

GEOTECHNICAL EVALUATION OF POTENTIAL MATERIAL SITES

SELECT LOCALES WITHIN THE GLENN & PARKS HIGHWAY CORRIDORS

**Prepared for
Matanuska Susitna Borough
Palmer, Alaska**

**By
RECON LLC
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RECON Project No. 2021-162

**Maria C. Sanders, EIT
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22 June 2021**



Rowland Engineering Consultants

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22 June 2021

Matanuska-Susitna Borough
350 E. Dahlia Ave.
Palmer, AK 99645

Attn: Emerson Krueger – Natural Resources Manager

Re: Geotechnical Evaluation of Potential Material Sites

Mr. Krueger,

RECON LLC (RECON) has prepared this report to summarize the findings of availability and potential suitability of highway construction aggregate at select locales on Matanuska-Susitna Borough (MSB) land. The areas of interest are along the Glenn Highway (MP 56-93) and Parks Highway (MP 77-126) road corridors.

RECON completed preliminary field reconnaissance of the eight sites identified for evaluation during the period May 7-14, 2021. Based on the preliminary reconnaissance, four of the eight sites were selected for additional subsurface investigation. Locations were defined for completion of test pits and access routes where identified. The subsurface investigation was performed June 1-3, 2021 and completed utilizing a hydraulic excavator. This report summarizes the findings at each potential material site and provides basic recommendations. Appendices include additional details for each potential material site including, test pit logs, material test results, and maps.

RECON has concluded that there is significant potential for suitable aggregate for highway construction projects at three of the eight sites along the Glenn and Parks Highway. Suitable aggregate includes material for bulk fill and production of crushed aggregate products. The geotechnical evaluation completed on these sites is only a preliminary assessment. Additional site investigation and aggregate testing is required to fully delineate the extent of the resources and more accurately define material quality at each site.

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SITE SUMMARY – GLENN HIGHWAY

1.0. MS01 – Glenn Highway MP 56

1.1. Site Description

The Glenn Highway MP 56 parcels (account numbers: 18N02E01A006, 18N02E01A005) can be accessed from the Glenn Highway Right-of-Way (ROW). Parcel 18N02E01A006 is immediately south of parcel 18N02E01A005 with an area of approximately 8 acres. See map, MS01 in Appendix A.

RECON accessed the larger parcel (223 acres) via an existing trail system that crosses State of Alaska land to the south. Both parcels are vegetated with old growth birch, cottonwood and spruce, averaging 12 to 18-inches in diameter, and intermixed with alder thickets. Under the tree canopy the ground cover consists of grass and light brush. The terrain of both parcels is characteristic of a glacial drift deposit. At this specific location, the material of interest appears to be a glacial outwash channel alluvium deposited over glacier ice that subsequently melted and resulted in the hilly terrain that characterizes the site.

1.2. Subsurface Conditions

The desktop analysis indicated that this site would contain deposits of outwash gravel and sand associated with a glacial outwash and ice contact deposit. The preliminary site visit located several exposures that indicated the site contained variable sized material, from sandy gravel to large cobble gravel. The subsurface investigation was comprised of six test pits. This preliminary subsurface investigation indicates that the soils are predominantly comprised of unconsolidated, well to poorly graded, clean sandy gravel. Boulders were encountered in all the test pits with a maximum diameter of 36-inches. The gravel clasts are predominately granitic and un-weathered to slightly weathered. Test pits were completed to a total depth of 12 to 20-feet. No groundwater was observed at the time of test pit excavation. The overburden averages three to five-feet in depth and a maximum of nine feet in the base of depressions. See Appendix B for complete test pit logs. The USDA soil survey has mapped this area as a Knik Silt Loam, this description is consistent with RECON's findings.

A total of six samples were collected: one from each test pit. A sieve analysis classified the material as poor to well-sorted gravel with sand. A degradation value of 85 was obtained from sample TP01-5. This test result is very promising, as most crushed products require a minimum degradation value of 45. See Appendix C for material test results

1.3. Recommendations

The results from the material testing indicate that this gravel source has potential to meet specification for select Type A material and crushed aggregate products for highway construction projects. The test pits indicate that this potential borrow source could produce consistent, uniform material. Preliminary calculations indicate this site may potentially produce up to 5.5 million cubic yards of suitable material. Based on the preliminary subsurface investigation and material test results, RECON concludes that these parcels have significant potential as a borrow source and that further investigation of the site is justified.



Figure 1. TP01-5 displaying typical material and vegetative cover.

2.0. MS02 – Glenn Highway MP 70

2.1. Site Description

This parcel (account number: 19N04E12A001) is approximately 400 acres and north of the Glenn Highway. Access is an issue due to the extremely steep terrain and private property. Several private parcels are located between MSB’s parcel and the highway. See map MS 02, in Appendix A. This parcel predominantly covers a NE-SW trending ridge except for the southeastern corner of the parcel. The southeast corner of the parcel (approx. 5 acres) is a part of the historic Matanuska River flood plain and likely contains clean, alluvial gravels.

RECON was able to visually assess this site from the highway during the preliminary field reconnaissance but was unable to walk the parcel due to the terrain and private property located between the highway and the borough parcel. The exposed rock outcrop along the highway consisted of poor-quality sedimentary rocks.



2.2. Subsurface Conditions

Geologically this site has been mapped as the “Matanuska Formation”, which predominantly consists of dark shales, siltstones and sandstones.

2.3. Recommendations

Based on RECON’s research and preliminary site investigation, this parcel has **no** significant potential as a gravel or quality rock source. RECON does not recommend any additional geotechnical investigation for this parcel.

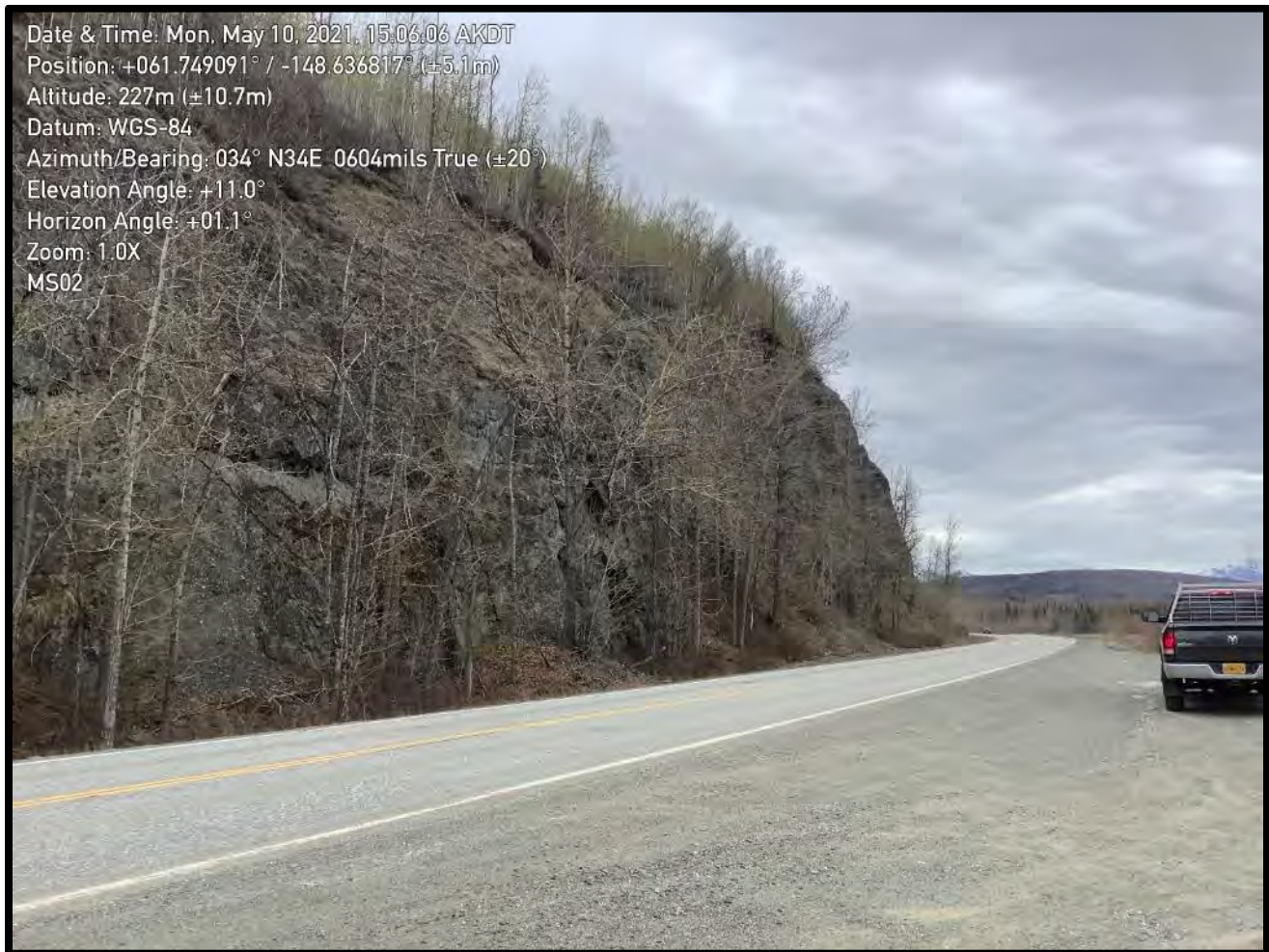


Figure 2. Rock outcrop on Glenn Highway adjacent to MS02.



3.0. MS03 – Glenn Highway MP 73.7

3.1. Site Description

This parcel (account number: 19N05E04A002) is approximately 270 acres located on the north side of the Glenn Highway. There are several smaller parcels owned by MSB between the highway and 19N05E04A002. The parcel overlays what appears to be a roche moutonnee that is trending east-west and parallels the Matanuska River. The southern slopes of the glacial formation are extremely steep with an approximate grade of 50%. See map MS 03 in Appendix A. The roche moutonnee is covered with old growth birch and aspen average diameter 14 to 16 inches and sporadic stands of alder and patches of devil's club. The southern half of parcel is very open under the tree canopy, the northern portion is covered in extensive deadfall.

3.2. Subsurface Conditions

RECON completed a preliminary field reconnaissance to assess quarry potential. Several minor rock outcrops were located on the parcel. The outcrops consisted of weathered sedimentary rocks and small intrusive dikes in select locales but were determined to be insignificant. Much of the parcel appears to be overlain by a blanket of silty loam.

3.3. Recommendations

Accessing this parcel would require significant effort due to the steep terrain and distance to the highway. Based on RECON's investigation, this site has *no* significant potential as a quality rock source or borrow site.



Date & Time: Mon, May 10, 2021, 15:42:46 AKDT
Position: -061.766041° / -148.550016° (±22.6m)
Altitude: 350m (±30.8m)
Datum: WGS-84
Azimuth/Bearing: 322° NS8W 5724mils True (±72°)
Elevation Angle: +17.4°
Horizon Angle: +05.4°
Zoom: 1.0X
MS03 Outcrop 2

Figure 3: Outcrop 03-2 and typical terrain for MS03.



Figure 4. Outcrop 03-4

4.0. MS04 – Glenn Highway MP 76.2

4.1. Site Description

At the request of MSB, RECON evaluated two additional parcels (account numbers: 20N05E35C008 & 20N05E35C009) at MP 76.2, immediately north of the Glenn Highway ROW. Combined, the parcels total approximately three acres. These parcels are up slope from an inactive ADOT quarry site (MS 42-2-001-1) that is in the highway ROW. See map MS 04 in Appendix A. The parcels are covered by thick stands of spruce and some aspen, averaging 4 to 6 inches in diameter. The terrain is a steep rock bluff.



4.2. Subsurface Conditions

During the preliminary investigation rock samples were collected from the ADOT quarry site for material testing. Large blocks in the quarry at time of site visit indicate that this site has previously generated riprap. A Nordic Abrasion test was completed that resulted in a value of 10.4 %. See Appendix C for material test results. This test result indicates that this quarry can potentially produce high quality rock for crushed aggregate products. Rock exposed in the quarry site is a slightly to highly weathered, medium-grained diorite. This outcrop was mapped in 1912 by Martin & Katz as being part of a large body of Tertiary diorite. A contact between the intrusive and the sedimentary host rock was observed at the base of the high wall. The contact dips south at approximately 40 degrees. Further investigation located multiple outcrops of the same lithology on the MSB parcels. A contact between the host rock and intrusive was also located on the MSB parcel and has a dip of approx. 35-40 degrees to the south. The preliminary investigation strongly suggests that granitic intrusive exposed in the existing quarry site extends into the MSB parcels.

4.3. Recommendations

Further investigation would require a comprehensive rock core drill program that would delineate the extent and quality of the granitic intrusive. Based on RECON's preliminary assessment, this site has significant potential as a quality rock source. If further investigation proves the rock quality and quantity, a detailed mine plan would be required due to proximity to the highway and steep terrain. Coordination with adjacent landowners is also recommended due to potential of a shared resource and limited area of the MSB parcels.



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Figure 5. Aerial view of MS04 and the inactive quarry site.



Figure 6. Inactive quarry site adjacent to MSB parcels.

5.0. MS05 – Glenn Highway MP 93

5.1. Site Description

This parcel (account number: 20N08E28B001) comprising approximately 60 acres and is located north of the Glenn Highway in the Glacier View community. It can be accessed via S. Muddy Creek Circle at MP 93.4. ADOT has an active borrow site known as the Cascade Pit (MS 42-2-333-1) located approximately one mile east of the MSB parcel. The active ADOT borrow site appears to be on a relic river terrace; whereas most of the subject parcel consists of glacially scoured, undulating, bedrock hills. The exception is the northeast corner of the parcel, which is a relic river terrace. See map MS 05 in Appendix A. Vegetative cover consists of open stands of aspen with an average diameter of 6 to 8 inches.



5.2. Subsurface Conditions

RECON hand-dug two test pits, both in the northeast corner of the parcel, one on the edge of each relic river terrace. The overburden is minimal (<12”) and consists of a sandy silt. The small pits dug indicate that the terraces contain well-sorted, weathered, silty-sandy gravels. A degradation and L.A. Abrasion test resulted in 37 and 19% respectively. These results indicate that this gravel is unlikely to meet specification for any crushed aggregate products. See Appendix C for material test results.

Exposed bedrock observed throughout the site was highly weathered sedimentary rocks.

5.3. Recommendations

RECON’s preliminary geotechnical evaluation indicates that this parcel has no significant potential as a borrow or quality rock source. RECON does not recommend any additional geotechnical investigation.



Figure 7. A road cut in the vicinity of the MSB parcel that contains similar gravels as found in the relic river terraces in the MSB parcel.



Figure 8. Typical rock outcrop in MS05 site.

SITE SUMMARY – PARKS HIGHWAY

6.0. MS06 – Parks Highway MP 77

6.1. Site Description

This site consists of two adjoining parcels (account number 20N04W07A001 and 28N05W32B002) immediately east of the Alaska Railroad. The western most parcel is 117 acres and the eastern most parcel is 540 acres, only ~60 acres of the eastern parcel are of interest. Access was obtained through the private parcel directly north of the MSB parcels. See map MS 07 in Appendix A.

The parcel is heavily vegetated with predominately second growth spruce and birch, average diameter four to twelve inches. Underbrush consists of grass and minor brush. The terrain in the western parcel is typical



of a glaciofluvial deposit, very hilly terrain with variable grades and elevations. The eastern parcel contains a flat, relic river terrace where the glacially deposited material has been reworked and sorted.

It is worth noting that the large, active gravel pit to the north is located on the same relic river terrace as the Borough's eastern parcel. Based on RECON's assessment, it appears that operators of the current gravel mining operation have avoided the hilly glacial drift terrain due to inconsistent and finer material. MSB topo data and field observations indicate that gravel mining of the glacial outwash deposits generally extends to 40 to 60 feet below the original ground surface.

6.2. Subsurface Conditions

A total of six test pits were completed: three on the relic river terrace and three on hilly ice contact terrain. All the test pits on the relic river terrace were 15-feet deep and the overburden depth ranged from 1.8 to 4.3-feet. As expected, the subsurface conditions in these pits are relatively consistent, a well-graded cobble gravel with sand. Few boulders were present in TP06-2 with a max diameter of ~18 to 20 inches. The three test pits completed in the hilly terrain found the material to be finer and inconsistent. Based on RECON's desktop analysis this was expected. The three in the hilly terrain ranged from 14 to 18-feet in total depth and overburden ranged from 1.6 to 2.0-feet deep. See Appendix B for detailed test pit logs. The material encountered varied from poorly graded sandy gravel with silt to poorly graded silty sand with gravel. See Appendix C for material test results. RECON has assessed the water table to be at an elevation of 210-feet. No groundwater was observed at time of excavation in any of the test pits.

6.3. Recommendations

These parcels have significant potential to produce aggregate for highway construction, particularly the area within the relic river terrace. RECON estimates the relic river terrace to potentially contain +3 million cubic yards of material. The hilly terrain to the west has the potential to contain similar volumes of material but based on RECON's preliminary investigation the material is variable and will likely require selective mining practices. The preliminary geotechnical investigation indicates that these parcels have significant potential as a borrow source.



Figure 9. Exposure in the active borrow site directly north of the MSB parcels.

7.0. MS07 – Parks MP 119

7.1. Site Description

This 117-acre parcel (account number: 26N05W06A002) is directly east of Parks Highway and can be accessed via the highway ROW via an existing approach. The southern portion of the parcel was previously used as a borrow site by ADOT and has produced gravel and sand. The historic borrow site appears to be located on a relic recessional moraine and is the high point within the parcel. The entire area north of the historic borrow site contains wetlands, including a pond, making it unfeasible to develop. The area south of the borrow site is hummocky glaciofluvial terrain that is at the same elevation or lower than the existing pit floor. See map MS 07 in Appendix A. The vegetative cover is minimal to none. The edges of the pit are growing back in with alder patches.



7.2. Subsurface Conditions

Based on RECON's desktop analysis most of the parcel is at or near the water table, except for the existing borrow site. The subsurface investigation focused on assessing the remaining quantity of material in the within the developed site. A total of four test pits were completed throughout the borrow site with total depth varying from 7 to 30-feet. All overburden had been stripped during previous mining activities; only a thin vegetative mat was present. The test pits indicate that the remaining material is limited and highly variable. See Appendix B for detailed test pit logs. The material ranges from sandy gravel with boulders to silty sand with clay lenses. See Appendix C for material test results. TP07-1 was completed in the existing borrow site, a groundwater seep was observed at 25-feet below the original ground, approximately 8-feet below the floor of the borrow site.

7.3. Recommendations

RECON's preliminary geotechnical evaluation indicates that this parcel has no significant potential has a borrow source. The existing borrow site has been mined to its limiting depth and the quantity of quality material remaining within the pit area is insignificant. RECON does not recommend any additional investigation.



Figure 10. MS07 – Inactive borrow site

8.0. MS08 – Parks MP 126

8.1. Site Description

This site consists of two adjoining parcels (account numbers: 28N05W31A001 & 28N05W32B002) located between the Parks Highway and Chulitna River. See map MS 08 in Appendix A. The western most parcel is 250 acres and has hummocky terrain that is typical of a glacial moraine. The northeastern portion of this parcel has been re-worked by fluvial action and relic stream terrace is present. An inactive ADOT borrow site is located on this parcel. The existing exposures display material varying from silty sand to large boulders. Based on Alaska’s statewide material site inventory this borrow site was relinquished to DNR in 1972 because it was depleted.

The eastern most parcel is adjacent to the Chulitna River where the terrain is dominated by relic river terraces. The vegetative cover consists of old growth birch and spruce averaging 12 to 18-inches in diameter. Numerous standing dead spruce and heavy deadfall are common, particularly in the northern portion of this site.



8.2. Subsurface Conditions

A total of six test pits were completed at this ranging from a total depth of 7.5 to 15-feet. The overburden averaged a depth of 1.5 to 3.0 -feet. See Appendix B for detailed test pit logs. The test pits and sieve analysis results indicate the subsurface conditions are inconsistent at this site. The material varied from well to poorly sorted, sandy gravel to silty sand with gravel. See Appendix C for material test results. Groundwater was observed in four of the six test pits, between 3 and 15-feet below the ground surface. The relic river terrace in the eastern parcel has some potential has a borrow source. Based on preliminary evaluations it may contain up to 56,000 cubic yards of material.

8.3. Recommendations

RECON's preliminary geotechnical evaluation indicates that this parcel has limited potential as a borrow or quality rock source. RECON does not recommend additional geotechnical investigation.



Figure 11. MS08 – Historic, inactive borrow site located on the western most parcel in the project area.



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REFERENCES

Martin, G.C., and Katz, F.J., 1912, Geology and coal fields of the lower Matanuska Valley, Alaska: U.S. Geol. Survey Bull. 500, 98 p.

State of Alaska Department of Transportation and Public Facilities, 2010, Statewide Material Site Inventory – Southern Parks Highway MS 35-3-042-1

State of Alaska Department of Transportation and Public Facilities, 2010, Statewide Material Site Inventory – Southern Parks Highway MS 35-3-044-1

State of Alaska Department of Transportation and Public Facilities, 2010, Statewide Material Site Inventory – Southern Parks Highway MS 42-2-333-1

CONCLUSION

RECON has concluded that there is significant potential for development of a gravel borrow or quality rock source at three of the eight sites investigated. This reconnaissance level geotechnical evaluation was to assess potential of the sites proposed by the MSB. Before any site can be developed as a source of classified aggregate; a detailed, site specific subsurface investigation, complete with extensive material testing will be required to fully delineate the extent and material quality at each site.

RECON appreciates the opportunity to perform this geotechnical investigation. Should you require further information concerning the investigation or this report, please contact us at your convenience.

Sincerely,

RECON LLC

A handwritten signature in black ink that reads "Maria C. Sanders".

Maria C. Sanders, E.I.T.



Steven R. Rowland, P.E.

APPENDIX A

MATERIAL SITE MAPS

149°00'W

148°30'W

148°00'W

62°00'N

62°00'N

61°45'N

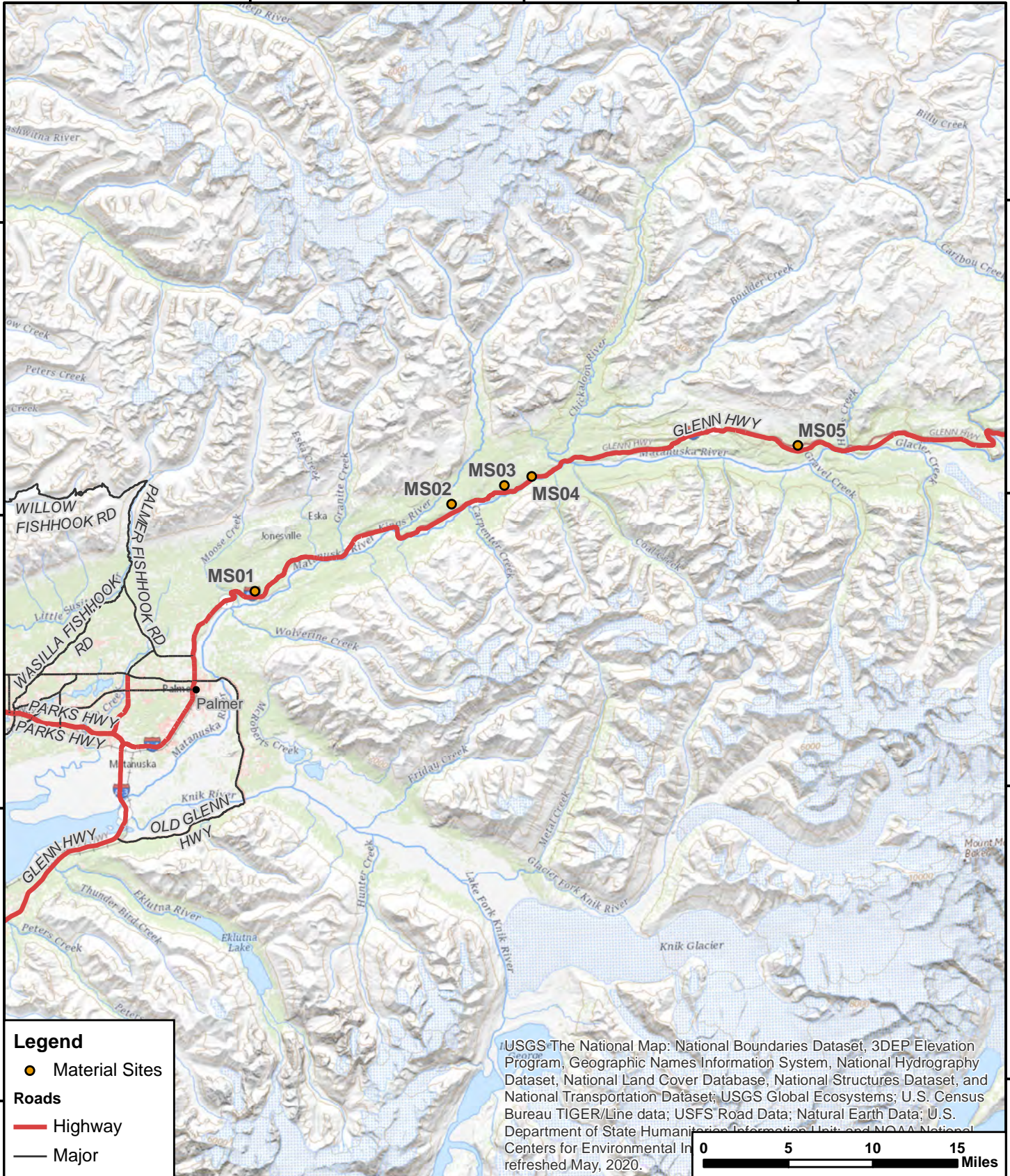
61°45'N

61°30'N

61°30'N

61°15'N

61°15'N



Legend

- Material Sites
- Roads**
- Highway
- Major

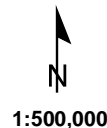
USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information. Data refreshed May, 2020.

MSB
Material Site Geotech

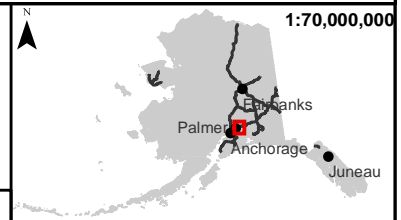
Map by RECON LLC
 565 W. RECON Cir, Palmer AK 99645
 NAD83 SPCS AK4 (US ft)
 Basemap by USGS



OVERVIEW
Glenn Highway



5/7/2021



149°1'30"W 149°1'0"W 149°0'30"W 149°0'0"W 148°59'30"W

61°41'15"N

61°41'15"N

61°41'0"N

61°41'0"N

61°40'45"N

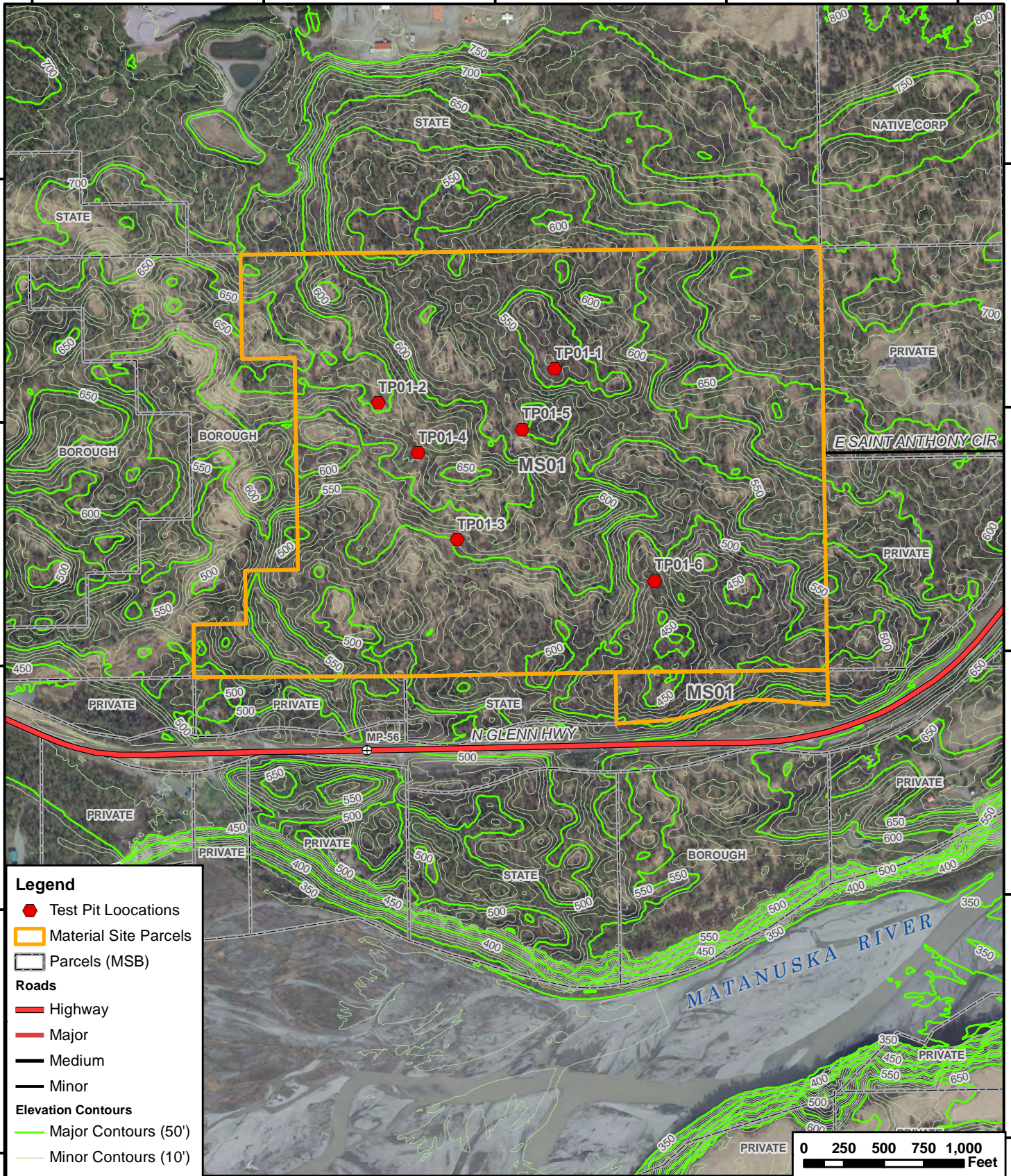
61°40'45"N

61°40'30"N

61°40'30"N

61°40'15"N

61°40'15"N



Legend

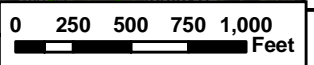
- Test Pit Locations
- ▭ Material Site Parcels
- ▭ Parcels (MSB)

Roads

- Highway
- Major
- Medium
- Minor

Elevation Contours

- Major Contours (50')
- Minor Contours (10')



MSB
Material Site Geotech
 Map by RECON LLC
 565 W. RECON Cir, Palmer AK 99645
 NAD83 SPCS AK4 (US ft)
 Basemap by MSB

