

HAINES HIGHWAY MILEPOST 3.5-25.3

FINAL GEOTECHNICAL REPORT

VOLUME I OF II

SUBSURFACE INVESTIGATION AND GEOTECHNICAL RECOMMENDATIONS

January 2009

DOT&PF PROJECT NO. 68606 HAINES, ALASKA



FINAL GEOTECHNICAL REPORT HAINES HIGHWAY, MP 3.5 TO 25.3 VOLUME I OF II STATE PROJECT NO. 68606 HAINES, ALASKA

Prepared for:

State of Alaska Department of Transportation and Public Facilities 6860 Glacier Highway Juneau, Alaska 99801-7999

Prepared by:

Maria E. Kampsen, P.E.

Geotechnical Engineer

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Prepared by:

DOWL HKM 4041 B Street Anchorage, Alaska 99503 (907) 562-2000



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1.0 INTRODUCTION

This report presents the results of the geotechnical field exploration and laboratory soil-testing program in support of the Haines Highway, Milepost (MP) 3.5 to 25.3 project near Haines, Alaska (Figure 1). This work was performed for the State of Alaska Department of Transportation and Public Facilities (DOT&PF).

1.1 Planned Development

The DOT&PF, in partnership with the Federal Highway Administration, plans to upgrade the Haines Highway from MP 3.5 to 25.3. The Haines Highway, a designated Scenic Byway, connects the communities of Haines, Alaska and Haines Junction, Yukon Territory. This highway is one of only several major highways out of the Southeast Alaska region, and is an important international transportation system, as it connects the Alaska Marine Highway in Haines with Canada.

The highway, which was originally constructed in 1943, has been periodically upgraded over the years, with the section from the Bluffs (MP 25.3) to the Canadian border (MP 40) having been most recently completed. During the last upgrades, the design speed for the Haines Highway was designated as 55 miles per hour (mph) in order to make the U.S. and Canadian highways compatible.

The project goal is to bring the MP 3.5 to 25.3 section of the Haines Highway up to National Highway System standards for a design speed of 55 mph by realigning, widening, and straightening portions of the roadway. DOT&PF is also considering possible relocation of the existing Chilkat River Bridge, and potential long-term solutions to debris flow problems near MPs 19 and 23. The upgrades are to provide a safe, consistent, and efficient roadway.

This report documents observed subsurface geotechnical conditions, and provides analyses and interpretations of anticipated subsurface conditions along the alignment. It also presents recommendations for design and construction of the project elements. This report and subsequent recommendations are based on and valid only for, the planned development, as it is currently understood as of August 17, 2006. Any changes to the planned development may

impact the recommendations contained herein and should be evaluated by the project geotechnical engineer.

1.2 Purpose of Investigation

The purpose of this investigation was to determine soil and rock stratigraphy along the existing road and proposed realignment areas. This information was compiled and interpreted to make design and construction recommendations for the project.

1.3 Scope of Work

DOWL HKM began this phase of the project by obtaining historical documents from DOT&PF. The information was compiled and reviewed and a scope of work/exploration plan developed. The plan was submitted to DOT&PF in early August 2005 for review and comment. Upon receipt of the comments, a final plan was developed and submitted to DOT&PF on September 19, 2005.

The scope of work for the geotechnical investigation included:

- Permitting
- Geologic mapping
- Evaluation of debris flows
- Subsurface investigation

1.3.1 <u>Permitting</u>

Due to the project location, multiple permits were required to conduct the geotechnical investigation. The required permits included a U.S. Army Corps of Engineers (USACE) Nationwide 6 permit, State of Alaska Department of Natural Resources Title 41 permit, State of Alaska Parks Special Park Use permit, State of Alaska Department of Natural Resources Coastal Consistency Review, and Rights-of-Entry for all privately owned parcels. All permits were obtained prior to conducting the subsurface investigation.

Coordination and Section 106 consultation with the State Historic Preservation Office (SHPO) and tribes was also required, resulting in an archaeological monitor being present during Phase II of the geotechnical investigation.

1.3.2 <u>Geologic Mapping</u>

Geologic mapping of bedrock exposures was conducted in areas of proposed realignments or widening. Information to include strikes, dips, trends, plunges, bedrock type, and fracture frequency was obtained. Stereonets were created and kinematic analyses performed. The information was analyzed for maximum rock slopes, access, and related construction issues.

1.3.3 Evaluation of Debris Flows

Two recurring debris flow areas exist along the alignment, at MP 19 and MP 23. As part of this project, documents pertaining to these two areas were reviewed. In addition, a site visit was conducted with the Haines DOT&PF Maintenance Foreman, Mr. Roger Ingledue. This task required an evaluation of the site conditions, development of construction options and corresponding cost estimates, and recommendations.

1.3.4 <u>Subsurface Investigation</u>

The subsurface investigation was planned to be completed in two phases; truck accessible test borings, test pits, and hand probes followed by tracked drill rig test borings. An estimated 100 test borings and 50 test pits were planned. The use of flaggers and the subsequent laboratory testing program was also outlined in the scope of work. Due to archeological concerns in selected areas, some of the test borings and pits have not yet been completed. A third phase has been proposed for completion in the near future.

A separate phase of fieldwork for the proposed bridge site at MP 24 was also included in the exploration plan. Test borings and penetrometers were planned at each abutment to depths of 100 feet. This phase was later removed from the project scope due to budget issues and not completed.

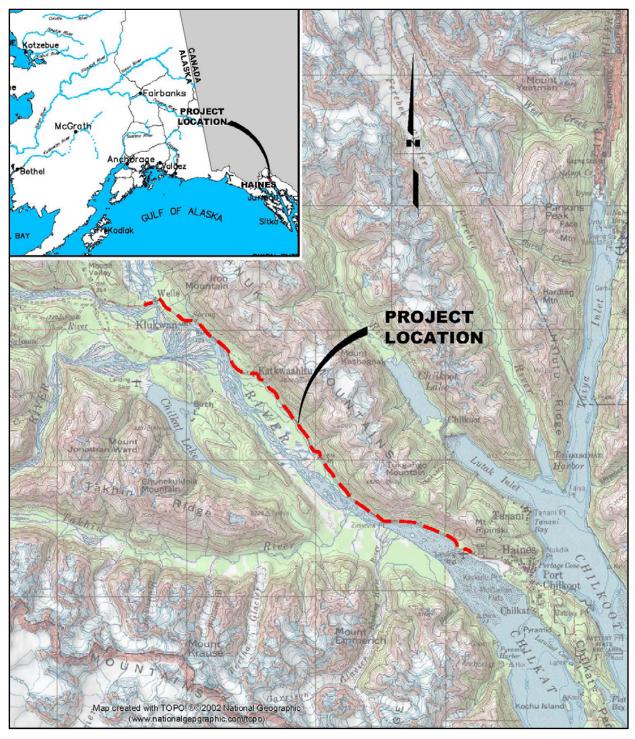


Figure 1: Vicinity Map

2.0 **REGIONAL INFORMATION**

Haines is located on the western shore of the Lynn Canal, at the northern end of the Chilkat Peninsula between Chilkat and Chilkoot Inlets in Southeast Alaska, approximately 75 air miles northwest of Juneau. The Haines Highway, MP 3.5 to 25.3 project spans from the airport (MP 3.5) to the Bluffs (MP 25.3) near Haines, Alaska.

2.1 Regional Geology

The Haines Highway lies within the Chatham Trough physiographic province of southeast Alaska. The area is dominated by the steep glaciated mountains and deep glacially scoured fjords. Haines occupies a low saddle area bounded by the bedrock slopes of Mount Ripinski to the north and the bedrock hills of the Chilkat Peninsula to the south. The dominant geologic feature of the region is the Chilkat River valley, which follows the Chilkat River Fault and divides the geologic terrains. The project area is on the east side of the fault and composed of ultramafic and igneous rocks of Cretaceous (Mzm/Mzp) and Tertiary age. The rock includes metamorphosed ultramafics with varying amounts of pyroxene, hornblende, gabbro, dunite, magnetite bearing pyroxenite and metamorphosed basalt. Younger intrusive veins and bodies of igneous rocks such as quartz diorite and mixed felsic volcanics are also present.

The existing road and proposed realignments follow the toe of the steep mountains with slope faces and foliation trends dipping 60 to 85 degrees westward toward the Chilkat River and the Haines Highway. The ultramafic complex trends in a northerly direction, and extends eastward from the Chilkat River Fault to the eastern mountain peaks of 4,000 to 6,000 feet high and beyond into unmapped territory.

The surficial geology of the Haines area has previously been mapped by Richard W. Lemke and Lynn A. Yehle of the U.S. Geological Survey (USGS) as part of a study on geologic hazards in communities in Southeast Alaska.

The surficial deposits are dominated by a unit designated "Qem" and described as "elevated finegrained marine deposits". These deposits are thought to have been deposited in a fjord environment by the settling of fine-grained silts and clays derived from glacial action. Subsequent to the retreat of the last glaciation from the Haines area, the land has been rebounding from the effect of loading by glacial ice 5,000 feet or more in thickness. The USGS estimates that the land has been uplifted by as much as 600 feet in the last 10,000 years, and that uplift is still occurring at a rate of about 1 inch per year.

Thus, the upper surface of the fine-grained fjordal sediments in the Haines area has now been elevated to a position well above sea level. The USGS report points out that one to several feet of muskeg commonly overlies these fine-grained marine deposits.

The "Qem" unit is also capped in some places by a "Qeb" unit, which is a veneer of elevated beach deposits consisting of well-sorted and stratified gravel, sand, and cobbles.

2.2 Climate

Haines is located in a maritime climate zone characterized by cool summers and mild winters. The climatological data presented below was taken from a range of sources; including the Department of Commerce, Community, and Economic Development Community Database and the Environmental Atlas of Alaska.

Mean Annual Precipitation	52 in
Mean Annual Snowfall	133 in
Mean Maximum Temperature July	65.9°F
Mean Maximum Temperature January	28.2°F
Mean Minimum Temperature July	51.1°F
Mean Minimum Temperature January	18.4°F
Average Summer Temperature Range	46°F - 66°F
Average Winter Temperature Range	10°F - 36°F
Haines Freezing Degree Days (°F-day)	900
Haines Thawing Degree Days (°F-day)	3,000
Haines Heating Degree Days (°F-day)	8,638

Average monthly temperatures and precipitation amounts for Haines and the vicinity, for the period between 1971 and 2000 are shown in Table 1.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
					49.5							
Precipitation (including snowfall) (in)	5.45	4.56	2.91	2.40	1.55	1.36	1.36	2.45	5.21	9.13	5.98	5.27

 Table 1: Average Monthly Temperatures and Precipitation

2.3 Topography and Drainage

The roadway was constructed at or near the base of the Takshanuk Mountains adjacent to the Chilkat River. The initial few miles of the project are largely flat, following the river floodplain at the base of the mountains. The road then transitions to rolling topography reflective of the undulating nature of the lower mountainside. Looking toward the end of the project, the overall slope of the road trends to the left across the roadway. Drainage from the mountains flows south to the river, crossing the roadway. Runoff is accommodated by the numerous creeks and culverts that provide cross drainage along the alignment. A hydrology study of the alignment was completed by Interfluve of Hood River, Oregon, under separate cover.

2.4 Notable Features

The road passes through previously developed areas as well as undeveloped areas. Residential structures are periodically present on the both sides of the road, pullouts and eagle-viewing areas have been developed, recreational and subsistence-fishing areas are accessible, and the village of Klukwan is located just past MP 21. Other notable features include archaeological sites, debris flows, the Wells Bridge, a pedestrian walking trail, buried utilities, and an abandoned fuel oil pipeline.

2.4.1 <u>Archaeological Sites</u>

As part of the Haines Highway Improvements, an archaeological survey was performed along the project corridor. Numerous areas of historical significance were identified and are addressed in the report Haines Highway Archaeological Reconnaissance Report, dated October 31, 2005, by Cultural Resource Consultants, LLC.

2.4.2 Debris Flows

Two debris flows are present along the alignment at MP 19 and MP 23. The two flows are considered active with the most recent large flow movement occurring at MP 19 in October 2005. Over 50,000 cubic yards of material were transported over the road, resulting in road closures and a significant cleanup effort.

2.4.3 <u>Wells Bridge</u>

At MP 23.8, the Wells Bridge crosses the Chilkat River. The bridge is a two-lane, concretedecking, multi-span structure about 500 feet in length. The bridge replaced a wooden structure and was completed in 1958.

2.4.4 Pedestrian Walking Trail

From Station 1010+00 to 1082+00, there is an asphalt paved walking trail situated between the highway and the river. The trail is designed to allow pedestrians to observe the eagles, safely move between designated rest areas, and access eagle viewing platforms that have been constructed.

2.4.5 <u>Haines Military Pipeline</u>

In 1953, the military constructed a petroleum pipeline parallel to the highway. The purpose of the pipeline was to supply fuel to the military bases in the Interior. The fuel line still exists although portions of the pipeline are now used as a conduit to house telephone and electric utility lines.

2.4.6 <u>Buried Utilities</u>

Along the alignment, electric and telephone utilities are present. These utilities serve the residents of Haines and the Chilkat Valley. Alaska Power and Telephone is responsible for the fiber optic and telephone cable along the entire project corridor and for the electric service to MP 10. From MP 10 to MP 25, Inside Passage Electric Company maintains the electrical service. Cable television is also present along the alignment from MP 3 to MP 5 as an overhead coaxial cable.

2.5 Permafrost

No permafrost was encountered in any of the test borings, nor is any known to exist in the general vicinity of the project corridor. In addition, no unusually cold soil temperatures were observed in the samples. Therefore, the risk of permafrost being present along the alignment is low. The contractor should be aware that if any evidence of frozen soil is encountered in any of the excavations, we should be notified immediately to evaluate the situation.

3.0 **RESEARCH AND FIELD EXPLORATION**

This section presents the technical data obtained from office research and the field investigation. The methods and procedures used in obtaining the data are presented. The data should be considered accurate only at the locations specified and only to the degree implied by the methods used.

3.1 Research

Several subsurface investigations have been conducted along the project corridor over the last several decades. These investigations included an environmental assessment, reconnaissance level investigations, bridge investigation, and a geologic evaluation of the debris flows. These investigations were reviewed in order to obtain information on original construction methods, subsurface conditions and to help establish an appropriate drilling program, and are not included in this report. Refer to Section 7.0, References for a list of publications reviewed.

3.2 Field Exploration

The field investigation completed to date was performed between September 2005 and May 2006. The project was divided into three phases as detailed below.

- Geologic Mapping and Alignment Observations,
- Phase I Test Boring Exploration, and
- Phase II Test Boring/Test Pit Exploration

The information obtained during the field explorations is presented graphically on the test pit and test boring logs found in Appendix B. The Test Hole Explanation Guide presented prior to the test boring/pit logs, should be reviewed to help understand the information presented on the test pit/test boring logs. Abbreviated versions of the logs are shown on the plan and profile sheets, Appendix A.

The test boring locations were staked and painted prior to drilling or excavating. In some instances, site conditions necessitated offsetting the test boring/pit locations from the previously staked locations. The offsets were measured and the elevations were estimated from a topographic map. The test borings and test pit locations have not been surveyed but their approximate locations are shown on Figures 1 through 44, Plan and Profile Sheets, Appendix A.

3.2.1 <u>Geologic Mapping/Alignment Observations</u>

There are a number of locations along the alignment, where road widening or relocation will result in rock cuts. At these locations, the existing bedrock exposures were mapped in general accordance with DOT&PF's "*Alaska Field Rock Classification and Structural Mapping Guide.*" It is important to note that during the mapping phase, the presence of snow limited observations. Fifty-five baselines were established and the following information obtained:

- strikes, dips, trends, plunges,
- type of bedrock, fracture frequency,
- presence of water/runoff,
- digital photographs, and
- recorded observations.

The information obtained was used to complete stereonets and kinematic analyses of rock cuts. Details regarding the geologic mapping are located in Volume II, Geologic Mapping, Haines Highway, MP 3.5 to MP 25.3.

Observations were recorded along the alignment and probable realignment areas as identified in the Alignment Study dated October 2005 by DOWL HKM. These observations began in October and continued throughout the duration of the fieldwork. Tasks included photographs of outcrops, exploring potential access routes to the top of bedrock exposures, walking realignments, and hand probes. Hand probes were completed along the entire alignment and along potential realignments in an effort to delineate the depth and extent of surface organics. The probes were performed by hand probing with a steel rod until an unyielding surface was encountered. The average depth of organics encountered in each area was recorded and is shown on the plan sheets.

3.2.2 Phase I Test Boring Exploration Program

The Phase I investigation was initially planned to address all truck accessible test borings and test pits adjacent to the road where flaggers and traffic control would be required. Due to a delayed start to the fieldwork and winter weather conditions, some of the road test borings were not completed during Phase I. In addition, archaeological concerns moved the test pit program to Phase II, pending completion of the archaeological survey.

During October and November 2005, a total of 43 test borings were drilled along the alignment. The test borings were drilled using a Mobile B-61, truck-mounted drill rig fitted with hollowstem auger. The drill rig is owned and operated by Denali Drilling, Inc. of Anchorage, Alaska. The test borings were drilled to explore and sample the existing road section and underlying material, while minimizing damage to the existing section. The samples collected were evaluated for their potential for reuse. The test borings ranged in depth from 2.5 feet to 16.5 feet and were logged by Mr. John Rego, Jr., a geologist with DOWL HKM.

Several types of sampling were conducted; bulk, grab, and disturbed. Bulk samples were obtained from selected test borings from below the asphalt pavement to a depth of three feet. These samples were typically 15,000 to 30,000 gram samples obtained for proctor tests. In some instances, grab samples were obtained at a depth of two feet or two and a half feet from the auger flights. These samples were typically 3,000 to 6,000 gram samples for mechanical analyses. Split spoon samples were typically obtained at depths of two and a half feet, five feet, and then at five-foot intervals thereafter.

The sampling intervals and frequency were dictated by the test boring location and conditions encountered and determined in the field. Either Standard Penetration Tests (SPT) or modified penetration tests were performed in each of the test borings. The results are an indication of the relative density or consistency of the subsoil.

The SPT was performed in 20 of the test borings by driving a two-inch outside-diameter, splitspoon sampler a distance of 18 inches ahead of the auger with a 140-pound hammer falling 30 inches in accordance with American Society for Testing and Materials (ASTM) D1586. The standard penetration resistance (N) value shown on the test boring logs indicates the number of blows required to drive the sampler the last 12 inches. The N-values shown in the logs are raw data from the field and have not been adjusted for overburden pressure.

The penetration test is a modification of the SPT in that the hammer weight and sampler are larger and are often used to retrieve larger samples of soil. The penetration test was performed in the remainder of the test borings. The penetration test is performed by driving a two and one-half inch inside-diameter, split-spoon sampler a distance of 18 inches ahead of the auger with a 340-pound hammer falling 30 inches. The blow counts shown on the test boring logs indicate

the number of blows required to drive the sampler for each six-inch interval. N-values are not shown in the logs, as there is not a direct accepted correlation between the larger sampler/hammer and the SPT.

As the soil samples were recovered, they were visually classified and sealed in plastic bags to preserve the natural water content. The samples were then transported to DOWL HKM's laboratory, Alaska Testlab, in accordance with ASTM 4220, for further testing.

Slotted PVC pipe was installed in the majority of the test borings and the depth to the groundwater was measured after the water levels appeared to have stabilized.

3.2.3 <u>Phase II Test Boring/Pit Exploration Program</u>

The Phase II investigation was initially planned to address all test borings requiring trackmounted rig access. Due to changes during Phase I, truck accessible test borings that were not completed during Phase I were also drilled during Phase II and test pits were completed. Flaggers and traffic control were required for most of the second phase. The number of test pits planned was reduced due to utilities, accessibility, and budgetary concerns. With the completion of the archaeological survey, several test pits were changed to test borings and a number of test borings were not drilled, pending approval/permission from native corporations. These test borings requiring approval were moved into a Phase III, which has not been completed.

Test Borings. During April and May 2006, a total of 63 test borings were drilled along the alignment. The test borings were drilled utilizing two drill rigs:

- Mobile B-61 truck-mounted drill rig
- CME-45 skid-mounted drill rig on a Nodwell

Both drill rigs were fitted with continuous flight, hollow-stem auger. The rigs are owned and operated by Denali Drilling, Inc. The drilling was supervised and the samples logged by Ms. Keri Nutter, a geologist with DOWL HKM.

The test borings in the road and shoulder areas were drilled to explore and sample the existing road section and underlying material while minimizing damage to the existing section. The samples collected were evaluated for their potential for reuse. The test borings drilled outside of

the road prism were used to determine depths of peat and soil conditions where road realignments would occur. The test borings ranged in depth from 2.5 feet to 17 feet. Sampling intervals and frequencies were consistent with what occurred in Phase I.

Slotted PVC pipe was installed in the majority of the test borings and the depth to the groundwater was measured after the water levels appeared to have stabilized.

Test Pits. During April 2006, a total of 21 test pits were excavated along the alignment. Each test pit was excavated to rock, to competent mineral soils, or to the limits of the excavator. The test pits varied in depth with a maximum depth of 14.5 feet.

The test pits were excavated using a Hitachi Z-Axis 135 backhoe owned and operated by Mr. Donnie Turner of Turner Construction, Haines, Alaska. Ms. Nutter supervised the test pit exploration and obtained samples of the distinct soil layers.

As the soil samples were recovered, they were visually classified and sealed in plastic bags to preserve the natural water content. The samples were then transported to DOWL HKM's Anchorage laboratory for further testing.

No environmental testing or monitoring was conducted as a part of this investigation. However, a strong hydrocarbon odor and sheen were encountered in two test borings (101 and 102) located at Stations 825+00 and 828+50, respectively.

It was later discovered that this is a known previous fuel spill site, and the USACE is investigating it as part of their Formerly Used Defense Site (FUDS) program. The USACE plans to take responsibility of any cleanup necessary at this site.

4.0 LABORATORY TESTING

This section of the report presents the technical data obtained during the soil laboratory testing in narrative, tabular, and graphic form. The methods and procedures used in obtaining the data are described herein. The data should be considered accurate only to the degree implied by the methods used.

An engineering technician visually classified each sample recovered and the natural water content was measured. Index tests were performed on selected samples and consisted of grain size analyses, plasticity index tests, organic content tests, and maximum soil density tests.

4.1 Visual Classification

In the laboratory, an engineering technician visually classified each soil sample obtained from the field exploration. The visual classification procedure consists of:

- identifying the color of the soil,
- estimating the percentages of gravel, sand, and minus No. 200 particle sizes,
- estimating the maximum particle size,
- estimating the size range of the sand particles,
- identifying the shape of the particles,
- estimating the dry strength of the soil when a water content test is performed,
- estimating the plasticity description of the soil and plasticity index,
- comparing the natural water content with respect to the Atterberg limits, and
- identifying the Unified Soil Classification System group.

4.2 Moisture Content

The natural water content of each sample was determined in accordance with ASTM D2216, Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock. The water contents are reported on the graphic test boring/pit logs, Appendix B.

4.3 **Particle Size Distribution**

Ninety particle-size distribution tests were performed on selected soil samples in accordance with ASTM D422, Standard Test Method for Particle-Size Analysis of Soils. These tests consisted of mechanical sieving, the results of which are presented graphically as Appendix C.

4.4 Plasticity Index

Seven plasticity index tests were performed in accordance with ASTM D4318, Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils. The liquid limit, plastic limit, and plasticity index numbers obtained from the test are plotted and used to classify the cohesive soil as silts or clays. In addition, the limits are used to estimate strength and settlement characteristics of these soils.

The liquid limit is the water content (in percent) of a soil passing the boundary between the liquid and plastic states. If the *in situ* moisture content of the soil is higher than the liquid limit, the soil will be difficult to properly compact.

The plastic limit of a soil is the lowest water content at which the soil is plastic. The difference between the liquid and plastic limits is the plasticity index or the range of water contents where a soil will behave plastically. All of the plasticity index tests determined the material to be "nonplastic" and the selected samples tested are identified in the table below.

Test Boring No.	Sample No.	Depth (ft)	Measured Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	USCS Classification of Finer Fraction
10	1	0.5-2	34	Non-Plastic			Silt
25	3	5-6.5	36	Non-Plastic			Silt
43	1	0-2	62	Non-Plastic			Silt
49	3	7.5-9.5	44	Non-	Plastic		Silt
50	2	5-7	37	Non-Plastic			Silt
84	1	0-2	53	Non-Plastic			Silt
91	4	10-11.5	36	Non-	Plastic		Silt

 Table 2: Plasticity Index Tests

4.5 Organic Content

Three organic content tests were performed on selected soil samples in accordance with ASTM D2974, Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic

Soils. These tests were conducted to determine the *quantity* of organic matter in the material *by weight*. The results of these tests are presented on the test boring logs. The percentage of organics shown in the narrative on the test boring logs is the percentage *by volume*, visually estimated in the field.

Test Boring/Pit No.	Sample No.	Sample Depth (ft)	Organic Content (%)
52	1A	1.0-2.0	4
86	1A	0.5-2	16
110	2	3-3.5	62

 Table 3: Organic Content Tests

4.6 Maximum Soil Density (Proctor)

Twelve modified proctors were performed in accordance with one of three test methods:

AASHTO T-180B - Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop, Method B

ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort

ASTM D4253 - Maximum Index Density of Soils - Vibratory Table

These tests are designed to determine the relationship between water content and dry unit weight of soils using laboratory compaction procedures. These tests provide the basis for determining the percent compaction and water content needed to achieve the required engineering properties for the project.

Test Boring No.	Sample No.	Depth (ft)	Maximum Index Density (pcf)	Optimum Moisture Content (%)	In-Situ Moisture Content (%)
15	1	0.5-3	156.5	4	5
31	1	0-3	115	13	7
55	1	0.3-2.5	148.5	4	6
90	1	0.3-3	148.5	5	6
103	1	0-3	154.5	3.5	4
116	1	0.3-3	142	6	10
122	1	0-3	141	5.5	13
129	1	0.2-3	147	5	6
134	1	0.2-3	151	5.5	6
146	1	0.3-3	159	4.5	6
150	1	0-3	150		5
155	1	0.6-3	147.5	3.5	7

Table 4: Proctor Tests

5.0 ENGINEERING ANALYSIS AND GENERAL RECOMMENDATIONS

This section of the report includes interpretations and opinions concerning the interaction of the planned development with the surface and subsurface conditions detected by the field exploration and laboratory tests. It reflects an evaluation of the data collected during the field exploration and soil laboratory tests, and an understanding of the planned development. The analysis is valid for the data collected within the scope of work. The collection of additional data, or a change in the development plans, could provide information, which would alter some or all the interpretations and opinions expressed herein.

These general recommendations are based on professional judgment and experience and the data collected during the site exploration and soil laboratory tests. These recommendations generally are not the only design options available; there may be several acceptable alternatives. These recommendations are not intended to represent the only way, but rather to indicate one appropriate option based on the information available.

5.1 Existing Roadway Section

The existing roadway consists of two 10-foot-wide paved travel lanes with two-foot-wide paved shoulders. Along the majority of the alignment, vegetation has been cleared along both sides of the road with guardrail in areas lacking sufficient safety area.

Along the route, the thickness of the pavement section varied depending on the subsurface conditions. The road section was founded on one or more of the following soil conditions; floodplain deposits of soft silts and loose sands, alluvial deposits of sands and gravels, and bedrock. On average, the road section appeared to consist of the following:

- three inches of asphalt pavement, over
- three feet of Selected Material, Type A, over
- Selected Material, Type B as needed.

No crushed aggregate base course was encountered during the field explorations. In a number of areas, it appeared that Type A material had degraded to Type B. The road embankment appears to have been constructed after the removal of the surficial organics. Any settlement that likely

occurred over the years due to the soft, floodplain deposit was probably addressed during pavement repairs over the years.

5.2 New Embankment

The new embankment should be designed and constructed utilizing appropriate procedures that account for anticipated traffic loads that may increase during the life of the road, as well as variable soil conditions along the alignment. The method should account for the reduction in subgrade soil strength during annual spring thaw, acknowledging that differential frost heave may not be eliminated.

Current plans for the flexible pavement design for this project will follow what was previously done on other sections of the highway for design continuity. The overall design follows the procedure in the AASHTO Guide for Design of Pavement Structures in conjunction with an analysis using BERG2, developed by DOT&PF. The design is based on the project design life and anticipated traffic loads for that period, the roadbed material at the site, and the annual depth of frost, estimated to be a maximum of two feet. Since the roadbed material will vary from bedrock to frost susceptible silts, the thickness of the road section will vary. Figure 2 shows the typical section for the roadway.

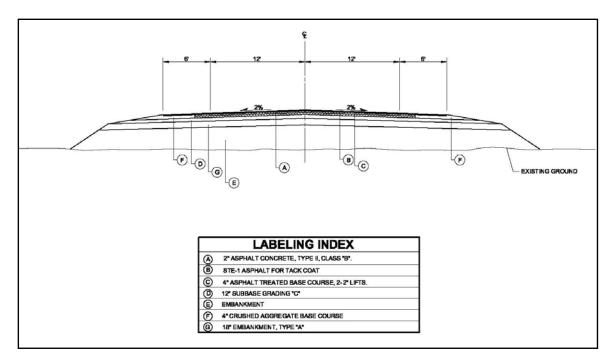


Figure 2: Typical Pavement Section

5.3 Excavation

Excavation. All existing fill, peat, organic silt, and frozen soil should be removed from beneath the embankment and replaced with Selected Material. In some locations, fill material varies in depth from less than three feet to more than eight feet. Much of this fill has been in place for decades. The blow counts in the fill material are generally 20 or higher, and the material appears to meet or exceed the requirements for Selected Material Type B. Therefore, it does not appear to be advantageous or economical to remove all of the existing fill, nor does it appear that complete removal and replacement of all fill will significantly improve the long-term performance of the road section. Therefore, where site grades remain close to existing grades, we recommend that fill material sufficient to construct a three-foot pavement section be removed. The exposed underlying fill material should then be scarified and compacted as specified herein and viewed as the subgrade.

Reuse of Material. Much of the existing fill along the alignment will be reusable in deeper excavations as Selected Material, Type B embankment. The peat, organic silt, and any debris are not reusable and should be wasted off-site. Some of these materials might be suitable for processing to provide topsoil for use within the project.

Surcharge. In some areas, the roadway embankment will be constructed over soft floodplain deposits and elastic settlement is likely. In order to reduce the potential for settlement, one option is to surcharge these areas. This generally requires the placement of sufficient gravel to bring the traffic area to grade (estimated to be about three to six feet) plus an additional two to three feet of gravel. The additional gravel would remain in place for one to two months and the amount of settlement monitored. Once the surcharge is removed, final grading and paving could occur.

Settlement monuments consisting of rebar placed after the surcharge in place can be used to monitor the rate of settlement of the soft material during the construction window. By monitoring actual settlements, reasonable decisions regarding paving and annual maintenance can be made.

Excavation in Sands/Gravels. For excavations where the pavement section is expected to be founded on sands and gravels (GP, GM, SP, SM), the excavation should be made utilizing a

backhoe with a smooth-bladed bucket from outside the excavation to minimize disturbance of the subgrade soils. Soils, which are disturbed, pumped, or rutted by the construction activity, should be re-densified as outlined herein, if possible, or completely removed and replaced with structural fill.

Excavation in Silts. For excavations where the pavement section is expected to be founded on silty soils (ML), the approach to excavation is similar to what was previously described. However, pumped or rutted silts are difficult to impossible to recompact when wet or disturbed. There were a number of samples recovered that classified as "non-plastic" yet had very high moisture contents. The soils will be difficult to impossible to compact, will not be able to support heavy loads, will settle, and will have a tendency to pump. In most cases, once disturbed, these soils must be over excavated. These types of soils will be encountered on both sides of the road from the start of the project to about MP 17.5.

Running Sands. Clean sands can present difficulties when excavating below the water table. The sands may be stable when confined by surrounding soils, but seepage forces can create a "quick" condition and wash the sands into the excavation, resulting in slumping and caving of the sides. This phenomenon is locally referred to as a *running sand* or *heaving sand* condition, and can greatly increase the size of an excavation. Deeper excavations may encounter this condition.

The condition can be controlled by drawing the elevation of the water table down to below the bottom of the planned excavation, and with an appropriate dewatering system prior to excavation, maintain the dewatering until the backfill is above the level of the water table.

Clearing and Grubbing. Cut all trees and brush to a maximum height of six inches above the existing ground surface, and a distance of 10 feet beyond slope limits. Remove all woody debris, organics and other objectionable material to an appropriate disposal site outside the project area. Any holes due to extraction of stumps, roots, or other material should be backfilled with Selected Material.

Geotextiles. A geotextile is used to permanently separate two distinct layers of soil in a roadway. For this project, a separation/stabilization geotextile such as LINQ GTF-300, Propex 2006, or equivalent could be used where Selected Material will overlie soft silts.

Frozen Soils. Do not place fill or asphalt pavement over frozen soils. Do not fill or backfill with frozen soils. All frozen soils encountered within the roadway section must be removed.

Selected Material. Two different materials may be used to construct portions of the road embankment; Selected Material Type A and Type B.

At a minimum, the upper 2.5 feet of the subbase should meet the gradation shown in the DOT&PF Standard Specifications for Highway Construction, Table 703-2.07, Selected Material, Type A.

In deeper excavations, Selected Material Type B may be used, as outlined in the DOT&PF Specifications Book, Section 703-2.07, Selected Material, Type B.

Fill Placement. Selected Material should be placed and compacted in lifts not exceeding eight inches in thickness. Each lift of structural fill should be compacted throughout its entire depth to a density of at least 95 percent of the laboratory maximum index density determined in accordance with AASHTO T 180, Method D (Modified Proctor) or Alaska T-12. All excavations should be dewatered before placement of structural fill.

Where the initial lift of fill is situated on soft silts, the lift thickness should be increased to a minimum of 18 inches. The compactive effort should also be reduced to 90 percent. This thicker lift and lower compactive effort helps to reduce the potential for pumping of the soils.

Fill Limits. Structural fill beneath the pavement section is constructed as a prism. The structural fill should extend laterally from the edge of the pavement one foot for each foot of fill beneath the pavement.

Fill Testing. Frequent, in-place density tests (Alaska T-3 or T-11) should be performed in each lift of fill to verify that the fill has been properly compacted prior to placing subsequent lifts. The number of tests performed in each lift should be commensurate with the size of the area

worked by the contractor, the variability of the soil types used as fill, and the amount of time an inspector spends on site observing the work.

5.4 Dewatering and Drainage

The reconstruction of the alignment and the construction of realignment areas must take surface drainage into account. As the Haines area receives more than 50 inches of rain a year, surface drainage is a significant concern as runoff can interfere with traffic, cause erosion, or damage the subgrade.

Dewatering. Depending on the measured depth of the groundwater table, the planned construction, and the weather at the time of construction, construction dewatering may be necessary in deeper excavations. Groundwater can likely be removed from excavations with the use of pumps. High infiltration rates of groundwater may require the use of well points or alternate techniques. It is essentially impossible to adequately place and compact structural fill if there is standing water in an excavation. Therefore, it is important that water be removed from excavations until they are properly backfilled. It should be the contractor's responsibility to determine the appropriate dewatering techniques for construction methods he chooses to use and for the soil and water conditions encountered.

Drainage. The surface water gradient follows the topography. Culverts should be installed periodically along the toe of the embankment to allow for passage of surface runoff. The designer should verify that the culverts could accommodate flood flows to avoid damming along the embankment. Surface drainage should be designed to collect and to carry precipitation and snowmelt away from the road surface.

Surface runoff will likely be present around most excavations and may impact construction efforts. Small shallow trenches or soil berms on the up-slope sides of the excavation can be used to help channel water away from the excavation area.

5.4.1 <u>Runoff</u>

Runoff can be removed from the sides of the alignment by the use of ditch lines, ditch relief culverts, or in-sloping or out-sloping the road surface.

Ditch lines. Surface runoff is a significant consideration for construction of the roadway. The existing alignment typically has a drainage ditch parallel to the road on the up-slope side. The depth and width of the ditch line varies depending on terrain. In areas of the alignment where a hill or cut face abuts the road section, drainage ditches should be constructed to accommodate higher quantities of runoff and should be a minimum of one foot deep. Areas where the topography is flat and more open could have shallower ditch lines. The ditch lines would then parallel the road until a ditch relief culvert in encountered.

Ditch Relief Culverts. Ditch relief culverts are placed periodically along the alignment to intercept the flow of water in the ditch lines. These culverts pipe water to the opposite side of the road where the flow disperses away from the pavement section. The spacing of ditch relief culverts depends on the road gradient, road surface and ditch soil types, runoff characteristics, and the effect of water concentrations on slopes below the road.

5.4.2 <u>Groundwater</u>

Some test pits and test borings encountered shallow groundwater along the existing road alignment. It should be anticipated that locally low areas where the vegetation consists of muskeg, would have a high water table. Some of these areas include:

- Stations 280+00 290+00 (Plan Sheets 3 and 4),
- Stations 510+00 532+00 (Plan Sheets 12 and 13),
- Stations 732+-00 to 740+00 (Plan Sheet 21), and
- Stations 813+00 828+00 (Plan Sheet 24)

In general, along the alignment, groundwater will tend to flow in one of three areas:

- along the peat/soil interface in areas of poor drainage (TB 38 Plan Sheet 12)
- through the alluvium (sands and gravels) (TPs 159 and 156 Plan Sheet 41)
- along the soil/bedrock interface

The water level will tend to fluctuate by several feet seasonally, especially during periods of heavy precipitation and spring "break-up."

5.5 Soil Slope Stability

Temporary cut slopes and trenches in both granular and fine-grained soils have been known to stand temporarily at very steep angles; however, they also have been known to fail suddenly and without warning thereby claiming lives. It is the responsibility of the contractor to determine appropriate temporary cut slopes or shoring for excavations and trenches for the site soils, water conditions, and surface loading conditions. As a minimum, the contractor should be in full compliance with all appropriate federal, state, and local safety requirements for trenching and shoring.

Permanent cut slopes in soil should be no steeper than 2:1 (horizontal:vertical), and should be protected from surface erosion as soon as possible after cutting. Permanent erosion protection may be accomplished with healthy landscaping such as grass, plants, or coarse gravel. Temporary protection with plastic sheets, straw, wood cellulose fiber mulch, or jute matting may be required if heavy rains occur before the plants are established.

5.6 Excavations in Rock

There are a significant number of areas where bedrock will require removal along the alignment. This investigation indicates that the bedrock will require blasting. Much of the blasted material should be reusable as roadbed material, if care is exercised during blasting. It is important that the blasting be done by a qualified licensed blaster with at least three years experience in the Haines and Southeast Alaska.

The blasting program should be designed to produce a neat cut face with minimal over-blast and loosening of the finished rock face. The blasting program should be designed to generally produce shot rock with a gradation that varies from sand sized particles to stones no larger than 12 inches. Pre-split blasting may be necessary. Any rock in the finished face of the cut loosened by blasting should be removed to control the potential for falling rock and debris at the toe of the slope before the excavation progresses downward. A plan should be in place for the control of flyrock to ensure the safety of the workers.

