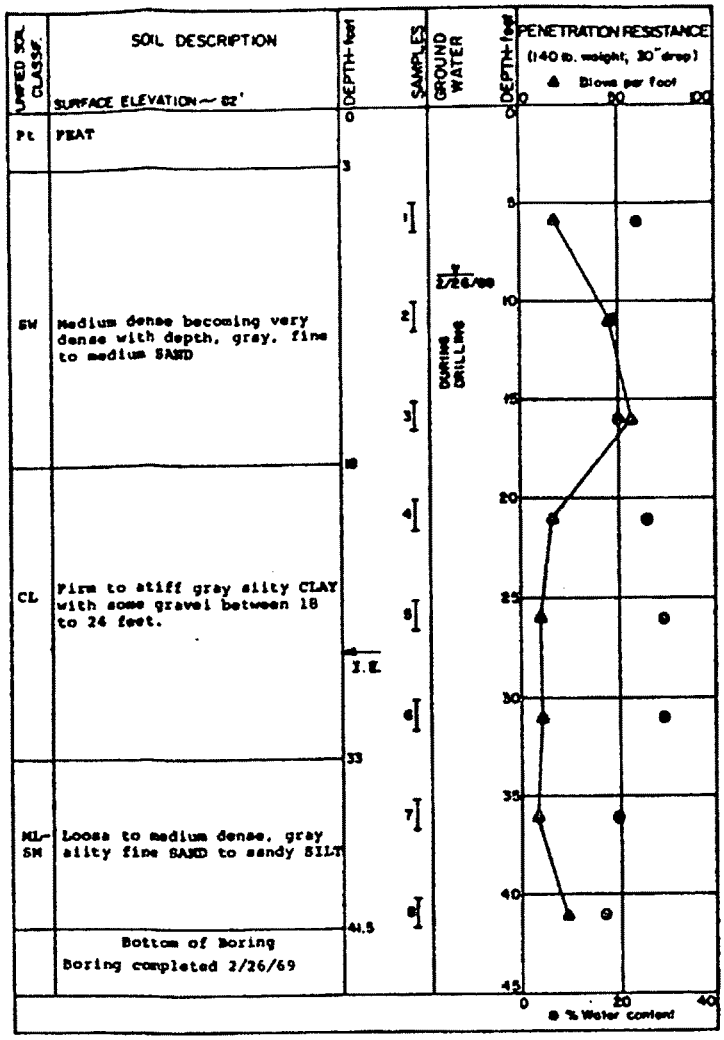
Attached: Bog logs (from northwest to southeast) for: SW1927D005, SW2027B001, SW2027B002, SW2027B003, SW2027B004, SW2028C001, SW2028C002, and SW2028C003.

MOA
Boring ID: SW1927D005
Grid: SW1927

B-60
233+30



BORING B-61 (5)
STATION 237+30



1927-D

GREATER ANCHORAGE AREA BOROUGH, SEWERAGE STUDY

WEST INTERCEPTOR (A)

BORING LOGS
BORING B-59,60,61

SHANNON & WILSON, INC.
PORTLAND, OREGON
JULY, 1969
0-374

FIG. 33

MOA
Boring ID: SW1927B001
Grid: SW2027

BORING B-62 (1)
STATION 241+30

UNIFIED SOIL CLASS.	SOIL DESCRIPTION SURFACE ELEVATION ~82'	DEPTH-feet
Pt	PEAT	0
SW	Medium dense becoming very dense, gray gravelly fine to coarse SAND	4.5
ML	Dense, gray sandy SILT with silty sand layers	18
SP	Very Dense, grey fine SAND	24
SM	Very dense, gray silty fine SAND with gravel	32
ML	Dense, grey SILT	39
	Bottom of Boring Boring completed 2/27/69	41.5

SAMPLES / GROUND WATER: ▽ 2/27/69 DURING DRILLING

PENETRATION RESISTANCE (140 lb. weight, 30" drop) ▲ Blows per foot

DEPTH-feet: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45

0 20 40 ● % Water content

>100

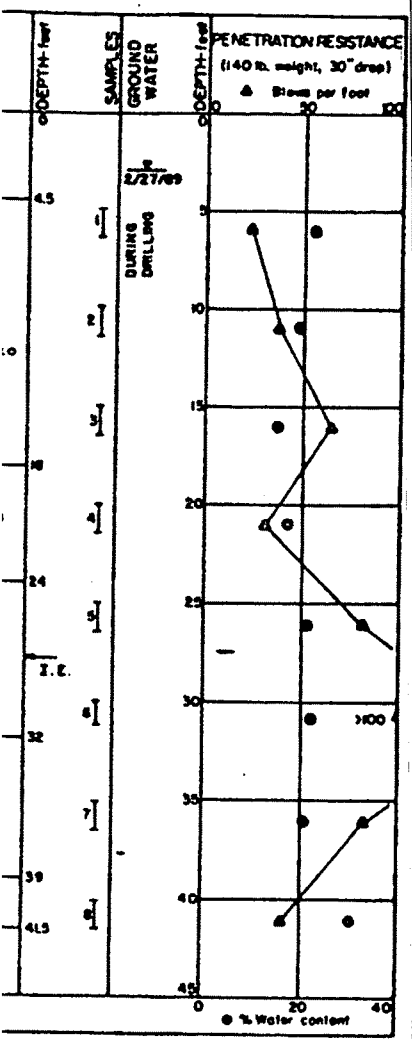
2027-B

UNIFIED SOIL CLASS.	SOIL DESCRIPTI SURFACE ELEVATION ~ 82'
Pt	PEAT
SP	Medium dense, gray me SAND with some fine g at 9 feet
SM	Medium dense, grey sil fine SAND
SP-SM	Very dense, grey fine medium SAND with rando gravel
SP-SM	Very dense, grey silty SAND with some fine gr
ML	Medium dense, grey SIL some thin lenses o silty clay
	Bottom of Boring Boring completed 2/26/

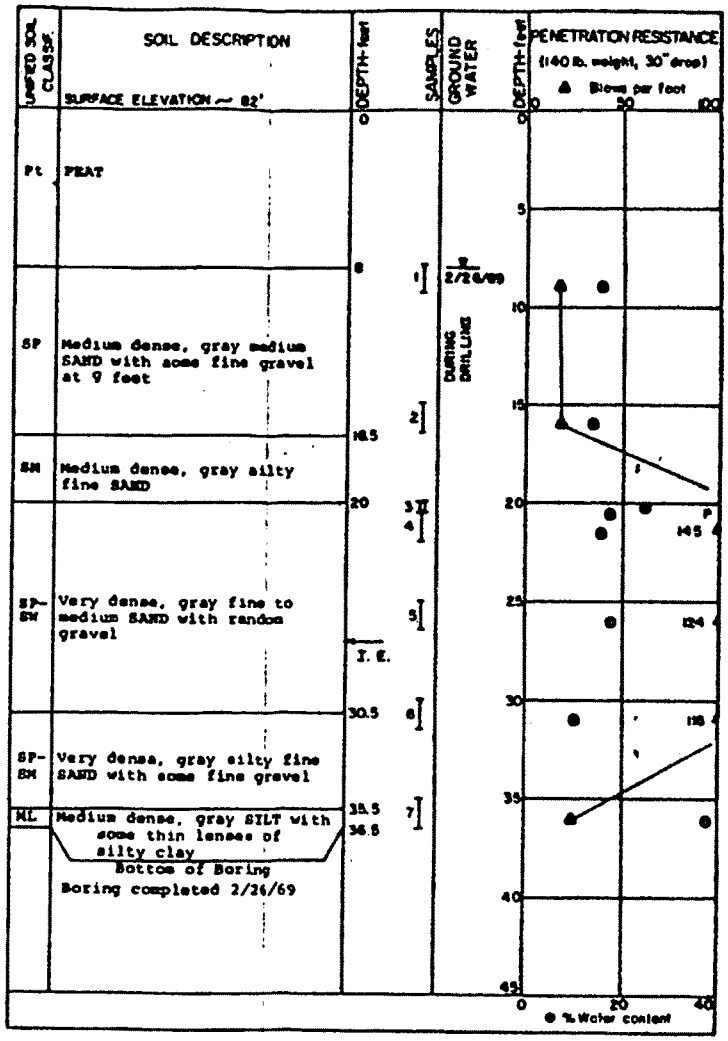
I 2" O.D. split spoon
II 3" O.D. thin-wall
P Sampler pushed
* Sample not recover
▽ Water level
Impervious seal
Piezometer tip-Sto