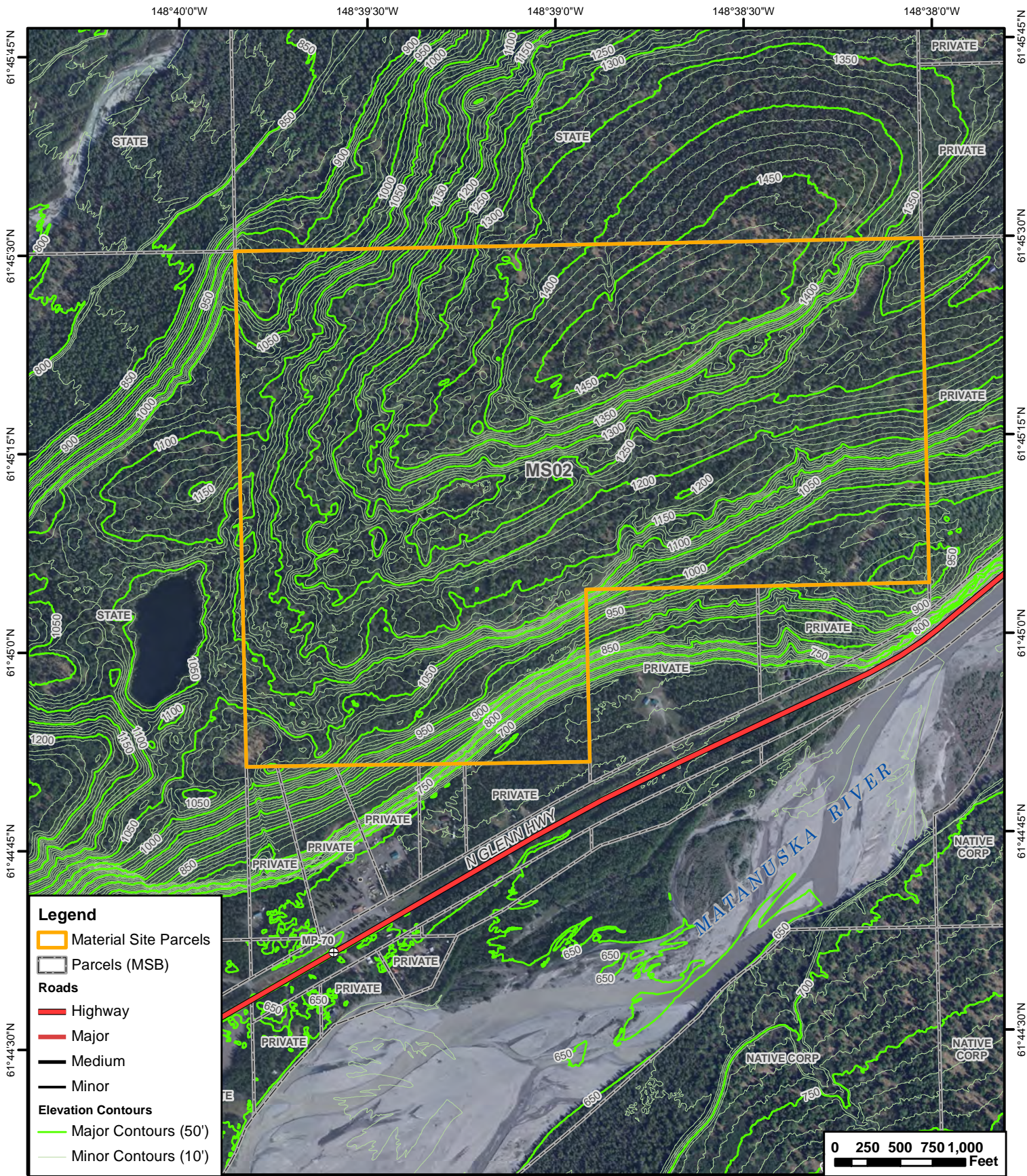
Attachment A
MS01

N

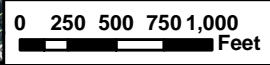
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6/21/2021







- Legend**
- Material Site Parcels
 - Parcels (MSB)
- Roads**
- Highway
 - Major
 - Medium
 - Minor
- Elevation Contours**
- Major Contours (50')
 - Minor Contours (10')



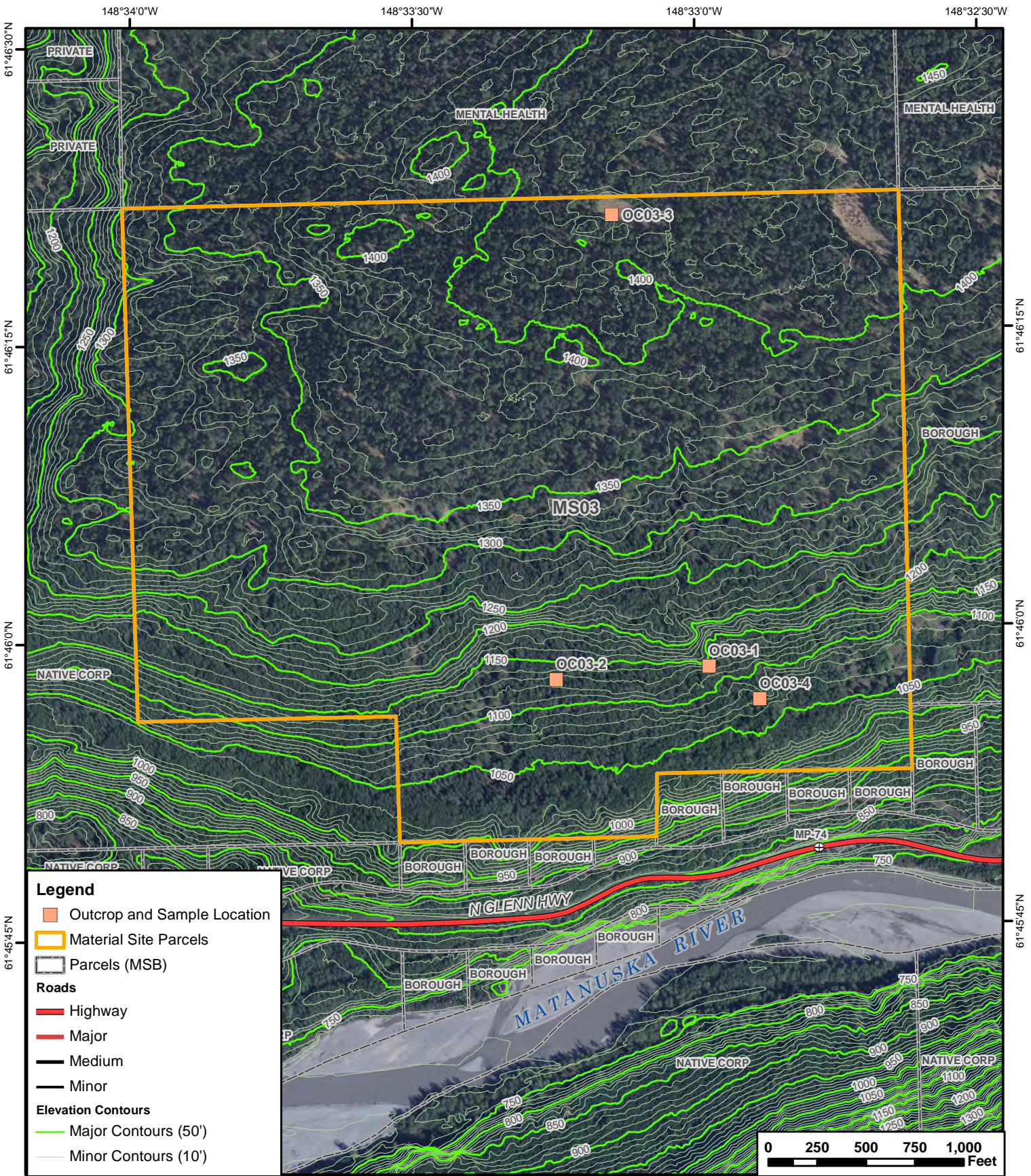
MSB
Material Site Geotech

Map by RECON LLC
 565 W. RECON Cir, Palmer AK 99645
 NAD83 SPCS AK4 (US ft)
 Basemap by MSB


Attachment A
MS02


1:12,000
 1 in = 1,000 ft
6/21/2021





Legend

- Outcrop and Sample Location
- Material Site Parcels
- Parcels (MSB)

Roads

- Highway
- Major
- Medium
- Minor

Elevation Contours

- Major Contours (50')
- Minor Contours (10')

MSB
Material Site Geotech

Map by RECON LLC
 565 W. RECON Cir, Palmer AK 99645
 NAD83 SPCS AK4 (US ft)
 Basemap by MSB

Attachment A

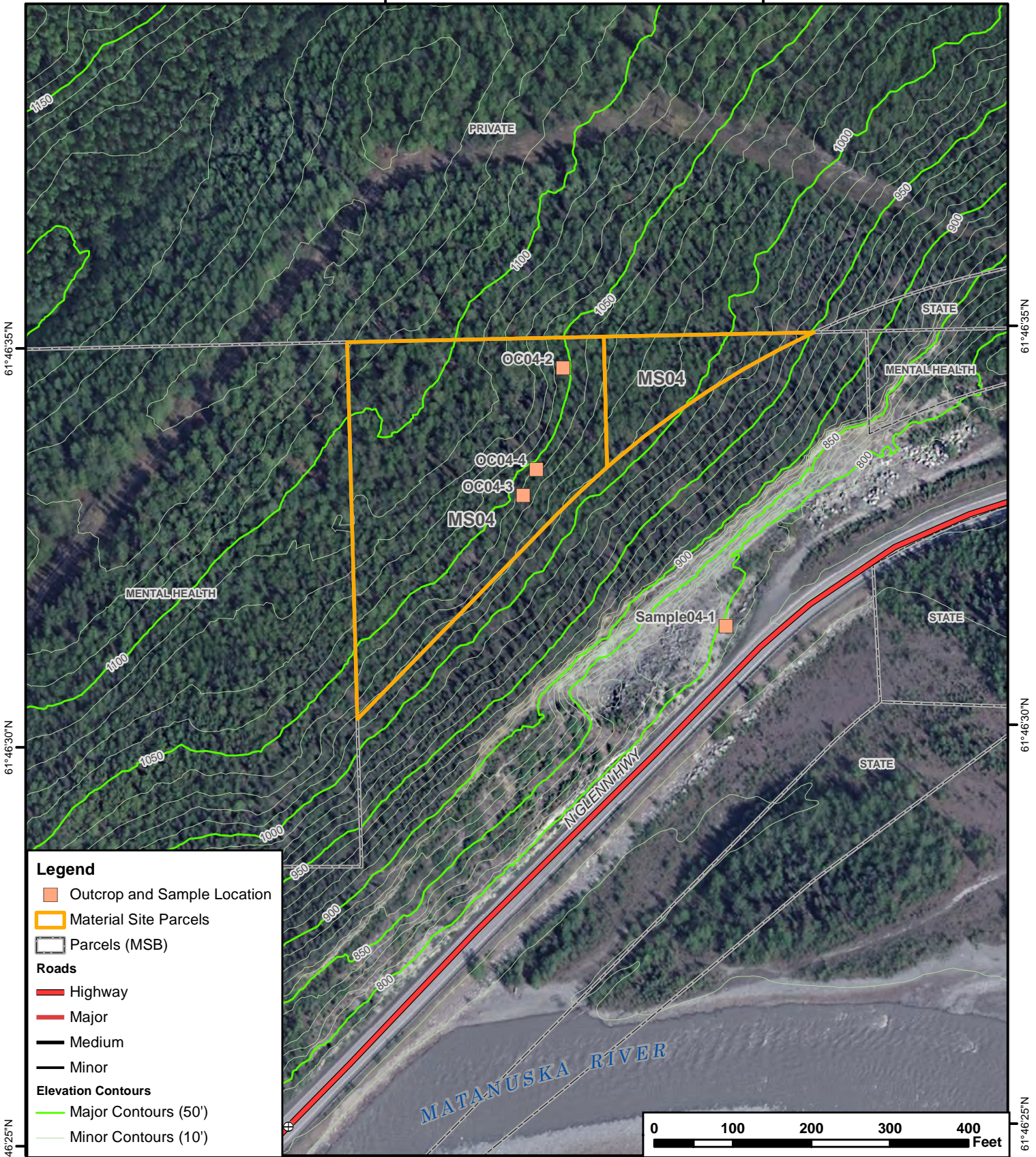
MS03

1:8,000
 1 in = 667 ft
6/21/2021



148°30'20"W

148°30'10"W



61°46'35"N

61°46'35"N

61°46'30"N

61°46'30"N

61°46'25"N

61°46'25"N

Legend

- Outcrop and Sample Location
- Material Site Parcels
- Parcels (MSB)
- Roads**
- Highway
- Major
- Medium
- Minor
- Elevation Contours**
- Major Contours (50')
- Minor Contours (10')



**MSB
Material Site Geotech**

Map by RECON LLC
565 W. RECON Cir, Palmer AK 99645
NAD83 SPCS AK4 (US ft)
Basemap by MSB



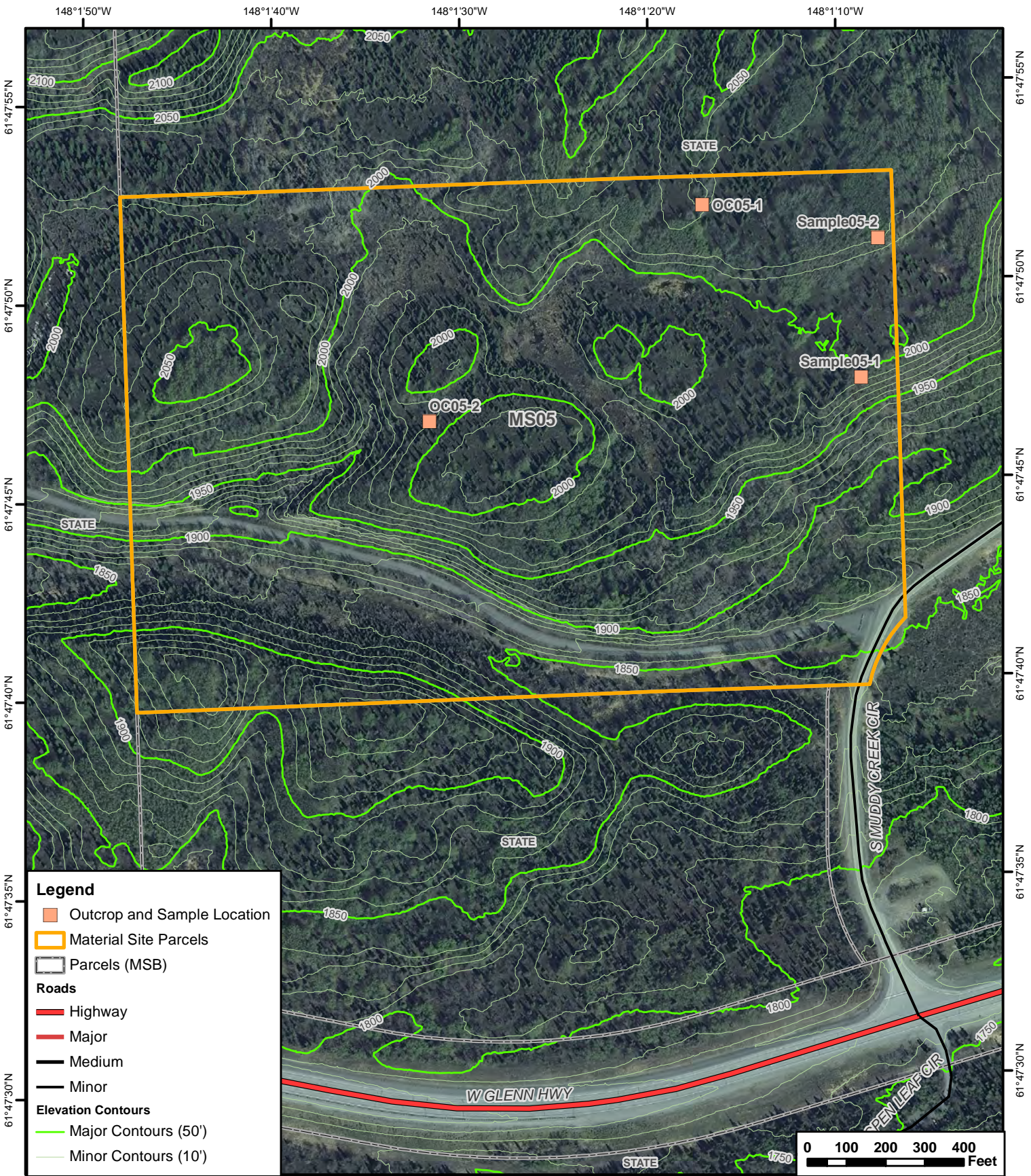
**Attachment A
MS04**



1:2,000
1 in = 167 ft

6/21/2021





Legend

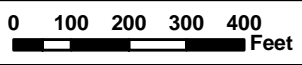
- Outcrop and Sample Location
- Material Site Parcels
- Parcels (MSB)

Roads

- Highway
- Major
- Medium
- Minor

Elevation Contours

- Major Contours (50')
- Minor Contours (10')



MSB
Material Site Geotech

Map by RECON LLC
 565 W. RECON Cir, Palmer AK 99645
 NAD83 SPCS AK4 (US ft)
 Basemap by MSB

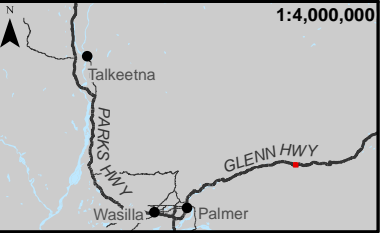


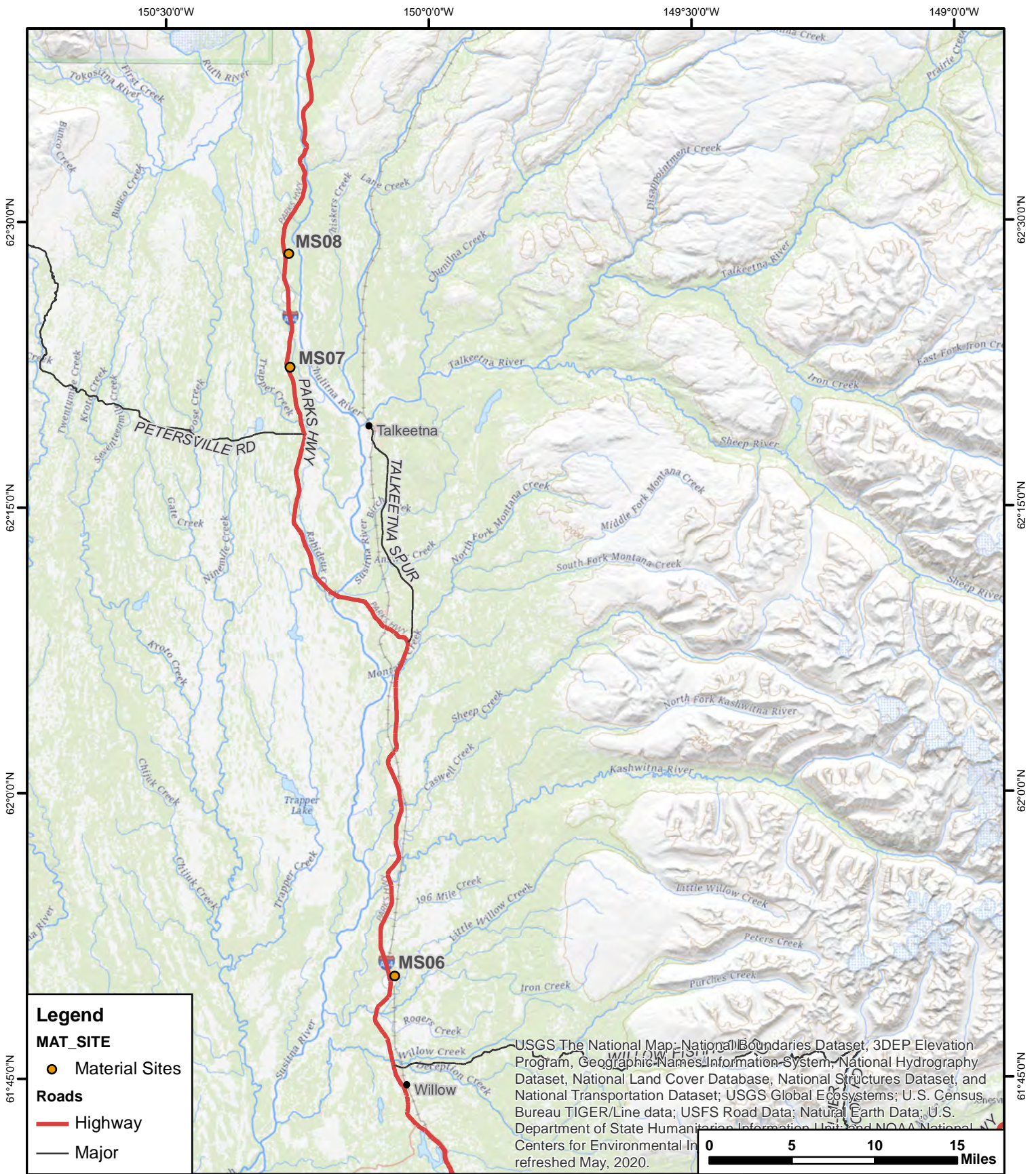
Attachment A
MS05

N

1:4,000
 1 in = 333 ft

6/21/2021





Legend

MAT_SITE

- Material Sites

Roads

- Highway
- Major

USGS The National Map; National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information. Basemap refreshed May, 2020.

MSB
Material Site Geotech

Map by RECON LLC
 565 W. RECON Cir, Palmer AK 99645
 NAD83 SPCS AK4 (US ft)
 Basemap by USGS

RECON

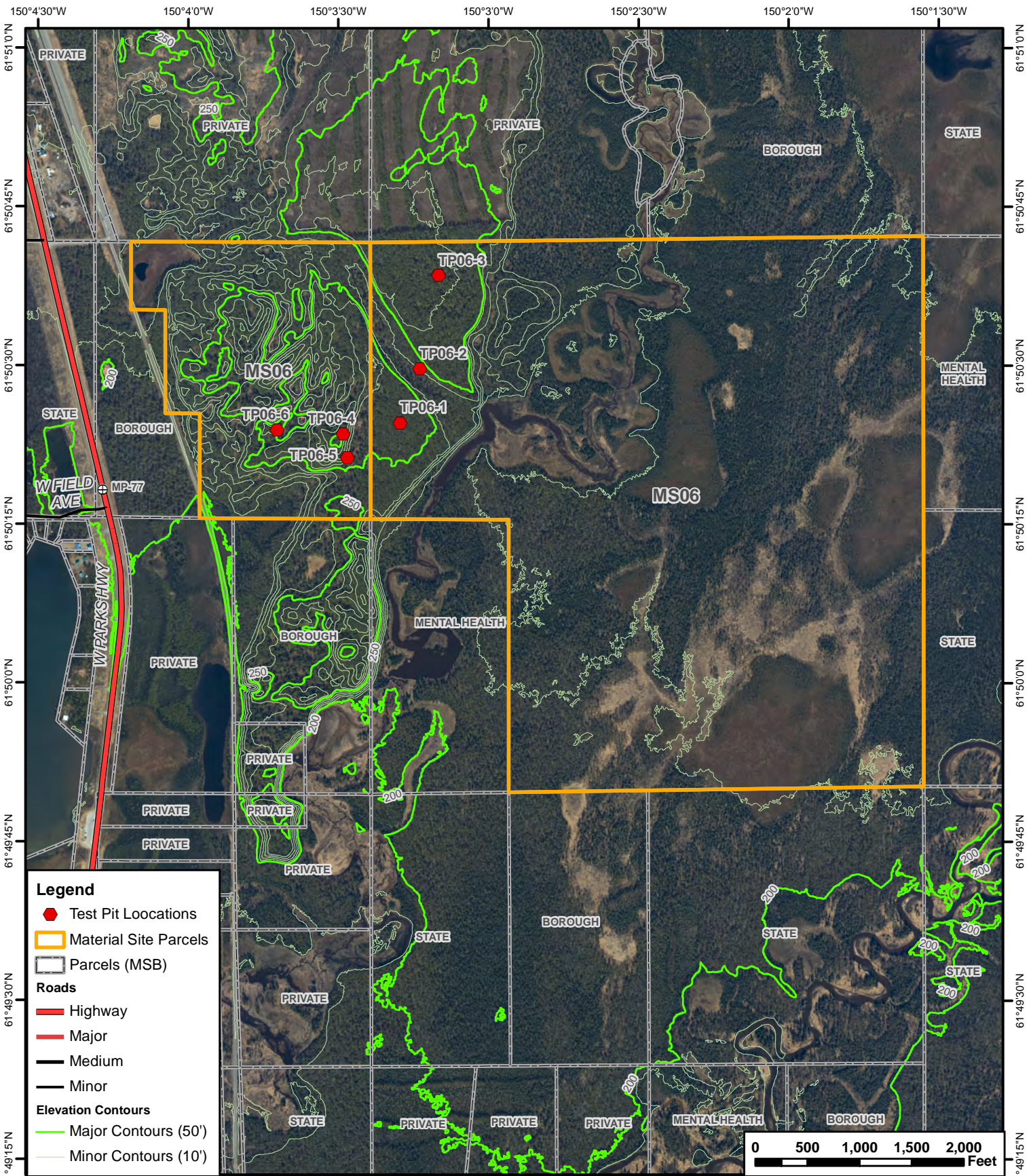
OVERVIEW
Parks Highway

1:500,000

5/27/2021

1:70,000,000

Palmer, Anchorage, Juneau



Legend

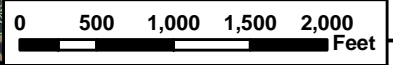
- Test Pit Locations
- ▭ Material Site Parcels
- ▭ Parcels (MSB)

Roads

- Highway
- Major
- Medium
- Minor

Elevation Contours

- Major Contours (50')
- Minor Contours (10')



MSB
Material Site Geotech

Map by RECON LLC
 565 W. RECON Cir, Palmer AK 99645
 NAD83 SPCS AK4 (US ft)
 Basemap by MSB



Attachment A
MS06

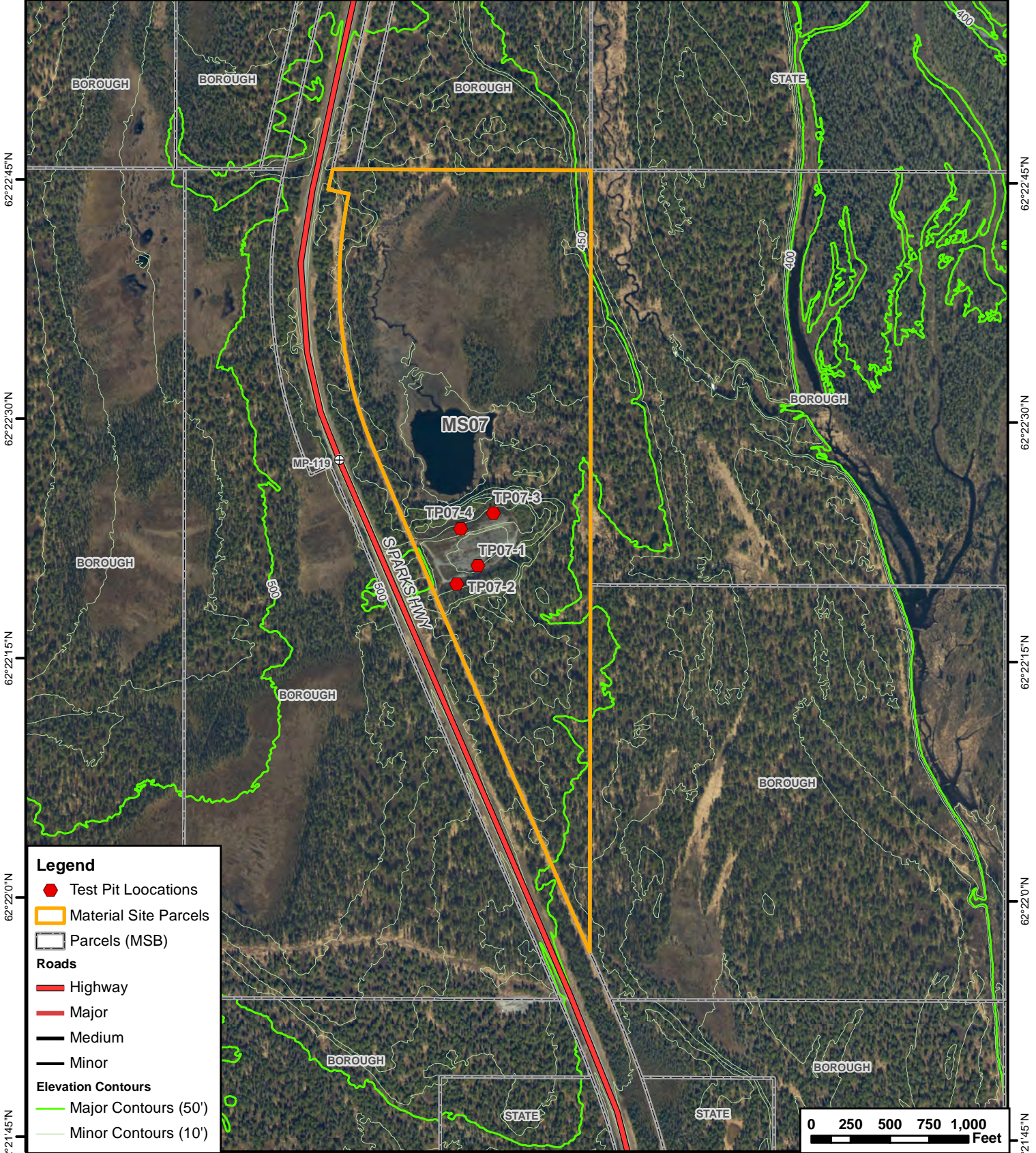
N

1:15,000
 1 in = 1,250 ft

6/21/2021



150°16'30"W 150°16'0"W 150°15'30"W 150°15'0"W 150°14'30"W



Legend

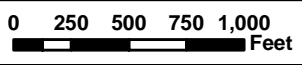
- Test Pit Locations
- Material Site Parcels
- Parcels (MSB)

Roads

- Highway
- Major
- Medium
- Minor

Elevation Contours

- Major Contours (50')
- Minor Contours (10')



MSB
Material Site Geotech

Map by RECON LLC
 565 W. RECON Cir, Palmer AK 99645
 NAD83 SPCS AK4 (US ft)
 Basemap by MSB



Attachment A
MS07

N

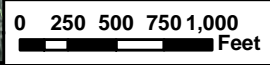
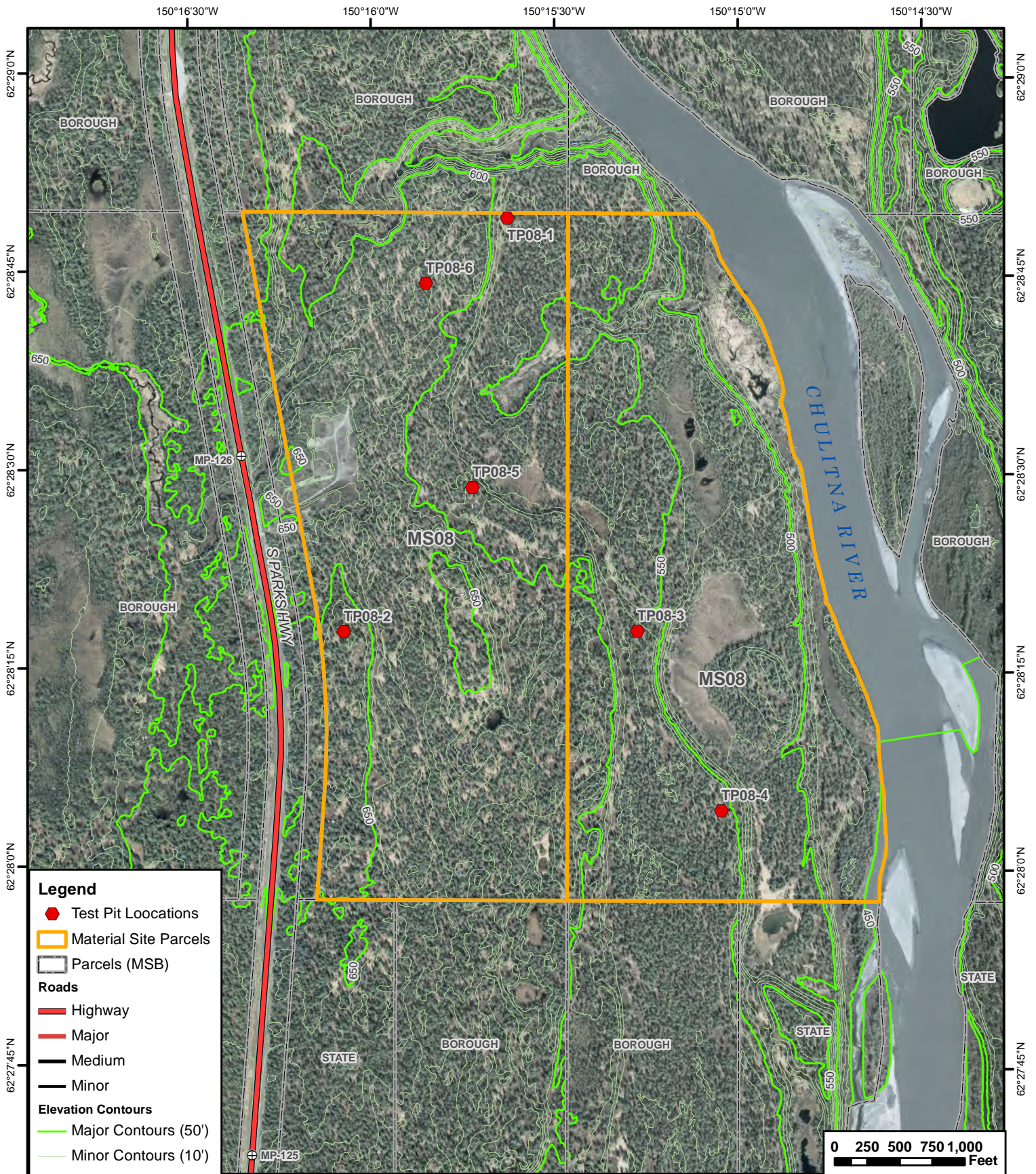
1:10,000
 1 in = 833 ft

6/21/2021



62°22'45"N
62°22'30"N
62°22'15"N
62°22'0"N
62°21'45"N

62°22'45"N
62°22'30"N
62°22'15"N
62°22'0"N
62°21'45"N



**MSB
Material Site Geotech**

Map by RECON LLC
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NAD83 SPCS AK4 (US ft)
Basemap by MSB



**Attachment A
MS08**



1:12,000
1 in = 1,000 ft

6/21/2021

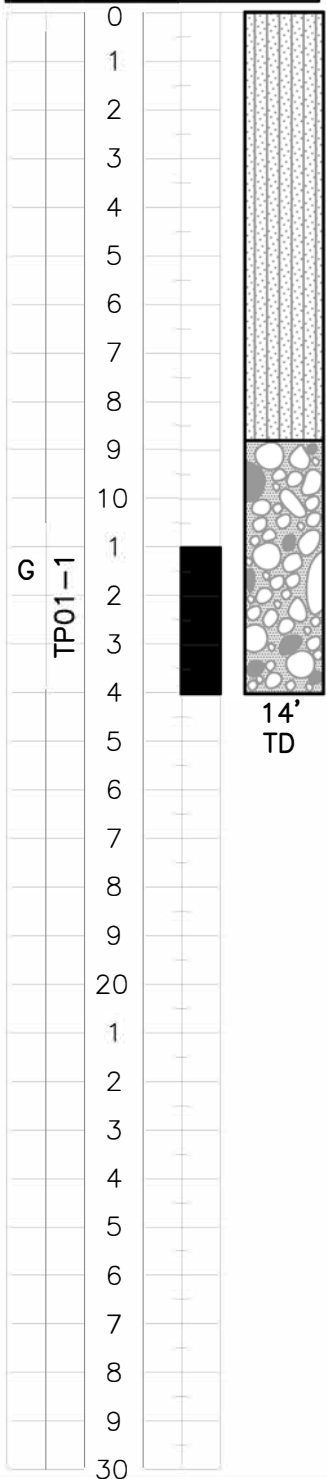


APPENDIX B

TEST PIT LOGS

GEOLOGIC LOG TEST PIT: TP01-1

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 530' Total Depth : 14' Bottom Elev.: Collar Elev.: Reference:	Vegetation: Grass & Old growth Birch Remarks:	Location: Glenn MP 56 Acct # 18N02E01A005 N: 2808807.49 E: 1812963.36 Coord.: AKSP Z4 NAD83
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0.0' – 8.8' Sandy silt, soft to med. firm, dark brown, moist. Trace organics.