5.6.1 <u>Cut Slopes in Rock</u>

Fifty baselines were mapped. In addition, kinematic analyses were performed on the existing slopes and on 0.5:1 and 0.25:1 (H:V) slopes. The analyses show that in some areas there is a potential for planar, wedge, or toppling failures to occur as the slopes become steeper. Discussions with DOT&PF personnel were held to identify general practices in Southeast regarding back slopes, catchment widths, and benching. Based on these discussions, the rock type encountered along the alignment, and examples of similar rock cuts across Southeast, we recommend the following:

- Back slope 0.25:1
- Catchment Widths varies based on slope height and 80 percent retention
- Benching 1.5- to 2-foot benches every 30 feet

Slopes cut into the competent bedrock should stand nearly vertical with pre-splitting. However, the bedrock is variable in its quality and fracture frequency. A rock slope cut in highly fractured bedrock may not have the integrity to stand nearly vertical. Each rock cut, after blasting, will need to be evaluated for its stability and appropriateness of the selected slope. The contractor should be prepared to employ stabilization methods, if necessary.

Any overburden at the top of the rock cut should be removed for a minimum distance of 10 feet from the face of the rock and then laid back at a 2:1 slope. A clear zone should be maintained at the toe of the rock cut to protect the public from falling rock and debris. All overburden exposed at the top of the cut should be seeded as soon as is practical after the cut is made to control erosion of the soil.

5.6.2 <u>Rock Slope Stability</u>

Several modes of slope instability were evaluated using Rockpack III, including sliding out of the plane of the cut face and toppling. The bedding planes of the rock units and joint sets were also evaluated to determine if sliding of the rock along those planes is possible or if wedge-type failure modes were possible. The analyses were performed on the existing slope angle as well as slope angles of 63° and 76°. The results of these analyses are provided in Volume II, Geologic Mapping and specific recommendations are provided in Section 6.0, Station-to-Station

Descriptions. It should be noted that the kinematic analyses performed only indicate the potential for rockfalls, are based on generalized data, and are subjective.

There may be local areas of instability at the face of the cuts due to joints and fractures that may become exposed during blasting and excavation. If subsequent investigations show these local areas of instability, the face of the cut should be laid back to safe slope as determined. With cuts in rock, there is also a possibility of local wedge-type failures at the intersection of joint sets and fractures as the rock is excavated. Any zones of local instability should be removed as the excavation progresses or stabilized with rock anchors drilled into stable rock behind loose zones.

5.6.3 <u>Rock Catchment Ditches</u>

At the base of slopes, rock catchment ditches should be constructed (Figure 3). The appropriate width and depth of the ditch depends on the discontinuities of the rock slope, the height of the rock face, and the percentage of rocks retained. Table 5 provides general recommendations based on 0.25:1 slopes, but it should be recognized that some site-specific changes may be required, depending on the resultant rock face. Recommendations based on maximum slopes are provided in the Station-to-Station Descriptions.

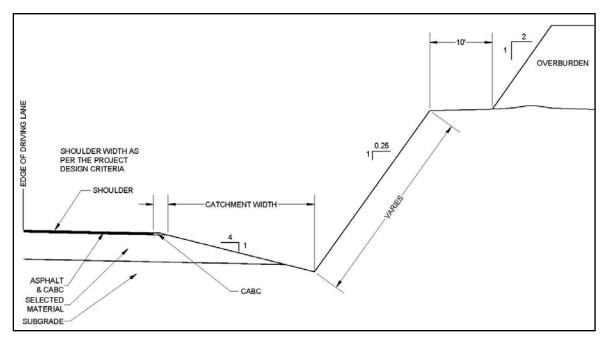


Figure 3: Rock Catchment Ditch

Slope Ratio (H:V)	Rock Slope Height (ft)	(80% Retained) Catchment Width (ft)	Catchment Depth at 4:1 (ft)			
0.25:1	40	7*	1.75			
0.25:1	50	10*	2.5			
0.25:1	60	12.5	3.13			
0.25:1	70	15	3.75			
0.25:1	80**	18	4.5***			
* Catchment widths less than 12 feet require guardrail per design criteria for clear zones.						
** Add three feet of catchment width for every 10 feet of rock slope height over 80 feet.						
*** Catchment de rock slope hei	pth increases 0.75 for ght = catchment 54	eet for every 10 feet of rock feet wide and 13.5 feet deep.	slope height (i.e., 200-foot			

Table 5: Catchment Ditches

5.6.4 <u>Access</u>

During the geologic mapping phase, each baseline area was investigated for equipment access routes to the top of the slopes. It was assumed that access would be required for blasting. Areas where potential routes were identified are shown on the Plan and Profile Sheets as arrows.

5.7 Rock Stabilization Methods

Once the slopes have been laid back to their design slopes, the new rock face may indicate localized areas of instability. Stabilization of these areas may be required however; the method of stabilization will likely vary from one location to the next. In general, there are three categories of stabilization:

- Reinforcement
- Rock removal
- Protection

The decision regarding which method to use must address construction issues such as cost, required equipment, access, as well as topography and environmental issues. There is no one method that addresses all instabilities.

5.7.1 <u>Reinforcement</u>

If the cause of instability is potentially loose rock, reinforcement may be required. There are a number of different methods to use. Each has its own advantages and disadvantages and is appropriate under certain circumstances. Figure 4 shows the different methods that can be used for reinforcement to include:

- Rock Bolts Tensioned to prevent further movement or sliding along the fracture face. Installed across potential failure areas or anchored into competent rock.
- Dowels Untensioned bolts grouted at the crest of a cut before excavation. Adds stability beforehand to help prevent the rock from moving along the fracture zones. Quicker installation and lower cost than rock bolts.
- Tieback Walls These types of walls are good for areas where there is a sliding failure in fractured rock. A reinforced concrete wall is constructed over the fracture area and then reinforced rock bolts are placed through the wall and into competent rock. This prevents raveling of the fractured rock over time.
- Shotcrete The primary purpose of shotcrete is to protect the face of the slope from degrading rock or very closely spaced fractured areas. However, it does not protect against sliding failure. The use of shotcrete should include reinforcement with either welded-wire mesh or steel fibers. Weepholes must be drilled to prevent the buildup of water.
- Buttresses There are areas where weak rock may fall, creating a cavity. Buttresses can be constructed, where concrete is used to fill the cavity. This protects the weak rock and supports the overhanging rock, preventing further failure. In order for the buttress to perform well, the top of the buttress must be in contact with the rock above and the buttress must be formed such that the rock above supports the buttress in compression.
- Drainage One of the most common causes of slope failure is groundwater. The typical method of addressing drainage is to drill weepholes into the rock at specified intervals. The weepholes are drilled at the toe of the slope in order to catch water flowing through the fractures and provide an outlet for the water. The angle of the weepholes will vary from exposure to exposure and should be drilled so that they intersect the discontinuities dipping from the rock face.

If excessive runoff flows from the top of the slope and into large fractures, other methods to control drainage could include filling the cracks with shotcrete, or constructing lined drainage ditches at the top of the slope to intercept water and route away from the area.

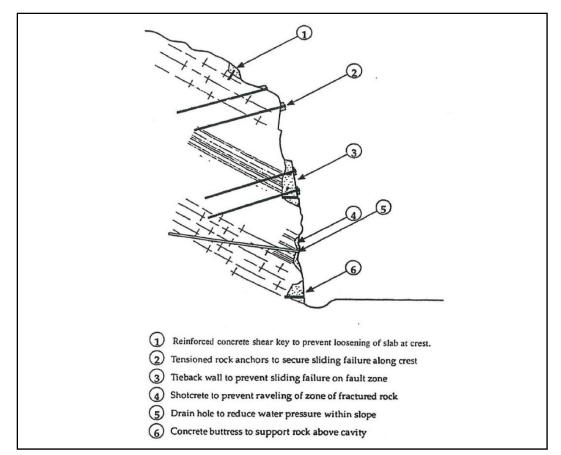


Figure 4: Reinforcement Methods (Wyllie and Mah, 1998)

5.7.2 <u>Rock Removal</u>

There may be areas where there is potential unstable rock and removal is the best option. Typically this can be done in one of three ways and depends of the cause for the instability:

- Resloping. This is primarily done on the upper portions of slopes where weathered rock or overburden is present. If material is not removed for a sufficient distance back from the slope, this adds an unnecessary load to the rock face.
- Trimming. There are occasions where rock will form an overhang on a rock face due to previous failures or weathering. In this case, removal of the rock should be done to prevent future failure. This can be done with controlled, cushioned blasting that only removes small areas of rock.
- Scaling. In areas where there is small rock raveling or vegetation that must be removed, personnel with chain saws and bars can scale from the top of the slope using ropes to

remove these areas. On short slopes, mechanical lifts from the base of the slope can be used.

These methods are shown on Figure 5 below.

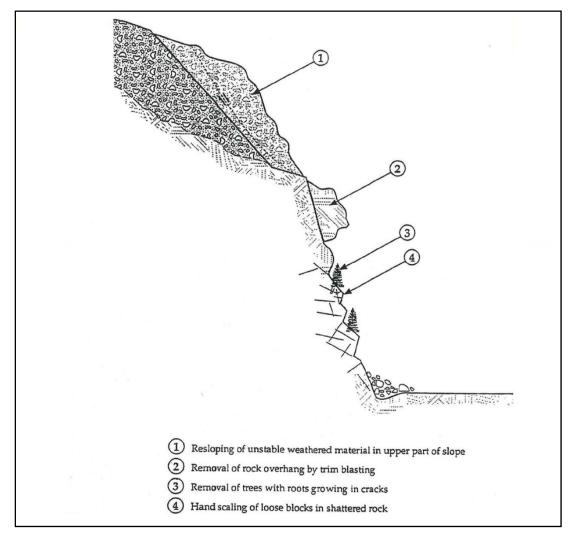


Figure 5: Rock Removal (Wyllie and Mah, 1998)

5.7.3 <u>Protection</u>

In many instances, allowing the rock to fall, but preventing it from impacting traffic or moving too far from the slope is the best option. There are numerous methods that can be used to protect the public from the rock falls. Methods include catchment ditches, mesh hanging from the slope, and barriers some distance from the toe of the slope. The use of the protection must include an analysis into the type of rockfall in order to determine the most appropriate protection measure to employ.

6.0 STATION TO STATION DESCRIPTIONS

6.1 Station 204+00 (BOP) to 235+00 (Sheets 1 and 2 of 44)

This section of the roadway falls within a culturally sensitive area. Permission to access the area for drilling or excavating was not obtained before the Phase I and Phase II fieldwork were completed, and to date, no subsurface exploration has been performed. Test Borings/Pits 1 through 5 have been moved to a future Phase III.

6.1.1 <u>Topography</u>

This section is level and the road extends around a bedrock hill, adjacent to the Chilkat River.

6.1.2 <u>Vegetation</u>

Both sides of the road have been previously cleared. The cleared distance varies depending on which side of the road and topographical features, such as bedrock outcrops, but in general, the cleared setback is at least ten feet. Grass and occasional low shrubs were observed.

6.1.3 <u>Surface Drainage</u>

Ditchlines are present on both sides of the road although occasionally overgrown. Drainage tends to flow from the north to the south.

6.1.4 <u>Proposed Alignment</u>

The new road section will be widened but will still follow the current alignment through a majority of this section. At Station 220+00, the roadway will deviate to the north from the existing section, and cut into the bedrock hill.

6.1.5 <u>Bedrock</u>

Baselines 1 and 2 were completed in this section. The measured discontinuities are as follows:

Baseline No.	No. of Joints	Dip Direction (Degrees)	Dip Angle (Degrees)
1	4	125 - 324	25 - 72
2	8	55 - 230	12 - 50

Table 6: Baseline Data (Station 204+00 – 235+00)

Kinematic analyses indicate that the potential for wedge, sliding, or toppling failures increases for slopes steeper than 50 degrees. Large pieces of rock do fall from the face periodically. A rockfall was observed this spring when a boulder approximately two feet in diameter fell from a distance of about 15 feet at Station 225+00. The rockfall was an impact type fall and retained by the existing catchment.

Recommendations

1. At least one or two test borings should be drilled in this area to confirm suspected subsurface conditions below the roadway.

2. The rock slope angles and catchment depths for this section of the alignment are as follows:

					Maximum		
		Existing	Existing	Existing	Proposed	Proposed	(80% Retained)
		Rock Slope	Slope	Slope	Rock Slope	Slope	Catchment
Begin	End	Height	Angle	Ratio	Height	Ratio	Width
Station	Station	(ft)	(degrees)	(H:V)	(ft)	(H:V)	(ft)
220+50	226+50	40	49 - 69	0.75:1 to 0.50:1	35	0.25:1	7

 Table 7: Rock Slopes/Catchment Depths (Station 204+00 - 235+00)

3. Water seeps were not observed in the rock faces so weephole locations have not been specified. New rock slopes should be carefully examined for water seeps after a heavy rainfall. As a precaution, weepholes could be installed every 20 to 30 feet along the base of the slope face.

6.2 Station 235+00 to 400+00 (Sheets 2 through 8 of 44)

Within this section, 10 test borings (TBs 9–14, 16, 17, 22, and 23) were completed off both sides of the existing roadway, five test borings (TBs 15, 18–20, and 29) were drilled in the roadway, and TB 25 was drilled on the gravel road shoulder. Test Borings 6–8, 21, 24 and 27 were not drilled and Test Pits 26 and 28 were not excavated.

6.2.1 <u>Topography</u>

This section is level and winds along the Chilkat River at the base of the hills between elevation 25 feet and 35 feet.

6.2.2 Vegetation

Both sides of the road have been previously cleared for a distance of about 10 to 20 feet. Secondary brush is present in some areas.

6.2.3 Surface Drainage

Ditchlines are present in select areas. However, the road section is built up such that the road slopes away from centerline. Drainage tends to flow from the north to the south. At Stations 316+00 and 338+00, heavy flood flows during the winter-transported gravels, sands, and silts down the mountainside and onto the roadway. Remnants of the debris are evident as clogged ditchlines adjacent to the road and newly deposited gravels on the opposite side of the roadway.

Waterfalls over the rock face at Stations 313+08 and 324+34 were observed. Water seeps in the rock face were observed at Station 331+05.

6.2.4 <u>Proposed Alignment</u>

This section of the new roadway is a series of minor realignments while still generally following the current roadway. At Station 301+00, the widening of the road will result in scaling the rock face back less than five feet. At Station 325+00, the roadway deviates slightly to the north from the existing section, and cuts into the bedrock slope a distance of about 30 feet. At Station 375+00, the roadway deviates slightly to the north from the existing section, and cuts into the bedrock hill about 15 feet.

6.2.5 <u>Subgrade Soils</u>

The existing road is a fill section. Poorly and well-graded gravels ranging in thickness from three feet to seven feet have been placed over the floodplain deposits of silts, sands, and silty sands. Off the sides of the road section, peat is present to depths not observed to exceed two feet. The floodplain deposits in the upper five feet of the soil column have low (less than 10) N –values, and more often, less than five.

6.2.6 <u>Bedrock</u>

Baselines 3 through 11 were completed in this section. A ditchline is located at the bases of the rock faces. The measured discontinuities are as follows:

Baseline No.	No. of Joints	Dip Direction (Degrees)	Dip Angle (Degrees)
3	10	0 - 30	42 - vertical
4	8	60 - 336	55 - 85
5	5	140 -336	60 - 77
6	11	36 - 336	28 - 81
7	3	225 - 331	50 - 76
8	6	254 - 320	50 - 82
9	9	251 - 340	48 - 86
10	3	50 - 330	62 - 75
11	6	15 - 304	55 - vertical

Table 8:	Baseline I	Data (Station	235+00 -	400+00)
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Kinematic analyses indicate that the potential for wedge, sliding, or toppling failures increases for slopes steeper than 56 degrees. Large pieces of rock fall from the face periodically.

6.2.7 Groundwater Conditions

Within the existing roadway, the groundwater elevations were observed or measured within the upper five feet of the soil column.

Test Boring No.	Estimated Groundwater Elevation (ft)	While Drilling (Nov. 16, 2005 April 24, 2006 April 29, 2006) Depth to Water (ft)	Measured Depth (Nov. 22, 2005 April 27, 2006 May 1, 2006) Depth to Water (ft)
9	19.5	5.5	No PVC
10	19.5	5.5	1
11	25	0	0
12	23	4	No PVC
13	28	1' above ground surface	No PVC
14	27	0	No PVC
15	24	4	1
16	27	0	No PVC
17	22	5	1.5
18	23	5	5.5
19	23	7	2
20	22	8	5
22	28	0	No PVC
23	28	0	No PVC
25	24	9	7
29	29	5	6.5

 Table 9: Groundwater Measurements (Station 235+00 – 400+00)

Recommendations

- Drainage should be improved in the vicinity of Stations 316+00 and 338+00, where heavy rainfall transports large quantities of water and soil into the ditchline and across the road. This could be accomplished with oversized culverts and deeper ditches.
- 2. In the vicinity of Stations 240+00, 260+00, 345+00 and 390+00, much of the new roadway will be constructed over soft floodplain deposits with the overall site grades raised by three feet or more. Settlement on the order of two to four inches could occur due to the placement of the gravels. In order to reduce the potential for cracking of the asphalt, fill should be placed early during the construction sequence and paving should be one of the last items completed. This will allow as much settlement as possible to occur before the pavement is placed. It should be assumed that about half of the total settlement would occur before the paving is placed if this sequence is followed. An alternate method of construction is to surcharge with two to three feet of gravel until monitoring indicates the surcharge can be removed.
- 3. The rock slope angles and catchment depths for this section of the alignment are as follows:

Begin Station	End Station	Existing Rock Slope Height (ft)	Existing Slope Angle (degrees)	Existing Slope Ratio (H:V)	Maximum Proposed Rock Slope Height (ft)	Proposed Slope Ratio (H:V)	(80% Retained) Catchment Width (ft)
301+50	304+00	60	63 - 65	0.50:1	70	0.25:1	15
306+00	308+50	30	45 - 56	0.75:1 to 1:1	30	0.25:1	5
312+00	315+00	50	70	0.33:1	45	0.25:1	10
319+00	321+50	45	55	0.75:1	55	0.25:1	12
322+00	334+00	40 - 50	54 - 69	0.75:1 to 0.50:1	65	0.25:1	14
376+00	384+00	25 - 35	51 - 68	0.75:1 to 0.50:1	65	0.25:1	14

 Table 10: Rock Slopes/Catchment Depths (Station 235+00 - 400+00)

4. Water is seeping through the rock near the base of the existing slope at Station 331+05. Weepholes should be installed through this section. The weepholes should be spaced at 10-foot intervals at least 10 feet deep at a shallow angle that intersects the discontinuities. The holes should be lined with perforated casing.

 In areas where water seeps were not observed in the rock faces, weepholes could be installed every 20 – 30 feet along the base of the slope face as a precaution. New rock slopes should be carefully examined for water seeps after a heavy rainfall.

6.3 Station 400+00 to 520+00 (Sheets 8 through 13 of 44)

Within this section, six test borings (TBs 38–43) were completed off both sides of the existing roadway, five test borings (TBs 30, 32–34, and 37) were drilled in the roadway, and two test borings (TBs 31 and 35) were drilled on the gravel road shoulder. Test Pit 36 was not excavated.

6.3.1 <u>Topography</u>

The topography of this section is similar to the previous section, winding along the Chilkat River at the base of the hills between elevation 35 feet and 45 feet.

6.3.2 <u>Vegetation</u>

Both sides of the road have been previously cleared for a distance of about 10 to 20 feet. Secondary brush is present in some areas. Beyond the road prism and clear zones, the area is well forested with old growth trees.

6.3.3 <u>Surface Drainage</u>

Ditchlines are present in select areas. However the road section is built up such that the sides slope away from both sides of the road. Drainage tends to flow from the north to the south. Between Station 453+00 and 454+00, heavy flood flows during the winter-transported gravels, sands, and silts down the mountainside and onto the roadway in this area. Remnants of this debris are evident as clogged ditchlines adjacent to the road and newly deposited gravels on the opposite side of the roadway.

A waterfall over the rock face at Station 461+00 was observed. No water seeps in the rock face were noted through this section of the alignment.

6.3.4 <u>Planned Alignment</u>

The new road section will be widened but will still follow the current alignment through a majority of this section. Between Stations 402+00 and 413+00, the road begins to deviate to the

south about 30 feet into the Chilkat River. Other minor alignments where the road cuts into the bedrock to the north occur:

- Between Station 428+00 and 436+00, cutting into the bedrock a maximum distance of about 60 feet,
- Between Station 457+00 and 484+00, cutting in the bedrock a maximum of 50 feet, and on average, less than 30 feet.

6.3.5 <u>Subgrade Soils</u>

The existing road is a fill section. Poorly and well-graded gravels ranging in thickness from 2.5 feet (Test Boring 32) to 10 feet (Test Boring 30) have been placed over the floodplain deposits of silts, sands, and silty sands. Off the sides of the road section, peat is present to depths from two or three inches to five feet (Test Boring 38), but averages less than one foot. The floodplain deposits in the upper five feet of the soil column have low (less than 10) N –values, and more often, less than five. Bedrock was encountered in several of the test borings as shallow as 2.5 feet.

6.3.6 <u>Bedrock</u>

Baselines 12 through 23 were completed in this section. The slope of the bedrock varies from 37 degrees to 71 degrees. Ditchlines are located at the base of the rock faces. The measured discontinuities are as follows:

Baseline	No. of	Dip Direction	Dip Angle
No.	Joints	(degrees)	(degrees)
12	7	45 - 350	40 - 70
13	7	5 - 330	10 - 81
14	3	40 - 325	50 - 85
15	10	12 - 355	15 - 70
16	6	269 - 345	15 - 74
17	3	185 - 340	37 - 51
18	13	40 - 340	18 - 78
19	7	0 - 305	40 - 85
20	10	234 - 325	17 - 88
21	11	35 - 326	20 - 75
22	3	55 - 338	50 - 87
23	14	157 - 322	38 - 75

 Table 11: Baseline Data (Station 400+00 - 520+00)

Kinematic analyses indicate that the potential for wedge, sliding, or toppling failures increases for slopes steeper than 56 degrees. Large pieces of rock periodically fall from the face.

6.3.7 <u>Groundwater</u>

Within the existing roadway, the groundwater elevations were observed or measured within the upper five feet of the soil column. In the table below, "N.O." signifies that groundwater was "not observed" while drilling.

Test Boring No.	Estimated Groundwater Elevation (ft)	While Drilling (Nov. 17, 2005, April 23, 2006 through May 1, 2006) Depth to Water (ft)	Measured Depth (Nov. 22, 2005 and April 23, 2006) Depth to Water (ft)
30	28	8	8.5
31	26	4	No PVC
32		N.O.	No PVC
33		N.O.	N.O.
34		N.O.	No PVC
35		N.O.	No PVC
37		N.O.	No PVC
38	35	N.O.	5
39	35	5	No PVC
40	35	5	No PVC
41	35	5	No PVC
42	35	5	No PVC
43	35	5	No PVC

 Table 12: Groundwater Measurements (Station 400+00 - 520+00)

Recommendations

- 1. Drainage should be improved between Stations 453+00 and 454+00, where heavy rainfall transports large quantities of water and soil into the ditchline and across the road.
- 2. The rock slope angles and catchment depths for this section of the alignment are as follows:

Begin Station	End Station	Existing Rock Slope Height (ft)	Existing Slope Angle (degrees)	Existing Slope Ratio (H:V)	Maximum Proposed Rock Slope Height (ft)		(80% Retained) Catchment Width (ft)
426+00	436+00	35	27 - 61	2:1 to 0.50:1	80	0.25:1	18
458+00	462+00	25 - 35	51 - 60	0.75:1	120	0.25:1	30
462+00	468+00	30	45 - 60	1:1 to 0.75:1	60	0.25:1	12.5
468+00	483+00	35 - 60	37 - 71	1:1 to 0.50:1	130	0.25:1	33

 Table 13: Rock Slopes/Catchment Depths (Station 400+00 - 520+00)

- 3. Between Stations 402+00 and 413+00, 448+00 and 456+00, and 490+00 and 517+00, much of the new roadway will be constructed over soft floodplain deposits with the overall site grades raised by one to five feet. Settlement on the order of two to four inches could occur due to the placement of the gravels. In order to reduce the potential for cracking of the asphalt, fill should be placed early during the construction sequence and paving should be one of the last items completed. This will allow as much settlement as possible to occur before the pavement is placed. It should be assumed that about half of the total settlement would occur before the paving is placed if this sequence is followed. An alternate method of construction is to surcharge with two to three feet of gravel until monitoring indicates the surcharge can be removed.
- 4. From Stations 402+00 to 413+00, armor or the use of riprap should be considered for the river side of the embankment to reduce the potential for scour from the river. In addition, the planned alignment shows a low road elevation of about 27 feet, which is very close to the elevation of the water in the river. Raising the road grade through this realignment area should be considered.
- Water seeps were not observed in the rock faces so weephole locations have not been specified. New rock slopes should be carefully examined for water seeps after a heavy rainfall. As a precaution, weepholes could be installed every 20 – 30 feet along the base of the slope face.

6.4 Station 520+00 to 906+00 (Sheets 13 through 27 of 44)

Within this section, 26 test borings (TBs 45–53, 62–67, 76–78, 82–87, 101, 102,) were completed off both sides of the existing roadway, 16 test borings (TBs 55, 57, 60, 61, 71, 74, 81, 88, 90-93, 104, and 107-109) were drilled in the roadway, three test borings (TBs 44, 68, and 103) were drilled on the gravel road shoulder, and two test pits (TP 80, 106) were excavated.

Test Borings 56, 58, 59, 70, 89, and 95 – 100 were not drilled. Test Pits 54, 56, 58, 59, 69, 72 – 75, and 94 were not excavated.

6.4.1 <u>Topography</u>

This section of the roadway deviates from the main channel of the Chilkat River and begins to gain elevation from elevation 45 feet to about elevation 80. The roadway is situated between the mountains and an overflow branch of the river.

6.4.2 <u>Vegetation</u>

Both sides of the road have been previously cleared for a distance of about 10 to 20 feet. Secondary brush is present in some areas. Beyond the road prism and clear zones, the area is well forested with old growth trees.

6.4.3 <u>Surface Drainage</u>

Ditchlines are present in select areas. However the road section is built up such that the sides slope away from both sides of the road. Drainage tends to flow from the north to the south.

No waterfalls or water seeps were noted through this section of the alignment.

6.4.4 <u>Planned Alignment</u>

In this area, the new roadway contains numerous minor realignments and two major realignments required to meet the new design criteria while still generally following the current roadway. Minor realignments are planned at the following stations:

- Between Station 524+00 and 533+00, crossing a low-lying area,
- Between Station 534+00 and 552+00, with a segment cutting into the bedrock a maximum distance of about 30 feet,

- Between Station 612+00 and 623+00, crossing a low-lying area,
- Between Station 643+00 and 662+00, cutting into the bedrock,
- Between Station 703+00 and 753+00, with some bedrock cuts and crossing a low-lying area,
- Between Station 758+00 and 780+00, cutting into the bedrock,
- Between Station 785+00 and Station 812+00, cutting into the rock about 20 feet,
- Between Station 830+00 and 837+00, cutting into the rock about 30 feet,
- Between Station 840+00 and 851+00, cutting into the rock about 40 feet, and
- Between Station 861+00 and 876+00, cutting into the talus slope.

Major Realignments are planned at the following locations:

- Between Station 665+00 and 692+00, and
- Between Station 879+00 and 906+00.

6.4.5 <u>Subgrade Soils</u>

The existing road through this area continues to be a fill section. Poorly and well-graded gravels ranging in thickness from 2.5 feet to seven feet have been placed over the floodplain deposits of silts, sands, and silty sands. Off the sides of the road section, peat is present to depths from two or three inches to five feet, but averages less than one foot. The floodplain deposits in the upper five feet of the soil column have low (less than 10) N –values, and more often, less than five. Bedrock was encountered in two of the test borings as shallow as 2.5 feet.

6.4.6 <u>Bedrock</u>

Baselines 24 through 55 were completed in this section. The bedrock has a variable slope throughout this area. Ditchlines are located at the base of the rock. The measured discontinuities are as follows:

Baseline	No. of	Dip Direction	Dip Angle
No.	Joints	(degrees)	(degrees)
24	13	0 - 339	26 - vertical
25	10	3 - 320	28 - 87
26	5	6 - 319	40 - 81
27	12	19 - 325	32 - vertical
28	18	10 - 350	31 - vertical
29	10	195 - 355	51 - 83
30	9	12 - 320	20 - 75
31	14	0 - 350	49 - 81
32	22	0 - 355	17 - vertical
33	4	0 - 331	26 - 89
34	3	55 - 345	59 - 75
35	15	0 - 355	15 - 87
36	22	0 - 358	15 - vertical
37	4	5 - 284	60 - vertical
38	12	45 - 358	27 - vertical
39	14	45 - 334	1 - vertical
40	7	52 - 353	55 - vertical
41	9	98 - 350	5 - 88
42	7	187 - 343	32 - vertical
43	24	17 - 347	32 - vertical
44	4	30 - 333	30 - 75
45	11	4 -338	6 - vertical
46	12	5 - 338	35 - 87
47	4	210 - 355	32 - 77
48	10	18 - 340	36 - 83
49	10	245 - 348	34 - 79
50	11	15 - 359	51 - vertical
51	3	265 - 353	41 - 76
52	10	45 - 350	33 - 87
53	1	333	82
54	22	11 - 343	6 - vertical
55	1	340	50

 Table 14: Baseline Data (Station 520+00 – 906+00)

Kinematic analyses indicate that the potential for wedge, sliding, or toppling failures increases for slopes steeper than 56 degrees. Large pieces of rock periodically fall from the face.

6.4.7 <u>Groundwater</u>

Within the existing roadway, the groundwater elevations were observed or measured within the upper five feet of the soil column. In the table below, "N.O." signifies that groundwater was "not observed" while drilling/excavating.

		While Drilling	Measured Depth
		(Nov. 17, 2005, April 25, 2006	(Nov. 22, 2005, April 23, 2006
		April 25, 2006	April 23, 2006
_	Estimated	through	through
Test	Groundwater	_May 1, 2006)	May 1, 2006)
Boring	Elevation	Depth to Water	Depth to Water
No.	(ft)	(ft)	(ft)
44	37	N.O.	5
45	35	5	4.5
46	34	6	No PVC
47	35.5	4.5	No PVC
48	35	5	3
49	40	0	No PVC
50	35.5	4.5	0
51	35	5	No PVC
52	40	5	0.3
53	40.5	4.5	No PVC
55	36	9	9
57	41	5	6.5
60		N.O.	No PVC
61	46	N.O.	4
62	41	4	4.5
63	37.5	7.5	4.3
64	40	5	No PVC
65	40	5	PVC not found
66	44	6	No PVC
67	39.5	5.5	6.5
68	42	8	8
71	49.7	N.O.	4.3
76	54	6	No PVC
77	54	6	0.3
78	55	5	0
79		N.O.	No PVC
80	53.5	6.5	No PVC
81	46	14	8.5
82	59.5	5.5	2.5
83	52.5	7.5	No PVC
84	54.5	5.5	4.5
85	53	7	No PVC
86	52	8	5
87		N.O.	No PVC
88		N.O.	No PVC
90		N.O.	PVC obstructed
91	49	11	<u>9</u>
92	55	7	9
93	55	5	PVC obstructed
101		N.O.	No PVC
101	55	5	1
102		N.O.	PVC not found
103		N.O.	PVC obstructed
104		N.O.	No PVC
100		N.O.	No PVC
107	72	<u> </u>	8
108	12	N.O.	o PVC obstructed
107		11.0.	

Table 15: Groundwater Measurements (Station 520+00 – 906+00) Page 100

Recommendations

- 1. Between Stations 525+00 and 531+00, 539+00 and 543+00, 614+00 and 620+50, 686+00 and 690+00, and 730+00 and 734+00, much of the new roadway will be constructed over soft floodplain deposits with the overall site grades raised by one to five feet. Settlement on the order of two to four inches could occur due to the placement of the gravels. In order to reduce the potential for cracking of the asphalt, fill should be placed early during the construction sequence and paving should be one of the last items completed. This will allow as much settlement as possible to occur before the pavement is placed. It should be assumed that about half of the total settlement would occur before the paving is placed if this sequence is followed. An alternate method of construction is to surcharge with two to three feet of gravel until monitoring indicates the surcharge can be removed.
- 2. The rock slope angles and catchment depths for this section of the alignment are as follows:

Begin Station	End Station	Existing Rock Slope Height (ft)	Existing Slope Angle (degrees)	Existing Slope Ratio (H:V)	Maximum Proposed Rock Slope Height (ft)	Proposed Slope Ratio (H:V)	(80% Retained) Catchment Width (ft)
543+50	547+50	20 - 30	38	2:1	50	0.25:1	10
564+50	569+50	25 - 35	34 - 54	2:1 to 0.75:1	55	0.25:1	12
573+50	601+50	15 - 40	30 - 50	2:1 to 0.75:1	55	0.25:1	12
608+00	612+00	30	58	0.75:1	55	0.25:1	12
635+50	640+50	30 - 60	45 - 56	1:1 to 0.75:1	55	0.25:1	12
640+50	651+00	70 - >150	49 - 62	1:1 to 0.50:1	220	0.25:1	60
651+00	662+50	25 - 40	33 - 43	3:1 to 2:1	45	0.25:1	9
662+50	685+00	0	10	N/A	90	0.25:1	21
692+50	698+00	20 - 40	40	3:1 to 2:1	85	0.25:1	20
703+50	706+50	20	15	3:1	25	0.25:1	5
706+50	714+00	20 - 80	53 - 59	0.75:1	100	0.25:1	24
714+00	729+50	20 - 80	49	1:1	50	0.25:1	10
762+00	772+00	15 - 50	40 - 53	2:1 to 0.75:1	80	0.25:1	18
772+00	777+50	15	30	3:1	60	0.25:1	12.5
777+50	780+50	20	45	1:1	120	0.25:1	30
780+50	782+00	150	63	0.50:1	225	0.25:1	62
782+00	794+50	60	63	0.50:1	85	0.25:1	20
794+50	799+00	80	63	0.50:1	100	0.25:1	24
799+00	808+50	30	45	1:1	40	0.25:1	7
808+50	812+00	60	63	0.50:1	100	0.25:1	24
830+00	836+50	50	59	0.75:1	120	0.25:1	30
841+00	850+00	50-60	45-57	1:1 to 0.75:1	120	0.25:1	30

 Table 16: Rock Slopes/Catchment Depths (Station 520+00 – 906+00)

3. Water seeps were not observed in the rock faces so weephole locations have not been specified. New rock slopes should be carefully examined for water seeps after a heavy rainfall. As a precaution, weepholes could be installed every 20 to 30 feet along the bases of the rock slopes.

6.5 Station 906+00 to 1020+00 (Sheets 27 through 32 of 44)

Within this section, four test borings (TBs 116–120) were drilled in the roadway, one test boring (TB 122) was drilled on the gravel road shoulder, and ten test pits (TP 110-115, 121, 123, 124 and 126) were excavated. Test Pits 119, 125 and 127 were not excavated.

6.5.1 <u>Topography</u>

This section of the roadway begins with a major realignment from the main roadway across a low lying area about 10 feet lower in elevation that the existing roadway. After the realignment, the roadway climbs in elevation to about elevation 130 while crossing an alluvial fan. The fan contains the MP 19 debris flow, which the roadway crosses before sloping down to elevation 110 feet and the Chilkat River below.

6.5.2 <u>Vegetation</u>

Both sides of the road have been previously cleared for a distance of about 10 to 20 feet. Secondary brush is present in some areas. Beyond the road prism and clear zones, the area is well forested with old growth trees.

6.5.3 <u>Surface Drainage</u>

Ditchlines are present and the roadway is crowned such that water drains away from the roadway and side slopes. Drainage tends to flow from the north to the south.

6.5.4 <u>Planned Alignment</u>

At the start of this segment, the planned alignment deviates to the northwest in a substantial realignment that extends from Station 906+00 to 928+00. The new roadway then generally follows the current alignment throughout the rest of this section. There is a minor realignment at the Mile 19 debris flow, where the planned roadway shifts to the west about 60 feet.

6.5.5 <u>Subgrade Soils</u>

The existing road through this area continues to be a fill section. Gravels and sands ranging in thickness from 2.5 feet to eight feet have been placed over the alluvial deposits of gravels and sands. The thickness of the fill material is difficult to determine due to the similarity of the "native" soils below.

In the vicinity of the planned realignment, the soils consist of silts, organic silts, and silty sands that are soft and loose and covered in as much as two feet of peat. Bedrock should not be encountered through this section, although cobbles and boulders will be present.

6.5.6 <u>Groundwater</u>

Within the existing roadway, the groundwater elevations were observed or measured within the upper five feet of the soil column. In the table below, "N.O." signifies that groundwater was "not observed" while drilling/excavating.

Test Boring No.	Estimated Groundwater Elevation (ft)	While Drilling (Nov. 20, 2005, April 18, 2006) Depth to Water (ft)	Measured Depth Depth to Water (ft)
110	65	7	No PVC
111		N.O.	No PVC
112	72	4	No PVC
113	75	3	No PVC
114	82	3	No PVC
115	88	7	No PVC
116		N.O.	PVC frozen at 4 ft
117		N.O.	PVC frozen at 4 ft
118		N.O.	No PVC
120		N.O.	N.O.
121		N.O.	No PVC
122		N.O.	N.O.
123		N.O.	No PVC
124		N.O.	No PVC
126		N.O.	No PVC

 Table 17: Groundwater Measurements (Station 906+00 – 1020+00)

Recommendations

- 1. Between Stations 906+00 and 924+00, a new roadway will be constructed over soft floodplain deposits consisting of silts, organic silts, and sands. In some areas, the site grades will be raised by about three feet. Settlement on the order of two to six inches could occur due to the placement of the gravels. In order to reduce the potential for cracking of the asphalt, fill should be placed early during the construction sequence and paving should be one of the last items completed. This will allow as much settlement as possible to occur before the pavement is placed. It should be assumed that about half of the total settlement would occur before the paving is placed if this sequence is followed. An alternate method of construction is to surcharge with two to three feet of gravel until monitoring indicates the surcharge can be removed.
- 2. Improvements to the MP 19 debris flow area have been evaluated and are addressed in Appendix D, Debris Flows.

6.6 Station 1020+00 to 1100+00 (Sheets 32 through 35 of 44)

Within this section, one test boring (TB 135) were completed off the side of the existing roadway, and four test borings (TBs 129, 131, 133, and 134) were drilled in the roadway. Test Boring 128 was not drilled and Test Pits 130 and 132 were not excavated.

6.6.1 <u>Topography</u>

This section of the roadway generally follows the existing roadway and steadily climbs in elevation from about elevation 110 to elevation 130. The roadway is situated at the base of the hills and adjacent to the Chilkat River.

6.6.2 <u>Vegetation</u>

Both sides of the road have been previously cleared for a distance of about 10 to 20 feet. Secondary brush is present in some areas. Beyond the road prism and clear zones, the area is well forested with old growth trees.

6.6.3 <u>Surface Drainage</u>

Ditchlines are present in select areas. However, the road section is built up such that the sides slope away from both sides of the road. Drainage tends to flow from the north to the south. At Station 1021+50 and 1065+00, heavy flood flows during the winter transported gravels, sands, and silts down the mountainside and onto the roadway in these areas. Remnants of the debris are evident as clogged ditchlines adjacent to the road and newly deposited gravels on the opposite side of the roadway.

6.6.4 <u>Planned Alignment</u>

The planned alignment generally follows the current alignment throughout this section with minor modifications at curves. The largest realignment occurs between Station 1062+00 and 1079+00 where the road shifts inland approximately 100 feet.

6.6.5 <u>Subgrade Soils</u>

The existing road through this area continues to be a fill section. Gravels and sands ranging in thickness from 2.5 feet to five feet have been placed over alluvial deposits of gravels and sands.