MOA
Boring ID: SW1927B002
Grid: SW2027

RING B-62
ATION 241+30



BORING B-63 (2)
STATION 245+30



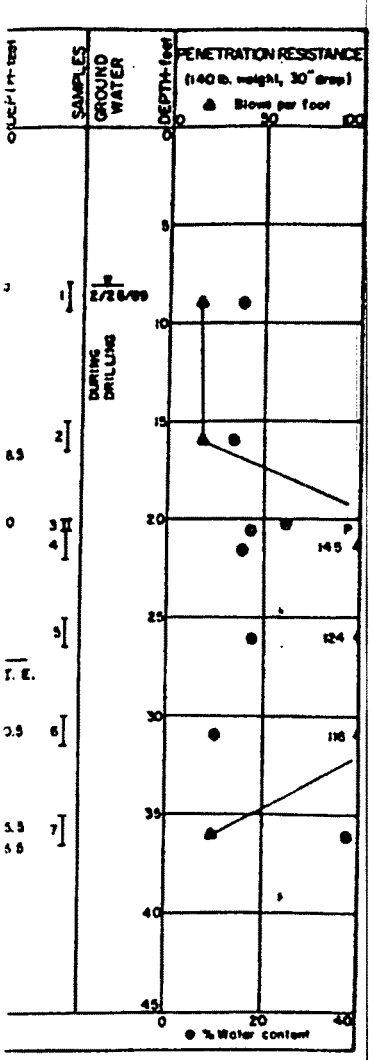
2027-B

LEGEND

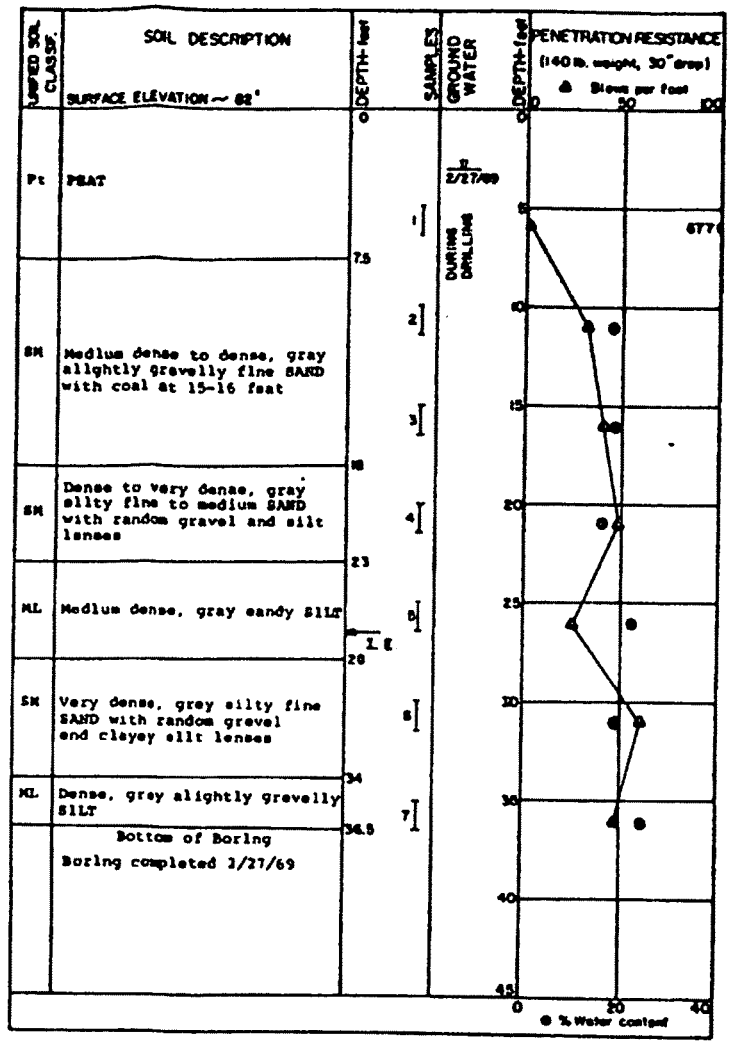
- 2" O.D split spoon sample
- 3" O.D thin-wall sample
- P Sampler pushed
- * Sample not recovered
- Water level
- Impervious seal
- Piezometer tip-Stand pipe
- Observation well
- Perforated pipe
- Atterberg limits
- Liquid limit
- Natural water content
- Plastic limit
- I.E. Approximate invert elevation.

MOA
Boring ID: SW1927B003
Grid: SW2027

NG B-63
ON 245+30



BORING B-64 (3)
STATION 249+30



2027-B

END

Observation well
Perforated pipe

Atterberg limits
Liquid limit
Natural water content
Plastic limit

I.E. Approximate invert elevation.

GREATER ANCHORAGE AREA BOROUGH, SEWERAGE STUDY

WEST INTERCEPTOR (A)

BORING LOGS
BORING B-62,63,64

SHANNON & WILSON, INC.
PORTLAND, OREGON

JULY, 1969

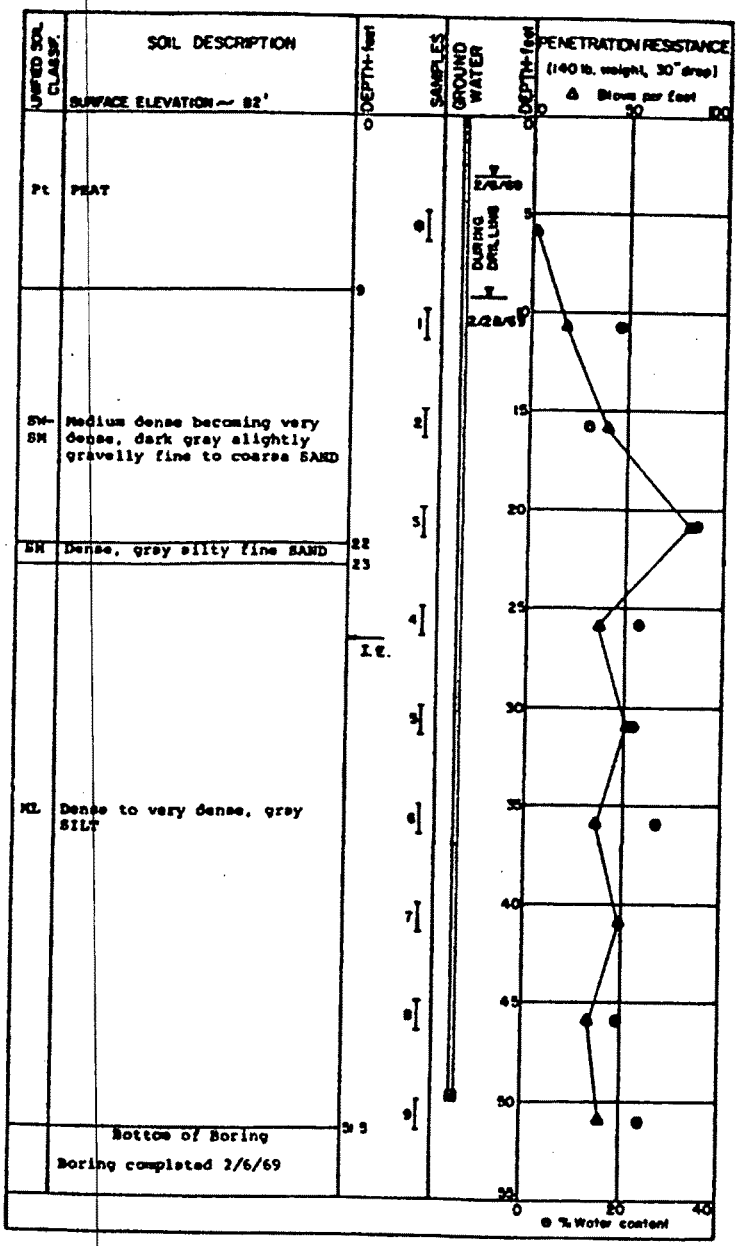
0-374

FIG. 34

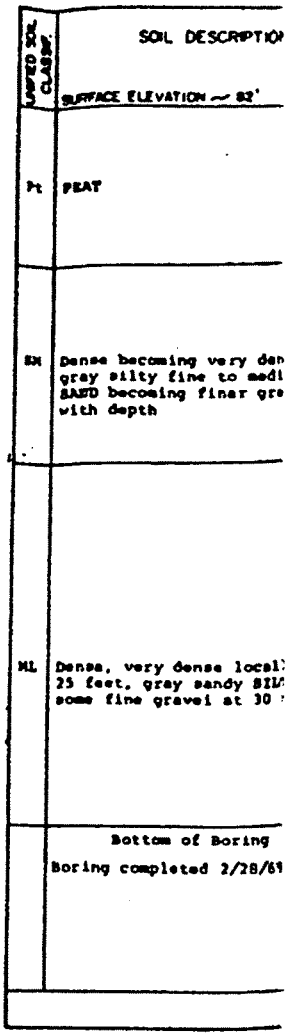
MOA
Boring ID: SW1927B004
Grid: SW2027

BORING B-65 (4)

STATION 253+30



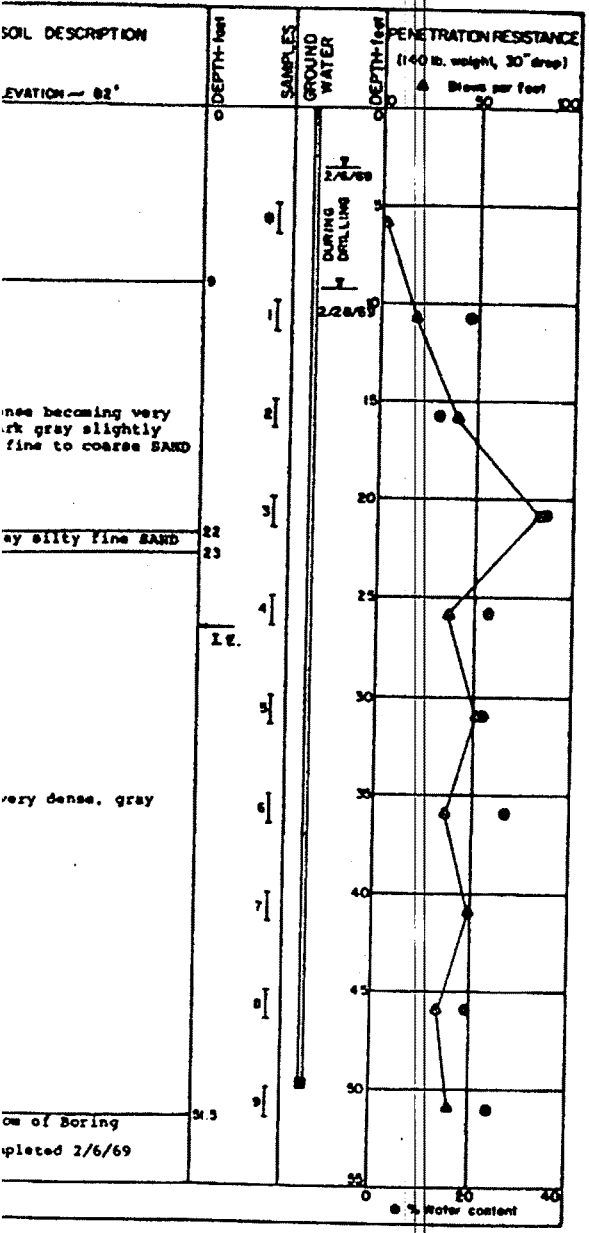
2027-B



I 2" O.D split spoo
II 3" O.D thin-wall
P Sampler pushed
※ Sample not recov
Water level
Impervious seal
Piezometer tip-S

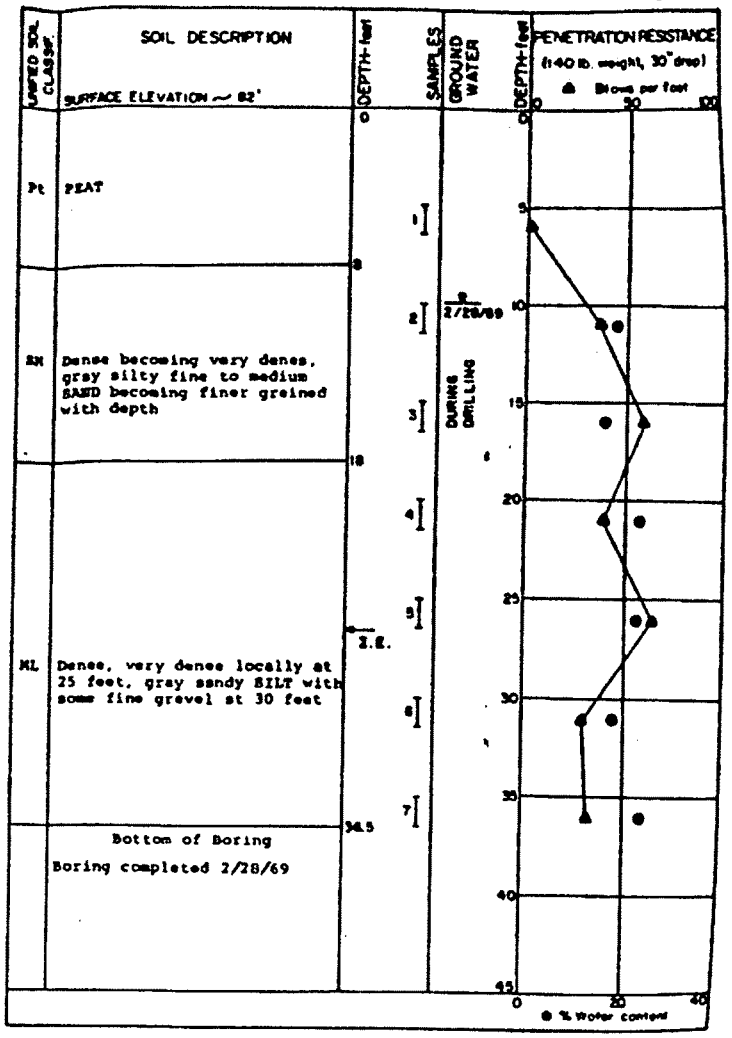
MOA
Boring ID: SW1927C001
Grid: SW2028

BORING B-65
STATION 253+30



BORING B-66
STATION 257+30

(1)