8.8 – 14.0' Well sorted, sandy cobble gravel w/ boulders, moderately dense, dry, boulders to dia. 36". Clasts subrounded to rounded, granitic, un-weathered to slightly weathered.

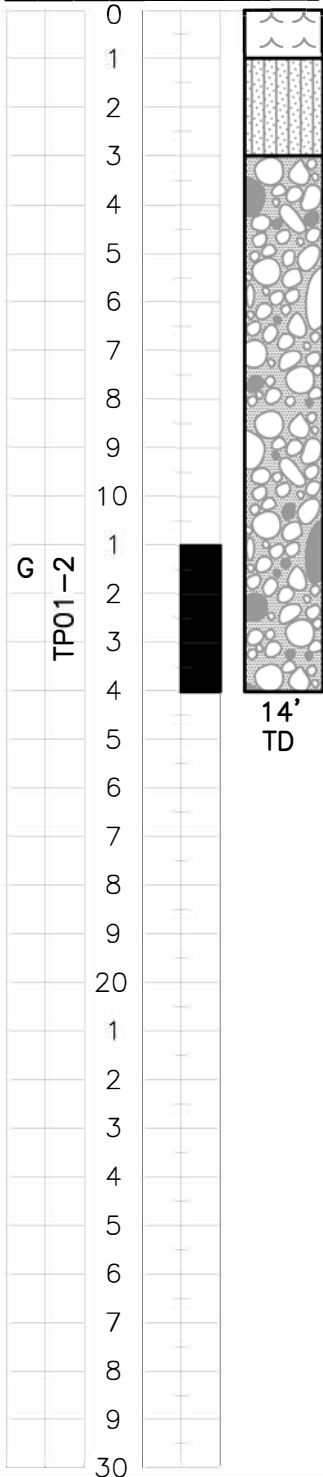
Notes: No groundwater observed at time of excavation. Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Terrain is a large depression within a hilly glacial outwash plain.



RECON, LLC 565 W. Recon Cir. Palmer, Alaska 99645 Ph: (907) 746-3630	Project No.: 2021-162 Project Name: MSB Material Site Geotech Location: Glenn Hwy MP 56 Method Used: Hydraulic Excavator Logged by: MCS & SRR Date Begun: 06/01/21	Sheet 1 of 6 Log #TP01-1 Rig Type: CASE CX1450 Contractor: K&H Date Comp.: 06/01/21
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GEOLOGIC LOG TEST PIT: TP01-2

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 659' Total Depth : 14' Bottom Elev.: Collar Elev.: Reference:	Vegetation: Grass Remarks:	Location: Glenn MP 56 Acct # 18N02E01A005 N: 2808595.48 E: 1811859.56 Coord.: AKSP Z4 NAD83
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0.0' – 1.0' Organic silt, moderately firm to firm, dark brown, moist.

1.0' – 3.0' Sandy silt, med. firm to firm, brown, damp.

3.0' – 14.0' Well sorted, sandy cobble gravel w/ boulders, moderately dense, dry, boulders to dia. 24". Clasts subrounded to rounded, granitic, un-weathered to slightly weathered.

Notes: No groundwater observed at time of excavation. Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Terrain is a NW-SE trending ridge



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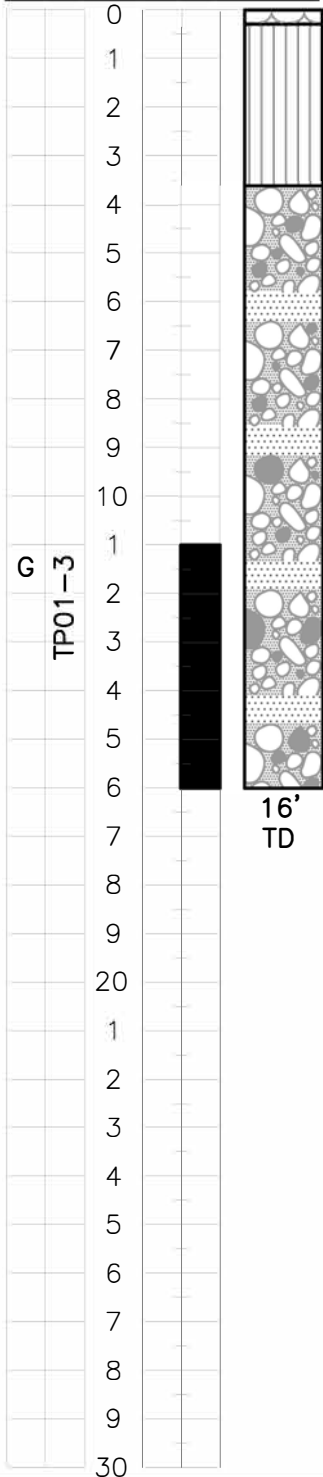
Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Glenn Hwy MP 56
 Method Used: Hydraulic Excavator
 Logged by: MCS & SRR
 Date Begun: 06/01/21

Sheet 2 of 6 Log # TP01-2

Rig Type: CASE CX1450
 Contractor: K&H
 Date Comp.: 06/01/21

GEOLOGIC LOG TEST PIT: TP01-3

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 554' Total Depth : 16' Bottom Elev.: Collar Elev.: Reference:	Vegetation: Grass & Dwarf birch Remarks:	Location: Glenn MP 56 Acct # 18N02E01A005 N: 2807738.46 E: 1812352.44 Coord.: AKSP Z4 NAD83
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0.0' - 0.2' Organic mat and decaying organic material, very soft, moist, dark brown

0.2' - 3.6' Silt, brown, med. firm to firm, damp

3.6' - 16.0' Stratified, well sorted, sandy cobble gravel w/ boulders, moderately dense, dry, boulders to dia. 36". Trench walls sloughing while excavating. Clasts subrounded to rounded, granitic, un-weathered to slightly weathered.

Notes: No groundwater observed at time of excavation. Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Terrain is a SW facing slope, approx. 20%



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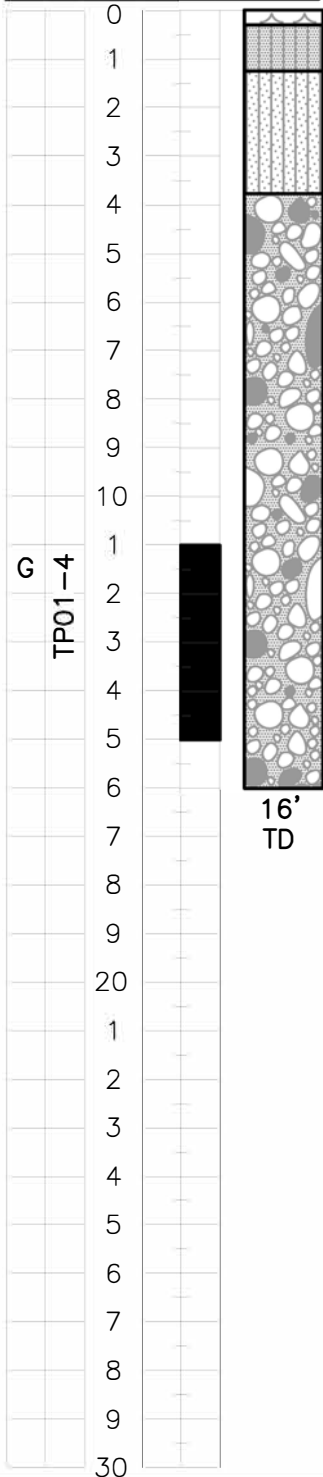
Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Glenn Hwy MP 56
 Method Used: Hydraulic Excavator
 Logged by: MCS & SRR
 Date Begun: 06/01/21

Sheet 3 of 6 Log # TP01-3

Rig Type: CASE CX1450
 Contractor: K&H
 Date Comp.: 06/01/21

GEOLOGIC LOG TEST PIT: TP01-4

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 622' Total Depth : 16' Bottom Elev.: Collar Elev.: Reference:	Vegetation: Grass, Alder thicket Remarks:	Location: Glenn MP 56 Acct # 18N02E01A005 N: 2808282.53 E: 1 8121 08. 77 Coord.: AKSP Z4 NAD83
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0.0' - 0.3' Organic mat and decaying organic material, very soft, moist, dark brown

0.3' - 1.2' Sandy silt, dark brown, med. firm to firm, damp

1.2' - 3.8' Sandy silt, Brown to tan, med. firm to firm, dry

3.8' - 16' Well sorted, sandy cobble gravel w/ boulders, moderately dense, dry, boulders to dia. 36". Trench walls maintained during excavation. Clasts subrounded to rounded, granitic, un-weathered to slightly weathered.

Notes: No groundwater observed at time of excavation. Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Terrain is flat area in a small saddle between 2 small hills.



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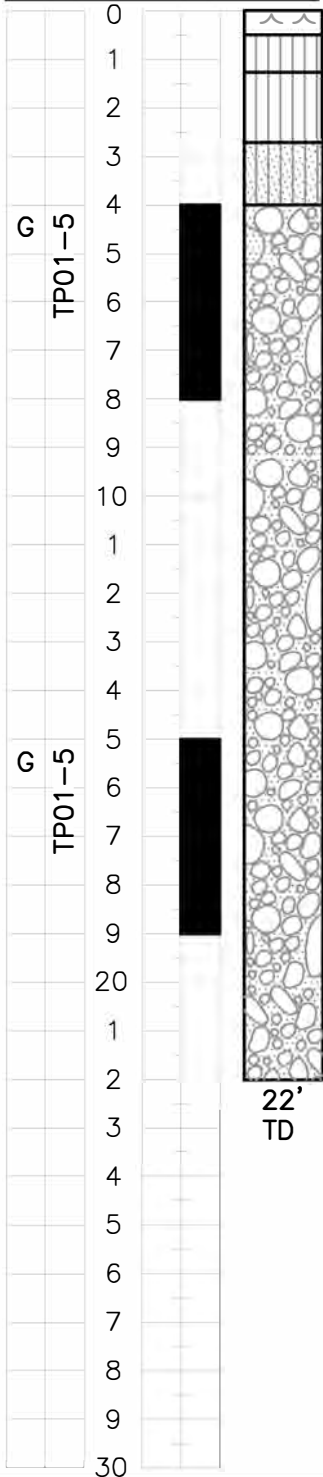
Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Glenn Hwy MP 56
 Method Used: Hydraulic Excavator
 Logged by: MCS & SRR
 Date Begun: 06/01/21

Sheet 4 of 6 Log # TP01-4

Rig Type: CASE CX1450
 Contractor: K&H
 Date Comp.: 06/01/21

GEOLOGIC LOG TEST PIT: TP01-5

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 591' Total Depth : 22' Bottom Elev.: Collar Elev.: Reference:	Vegetation: N/A Remarks:	Location: Glenn MP 56 Acct # 18N02E01A005 N: 2808429.38 E: 1812758.6 Coord.: AKSP Z4 NAD83
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0.0' - 0.5' Organic mat and decaying organics, dark brown, very soft, moist

0.5' - 1.3' Silt, dark brown, soft to med. firm, damp

1.3' - 2.7' Silt, tannish red, soft to med. firm, dry

2.7' - 3.7' Sandy silt, tan to brown, med. firm to firm, dry

3.7' - 22.0' Well sorted, sandy cobble gravel w/ few boulders, moderately dense, dry, boulders to dia. 18". Trench walls maintained during excavation. Clasts subrounded to rounded, granitic, un-weathered to slightly weathered.

Notes: No groundwater observed at time of excavation. Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Terrain consist of a small, old borrow site. Located at toe of NW-SE trending asymmetrical ridge.



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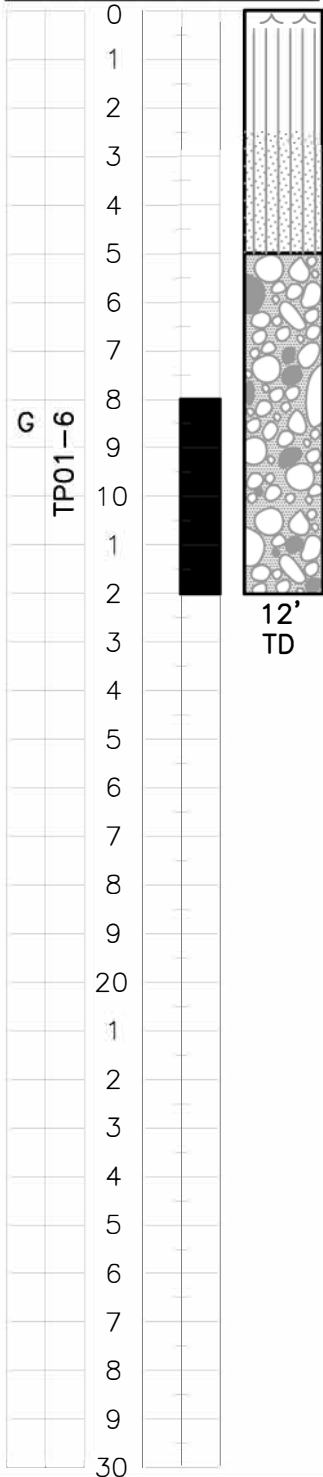
Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Glenn Hwy MP 56
 Method Used: Hydraulic Excavator
 Logged by: MCS & SRR
 Date Begun: 06/01/21

Sheet 5 of 6 Log # TP01-5

Rig Type: CASE CX1450
 Contractor: K&H
 Date Comp.: 06/01/21

GEOLOGIC LOG TEST PIT: TP01-6

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 473' Total Depth : 12' Bottom Elev.: Collar Elev.: Reference:	Vegetation: Grass & Small brush Remarks:	Location: Glenn MP 56 Acct # 18N02E01A005 N: 2807483.61 E: 1813587.52 Coord.: AKSP Z4 NAD83
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0.0' - 5.0' Silt to sandy silt, dark brown to tan, very soft to med. firm, moist to damp

5.0' - 12.0' Well-sorted, sandy cobble gravel w/ few boulders, moderately dense, dry to damp, boulders to dia. 18". Significant sloughing of trench walls during excavation. Clasts subrounded to rounded, granitic, un-weathered to slightly weathered.

Notes: No groundwater observed at time of excavation. Coordinates from hand held GPS. Ground elevation from MSB 2011 LIDAR data. Terrain consists of a narrow bench between 2 small ridges.



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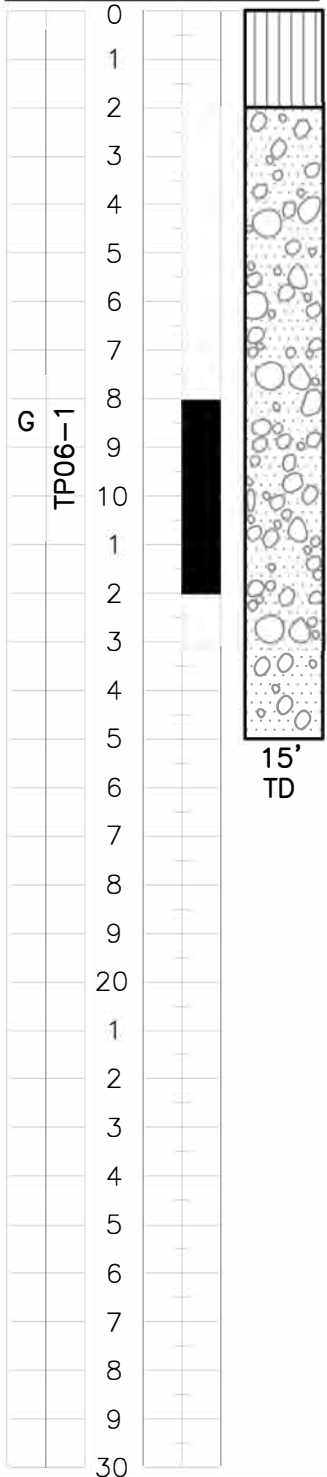
Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Glenn Hwy MP 56
 Method Used: Hydraulic Excavator
 Logged by: MCS & SRR
 Date Begun: 06/01/21

Sheet 6 of 6 Log # TP01-6

Rig Type: CASE CX1450
 Contractor: K&H
 Date Comp.: 06/01/21

GEOLOGIC LOG TEST PIT: TP06-1

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 255' Total Depth : 15' Bottom Elev.: Collar Elev.: Reference:	Vegetation: 2nd Growth Birch Remarks:	Location: Parks Hwy 77 Acct # 20N04W08A001 N: 2864541 . 7 E: 1630930.73 Coord.: AKSP Z4 NAD83
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0.0' – 2.0' Silt, brown, soft to med. firm, moist. Trace organics.

2.0' – 15.0' Well sorted, coarse sandy gravel w/ cobbles, dense, gray, dry

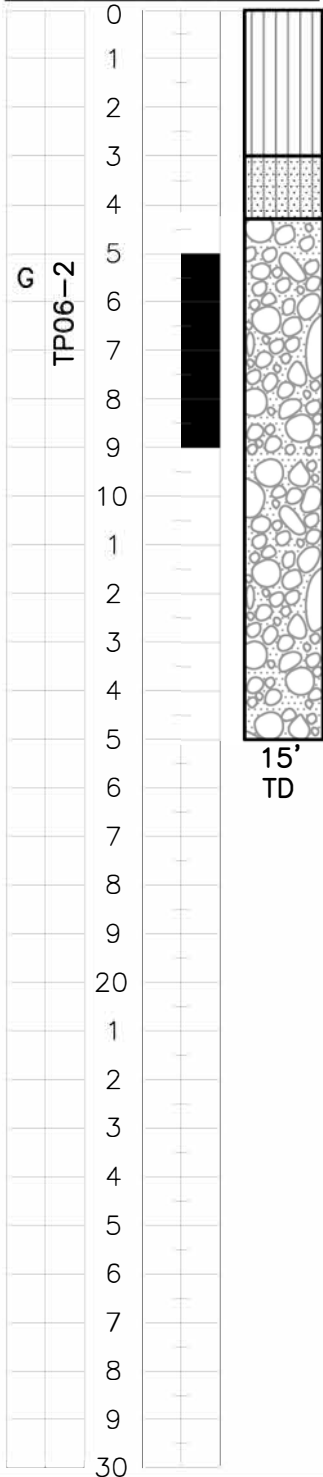
Notes: No groundwater observed at time of excavation. Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Terrain consist of a relic river terrace.



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GEOLOGIC LOG TEST PIT: TP06-2

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 240 Total Depth : 15' Bottom Elev.: Collar Elev.: Reference:	Vegetation: 2nd Growth Birch Remarks:	Location: Parks Hwy 77 Acct # 20N04W08A001 N: 2865061 .34 E: 1 631118.31 Coord.: AKSP Z4 NAD83
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0.0' – 3.0' Silt, brown, soft to med. firm, moist. Trace organics.

3.0' – 4.3' Silty sand, gray med. firm to firm, dry

4.3' – 15.0' Well sorted, coarse sandy, cobble gravel w/boulders, boulder dia. up to 18–20", dense, dry. Min. sloughing near bottom of trench.

Notes: No groundwater observed at time of excavation. Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Terrain is a level area in a relic river channel.



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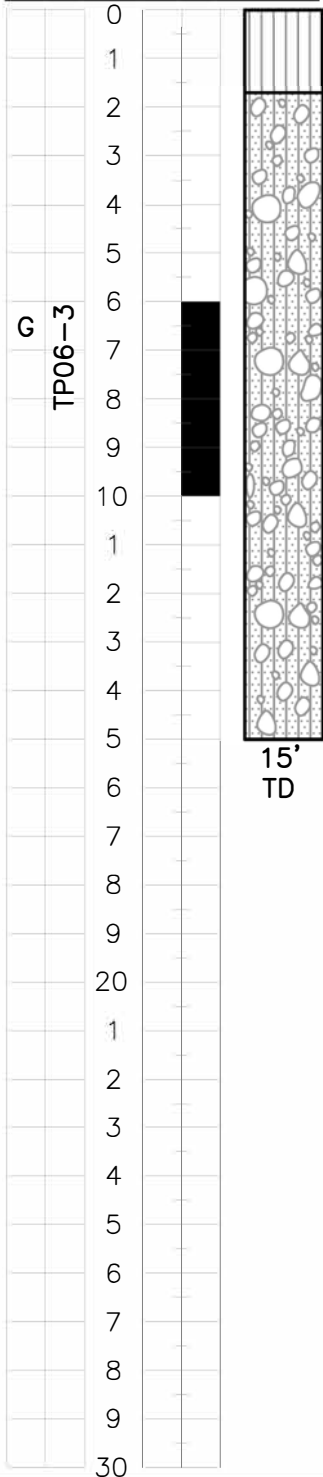
Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Parks Hwy MP 77
 Method Used: Hydraulic excavator
 Logged by: MCS & SRR
 Date Begun: 06/03/21

Sheet 2 of 6 Log # TP06-2

Rig Type: CASE CX1450
 Contractor: K&H
 Date Comp.: 06/03/21

GEOLOGIC LOG TEST PIT: TP06-3

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 262 Total Depth : 15' Bottom Elev.: Collar Elev.: Reference:	Vegetation: Grass, 2nd Growth birch Remarks:	Location: Parks Hwy 77 Acct # 20N04W08A001 N: 2865956.7 E: 1631299.1 Coord.: AKSP Z4 NAD83
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0.0' – 1.8' Silt, brown, soft to med. firm, moist. Trace organics.

1.8' – 15.0' Well sorted sandy, silty, gravel w/ cobbles, dense, dry. No boulders.

Notes: No groundwater observed at time of excavation. Coordinates from handheld GPS. Ground elevation from MSB 2011 LiDAR data. Terrain is a relic river terrace.



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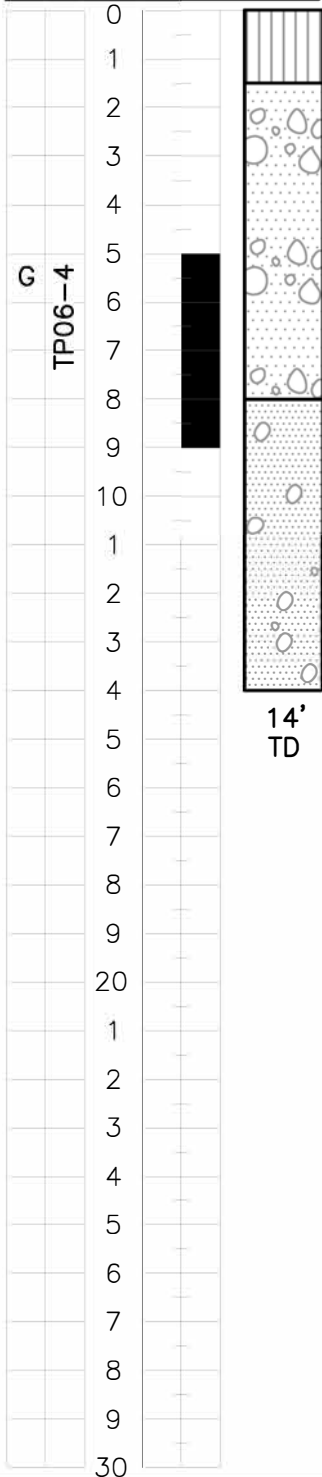
Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Parks Hwy MP 77
 Method Used: Hydraulic excavator
 Logged by: MCS & SRR
 Date Begun: 06/03/21

Sheet 3 of 6 Log # TP06-3

Rig Type: CASE CX1450
 Contractor: K&H
 Date Comp.: 06/03/21

GEOLOGIC LOG TEST PIT: TP06-4

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 300' Total Depth : 14' Bottom Elev.: Collar Elev.: Reference:	Vegetation: 2nd Growth Birch Remarks:	Location: Parks Hwy 77 Acct # 20N04W07A001 N: 2864435.7 E: 1 630382.39 Coord.: AKSP Z4 NAD83
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0.0' - 1.6' Silt, brown, soft to med. firm, moist. Trace organics.

1.6' - 7.9' Stratified, coarse sand w/ silt & gravel, gray, dense, dry

7.9' - 14.0' Medium grained sand w/ silt & gravel, gray, dense, dry

Notes: No groundwater observed at time of excavation. Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Test pit located on furthest E ridge top within the relic glacial moraine.



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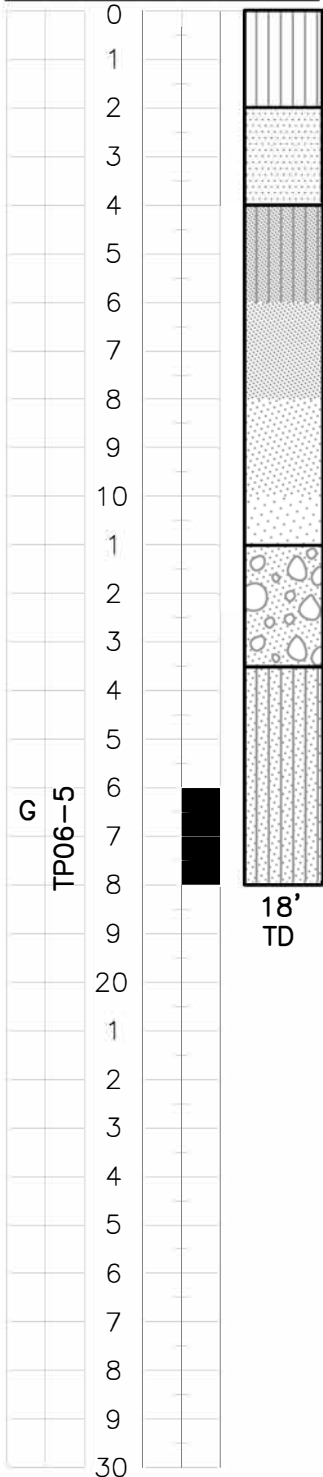
Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Parks Hwy MP 77
 Method Used: Hydraulic excavator
 Logged by: MCS & SRR
 Date Begun: 06/03/21

Sheet 4 of 6 Log # TP06-4

Rig Type: CASE CX1450
 Contractor: K&H
 Date Comp.: 06/03/21

GEOLOGIC LOG TEST PIT: TP06-5

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 260' Total Depth : 18' Bottom Elev.: Collar Elev.: Reference:	Vegetation: 2nd growth Birch Remarks:	Location: Parks Hwy 77 Acct # 20N04W07A001 N: 2864205.03 E: 1630422.47 Coord.: AKSP Z4 NAD83
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0.0' – 2.0' Silt, brown, soft to med. firm, moist. Trace organics.

2.0' – 3.9' Medium grain sand, brown, med. firm to firm, dry

3.9' – 11.0' Grading from fine silty sand to medium/coarse sand, gray, dense, dry.

11.0' – 13.5' Medium to coarse grained sandy gravel, gray, dense, dry

13.5' – 18.0' Medium grained silty sand, gray, dense, dry

Notes: No groundwater observed at time of excavation. Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Test pit located on steep E facing slope approx. 44%



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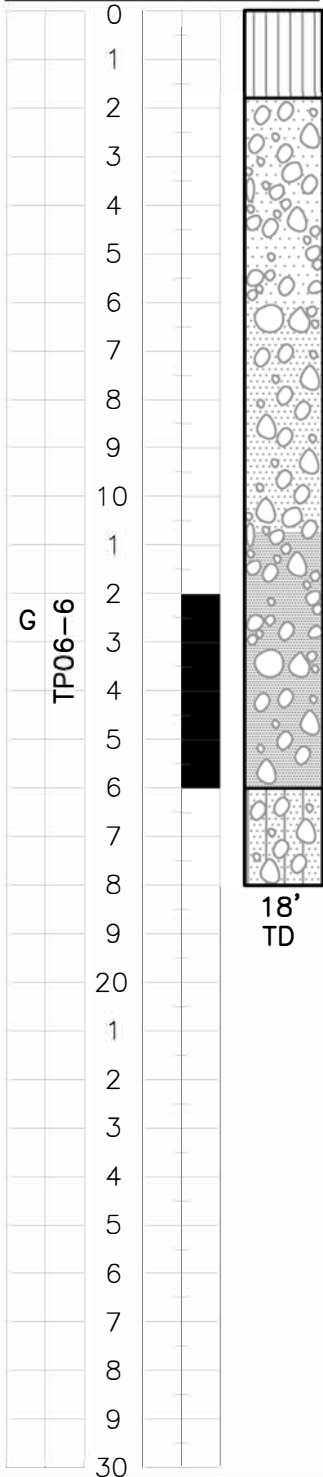
Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Parks Hwy MP 77
 Method Used: Hydraulic excavator
 Logged by: MCS & SRR
 Date Begun: 06/03/21

Sheet 5 of 6 Log # TP06-5

Rig Type: CASE CX1450
 Contractor: K&H
 Date Comp.: 06/03/21

GEOLOGIC LOG TEST PIT: TP06-6

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 256' Total Depth : 18' Bottom Elev.: Collar Elev.: Reference:	Vegetation: 2nd Growth Birch Remarks:	Location: Parks Hwy 77 Acct # 20N04W07A001 N: 2864476.92 E: 1629749.54 Coord.: AKSP Z4 NAD83
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0.0' - 1.7' Silt, brown, soft to med. firm, moist, Trace organics.

1.7' - 16.0' Sandy gravel w/ cobbles and silt, gray, dense, dry. Sand grades from coarse to fine.

16.0' - 18.0' Sandy silt w/ gravel, gray, dense to very dense, damp. Difficult digging for excavator.

Notes: No groundwater observed at time of excavation. Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Test pit on slope of small depression in middle of moraine feature.