In the vicinity of the planned realignment (Station 1062+00 and 1079+00), no excavations were completed. However, it appears that this area consists of alluvial soils and bedrock is not expected to be encountered. Cobbles and boulders will be present.

6.6.6 <u>Groundwater</u>

Within the existing roadway, the groundwater elevations were observed or measured within the upper five feet of the soil column. In the table below, "N.O." signifies that groundwater was "not observed" while drilling/excavating.

Test Boring No.	Estimated Groundwater Elevation (ft)	While Drilling (Nov. 20, 2005) Depth to Water (ft)	Measured Depth (April 17, 2006) Depth to Water (ft)
129		N.O.	No PVC
131	100		8
133	113		3
134		N.O.	No PVC
135		N.O.	No PVC

 Table 18: Groundwater Measurements (Station 1020+00 – 1100+00)
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Recommendations

1. Drainage should be improved in the vicinity of Stations 1021+50 and 1065+00, where heavy rainfall transports large quantities of water and soil into the ditchline and across the road.

6.7 Station 1100+00 to 1220+00 (Sheets 35 through 40 of 44)

Within this section, eight test borings (TBs 137, 139, 142–144, and 146-148) were drilled in the roadway, and two test pits (TPs 138 and 149) were excavated. Test Boring 145 was not drilled and Test Pits 136, 140, and 141 were not excavated.

6.7.1 <u>Topography</u>

This section of the roadway moves away from the Chilkat River at elevation 135 and begins a steep winding climb to elevation 168, drops down to elevation 130, and then begins to climb again, passing above the village of Klukwan and the MP 23 debris flow to elevation 318 feet. The roadway then descends to the river crossing below.

6.7.2 <u>Vegetation</u>

Both sides of the road have been previously cleared for a distance of about 10 to 20 feet. Secondary brush is present in some areas. Beyond the road prism and clear zones, the area is well forested with old growth trees.

6.7.3 <u>Surface Drainage</u>

Ditchlines are present in select areas. However, the road section is built up such that the sides slope away from both sides of the road. Drainage tends to flow from the north to the south. At Station 1103+50 and 1208+00, heavy flood flows during the winter transported gravels, sands,

and silts down the mountainside and onto the roadway in these areas. Remnants of the debris are evident as clogged ditchlines adjacent to the road and newly deposited gravels on the opposite side of the roadway. At Station 1208+00, the amount of debris carried adjacent to the road extended to the river (next section) and across the road at the curve before the river.

6.7.4 <u>Planned Alignment</u>

The planned alignment follows the current alignment throughout this section.

6.7.5 <u>Subgrade Soils</u>

The existing road through this area continues to be a fill section. Gravels and sands ranging in thickness from 2.5 feet to four feet have been placed over alluvial deposits of gravels and sands with the occasional silt layer.

Test Pit 138, excavated at the intersection of the Haines Highway and Village of Klukwan Road indicted about four feet of sandy fill material over four feet of organic silt. It is unlikely that bedrock will be encountered through this segment; however, cobbles and boulders will be present.

6.7.6 Groundwater

Within the existing roadway, the groundwater elevations were observed or measured within the upper five feet of the soil column.

Test Boring No.	Estimated Groundwater Elevation (ft)	While Drilling (Nov. 21, 2005, April 22, 2006) Depth to Water (ft)	Measured Depth (Nov. 22, 2005) Depth to Water (ft)
137		N.O.	N.O.
139		N.O.	N.O.
142		N.O.	PVC obstructed
143	249	N.O.	15
144		N.O.	No PVC
146		N.O.	N.O.
147		N.O.	N.O.
148		N.O.	N.O.
149		N.O.	No PVC

 Table 19: Groundwater Measurements (Station 1100+00 – 1220+00)

Recommendations

1. Drainage should be improved in the vicinity of Stations 1103+50 and 1208+00, where heavy rainfall transports large quantities of water and soil into the ditchline and across the road.

6.8 Station 1220+00 to 1260+00 (Sheets 40 through 42 of 44)

Within this section, one test boring (TB 154) was drilled in the roadway, one test boring (TB 150) was drilled on the gravel road shoulder, and seven test pits (TPs 151–153, 156–159) were excavated.

6.8.1 <u>Topography</u>

This section of the roadway continues sloping down to the river from elevation 220 to elevation 130. Across the river, the area is at a relatively constant elevation of about 130 feet.

6.8.2 <u>Vegetation</u>

This area is undeveloped and is well forested with old growth trees.

6.8.3 <u>Surface Drainage</u>

On both sides of the river, the areas naturally slope down towards the river. Design of the realignment should incorporate a similar sloping condition as well as ditchlines. The ditchlines on the east side of the river should be designed to incorporate some of the debris that will flow from MP 23 to the river.

6.8.4 <u>Planned Alignment</u>

The planned alignment is a proposed realignment that descends to and crosses the Chilkat River before merging with the existing roadway.

6.8.5 <u>Subgrade Soils</u>

The soils through this area will be a combination of alluvial material and outwash deposits of sands and gravels with near surface silts below the organic mat. Bedrock is unlikely; however, cobbles and boulders will be present.

6.8.6 <u>Groundwater</u>

Within the existing roadway, the groundwater elevations were observed or measured within the upper five feet of the soil column. In the table below, "N.O." signifies that groundwater was "not observed" while drilling/excavating.

Test Boring No.	Estimated Groundwater Elevation (ft)	While Drilling (April 19, 2006 through April 22, 2006) Depth to Water (ft)	Measured Depth (April 3, 2006) Depth to Water (ft)
150		N.O.	N.O.
151		N.O.	No PVC
152		N.O.	No PVC
153		N.O.	No PVC
154		N.O.	PVC frozen at 4 ft
156	116	9	No PVC
157	117	8	No PVC
158	119	6	No PVC
159	115	10	No PVC

Table 20:	Groundwater	Measurements	(Station	1220+00 -	1260+00)
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Recommendations

1. Drainage should be constructed to allow for debris from MP23 to flow towards the river.

6.9 Station 1260+00 to 1317+59 (EOP) (Sheets 42 through 44 of 44)

Within this section, one test boring (TB 155) was drilled in the roadway.

6.9.1 <u>Topography</u>

This section of the roadway generally follows the existing roadway and steadily climbs in elevation. The roadway is situated at the base of the hills away from the river.

6.9.2 <u>Vegetation</u>

Both sides of the road have been previously cleared for a distance of about 10 to 20 feet. Secondary brush is present in some areas. Beyond the road prism and clear zones, the area is well forested with old growth trees.

6.9.3 <u>Surface Drainage</u>

Currently drainage is to the east. No ditchlines are present within the undeveloped area. Ditchlines are present on both sides of the roadway from Station 1265+00 to the end of the project.

6.9.4 <u>Planned Alignment</u>

The planned alignment extends from the river, about 400 feet downstream of Wells Bridge and merges with the existing highway at Station 1265+00.

6.9.5 <u>Subgrade Soils</u>

The existing road through this area continues to be a fill section about seven feet thick and comprised of gravels and sands over alluvial and floodplain deposits of silty sands and silts.

Based on the limited subsurface information collected, it appears that this area consists of alluvial/floodplain soils and bedrock is not expected to be encountered. Cobbles and boulders will be present.

6.9.6 <u>Groundwater</u>

Within the existing roadway, the groundwater elevation was observed or measured within the upper ten feet of the soil column.

Test Boring No.	Estimated Groundwater Elevation (ft)	While Drilling (Nov. 22, 2005) Depth to Water (ft)	Measured Depth (April 3, 2006) Depth to Water (ft)
155	124	7	PVC obstructed

 Table 21: Groundwater Measurements (Station 1260+00 – 1317+60 (EOP))

Recommendations

1. Drainage should be constructed to allow for runoff to flow towards the river.

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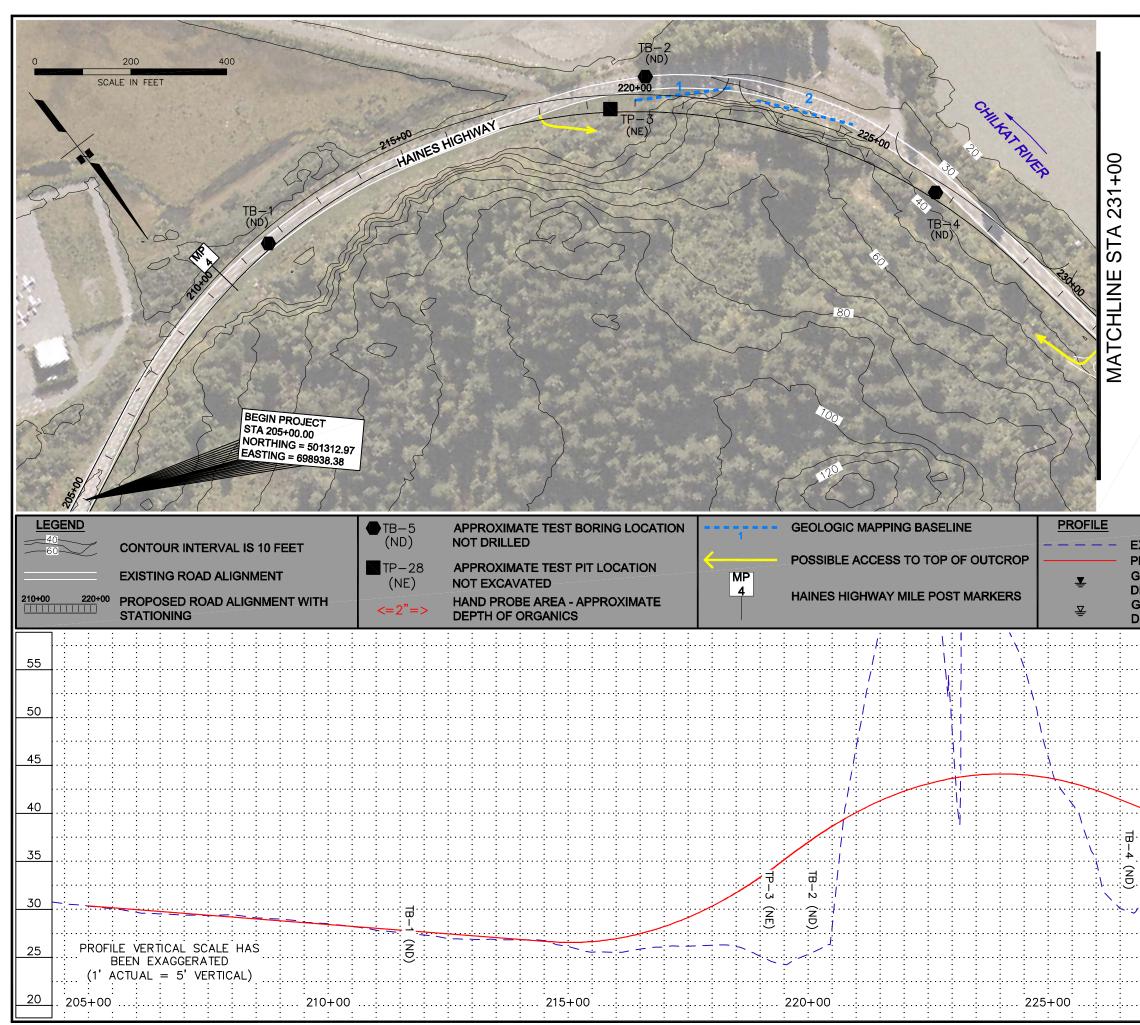
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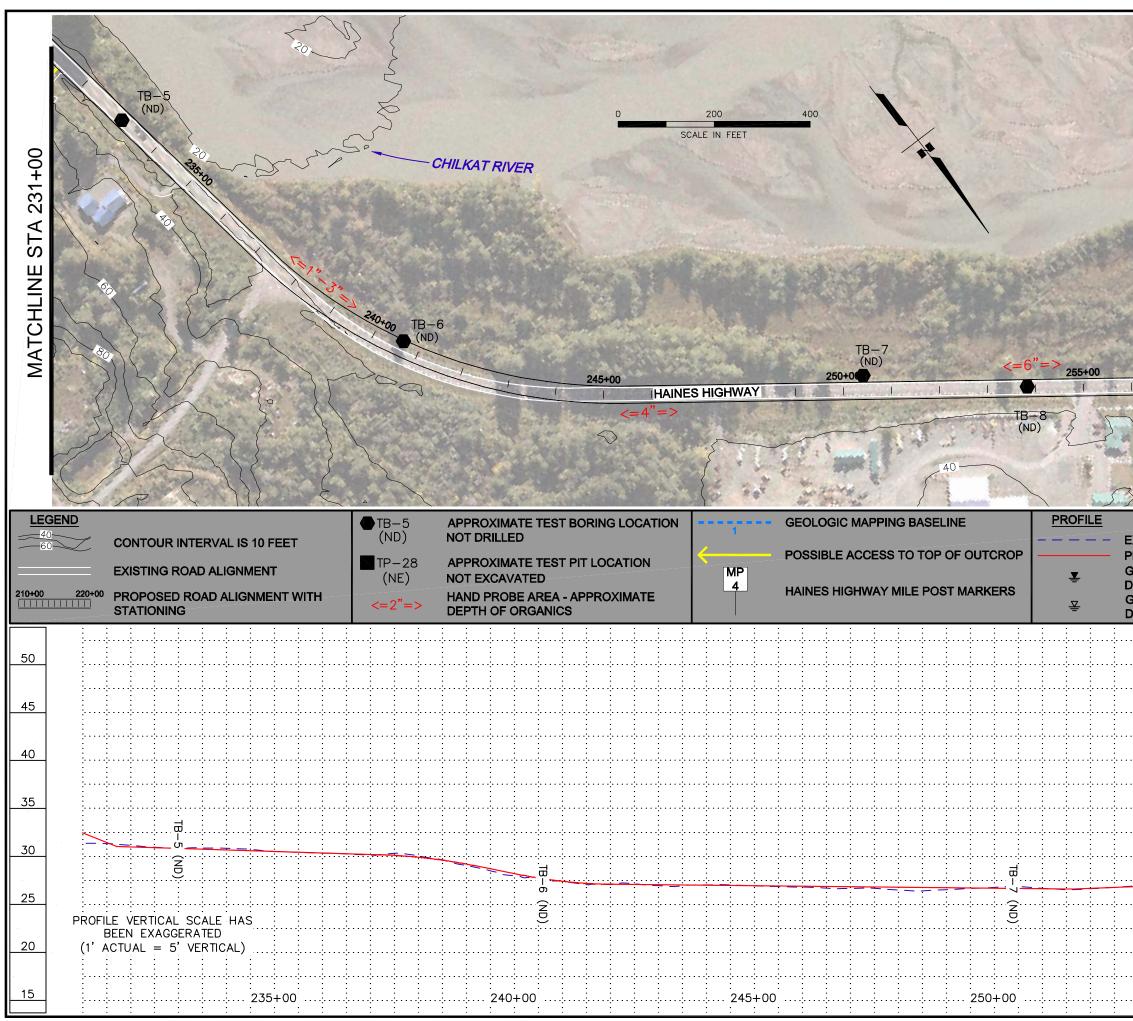
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APPENDIX A

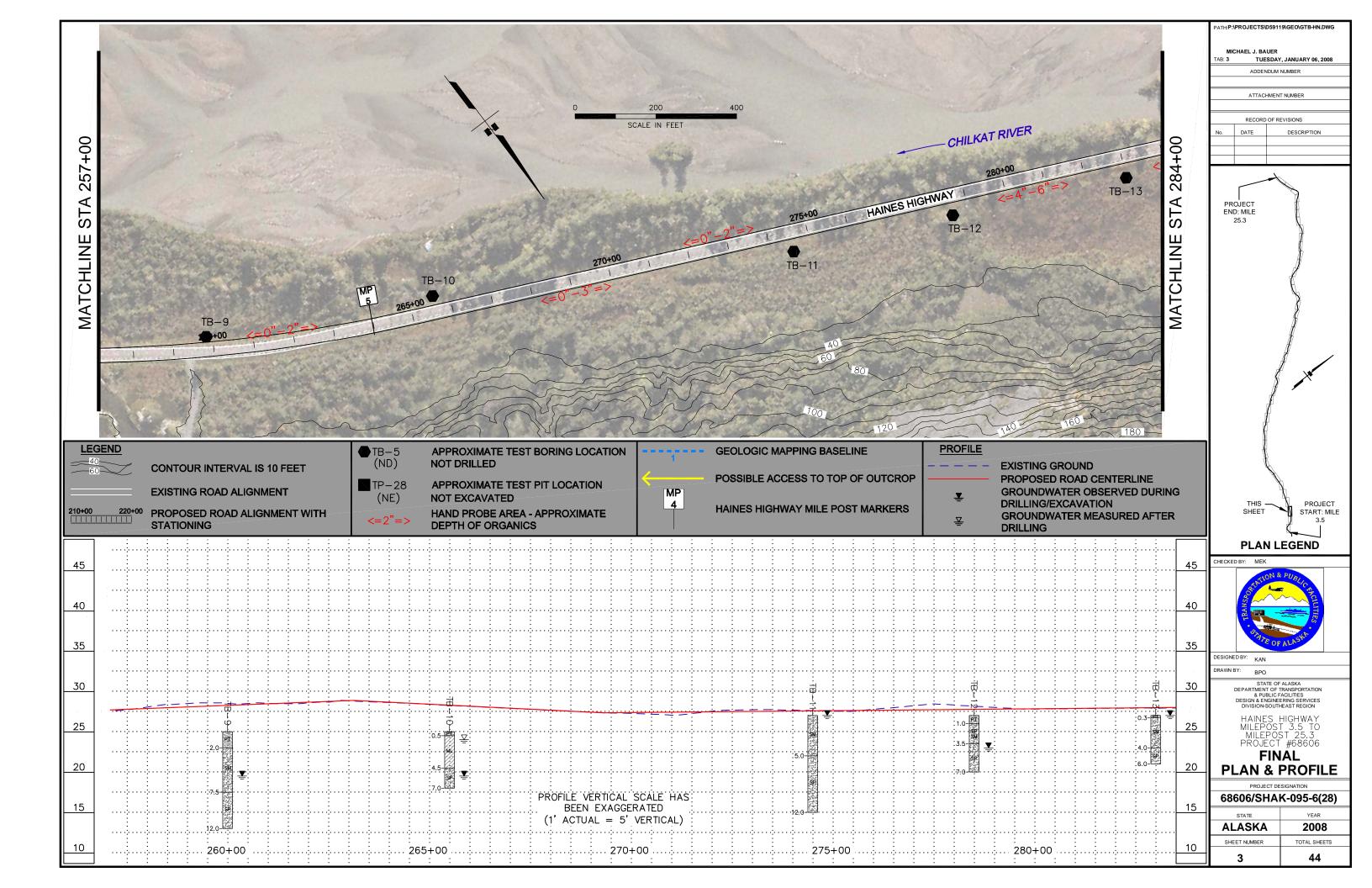
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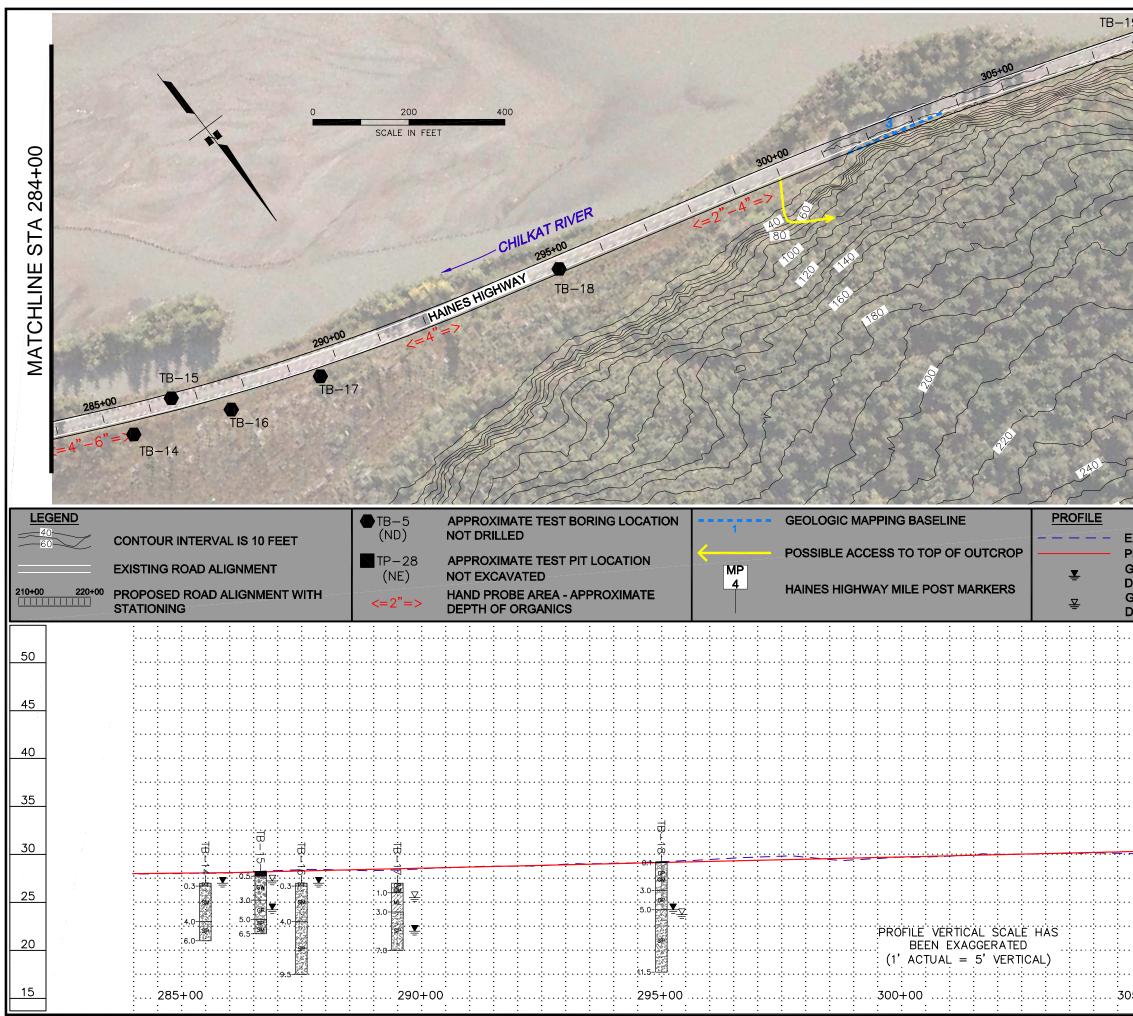


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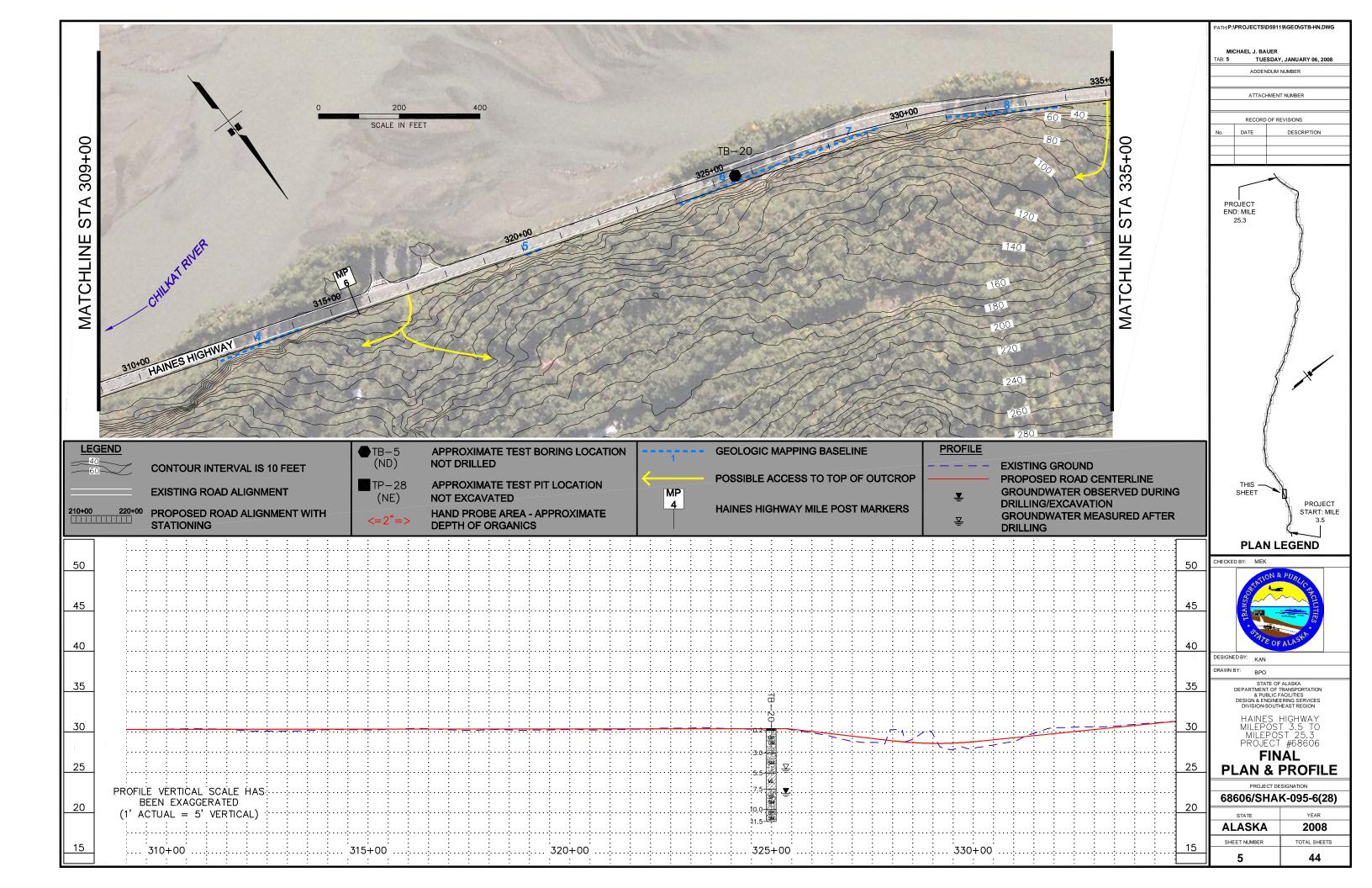


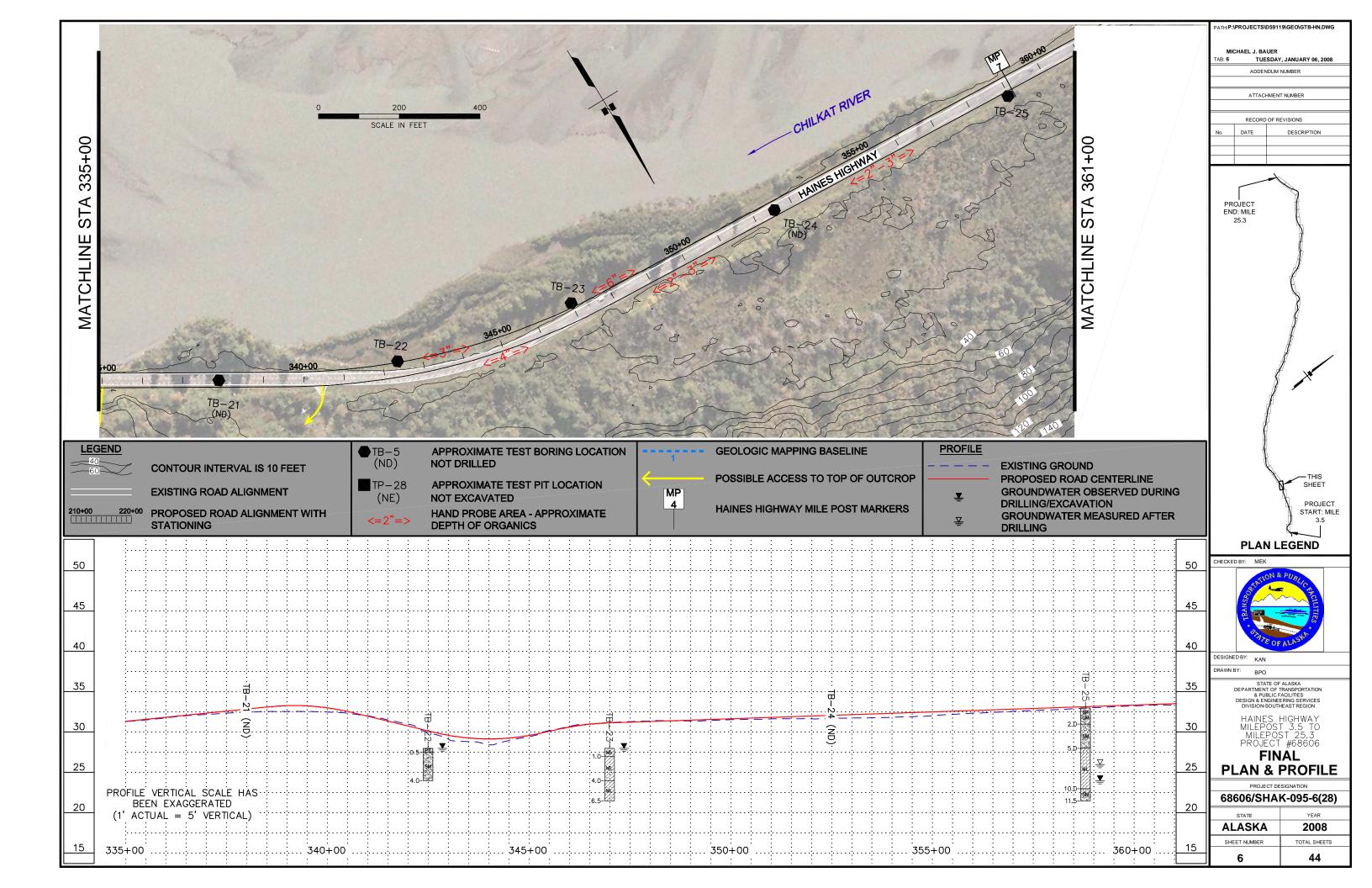
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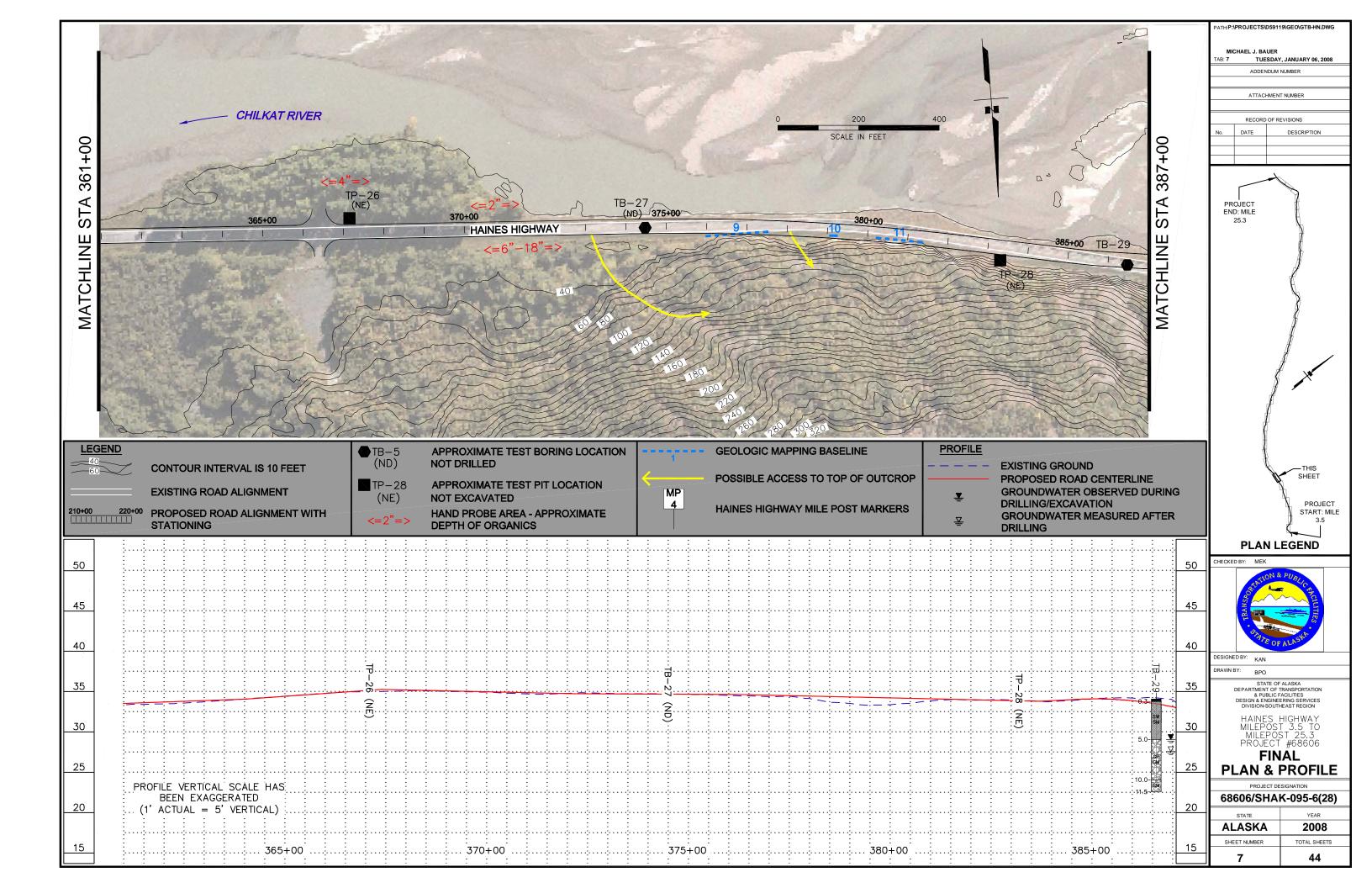


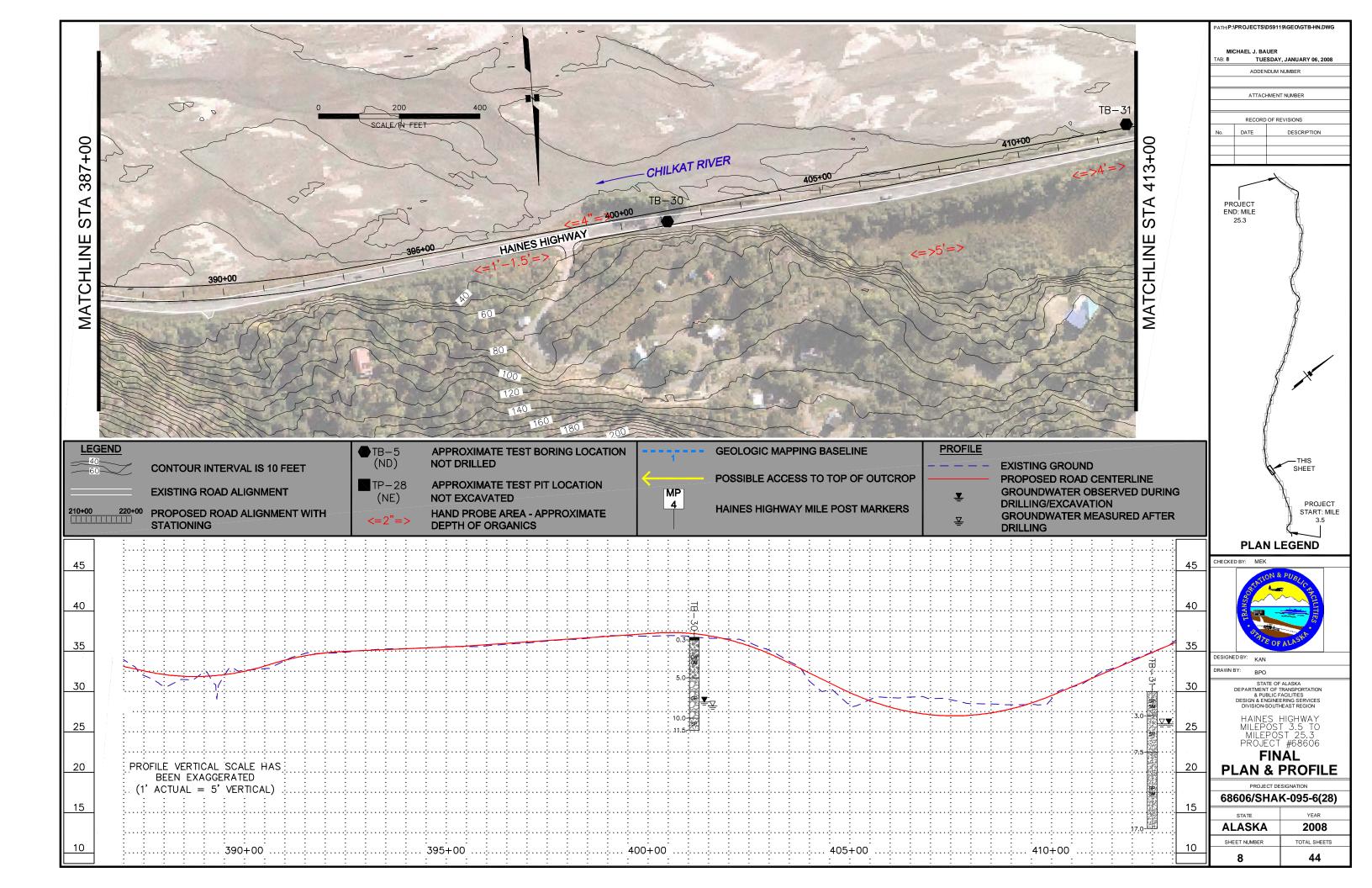


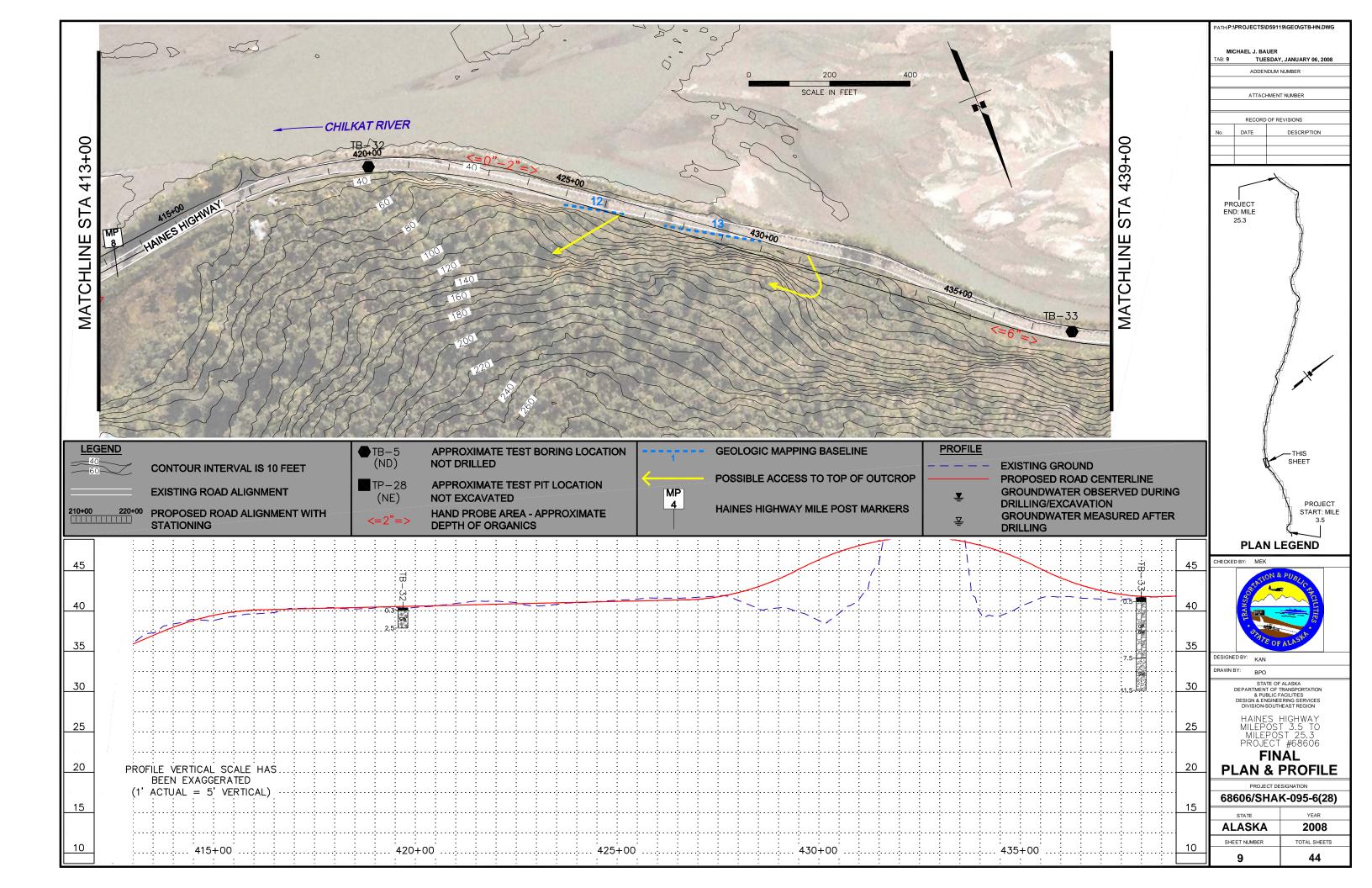
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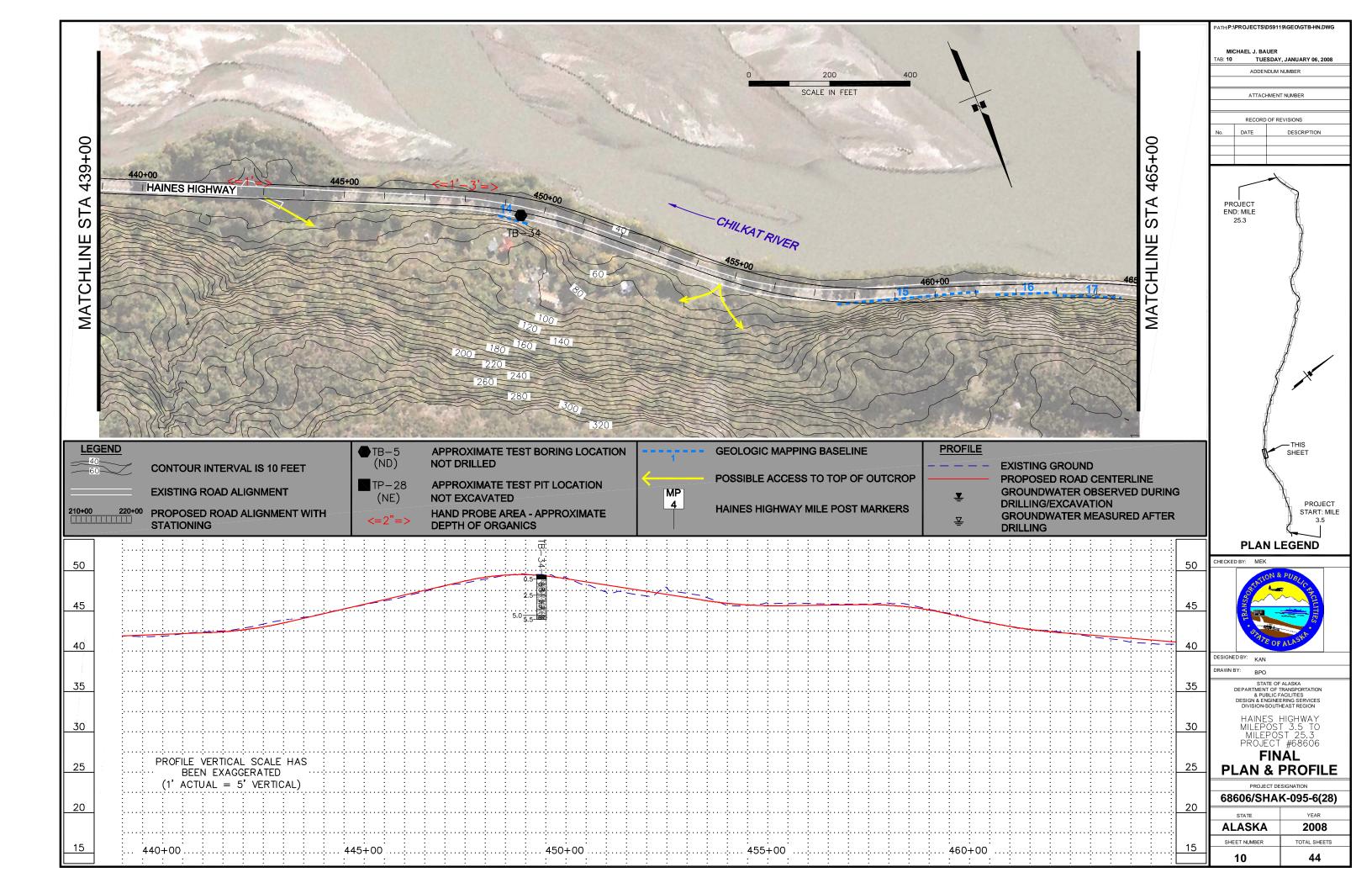