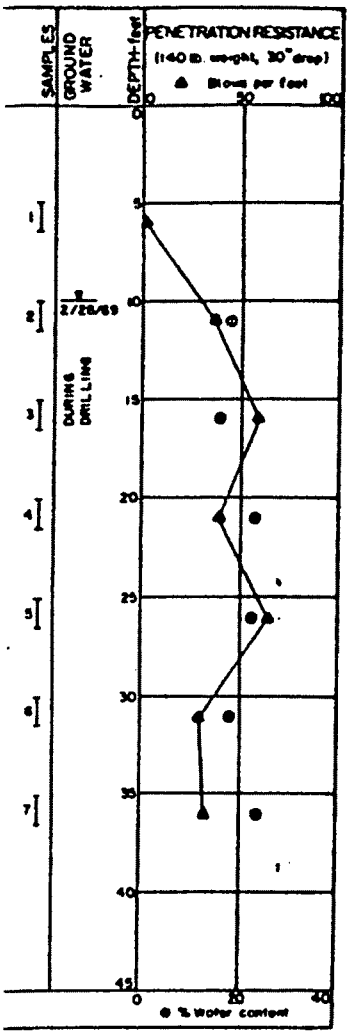
LEGEND

- 2" O.D. split spoon sample
- 3" O.D. thin-wall sample
- P Sampler pushed
- Sample not recovered
- Water level
- Impervious seal
- Piezometer tip-Stone tip
- Observation well Perforated pipe
- Atterberg limits: Liquid limit; Natural water content; Plastic limit
- L.E. Approximate invert elevation

See West Interceptor Report
Report Drawer 4

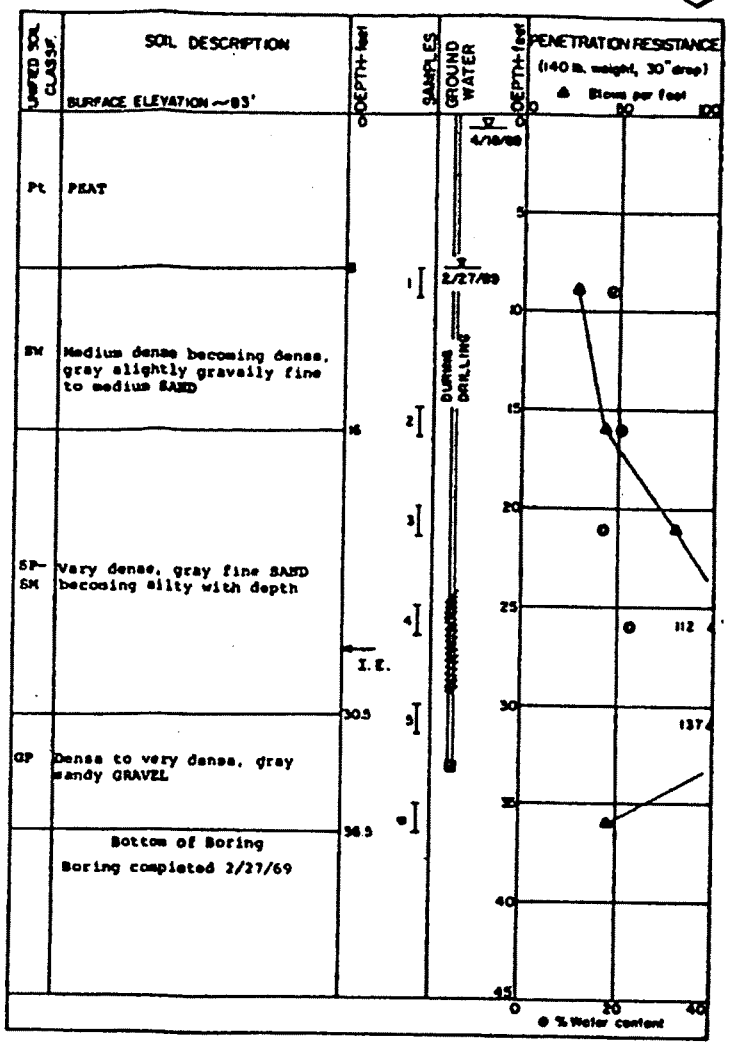
MOA
Boring ID: SW1927C002
Grid: SW2028

G B-66
257+30



BORING B-67
STATION 261+30

(2)



END

Observation well
Perforated pipe

Atterberg limits:
Liquid limit
Natural water content
Plastic limit

Approximate invert elevation

GREATER ANCHORAGE AREA BOROUGH, SEWERAGE STUDY

WEST INTERCEPTOR (A)

BORING LOGS
BORING B-65,66,67

SHANNON & WILSON, INC.
PORTLAND, OREGON

JULY, 1969

FIG. 35

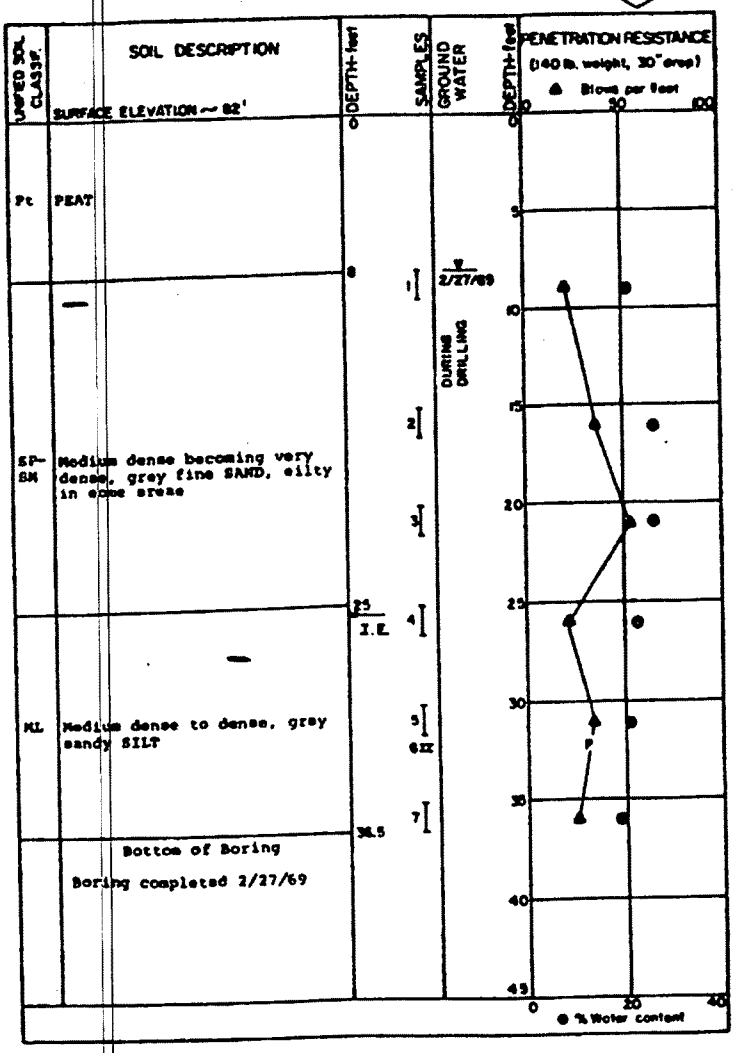
D-374

MOA
Boring ID: SW1927C003
Grid: SW2028

BORING B-68

STATION 265+80

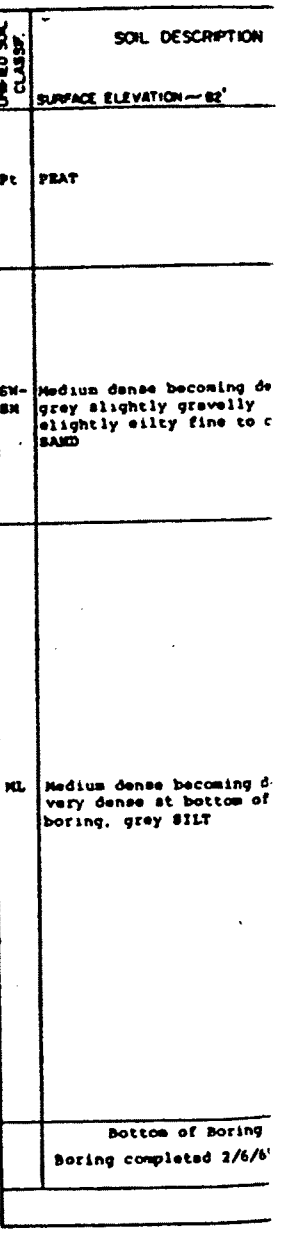
(3)