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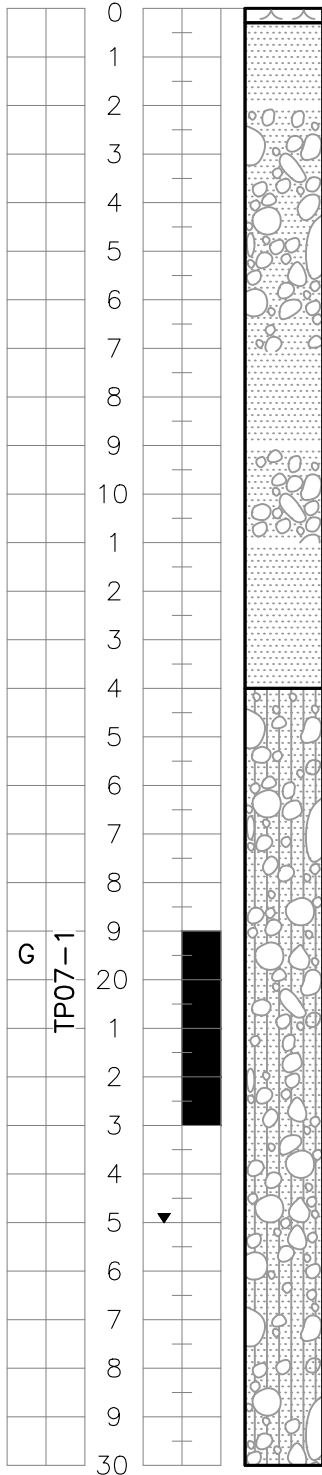
Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Parks Hwy MP 77
 Method Used: Hydraulic excavator
 Logged by: MCS & SRR
 Date Begun: 06/03/21

Sheet 6 of 6 Log # TP06-6

Rig Type: CASE CX1450
 Contractor: K&H
 Date Comp.: 06/03/21

GEOLOGIC LOG TEST PIT: TP07-1

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 471' Total Depth : 30' Bottom Elev.: _____ Collar Elev.: _____ Reference: _____	Vegetation: OB Prevs. stripped Remarks: _____ _____ _____	Location: Parks MP 119 Acct # 26N05W06A002 _____ N: 3059246.43 E: 1596048.75 Coord.: AKSP Z4 NAD83
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0.0' - 0.1' Vegetative mat

0.1' - 14.0' Stratified 2-5 ft intervals of med. grain sand and gravel, dark gray, dense, dry

14.0' - 30.0' Sandy, silty gravel, gray, dense, moist to wet

17.0' Approx. floor of historic borrow site

25.0' Groundwater seep

Notes: Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Test pit in side slope in historic borrow site.
30' TD

RECON, LLC

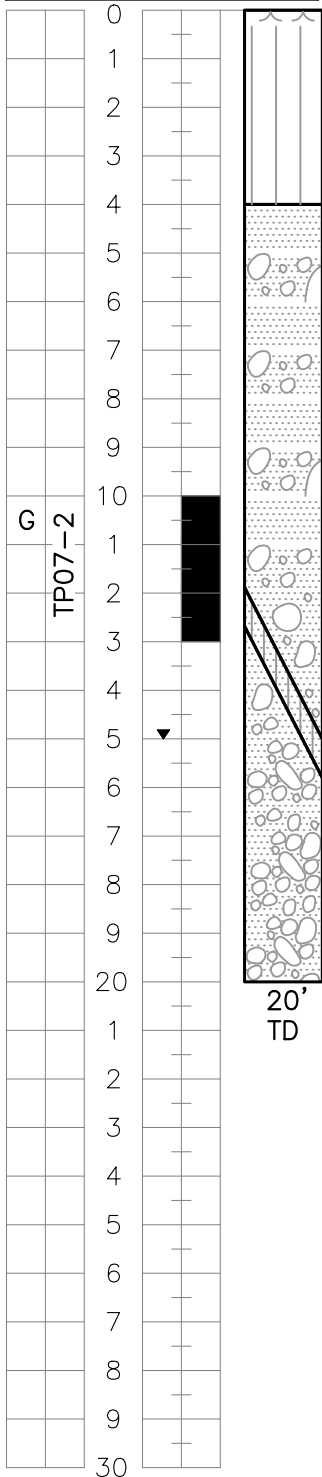
565 W. Recon Cir.
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Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Parks Hwy MP 119
 Method Used: Hydraulic excavator
 Logged by: MCS & SRR
 Date Begun: 06/02/21

Sheet 1 of 4 Log # TP07-1
 Rig Type: CASE CX1450
 Contractor: K&H
 Date Comp.: 06/02/21

GEOLOGIC LOG TEST PIT: TP07-2

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 488' Total Depth : 20' Bottom Elev.: _____ Collar Elev.: _____ Reference: _____	Vegetation: Alders _____ Remarks: _____ _____	Location: Parks MP 119 Acct # 26N05W06A002 _____ N: 3059129.4 E: 1595911.63 Coord.: AKSP Z4 NAD83
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0.0' - 4.0' Silt, brown, soft to med. dense, dry. Trace organics. Overburden stripped from previous operations.

4.0' - 11.8' Stratified sand & cobble gravel w/ boulders up to ~24", gray, dense, moist

11.8' - 12.6' Silty sand, gray, dense to very dense, dry. Top of angled silty sand layer on N side of pit. 0.8 ft thick

15' - 15.8' Silty sand, gray, dense to very dense, dry. Top of angled silty sand layer on S side of pit. 0.8 ft thick. Rapid in-flow of groundwater. Appears to be perched water table.

15.8' - 20.0' Sandy gravel, gray, dense, moist to wet.

Notes: Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Test pit located in small bench in terminal moraine.



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 Palmer, Alaska 99645
 Ph: (907) 746-3630

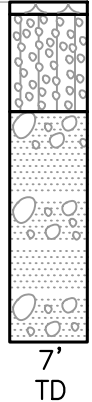
Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Parks Hwy MP 119
 Method Used: Hydraulic excavator
 Logged by: MCS & SRR
 Date Begun: 06/02/21

Sheet 2 of 4 Log # TP07-2
 Rig Type: CASE CX1450
 Contractor: K&H
 Date Comp.: 06/02/21

GEOLOGIC LOG TEST PIT: TP07-3

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 496' Total Depth : 7' Bottom Elev.: _____ Collar Elev.: _____ Reference: _____	Vegetation: Veg _____ Mat, alders _____ Remarks: _____	Location: Parks MP 119 Acct # 26N05W06A002 _____ N: 3059580.79 E: 1596145.46 Coord.: AKSP Z4 NAD83
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		0			
		1			
		2			
		3			
		4			
		5			
		6			
		7			
		8			
		9			
		10			
		1			
		2			
		3			
		4			
		5			
		6			
		7			
		8			
		9			
		20			
		1			
		2			
		3			
		4			
		5			
		6			
		7			
		8			
		9			
		30			



0.0' - 0.3' Vegetative mat
 0.3' - 2.3' Poorly sorted gravel w/ silt, brown & gray, med. dense to dense, dry
 2.3' Plant roots
 2.3' - 7.0' Stratified sand & gravel, gray, dense to very dense, dry

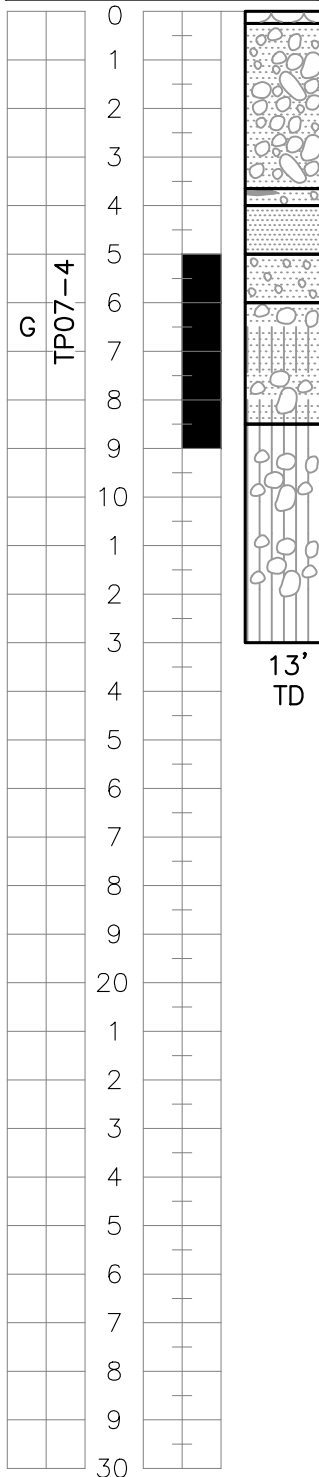
Notes: No groundwater observed at time of excavation. Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Test pit located on previous work bench in borrow site. No sample taken.



<b style="font-size: 1.2em;">RECON, LLC 565 W. Recon Cir. Palmer, Alaska 99645 Ph: (907) 746-3630	Project No.: 2021-162 Project Name: MSB Material Site Geotech Location: Parks Hwy MP 119 Method Used: Hydraulic excavator Logged by: MCS & SRR Date Begun: 06/02/21	Sheet 3 of 4 Log # TP07-3 Rig Type: CASE CX1450 Contractor: K&H Date Comp.: 06/02/21
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GEOLOGIC LOG TEST PIT: TP07-4

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 496' Total Depth : 13' Bottom Elev.: _____ Collar Elev.: _____ Reference: _____	Vegetation: Alders _____ Remarks: _____ _____	Location: Parks MP 119 Acct # 26N05W06A002 _____ N: 3059482.95 E: 1595936.53 Coord.: AKSP Z4 NAD83
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0.0' – 0.1' Vegetative mat, no overburden, previously stripped.

0.1' – 3.8' Sandy gravel, gray, dense, dry

3.8' – 4.0' Sandy gravel w/clay lenses, gray, dense, dry

4.0' – 5.0' Medium grain sand, gray, dense, dry

5.0' – 6.0' Stratified sand w/ fine gravel, gray, dense to very dense, moist

6.0' – 8.5' Stratified silty sand w/ cobbles, gray, dense to very dense, moist

8.5' – 13.0' Stratified silt w/cobbles, gray, dense to very dense, wet. Difficult digging

Notes: No groundwater observed at time of excavation. Coordinates from handheld GPS. Ground elevation from MSB 2011 LiDAR data. Test pit on previous work bench in borrow site



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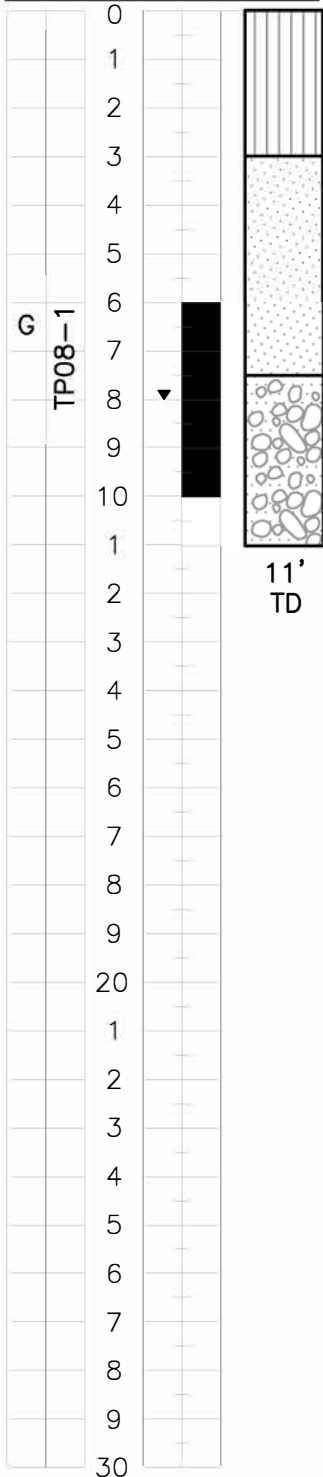
Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Parks Hwy MP 119
 Method Used: Hydraulic excavator
 Logged by: MCS & SRR
 Date Begun: 06/02/21

Sheet 4 of 4 Log # TP07-4

Rig Type: CASE CX1450
 Contractor: K&H
 Date Comp.: 06/02/21

GEOLOGIC LOG TEST PIT: TP08-1

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 568' Total Depth : 11' Bottom Elev.: Collar Elev.: Reference:	Vegetation: Deadfall, Old grwth brch/spruce Remarks:	Location: Parks MP 126 Acct # 28N05W31A001 N: 3098684.19 E: 1596355.23 Coord.: AKSP Z4 NAD83
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0.0' – 3.0' Silt, dark brown, very soft to med. firm, moist. Trace organics.

3.0' – 7.5' Coarse, clean sand, gray, med. firm to firm, moist

7.5' – 11.0' Coarse sandy gravel, gray, med. firm to firm, moist to wet
 8.0' Steady water inflow

Notes: Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Test pit located on relic river terrace.



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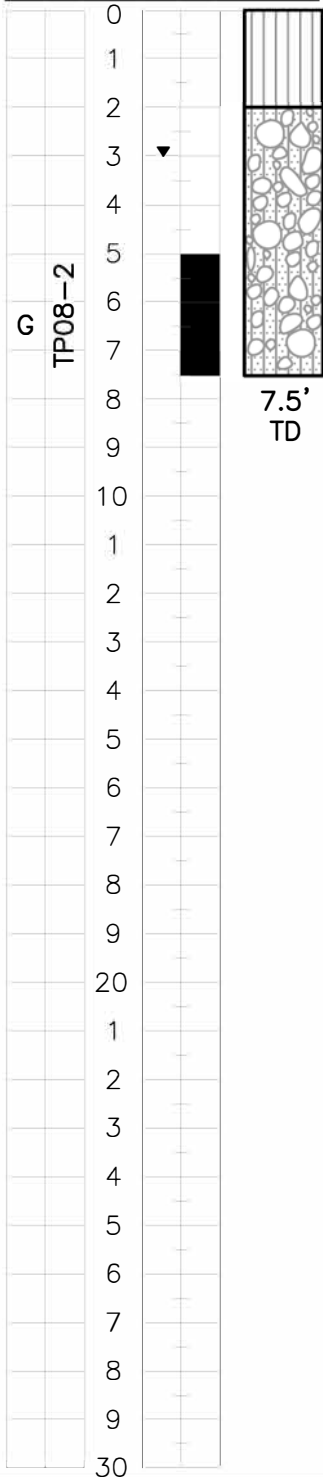
Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Parks Hwy MP 126
 Method Used: Hydraulic Excavator
 Logged by: MCS & SRR
 Date Begun: 06/02/21

Sheet 1 of 6 Log # TP08-1

Rig Type: CASE XC1450
 Contractor: K&H
 Date Comp.: 06/02/21

GEOLOGIC LOG TEST PIT: TP08-2

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 665' Total Depth : 7.5' Bottom Elev.: Collar Elev.: Reference:	Vegetation: Grass Remarks:	Location: Parks MP 126 Acct # 28N05W31A001 N: 3095504.69 E: 1595100.75 Coord.: AKSP Z4 NAD83
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0.0' – 2.0' Silt, brown, very soft to soft, moist. Trace organics.

2.0' – 7.5' Silty gravel w/sand & boulders, up to dia. ~18", gray, dense to very dense, moist to wet

3.0' Steady groundwater seep

Notes: Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Test pit on hummocky drumlin.



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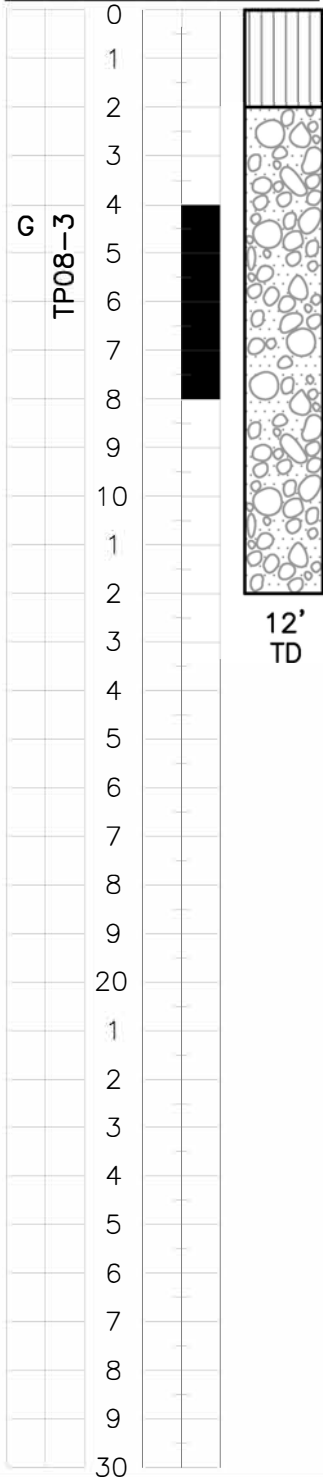
Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Parks Hwy MP 126
 Method Used: Hydraulic Excavator
 Logged by: MCS & SRR
 Date Begun: 06/02/21

Sheet 2 of 6 Log # TP08-2

Rig Type: CASE XC1450
 Contractor: K&H
 Date Comp.: 06/02/21

GEOLOGIC LOG TEST PIT: TP08-3

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 572' Total Depth : 12' Bottom Elev.: Collar Elev.: Reference:	Vegetation: Old Grwth birch Remarks:	Location: Parks MP 126 Acct # 28N05W32B002 N: 3095510.24 E: 1597354.6 Coord.: AKSP Z4 NAD83
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0.0' – 2.0' Silt, brown, very soft to soft, dry. Trace organics.

2.0' – 12.0' Cobble gravel w/ sand, gray, dense to very dense, moist. Cobbles are slightly weathered. Difficult digging for excavator.

Notes: No groundwater observed at time of excavation. Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Test pit on relic river terrace.



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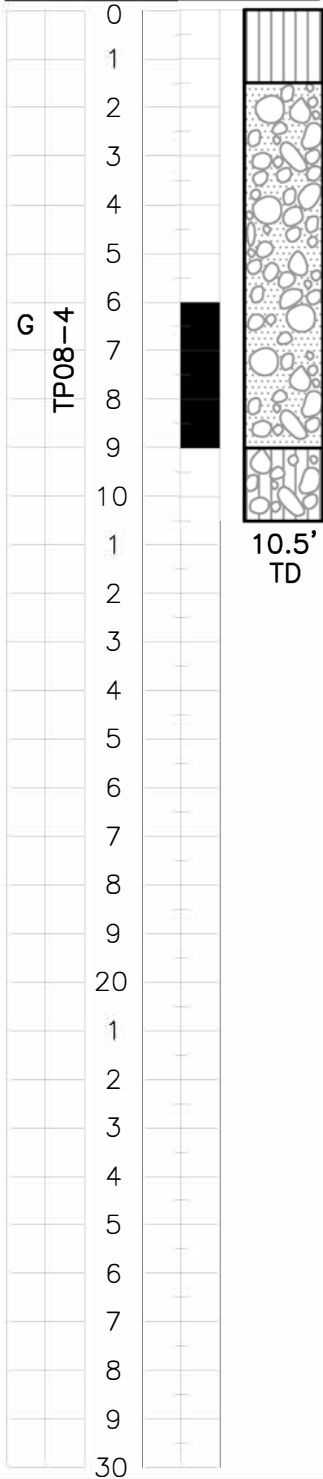
Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Parks Hwy MP 126
 Method Used: Hydraulic Excavator
 Logged by: MCS & SRR
 Date Begun: 06/02/21

Sheet 3 of 6 Log # TP08-3

Rig Type: CASE XC1450
 Contractor: K&H
 Date Comp.: 06/02/21

GEOLOGIC LOG TEST PIT: TP08-4

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 566' Total Depth : 10.5' Bottom Elev.: Collar Elev.: Reference:	Vegetation: Grass, Small alders Remarks:	Location: Parks MP 126 Acct # 28N05W32B002 N: 3094131.45 E: 1597999.18 Coord.: AKSP Z4 NAD83
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0.0' - 1.5' Silt, brown, very soft to soft, moist, Trace organics.

1.5' - 9.0' Sandy cobble gravel w/ silt & boulders up to max dia. ~24", med. dense to dense, dry to moist Trench walls maintained.

9.0' - 10.5' Silty gravel, gray, dense to very dense, moist. Lodgement till. Difficult digging for excavator.

Notes: No groundwater observed at time of excavation. Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Test pit on relic river terrace.



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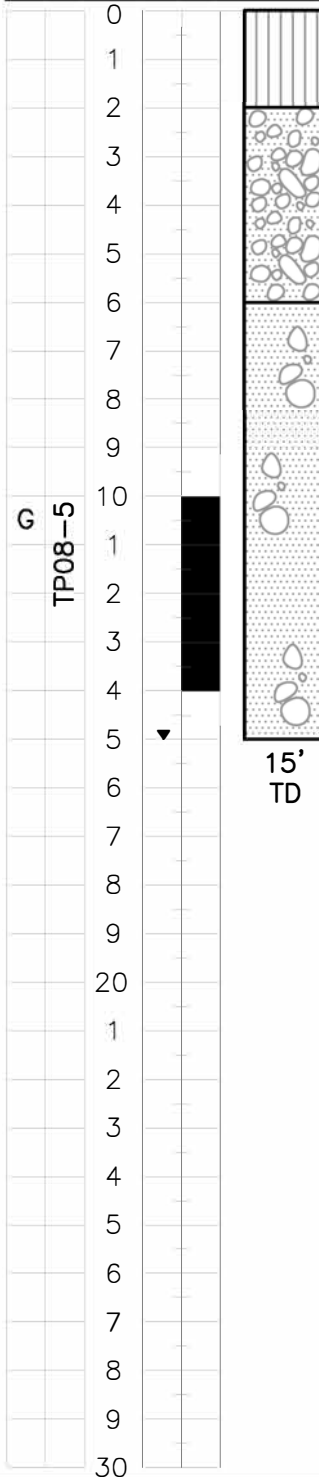
Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Parks Hwy MP 126
 Method Used: Hydraulic Excavator
 Logged by: MCS & SRR
 Date Begun: 06/02/21

Sheet 4 of 6 Log # TP08-4

Rig Type: CASE XC1450
 Contractor: K&H
 Date Comp.: 06/02/21

GEOLOGIC LOG TEST PIT: TP08-5

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev. 586' Total Depth : 15' Bottom Elev.: Collar Elev.: Reference:	Vegetation: Old grwth Brch, open udr canpy Remarks:	Location: Parks MP 126 Acct # 28N05W31A001 N: 3096612.62 E: 1596086.53 Coord.: AKSP 74 NAD83
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0.0' – 2.0' Silt, brown, very soft to soft, moist. Trace organics.

2.0' – 6.0' Coarse sandy gravel, gray, med. dense to dense, moist

6.0' – 15.0' Coarse sand w/ gravel, gray, med. dense to dense, moist to wet. Easy digging for excavator. Trench walls maintained.

15.0' Groundwater in-flow at steady rate at bottom of trench.

Notes: Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Test pit located on small relic drainage channel on old river terrace.



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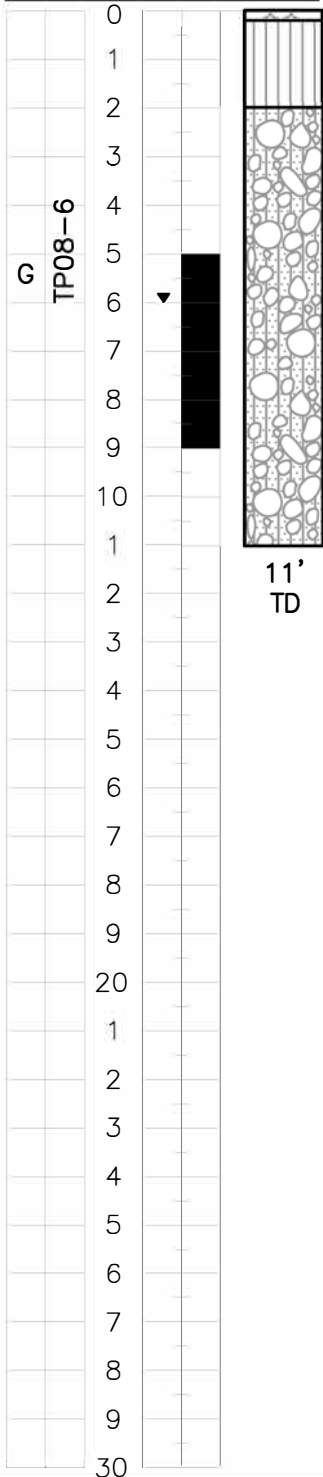
Project No.: 2021-162
 Project Name: MSB Material Site Geotech
 Location: Parks Hwy MP 126
 Method Used: Hydraulic Excavator
 Logged by: MCS & SRR
 Date Begun: 06/02/21

Sheet 5 of 6 Log # TP08-5

Rig Type: CASE XC1450
 Contractor: K&H
 Date Comp.: 06/02/21

GEOLOGIC LOG TEST PIT: TP08-6

Sample Method	Sample Number	Depth In Feet	Sample Interval	Frozen Interval	Graphic Log	Ground Elev.: 620' Total Depth : 11' Bottom Elev.: Collar Elev.: Reference:	Vegetation: Dwarf brch Dead spruce Remarks:	Location: Parks MP 126 Acct # 28N05W31A001 N: 3098181.37 E: 1595730.83 Coord.: AKSP Z4 NAD83
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0.0' - 0.1' Vegetative mat
 0.1' - 2.0' Sandy silt, brown, soft, dry

2.0' - 11.0' Silty/sand gravel, gray, dense to very dense, moist to wet.
 Difficult digging for excavator.

6.0' Rapid water inflow

Notes: Coordinates from hand held GPS. Ground elevation from MSB 2011 LiDAR data. Test pit located on small rise in ice contact terrain.



RECON, LLC 565 W. Recon Cir. Palmer, Alaska 99645 Ph: (907) 746-3630	Project No.: 2021-162 Project Name: MSB Material Site Geotech Location: Parks Hwy MP 126 Method Used: Hydraulic Excavator Logged by: MCS & SRR Date Begun: 06/02/21	Sheet 6 of 6 Log # TP08-6 Rig Type: CASE XC1450 Contractor: K&H Date Comp.: 06/02/21
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APPENDIX C

MATERIAL TEST RESULTS

PROJECT: 2021 TEST SVCS
 PROJECT NO.: 21-400-4
 CLIENT: RECON
 SAMPLE NO.: 21P288
 LOCATION: MS01-GLENN MP 56

DATE TAKEN: 6/2/2021
 DATE TESTED: 6/5/2021
 TESTED BY: NP
 REVIEWED BY: JAB
 DESCRIPTION: TP01-1

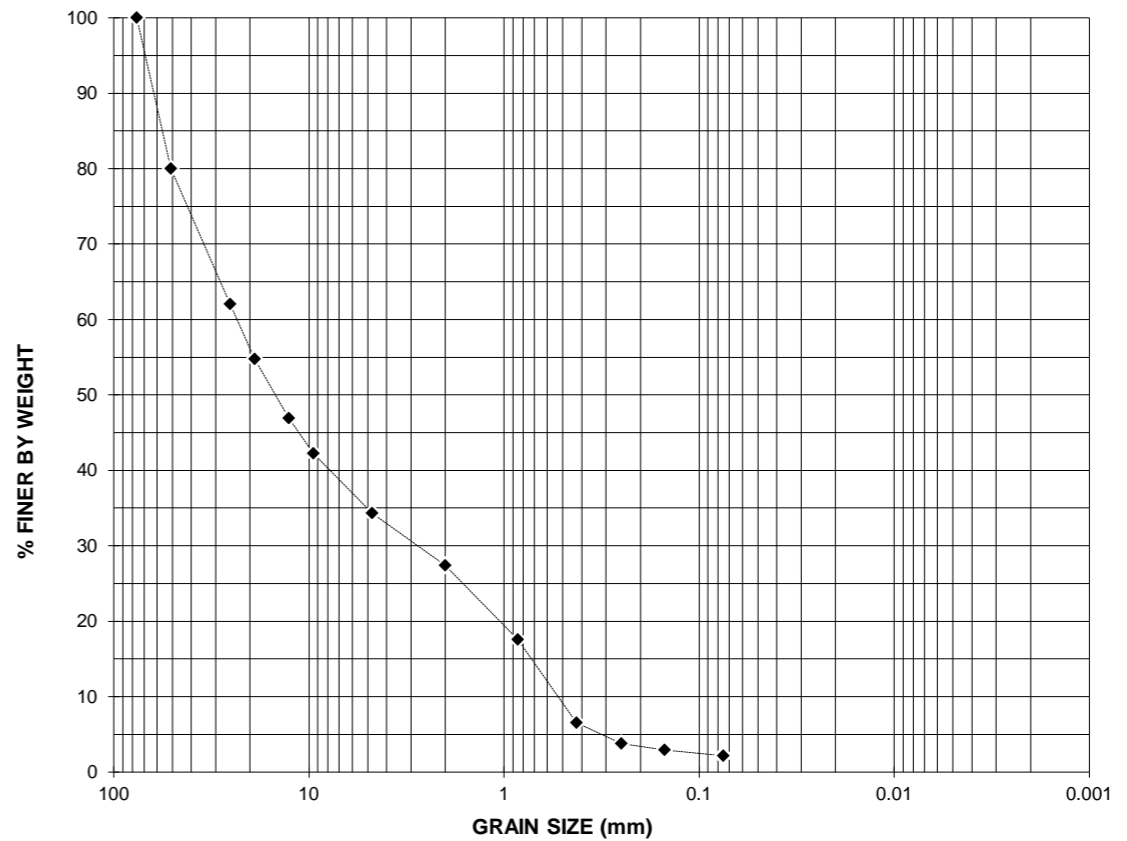
SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	
4"	100.0	
3"	76.2	100
2"	50.8	80
1"	25.4	62
3/4"	19.0	55
1/2"	12.7	47
3/8"	9.5	42
#4	4.75	34
#10	2.00	27
#20	0.85	18
#40	0.425	7
#60	0.25	4
#100	0.15	3
#200	0.075	2.2

% Gravel: 65.6
% Sand: 32.2
% Fines: 2.2
D60: 23.63
D30: 3.02
D10: 0.56
Cu: 42.3
Cc: 0.7
%.02 mm:
% Moisture: 2.8
Fine Modulus:
(ASTM D4318)
Liquid Limit:
Plastic Limit:
Plastic Index:

GRAIN SIZE DISTRIBUTION



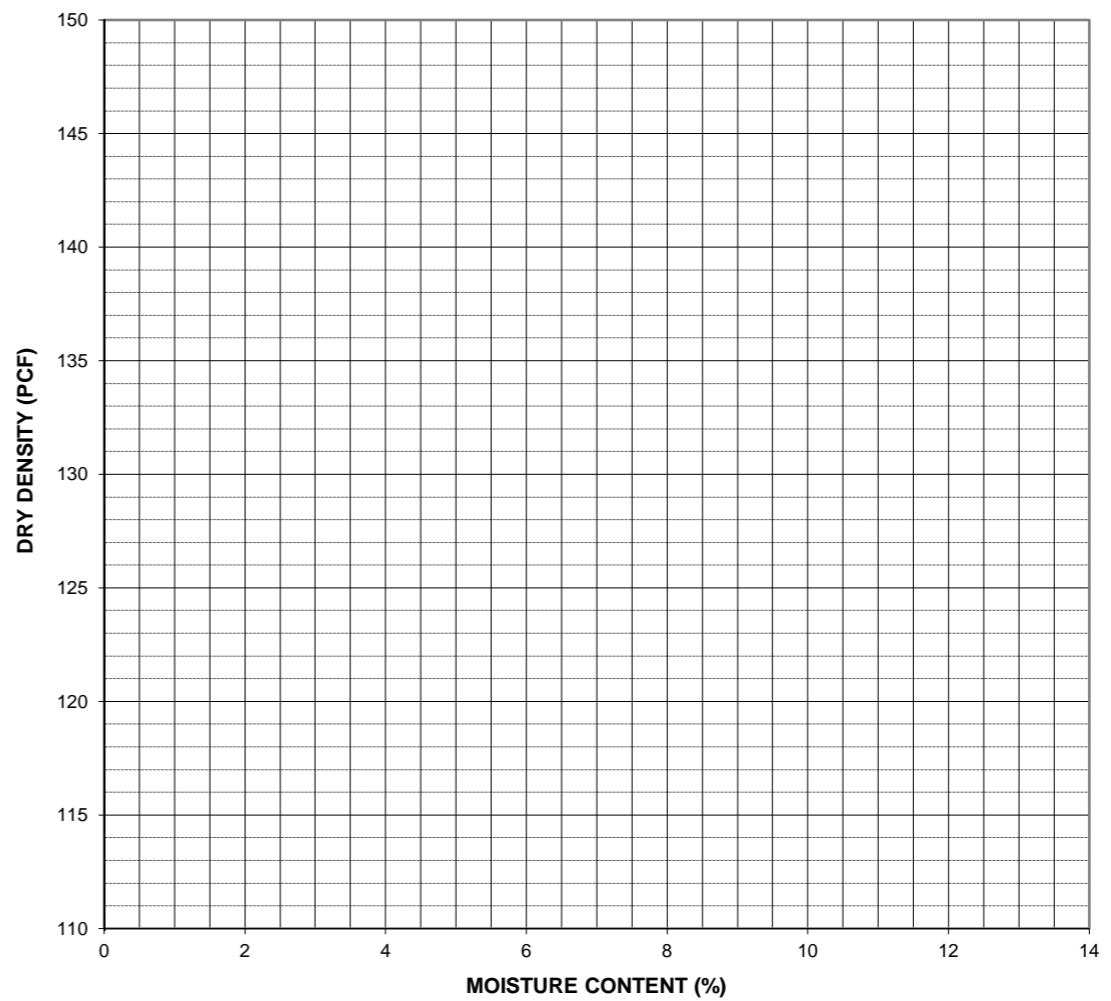
HYDROMETER TEST

(ASTM D422)