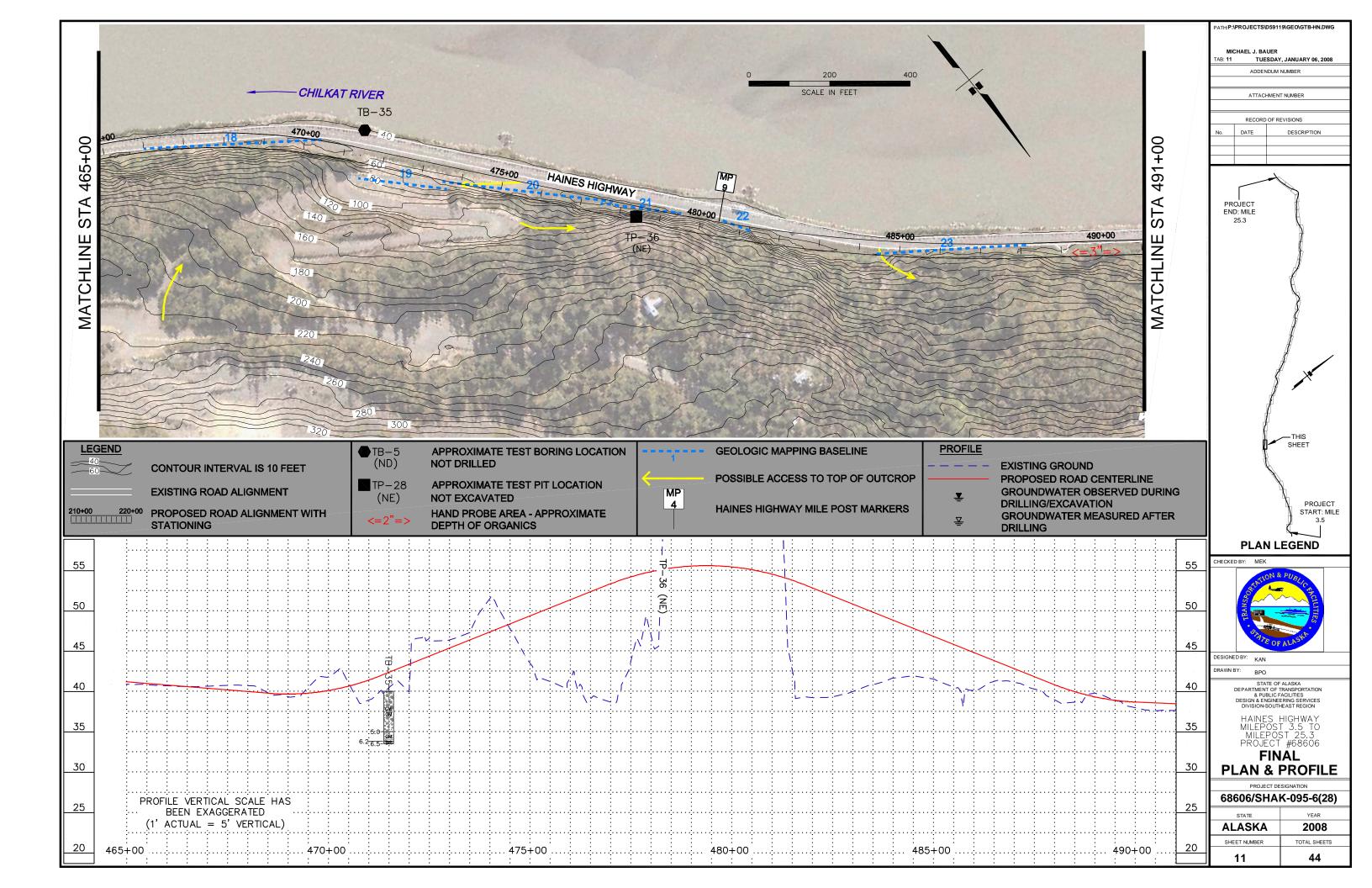


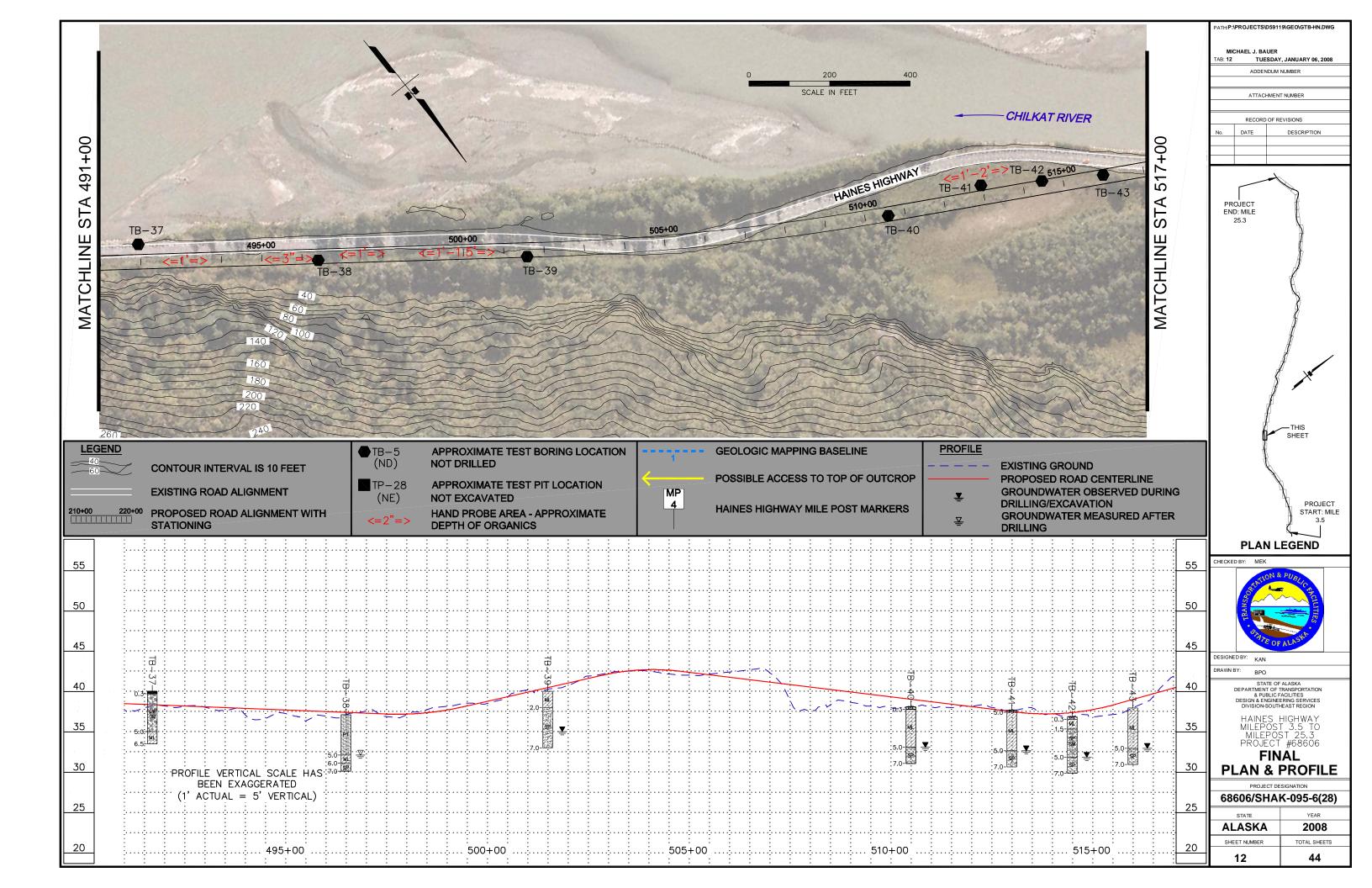


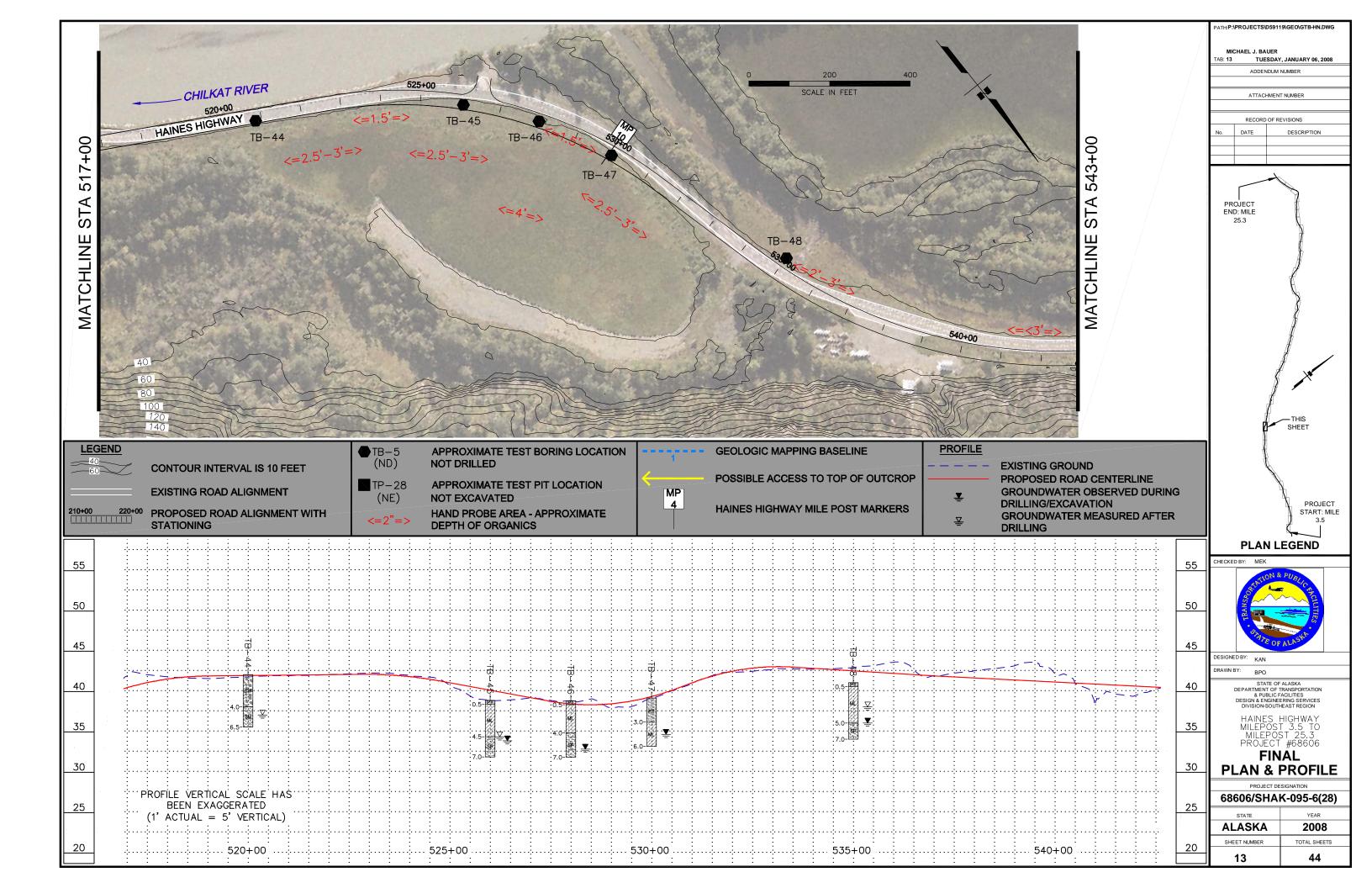


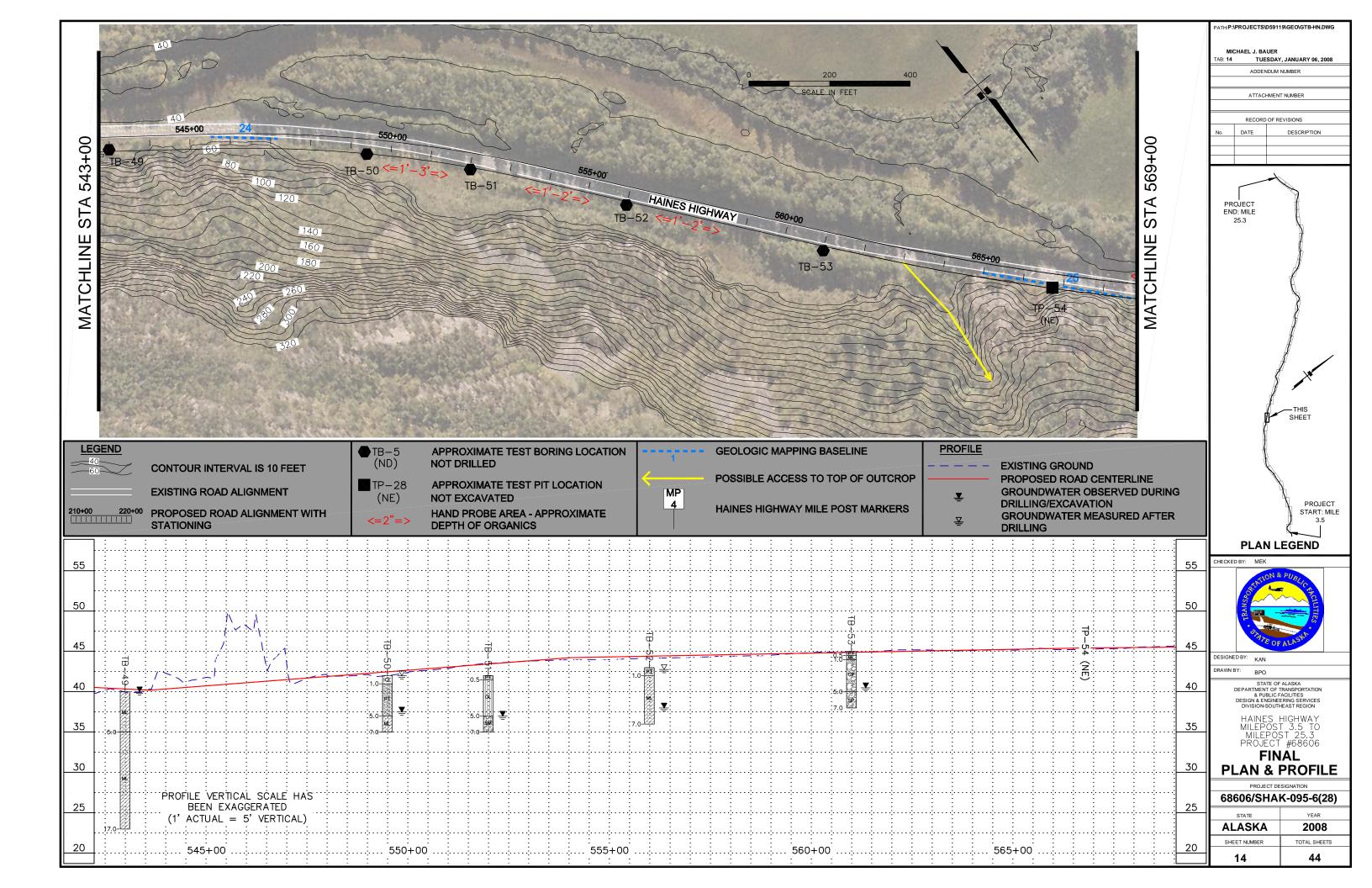


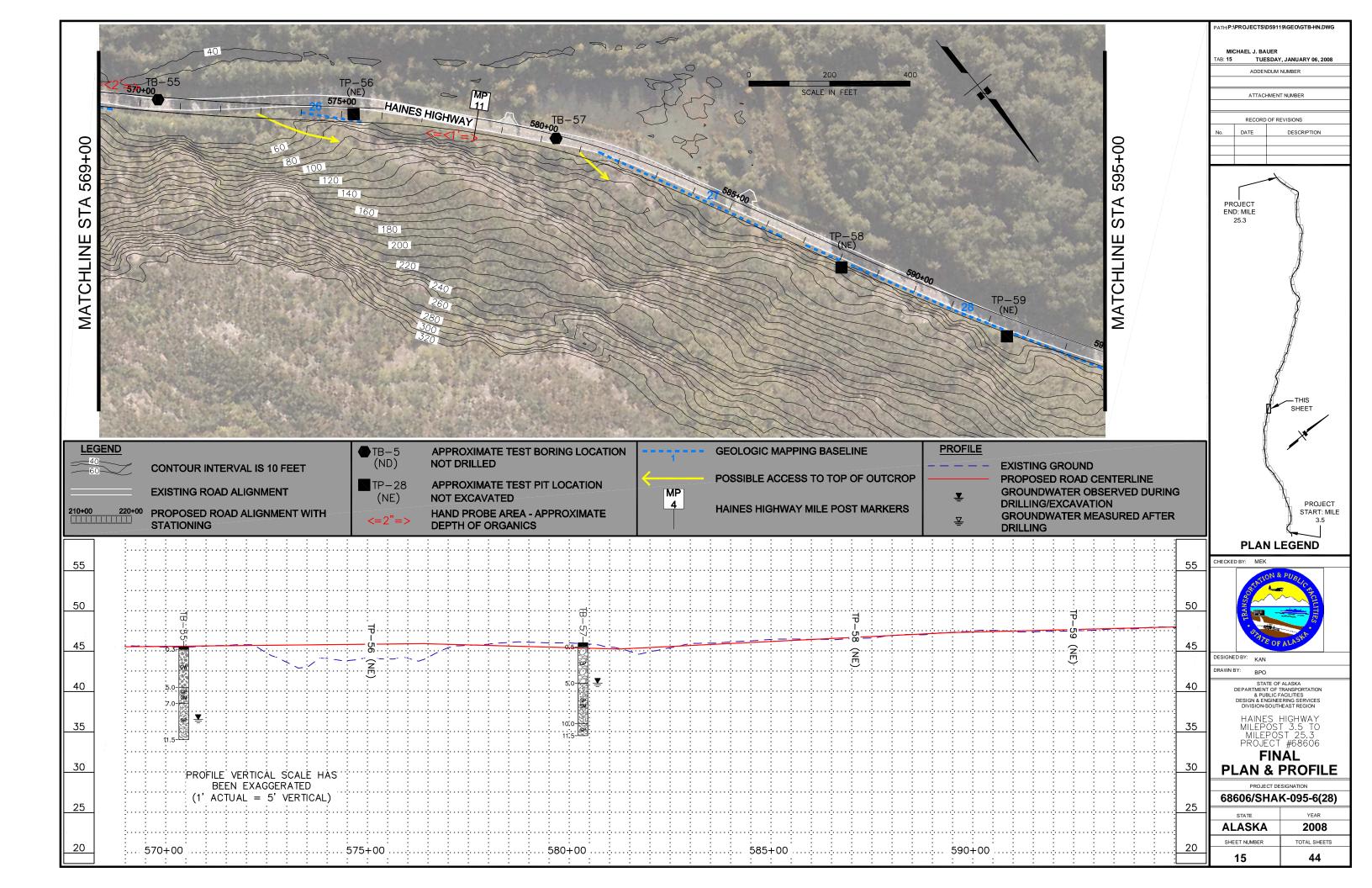


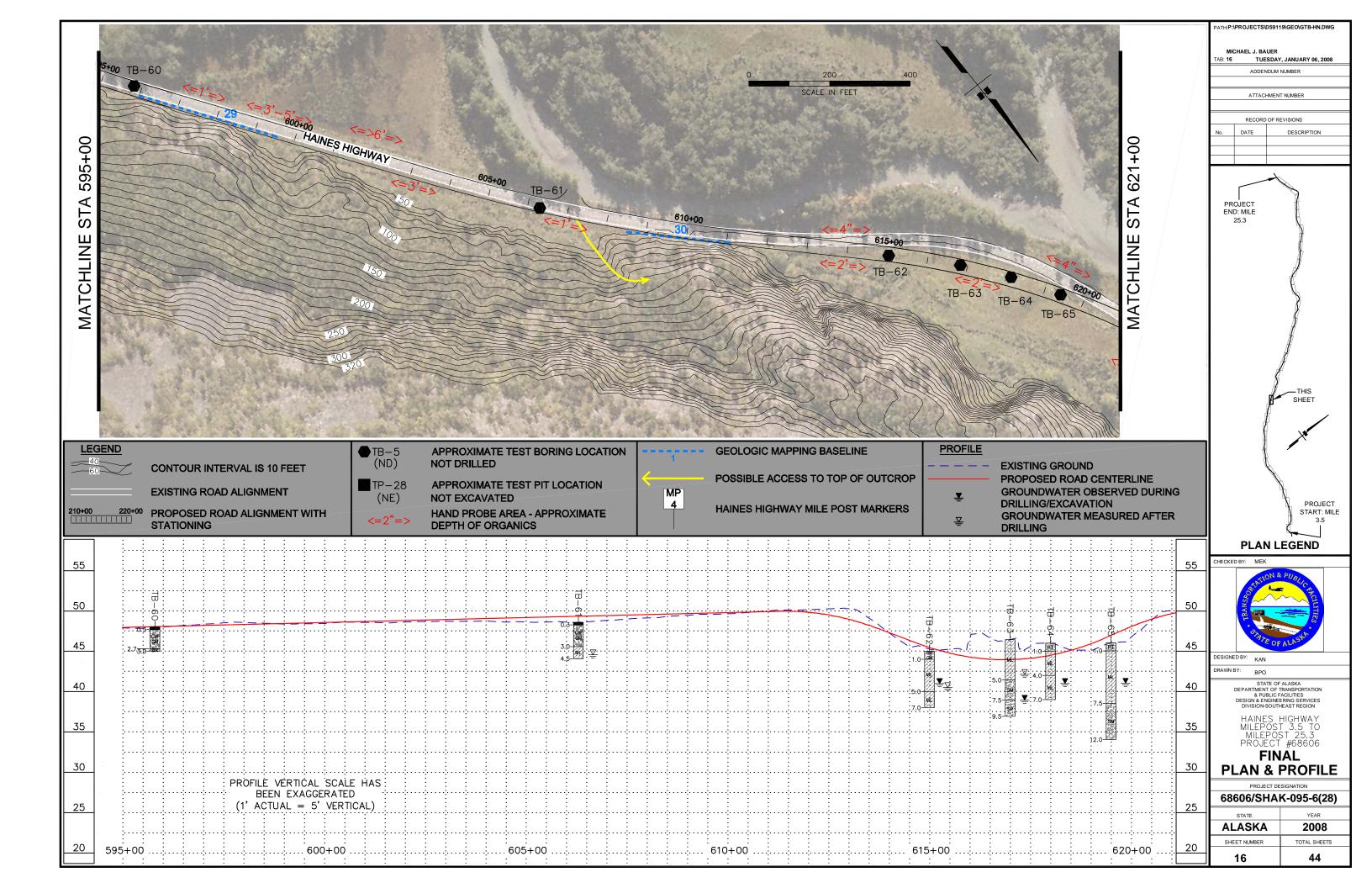


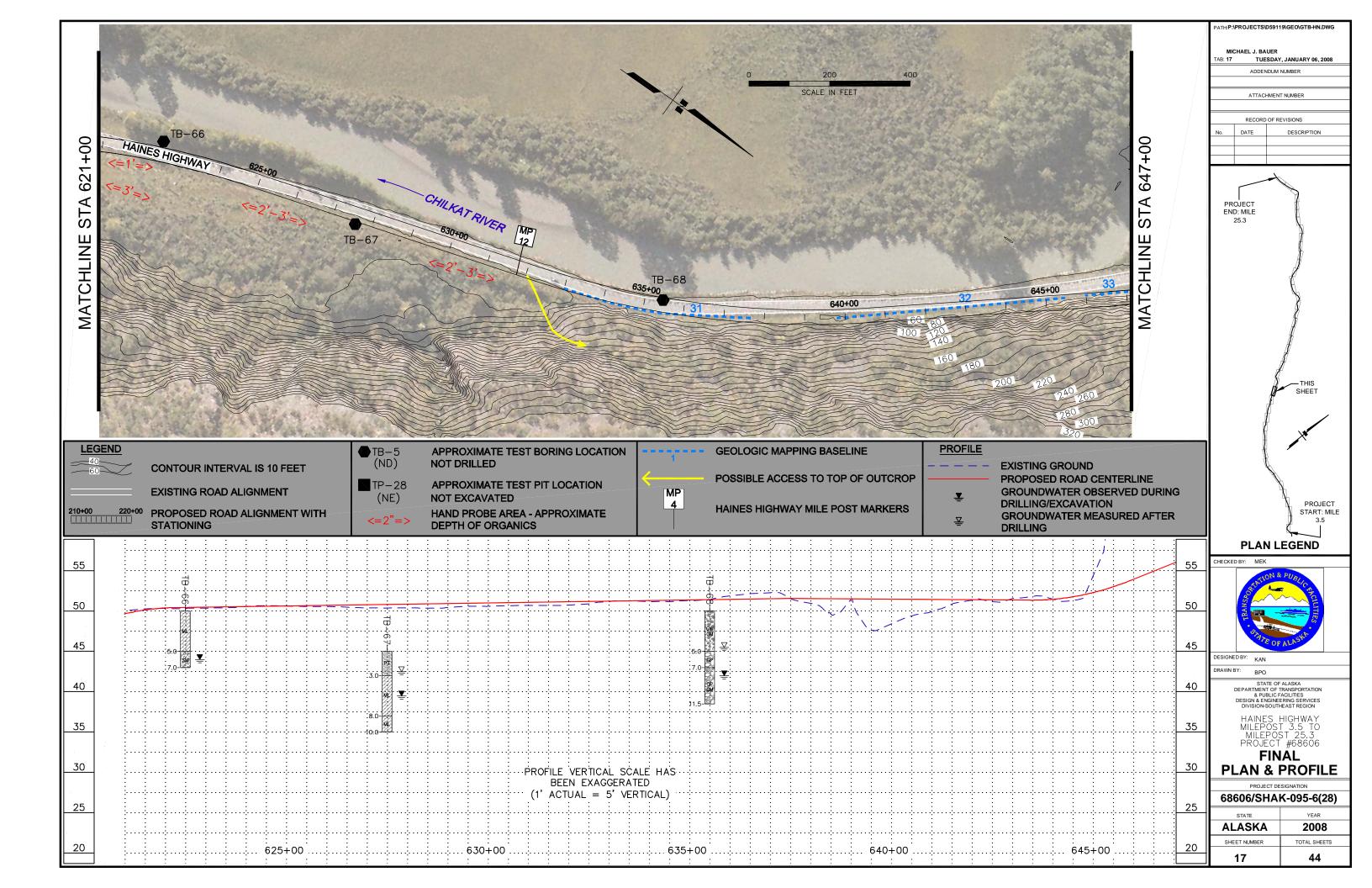


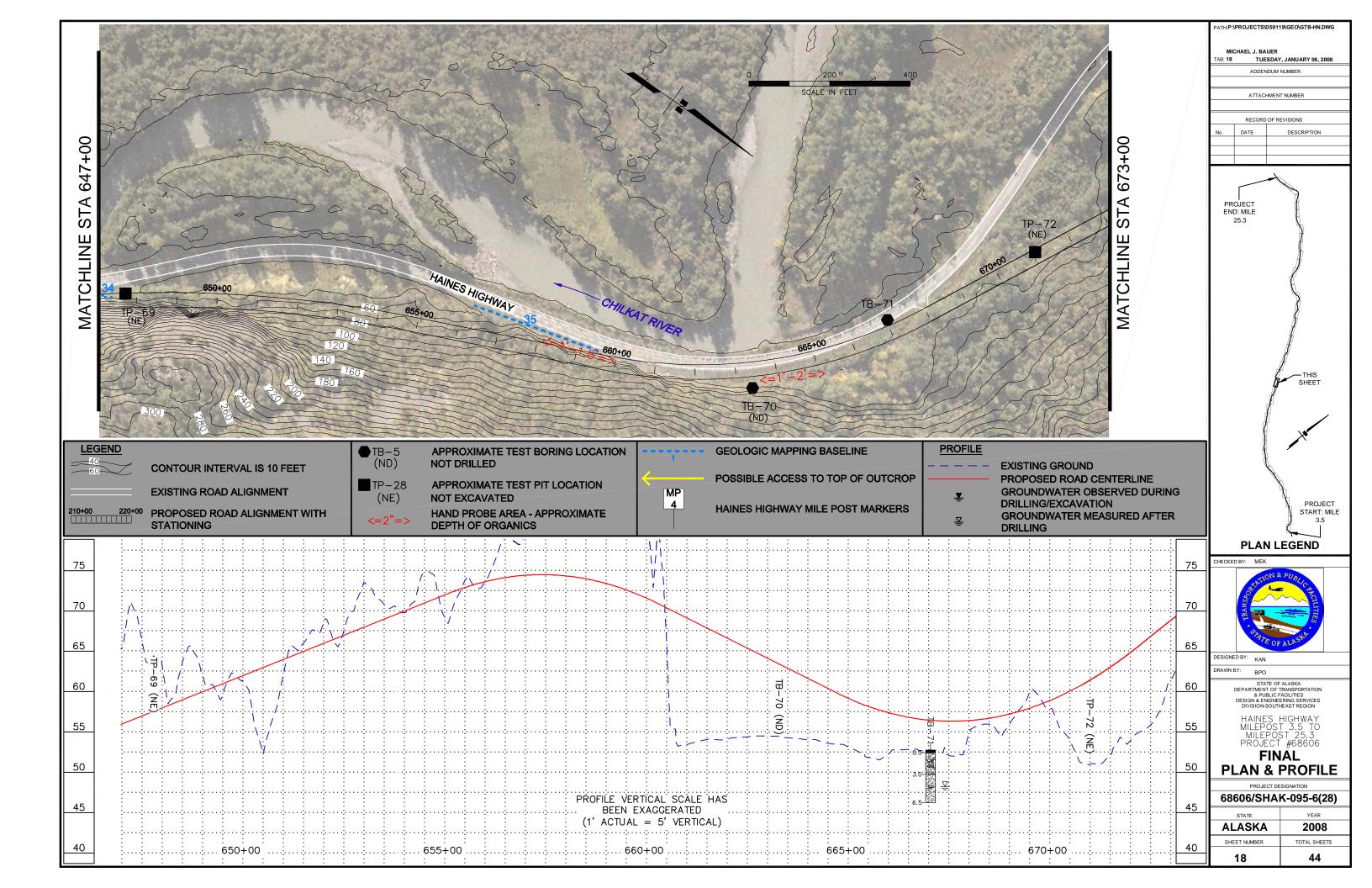


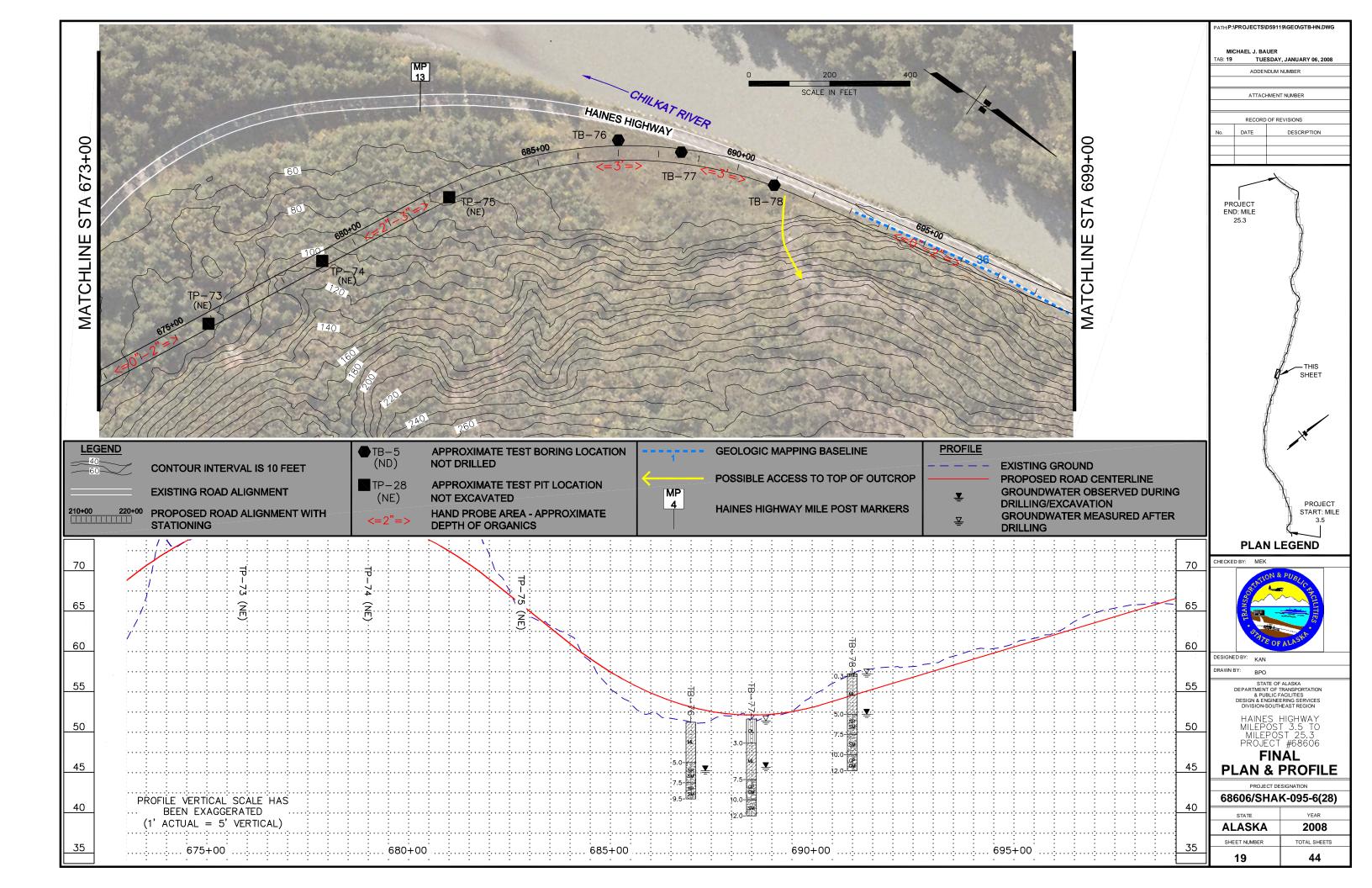


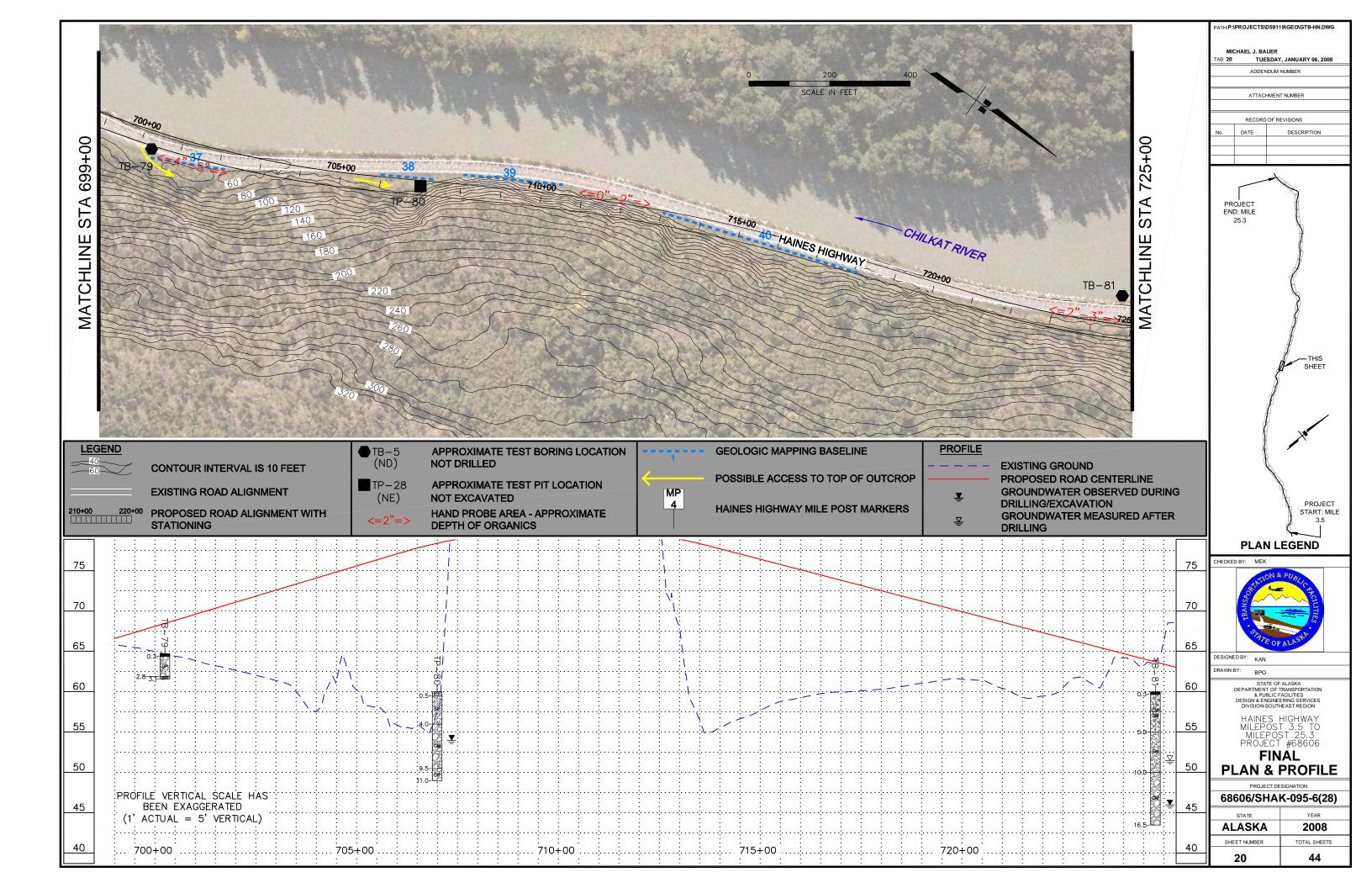


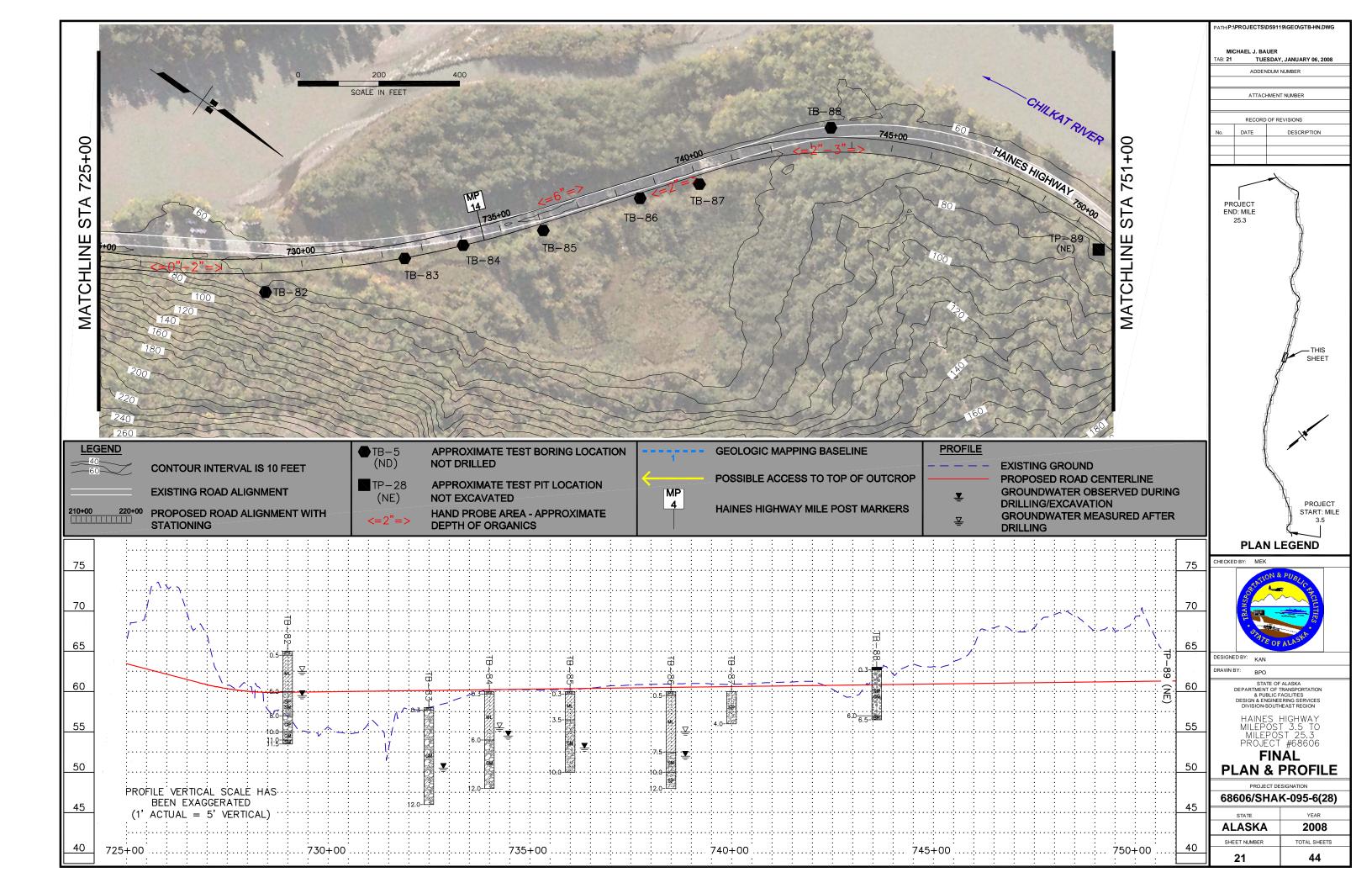


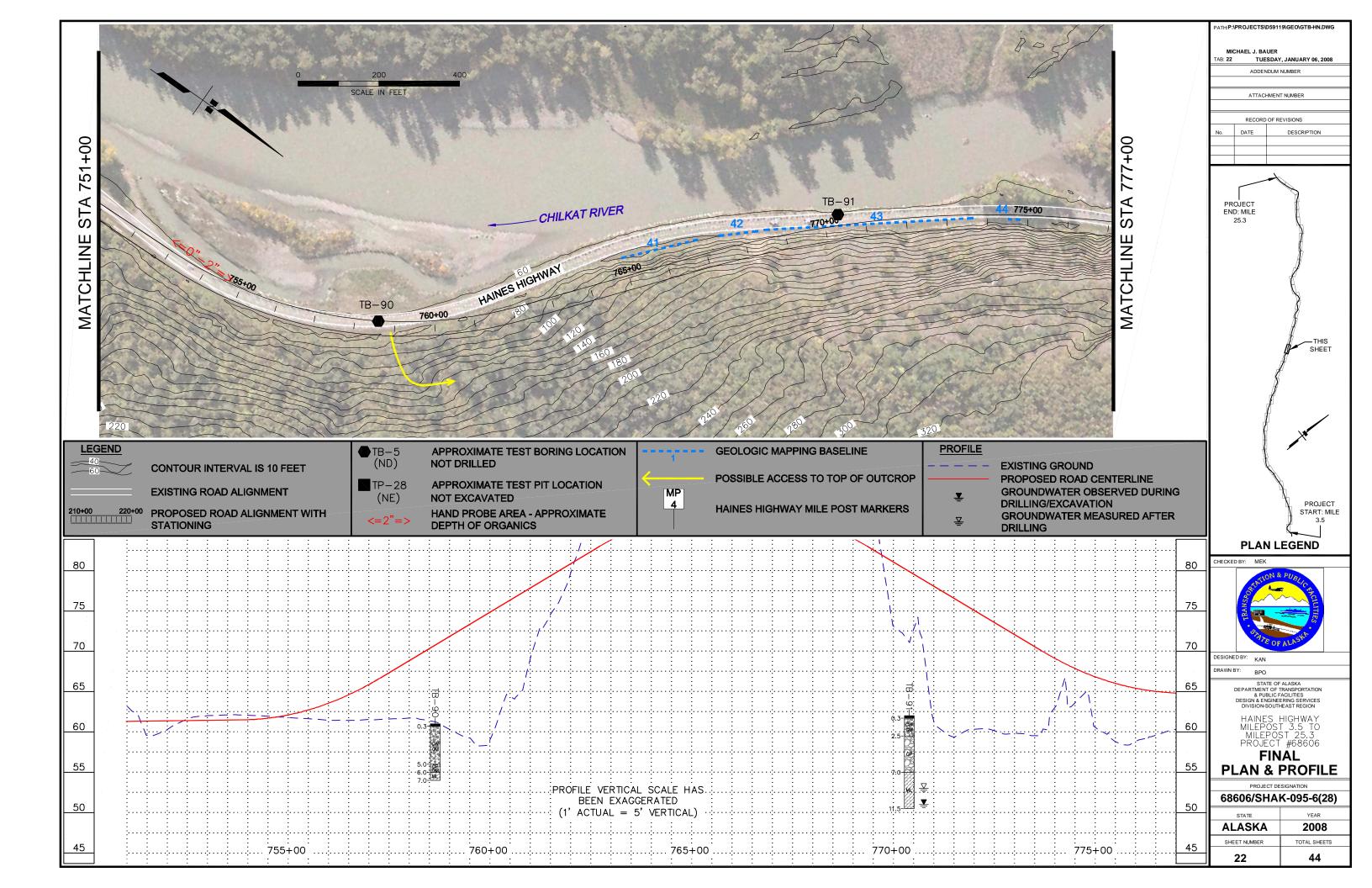


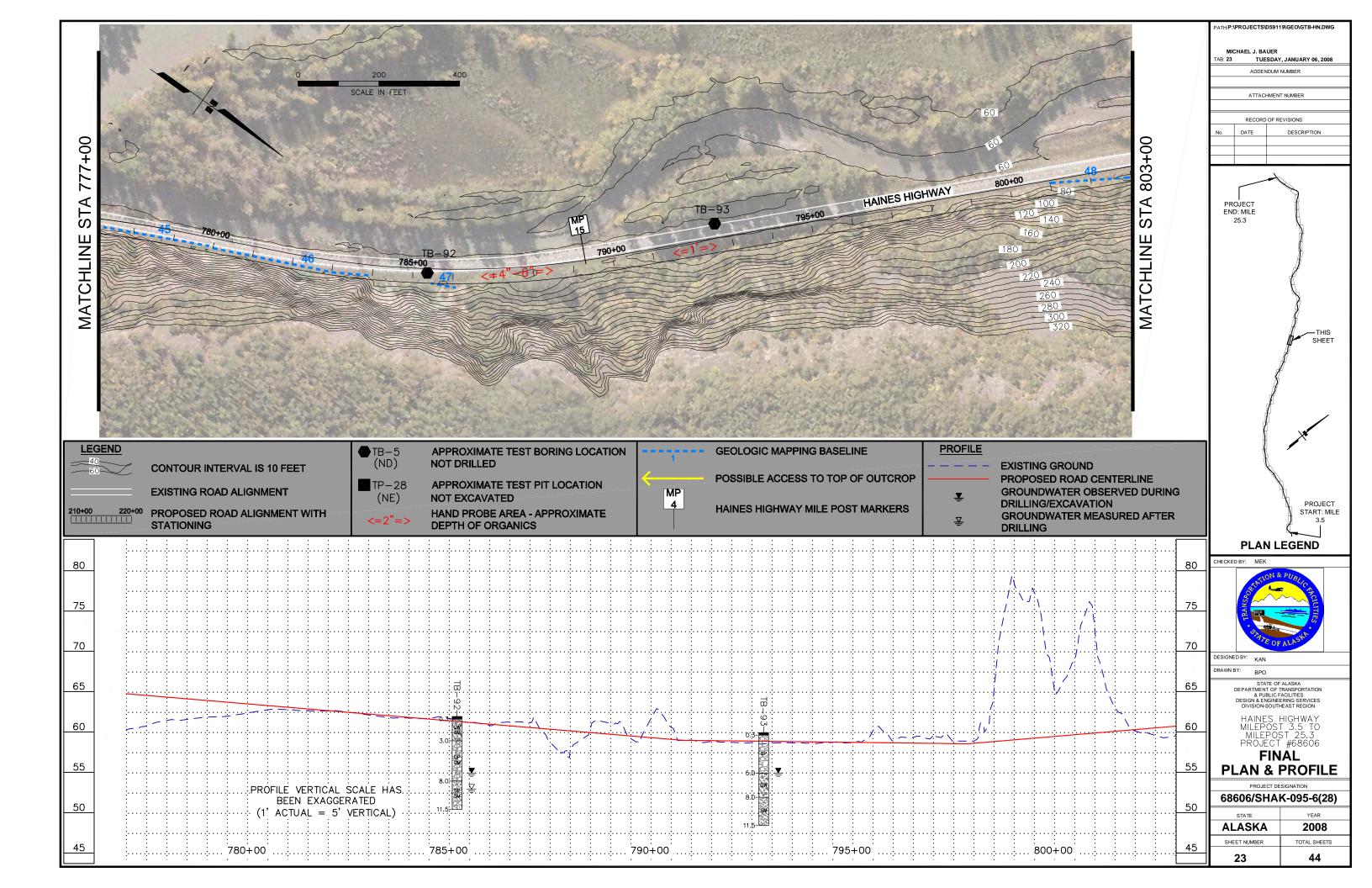


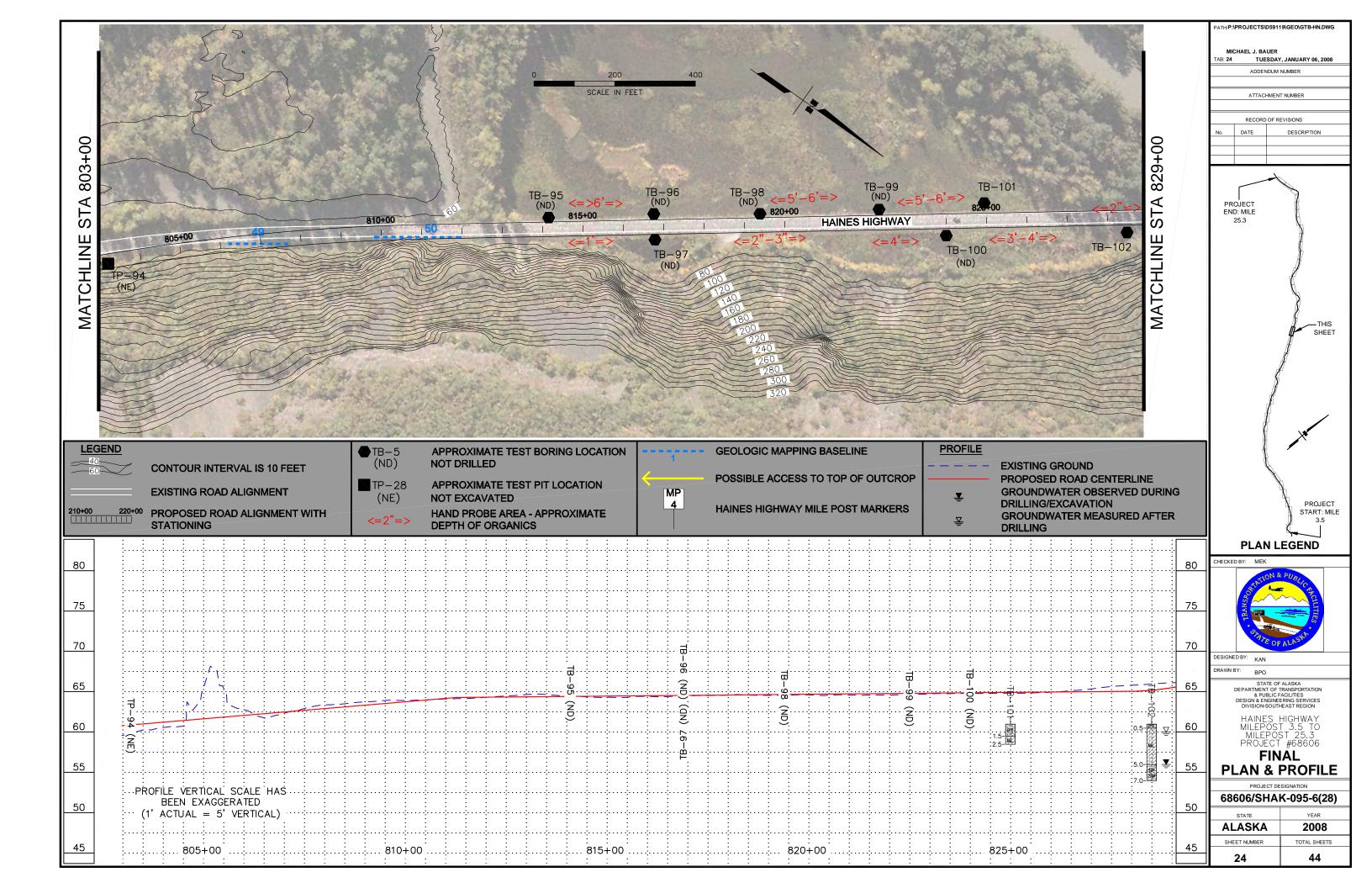


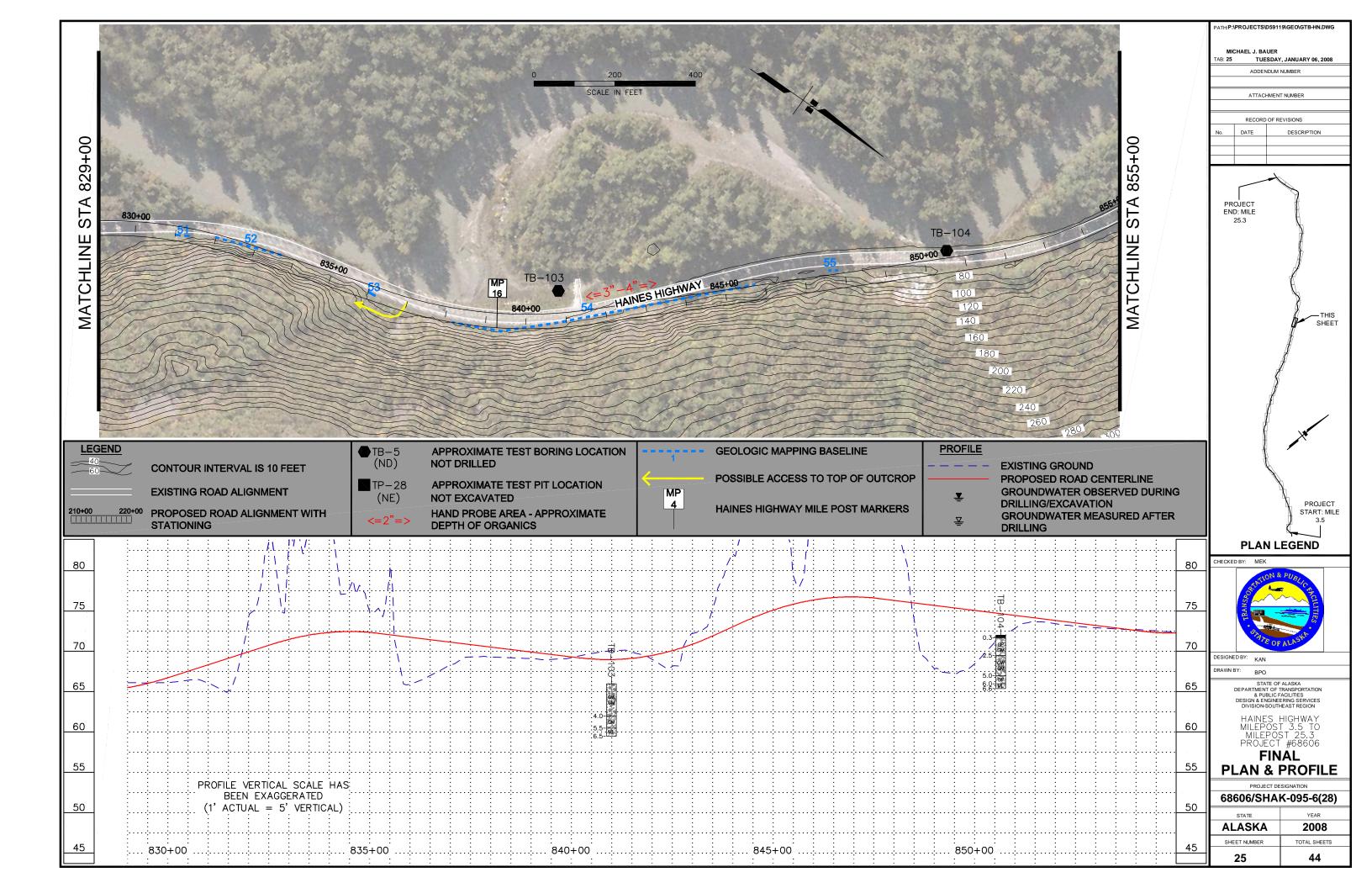