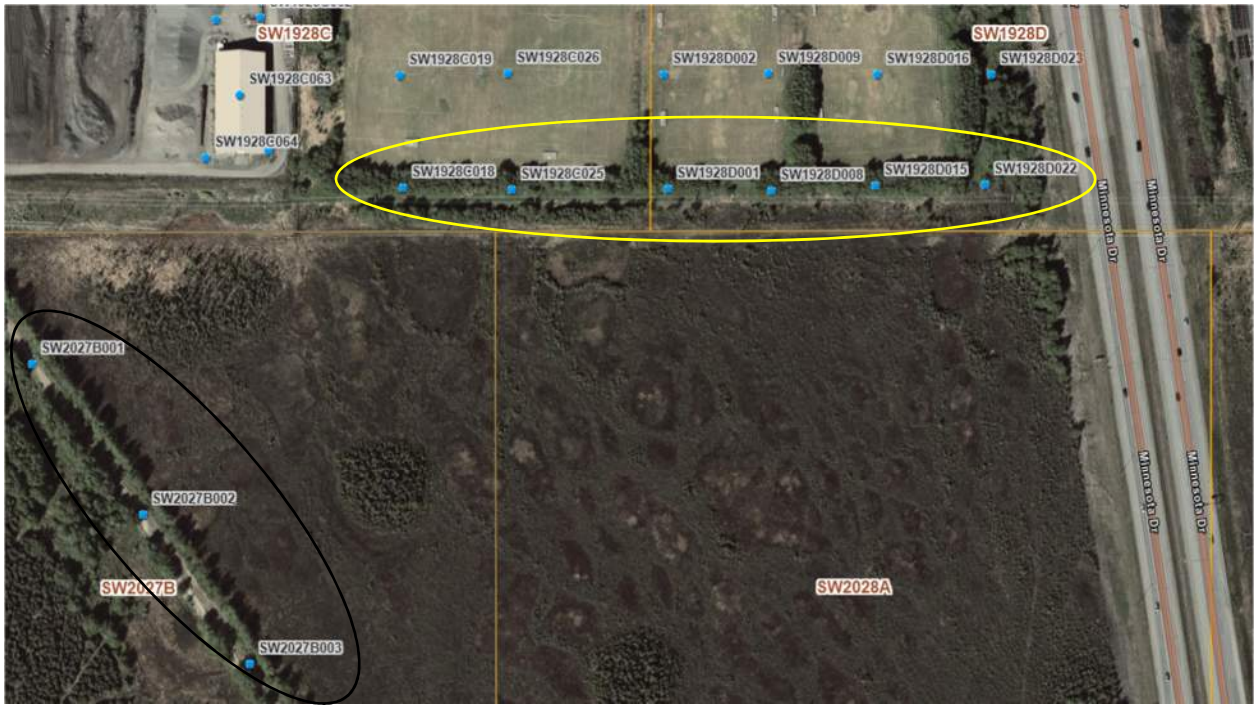
LEGEND

- 2" O.D. split spoon sample
- 3" O.D. thin-wall sample
- P Sampler pushed
- M Sample not recovered
- Water level
- Impervious seal
- Piezometer tip - Stone tip
- Observation well
- Perforated pipe
- Atterberg limits
- Liquid limit
- Natural water content
- Plastic limit
- Approximate invert elevation

BC



West to East Bore Holes



Attached: Bog logs (from west to east) for: SW1928C018, SW1928C025, SW1928D001, SW1928D008, SW1928D015, and SW1928D022.

MUNICIPALITY OF ANCHORAGE

MOA
Boring ID: SW1928C018
Grid: SW1928

DEPARTMENT OF PUBLIC WORKS
CONSTRUCTION DIVISION

(18)

SOILS LOG

HOLE NO. 1
DATE 1/19/84
BY D.N. Bolles
DEPTH 8'
WATER TABLE 6.5'

LOCATION Anchorage Soccer / Softball Park / 410' West of E Tabt extended / 1295' South of E 55th Ave extended
COMMENTS Location of test holes per F.B. 1910
Visual Classification only

	DEPTH	UNIFIED CLASS	FROST GROUP	DESCRIPTION
.025'	0			Existing Grade
	1			
	2	Pt	NA	Dk. Brown - Organics w/ stick & roots Low density / Very high moisture
	3			
	4			
	5			
▼	6			
	7	SM	F-2	Grey - Silty Sand w/ Gravel / Saturated Moderately low density
	8			
	9			
	10			
	11			
	12			
	13			
	14			

LOCATION SKETCH:

LEGEND

SYMBOL

- TEST HOLE
- WATER TABLE
- FROZEN MATERIAL

ALL FROST CLASSIFICATION BASED ON THE .02mm = 50% OF THE -#200 UNLESS OTHERWISE NOTED

GRID NO. 1928

82-032 (2/81)

MUNICIPALITY OF ANCHORAGE

MOA
Boring ID: SW1928C025
Grid: SW1928

DEPARTMENT OF PUBLIC WORKS
CONSTRUCTION DIVISION

(25)

SOILS LOG

HOLE NO. 8
DATE 1/19/84
BY D. N. Bolles
DEPTH 8.5'
WATER TABLE 5.5'

LOCATION Anchorage Soccer / Softball Park / 200' West of E Tait ext. / 1300' South of E 55th Ave ext.
COMMENTS Locations of Testholes per F.B. 1910
Visual Classifications Only

	DEPTH	UNIFIED CLASS	FROST GROUP	DESCRIPTION
0.25'	0			Existing Grade
	1			
	2	Pt	NA	Dark Brown - Organics w/root matter
	3			Low density / Very high moisture.
	4			
▼	5			
	6			
	7	SM	F-2	Grey - Silty Sand w/Gravel / Saturated
	8			Moderately Low Density
	9			
	10			
	11			
	12			
	13			
	14			

LOCATION SKETCH:

LEGEND

SYMBOL

- ⬢ TEST HOLE
- ▼ WATER TABLE
- 2 3 4 5 FROZEN MATERIAL

ALL FROST CLASSIFICATION BASED ON THE .02mm = 50% OF THE -#200 UNLESS OTHERWISE NOTED

GRID NO. 1928

82-032 (2/81)

MUNICIPALITY OF ANCHORAGE

MOA
Boring ID: SW1928D001
Grid: SW1928

DEPARTMENT OF PUBLIC WORKS
CONSTRUCTION DIVISION

SOILS LOG

HOLE NO. 15
DATE 11/19/84
BY D. N. Bolles
DEPTH 8.9'
WATER TABLE 6.2'

LOCATION Anchorage Soccer/Softball Park / E of Taft extended / 12.50' south of E 55th Ave ext.
COMMENTS Locations of Testholes per F.B. 1910
Visual Classifications Only

DEPTH	UNIFIED CLASS	FROST GROUP	DESCRIPTION
0			Existing Grade
1			
2	Pt	NA	Dark Brown - Organics / Low Density
3			Very High Moisture
4			
5			
6			
7	SM	F-2	Grey - Silty Sand w/ Gravel
8			Moderately Low Density / Saturated
9			Sloughing
10			
11			
12			
13			
14			

LOCATION SKETCH:

LEGEND

SYMBOL

- TEST HOLE
- WATER TABLE
- FROZEN MATERIAL

ALL FROST CLASSIFICATION BASED ON THE .02mm = 50% OF THE -#200 UNLESS OTHERWISE NOTED

GRID NO. 1928

82-032 (2/81)

MUNICIPALITY OF ANCHORAGE

MOA
Boring ID: SW1928D018
Grid: SW1928

DEPARTMENT OF PUBLIC WORKS
CONSTRUCTION DIVISION

(9)

SOILS LOG

HOLE NO. 22
DATE 1/19/84
BY D.N. Bolles
DEPTH 8'
WATER TABLE 4'

LOCATION Anchorage Soccer / Softball Park / 200' East of E Tait St. Ext. / 1295' South of E 56th Ave ext.
COMMENTS Locations of Testholes per E.R. 1910
Visual Classifications Only

DEPTH	UNIFIED CLASS	FROST GROUP	DESCRIPTION
0			Existing Grade
1	Pt	NA	Dk. Brown - Organics / Low Density
2			Very High Moisture
3			
4 ▼			
5	SM	F2	Grey - Silty Sand w/ Gravel
6			Saturated / Moderately Low Density
7	SP	NFS	Grey - Coarse Sand w/ Gravel
8			Saturated / Medium Density
9			
10			
11			
12			
13			
14			

LOCATION SKETCH:

LEGEND

SYMBOL

- TEST HOLE
- WATER TABLE
- FROZEN MATERIAL

ALL FROST CLASSIFICATION BASED ON THE .02mm = 50% OF THE -#200 UNLESS OTHERWISE NOTED

GRID NO. 1928

82-032 (2/81)

MUNICIPALITY OF ANCHORAGE

MOA
Boring ID: SW1928D015
Grid: SW1928

DEPARTMENT OF PUBLIC WORKS
CONSTRUCTION DIVISION

(15)

SOILS LOG

HOLE NO. 29
DATE 1/19/84
BY D.N. Bolles
DEPTH 8.0'
WATER TABLE 6.0'

LOCATION Anchorage Soccer/Softball Park / 400' East of E Tabt St. ext. / 1295' Southof E. 55th Ave. ext.
COMMENTS Locations of Testholes per F.B. 1910
Visual Classifications Only

DEPTH	UNIFIED CLASS	FROST GROUP	DESCRIPTION
0			Existing Grade
1			
2			
3	Pt	NA	Dark Brown - Organics / Low Density Very High Moisture
4			
5			
6			
7			
8	SM	F-2	Grey - Silty Sand w/ Gravel Moderately Low Density / Saturated
9			
10			
11			
12			
13			
14			

LOCATION SKETCH:

LEGEND

SYMBOL

- TEST HOLE
- WATER TABLE
- FROZEN MATERIAL

ALL FROST CLASSIFICATION BASED ON THE .02mm = 50% OF THE #200 UNLESS OTHERWISE NOTED

GRID NO. 1928

82-032 (2/81)

MUNICIPALITY OF ANCHORAGE

MOA
Boring ID: SW1928D022
Grid: SW1928

DEPARTMENT OF PUBLIC WORKS
CONSTRUCTION DIVISION

22

SOILS LOG

HOLE NO. 36
DATE 1/19/84
BY D. N. Bolles
DEPTH 8'
WATER TABLE 6'

LOCATION Anchorage Soccer / Softball Park / 600' East of E Tak St. ext. / 1295' South of E 55TH Ave ext.
COMMENTS Locations of Testholes per EB. 1910
Visual Classifications Only

DEPTH	UNIFIED CLASS	FROST GROUP	DESCRIPTION
0			Existing Grade
1			
2	PT	NA	Dk. Brown - Organics / Low Density Very High Moisture
3			
4			
5			
6	SM	F-2	Grey - Silty Sand w/ Trace Gravel Medium Density / Very High Moisture
7	SP	NFS	Grey - Sand w/ Gravel / Medium Density Saturated
8			
9			
10			
11			
12			
13			
14			

LOCATION SKETCH:

LEGEND

SYMBOL

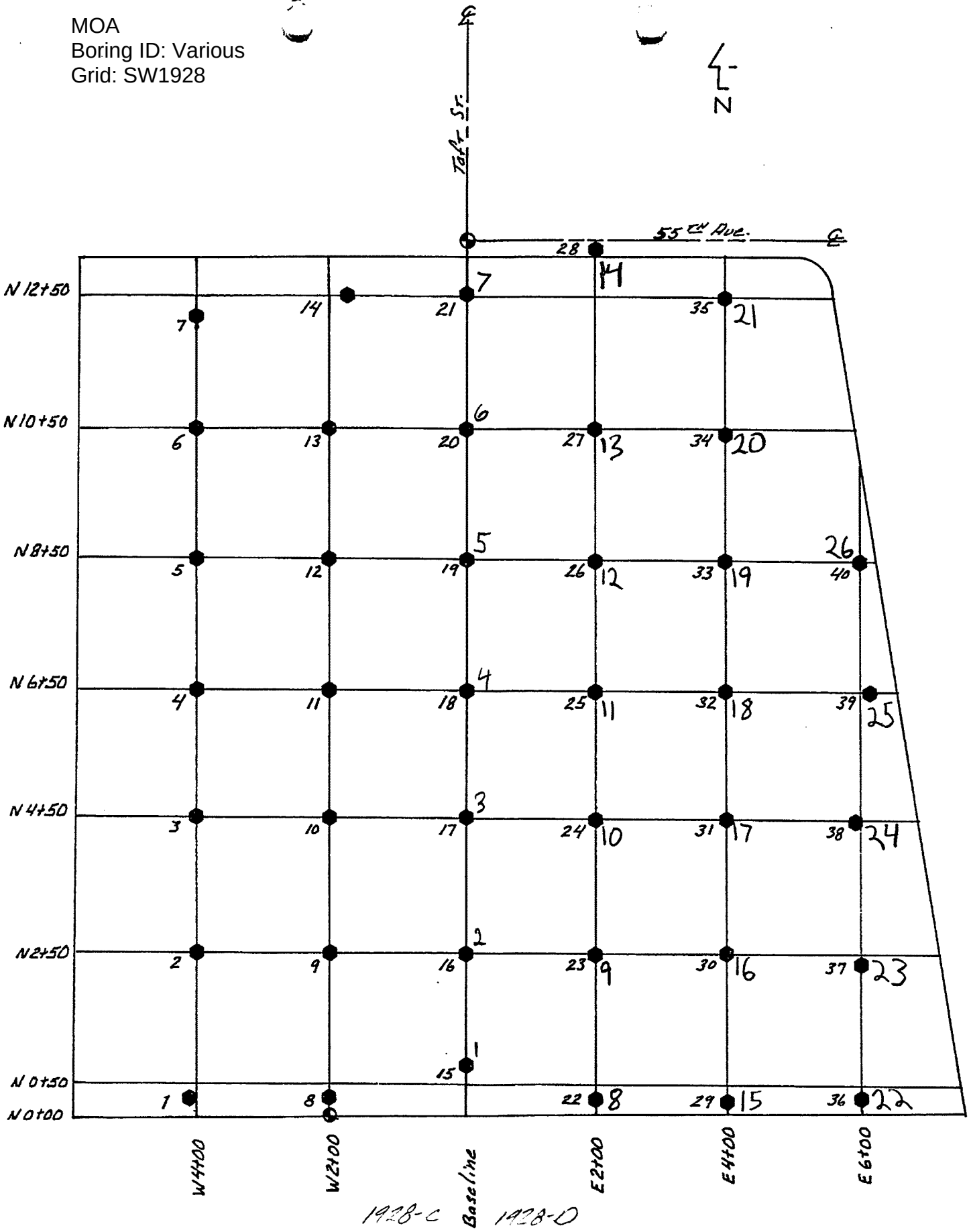
- TEST HOLE
- WATER TABLE
- FROZEN MATERIAL (2 3 4 5)

ALL FROST CLASSIFICATION BASED ON THE .02mm = 50% OF THE -#200 UNLESS OTHERWISE NOTED

GRID NO. 1928

82-032 (2/81)

MOA
Boring ID: Various
Grid: SW1928



Appendix C: Stormwater Management Report

Draft Stormwater Management Report

West Anchorage Snow Disposal Site

Municipality of Anchorage, Project Management & Engineering

4700 Elmore Road, 2nd Floor
Anchorage, AK

July 23, 2021

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Contents

Figures

Tables

Attachments

Acronyms and Abbreviations

AWWU	Anchorage Water and Wastewater Utility
DCM	Design Criteria Manual
M&O	Maintenance and Operations
MOA	Municipality of Anchorage
USACE	U.S. Army Corps of Engineers

1. Project Overview

The Municipality of Anchorage (MOA) has identified a need to replace the Northwood Snow Disposal Site (Northwood Site) that currently serves the West Anchorage snow service area. This project will provide the Municipality with a permanent snow disposal site in West Anchorage sized to accommodate the expected snow storage needs for the next 50 years.

1.1 Location

The parcel selected for the proposed snow disposal site is identified as the unsubdivided NW ¼ of the NW ¼ of Section 1, T12N, R4W, Municipal Parcel ID 012-571-01-000 (Figure 1). It is bounded on the north by Javier De La Vega Park, on the east by Minnesota Drive, and on the south and west by undeveloped parkland known as Connor's Bog.

1.2 Description

The site is composed of a single parcel, identified above, that is 31.7 acres in size. The parcel is currently managed by the Anchorage Parks and Recreation Department but is not dedicated parkland. Once the project is developed, the parcel will be managed by MOA Maintenance and Operations Department (M&O). The parcel and surrounding bog are predominantly flat, but slope very slightly from northeast to southwest. The parcel and surrounding area contain Class A wetlands with low bog vegetation and several small areas of larger trees. There is no current development of any kind on the parcel.

1.2.1 Access Road

Once on Northwood Drive, truck access to the Connor's Bog Site is similar to access to the Northwood Snow Disposal Site, with some additional driving through the Kloep Station area. The existing security gate will continue to be used for both Kloep Station and the new snow site facilities as it is for the existing Northwood Snow Site. The additional routing will be on service roads with no public traffic. M&O has administrative offices, active operations, equipment storage and maintenance, sand and deicer storage, a grit facility, and other activities at their Kloep Station site. The new snow disposal site will be beyond the operations areas, and heavy trucks will have to be routed through or around the current facilities. At the entrance to the facility along Northwood Drive, truck traffic will be routed west of the administrative parking area, which will be moved slightly east, closer to the building. Additional fill along the parking area will provide for a separate 24-foot-wide truck route outside the parking area.

Beyond the deicer storage tanks, truck traffic will continue on the existing gravel roadway pass under the Chugach Electric Association power lines to the southwest corner of the facility. At this point, trucks will turn east, split from the road to the warm sand storage building, descend the old landfill face, pass under the Chugach lines a second time, and travel east using the section line easement and a small incursion into park lands onto the northwest corner of the new snow site. In order to ensure that snow hauling trucks will have no possibility of impacting the Chugach Electric Association power lines, a structure will be placed on the Kloep Station side and the snow disposal pad side of the access road. The structure's height will not allow for trucks to pass under with their beds in the raised position.

The access road prism will be cut into the slope of the landfill to the extent possible with 2:1 back and side slopes. Geotechnical borings show ample cover material over the landfill to allow partial benching to avoid the overhead power lines. The portions of the access road through the bog will also be

surcharged. A single culvert will be needed west of the snow site pad to allow for cross-drainage in that area.

1.2.2 Snow Disposal Pad

The snow depositional pad will be constructed to provide a stable work area for winter and summer operations. At a minimum, the pad section will contain a geotextile layer for separation of the fill from the underlying peat; this will be followed by a minimum of 2 feet of structural fill. Pending the results of the full geotechnical report, it is assumed that there will be 2–3 feet of compression in the underlying layer of peat. Surcharging of the pad is recommended over a 6-month period with 3 additional feet of fill. This surcharge material would be removed and used for other parts of the project or hauled off as excess.

As stated above, the pad will slope slightly from a central high point to shed melt and precipitation waters into the surrounding wetland on all sides. Slopes will be slight, and it is assumed that some residual ponding is acceptable. Slopes will be regraded as required to maintain positive drainage.

The area of the pad is initially targeted at 14 acres and will be shaped to take advantage of existing sloped topography and to allow a consistent visual setback from the heavily used AWWU corridor.

The final pad will be seeded with an inundation and salt-tolerant seed mix as specified in the DCM. Snow deposition delineation poles will mark the perimeter of the pad to prevent snow deposition in the areas reserved for water treatment.

1.2.3 Water Quality Process Moat

The depositional pad will be surrounded by a variable-width area of undisturbed wetlands that will serve the meltwater processing functions for the site. This moat area will detain initial meltwaters with higher chloride concentrations for dilution by later, lower-concentration meltwaters, as described in Section 8.2. Water levels will be maintained in this area through the snow melt season to also capture suspended sediments in the meltwaters. Because the area will require only minimal development infrastructure, it can be enlarged beyond the minimum area specified in the DCM with small additional cost. This will serve the dual purpose of allowing a higher level of treatment with the capture of finer suspended sediments and serving as an overflow storage area in extreme snow years.

Due to the natural topography of the wetlands at the snow disposal site, melt water will tend to flow south and west, pooling against the south and west berm areas. At these points in the berm, weirs will disperse it into the wetland. The width of the moat will vary depending on whether it is serving a primarily transmission function along the north and east faces of the pad or a primarily treatment function along the south and west sides. Any additional area for snow storage overflow will occur along the southern areas of the site.

1.2.4 Surrounding Berm and Weirs

The surrounding berm will be variable in design and serve multiple functions. It will be the base for foot access to the weirs in order to control water levels in the moat. It will also serve a landscape and screening function and as the planting base for larger upland tree species, and finally it will serve as a containment dike for the water quality impoundment. Three to four weirs will be fitted along the dike as discharge areas into the greater bog.

The berm surrounding the snow disposal pad will have different functions and design parameters depending on location. Along the north side, a low, non-landscaped berm is needed separate and direct existing drainage from the landfill and Minnesota Drive to a culvert that passes under the snow disposal site access road. Potential leachate drainage from the toe of the landfill and stormwater from the Minnesota Drive right-of-way should be separated from meltwater from the snow disposal site due to concerns with water quality and quantity from these sources. The edge of the old landfill is nearby and will serve to contain drainage to the north. It is unlikely that a berm and landscaping along the north side will attain sufficient height to provide any screening when viewed through the existing vegetation from the Javier De La Vega ball fields at the top of the landfill. No landscaping other than grass is provided in the cost estimate.

Along the east side, the berm will serve as the basis for Level 4 landscaping as specified in Title 21 as well as the foundation of a walking trail to connect Javier De La Vega field with the rest of Connor's Bog Park. This trail would likely run along the top of the berm and support foot traffic. There will be no weirs along this side, and vehicular access is not anticipated. As a park trail and the primary visual feature seen from Minnesota Drive, landscape features will be robust while taking advantage of the existing large tree stands at the north and south ends. As the berm wraps around the south side of the site, it will maintain its trail and landscape functions. Access to the single weir in the south east corner will be provided from the inside by placing the fence around the weir and displacing the trail around the weir with a short drainage culvert. The recreation trail will transition across the wetlands from the southwest corner to join the AWWU corridor to the west. This trail will remain entirely within the parcel and adjacent section line easements. This southwestern section of the trail will be only slightly elevated above the wetlands and may contain a culvert for cross-drainage purposes.

Along the west-facing side, the berm's primary function will be screening and access to the weir sites. No vehicular access will be provided, with plantings for screening. Existing copes of trees will be incorporated into the screening where possible. Although not primary, it is likely that this berm will be used as a recreation trail and should be designed with access to the AWWU corridor from the north end. The design of the recreational trails should be discussed with the Parks and Recreation Department. Proximity to dense trees and brush can have a negative impact on users' actual and perceived safety. An alternative would involve creating a separate trail alignment with no adjacent landscaping to provide better sight distance and safety to park users.