Elapsed Time (min)	Diameter (mm)	Total % Passing
0		
0.5		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

(ASTM C127)
Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:
(ASTM C128)
Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:
(ASTM D1557)
Dry Den (U):
Dry Den (C):
M% (U):
M% (C):
SpG (assumed):
M-D Test Method:

MOISTURE-DENSITY RELATIONSHIP



CLASSIFICATION: Poorly Graded Gravel w/Sand
USC: GP
FROST CLASS:

Remarks:

JOHN A. BUZDOR, P.E. 6/15/2021

PROJECT: 2021 TEST SVCS
PROJECT NO.: 21-400-4
CLIENT: RECON
SAMPLE NO.: 21P289
LOCATION: MS01-GLENN MP 56

DATE TAKEN: 6/2/2021
DATE TESTED: 6/5/2021
TESTED BY: NP
REVIEWED BY: JAB
DESCRIPTION: TP01-2

SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	
4"	100.0	100
3"	76.2	92
2"	50.8	80
1"	25.4	64
3/4"	19.0	58
1/2"	12.7	50
3/8"	9.5	45
#4	4.75	36
#10	2.00	27
#20	0.85	17
#40	0.425	7
#60	0.25	3
#100	0.15	2
#200	0.075	1.1

% Gravel: 64.2
% Sand: 34.7
% Fines: 1.1
D60: 20.86
D30: 2.85
D10: 0.55
Cu: 38.0
Cc: 0.7
% .02 mm:
% Moisture: 1.4
Fine Modulus:

(ASTM D4318)

Liquid Limit:
Plastic Limit:
Plastic Index:

(ASTM C127)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM C128)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM D1557)

Dry Den (U):
Dry Den (C):
M% (U):
M% (C):

SpG (assumed):
M-D Test Method:

HYDROMETER TEST

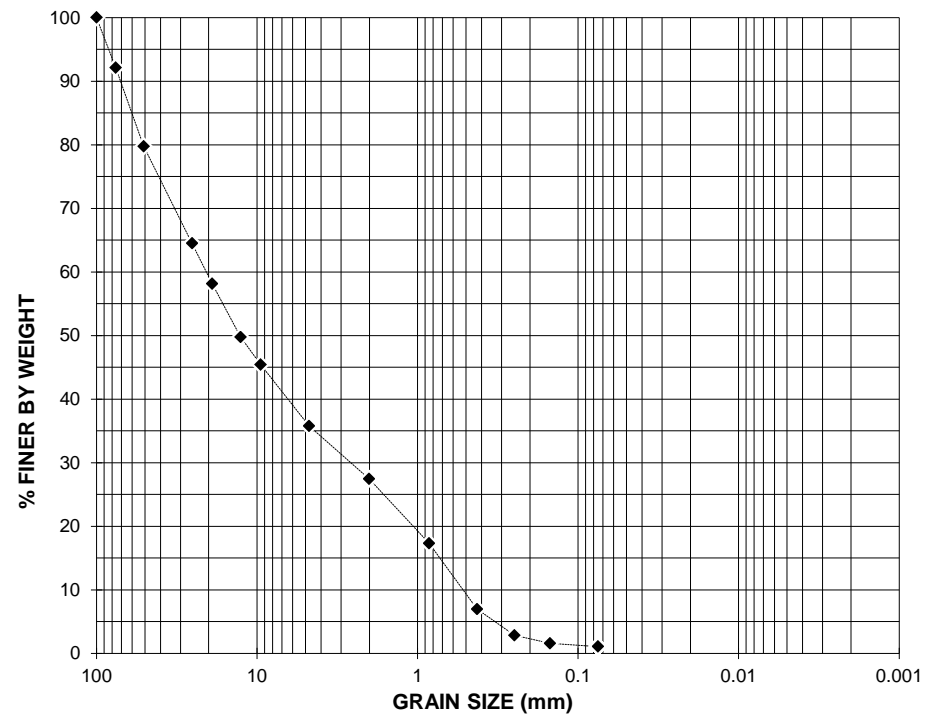
(ASTM D422)

Elapsed Time (min)	Diameter (mm)	Total % Passing
0		
0.5		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

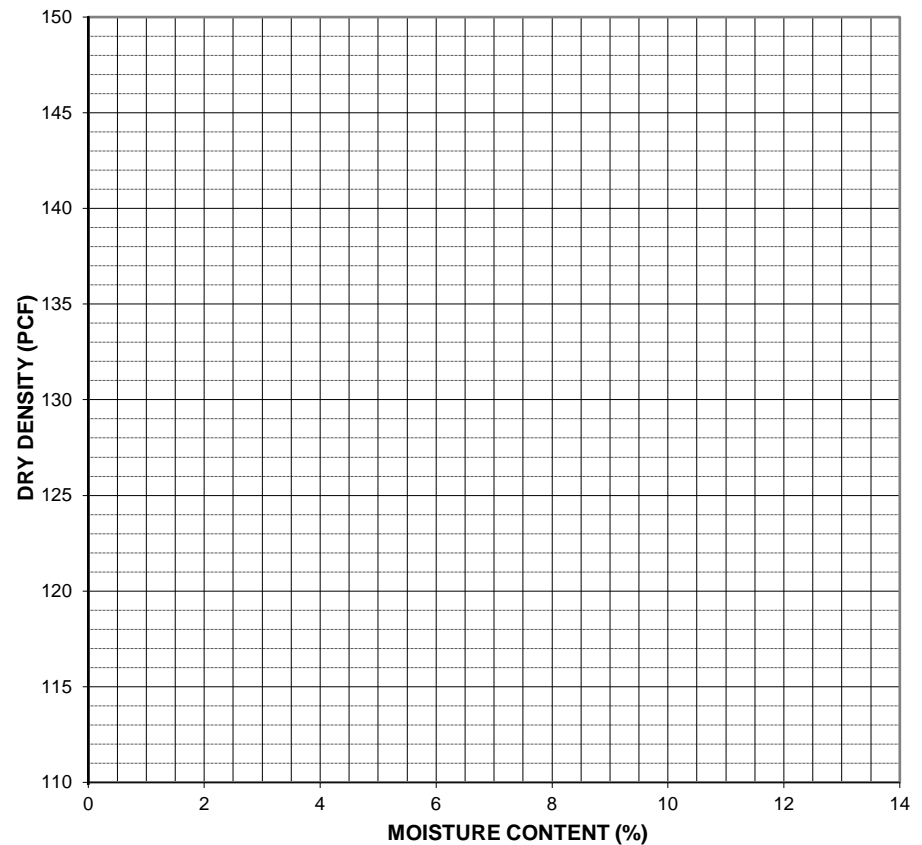
CLASSIFICATION: Poorly Graded Gravel w/Sand
USC: GP
FROST CLASS:

Remarks:

GRAIN SIZE DISTRIBUTION



MOISTURE-DENSITY RELATIONSHIP



JOHN A. BUZDOR, P.E. 6/7/2021

PROJECT: 2021 TEST SVCS
PROJECT NO.: 21-400-4
CLIENT: RECON
SAMPLE NO.: 21P290
LOCATION: MS01-GLENN MP 56

DATE TAKEN: 6/2/2021
DATE TESTED: 6/5/2021
TESTED BY: NP
REVIEWED BY: JAB
DESCRIPTION: TP01-3

SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	
4"	100.0	100
3"	76.2	92
2"	50.8	74
1"	25.4	58
3/4"	19.0	51
1/2"	12.7	43
3/8"	9.5	39
#4	4.75	31
#10	2.00	26
#20	0.85	16
#40	0.425	7
#60	0.25	4
#100	0.15	3
#200	0.075	2.0

% Gravel: 68.5
% Sand: 29.4
% Fines: 2.0
D60: 28.34
D30: 4.01
D10: 0.58
Cu: 49.2
Cc: 1.0
% .02 mm:
% Moisture: 1.6
Fine Modulus:

(ASTM D4318)

Liquid Limit:
Plastic Limit:
Plastic Index:

(ASTM C127)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM C128)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM D1557)

Dry Den (U):
Dry Den (C):
M% (U):
M% (C):

SpG (assumed):
M-D Test Method:

HYDROMETER TEST

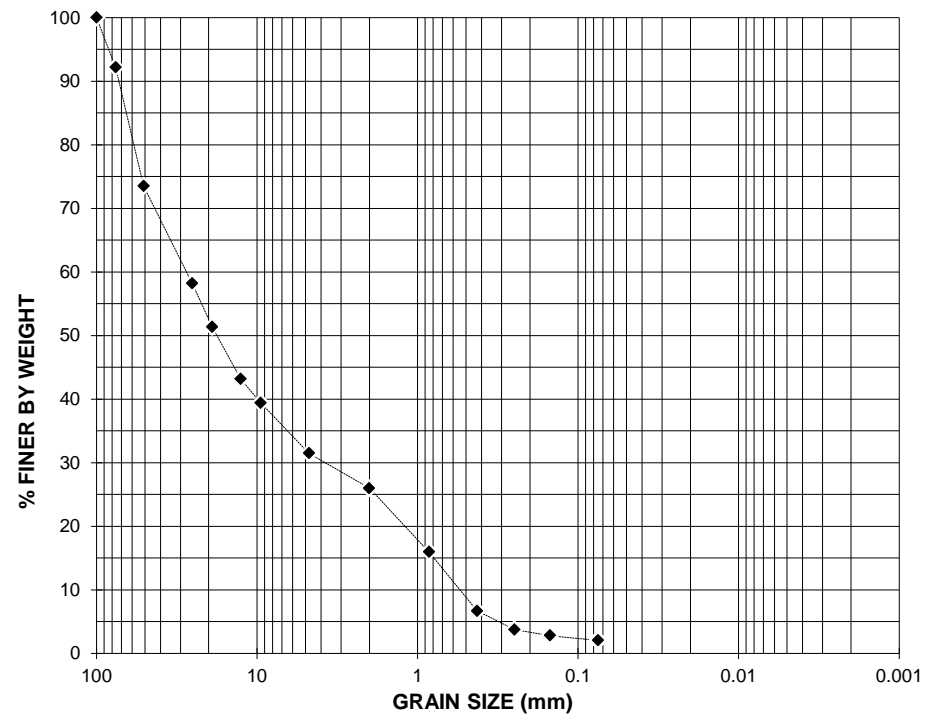
(ASTM D422)

Elapsed Time (min)	Diameter (mm)	Total % Passing
0		
0.5		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

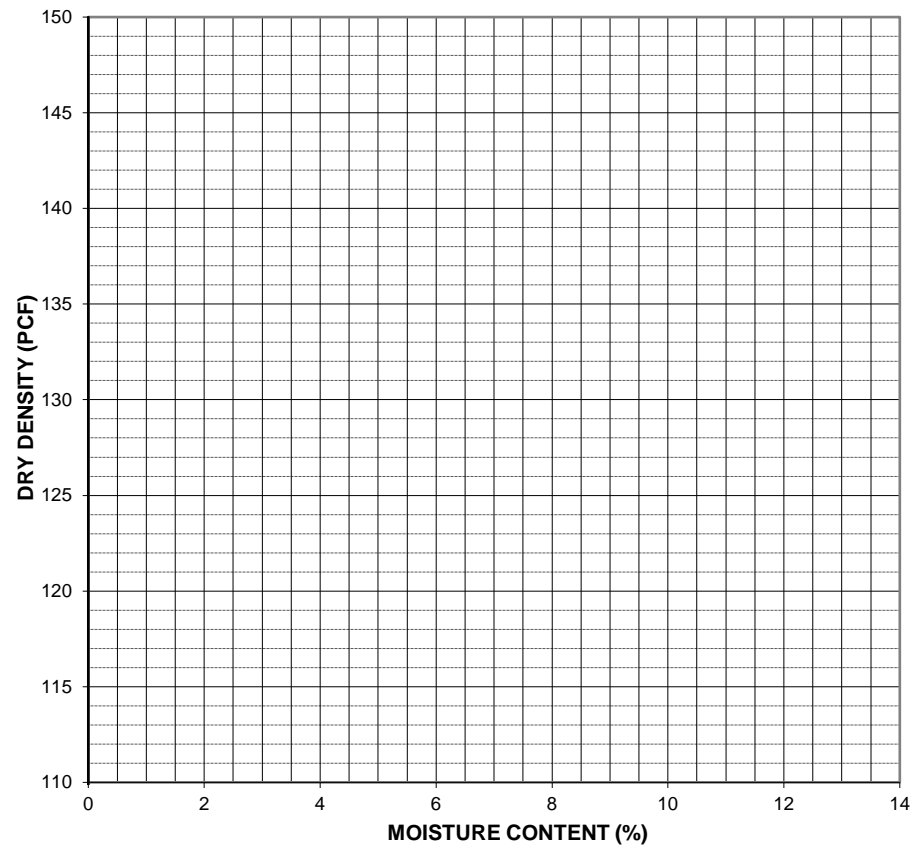
CLASSIFICATION: Poorly Graded Gravel w/Sand
USC: GP
FROST CLASS:

Remarks:

GRAIN SIZE DISTRIBUTION



MOISTURE-DENSITY RELATIONSHIP



JOHN A. BUZDOR, P.E. 6/7/2021

PROJECT: 2021 TEST SVCS
PROJECT NO.: 21-400-4
CLIENT: RECON
SAMPLE NO.: 21P291
LOCATION: MS01-GLENN MP 56

DATE TAKEN: 6/2/2021
DATE TESTED: 6/5/2021
TESTED BY: NP
REVIEWED BY: JAB
DESCRIPTION: TP01-4

SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	100
4"	100.0	91
3"	76.2	87
2"	50.8	85
1"	25.4	67
3/4"	19.0	58
1/2"	12.7	48
3/8"	9.5	42
#4	4.75	31
#10	2.00	22
#20	0.85	12
#40	0.425	6
#60	0.25	3
#100	0.15	2
#200	0.075	1.6

% Gravel: 69.3
% Sand: 29.1
% Fines: 1.6
D60: 20.43
D30: 4.53
D10: 0.72
Cu: 28.5
Cc: 1.4
% .02 mm:
% Moisture: 1.2
Fine Modulus:
(ASTM D4318)
Liquid Limit:
Plastic Limit:
Plastic Index:

(ASTM C127)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

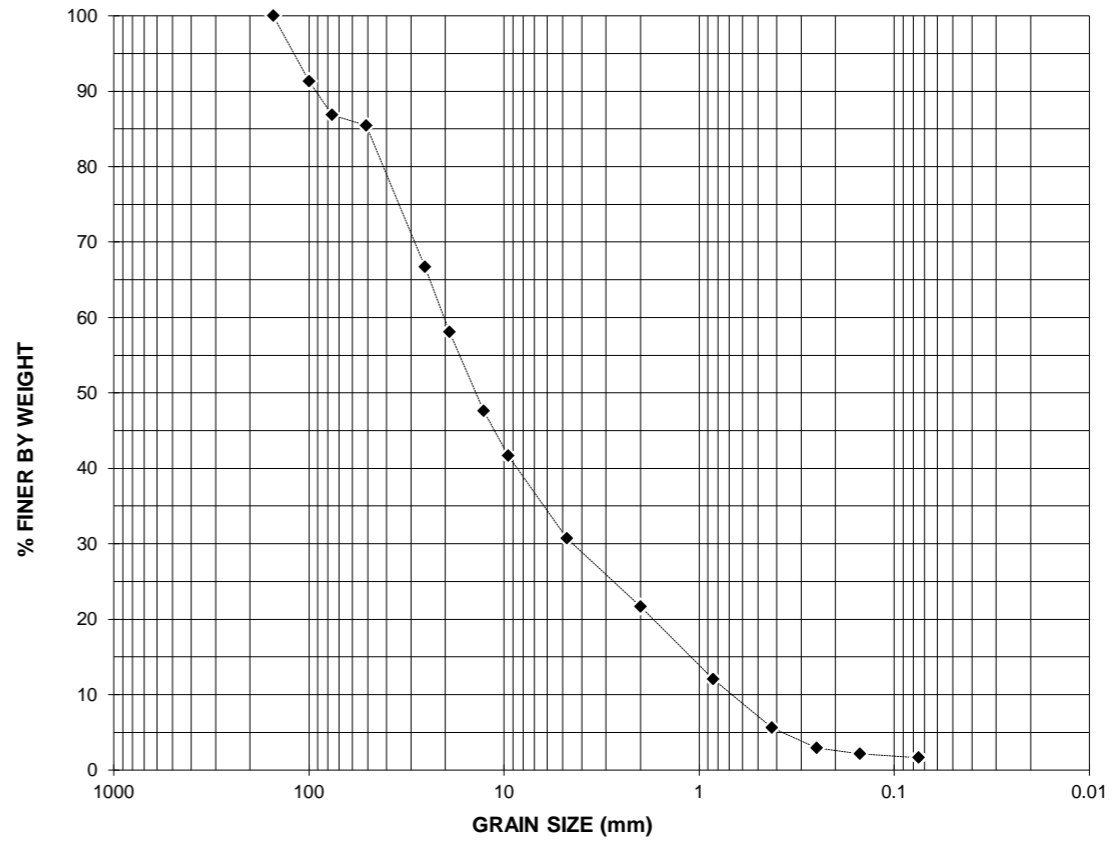
(ASTM C128)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM D1557)

Dry Den (U):
Dry Den (C):
M% (U):
M% (C):
SpG (assumed):
M-D Test Method:

GRAIN SIZE DISTRIBUTION

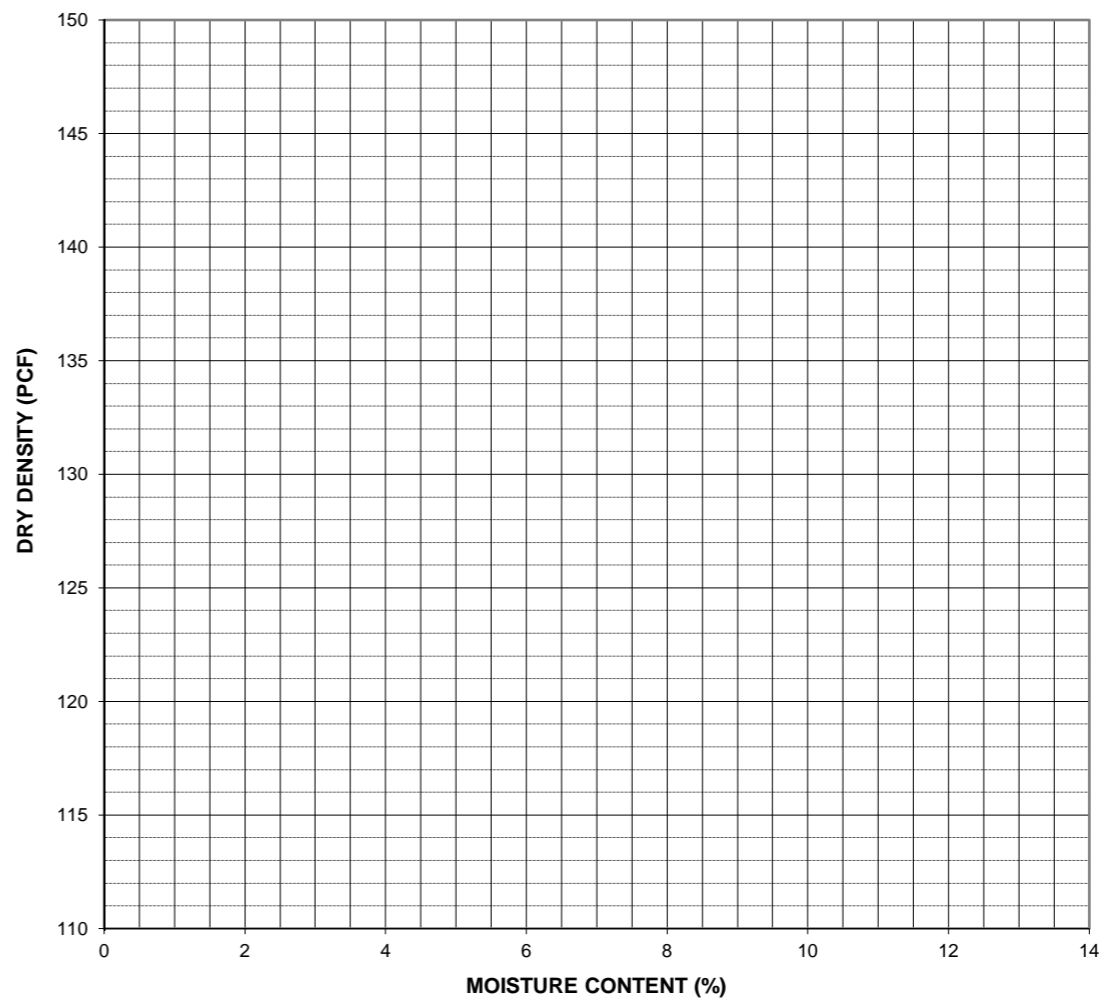


HYDROMETER TEST

(ASTM D422)

Elapsed Time (min)	Diameter (mm)	Total % Passing
0		
0.5		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

MOISTURE-DENSITY RELATIONSHIP



CLASSIFICATION: Well Graded Gravel w/Sand
USC: GW
FROST CLASS:

Remarks:

JOHN A. BUZDOR, P.E. 6/8/2021

PROJECT: 2021 TEST SVCS
 PROJECT NO.: 21-400-4
 CLIENT: RECON
 SAMPLE NO.: 21P292
 LOCATION: MS01-GLENN MP 56

DATE TAKEN: 6/2/2021
 DATE TESTED: 6/5/2021
 TESTED BY: NP
 REVIEWED BY: JAB
 DESCRIPTION: TP01-5

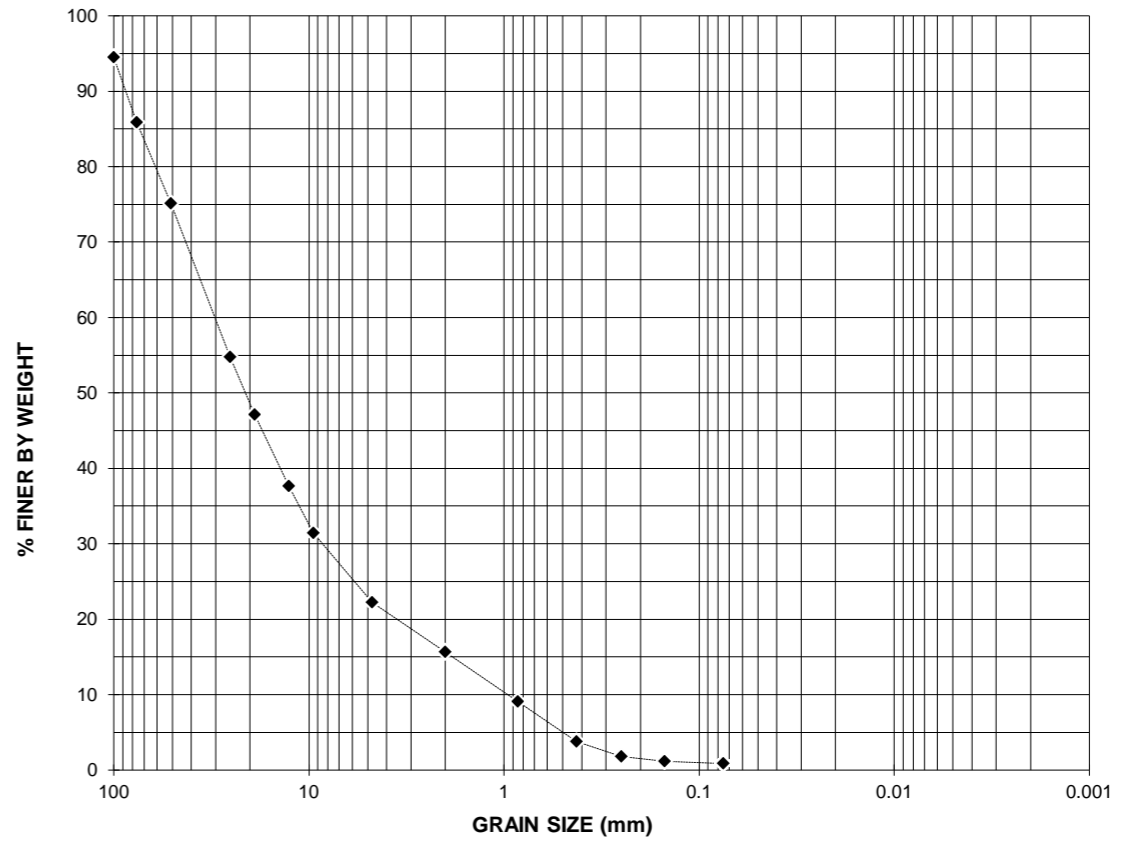
SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	100
4"	100.0	95
3"	76.2	86
2"	50.8	75
1"	25.4	55
3/4"	19.0	47
1/2"	12.7	38
3/8"	9.5	31
#4	4.75	22
#10	2.00	16
#20	0.85	9
#40	0.425	4
#60	0.25	2
#100	0.15	1
#200	0.075	0.9

% Gravel: 77.8
% Sand: 21.4
% Fines: 0.9
D60: 31.94
D30: 8.77
D10: 1.01
Cu: 31.7
Cc: 2.4
%.02 mm:
% Moisture: 0.9
Fine Modulus:
(ASTM D4318)
Liquid Limit:
Plastic Limit:
Plastic Index:

GRAIN SIZE DISTRIBUTION



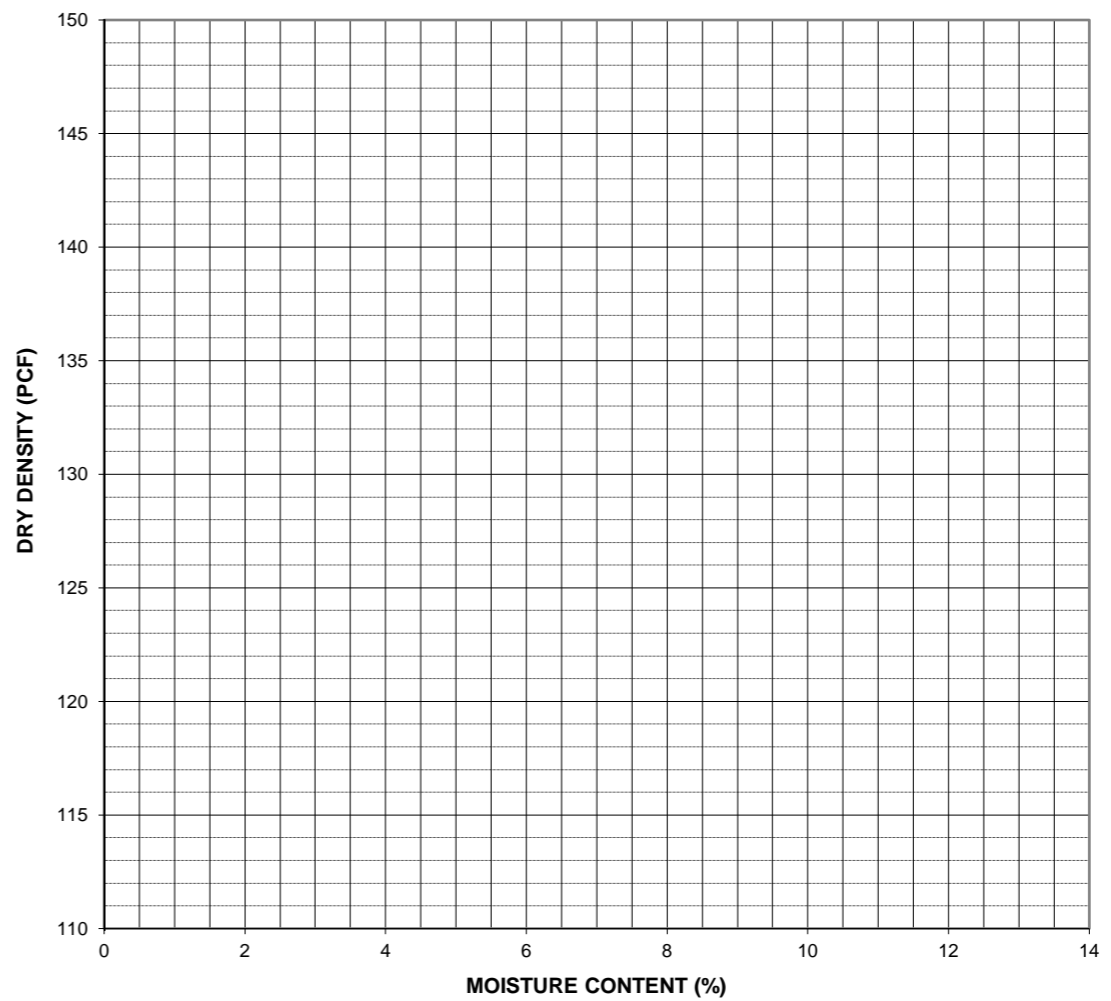
HYDROMETER TEST

(ASTM D422)

Elapsed Time (min)	Diameter (mm)	Total % Passing
0		
0.5		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

(ASTM C127)
Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:
(ASTM C128)
Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:
(ASTM D1557)
Dry Den (U):
Dry Den (C):
M% (U):
M% (C):
SpG (assumed):
M-D Test Method:

MOISTURE-DENSITY RELATIONSHIP



CLASSIFICATION: Well Graded Gravel w/Sand
USC: GW
FROST CLASS:

Remarks: **DEG = 85**

JOHN A. BUZDOR, P.E. 6/14/2021

GRAINSIZE ANALYSIS

ASTM D422

PROJECT NAME:	2021 TEST SVCS	DATE TAKEN:	6/2/2021
PROJECT NO.:	21-400-4	DATE TESTED:	6/5/2021
CLIENT:	RECON	TESTED BY:	NP
SAMPLE NO:	21P293	REVIEWED BY:	JAB
LOCATION/ELEV:	MS01-GLENN MP 56	DESCRIPTION:	TP01-6

INITIAL WEIGHTS:

WET WEIGHT & TARE	69783.0	21676.4
DRY WEIGHT & TARE	68706	-0.1%
TARE WEIGHT	7932.5	
M.C. %	1.8	
EVE DRY SAMPLE WEIGHT	60773.5	
G.S. SPLIT		
SPLIT SIEVE #	#4	714.3
MASS BEFORE		714.1
MASS AFTER	735.1	0.0%

THIS SECTION FOR HYDROMETER:

HYDROMETER SAMPLE WEIGHT=	0.00
HYGROSCOPIC MOISTURE :	
WET & TARE	
DRY & TARE	
TARE	% MOISTURE= 0.0
CORRECTED SAMPLE WEIGHT=	0.00

SIEVE ANALYSIS TEST

SIEVE #	DIAMETER (mm)	MASS RETAINED	MASS PASSING	TOTAL % PASSING	
6"	152.4	0	60773.5	100	%
4"	100	5290.6	55482.9	91	%
3"	76.2	7778.9	52994.6	87	%
2"	50.8	12696.4	48077.1	79	%
1"	25.4	21145.1	39628.4	65	%
3/4"	19	25083.9	35689.6	59	%
1/2"	12.7	29897.8	30875.7	51	%
3/8"	9.5	32752.5	28021.0	46	%
#4	4.75	39049.1	21724.4	36	%
#10	2	191.2	543.9	26	%
#20	0.85	391.3	343.8	17	%
#40	0.425	607.4	127.7	6	%
#60	0.25	681.9	53.2	3	%
#100	0.15	700.2	34.9	2	%
#200	0.075	712.1	23.0	1	%
Pan					%
Cu=	35.03	HYDROMETER TEST?			
Cc=	0.79	HYDRO SAMPLE WT.:			
D60=	20.2585	% 0.02 mm =			
D30=	3.0503	% 0.002 mm =			
D10=	0.5783	% 0.001 mm =			
% GRAVEL:	64.253				
% SAND:	34.628				
% FINES:	1.118				

HYDROMETER TEST

TIME (h,mn)	ELAPSED TIME	READING	TEMP (C)	DIAM. (mm)	TOTAL % PASS
	0				
	0.5				
	1				
	2				
	5				
	8				
	15				
	30				
	60				
	250				
	1440				
DISPERSANT TYPE:					
SODIUM HEXAMETAPHOSPHATE					
SPEC. GRAVITY : 2.65 (ASSUMED)					
CYLINDER NO.:					
HYDROMETER #: 151 H					
COMP CORRECTION: 0.005					

CLASSIFICATION: Poorly Graded Gravel w/Sand

USC: GP

FC:

Comments:

PROJECT: TESTING SVCS
 PROJECT NO.: 21-400-4
 CLIENT: RECON
 SAMPLE NO.: 21P153
 LOCATION: UKN

DATE TAKEN: 5/12/2021
 DATE TESTED: 5/24/2021
 TESTED BY: NP
 REVIEWED BY: JAB
 DESCRIPTION: GREY ROCK

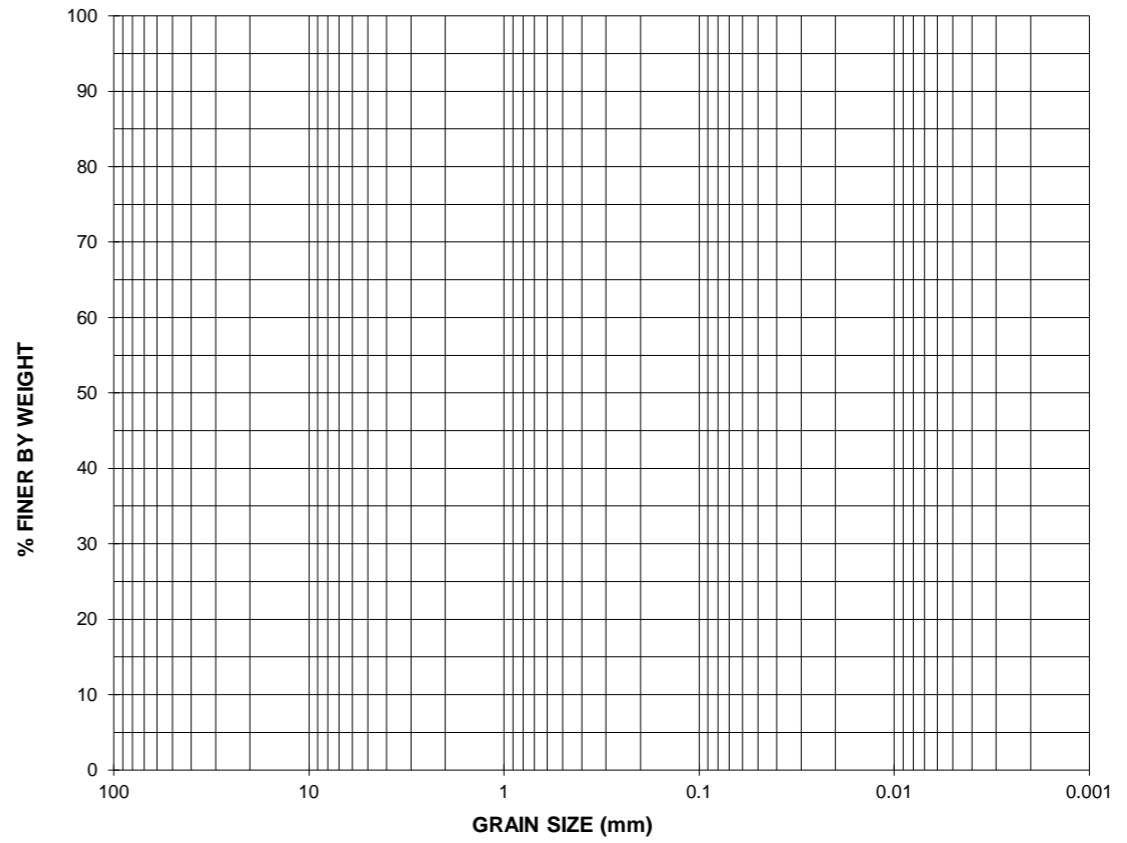
SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	
4"	100.0	
3"	76.2	
2"	50.8	
1"	25.4	
3/4"	19.0	
1/2"	12.7	
3/8"	9.5	
#4	4.75	
#8	2.36	
#16	1.18	
#30	0.6	
#50	0.3	
#100	0.15	
#200	0.075	

% Gravel:
 % Sand:
 % Fines:
 D60:
 D30:
 D10:
 Cu:
 Cc:
 % .02 mm:
 % Moisture:
 Fine Modulus:
 (ASTM D4318)
 Liquid Limit:
 Plastic Limit:
 Plastic Index:

GRAIN SIZE DISTRIBUTION



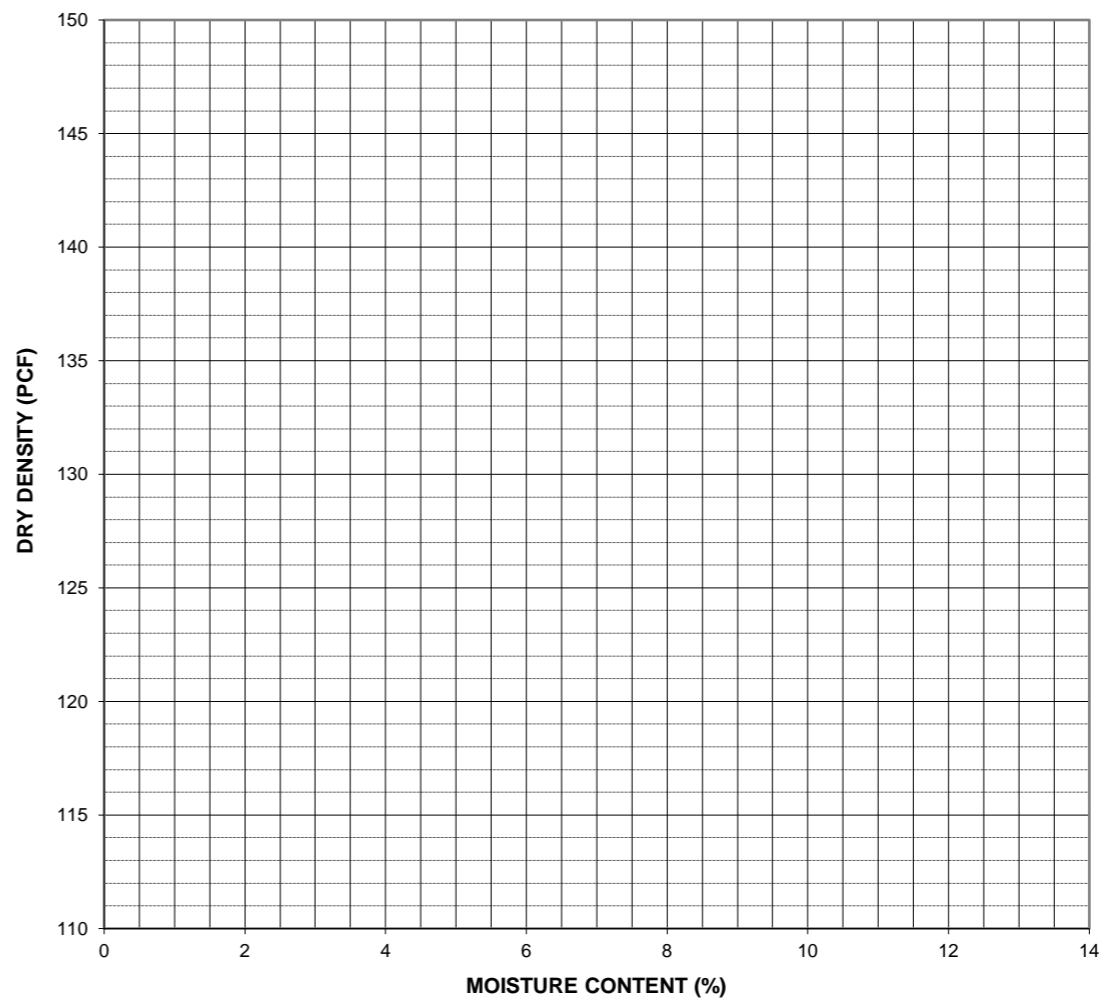
HYDROMETER TEST

(ASTM D422)

Elapsed Time (min)	Diameter (mm)	Total % Passing
0		
0.5		
1		
2		
5		
8		
15		
30		
60		
250		
1459		
2750		

(ASTM C127)
 Bulk SpG: 2.636
 SSD SpG: 2.650
 Apparent SpG: 2.675
 % Absorption: 0.55
 (ASTM C128)
 Bulk SpG:
 SSD SpG:
 Apparent SpG:
 % Absorption:
 (ASTM D1557)
 Dry Den (U):
 Dry Den (C):
 M% (U):
 M% (C):
 SpG (assumed):
 M-D Test Method:

MOISTURE-DENSITY RELATIONSHIP



CLASSIFICATION:

USC:

FROST CLASS:

Remarks: **NORDIC = 10.4%**

JOHN A. BUZDOR, P.E. 6/2/2021

PROJECT: TESTING SVCS
 PROJECT NO.: 21-400-4
 CLIENT: RECON
 SAMPLE NO.: 21P154
 LOCATION: UKN

DATE TAKEN: 5/12/2021
 DATE TESTED: 5/24/2021
 TESTED BY: NP
 REVIEWED BY: JAB
 DESCRIPTION: BROWN ROCK

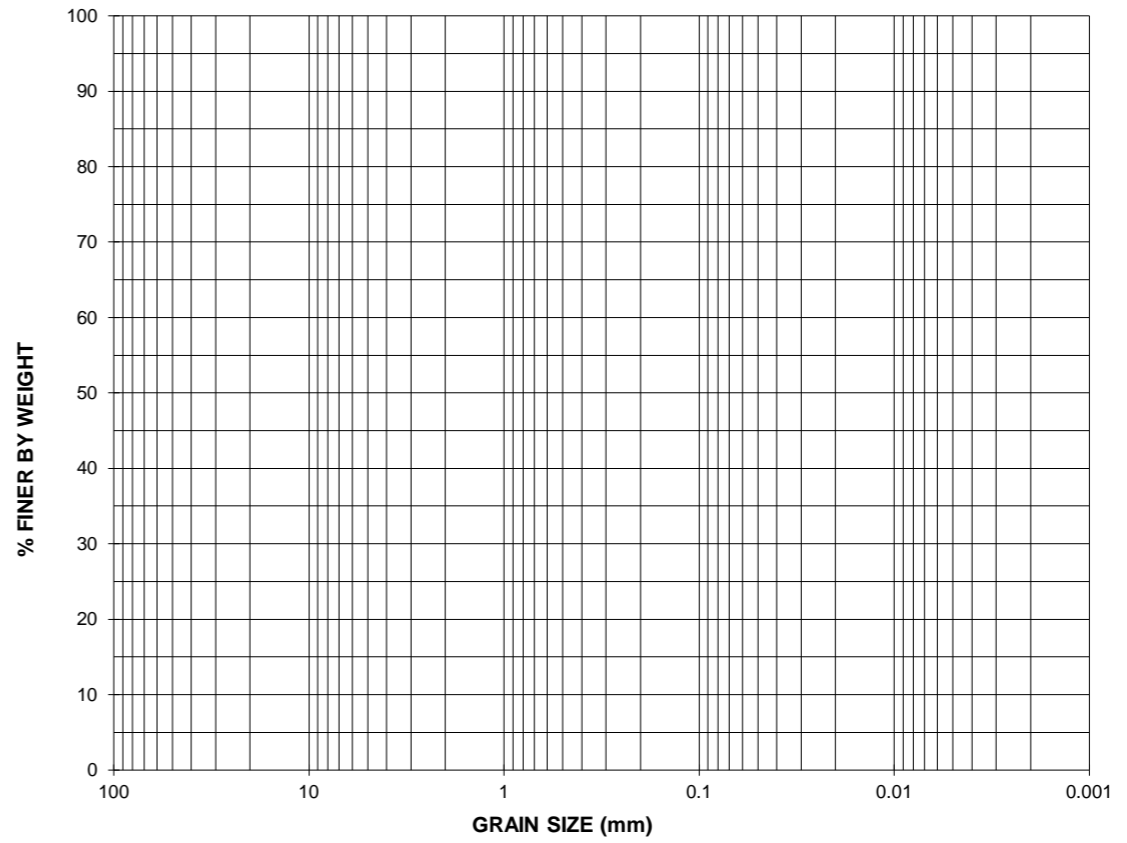
SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	
4"	100.0	
3"	76.2	
2"	50.8	
1"	25.4	
3/4"	19.0	
1/2"	12.7	
3/8"	9.5	
#4	4.75	
#8	2.36	
#16	1.18	
#30	0.6	
#50	0.3	
#100	0.15	
#200	0.075	

% Gravel:
 % Sand:
 % Fines:
 D60:
 D30:
 D10:
 Cu:
 Cc:
 % .02 mm:
 % Moisture:
 Fine Modulus:
 (ASTM D4318)
 Liquid Limit:
 Plastic Limit:
 Plastic Index:

GRAIN SIZE DISTRIBUTION



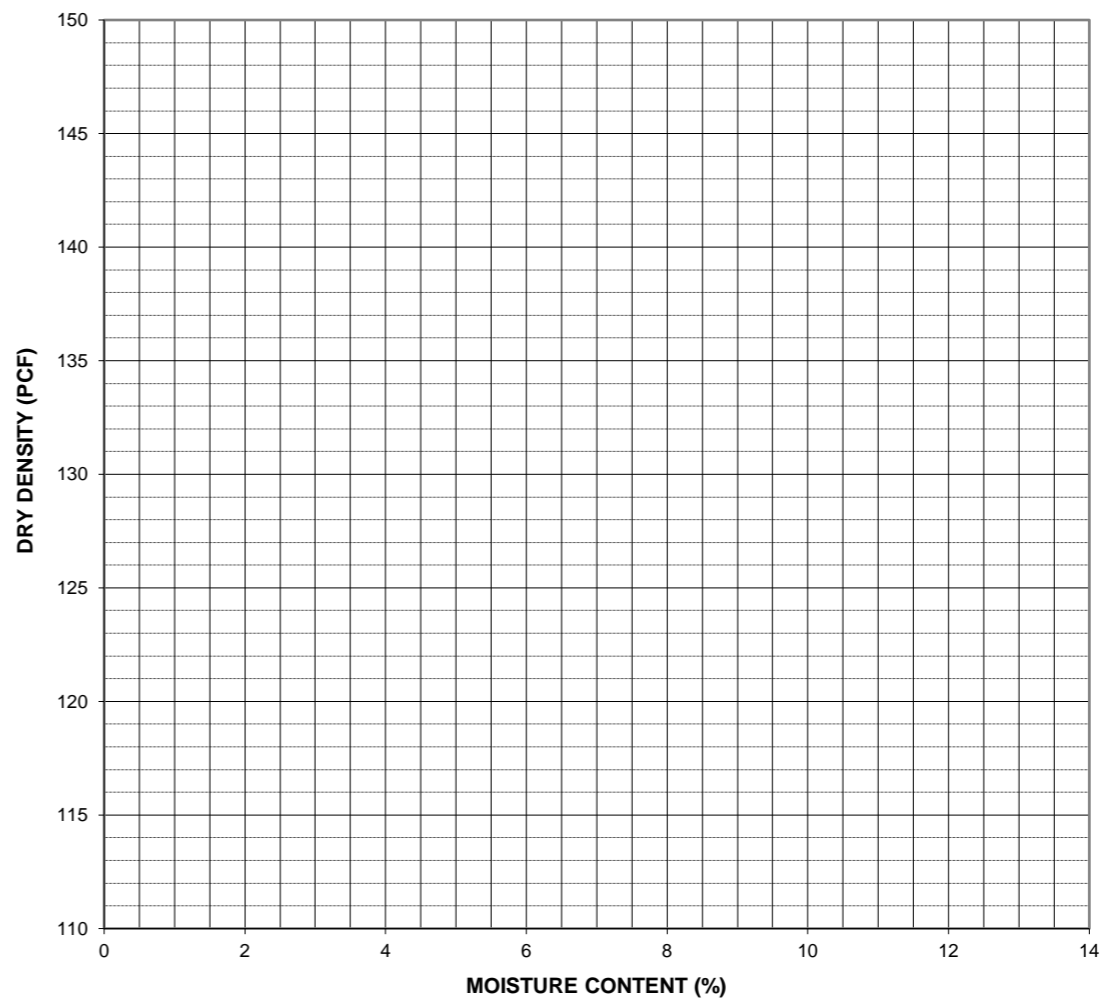
HYDROMETER TEST

(ASTM D422)

Elapsed Time (min)	Diameter (mm)	Total % Passing
0		
0.5		
1		
2		
5		
8		
15		
30		
60		
250		
1459		
2750		

(ASTM C127)
 Bulk SpG: 2.636
 SSD SpG: 2.650
 Apparent SpG: 2.675
 % Absorption: 0.55
 (ASTM C128)
 Bulk SpG:
 SSD SpG:
 Apparent SpG:
 % Absorption:
 (ASTM D1557)
 Dry Den (U):
 Dry Den (C):
 M% (U):
 M% (C):
 SpG (assumed):
 M-D Test Method:

MOISTURE-DENSITY RELATIONSHIP



CLASSIFICATION:

USC:

FROST CLASS:

Remarks: LA = 19%
 DEGRADATION = 37

JOHN A. BUZDOR, P.E. 6/2/2021

PROJECT: 2021 TEST SVCS
PROJECT NO.: 21-400-4
CLIENT: RECON
SAMPLE NO.: 21P294
LOCATION: MS06-PARKS MP 77

DATE TAKEN: 6/2/2021
DATE TESTED: 6/5/2021
TESTED BY: NP
REVIEWED BY: JAB
DESCRIPTION: TP06-1, 2 & 3 COMBINED

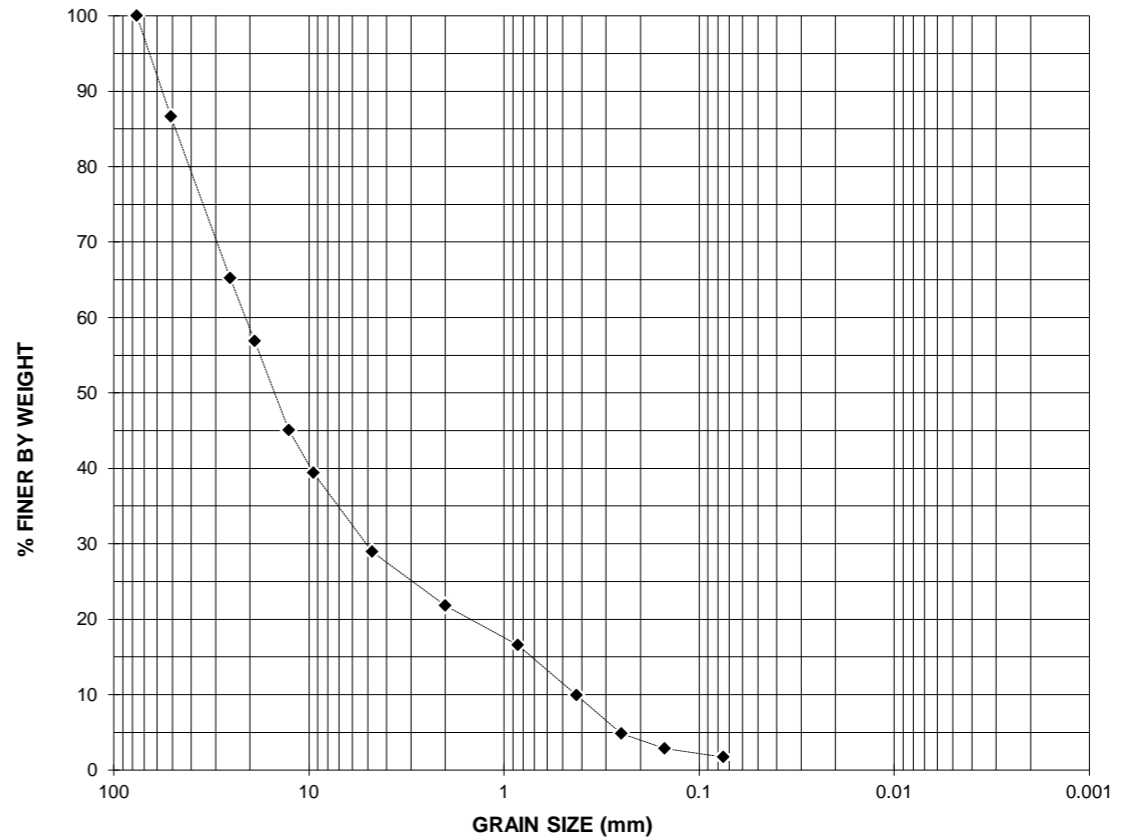
SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	
4"	100.0	
3"	76.2	100
2"	50.8	87
1"	25.4	65
3/4"	19.0	57
1/2"	12.7	45
3/8"	9.5	39
#4	4.75	29
#10	2.00	22
#20	0.85	17
#40	0.425	10
#60	0.25	5
#100	0.15	3
#200	0.075	1.7

% Gravel: 71.1
% Sand: 27.2
% Fines: 1.7
D60: 21.38
D30: 5.23
D10: 0.43
Cu: 49.6
Cc: 3.0
%.02 mm:
% Moisture: 2.9
Fine Modulus:
(ASTM D4318)
Liquid Limit:
Plastic Limit:
Plastic Index:

GRAIN SIZE DISTRIBUTION



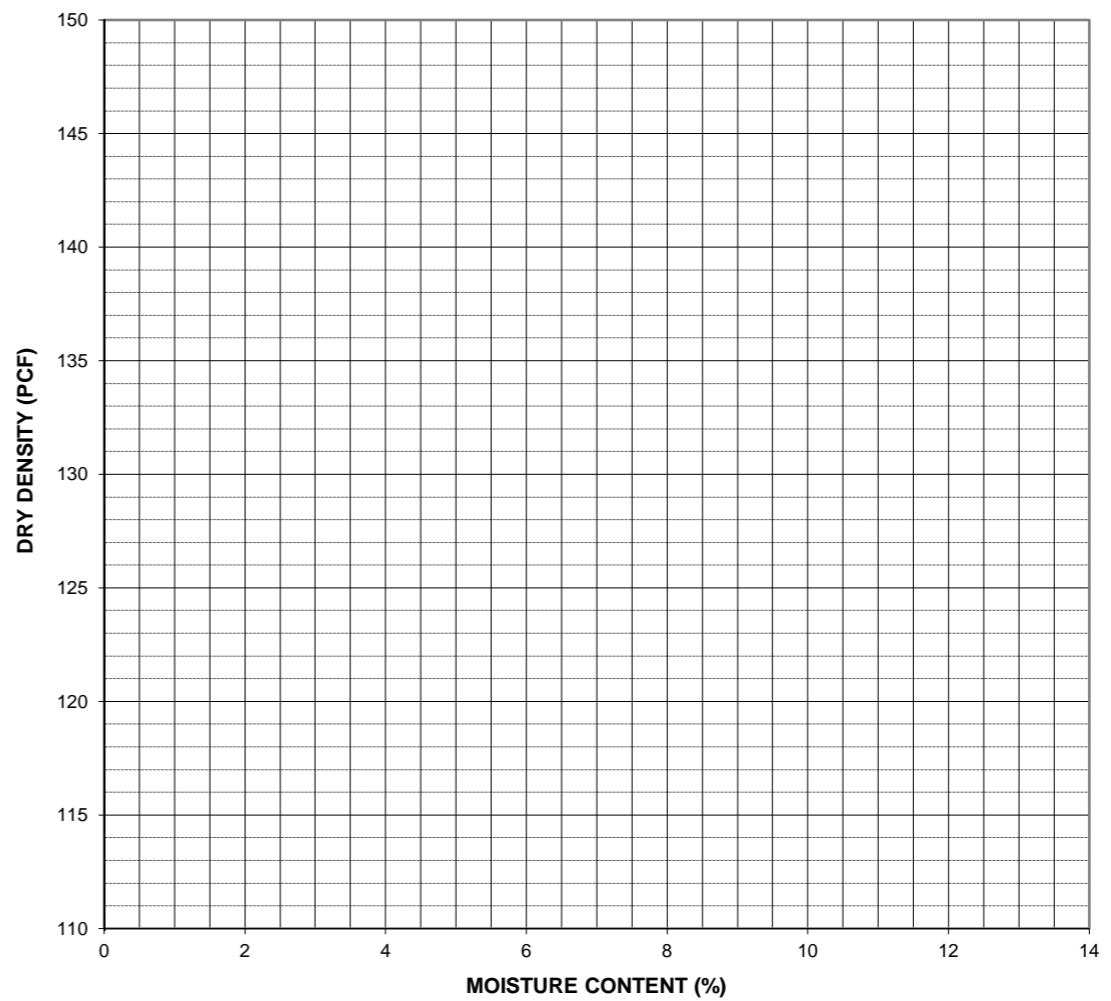
HYDROMETER TEST

(ASTM D422)

Elapsed Time (min)	Diameter (mm)	Total % Passing
0		
0.5		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

(ASTM C127)
Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:
(ASTM C128)
Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:
(ASTM D1557)
Dry Den (U):
Dry Den (C):
M% (U):
M% (C):
SpG (assumed):
M-D Test Method:

MOISTURE-DENSITY RELATIONSHIP



CLASSIFICATION: Well Graded Gravel w/Sand
USC: GW
FROST CLASS:

Remarks: //LL,L;/;L N6 //L,M,../

JOHN A. BUZDOR, P.E. 6/14/2021

PROJECT: 2021 TEST SVCS
PROJECT NO.: 21-400-4
CLIENT: RECON
SAMPLE NO.: 21P293
LOCATION: MS06-PARKS MP 77

DATE TAKEN: 6/2/2021
DATE TESTED: 6/5/2021
TESTED BY: NP
REVIEWED BY: JAB
DESCRIPTION: TP06-4

SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	
4"	100.0	100
3"	76.2	97
2"	50.8	86
1"	25.4	77
3/4"	19.0	74
1/2"	12.7	69
3/8"	9.5	67
#4	4.75	62
#10	2.00	58
#20	0.85	53
#40	0.425	36
#60	0.25	19
#100	0.15	8
#200	0.075	5.3

% Gravel: 38.2
% Sand: 56.5
% Fines: 5.3
D60: 3.38
D30: 0.37
D10: 0.17
Cu: 20.4
Cc: 0.2
% .02 mm:
% Moisture: 3.8
Fine Modulus:

(ASTM D4318)

Liquid Limit:
Plastic Limit:
Plastic Index:

(ASTM C127)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM C128)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM D1557)

Dry Den (U):
Dry Den (C):
M% (U):
M% (C):

SpG (assumed):
M-D Test Method:

HYDROMETER TEST

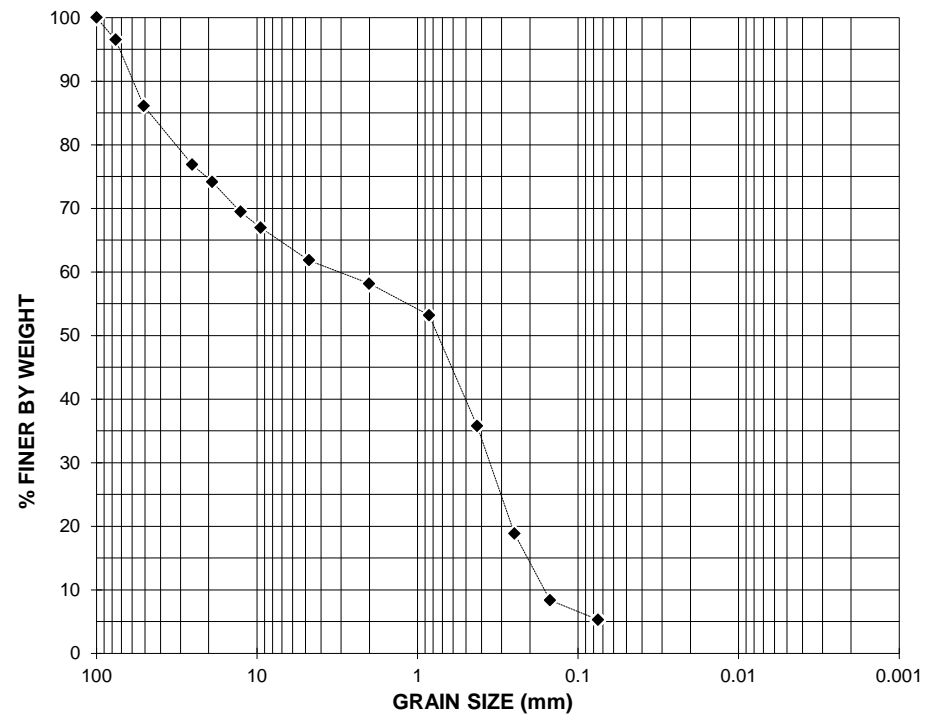
(ASTM D422)

Elapsed Time (min)	Diameter (mm)	Total % Passing
0		
0.5		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

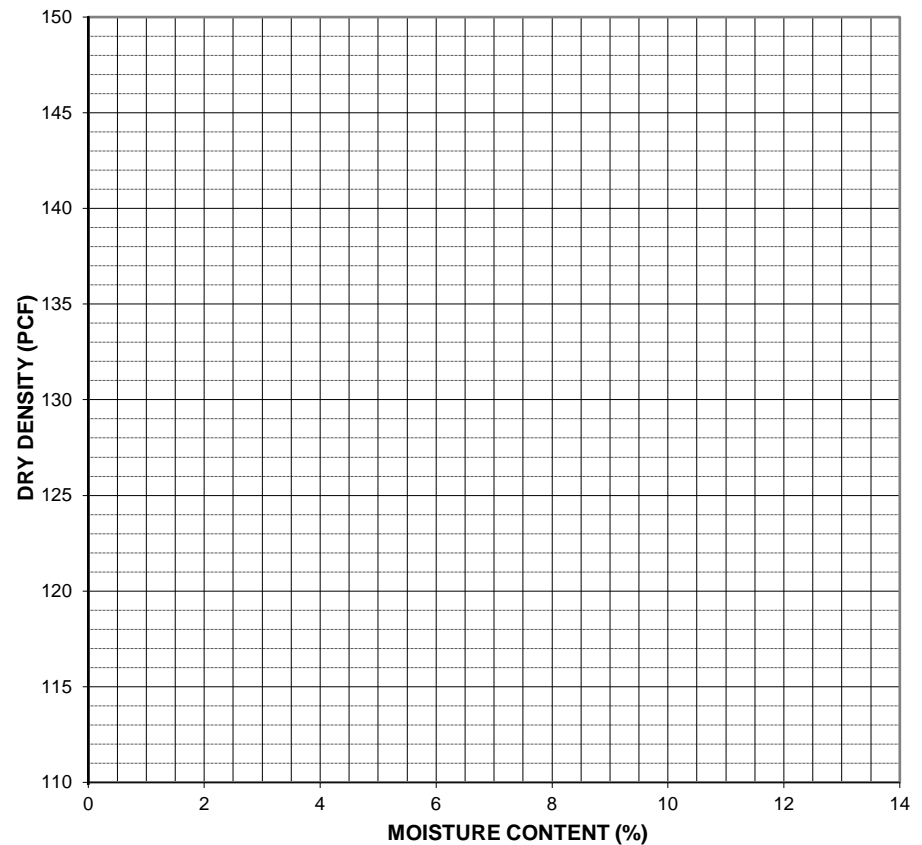
CLASSIFICATION: Poorly Graded Sand w/Silt & Gravel
USC: SP-SM
FROST CLASS:

Remarks:

GRAIN SIZE DISTRIBUTION



MOISTURE-DENSITY RELATIONSHIP



JOHN A. BUZDOR, P.E. 6/7/2021

PROJECT: 2021 TEST SVCS
PROJECT NO.: 21-400-4
CLIENT: RECON
SAMPLE NO.: 21P296
LOCATION: MS06-PARKS MP 77

DATE TAKEN: 6/2/2021
DATE TESTED: 6/8/2021
TESTED BY: NP
REVIEWED BY: JAB
DESCRIPTION: TP06-5

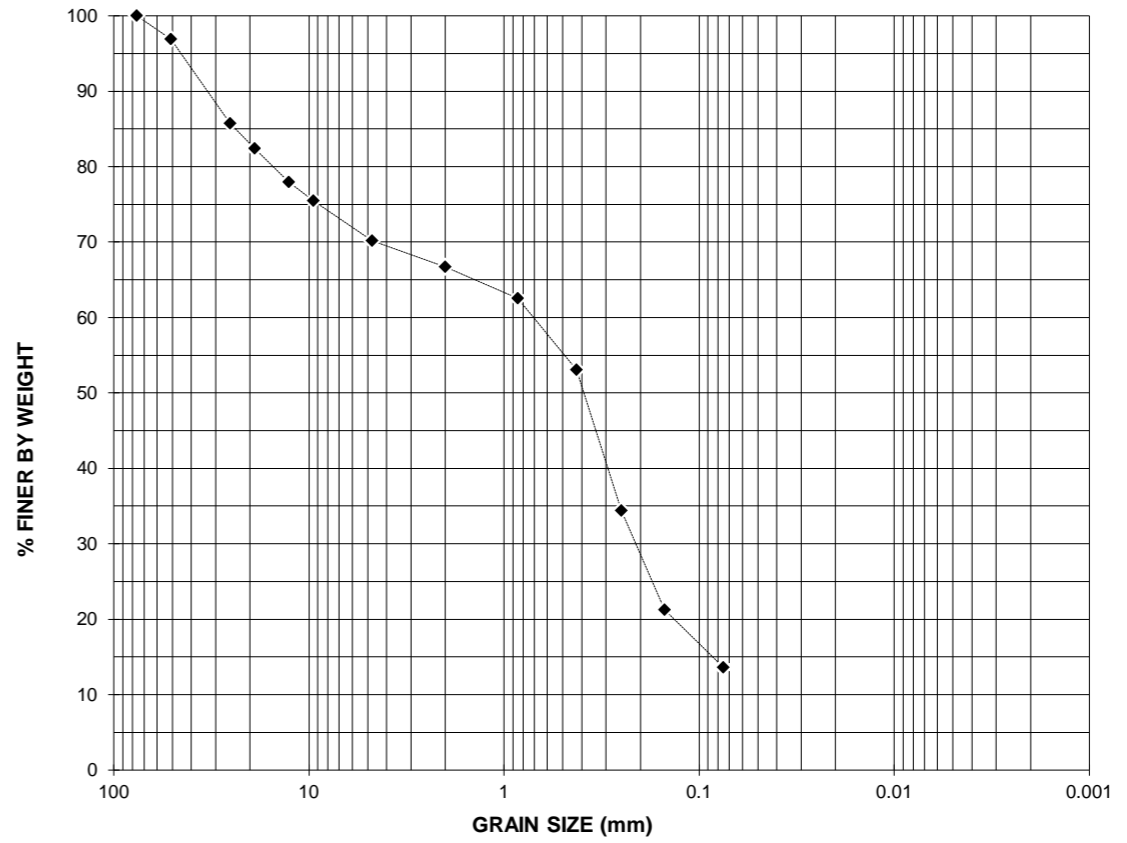
SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	
4"	100.0	
3"	76.2	100
2"	50.8	97
1"	25.4	86
3/4"	19.0	82
1/2"	12.7	78
3/8"	9.5	75
#4	4.75	70
#10	2.00	67
#20	0.85	63
#40	0.425	53
#60	0.25	34
#100	0.15	21
#200	0.075	13.6

% Gravel: 29.8
% Sand: 56.6
% Fines: 13.6
D60: 0.74
D30: 0.22
D10:
Cu:
Cc:
%.02 mm:
% Moisture: 5.9
Fine Modulus:
(ASTM D4318)
Liquid Limit:
Plastic Limit:
Plastic Index:

GRAIN SIZE DISTRIBUTION



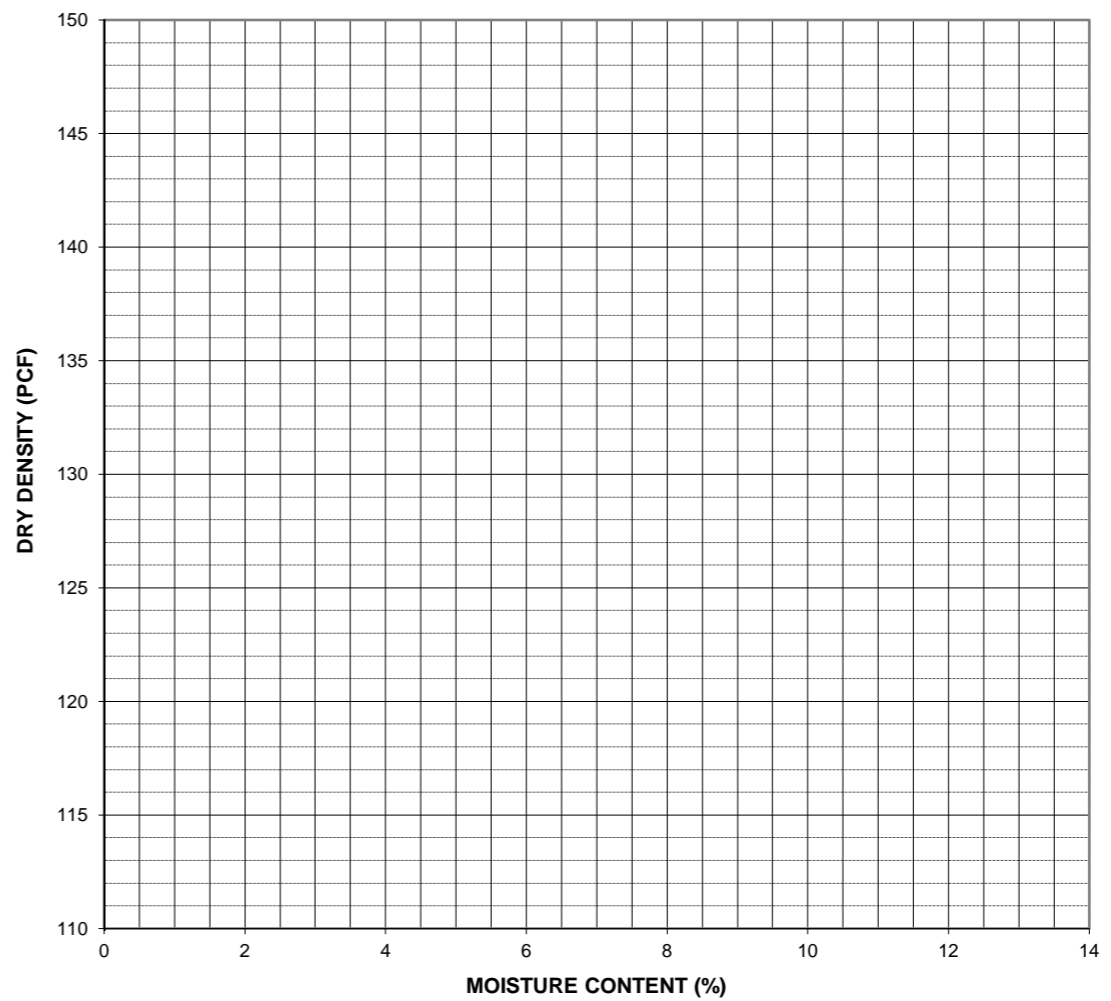
HYDROMETER TEST

(ASTM D422)

Elapsed Time (min)	Diameter (mm)	Total % Passing
0		
0.5		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

(ASTM C127)
Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:
(ASTM C128)
Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:
(ASTM D1557)
Dry Den (U):
Dry Den (C):
M% (U):
M% (C):
SpG (assumed):
M-D Test Method:

MOISTURE-DENSITY RELATIONSHIP



CLASSIFICATION: Silty Sand w/Gravel
USC: SM
FROST CLASS:

Remarks:

JOHN A. BUZDOR, P.E. 6/14/2021

AGGREGATE/SOILS TEST REPORT

PROJECT: 2021 TEST SVCS
PROJECT NO.: 21-400-4
CLIENT: RECON
SAMPLE NO.: 21P297
LOCATION: MS06-PARKS MP 77

DATE TAKEN: 6/2/2021
DATE TESTED: 6/8/2021
TESTED BY: NP
REVIEWED BY: JAB
DESCRIPTION: TP06-6

SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	
4"	100.0	100
3"	76.2	92
2"	50.8	86
1"	25.4	74
3/4"	19.0	69
1/2"	12.7	61
3/8"	9.5	60
#4	4.75	49
#10	2.00	44
#20	0.85	36
#40	0.425	28
#60	0.25	21
#100	0.15	15
#200	0.075	10.6

% Gravel: 50.6
% Sand: 38.7
% Fines: 10.6
D60: 10.18
D30: 0.54
D10:
Cu:
Cc:
% .02 mm:
% Moisture: 3.1
Fine Modulus:

(ASTM D4318)

Liquid Limit:
Plastic Limit:
Plastic Index:

(ASTM C127)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM C128)

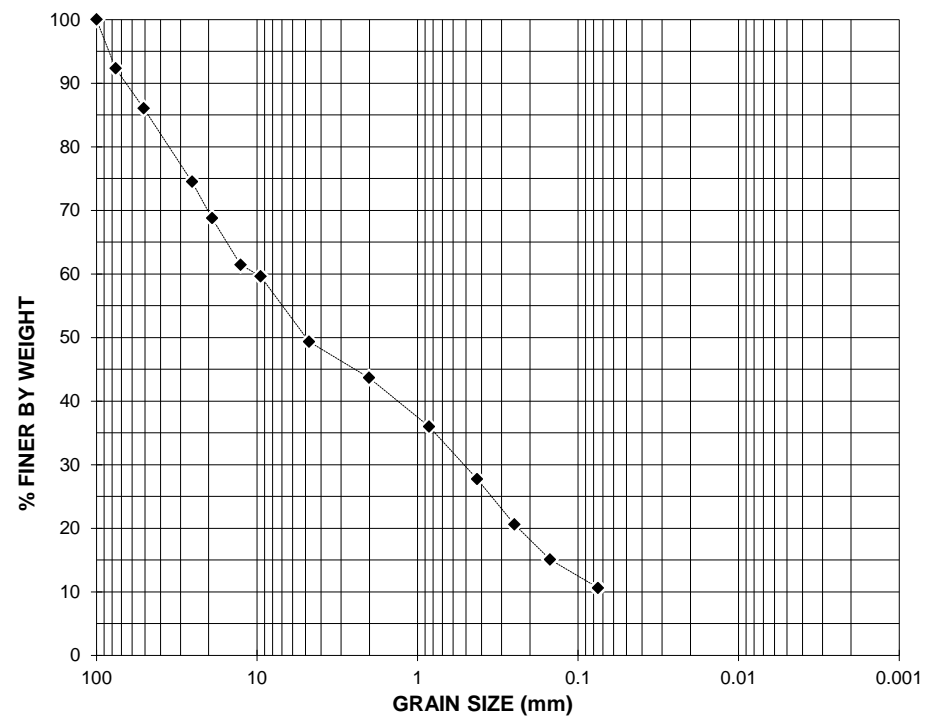
Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM D1557)

Dry Den (U):
Dry Den (C):
M% (U):
M% (C):

SpG (assumed):
M-D Test Method:

GRAIN SIZE DISTRIBUTION

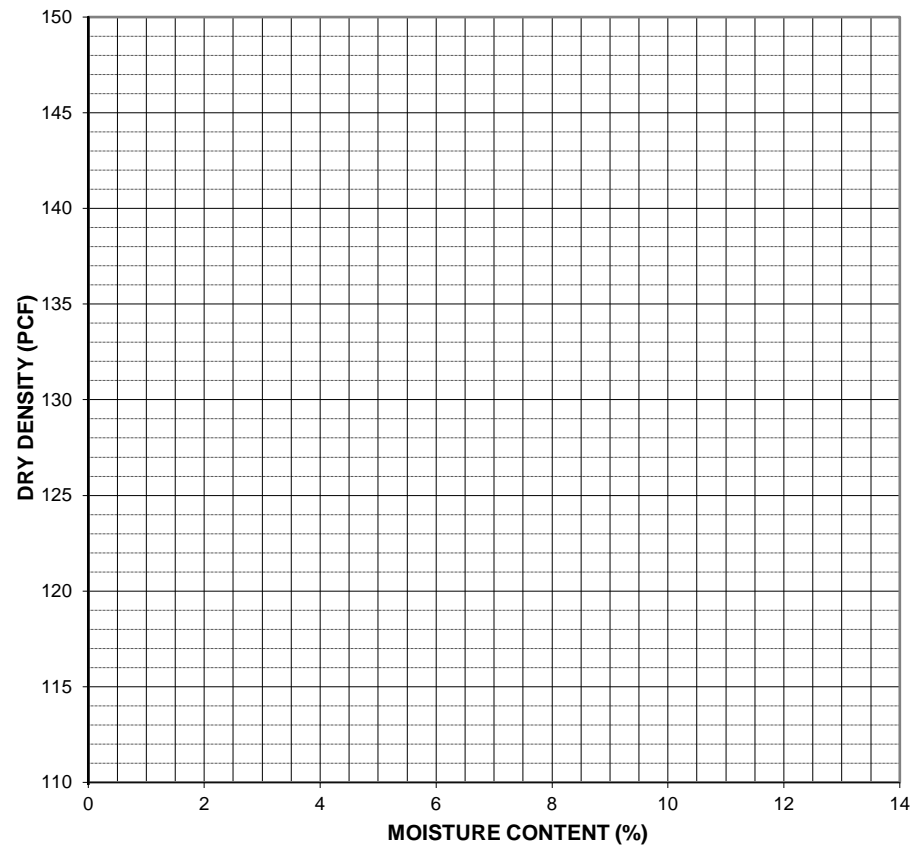


HYDROMETER TEST

(ASTM D422)

Elapsed Time (min)	Diameter (mm)	Total % Passing
0		
0.5		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

MOISTURE-DENSITY RELATIONSHIP



CLASSIFICATION: Poorly Graded Gravel w/Silt & Sand
USC: GP-GM
FROST CLASS:

Remarks:

JOHN A. BUZDOR, P.E. 6/14/2021

AGGREGATE/SOILS TEST REPORT

PROJECT: 2021 TEST SVCS
PROJECT NO.: 21-400-4
CLIENT: RECON
SAMPLE NO.: 21P298
LOCATION: MS07-PARKS MP 119

DATE TAKEN: 6/2/2021
DATE TESTED: 6/8/2021
TESTED BY: NP
REVIEWED BY: JAB
DESCRIPTION: TP07-1

SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	
4"	100.0	100
3"	76.2	96
2"	50.8	92
1"	25.4	79
3/4"	19.0	74
1/2"	12.7	66
3/8"	9.5	61
#4	4.75	51
#10	2.00	43
#20	0.85	34
#40	0.425	20
#60	0.25	10
#100	0.15	5
#200	0.075	2.8

% Gravel: 48.9
% Sand: 48.3
% Fines: 2.8
D60: 8.88
D30: 0.74
D10: 0.24
Cu: 36.8
Cc: 0.3
% .02 mm:
% Moisture: 1.6
Fine Modulus:

(ASTM D4318)

Liquid Limit:
Plastic Limit:
Plastic Index:

(ASTM C127)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM C128)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM D1557)

Dry Den (U):
Dry Den (C):
M% (U):
M% (C):

SpG (assumed):
M-D Test Method:

HYDROMETER TEST

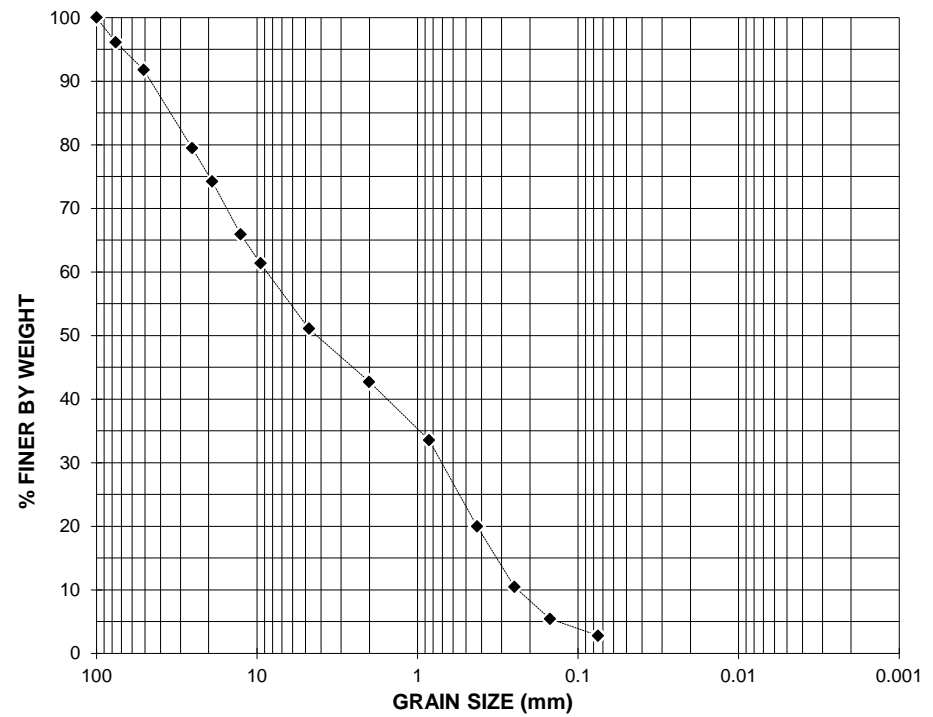
(ASTM D422)

Elapsed Time (min)	Diameter (mm)	Total % Passing
0		
0.5		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

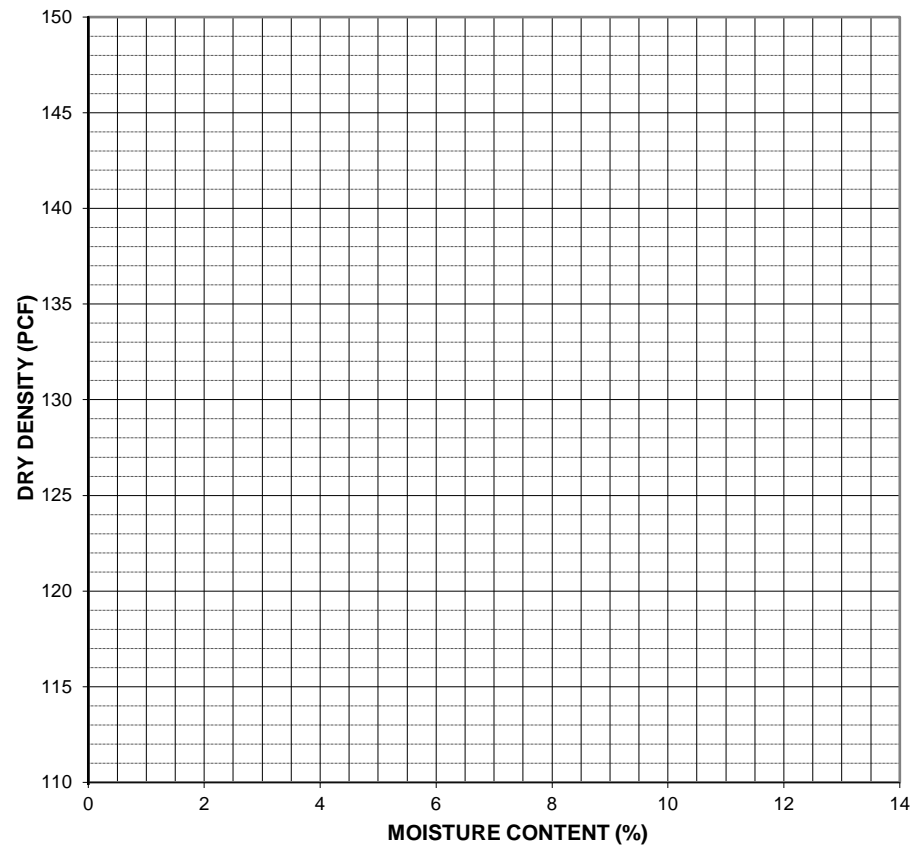
CLASSIFICATION: Poorly Graded Gravel w/Sand
USC: GP
FROST CLASS:

Remarks:

GRAIN SIZE DISTRIBUTION



MOISTURE-DENSITY RELATIONSHIP



JOHN A. BUZDOR, P.E. 6/14/2021

AGGREGATE/SOILS TEST REPORT

PROJECT: 2021 TEST SVCS
PROJECT NO.: 21-400-4
CLIENT: RECON
SAMPLE NO.: 21P299
LOCATION: MS07-PARKS MP 119

DATE TAKEN: 6/2/2021
DATE TESTED: 6/8/2021
TESTED BY: NP
REVIEWED BY: JAB
DESCRIPTION: TP07-2

SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	
4"	100.0	100
3"	76.2	93
2"	50.8	81
1"	25.4	67
3/4"	19.0	59
1/2"	12.7	48
3/8"	9.5	42
#4	4.75	29
#10	2.00	20
#20	0.85	13
#40	0.425	7
#60	0.25	4
#100	0.15	3
#200	0.075	2.5

% Gravel: 70.9
% Sand: 26.5
% Fines: 2.5
D60: 19.54
D30: 5.10
D10: 0.65
Cu: 30.2
Cc: 2.1
% .02 mm:
% Moisture: 1.3
Fine Modulus:

(ASTM D4318)

Liquid Limit:
Plastic Limit:
Plastic Index:

(ASTM C127)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM C128)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM D1557)

Dry Den (U):
Dry Den (C):
M% (U):
M% (C):

SpG (assumed):
M-D Test Method:

HYDROMETER TEST

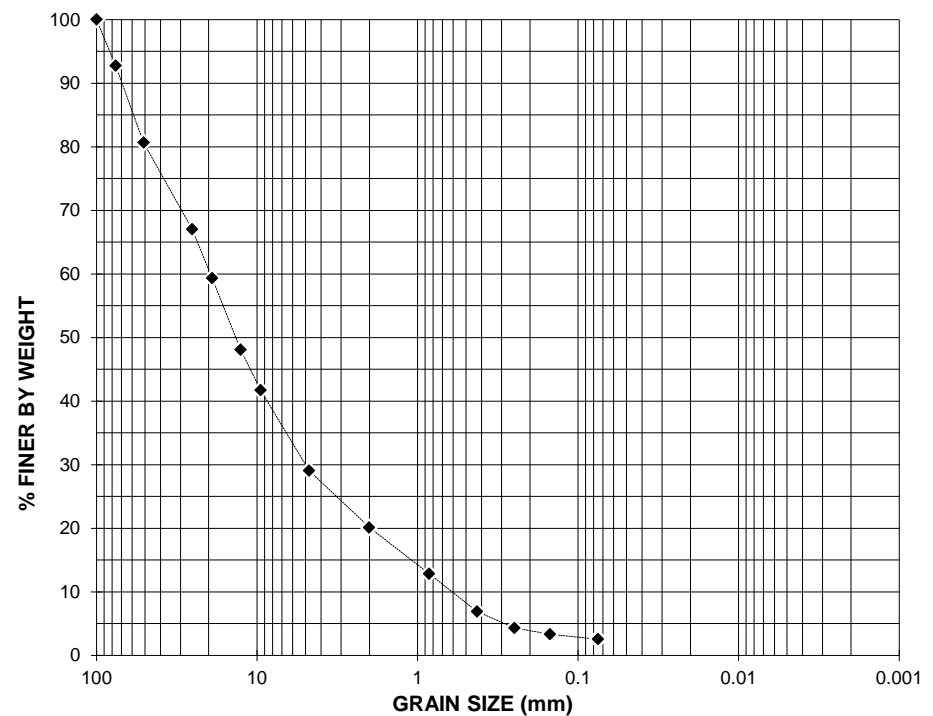
(ASTM D422)

Elapsed Time (min)	Diameter (mm)	Total % Passing
0		
0.5		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

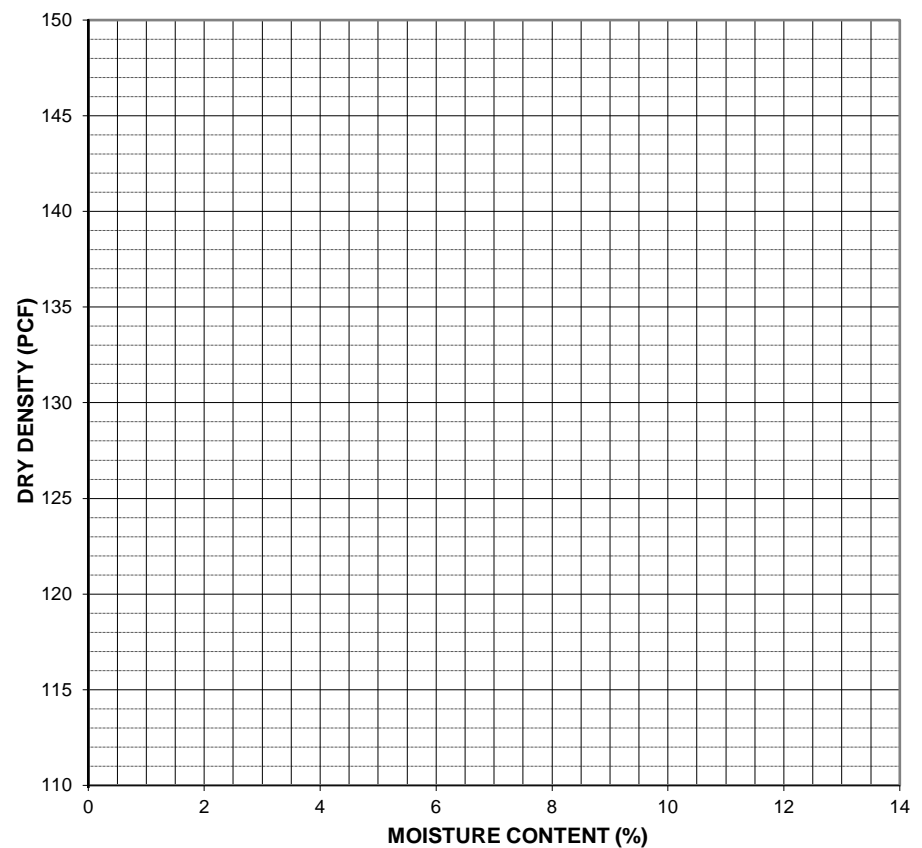
CLASSIFICATION: Well Graded Gravel w/Sand
USC: GP
FROST CLASS:

Remarks:

GRAIN SIZE DISTRIBUTION



MOISTURE-DENSITY RELATIONSHIP



JOHN A. BUZDOR, P.E. 6/14/2021

PROJECT: 2021 TEST SVCS
PROJECT NO.: 21-400-4
CLIENT: RECON
SAMPLE NO.: 21P300
LOCATION: MS07-PARKS MP 119

DATE TAKEN: 6/2/2021
DATE TESTED: 6/8/2021
TESTED BY: NP
REVIEWED BY: JAB
DESCRIPTION: TP07-4

SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	
4"	100.0	100
3"	76.2	92
2"	50.8	79
1"	25.4	63
3/4"	19.0	57
1/2"	12.7	50
3/8"	9.5	46
#4	4.75	37
#10	2.00	28
#20	0.85	20
#40	0.425	13
#60	0.25	9
#100	0.15	7
#200	0.075	5.4

% Gravel: 63.4
% Sand: 31.2
% Fines: 5.4
D60: 22.17
D30: 2.57
D10: 0.29
Cu: 76.7
Cc: 1.0
% .02 mm:
% Moisture: 1.8
Fine Modulus:

(ASTM D4318)

Liquid Limit:
Plastic Limit:
Plastic Index:

(ASTM C127)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM C128)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM D1557)

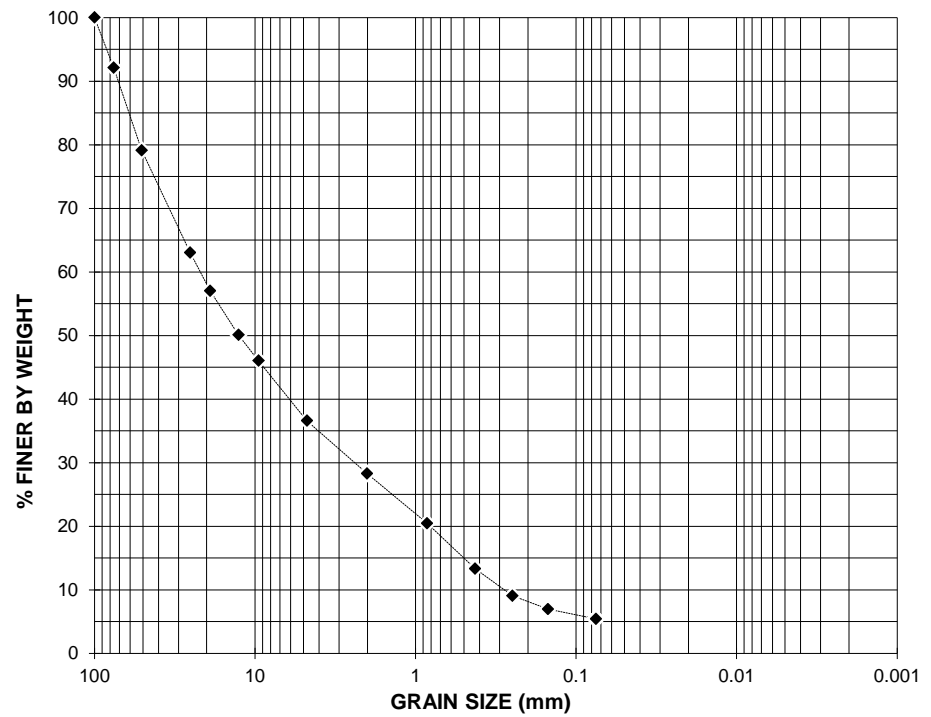
Dry Den (U):
Dry Den (C):
M% (U):
M% (C):

SpG (assumed):
M-D Test Method:

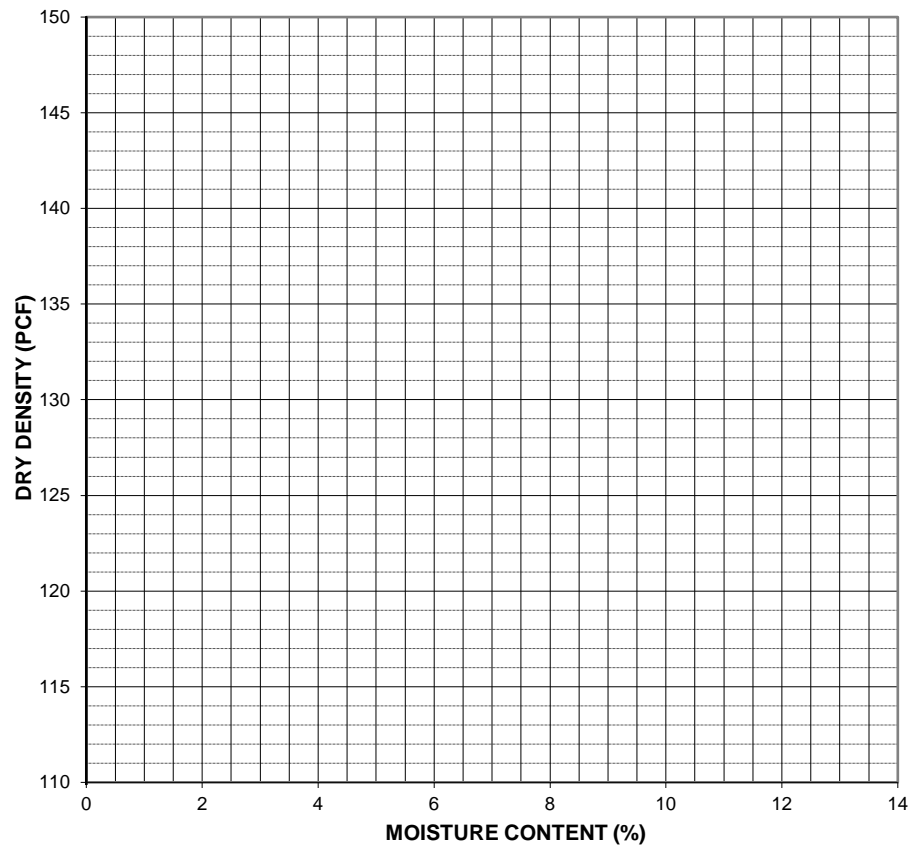
CLASSIFICATION: Well Graded Gravel w/Silt & Sand
USC: GW-GM
FROST CLASS:

Remarks:

GRAIN SIZE DISTRIBUTION



MOISTURE-DENSITY RELATIONSHIP



JOHN A. BUZDOR, P.E. 6/14/2021

AGGREGATE/SOILS TEST REPORT

PROJECT: 2021 TEST SVCS
PROJECT NO.: 21-400-4
CLIENT: RECON
SAMPLE NO.: 21P301
LOCATION: MS08-PARKS MP 126

DATE TAKEN: 6/2/2021
DATE TESTED: 6/8/2021
TESTED BY: NP
REVIEWED BY: JAB
DESCRIPTION: TP08-1, 3 & 5 COMBINED

SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	93
4"	100.0	93
3"	76.2	93
2"	50.8	87
1"	25.4	74
3/4"	19.0	68
1/2"	12.7	61
3/8"	9.5	56
#4	4.75	47
#10	2.00	36
#20	0.85	24
#40	0.425	11
#60	0.25	5
#100	0.15	3
#200	0.075	2.2

% Gravel: 53.2
% Sand: 44.5
% Fines: 2.2
D60: 12.26
D30: 1.42
D10: 0.38
Cu: 31.9
Cc: 0.4
% .02 mm:
% Moisture: 2.5
Fine Modulus:

(ASTM D4318)

Liquid Limit:
Plastic Limit:
Plastic Index:

(ASTM C127)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM C128)