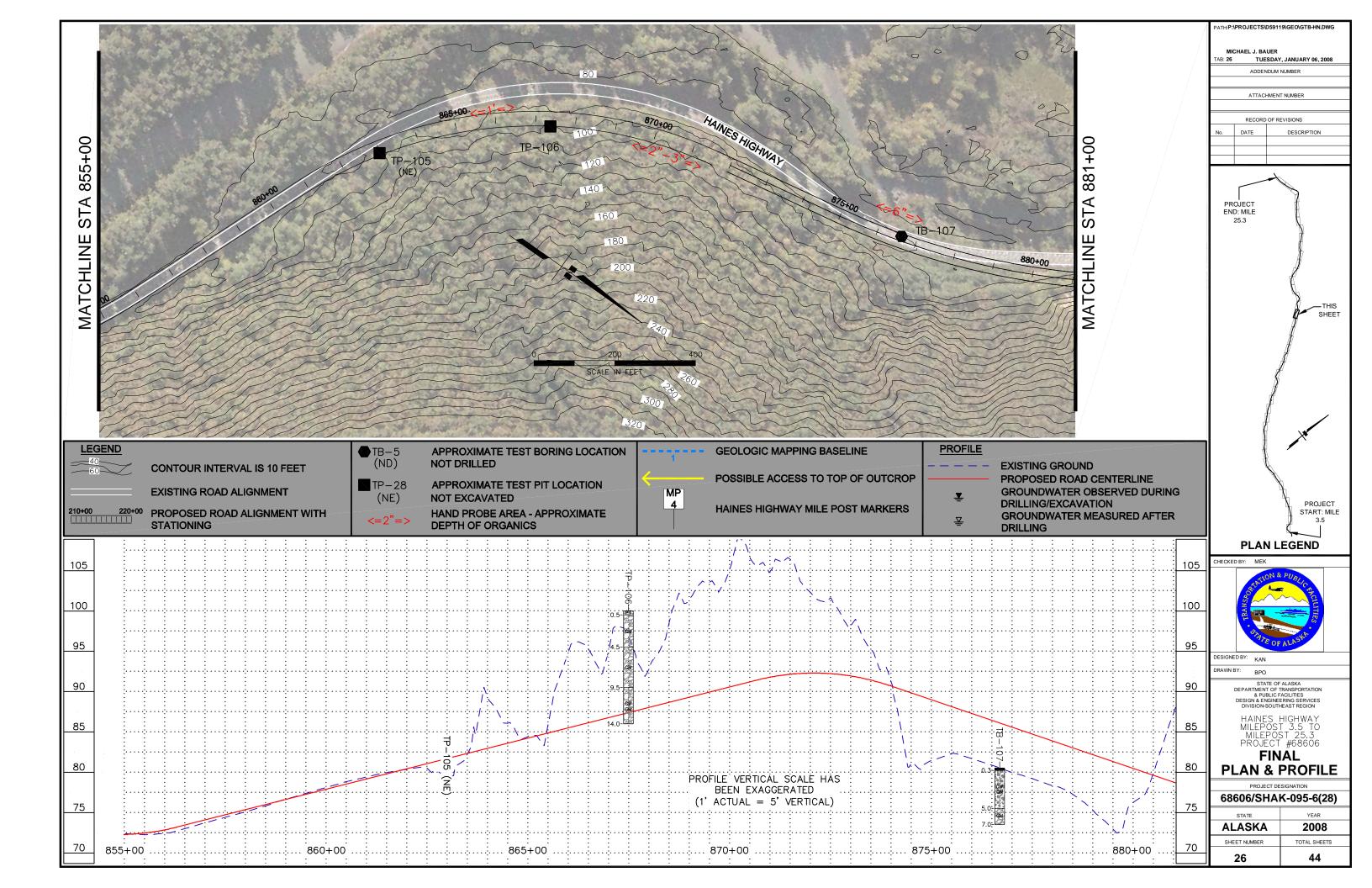


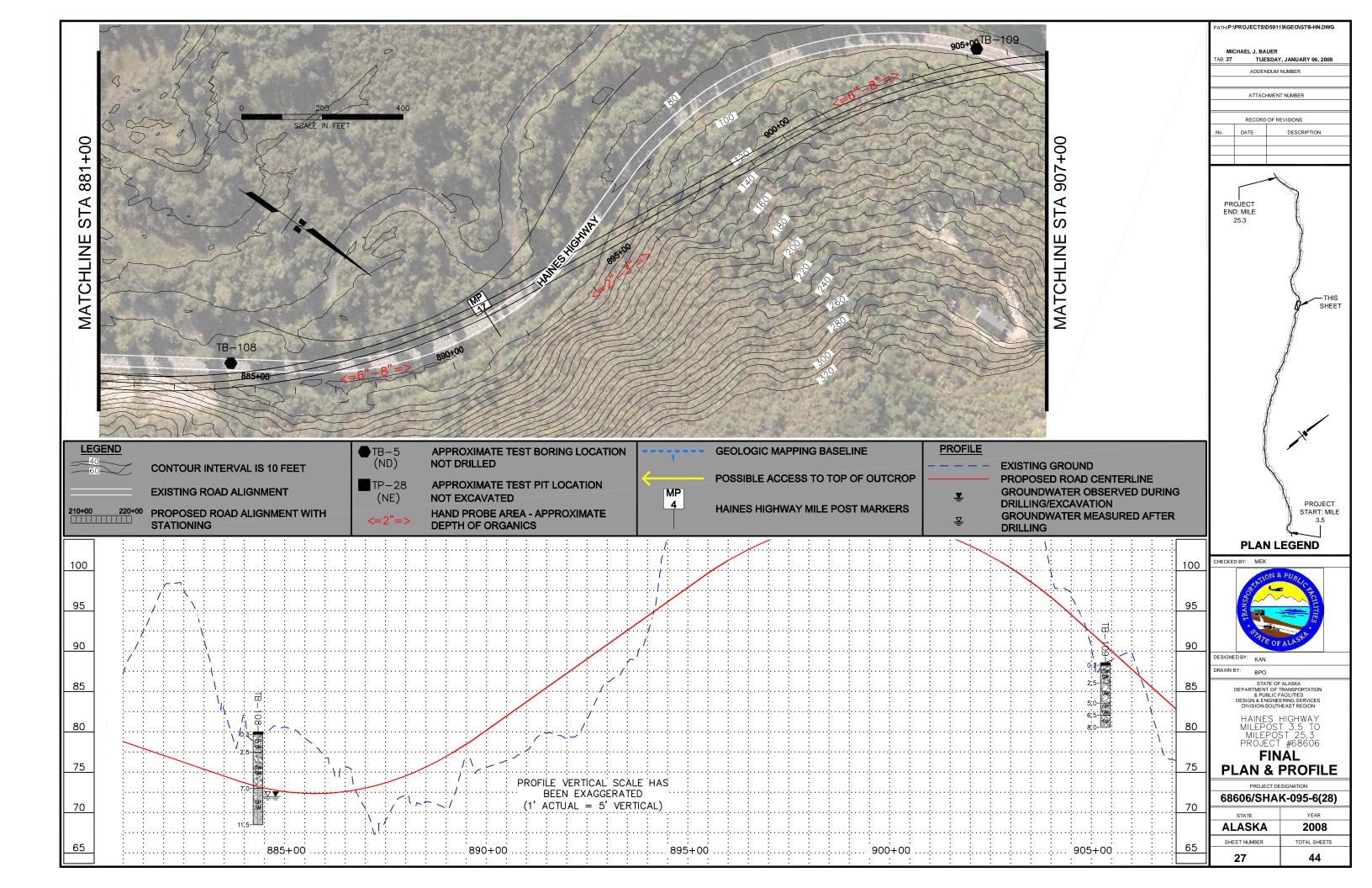


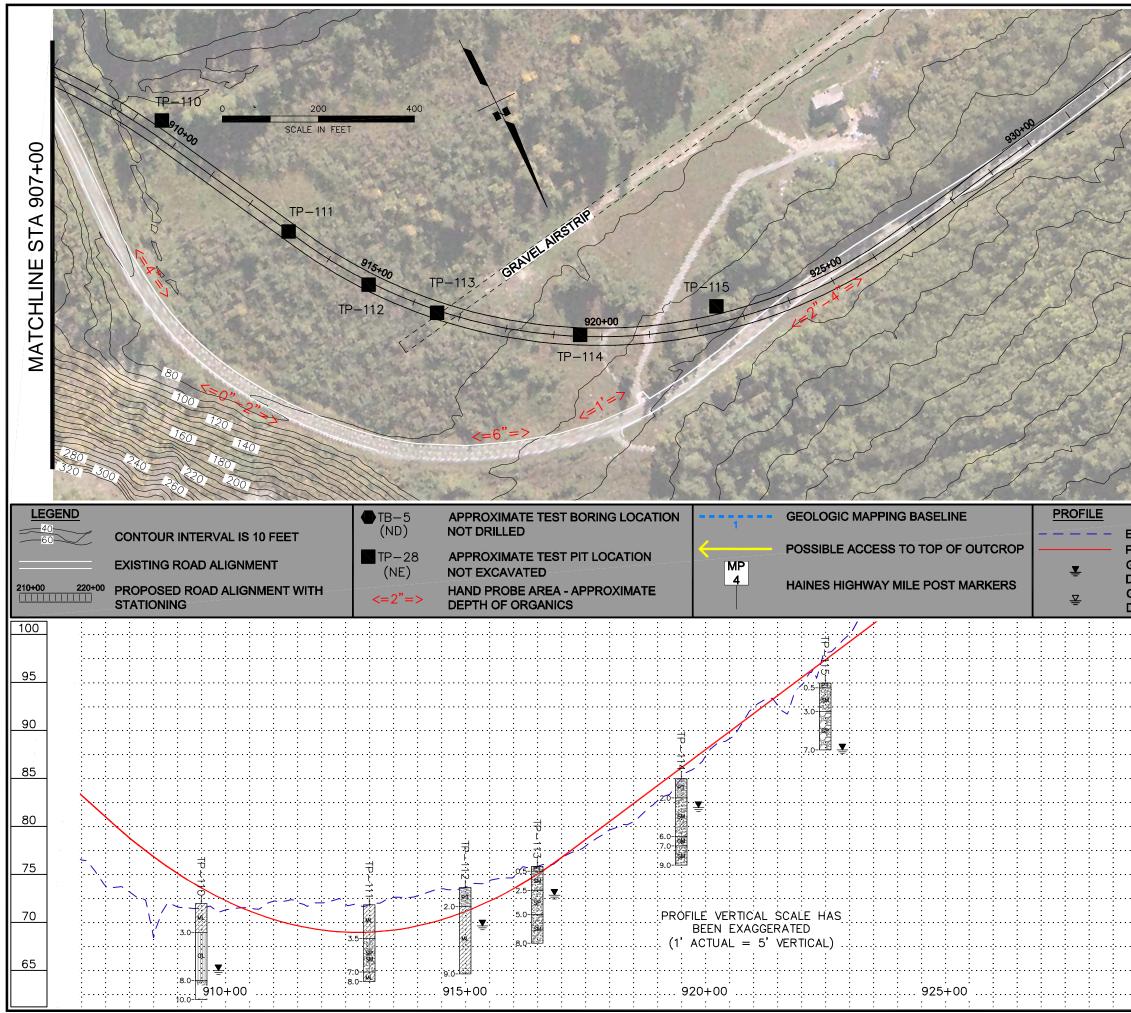




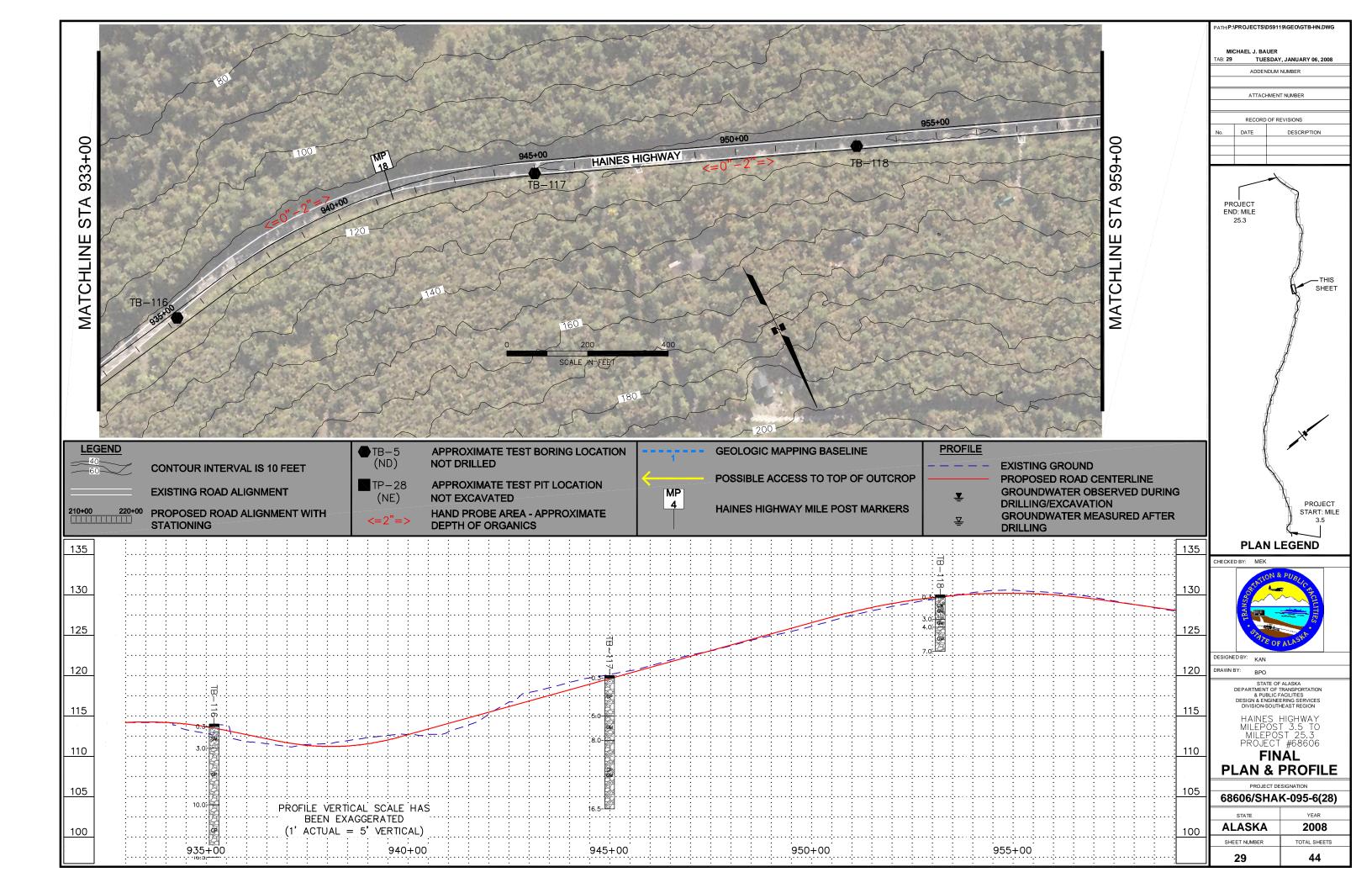


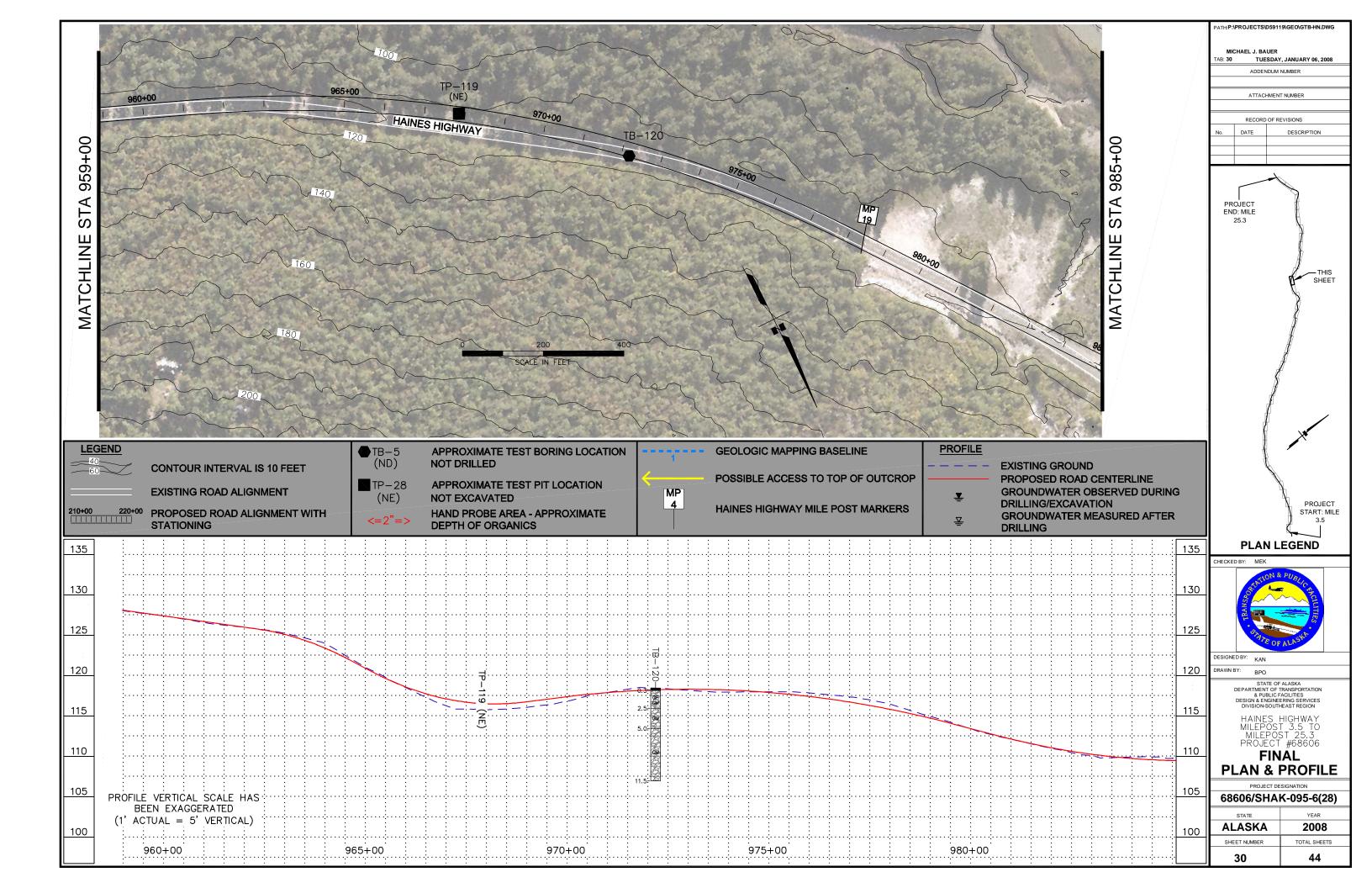


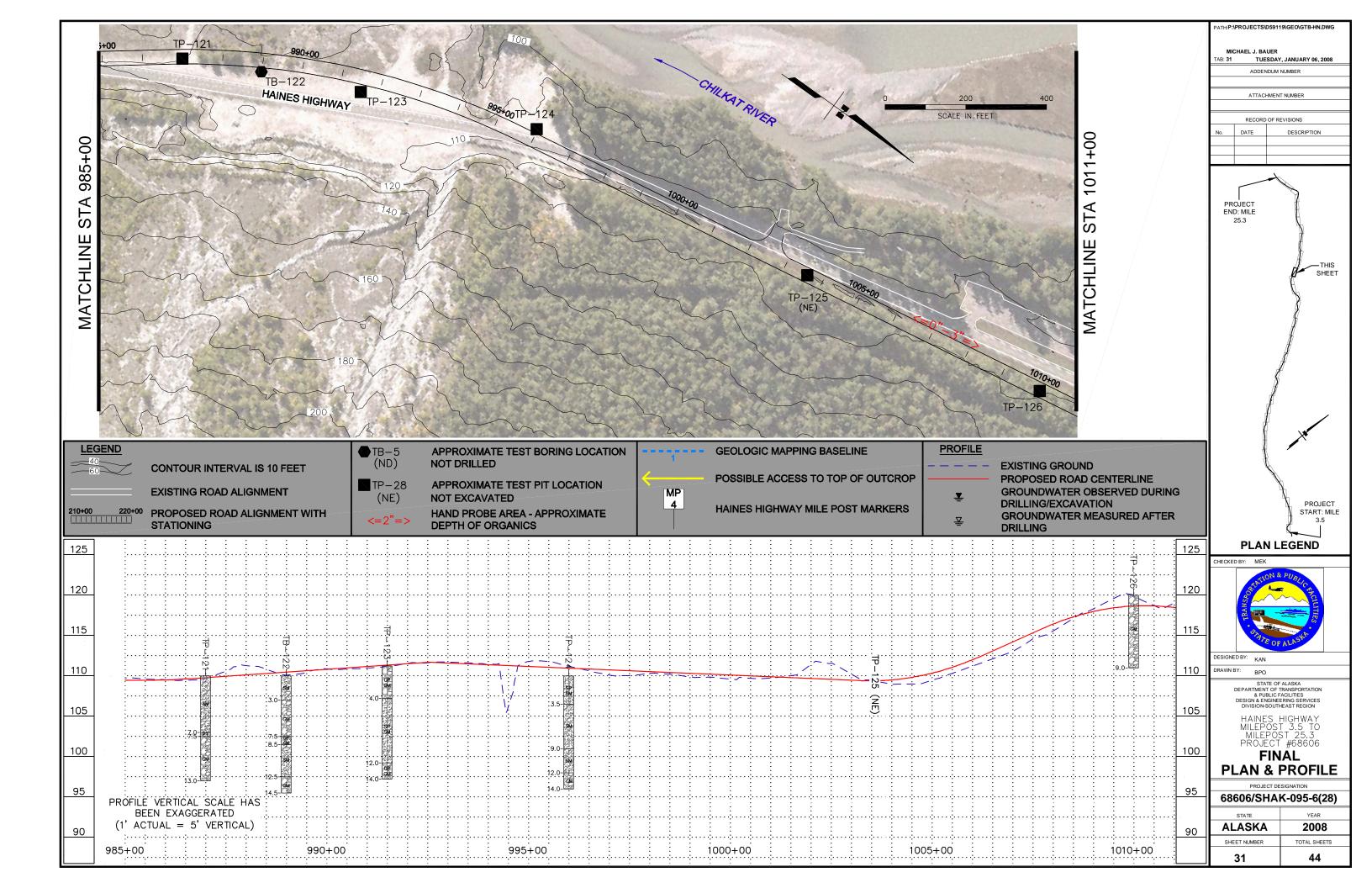


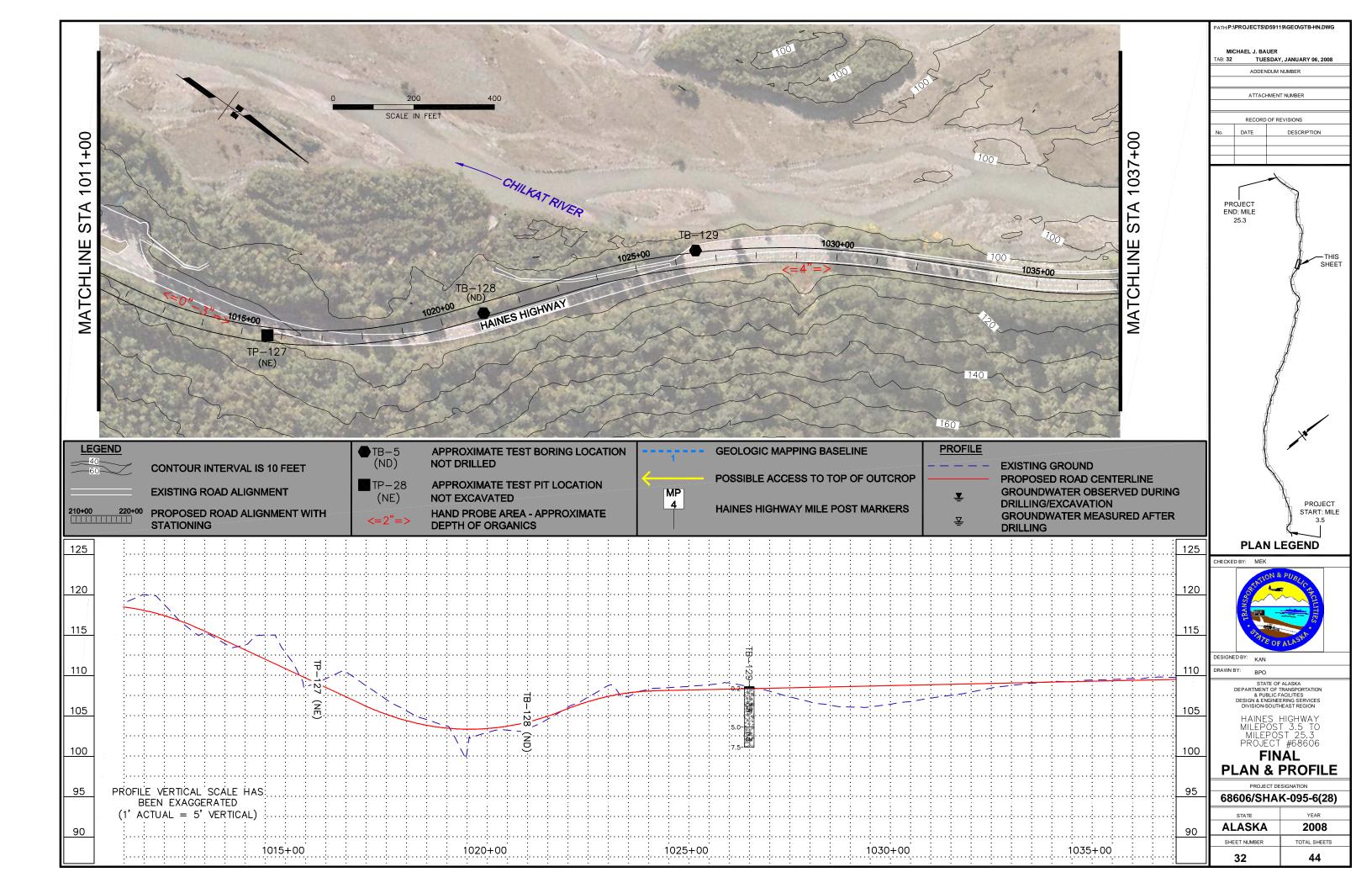


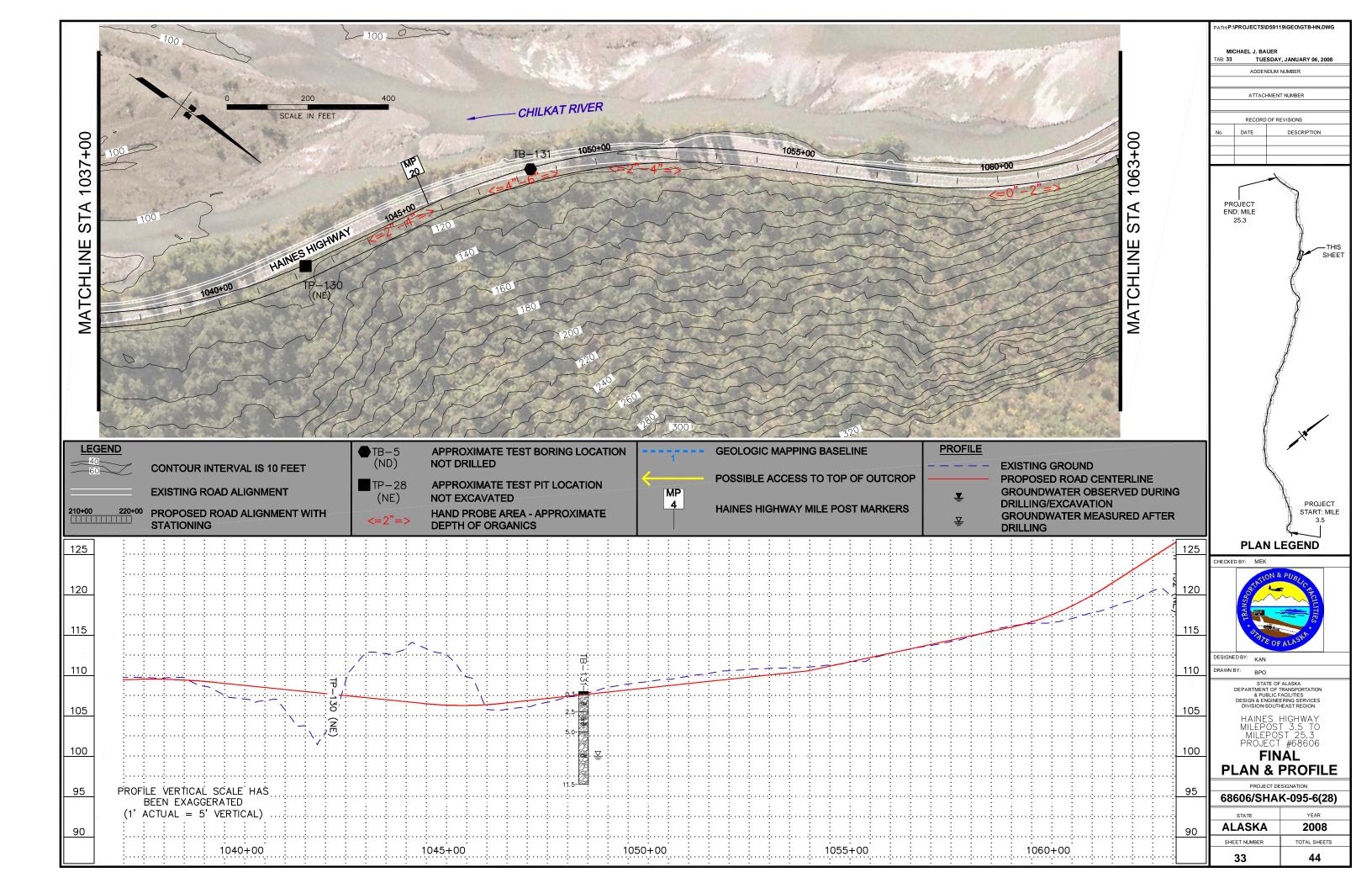
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EXISTING GROUND ROPOSED ROAD CENTERLINE BROUNDWATER OBSERVED DURING BRILLING/EXCAVATION BROUNDWATER MEASURED AFTER	PROJECT END: MILE 25.3	PROJECT START: MILE 3.5		
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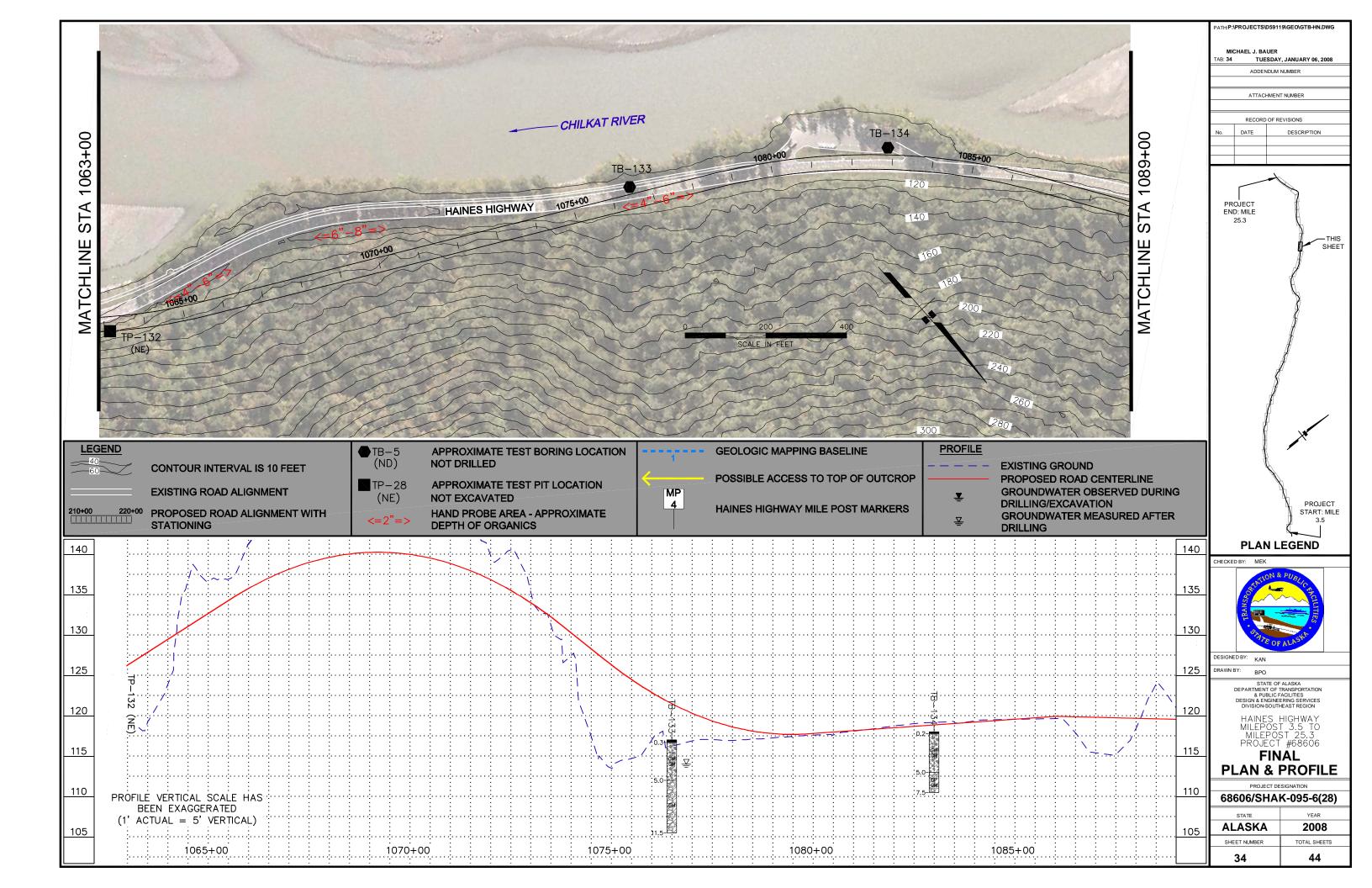