Three to four weirs will be provided for dispersion of meltwaters. These weirs need to be vertically stable and all located at the same elevation to allow an even distribution of water into a broad area of the bog. Preliminary design concepts show a short section of sheet piles driven through the peat layer and anchored in the underlying soil strata. The low nappe of all weirs will be set to match, allowing equal dispersion of flows from all weirs simultaneously. A valve will be fitted below the nappe of the weirs to allow the interior impoundment to be drained down to the base wetland level after the snow melt season has passed. The nappe of the weirs will be fitted with adjustable stop logs that can be added or removed to adjust for gradual sediment accumulation and or to adjustment of flows.

1.3 Category Determination

The *Anchorage Stormwater Manual*, Version 1.0 (MOA 2017) will be used for the analysis and relevant stormwater management requirements. The project will disturb more than 10,000 square feet and is categorized as a Large Project, per Section 3.3.1.4 of MOA 2017.

1.4 Drainage Project Notification

Mapping has been completed by MOA Watershed Management Services as of June 15, 2021. The site does not contain stream channels or major drainageways. The site does not contain any waters of the United States, per the United States Army Corps of Engineers' Approved Jurisdictional Determination (Attachment A).

2. Drainage Basin

The selected site lies within two MOA-delineated drainage subbasins, as shown on Figure 1.

2.1 Basin Size

The overall drainage basins discussed in this report are approximately 473 acres in size. Note that Raspberry Road has cut off the Connor's Bog portion of subbasin 1436-1 from the southern portion, which is composed of Strawberry Bog. Both sub-basins are wholly contained by surface development and have no surface water outlets.

2.2 Existing Conditions and Land Cover

The site is situated in on the eastern portion of Connor's Bog dominated by Class A wetlands of the strangmoor (patterned bog) type that were once abundant in the Anchorage lowlands. Wetlands at the proposed site have been cut off from their historic water sources and are slowly drying out. Comparisons of the current to historic (1950s) outline of Connor's Lake show a gradual shrinkage of water surface area. The existing Northwood Snow Disposal Site drains to Connor's Lake and helps maintain the lake levels but has only a small effect on the adjacent wetlands. The low shrub wetland areas of the bog are interspersed with several stands of black spruce. Table 1 provides a summary of the types of pre-development land cover in the area of the selected site.

Table 1. Pre-Development Land Cover

Land Cover	Slope	Area (acres)	Percent of Total
Impervious Surface	0–2%	27.1	5.7
Undisturbed Wetland	0–1%	344.8	72.9
Forest	0–1%	76.4	16.2
Grasses or Landscaped	0–4%	24.6	5.2

2.3 Proposed Conditions and Land Cover

The proposed development would create an approximately 14-acre impervious gravel snow disposal pad and an approximately 3-acre berm surrounding the snow disposal pad. These developments together total approximately 17 acres, or 4 percent of the total basin area. The remaining portion of the drainage basins would remain as wetlands and existing development. Snow melt from the new site has the potential to increase water tables and rehydrate a larger portion of the remaining bog as well as helping to maintaining the water surface elevation in Connor's Lake.

The post-development land cover is shown in Table 2.

Table 2. Post-Development Land Cover

Land Cover	Slope	Area (acres)	Percent of Total
Impervious Surface	0–2%	44.7	9.5
Undisturbed Wetland	0–2%	327.2	69.1
Forest	0–1%	76.4	16.2
Grasses or Landscaped	0–4%	24.6	5.2

2.4 Map of Basins

Figure 1 displays the MOA-delineated drainage basins.

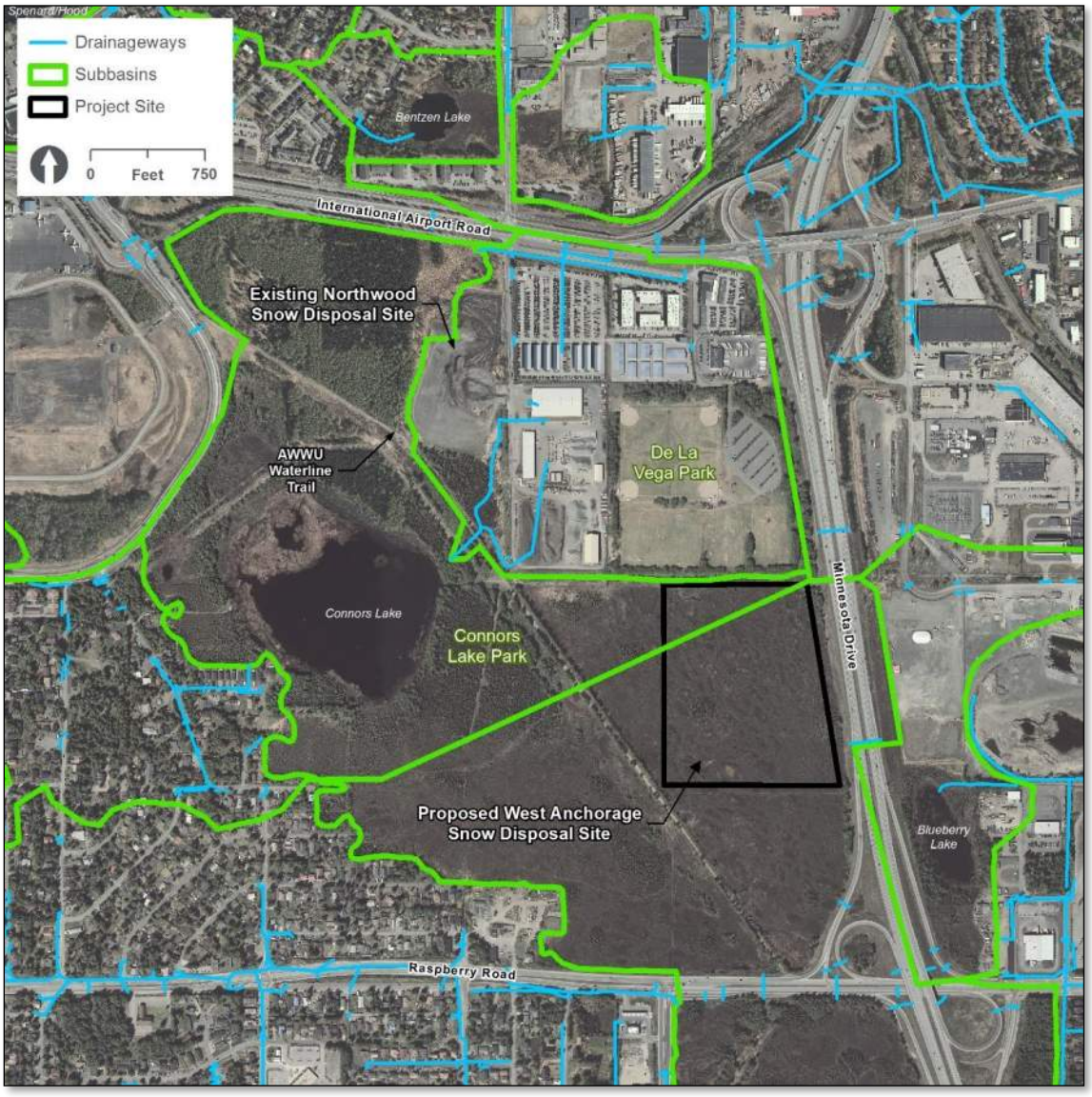

Figure 1. Drainage Basins in the Project Area

3. Existing Conditions

3.1 Pre-development Site Plan

Existing conditions are shown in Figure 2. The drainage basin is bound by existing roadway developments that have cut off any surface water input into the basin or surface water drainage out of the basin. Additionally, there are no storm drains or culverts that flow out of the basin. Runoff from surrounding roads moves as sheetflow into the basin. Based on previous studies in the basin, spring meltwater moves southward through Connor's Bog toward Raspberry Road. Since this surface water cannot leave the bog, it begins to accumulate on the southern edge of the bog and along the AWWU waterline trail. A 12-inch culvert was placed through the waterline trail by AWWU to alleviate seasonal flooding in this area and allow surface water to drain into the western portion of Connor's Bog and eventually into Connor's Lake.

3.2 Floodways, Floodplains, and Problem Areas

The site is not located in a floodplain and there are no known problem areas in the immediate vicinity. Standing water from spring snowmelt is visible until late May or early June. The duration of standing water is dependent primarily upon the amount of snow that has fallen over the preceding winter.

3.3 Soils

The site is dominated by organic peat soils that vary in depth from 5 to 12 feet in thickness. The peat is underlain by medium dense sand and fine gravel. A soils report for the project is provided in the *Design Study Report*. The report contains the soil boring logs for the project site and access road as well as laboratory data for selected soil samples.

4. Proposed Conditions

4.1 Post-development Site Plan

The post-development conditions will include an access road and an approximately 14-acre gravel pad surrounded by undisturbed bog that will serve the meltwater processing functions for the site. Surrounding the undisturbed bog will be an approximately 3-acre berm that will serve as a containment dike for water quality impoundment. Three to four weirs will be fitted along the dike as discharge areas into the greater bog. Meltwater with relatively high concentrations of chloride will run off from the gravel snow disposal pad and will be directed into the undisturbed bog. The initial high chloride meltwater will be diluted with later meltwater that is relatively lower in chloride concentration. Runoff from the pad will not be directed into any constructed retention ponds or into the stormwater system.

The final pad will be seeded with an inundation and salt-tolerant seed mix as specified in the DCM (MOA 2007). Snow deposition delineation poles will mark the perimeter of the pad to prevent snow deposition in the areas reserved for water treatment. The berm surrounding the snow disposal pad will be vegetated following Title 21 and Conditional Use stipulated guidelines.

The post-development site plan is provided in Figure 2.