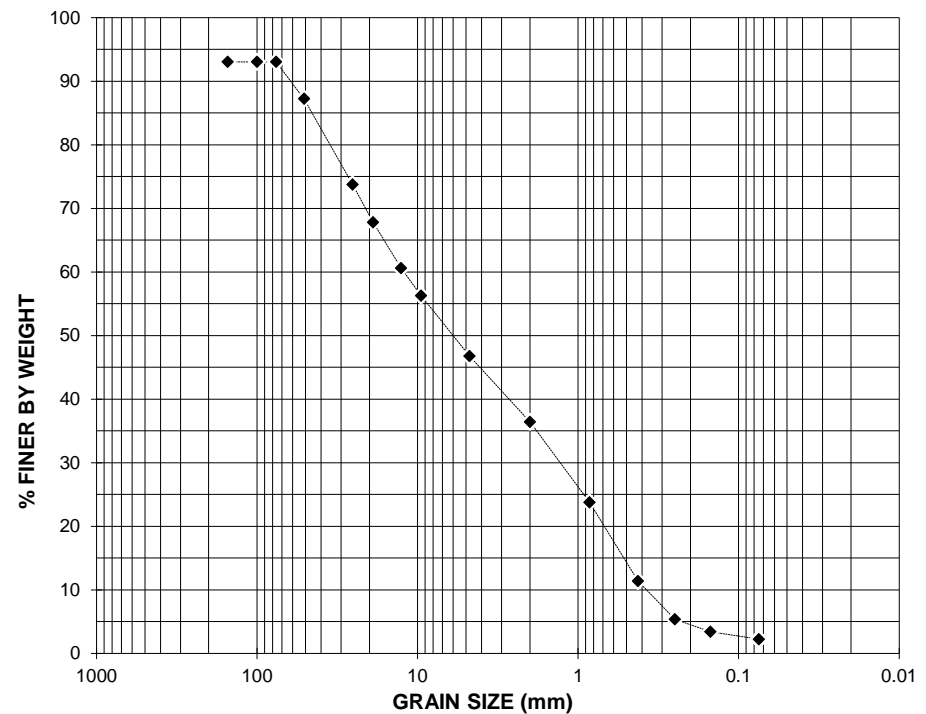
Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM D1557)

Dry Den (U):
Dry Den (C):
M% (U):
M% (C):

SpG (assumed):
M-D Test Method:

GRAIN SIZE DISTRIBUTION

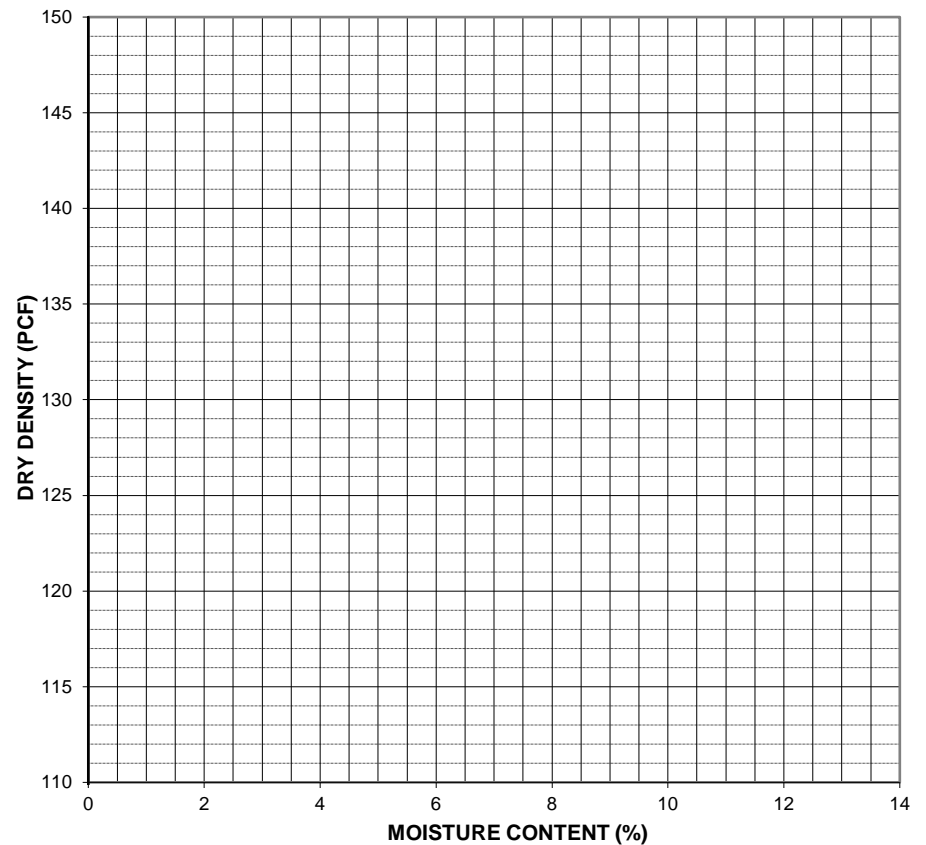


HYDROMETER TEST

(ASTM D422)

Elapsed Time (min)	Diameter (mm)	Total % Passing
0		
0.5		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

MOISTURE-DENSITY RELATIONSHIP



CLASSIFICATION: Poorly Graded Gravel w/Sand
USC: GP
FROST CLASS:

Remarks:

JOHN A. BUZDOR, P.E. 6/14/2021

PROJECT: 2021 TEST SVCS
PROJECT NO.: 21-400-4
CLIENT: RECON
SAMPLE NO.: 21P302
LOCATION: MS08-PARKS MP 126

DATE TAKEN: 6/2/2021
DATE TESTED: 6/8/2021
TESTED BY: NP
REVIEWED BY: JAB
DESCRIPTION: TP08-2

SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	
4"	100.0	
3"	76.2	100
2"	50.8	91
1"	25.4	83
3/4"	19.0	79
1/2"	12.7	73
3/8"	9.5	70
#4	4.75	61
#10	2.00	52
#20	0.85	43
#40	0.425	35
#60	0.25	30
#100	0.15	26
#200	0.075	20.0

% Gravel: 38.9
% Sand: 41.1
% Fines: 20.0
D60: 4.41
D30: 0.25
D10:
Cu:
Cc:
% .02 mm:
% Moisture: 6.8
Fine Modulus:

(ASTM D4318)

Liquid Limit:
Plastic Limit:
Plastic Index:

(ASTM C127)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM C128)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM D1557)

Dry Den (U):
Dry Den (C):
M% (U):
M% (C):

SpG (assumed):
M-D Test Method:

HYDROMETER TEST

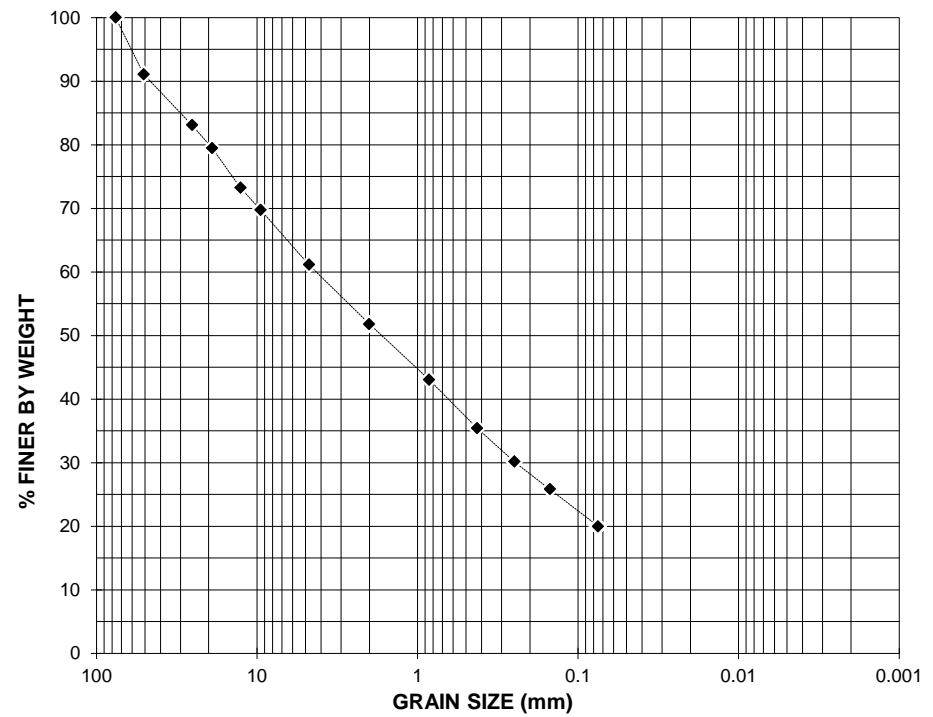
(ASTM D422)

Elapsed Time (min)	Diameter (mm)	Total % Passing
0		
0.5		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

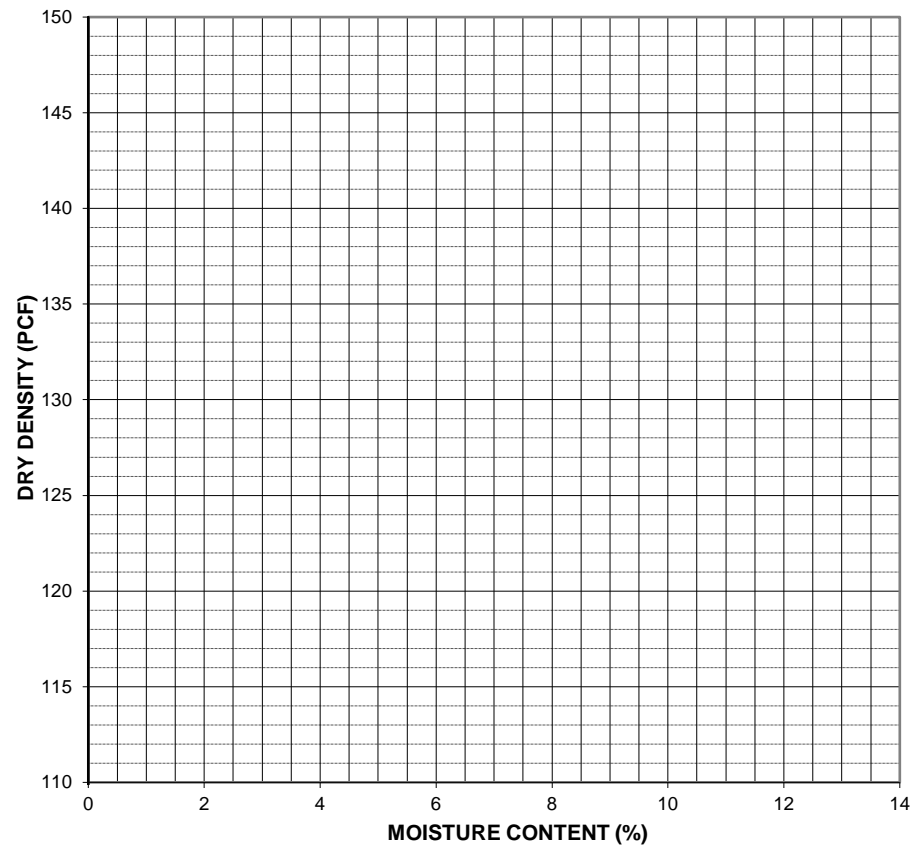
CLASSIFICATION: Silty Sand w/Gravel
USC: SM
FROST CLASS:

Remarks:

GRAIN SIZE DISTRIBUTION



MOISTURE-DENSITY RELATIONSHIP



JOHN A. BUZDOR, P.E. 6/14/2021

AGGREGATE/SOILS TEST REPORT

PROJECT: 2021 TEST SVCS
PROJECT NO.: 21-400-4
CLIENT: RECON
SAMPLE NO.: 21P303
LOCATION: MS08-PARKS MP 126

DATE TAKEN: 6/2/2021
DATE TESTED: 6/8/2021
TESTED BY: NP
REVIEWED BY: JAB
DESCRIPTION: TP08-4

SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	
4"	100.0	
3"	76.2	100
2"	50.8	77
1"	25.4	63
3/4"	19.0	57
1/2"	12.7	49
3/8"	9.5	42
#4	4.75	34
#10	2.00	25
#20	0.85	16
#40	0.425	9
#60	0.25	6
#100	0.15	4
#200	0.075	3.1

% Gravel: 65.5
% Sand: 31.3
% Fines: 3.1
D60: 22.05
D30: 3.40
D10: 0.48
Cu: 46.3
Cc: 1.1
% .02 mm:
% Moisture: 4.6
Fine Modulus:

(ASTM D4318)

Liquid Limit:
Plastic Limit:
Plastic Index:

(ASTM C127)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM C128)

Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:

(ASTM D1557)

Dry Den (U):
Dry Den (C):
M% (U):
M% (C):

SpG (assumed):
M-D Test Method:

HYDROMETER TEST

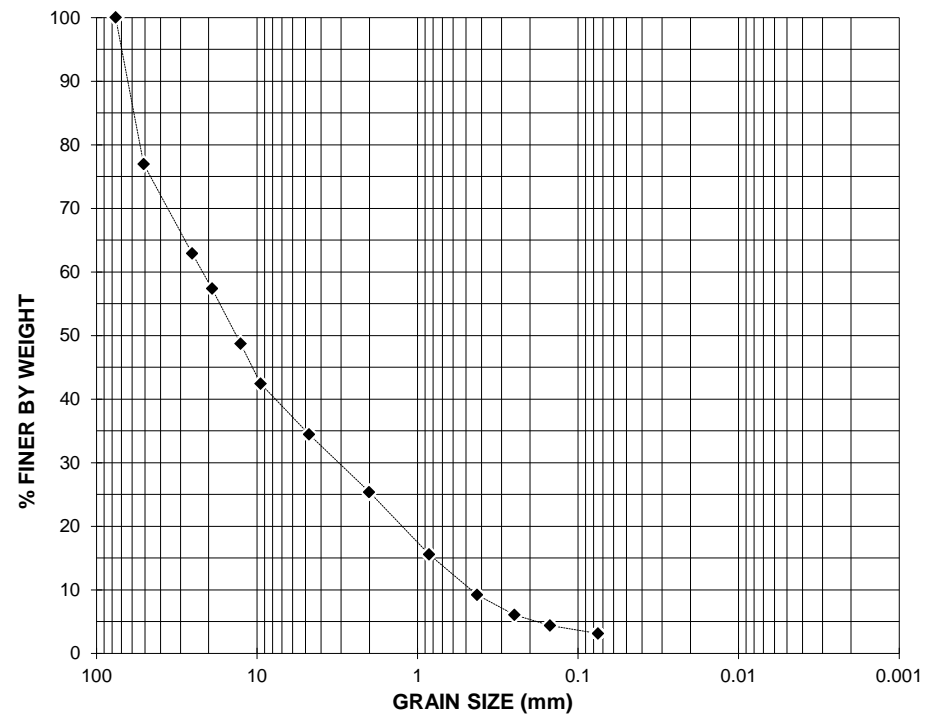
(ASTM D422)

Elapsed Time (min)	Diameter (mm)	Total % Passing
0		
0.5		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

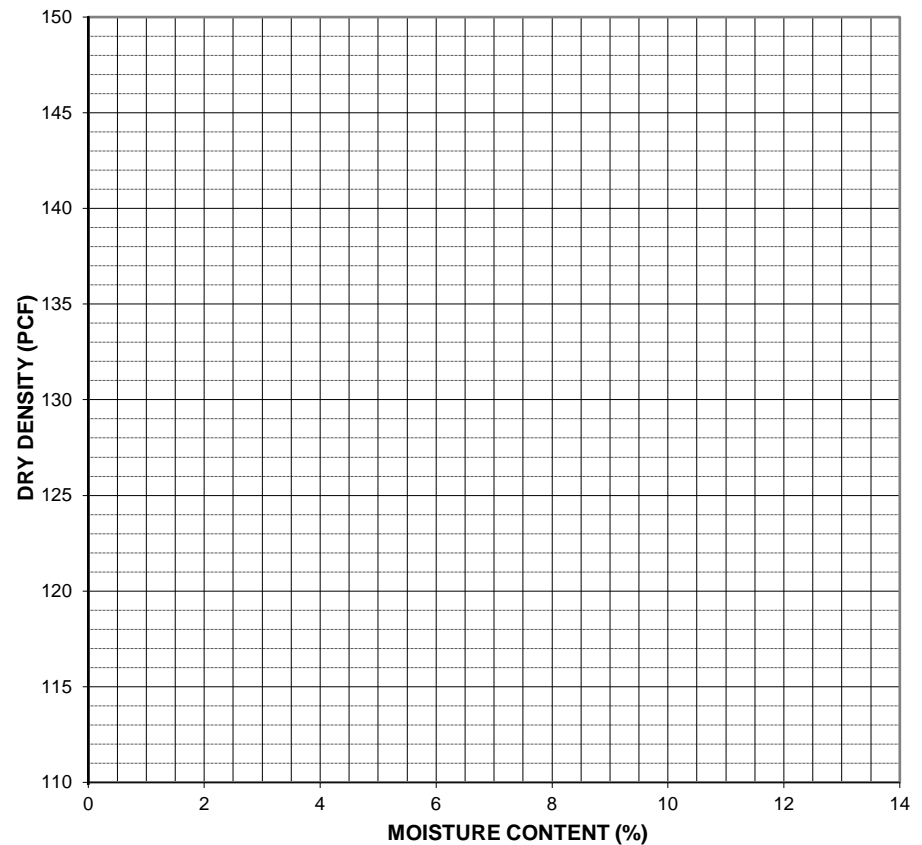
CLASSIFICATION: Well Graded Gravel w/Sand
USC: GW
FROST CLASS:

Remarks:

GRAIN SIZE DISTRIBUTION



MOISTURE-DENSITY RELATIONSHIP



JOHN A. BUZDOR, P.E. 6/14/2021

PROJECT: 2021 TEST SVCS
 PROJECT NO.: 21-400-4
 CLIENT: RECON
 SAMPLE NO.: 21P304
 LOCATION: MS08-PARKS MP 126

DATE TAKEN: 6/2/2021
 DATE TESTED: 6/8/2021
 TESTED BY: NP
 REVIEWED BY: JAB
 DESCRIPTION: TP08-6

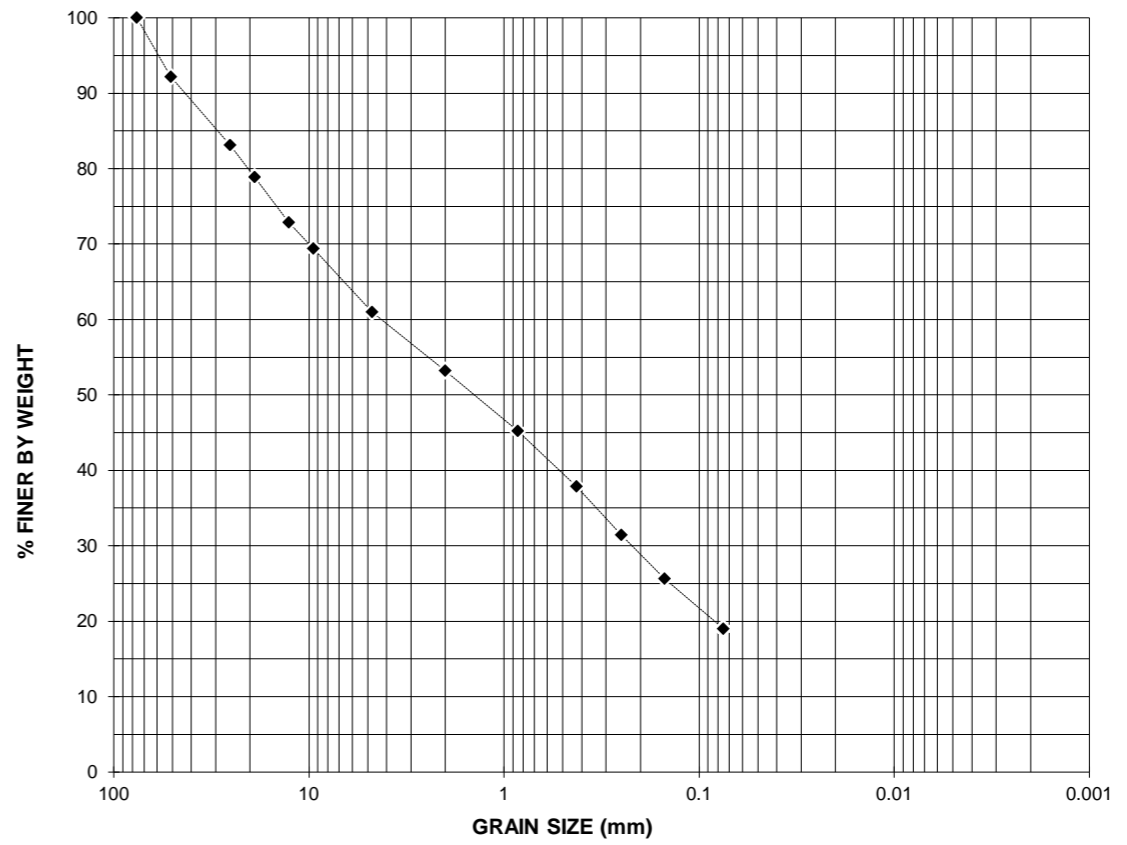
SIEVE ANALYSIS TEST

(ASTM D422)

Sieve Size	Diameter (mm)	Total % Passing
6"	152.4	
4"	100.0	
3"	76.2	100
2"	50.8	92
1"	25.4	83
3/4"	19.0	79
1/2"	12.7	73
3/8"	9.5	69
#4	4.75	61
#10	2.00	53
#20	0.85	45
#40	0.425	38
#60	0.25	31
#100	0.15	26
#200	0.075	19.0

% Gravel: 39.0
% Sand: 42.0
% Fines: 19.0
D60: 4.40
D30: 0.23
D10:
Cu:
Cc:
%.02 mm:
% Moisture: 6.4
Fine Modulus:
(ASTM D4318)
Liquid Limit:
Plastic Limit:
Plastic Index:

GRAIN SIZE DISTRIBUTION



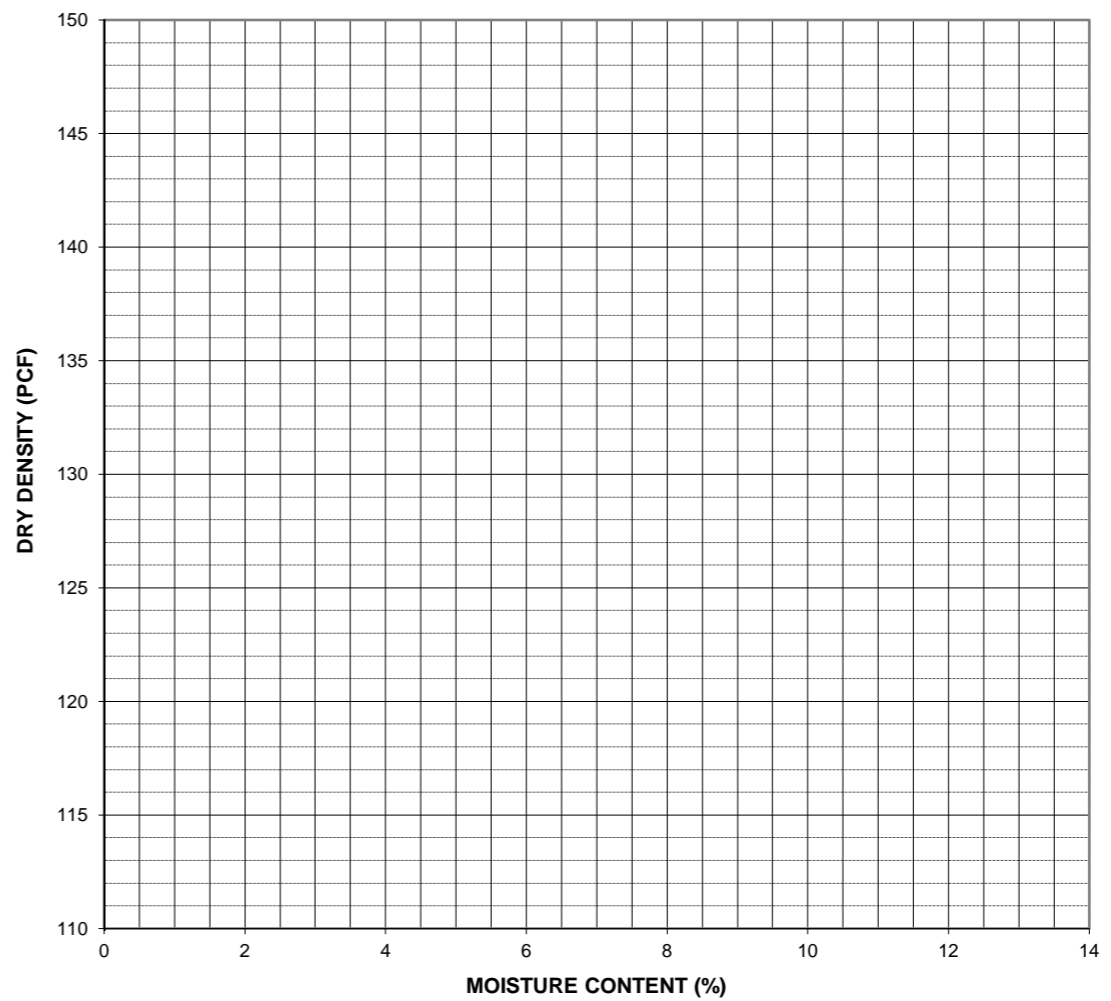
HYDROMETER TEST

(ASTM D422)

Elapsed Time (min)	Diameter (mm)	Total % Passing
0		
0.5		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

(ASTM C127)
Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:
(ASTM C128)
Bulk SpG:
SSD SpG:
Apparent SpG:
% Absorption:
(ASTM D1557)
Dry Den (U):
Dry Den (C):
M% (U):
M% (C):
SpG (assumed):
M-D Test Method:

MOISTURE-DENSITY RELATIONSHIP



CLASSIFICATION: Silty Sand w/Gravel
USC: SM
FROST CLASS:

Remarks:

JOHN A. BUZDOR, P.E. 6/15/2021

APPENDIX D

MATERIAL SITE INVENTORY FORMS

GENERAL			
Material Site ID	MS01	Date Inspected	June 1, 2021
Field Inspector	RECON LLC - S. Rowland & M. Sanders		
LOCATION			
Highway and Milepost	Glenn Highway MP 56		
Township/Range	T18N, R2E	Meridian	Seward
Section	1		
Account #	18N02E01A005, 18N02E01A006		
SITE DESCRIPTION			
Acres	220		
Access	Can be accessed from existing Glenn Highway ROW.		
Vegetation	Old growth birch, cottonwood, and spruce. Avg dia 12 to 18" and intermixed with alder thickets. Open under tree canopy, small brush & tall grass.		
Groundwater Permafrost	Free-draining gravels. A seasonal pond was noted in a low depression during preliminary reconnaissance. All standing water disappeared following ground thaw.		
Terrain Description	The terrain of both parcels is characteristic of glacial drift deposit. At this location, the material of interest appears to be a glacial outwash channel alluvium deposited over glacier ice that subsequently melted and resulted in the hilly terrain that characterizes the site.		
Geology	Unconsolidated, well to poorly graded, clean sandy gravel. Boulders were encountered in all the test pits with an average max diameter of 36-inches. The clasts are predominately granitic and un-weathered to slightly weathered.		
Additional Notes			

PROPOSED MINING PLAN			
Type of Material Site	Borrow site		
Type of Overburden	Silt Loam	Depth of Overburden (ft)	~3.0 – 8.8
Estimated size (acres)	220	Estimated volume (cyds)	5.5 million
Describe volume calculation	Used MSB 2011 LiDAR to calculate an approximate volume in ACAD. Assumed mineable depth to elev. 575' and 5 ft of overburden Calculated approx. 5.5 million cyds of material		
Notes: Potential issues, special problems, etc.			
MATERIAL TESTING			
USC Material Classification	GP to GW – Poorly to well sorted gravel w/ sand		
Boulders and Cobbles (Est % by Vol., Max size)	Estimate 5% boulders, max dia. observed 36". Estimate cobbles at 10%		
Aggregate Test Results (Year of test result – Test result)			
Apparent SG of Coarse			
Apparent SG of Fine			
Absorption Coarse			
Absorption Fine			
Nordic Abrasion			
L.A. Abrasion			
Degradation (T-13)	2021 - 85		
NaSO ₄ Loss Coarse			
NaSO ₄ Loss Fine			

GENERAL			
Material Site ID	MS04	Date Inspected	May 12, 2021
Field Inspector	RECON LLC - S. Rowland & M. Sanders		
LOCATION			
Highway and Milepost	Glenn Highway MP 76		
Township/Range	T20N, R5E	Meridian	Seward
Section	35		
Account #	20N05E35C009, 20N05E35C008		
SITE DESCRIPTION			
Acres	3		
Access	Can be accessed via the Glenn Highway ROW		
Vegetation	Thick stands of spruce and some aspen, averaging 4 to 6 inches in diameter		
Groundwater Permafrost	N/A		
Terrain Description	Steep bedrock bluff		
Geology	Intrusive rock is a slightly to highly weathered medium grained diorite. Host rock is a soft sedimentary rock.		
Additional Notes	Development of this site will likely require coordination with adjacent landowners.		

PROPOSED MINING PLAN			
Type of Material Site	Quarry		
Type of Overburden	Silt loam	Depth of Overburden (ft)	Max. est. 12"
Estimated size (acres)	3	Estimated volume (tons)	311,000 tons
Describe volume calculation	MSB 2011 LiDAR was used and based of field investigation, assumed intrusive is dipping south 35 degrees. Estimate in-place rock approx. 311,000 tons. Estimate does not account for a mining plan		
Notes: Potential issues, special problems, etc.	Development of this site will likely require coordination with adjacent landowners		
MATERIAL TESTING			
Material Classification	Rock		
Boulders and Cobbles (Est % by Vol., Max size)			
Aggregate Test Results (Year of test result – Test result)			
Apparent SG of Coarse			
Apparent SG of Fine			
Absorption Coarse			
Absorption Fine			
Nordic Abrasion	2021 – 10.4%		
L.A. Abrasion			
Degradation (T-13)			
NaSO ₄ Loss Coarse			
NaSO ₄ Loss Fine			

GENERAL			
Material Site ID	MS06	Date Inspected	June 3, 2021
Field Inspector	RECON LLC - S. Rowland & M. Sanders		
LOCATION			
Highway and Milepost	Parks Highway MP 77		
Township/Range	T20N, R4W	Meridian	Seward
Section	8		
Account #	20N04W07A001, 20N04W08A001		
SITE DESCRIPTION			
Acres	657		
Access	West parcel can be accessed from Alaska Railroad ROW and using an old trail network from previous geotech investigations. Preferred accessed for E parcel is through Colaska parcel to N. Heavy timber and wetlands restricted excavator access directly from the Railroad ROW.		
Vegetation	The parcel is heavily vegetated with predominately second growth spruce and birch, average diameter 4 to 12 inches. Underbrush consists of grass and minor brush		
Groundwater Permafrost	Groundwater is at an elevation 40 to 60 feet below the relic outwash terrace and up to 100 feet below groundsurface in the hilly area. No Permafrost is anticipated to exist on the subject parcels.		
Terrain Description	W parcel is hilly terrain, typical of glaciofluvial deposit. The parcel to the E is a relic river terrace and drainage. The E parcel is ~540 acres but the area of interest is limited to ~60 acres.		
Geology	The relic river terrace contains well-graded cobble gravel with sand. The material in the hilly glaciofluvial terrain varies from poorly graded sandy gravel with silt to poorly graded silty sand with gravel		
Additional Notes	The historic Knik-Talkeetna trail was located along southern portion of the western parcel.		

PROPOSED MINING PLAN			
Type of Material Site	Borrow site – applies to area on relic river terrace		
Type of Overburden	Silt loam	Depth of Overburden (ft)	~1.8 – 4.3
Estimated size (acres)	60	Estimated volume (cyds)	+3 million
Describe volume calculation	Assumed total mineable depth of 40-feet and 60 acres for the area it is estimated that this site has the potential to produce +3 million cyds.		
Notes: Potential issues, special problems, etc.			
MATERIAL TESTING			
Material Classification	River terrace – GW Glacial outwash hills – SP-SM to GP-GM		
Boulders and Cobbles (Est % by Vol., Max size)	Trace amount of boulders, max dia. 18- 20". Estimate cobbles at 10%		
Aggregate Test Results (Year of test result – Test result)			
Apparent SG of Coarse			
Apparent SG of Fine			
Absorption Coarse			
Absorption Fine			
Nordic Abrasion			
L.A. Abrasion			
Degradation (T-13)			
NaSO ₄ Loss Coarse			
NaSO ₄ Loss Fine			