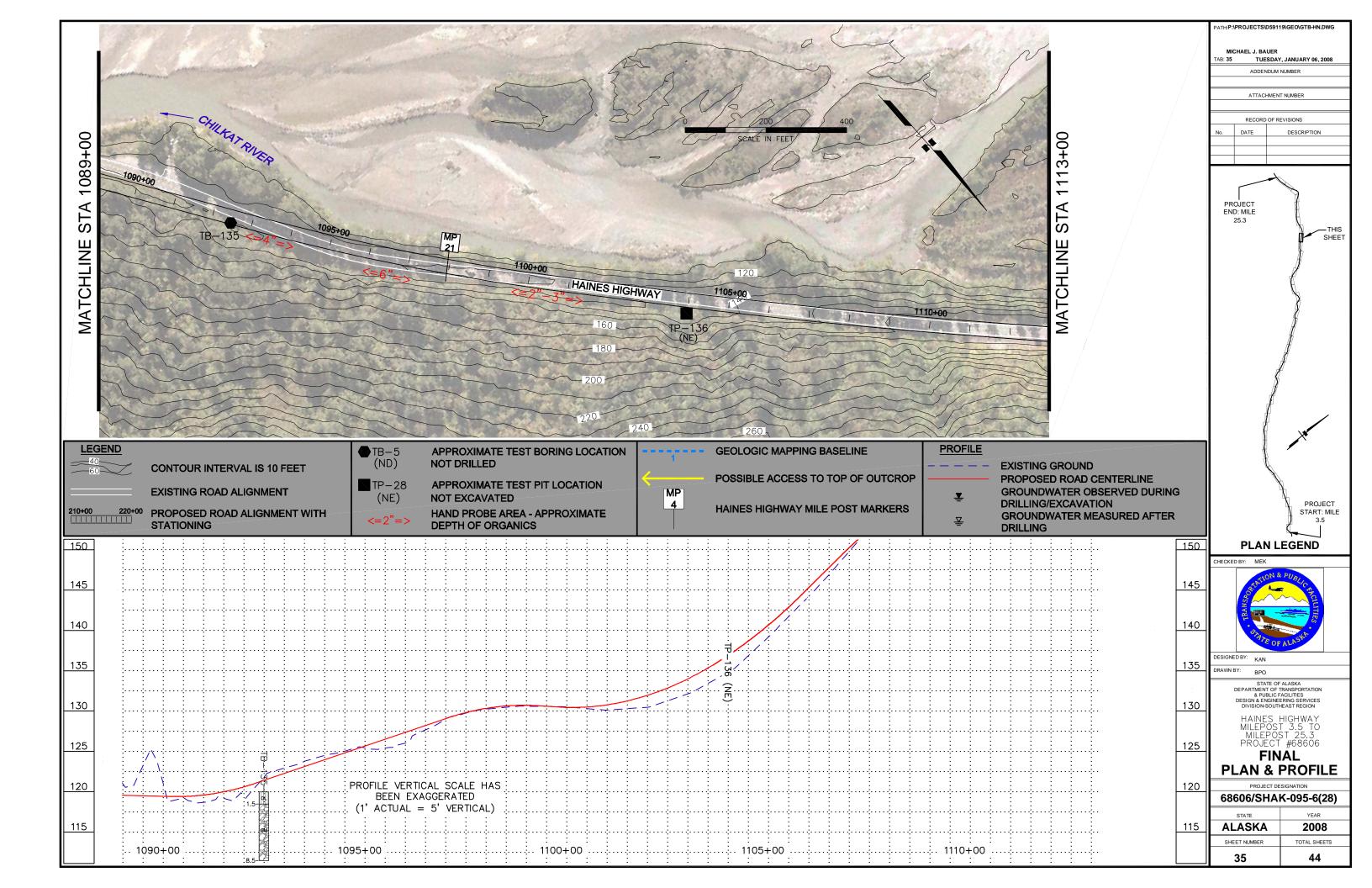


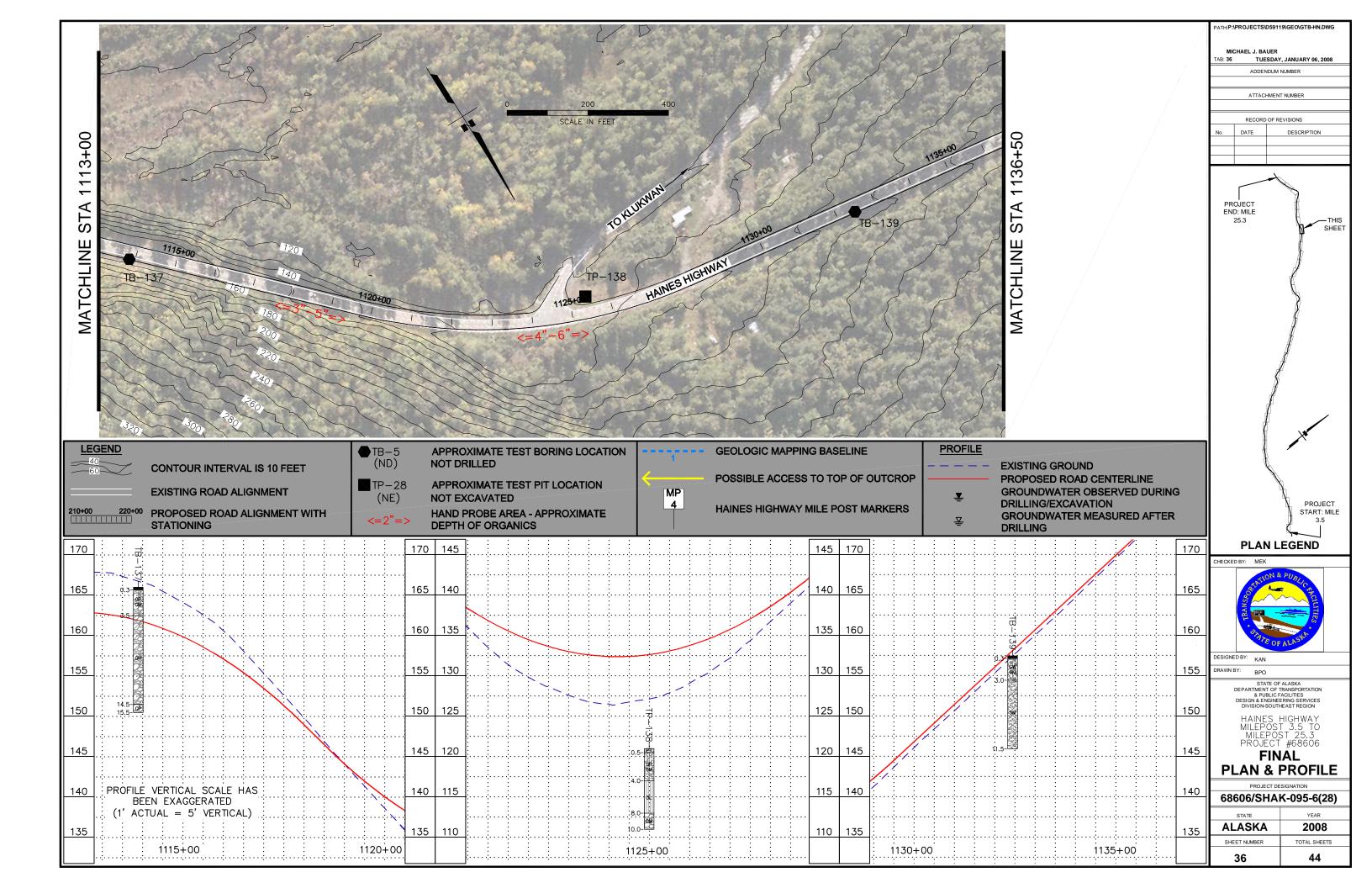


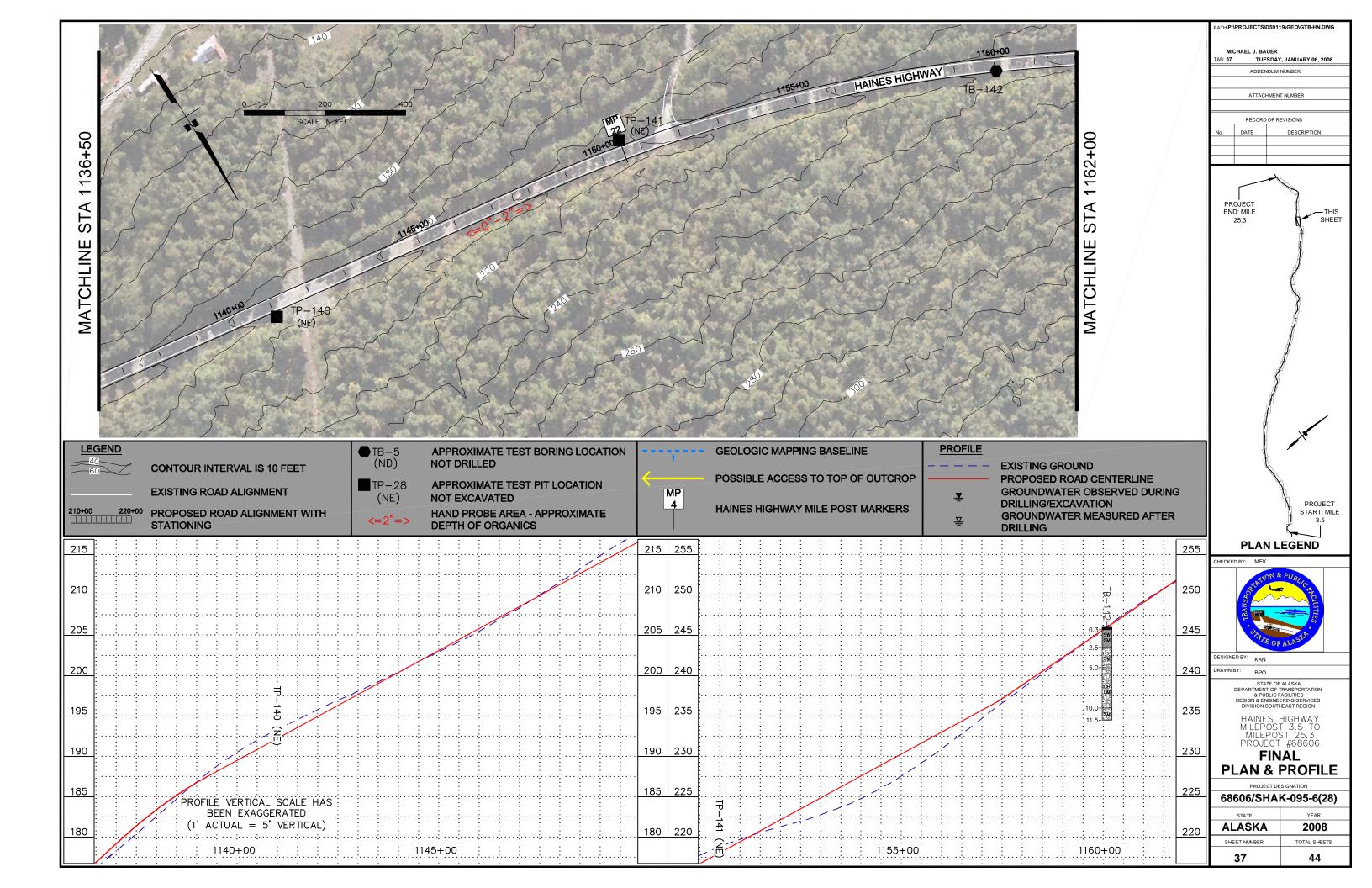


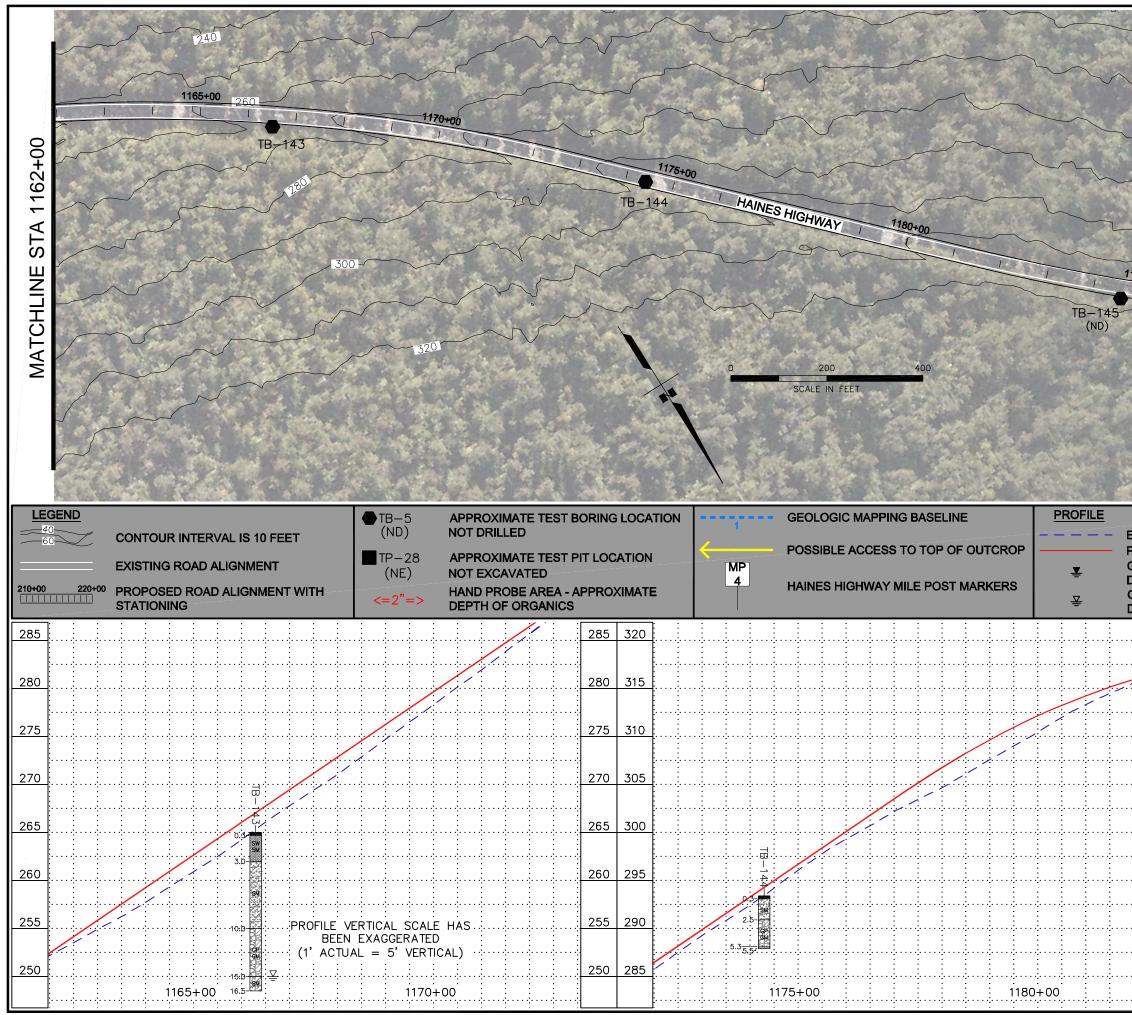




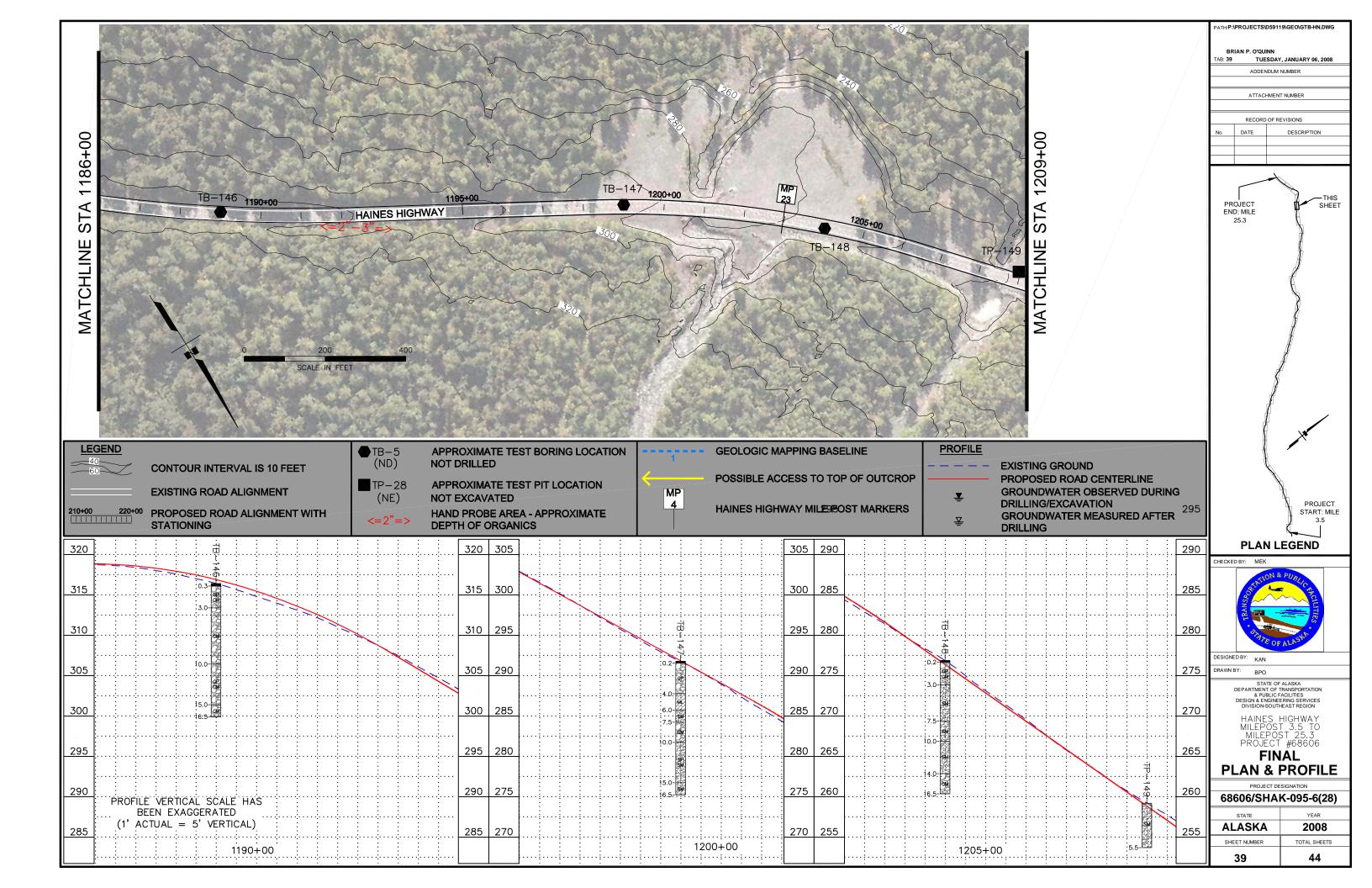


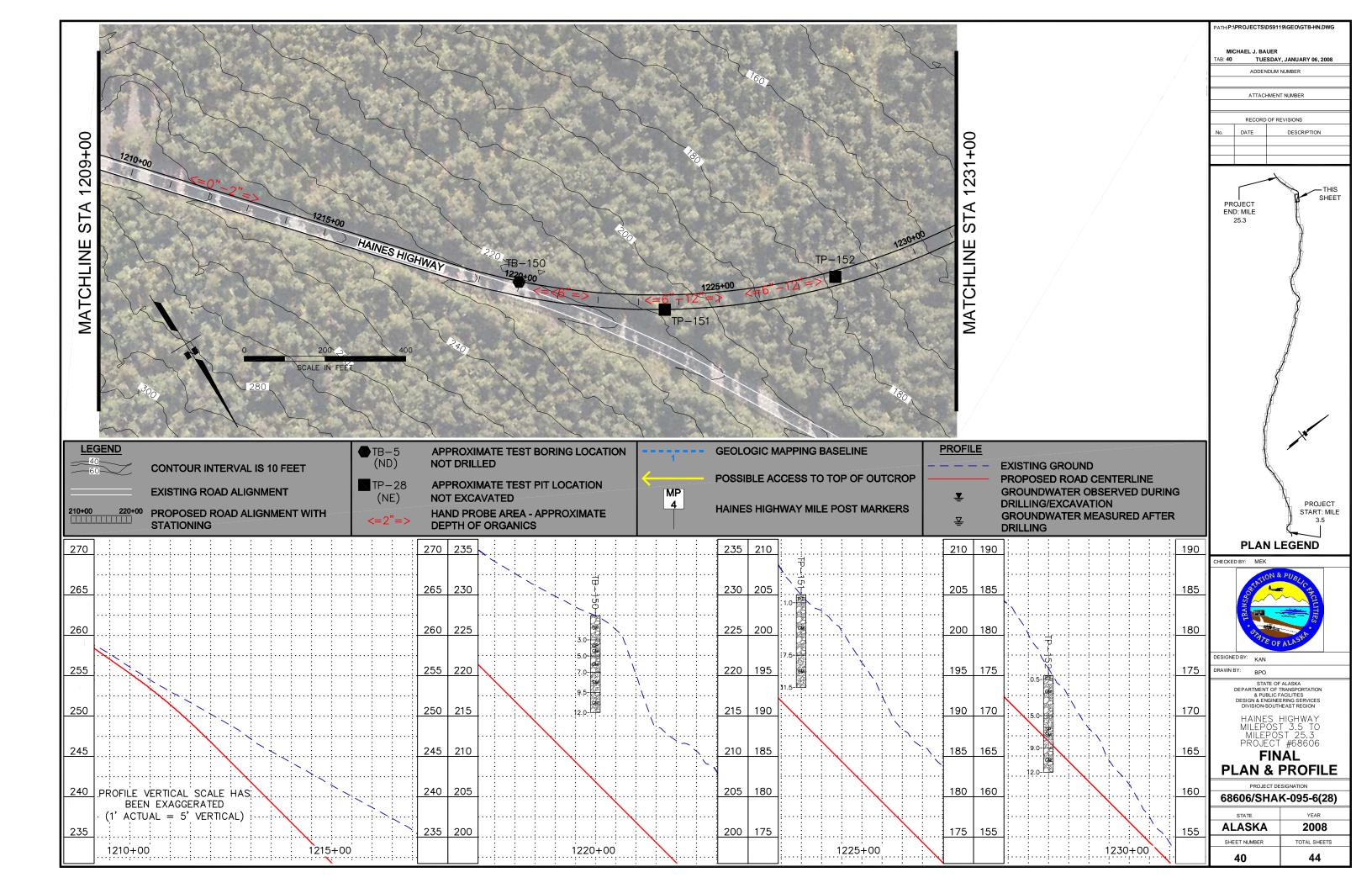


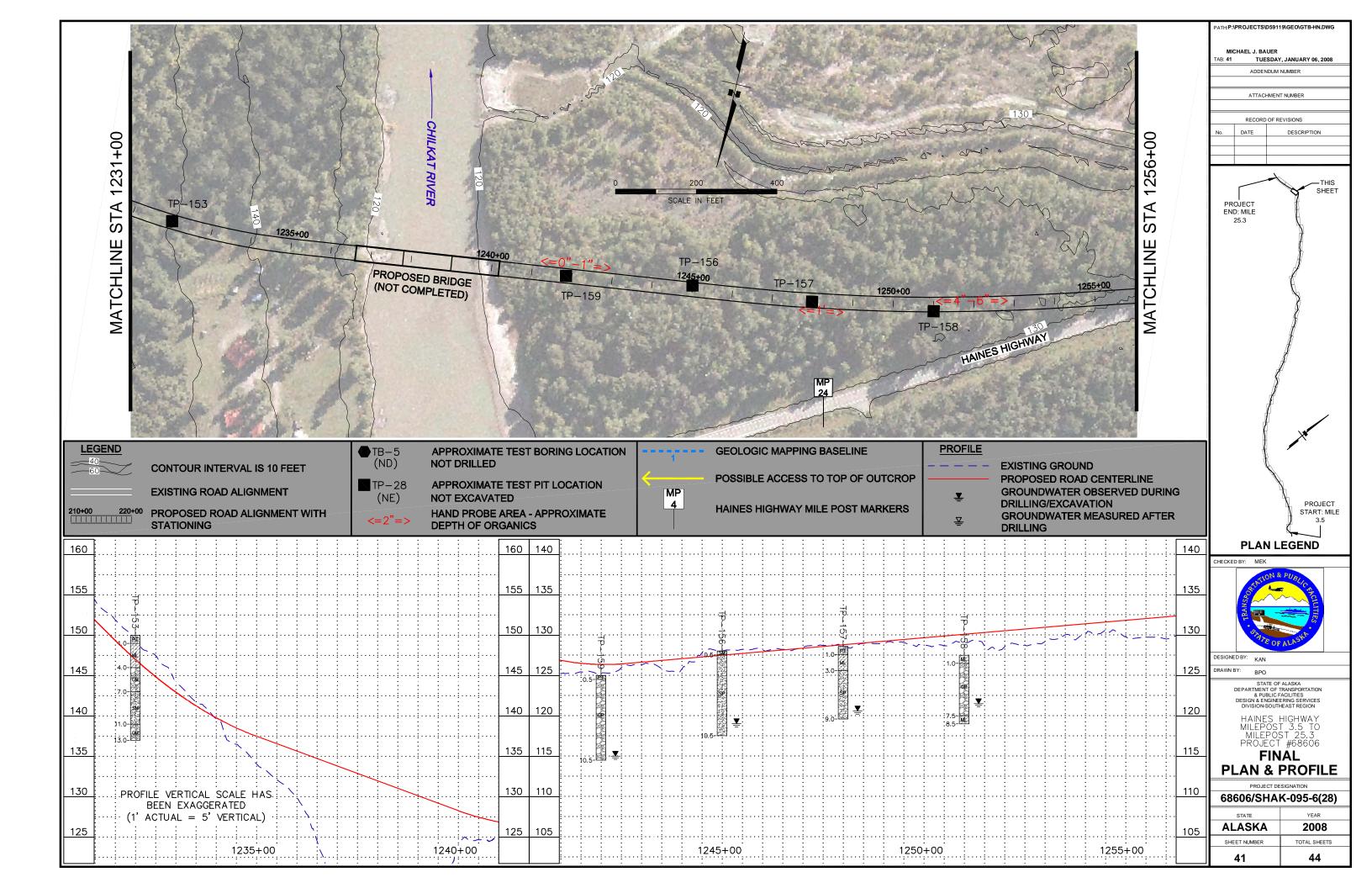


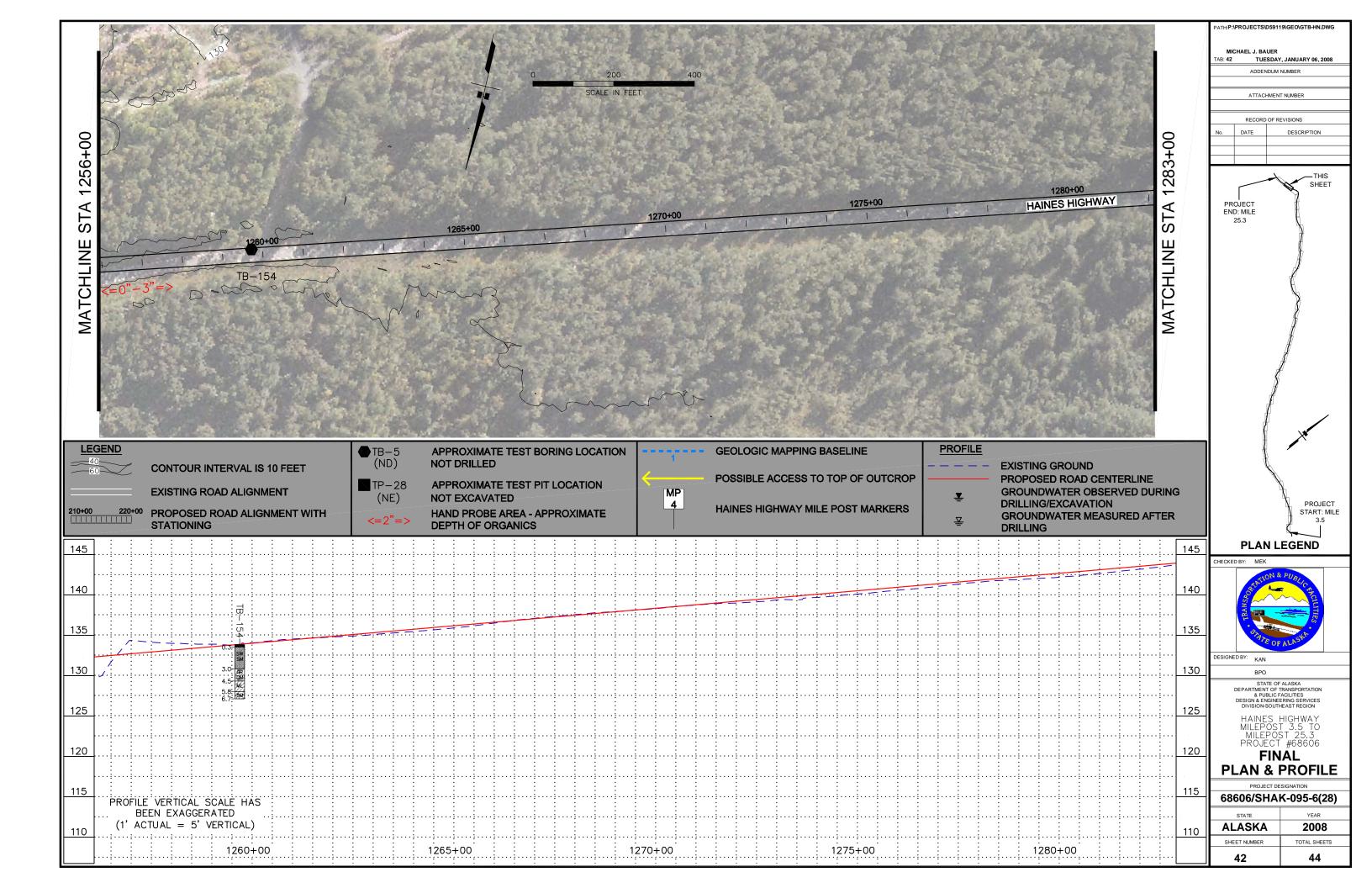


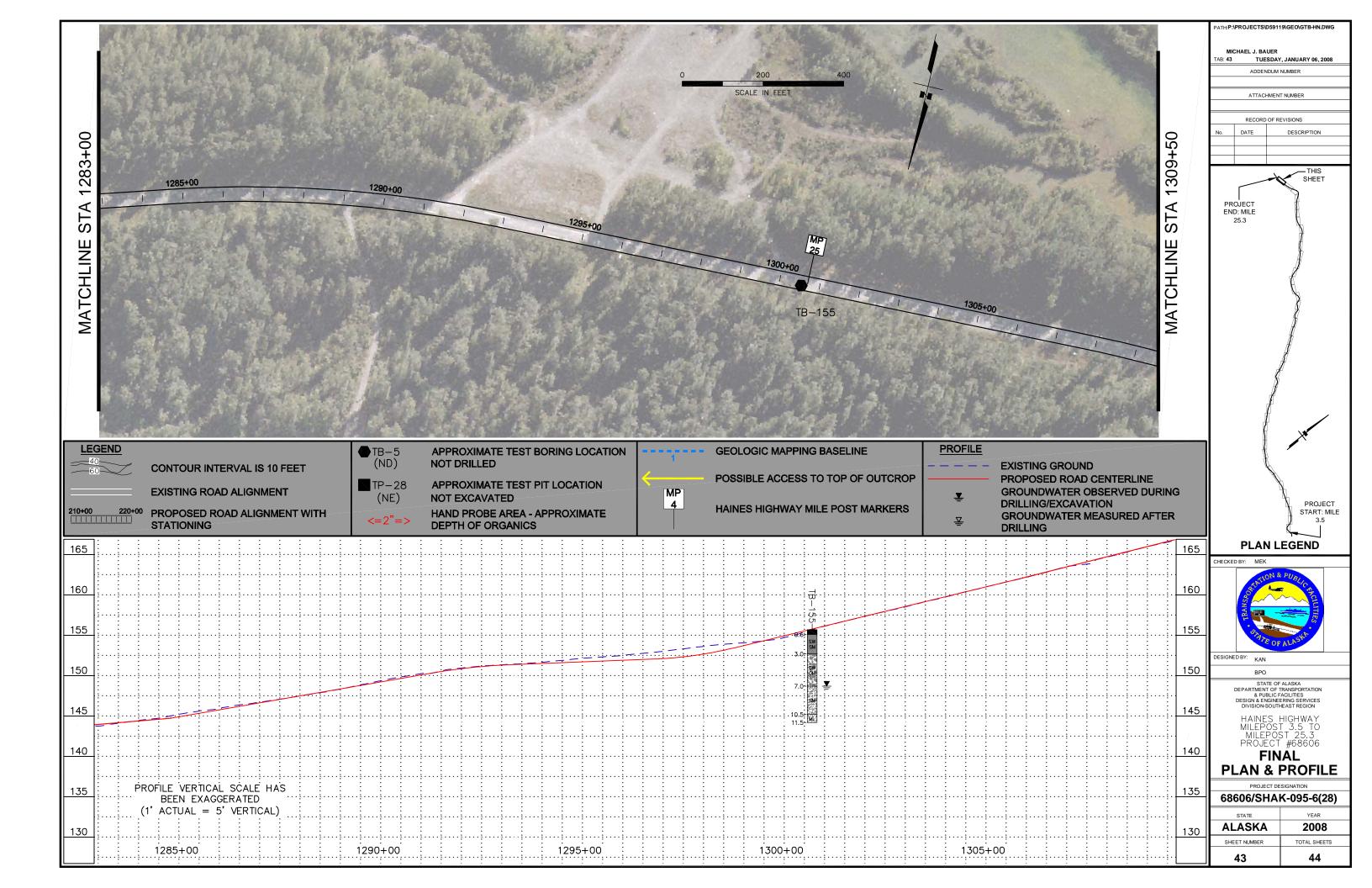
WICHING GROUND PROPOSED ROAD CENTERLINE BROUNDWATER OBSERVED DURING			PATH P:/PROJECTS/D59119/GEO/GTB-HN.DWG MICHAEL J. BAUER TAB: 38 TUESDAY, JANUARY 06, 2008 ADDENDUM NUMBER ATTACHMENT NUMBER RECORD OF REVISIONS No. DATE DESCRIPTION PROJECT END: MILE 25.3 FROJECT SHEET			
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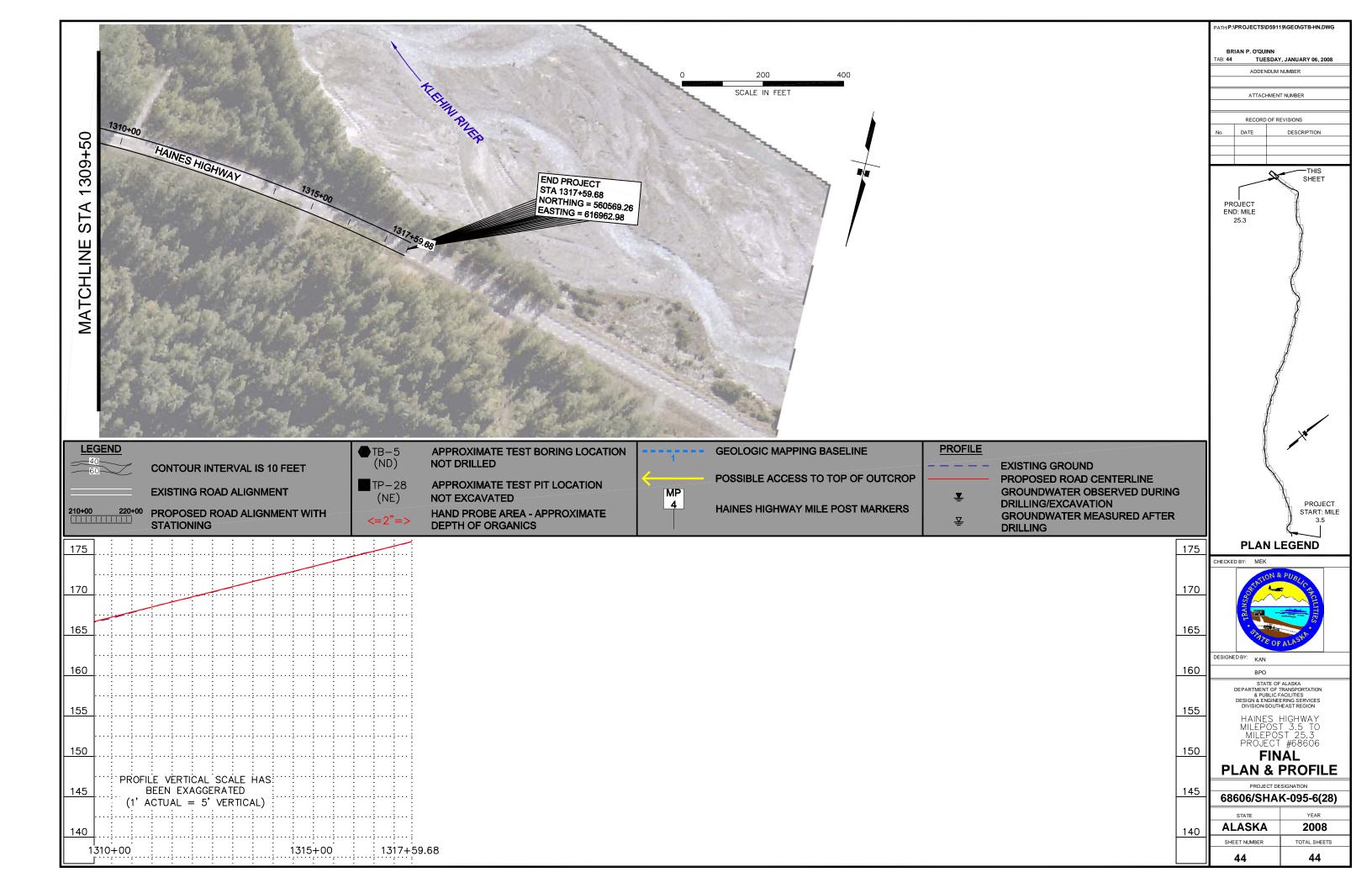






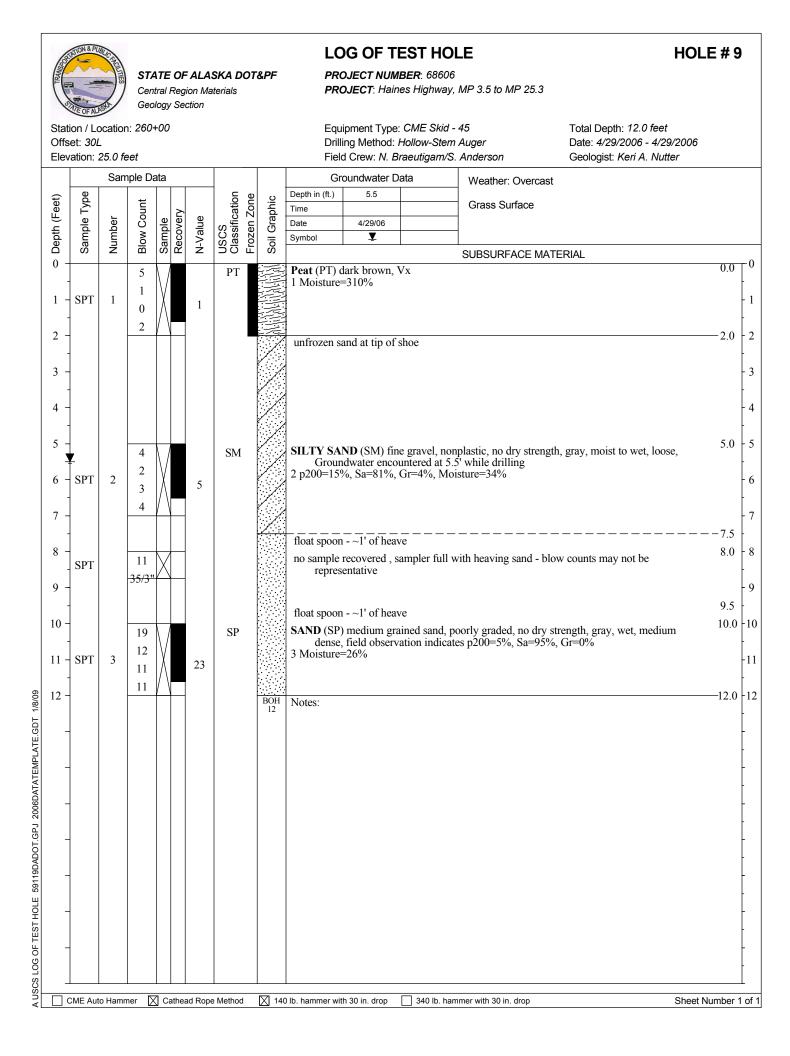




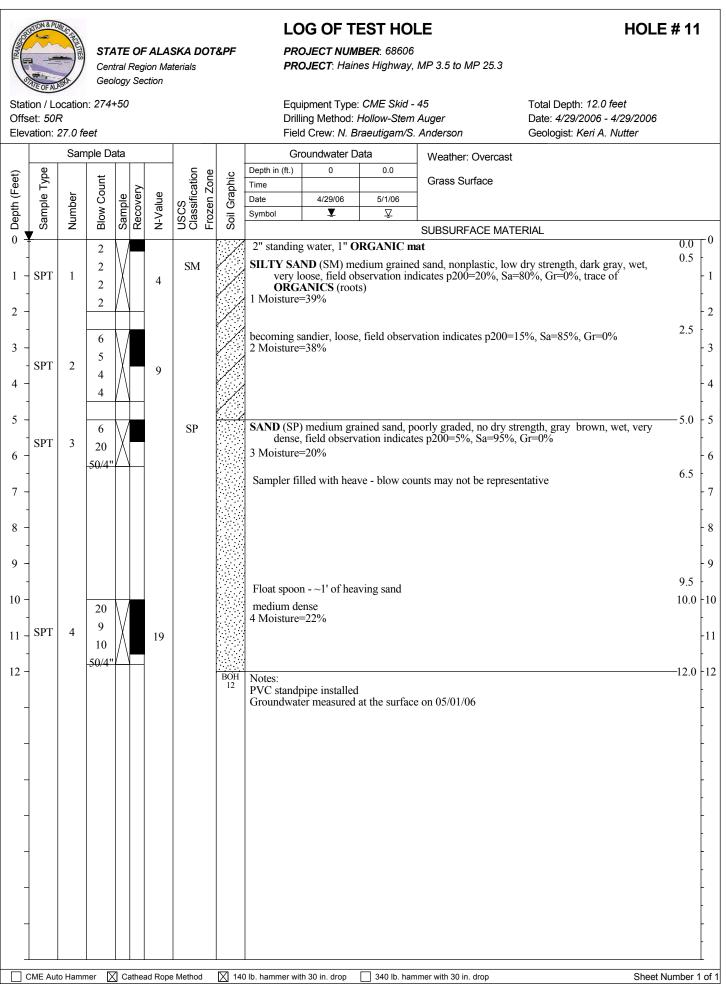


APPENDIX B

Test Hole Explanation Guide and Test Boring/Pit Logs



A DECEMBER OF	ALE OF AL		Cen	tral I	Regi		SKA DO	DT&PF	PF	OG OF T ROJECT NUM ROJECT: Hain	BER : 68606		HOLE	
Offs	ion / Lo et: <i>40L</i> ation: 2	-		+50					Dri	uipment Type illing Method: eld Crew: <i>N. B</i>	Hollow-Stem	Auger	Total Depth: 7.0 feet Date: 4/29/2006 - 4/29/2006 Geologist: Keri A. Nutter	
		Sam	ple D	ata					G	Groundwater D	ata	Weather: Overcast		
Leptn (reet)	Sample Type	Number	Blow Count	Sample	Recovery	N-Value	USCS Classification	Frozen Zone Soil Graphic	Depth in (ft.) Time Date	4/29/06	1.0 5/1/06	Grass Surface		
	Sam	Num	Blow	Sam	Reco	N-Va	USC Clas	Soil	Symbol	Ţ	₽			
0 -	•,	_	_		_	-	PT			brown, moist	fibrous	SUBSURFACE MATE	-RIAL	0.0
- 1 \[- 2 - 3 - - -	<u>7</u> SPT	1	2 11 9 6			20	ML		SANDY S obse 1 Moistur	rvation indica	arse gravel, r tes p200=60 ^c	oonplastic, low dry stren %, Sa=35%, Gr=5%	ngth, gray brown, moist, field	—0.5
4 - 5 - 1 6 - 7 -	SPT	2	3 5 4 5			9	SP	BOI	SAND (SI loose 2 Moistur	hange to gray ater observed a P) medium gra e, field observa e=21%	and sandier at 5.5' while of and sand, p ation indicate	drilling oorly graded, no dry st es p200=5%, Sa=95%,	rength, gray, moist to wet, Gr=0%	
	CME Aut	o Hamm	ner []	Ca	athea	ad Rope	e Method		40 lb. hammer v	vith 30 in. drop	340 lb. ham	nmer with 30 in. drop	Sheet N	lumber



A USCS LOG OF TEST HOLE 59119DADOT.GPJ 2006DATATEMPLATE.GDT

1/8/09

	ALE OF AL	SAL	Cen Geo		-		aterials		PR	OJECT: Hair	nes Highway,	MP 3.5 to MP 25.3			
Offs	ion / Lo et: <i>50F</i> ration: 2	7		+50					Drill	ing Method:	: CME Skid - Hollow-Stem Praeutigam/S	Auger	Total Depth: 7.0 feet Date: 4/29/2006 - 4/29/2006 Geologist: Keri A. Nutter		
		Sam	ple D	ata					Gr	oundwater E	oata	Weather: Overcast			
eet)	Sample Type		ınt				USCS Classification Frozen Zone	hic	Depth in (ft.) Time	4		Grass Surface			
н Г.	ple 1	ber	Col	ble	ver	Ilue	S sifica en Z	Grap	Date	4/29/06					
Depth (Feet)	Sam	Number	Blow Count	Sample	Recovery	N-Value	USCS Classification Frozen Zone	Soil Graphic	Symbol	Ţ					
0 -		-	6			_	PT		Peat (PT)	rown fibro	IS FROZEN	SUBSURFACE MAT		0.0	_
-			20	\mathbb{N}			I I		1 Moisture	=126%	<i>1</i> , 1	(100 us / x (10/0100)	oy volume)		
1 - 2 - 3 -	SPT	1 1A	7 6	Å			SP-SM		SAND (SP- observ preser 1A Moistur	vation indica t to ~30% b	n grained sar tes p200=10 y volume (pl	nd, poorly graded, no d %, Sa=90%, Gr=0%, F ants, rootlets)	ry strength, brown, field ROZEN Ice as Nb, ORGANICS	-1.0	
-								<u> </u>						-3.5	
4 -									Groundwa	ter encounte	red at 4' while	e drilling		4.0	
5 - 6 -	SPT	2	8 6 4	X		10	SP		SAND (SP) observ 2 Moisture	ation indica	ained sand, p tes p200=5%	oorly graded, no dry st 9, Sa=95%, Gr=0%	rength, gray, wet, loose, field	5.0	
7 -			4	()				BOH	Notes:					-7.0	
-															
-		o Hamn					e Method	∑ 140) lb. hammer wil			nmer with 30 in. drop	Sheet Nr		

	ATION & PU	ALC: NO.	ST	4 <i>TE</i>	OF	ALA	SKA DO	T&PF		DG OF T			HC)LE # 13
III S					-	ion Ma ction	aterials		PR	OJECT: Hair	es Highway,	MP 3.5 to MP 25.3		
Offs	ion / Lo et: 55F	7		+00					Dril	uipment Type ling Method: d Crew: <i>N. B</i>	Hollow-Stem	Auger	Total Depth: 6.0 feet Date: 4/29/2006 - 4/29/20 Geologist: Keri A. Nutter	006
		Sam	ple D	ata					G	roundwater D	ata	Weather: Overcast		
er)	ype		nt				USCS Classification Frozen Zone	je je	Depth in (ft.)			Grass Surface		
Depth (Feet)	Sample Type	er	Blow Count	e	very	ne	USCS Classification Frozen Zone	Soil Graphic	Time Date					
epth	amp	Number	No	Sample	Recovery	N-Value	ISCS lass	oil O	Symbol					
ם 0 –	S	Z	В	S	R	Z		_				SUBSURFACE MATE	ERIAL	
- -							PT SM		Peat (PT)	brown ND (SM) fir	e grained sa	nd nonplastic low dry	strength grav wet very loo	$\frac{0.0}{0.3}$
1 - 2 - 3 -	SPT	1	2 1 1 2			2			field (1 Moisture	=38%	ndicates p20)=35%, Sa=65%, Gr=0	strength, gray, wet, very loo %	
-														
4 -			1				SP		SAND (SP) medium gr	ained sand n	o dry strength gray we	et, very loose, field observati	4.0
-			1	\mathbb{N}			Sr		indica	ates p200=5%	%, Sa=95%, (Gr=0%	t, very loose, held observati	on
5 -	SPT	2	2	١X		3			2 Moisture	=29%				
-			2	$ \rangle$					•					
5 -								BOH 6	Notes:	ter observed				6.0
-	CME Aut		ner []				e Method	× 14	0 lb. hammer wi					eet Number

LEAVE ST			Cen	tral	Regi		SKA DO	T&PF	PR	DG OF T OJECT NUM OJECT: Hain	BER : 68606		HOLE	: # 14	4
Offs	ion / Lo et: 50F	7	n: 285						Drill	iipment Type ling Method: d Crew: <i>N. B</i>	Hollow-Stem	Auger	Total Depth: 6.0 feet Date: 4/29/2006 - 4/29/2006 Geologist: Keri A. Nutter		
		Sam	ple D	ata					Gr	oundwater D	ata	Weather: Overcast			
et)	,pe		It				USCS Classification Frozen Zone	<u>.</u>	Depth in (ft.)	0		Grass Surface			
Depth (Feet)	Sample Type	Ŀ.	Blow Count	le	ery	ē	USCS Classification Erozan Zona	Soil Graphic	Time Date	4/29/06					
pth	du	Number	_ ≥	Sample	Recovery	N-Value	assif	il Gr	Symbol	4/29/00		-			
	Sa	N	B	Sa	Re	ź	S S S	S S		_		SUBSURFACE MAT	ERIAL		-
0			1	1			PT	1	Peat (PT)	orown, Grou	ndwater enco	untered at the surface	while drilling	0.0	
- 1 - - 2 -	SPT	1	1 2 2				SM		SILTY SA observ 1 Moisture	ND (SM) fin vation indica =40%	e grained sar tes p200=259	nd, no dry strength, gra %, Sa=75%, Gr=0%	ıy, wet, very loose, field	-~ 0.3	
3 -															
4 -			3				SP		SAND (SP) medium gra	uined sand, p	oorly graded, no drv st	rength, gray, wet, loose, field	4.0	
- 5 -	SPT	2	3	X		6	51		observ 2 Moisture	vation indica	tes p200=5%	o, Sa=95%, Gr=0%			
6 -			5	$\langle \rangle$				BOH	Notes:					-6.0	
-															
-		o Hamn					e Method	X 14	0 lb. hammer wi			nmer with 30 in. drop		Jumber	

(all all all all all all all all all all	ATION & PU	Section and	ST	4 <i>TE</i>	OF	ALA	SKA DOI	- &PF		DG OF T		LE	HOLE	# 1	5
- S				ntral l blogy			aterials		PR	OJECT: Hain	es Highway,	MP 3.5 to MP 25.3			
offs	ion / Lo et: 10L ration: 2	•		+65					Drill	lipment Type ling Method: d Crew: <i>N. B</i>	Hollow-Stem	Auger	Total Depth: 6.5 feet Date: 11/16/2005 - 11/16/2005 Geologist: John Rego		
		Sam	ple D	ata					Gr	oundwater D	ata	Weather: Rain			-
בו)	/pe		ıt				USCS Classification Frozen Zone	ic	Depth in (ft.)	4	1.0	Asphalt Surface			
محمرا الحدا	Sample Type	er	Blow Count	e	/ery	е	USCS Classification Frozen Zone	Soil Graphic	Time Date	11/16/05	11/22/05				
	dme	Number	Ň	Sample	Recovery	N-Value	SCS assi oze	oil G	Symbol	<u> </u>	 ₽				
5) –	ů	ž	B	ů	Ř	Ż	50 5	Ň				SUBSURFACE MA	TERIAL		_
, _									-	t Concrete (1				0.0 - 0.5	
2 -	<u>Z</u> GRAB	1					GW		moist,	, FILL	,		onplastic, no dry strength, brown, Dens=156.5pcf, Opt. Moisture=4%		
_			16	Ň			GP		GRAVEL	with Sand (C	GP) coarse gr	avel, poorly graded,	nonplastic, no dry strength,	-3.0	1
	SPT	2	11	X		36		200	browr Gr=80	n, moist to we	et, dense, FII	LL, field observation	indicates p200=5%, Sa=15%,	4.0	,