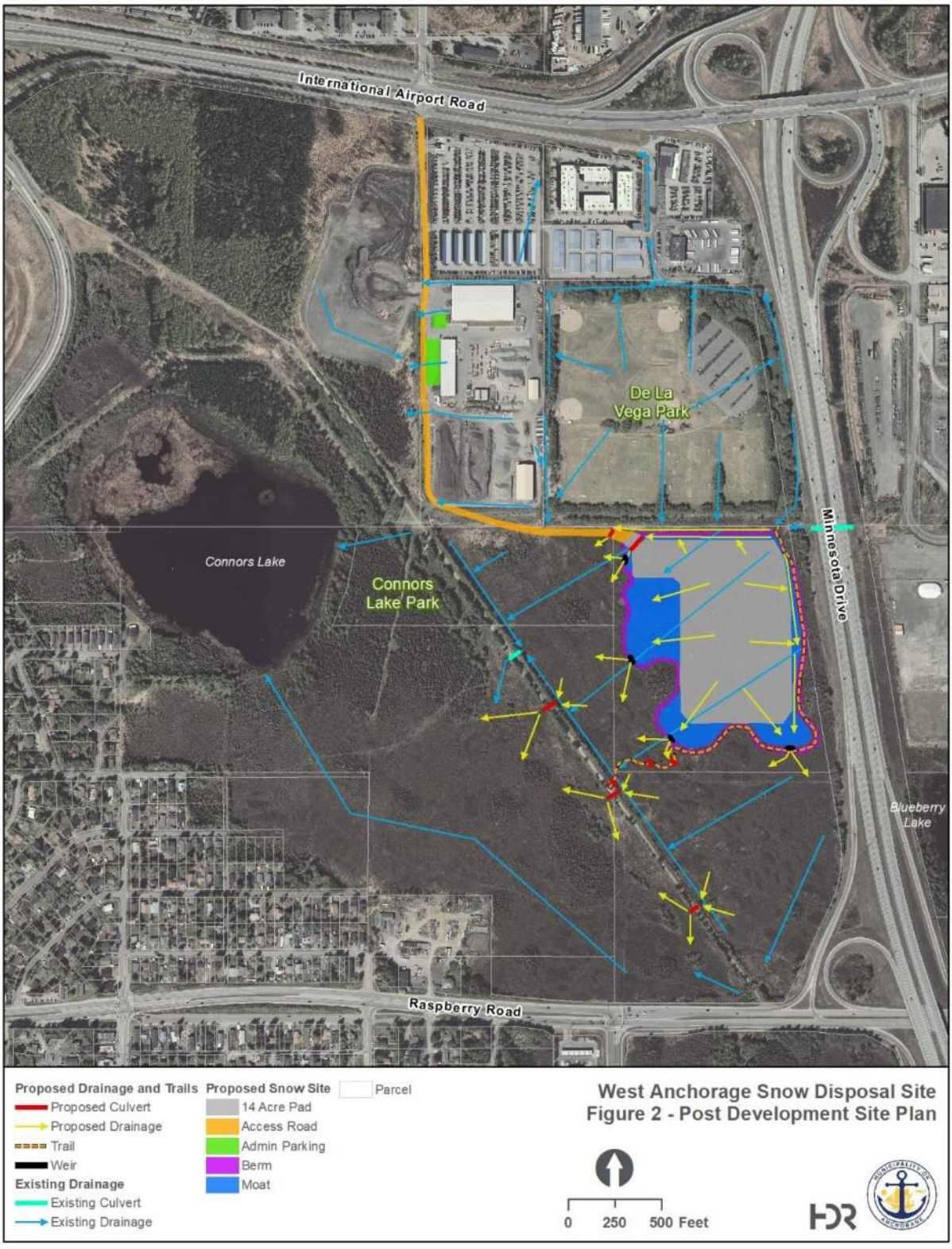

Figure 2. Post-Development Site Plan

4.2 Discharge Points and Receiving Water Bodies

The surrounding berm will be fitted with flow-control weirs (Figure 2). These weirs will discharge into infiltration areas of coarse rock along the outside of the berms. From there, the meltwaters will infiltrate into the surrounding bog and will dissipate over a variable distance, depending on flow rates. Total peak discharge divided among the four weir points is estimated at 1 cubic foot per second. Additional culverts will be placed through the AWWU waterline trail in Connor's Bog to allow surface water present during spring to move through the trail into the western portion of Connor's Bog. The bog is essentially flat until the slight depression that contains Connor's Lake. Increased ground and surface waters will migrate slowly to the depression and help maintain the levels of Connor's Lake. Connor's Lake has no surface water connection to any receiving waters but likely has a groundwater connection to aquifers trending north and west of the bog, judging from surface water levels in the surrounding waterbodies.

5. Stormwater Controls Construction Consideration Plan

The design of this snow deposition and meltwater site will rely on a twofold approach and larger areas for treatment and infiltration afforded by the expanse of Connor's Bog for treatment and handling of meltwater. The following key factors comprise the stormwater controls planning for the site:

- This will be a large-capacity facility with the ability to contain in excess of 700,000 cubic yards of compacted snow. Assuming compacted snow at 50 percent water content, 9,450,000 cubic feet of water will be added to the bog over the 3- to 4-month melt period. This meltwater will dissipate into and through the remaining 125 acres of the bog.
- Treatment and detention of the meltwater will be facilitated by an enclosed area of the bog outside the melt pad controlled by four elevated weirs. The size of this detention area is required to be equal to the expected meltwater output of the facility during the peak 40 hours of melt as defined in the DCM (MOA 2007). Assuming that the detention area will be 1 foot deep as controlled by the weirs, the required area is approximately 1 acre. Design calls for a holding area of two to five times this requirement. A secondary treatment requirement stipulated the removal of 95 percent of the sediments larger than 100 microns. Calculations based on typical street sediment wash-off indicate that the surface area for this level of settlement is relatively minor compared to the requirements for detention storage and is not expected to be a factor in design.
- Weirs are designed to be vertically stable over the long term, constructed of rust-resistant polyvinyl chloride sheet piles driven below the peat layer for frost jacking and settlement stability. These weirs will be fitted with stop logs that allow the nap of the weir to be adjusted vertically to facilitate seasonal manipulation of the retention area. The stop logs will be removed at the end of the meltwater season, allowing the detention areas to drain fully down to the normal ground water level in the bog. The stop logs will be left out until early March to allow any rain on snow events to drain from the detention area and will be seasonally installed to catch the meltwater season for dilution and settlement functions. On the outside of each weir, the meltwater will enter a coarse rock dissipation trench to facilitate dispersion into the bog.
- The bulk of the bog is underlain with peat, the upper layers of which are relatively porous due to the coarse vegetation and root mat structures. The peat layers themselves have relatively low permeability, and ground water levels appear to fluctuate from surface detention during spring

to 5 feet below ground surface. The peat layers are underlain by relatively nonporous sand and silt deposits.

- Other than the weirs and stop logs, the system will contain relatively few structural controls and is reliant on the capacity of the bog for treatment and dissipation, both of which are more than adequate.
- The existing snow facility also discharges to the Connor's Bog but was not designed to allow adequate drainage. Melt waters dissipate rapidly into the surrounding vegetation from this facility but results in ponding against International Airport Road to the north and the AWWU sewer alignment to the south. Both areas show localized spruce die off from higher than normal water tables. The new facility will be designed to route and convey melt water to reduce the chances for localized detention outside the bermed enclosure, and the enclosed basin will be allowed to drain fully after the melt water season. Large spruce will be removed from the enclosure and the vegetation within this area can be expected to adjust over time as high groundwater-tolerant species dominate over less-tolerant types.
- During construction of the facility, it may be necessary to surcharge the site to facilitate compaction of the peat layer. If this is required, the perimeter of the surcharged pad will be bermed sufficiently to prevent discharge of stormwater into the bog, back slopes of the material will be treated with hydroseeding for erosion control, and a perimeter silt fence will be installed at the base of the slopes.

6. Compliance with Stormwater Management Requirements

In order to comply with stormwater management requirements, the peak runoff was compared to requirements under Section 3 and Section 8 of the *Anchorage Stormwater Manual* (MOA 2017). The following sections and the *Design Study Report* prepared for the proposed snow disposal site detail aspects of the design that meet or exceed these requirements.

6.1 Water Quality Treatment

This is a unique facility with unique melt water volumes and site characteristics. The depth of melt water generated by the melting snow mass will be approximately 15 feet over the 3–4 months of the melt season. The normal Anchorage annual rain fall is only 16 inches over the entire year, therefore contributing only an additional 0.33 feet to the total melt water runoff.

Design parameters for detention at snow sites require the ability to detain the equivalent of the 40-hour snow melt from the specified 5-year recurrent hyetograph. This 0.9 inch of melt water is greater than the 0.52-inch precipitation specified design storm depth and requires 1.05 acre-feet of detention. Design provides for a 12-inch depth of detention over 2.5 acres for more than twice the required detention. This design will take advantage of large surface areas for sedimentation and discharge to an expansive wetland system for compliance with water quality standards. Please see the project *Design Study Report* for a further detailed analysis.

6.2 Extended Detention (Channel Protection)

The unique requirements of this facility, the utilization of detention storage for the initial high-chloride meltwater, and discharge to wetlands will exempt this project from the need for extended detention.

6.3 Conveyance

Conveyance sizing design for this facility is applicable to the capacity of the outfall weirs, the sizing of coarse rock in the dissipation trenches to prevent erosion, and the capacity sizing of the culverts under the AWWU trail. Expected peak flow rates are of 1 cubic foot per second calculated from the peak of the 40-hour snow melt hyetograph over the 14-acre pad and 6.5 cubic feet per second using Rational Method and a 25-year return interval storm over the entire site, including the landscaped berm. The relevant conveyance sizing numbers are as follows:

- Assuming 3-foot-wide rectangular weirs and 6 inches of backwater, each weir will pass 3.41 cubic feet per second. Three to four total weirs on the perimeter pf the berm will supply adequate capacity.
- Scour protection below the weir outfalls should be a 24-inch blanket of Class I rip rap in an 8-foot apron around the outfall, and the dispersion trenches can utilize 6-inch minus drain rock.
- Culvert capacity under the AWWU trail must provide capacity to handle runoff from the entire bog northeast of the trail plus melt water from the new snow disposal site. Currently, the flows are accommodated by a single 12-inch culvert in the middle of the trail and a lowered section near the south end that may pass flood flows, although no evidence of water flow over the lowered section is evident. Assuming that the current condition is able to handle the existing flows, the addition of 3-inch by 12-inch corrugated polyethylene pipe culverts will be adequate to handle the additional 6.5 cubic feet per second for the 25-year storm. Outfall aprons similar to those at the weirs are recommended.

6.4 Detention and Peak Flow Control

Detention of the controlling 40-hour, 5-year melt water event is described under Section 6.3 for conveyance. The weir-controlled detention area and extensive bog dissipation will meet the peak flow control requirements of this section. The current snow disposal site provides significant meltwater to the Connor's Bog and Lake system. This melt water will continue to be provided from the new site. The new site has the additional advantage of broader dispersion into a larger area of the bog prior to discharge into Connor's Lake through surface or groundwater connection. Dispersion of melt water through the enclosing detention berm and the existing raised AWWU trail will provide additional dispersion above and beyond the existing site, which outfalls to the lake area through a single flow channel through the AWWU trail.

6.5 Downstream Impact Analysis

The downstream impacts of this project are relatively limited in that the proposed snow site is intended to replace the existing facility with similar meltwater discharges into Connor's Bog. The proposed facility will alter the existing drainage patterns of the north east areas of the bog by disrupting existing drainage routes off the areas to the north from De La Vega Park and east from a single culvert under Minnesota Drive. Both of these drainages will be channeled west along the north side of the proposed snow facility and a culvert will be provided under the access roadway to convey drainage back to the bog. The access roadway culvert is sized to match the Alaska Department of Transportation and Public Facilities culvert under Minnesota Drive; peak flood flows beyond the capacity of the 24-inch culvert will be detained in the 1.5 acres of bog north of the snow site until the trailing leg of the storm.

6.6 Wetland Compliance

Compliance with regulations regarding discharge into wetlands is not required. The U.S. Army Corps of Engineers (USACE) has determined that the site does not consist of Waters of the United States and therefore does not require a Section 404 Clean Water Act permit. See the Approved Jurisdictional Determination form and letter from USACE, provided as Attachment A.