	-		25	\mathbb{Z}		50		2°C	2 Moisture	=6%				4.0	J
								00 • <u>0</u>	e	ter encounter		-		- 5.0)
, , -	SPT	3	2 6	\mathbb{N}		15	SP-SM		SAND with brown 3 Moisture	n, wet, mediu	 medium gi m dense, fiel 	ained sand, poorly g d observation indicat	raded, nonplastic, no dry strength, es p200=10%, Sa=85%, Gr=5%	5.0	,
_			9	\square				BOH	Notes:					-6.5	;
	CME Auto	o Hamn	ner [2	Call	athea	d Rope	e Method	14	0 lb. hammer wit	th 30 in. drop	340 lb. ham	nmer with 30 in. drop	Sheet Nu	mber	

TRANSCO				tral I	Regi	on Ma	SKA DOT terials	&PF	PRO	DG OF T DJECT NUM DJECT: Hain	BER : 68606		HOLE	5 # 10
Offs	ion / Lo set: 50F vation: 2	7		+50					Drill	ipment Type ing Method: d Crew: <i>N. B</i>	Hollow-Stem	Auger	Total Depth: 9.5 feet Date: 4/29/2006 - 4/29/2006 Geologist: Keri A. Nutter	
		San	nple Da	ata					Gr	oundwater D	ata	Weather: Partly Cl	oudv	
ŝt)	be						le o	<u>.</u>	Depth in (ft.)	0		-	· · ·)	
Uepth (Feet)	Sample Type	Ŀ	Blow Count	a	ery	Ð	USCS Classification Frozen Zone	Soil Graphic	Time Date	4/29/06		Grass Surface		
pth	du	Number	≥	Sample	Recovery	N-Value	CS assif zer	i Gr	Symbol	4/29/06		-		
	Sa	NN	8	Sa	Re	ź	NS S F	S				SUBSURFACE MA	TERIAL	
0 -			2	$\overline{)}$			PT					encountered at the su		0.0
1 - - 2 - 3 -	SPT	1	2				SM		loose.	field observa % by volum	ation indicate	es p200=20%. Sa=80%	dry strength, gray, wet, very %, Gr=0%, ORGANICS present	0.2
4 -			3											4.0
-			3	\mathbb{N}										
5 -	SPT		3	X		6			no sample	recovered				5.0
-			3	$ \rangle$					1					
6 -				\square										
-														
7 -														
- 8	SPT	2	4 5 9	V		14	SP		SAND (SP) dense, 2 Moisture	, field observ	iined sand, p ation indicat	oorly graded, no dry s es p200=5%, Sa=95%	strength, dark gray, wet, medium 6, Gr=0%	7.5
9 -			24	$ \rangle$										
-				\square				BOH 9.5	Notes:					—9.5
-														
-														
_														
_														
-														
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_														
_														
		o Hamr		71 0		d Done	Method	140) lb. hammer wit			nmer with 30 in. drop	Chast	lumber

A A A A A A A A A A A A A A A A A A A	ALE OF AL			tral I	Regi	on Ma	SKA DOT aterials	&PF	PROJECT NUMBER : 68606 PROJECT : Haines Highway, MP 3.5 to MP 25.3		
Offs	ion / Lo et: <i>50F</i> ation: 2	7		+50					Equipment Type: CME Skid - 45Total Depth: 7.0 feetDrilling Method: Hollow-Stem AugerDate: 4/29/2006 - 4/29/2006Field Crew: N. Braeutigam/S. AndersonGeologist: Keri A. Nutter		
set)	ype	Sam	nple Da				cation Zone	hic	Groundwater Data Weather: Partly Cloudy Depth in (ft.) 5 1.5 Time Grass Surface		
Depth (Feet)	Sample Type	Number	Blow Count	Sample	Recovery	N-Value	USCS Classification Frozen Zone	Soil Graphic	Date 4/29/06 5/1/06 Symbol ▼ ▼		
0 -	SPT	1	5 14	V			GP-GM		SUBSURFACE MATERIAL GRAVEL with Silt and Sand (GP-GM) coarse gravel, poorly graded, no dry strength, gray, moist, medium dense, FILL, field observation indicates p200=10%, Sa=35%, Gr=55%, trace of ORGANICS (roots, plants), cobbles to 10" (~5%)	0.0 0.5 7 1.0	
2 - 3 -		1A	4 20	$\left \right $			ML		 <u>1 Moisture=7%</u> SANDY SILT with Gravel (ML) fine gravel, nonplastic, low dry strength, brown, field observation indicates p200=50%, Sa=35%, Gr=15%, FROZEN Ice as Vc (~10% ice by volume), ORGANICS present to ~25% by volume (roots, plants) <u>1A Moisture=26%</u> 	 3.0	
4 - 5 1	Ļ		5				SP		Groundwater encountered at 5' while drilling SAND (SP) medium grained sand poorly graded no dry strength gray, wet loose field	4.5 5.0	
6 -	SPT	2	3 4 4 5	\mathbb{N}		8	SP		SAND (SP) medium grained sand, poorly graded, no dry strength, gray, wet, loose, field observation indicates p200=5%, Sa=95%, Gr=0% 2 Moisture=26%		
									Groundwater measured at 1.5' on 05/01/06		
	CME Aut	o Hamn	ner D	(] Ca		d Rone	e Method	× 14	1 lb. hammer with 30 in. drop 340 lb. hammer with 30 in. drop Sheet N	umber	

ation / Loc fset: 10R evation: 22 GRAB GRAB	R 28.0 fe	Cent Geo n: 295+	tral Reg logy Se -00	N-Value N-Value N-Value	Classification GGM- GGM- GP	Soil Graphic	PRO Equip Drillin Field Gro Depth in (ft.) Time Date Symbol V1.5" Asphal GRAVEL v moist,	pment Type: ng Method: <i>I</i> l Crew: <i>N. Bi</i> bundwater Da 5 4/24/06 ¥ It Concrete vith Silt and	es Highway, Mobile B-61 Hollow-Stem raeutigam/S. ata 5.5 4/27/06 ∑ (no CABC o Sand (GW-	Auger Anderson Weather: Partly Clou Asphalt Surface SUBSURFACE MATH bserved) GM) coarse gravel, we	·	
ffset: 10R evation: 20 adA adA adA adA adA ada adA ada ada ada	R Results of features Samuration Numper 1	12 2954	+ <i>00</i> ata	N-Value	GW- GM	Soil Soil	Drillin Field Gro Depth in (ft.) Time Date Symbol 1.5'' Asphal GRAVEL v moist,	ng Method: <i>H</i> I Crew: <i>N. BI</i> bundwater Da 4/24/06 ¥ It Concrete vith Silt and FILL	Hollow-Stem raeutigam/S. ata 5.5 4/27/06 又 (no CABC o Sand (GW-	Auger Anderson Weather: Partly Clou Asphalt Surface SUBSURFACE MATH bserved) GM) coarse gravel, we	Date: 4/24/2006 - 4/24/2006 Geologist: Keri A. Nutter udy	
GRAB GRAB SS SS	Sam Number	12 10 13			GW- GM	Soil Soil	Gro Depth in (ft.) Time Date Symbol V1.5" Asphal GRAVEL v moist,	andwater Da 5 4/24/06 ⊈ It Concrete with Silt and FILL	ata 5.5 4/27/06 ∑ (no CABC o Sand (GW-	Weather: Partly Clou Asphalt Surface SUBSURFACE MATI bserved) GM) coarse gravel, we	ERIAL	
GRAB GRAB SS SS SS	1 Number	II2 10 13			GW- GM	Soil Soil	Depth in (ft.) Time Date Symbol (1.5" Asphal GRAVEL y moist,	5 4/24/06 ▼ It Concrete vith Silt and FILL	5.5 4/27/06 又 (no CABC o Sand (GW-	Asphalt Surface SUBSURFACE MATI bserved) GM) coarse gravel, we	ERIAL	
GRAB GRAB SS SS SS	1	12 10 8 10 13	Sample Recovery		GW- GM	Soil Soil	Date Symbol V1.5" Asphal GRAVEL v moist,	¥ It Concrete vith Silt and FILL	∑ (no CABC o Sand (GW-	SUBSURFACE MATI bserved) GM) coarse gravel, we		
GRAB GRAB SS SS SS	1	12 10 8 10 13	Sampl		GW- GM	Soil Soil	Symbol 1.5'' Aspha GRAVEL v moist,	¥ It Concrete vith Silt and FILL	∑ (no CABC o Sand (GW-	bserved) GM) coarse gravel, we		
GRAB GRAB SS SS SS	1	12 10 8 10 13			GW- GM		GRAVEL v moist,	vith Silt and FILL	Sand (GW-	bserved) GM) coarse gravel, we		
SS SS ¥ SS SS SS		10 8 10 13			GM		GRAVEL v moist,	vith Silt and FILL	Sand (GW-	GM) coarse gravel, we	ell graded, no dry strength, gray,	
SS SS ¥ SS SS SS		10 8 10 13					moist,	FILL				
SS SS ¥ SS SS SS		10 8 10 13			GP		1 p200–876,	, 5a-40%, O	1-3270, 10101	SLUIC=270		
▼ SS -	2	10 8 10 13			GP					2		
▼ SS -	2	10 8 10 13			GP							
▼ SS - -	2	10 8 10 13			GP [~~~	CD (UT)				1	-3.0
▼ SS -	2	8 10 13			r.	$\mathcal{S}^{\mathcal{O}}_{\mathcal{O}}$	GRAVEL w mediur	vith Sand (G n dense, FII	P) coarse gr	avel, poorly graded, no ervation indicates p200	o dry strength, gray, moist, D=5%, Sa=25%, Gr=70%	
		10 13			0	,00 ,00	2 Moisture=	5%				
		13	V		c c							
					2 - -	حقي اه	Groundwate	er encounter	$\overline{\text{ed}} \overline{\text{at}} \overline{5'} \overline{\text{while}}$	e drilling		5.0 5.5
- SS		10			-		no sample r	recovered - d	riving a rock	ahead of sampler		5.5
- SS		10			:							
SS					ŀ							
SS		5			SP		SAND (SP)	medium gra	ined sand, p	oorly graded, no dry st	rength, gray, wet, medium	7.5
	3	8	X				dense, 3 Moisture=	field observa	ation indicate	es p200=5%, Sa=95%,	Gr=0%	
		10										
					ŀ							
-		2					loose samn	ler full with	heave			10.0
ss	4	3	Y		-		4 Moisture=	18%	licuve			
		6			-							11.5
					Ĺ	BOH 11.5	Notes: PVC standp	ina installad	to 11'			—11.5
							Groundwate	er measured a	at 5.5' on 04/	/27/06		
-												
-												
]												
-												
-												
1												
				ad Rope M					🗙 340 lb. ham	nmer with 30 in. drop		lumber '