6.7 Operations and Maintenance Plan

Maintenance of the new snow disposal site should not be significantly different than maintenance at existing snow sites across Anchorage. As with all snow sites, there is a gradual deposition of road grit that is left after the snow melts in late summer. The pad will occasionally need to be regraded to maintain the designed slopes for drainage. By the same token, any differential settlement of the pad due to the weight of the large snow mass will have to be regraded. Dust, litter control, maintenance of the access road, and other infrastructure will be per existing facilities.

6.8 Conclusion

The stormwater management plan for the proposed snow disposal site in Connor's Bog complies with all *Anchorage Stormwater Manual* requirements (MOA 2017). Runoff created by the development will be treated using a retention area that is sized to retain the 40-hour, 5-year snow-melt hyetograph.

7. References

MOA (Municipality of Anchorage). 2007. *Design Criteria Manual.* Anchorage Project Management & Engineering. Available at http://www.muni.org/departments/project_management/Pages/DesignCriteriaManual.aspx

MOA. 2017. *Anchorage Stormwater Manual,* Version 1.0. Available at https://www.muni.org/Departments/project_management/Documents/ASM_Volume1_Final_December2017.pdf

DEPARTMENT OF THE ARMY
ALASKA DISTRICT, U.S. ARMY CORPS OF ENGINEERS
REGULATORY DIVISION
P.O. BOX 6898
JBER, AK 99506-0898

December 23, 2020

Regulatory Division
POA-2020-00531

HDR, Inc.
Simon Wigren
2525 C Street Suite 500
Anchorage, AK 99503

Dear Mr. Wigren:

This is in response to your November 11, 2020, letter requesting an approved jurisdictional determination (AJD) for a parcel of land located within Sections 1 and 2, T. 12 N., R. 4 W., Seward Meridian, Anchorage, Alaska.

Based on our review of the information you provided and available to us, we have determined that the subject parcel contains wetlands which are not waters of the United States (U.S.) under our regulatory jurisdiction. The wetlands on your property do not have a surface hydrologic connection to a Traditional Navigable Water (TNW), and are therefore not considered a water of the U.S. Therefore, a Department of the Army (DA) permit is not required for any activities which may occur on your property.

A copy of the AJD form is enclosed and will be available at the following address: www.poa.usace.army.mil/Missions/Regulatory/JurisdictionalDeterminations under the above file number.

This jurisdictional determination does not establish any precedent with respect to any other jurisdictional determination under Section 404 of the Clean Water Act.

The wetlands on your parcel were reviewed pursuant to Section 404 of the Clean Water Act which requires that a DA permit be obtained for the placement or discharge of dredged and/or fill material into waters of the U.S., including wetlands, prior to conducting the work (33 U.S.C. 1344).

For regulatory purposes, the Corps of Engineers defines wetlands as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

This AJD is valid for a period of five years from the date listed on the AJD form, unless new information supporting a revision is provided to us before the expiration date. Also, enclosed is a Notification of Administrative Appeals Options and Process and Request for Appeal form regarding this approved jurisdictional determination (see section labeled “Approved Jurisdictional Determination”).

Nothing in this letter excuses you from compliance with other Federal, State, or local statutes, ordinances, or regulations.

Please contact me via email at: Lucas.J.Byker@usace.army.mil, by mail at the address above, by phone at (907) 753-2760, or toll free from within Alaska at (800) 478-2712, if you have questions. For more information about the Regulatory Program, please visit our website at: www.poa.usace.army.mil/Missions/Regulatory.

Sincerely,

Lucas J. Byker
Regulatory Specialist

Enclosures

Appendix D: Cost Estimate

ITEM NO.	SPEC. NO.	WORK DESCRIPTION	Units	Est. Qty.	Estimated Unit Cost	Total
A-1	20.02	Storm Water Pollution Prevention Plan	per LS	1	$30,000	$30,000
A-2	20.05 95.04	Clearing and Chipping	per Acre	18	$10,000	$180,000
A-3	20.10	Unusable Excavation	per CY	30111	$19	$572,111
A-4	20.10	Usable Excavation	per CY	38873	$18	$699,709
A-5	20.20	Unclassified Fill and Backfill	per CY	62834	$16	$1,005,348
A-6	20.21	Classified Fill (Type IIA)	per CY	96892	$36	$3,488,099
A-7	20.22	Leveling Course	per ton	160	$45	$7,222
A-8	20.23	Cobbles	per ton	267	$75	$20,000
A-9	20.24	Rip Rap (class I)	per CY	59	$140	$8,296
A-10	20.24	Rip Rap (class II)	per CY	21	$150	$3,200
A-11	20.25 95.04	Geotextile Fabric (Type A - Separation)	per SY	85566	$2	$149,740
A-12	20.25	Geotextile Fabric (Type B)	per SY	73703	$2	$147,406
A-13	30.05 95.04	Concrete Traffic Barrier (10 ft New Jersey Style)	per LF	360	$50	$18,000
A-14	40.06	A.C Pavement (Class D, 2 inch)	per SY	1405	$13	$18,269
A-15	40.08	Furnish & Install RAP	per Ton	1064	$46	$48,927
A-16	50.04	Adjust Sewer Cleanout to Finish Grade	per EA	2	$700	$1,400
A-17	55.02	Furnish and Install 12 inch CPEP Type S	per LF	50	$66	$3,300
A-18	55.02	Furnish and Install 24 inch CPEP Type S	per LF	450	$80	$36,000
A-19	55.08	Adjust Storm Drain Manhole Ring	per per EA	1	$1,100	$1,100
A-20	60.20	Adjust Valve Box to Finish Grade	per EA	1	$500	$500
A-21	65.02	Construction Survey Measurement	per LS	1	$30,000	$30,000
A-22	70.10	Traffic Markings (4" solid Yellow)	per LF	1400	$7	$9,800
A-23	70.11	Standard Sign	per S.F.	12	$100	$1,200
A-24	70.11	Remove and Relocate Signs	per EA	4	$415	$1,660
A-25	70.18	6' Chain-link fence	per LF	5406	$45	$243,270
A-26	70.19	Silt Fence	per LF	10000	$5	$50,000
A-27	70.23 95.04	9" Dia. Straw Wattles	per LF	50	$20	$1,000
A-28	70.24 95.04	Sheet pile weir 12' deep, 10' wide	per EA	4	$15,000	$60,000

ITEM NO.	SPEC. NO.	WORK DESCRIPTION	Units	Est. Qty.	Estimated Unit Cost	Total
A-29	70.25 95.04	Snow Marker Poles	per EA	100	$75	$7,500
A-30	70.26 95.04	Remove Water Tanks	per LS	2	$10,000	$20,000
A-31	70.27 95.04	Replace Water Tanks	per EA	2	$82,500	$165,000
A-32	70.28 95.04	Truck Over height Structure	per LS	1	$20,000	$20,000
A-33	70.29 95.04	Relocate Gas Line	per LF	20	$400	$8,000
A-34	70.30 95.04	Rebuild and Relocate Wooden Steps	per sq foot	50	$250	$12,500
A-35	70.31 95.04	Split Rail Fence	per LF	48	$50	$2,400
A-36	75.02	Trees, White Spruce, 5' HT. (Picea glauca)	per EA	100	$600	$60,000
A-37	75.02	Trees, Black Cottonwood, 5' HT. (Populus trichocarpa)	per EA	100	$600	$60,000
A-38	75.02	Trees, Sitka Alder, 12" HT. (Alnus sinuata)	per EA	350	$50	$17,500
A-39	75.04 95.04	Seeding (Schedule C) Wetland	per 1000 sq ft	87	$600	$52,272
A-40	75.04 95.04	Seeding (Schedule D) Revegitation	per 1000 sq ft	131	$600	$78,408
A-41	75.04 95.04	Seeding (Schedule F) Snow site	per 1000 sq ft	632	$600	$378,972
A-42	75.09 95.04	Remove and Replace Wooden Steps	per sq foot	50	$250	$12,500
A-43	75.09 95.04	Site Furnishings (Info Kiosk)	per EA	2	$10,000	$20,000
A-44	75.09 95.04	Site Furnishings (Park Bench)	per EA	4	$2,500	$10,000
A-45	75.10 95.04	Modular Block Wall	per LF	330	$180	$59,400
A-46	80.04	Driven Pile Luminaire Pole Foundation	per EA	8	$2,000	$16,000
A-47	80.05	Luminaire Pole, Fixed Base	per EA	8	$3,700	$29,600
A-48	80.06	Luminaire Arm	per EA	8	$750	$6,000
A-49	80.08	Junction Box (Type 1A)	per LF	10	$1,000	$10,000
A-50	80.10	Conductor (Unspecified)	per LF	2000	$7	$14,000
A-51	80.14	Post Mounted Load Center	per EA	1	$5,500	$5,500
A-52	80.23	Luminaire (unspecified)	per EA	8	$1,200	$9,600
A-53	80.xx 95.04	Relocate UG Electric	per LF	20	$400	$8,000
					Total	**$7,918,710**

Appendix E: Design Guidance Documents

Selection of Snow Disposal Site Guidance Documents and General Relevant Contents

Document: Section 21 Title 21
Author/Source: Municipality of Anchorage
Outline of public facility site selection process Snow disposal site regulations Waiver process outline
Document: 2017 Anchorage Stormwater Manual
Author/Source: Municipality of Anchorage PM&E
Melt water discharge profile Site selection criteria
Document: Anchorage Street Deicer and Snow Disposal 2003 Best Management Practices Guidance
Author/Source: Watershed Management Program - WMP CPg02001
Documentation of management of snow disposal sites
Document: 2013 Evaluation of Anchorage Snow Disposal Sites
Author/Source: Watershed Management Program - WMP APr14002
V-Swale design guidance General site design guidance
Document: Anchorage Storm Water Treatment in Wetlands: 2001 Progress Report
Author/Source: Watershed Management Program - WMP APr01002
Wetlands status in Anchorage Potential benefits of snow melt water into wetlands
Document: Urban and Highway Snowmelt: Minimizing the Impact on Receiving Water
Author/Source: Water Environment Research Foundation: Project 94-IRM-2
Estimation of metals and salts in melt water discharge Evaluation of toxic effects of these contaniment
Document: Effects of Snow Dump Meltwater on Adjacent Black Spruce Bog Vegetation
Author/Source: Alaska Pacific University - Kristen Hansen
Effect of melt water from snow disposal sites on adjacent vegetation
Document: Proposed Eagle River Snow Disposal Site: Preliminary Review
Author/Source: Watershed Management Program
Snow disposal site characteristics and impacts Contaminent characterization of snow disposal melt water General melt water discharge volumes and impacts
Document: Synthesis of Best Management Practices for Snow Storage Areas
Author/Source: Alaska DOT&PF Research & Technology Transfer
General best practices around the state for snow disposal
Document: The Anchorage Debit-Credit Method
Author/Source: Heather Dean, April 2011 – USACOE, EPA, US Fish & Wildlife, MOA
Procedure for determining development debits and compensatory mitigation credits