A USCS LOG OF TEST HOLE 59119DADOT.GPJ 2006DATATEMPLATE.GDT 1/8/09

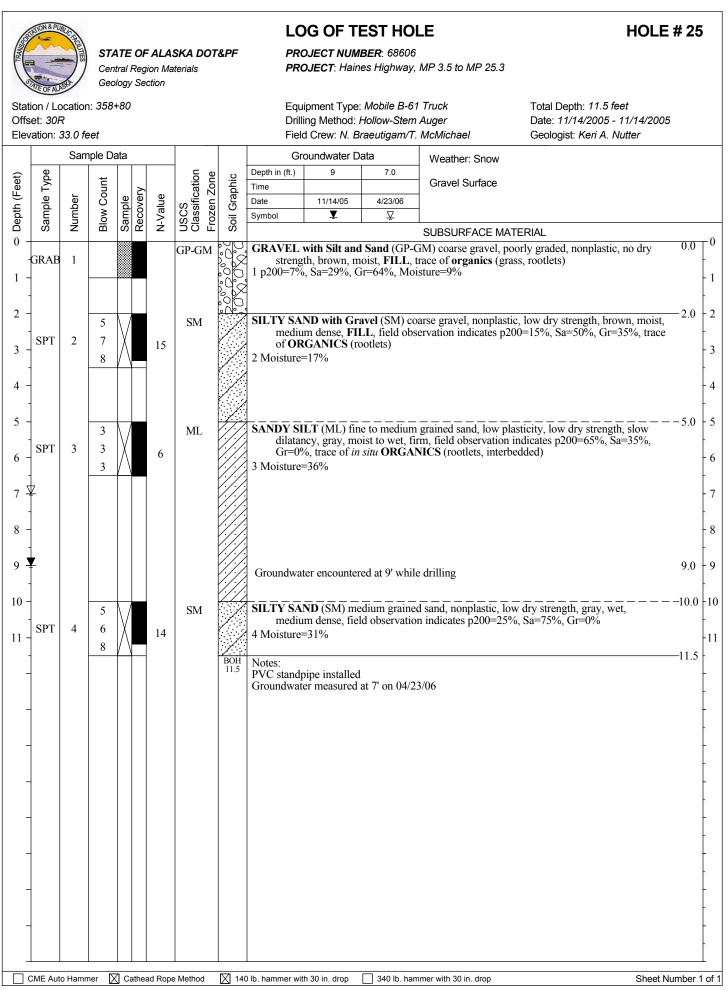
	ATE OF AL	ASRI L			-	on Ma ction	aterials		PR	OJECT: Hain	es Highway	, MP 3.5 to MP 25.3		
Offs	ion / Lo set: <i>10F</i> vation: .	7		+85					Dril	uipment Type: lling Method: <i>I</i> ld Crew: <i>N. B</i>	Hollow-Sterr	n Auger	Total Depth: 9.0 feet Date: 11/16/2005 - 11/16/200 Geologist: John Rego	5
		San	ple D	ata					G	roundwater D	ata	Weather: Rain		
Depth (Feet)	Sample Type	ber	Blow Count	ole	Recovery	lue	USCS Classification Frozen Zone	Soil Graphic	Depth in (ft.) Time Date	7	2.0	Asphalt Surface		
Jepth	Samp	Number	3low	Sample	Seco	N-Value	JSC9 Class Froze	Soil O	Symbol	Ţ	Ϋ́			
0 -	0	2	ш		ш	2		0)	1" Asphal	t Concrete (r	no CABC of	SUBSURFACE MA	TERIAL	0.0
1 -	GRAB Z	1					GP-GM		GRAVEL streng		l Sand (GP- noist, FILL	GM) coarse gravel, p	oorly graded, nonplastic, no dry	0.3
3 -	SPT	2	11 19 22	X		41			Becoming Gr=6 2 Moisture	0%	v dense, FIL	L, field observation is	ndicates p200=10%, Sa=30%,	2.5
4 - 5 -			9						dense, FII 3 Moisture	LL, field obse ≔14%	ervation indi	cates p200=10%, Sa=	=30%, Gr=60%	5.0
6 - 7 -	SPT	3	11 15	Å		26								7.0
8 -	SPT	4	6 13 17	X		30	SM		1			-	ic, low dry strength, brown, wet, %, Sa=45%, Gr=40%	—7.5
-								BOH 9		pipe installed ter measured		2/05		

LEAN COLOR	ATION & PU						SKA DOT tterials	&PF	PRC	JECT NUM	EST HO BER: 68606 es Highway,	LE MP 3.5 to MP 25.3	HOLE	# 20
	on / Lo et: 10F			logy +50	Sec	tion			•		: Mobile B-61 Hollow-Stem		Total Depth: <i>11.5 feet</i> Date: <i>4/24/2006 - 4/24/2006</i>	
Elev	ation: 3	30.0 fe	et					1	Field	Crew: N. B	raeutigam/S.	Anderson	Geologist: Keri A. Nutter	
		Sam	ple Da	ata						oundwater D	1	Weather: Partly Clo	udy	
Ueptn (Feet)	Sample Type		unt		2		USCS Classification Frozen Zone	phic	Depth in (ft.) Time	8	5.0	Asphalt Surface		
	aldr	Number	Blow Count	Sample	Recovery	N-Value	SS ssific	Soil Graphic	Date	4/24/06	4/27/06			
nep	San	Nun	Blov	San	Rec	>-Z	USC Clas	Soil	Symbol	Ţ		SUBSURFACE MAT	ΈRΙΔΙ	
) 		1							2.5" Aspha	lt Concrete	(no CABC c			_ 0.0
- - - -	GRAB						GP-GM		GRAVEL V	vith Silt and noist, FILL,	Sand (GP-C	GM) coarse gravel, poo	orly graded, low dry strength, 10%, Sa=40%, Gr=50%	0.2
-	SS	2	5 21 30				SM		FROZ	EN Ice as V	/c	arse gravel, nonplastic pisture=10%	e, low dry strength, gray,	-3.0
1	7	3						/	moist, loos	e, field obsei	vation indica	ntes p200=15%, Sa=45	5%, Gr=40%	4.8
		5	6						3 Moisture=	=21%				-5.5
-	SS	3A -	2 4				ML		SILT (ML) observ volume 3A Moisture	ation indicat	t sand, low pl tes p200=909	asticity, low dry stren %, Sa=10%, Gr=0%, G	gth, gray, moist, firm, field DRGANICS present to ~30% by	
	SS	4	3 5	Y			SP-SM		SAND with wet, m 4 Moisture=	edium dense	1) fine graine e, field obser	d sand, poorly graded vation indicates p200=	, no dry strength, gray, moist to =10%, Sa=90%, Gr=0%	-7.5
-			6						Groundwat	er encounter	ed at 8' while	e drilling		
) - -	SS	5	12 20	X			SP-SM		wet, de heave	ense, field of - blow count	oservation in) coarse gravel, poorl dicates p200=10%, Sa representative	y graded, no dry strength, gray, =45%, Gr=45%, sampler full with	-10.0
-			23					BOH	5 Moisture= Notes:	=10%				-11.5
								11.5	PVC standp Groundwate	ipe installed	to 10' at 5' on 04/2	7/06		
] c	:ME Aut	o Hamm	ier [>	Ca	thea	d Rope	e Method	140) lb. hammer with	n 30 in. drop	🔀 340 lb. han	mer with 30 in. drop	Sheet N	umber 1

A USCS LOG OF TEST HOLE 59119DADOT.GPJ 2006DATATEMPLATE.GDT 1/8/09

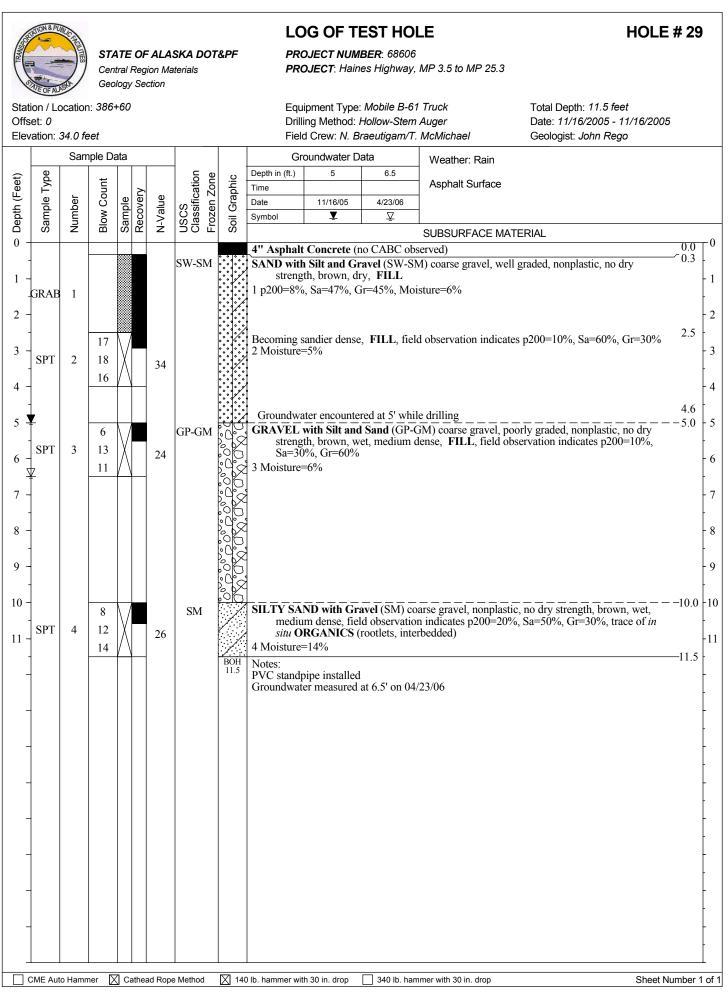
			Cen	tral	Reg		SKA DO aterials	T&PF	PRC	JECT NUM	EST HOI BER: 68606 es Highway,	_E MP 3.5 to MP 25.3	HOLE	: # 22	2
offse	t: <i>40L</i>	cation		+50	1				Drilli	ng Method:	CME Skid - Hollow-Stem raeutigam/S.	Auger	Total Depth: <i>4.0 feet</i> Date: <i>4/24/2006 - 4/24/2006</i> Geologist: <i>Keri A. Nutter</i>		
		Sam	ple Da	ata					Gro	oundwater D	ata	Weather: Partly Clo	udy		
cr)	ype		nt				USCS Classification	nic 5	Depth in (ft.) Time	0		Grass Surface			
	Sample Type	ber	Blow Count	e	Recovery	ne	USCS Classification	Graphic	Date	4/24/06					
2	amp	Number	NO	Sample	eco	N-Value	ISCS lass	Soil 0	Symbol	Ţ					
] ¥	0	2	ш	0	œ	2		- 0				SUBSURFACE MAT	ERIAL	0.0	-
-							PT		Peat (PT) b Groundwate	rown, wet, er encountere	ed at the surfa	ace while drilling		0.0 ₁ 0.5	ļ
_									·						-
-								/							ł
2 -															+
-			8				SM		SILTY SAN	ND (SM) me	dium grained	l sand, no dry strength	, gray, wet, medium dense, field	2.5	ł
-	SPT	1	6	IV			5111		observ 1 Moisture=	ation indicat	es p200=40%	%, Sa=60%, Gr=0%, tr	ace of ORGANICS (roots)		ł
-	511	1	5			11			i Moisture-	-30%					ł
-			-	\int				BOH 4	Notes:					-4.0	ł
															f
-															ł
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	STATE O Central Reg Geology Se	gion Ma		T&PF	LOG OF TEST HOLEHOLE # 2PROJECT NUMBER: 68606PROJECT: Haines Highway, MP 3.5 to MP 25.3	23
Station / Location Offset: 35L Elevation: 28.0 fe					Equipment Type: CME Skid - 45Total Depth: 6.5 feetDrilling Method: Hollow-Stem AugerDate: 4/24/2006 - 4/24/2006Field Crew: N. Braeutigam/S. AndersonGeologist: Keri A. Nutter	
San	nple Data				Groundwater Data Weather: Partly Cloudy	
ype	ut		USCS Classification	nic lie	Depth in (ft.) 0 Time Grass Surface	
Sample Type	Blow Count Sample Recoverv	ne	USCS Classification	Graphic	Time Class called Date 4/24/06	
Sample .	Blow Cc Sample Recover	N-Value	SCG	Soil G	Symbol Y	
	ലഗഷ	z			SUBSURFACE MATERIAL	
SPT 1 1 2 3 4 5 5 5 5 5 5 7 7 7 7 7 7 7 7 7 7 7 7 7		6	ML ML	BOH 6.5	 SILT with Sand (ML) fine grained sand, nonplastic, low dry strength, brown, wet, field observation indicates p200=60%, Sa=40%, Gr=0%, FROZEN Ice as Nb, ORGANICS present to ~30% by volume (rootlets), Groundwater encountered at the surface while drilling Moisture=36% SANDY SILT (ML) fine grained sand, nonplastic, low dry strength, brown, wet, field observation indicates p200=60%, Sa=40%, Gr=0%, ORGANICS present to ~15% by volume (rootlets) 1A Moisture=33% SILT with Sand (ML) fine grained sand, nonplastic, low dry strength, brown, wet, field observation indicates p200=75%, Sa=25%, Gr=0%, ORGANICS present to ~10% by volume (rootlets) 2 Moisture=39% 	0.0 0 5.0 5.5
CME Auto Hamr	ner 🔀 Cathe	ead Rope	e Method	X 140	40 lb. hammer with 30 in. drop 340 lb. hammer with 30 in. drop Sheet Numbr	ber



A USCS LOG OF TEST HOLE 59119DADOT.GPJ 2006DATATEMPLATE.GDT

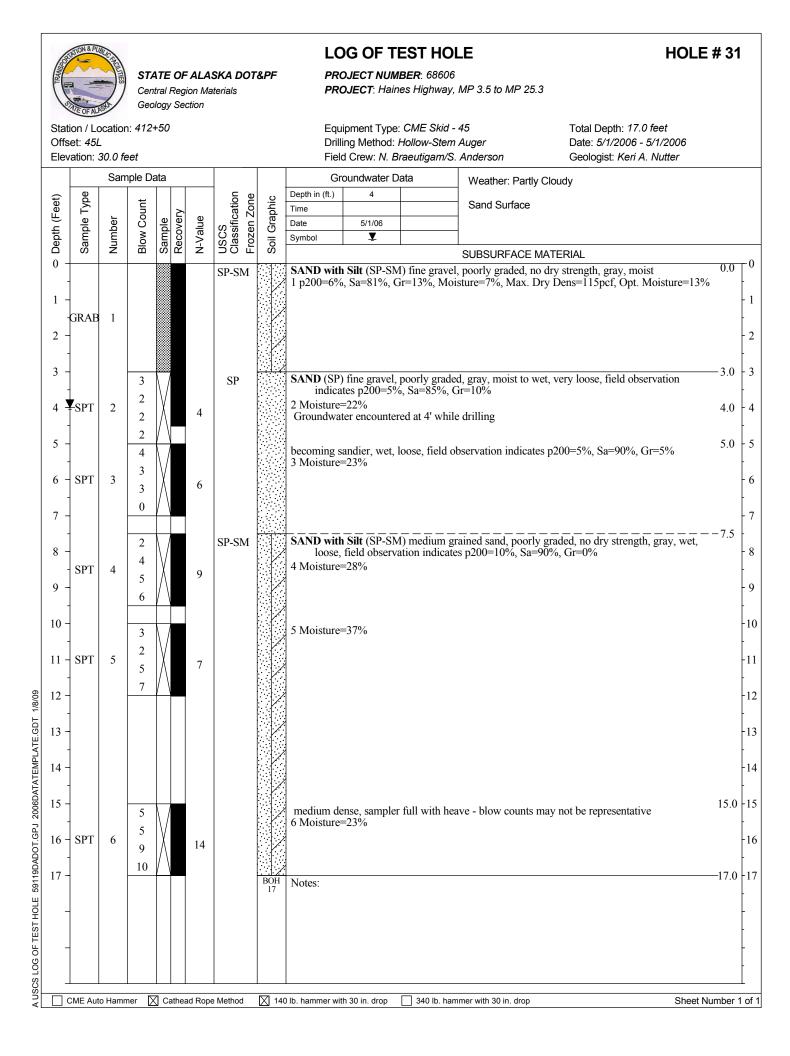
1/8/09



A USCS LOG OF TEST HOLE 59119DADOT.GPJ 2006DATATEMPLATE.GDT

1/8/09

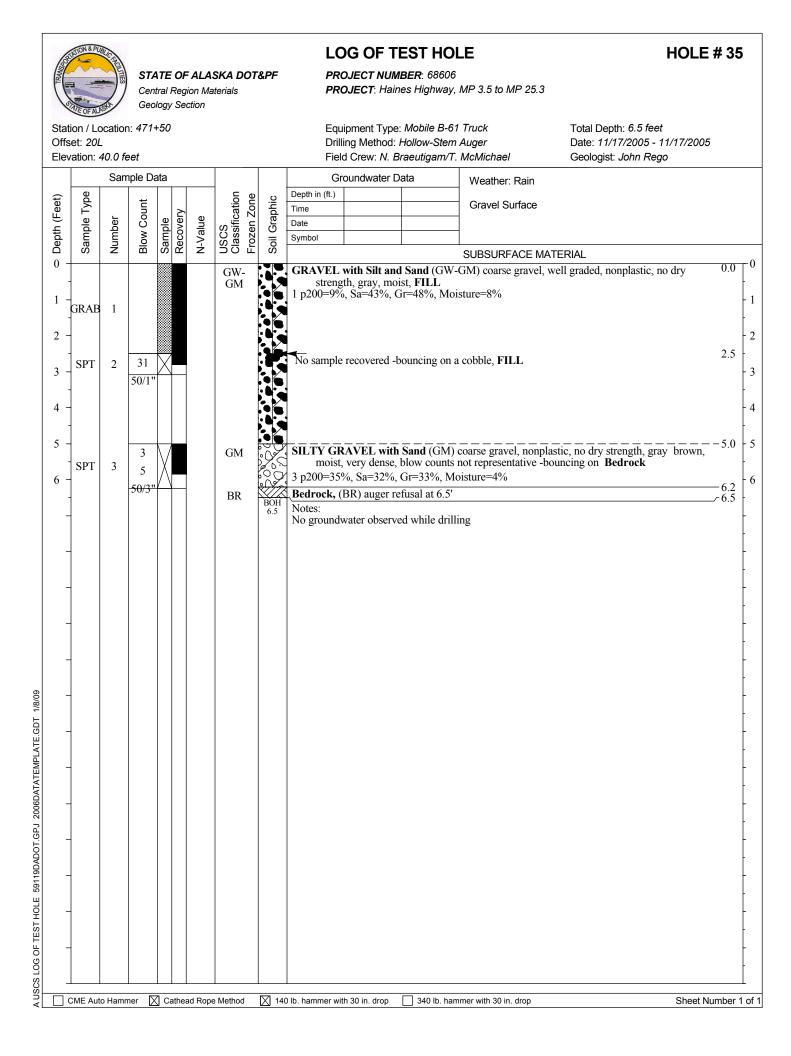
	ATION & PU	ALC:NO								G OF T			HOLE	# 30	D
LEAN ST				tral I	Regi	on Ma	SKA DO aterials	T&PF		DJECT NUM DJECT: Hain		MP 3.5 to MP 25.3			
Offs	ion / Lo et: 0 vation: 3		n: 401 [.]						Drill	ipment Type: ing Method: <i>I</i> d Crew: <i>N. B</i>	Hollow-Stem	Auger	Total Depth: <i>11.5 feet</i> Date: <i>11/17/2005 - 11/17/2003</i> Geologist: <i>John Rego</i>	5	
		Sam	ple D	ata					Gr	oundwater D	ata	Weather: Rain			
Depth (Feet)	Sample Type	L	ount		Z		USCS Classification Frozen Zone	Soil Graphic	Depth in (ft.) Time	8	8.5	Asphalt Surface			
oth (nple	Number	Blow Count	Sample	Recovery	N-Value	CS ssifi zen	l Gra	Date Symbol	11/17/05	4/23/06	-			
	Sar	NUI	Blo	Sar	Rec	/-z	US Cla	Soi	Gymbol		<u> </u>	SUBSURFACE MA	TERIAL		-
0 -										Concrete (r		served)		-0.0	
1 -	GRAB	1					GW- GM		streng	with Silt and th, brown, m o, Sa=28%, C	oist, FILL	· -	well graded, nonplastic, no dry	0.3	
2	SPT	2	13	N			GW- GM		Sa=30	%, Gr=60%	(GW-GM)	dense, FILL, field of	oservation indicates p200=10%,	2.5	
4 -	511	2	15 21	$\left \right $		36			2 Moisture	=5%					
5 -	SPT	3	15 11 9	X		20	GP			5%	GP) coarse gr ium dense, I	avel, poorly graded, ILL, field observatio	nonplastic, no dry strength, on indicates p200=5%, Sa=30%,	5.0	
7 -			9						- -		subangular,	indicated by cuttings	5	7.0	
8 <u>-</u> 8 -	<u>7</u>								Groundwa	ter encounter	ed at 8' whil	e drilling		8.0	
- 10 -			4	 /			SP		SAND with	Gravel (SP) coarse grav	rel, poorly graded, no vation indicates p200	onplastic, no dry strength, gray,)=5%, Sa=65%, Gr=30%	10.0)
11 -	SPT	4	8 13	ľŇ		21			4 Moisture		,	r	,		
_			15					BOH 11.5	: Notes: PVC standţ Groundwat	bipe installed er measured	at 8.5' on 04	/23/06		—11.5	
_															
_															
-															
_															
															_
	CME Aut	o Hamn	ner [Ca	athea	id Rope	e Method	14	0 lb. hammer wit	h 30 in. drop	340 lb. har	nmer with 30 in. drop	Sheet N	lumber	1



TRANSPORT	ATTON & PUL			tral I	Regi	ion Ma	SKA D Iterials	οτε	&PF	LOG OF TEST HOLEHOLEPROJECT NUMBER: 68606PROJECT: Haines Highway, MP 3.5 to MP 25.3	: # 32
Offs	on / Lo et: <i>5R</i> ation: 4			+70						Equipment Type: Mobile B-61 TruckTotal Depth: 2.5 feetDrilling Method: Hollow-Stem AugerDate: 11/17/2005 - 11/17/2005Field Crew: N. Braeutigam/T. McMichaelGeologist: John Rego	5
Depth (Feet)	Sample Type	Sam	Blow Count		Recovery	N-Value	USCS Classification	Frozen Zone	Soil Graphic	Groundwater Data Weather: Rain Depth in (ft.)	
0 –	Sai	Nu	Blo	Sai	Re	/-N			Soi	SUBSURFACE MATERIAL 4" Asphalt Concrete (no CABC observed)	0.0
	GRAB	1					GW		BOH 2.5	GRAVEL with Sand (GW) coarse gravel, well graded, nonplastic, no dry strength, brown, dry, FILL 1 p200–5%, Sa=35%, Gr=60%, Moisture=5% Difficulty while drilling Auger refusal at 2.5' in competent Bedrock Notes: No groundwater observed while drilling	1.8
							e Methoo		14		

	ATION & PU	SC TROUM	ST	ATE	OF	ALA	SKA DOT	&PF			EST HO		HOL	E # 33
NI CON			Cer	ntral	Regi		aterials					MP 3.5 to MP 25.3	3	
Offs	ion / Lo et: 10L ation: 4	-		+00					Dril	ling Method:	e: Mobile B-61 Hollow-Stem Braeutigam/S	Auger	Total Depth: <i>11.5 feet</i> Date: <i>4/23/2006 - 4/23/2006</i> Geologist: <i>Keri A. Nutter</i>	
		Sam	nple D	ata					Gi	roundwater E	Data	Weather: Partly	Cloudy	
et)	/pe		t				USCS Classification Frozen Zone	<u>.</u>	Depth in (ft.)			Asphalt Surface	-	
Depth (Feet)	Sample Type	Ъ	Blow Count	e	ery	e	USCS Classification Frozen Zone	Soil Graphic	Time Date					
pth	Idm	Number	N N	Sample	Recovery	N-Value	SCS assir assir	ii Ū	Symbol			-		
	Sa	ź	Ē	Sa	Å	ż	Sö F	S				SUBSURFACE N	/ATERIAL	
0 -									5" Asphal	t Concrete (no CABC ob	served)		0.0
1 -	GRAB	1					GP-GM		gray	brown, mois	d Sand (GP-0 t, FILL Gr=54%, Mo		poorly graded, low dry strength,	0.5
3 -								sh		.	CD) I	1	1	
- 4 - -	SS	2	7 18 7				GP		2 Moisture	0%, Gr=55%	GP) medium	dense, FILL, field	observation indicates p200=5%,	
5 -			11						becoming r	nore gravelly	FILL field	observation indica	ates p200=5%, Sa=30%, Gr=65%	5.0
6 -	SS	3	11 9 7						3 Moisture	=3%	, FILL, new		aus p200-570, 5a-5070, 61-6570	
7 -														
- 8 -	SS	4	4	Y			SM		SILTY SA p200= 4 Moisture		ravel (SM) co 5%, Gr=40%,	arse gravel, loose, trace of ORGAN	field observation indicates ICS (rootlets)	7.5
9 -			3											
10 - - 11 -	SS	5	3 4 4	X					becoming s 5 Moisture		bservation in	dicates p200=20%	, Sa=45%, Gr=35%	10.0
-								BOH 11.5	PVC stand	pipe installed	ed while drill 1 water to 11.5'	-		11.5
-														
	CME Auto	o Hamn	ner D		athea	ad Rop	e Method		0 lb. hammer wi	th 30 in. drop	X 340 lb. har	nmer with 30 in. drop	Sheet	Number

	ATION & PU	ALC: NO.	OT	1 T F	0		SKA DOT	205	LOG OF TEST HOLE HOLE	# 3
Solution into		ES STA		tral I	Regi	ion Ma	SKA DOT aterials	&PF	PROJECT NUMBER: 68606 PROJECT : Haines Highway, MP 3.5 to MP 25.3	
Offs	ion / Lo et: 35F vation: 4	7		+40					Equipment Type: Mobile B-61 TruckTotal Depth: 5.5 feetDrilling Method: Hollow-Stem AugerDate: 11/17/2005 - 11/17/2005Field Crew: N. Braeutigam/T. McMichaelGeologist: John Rego	5
		San	nple Da	ata					Groundwater Data Weather: Rain	
Depin (reel)	Sample Type	L	Blow Count	0	ery	Ð	USCS Classification Frozen Zone	Soil Graphic	Depth in (ft.) Asphalt Surface	
	ample	Number	ON C	Sample	Recovery	N-Value	SCS assifi ozen	oil Gr	Date Symbol Strategie Stra	
ว้) -	S	Ϊ	Ē	S	Å	ź	Sö F	Š	SUBSURFACE MATERIAL	0.0
, -								0 U ()	6" Asphalt Concrete (no CABC observed) GRAVEL with Silt and Sand (GP-GM) coarse gravel, poorly graded, no dry strength, gray,	-0.0 -0.5
-	GRAB	1					GP-GM		moist, FILL 1 p200=7%, Sa=35%, Gr=58%, Moisture=4%	
2 -								.00		2.5
3 - - 1 -	SPT	2	30 21 30	X		51	SP-SM		SAND with Silt and Gravel (SP-SM) coarse gravel, poorly graded, no dry strength, gray, moist, very dense, field observation indicates p200=10%, Sa=55%, Gr=35% 2 Moisture=6%	2.3
									difficulty drilling	4.5
5 -	SPT	3	50/1"	~			BR		Bedrock, (BR) no sample recovered, auger refusal at 5.5'	-5.0
-			50/1					BOH 5.5	Notes: No groundwater observed while drilling	-5.5



A CONTRACTOR	ALE OF AL		Cen	tral .		on Ma	SKA DOT Iterials	&PF	LOG OF TEST HOLE H PROJECT NUMBER: 68606 PROJECT: Haines Highway, MP 3.5 to MP 25.3	OLE # 3
Offs	ion / Lo et: 15L ation: 4	-		+70	1				Equipment Type: Mobile B-61 TruckTotal Depth: 6.5 feetDrilling Method: Hollow-Stem AugerDate: 11/17/2005 - 11/1Field Crew: N. Braeutigam/T. McMichaelGeologist: John Rego	7/2005
		Sam	ple D	ata					Groundwater Data Weather: Rain	
ueptn (reet)	Sample Type	Number	Blow Count	Sample	Recovery	N-Value	USCS Classification Frozen Zone	Soil Graphic	Depth in (ft.) Asphalt Surface Time	
ے ا د	Se	٦٢	Blo	s	Å	ź	Sö F	Š	SUBSURFACE MATERIAL	
-	GRAB	1					GW- GM		 4" Asphalt Concrete (no CABC observed) GRAVEL with Silt and Sand (GW-GM) coarse gravel, well graded, nonplastic, no dr strength, gray, moist, FILL 1 p200=7%, Sa=39%, Gr=54%, Moisture=6% 	0.0 y 0.3
- 3 - 4 -	SPT	2	32 35 23			58			becoming siltier very dense, FILL, field observation indicates p200=10%, Sa=35%, Gr=55% 2 Moisture=4%	2.5
5 - 6 -	SPT	3	7 12 14	X		26	ML		 SANDY SILT (ML) fine gravel, low plasticity, no dry strength, no to slow dilatancy, moist, stiff, contains ORGANICS ~5% by volume (plants) 3 F4 from sieve analysis, p200=65%, Sa=28%, Gr=7%, Moisture=29% Notes: 	gray, 5.0
-										
	CME Aut	o Hamn	ner 15		athea	Id Rope	e Method	∑ 14	Ib. hammer with 30 in. drop 340 lb. hammer with 30 in. drop 5	Sheet Number

	ATION & PU	SC TROUT	ST	∆T⊨		ΔΙΔ	SKA DC	TRPF	LOG OF TEST HOLE HOLE PROJECT NUMBER: 68606	# 38
No III	ALE OF AL	SAL S	Cer	tral	Regi		iterials	I GF I	PROJECT: Haines Highway, MP 3.5 to MP 25.3	
Offs	ion / Lo et: 40F vation: 4	7		+50					Equipment Type: CME Skid - 45Total Depth: 7.0 feetDrilling Method: Hollow-Stem AugerDate: 4/30/2006 - 4/30/2006Field Crew: N. Braeutigam/S. AndersonGeologist: Keri A. Nutter	
		Sam	ple D	ata			_		Groundwater Data Weather: Partly Cloudy	
періп (гесі)	Sample Type	r	ount		Z		USCS Classification	Prozen Zone Soil Graphic	Depth in (ft.) 5.0 Time Alder Surface	
n (l	mple	Number	Blow Count	Sample	Recovery	N-Value	CS assific	il Gra	Date 5/1/06 Symbol ∑	
Се) – (Sa	NN	BIG	Sa	Re	Z-Z	US I	S S	SUBSURFACE MATERIAL	
, _ -			8	\mathbb{N}			PT		Peat (PT) dark brown, Frozen Ice as Vx (~25% ice by volume, crystals ~1/8" diameter) 1 Moisture=107%	0.0
1 -	SPT	1	17 7	X		24				
-		1A	3	\mathbb{H}					1A Moisture=99%	
2 -										
3 -										
-										
4 -										
5 7	7									5.0
5 4	ŧ.		4	\mathbf{N}			ML		SILT with Sand (ML) fine grained sand, nonplastic, low dry strength, gray light brown, moist, soft, field observation indicates p200=75%, Sa=25%, Gr=0%	-5.0
5 -	SPT	2	4	<u>IV</u>					2 Moisture=36%	6.0
-		2A	5 5				SP		SAND (SP) medium grained sand, poorly graded, no dry strength, gray, moist, loose 2A p200=3%, Sa=94%, Gr=3%, Moisture=21%	
7 -			5	$\left \right $				BOH	Notes:	-7.0
								/	No groundwater observed while drilling PVC standpipe installed	
									Groundwater measured at 5' on 05/01/06	
_										
-										
_										
-										
_										
-										
_										
_										
		o Hamn		(Ca			e Method	14	D lb. hammer with 30 in. drop 340 lb. hammer with 30 in. drop Sheet N	umber

A A A A A A A A A A A A A A A A A A A	ALE OF AL		Cen	tral	Regi		SKA DOT aterials	"&PF	PRO	OJECT NUM	EST HO BER: 68606 es Highway,		HOLE	: # 39	J
Offs	ion / Lo et: 40F ation: 4	7		+50					Drill	ing Method:	: CME Skid - Hollow-Stem raeutigam/S	Auger	Total Depth: 7.0 feet Date: 4/30/2006 - 4/30/2006 Geologist: Keri A. Nutter		
		Sam	ple D	ata					Gr	oundwater D	ata	Weather: Partly C	Cloudy		
set)	Sample Type		It				USCS Classification Frozen Zone	hic	Depth in (ft.) Time	5		Grass Surface			
Depth (Feet)	le T	er	Cou	e	very	ne	ifica	Srap	Date	4/30/06		-			
epth	amp	Number	Blow Count	Sample	Recovery	N-Value	USCS Classification Frozen Zone	Soil Graphic	Symbol	Ţ					
□ 0 -	S	z	В	S	R	z		S				SUBSURFACE MA		0.0	_
- 1 - -	SPT	1	1 1 2 4			3	ML		SILT with soft, fi 1 Moisture=	ield observat	fine grained s ion indicates	and, nonplastic, low p200=80%, Sa=20%	v dry strength, light brown, moist, %, Gr=0%	0.0	
2 -			4	+					cuttings be	coming sand	ier			2.0	
3 -										<u> </u>					
4 -															
-									Groundwa	ter encounter	ed at 5' while	e drilling		4.5	
5 -	SPT	2	5 7	V		12	SP		•	n Gravel (SP vation indica		-	gray, wet, medium dense, field	5.0	
-			6			13									
7 -			6	1				BOH	Notes:					-7.0	
-															
-	CME Aut	o Hamn	ner D	C:	athea	ad Rope	e Method	× 14	0 lb. hammer wit	h 30 in. drop	340 lb. har	nmer with 30 in. drop	Sheet N	lumber	-

TEAL OF	ATION & PU		Cen	tral I	Regi	on Ma	SKA DC)T&PF	PR	OJECT NUM	EST HO IBER: 68606 nes Highway,		HOLE	# 4(
Offs	ion / Lo et: 80F	7				ction			Drill	ing Method:	: CME Skid - Hollow-Stem Praeutigam/S	Auger	Total Depth: 7.0 feet Date: 4/24/2006 - 4/24/2006 Geologist: <i>Keri A. Nutter</i>	
		Sam	ple D	ata						oundwater D		Weather: Partly Cl		
t)	ЭС			Γ			5	ല്	Depth in (ft.)	5		-	Judy	
Depth (Feet)	Sample Type	L	Blow Count		Ż	a)	USCS Classification	Frozen zone Soil Graphic	Time			Grass Surface		
oth (nple	Number	Ú ≥	Sample	Recovery	N-Value	Ssifi	Gr.	Date Symbol	4/24/06		-		
ne L	Sar	Nur	Blo	Sar	Rec	Z	US(Soil	Symbol	Ŧ		SUBSURFACE MA		
0 -			(:	Peat (PT)	rown FRO	ZFN Ice 98	Vx (~5% ice by volu		_0.0
- 1 2 - - 3 -	SPT	1	6 13 9 5				PT ML		SILT with	Sand (ML) to a stand (ML) to a stand (ML) to a standard stand standard standard stan	fine grained tes p200=75	sand, nonplastic, no di	ry strength, gray brown, field FROZEN Ice as Vx (~5% ice by	- 0.3
- 4 -														4.5
5 4	Ļ							<u> </u>			red at 5' whil	-		
- 6 -	SPT	2	6 9 8	\mathbb{N}		17	SP		SAND with dense) fine gravel ation indicat	, poorly graded, no dr es p200=5%, Sa=60%	y strength, gray, wet, medium 6, Gr=35%	0.0
7 -								BOH 7	Notes:					- 7.0
-														
-														
-														
-														
-				-	<u> </u>			- 1						

	ATION & PU	ALC: NO					ov	T 0 - -			EST HO	LE	HOLE	# 4
III S	**	and a		tral	Regi	ion Ma	SKA DO aterials	T&PF			IBER : 68606 nes Highway,	MP 3.5 to MP 25.3		
fs	on / Lo et: 70F	7	: 513						Drill	ing Method:	: CME Skid - Hollow-Stem Praeutigam/S	Auger	Total Depth: 7.0 feet Date: 4/24/2006 - 4/24/2006 Geologist: <i>Keri A. Nutter</i>	
		Sam	ple D	ata					1	oundwater D	-	Weather: Partly C	· _	
	pe		Ħ				- Lo S	<u>.</u>	Depth in (ft.)	5				
.	Sample Type	۲.	Blow Count	le	ery	Ð	USCS Classification	Graphic	Time Date	4/24/06		Grass Surface		
` ·	ldm	Number	Ň	dm	Recovery	N-Value	SCS assif		Symbol	4/24/00		-		
	Sa	Ŋ	Blo	Sa	Re	ź		Soil	-		1	SUBSURFACE MA	TERIAL	
1			7				PT					Vx (~10% ice by volu		$- 0.0 \\ - 0.3$
	SPT	1	5 2 4				ML		SILT with observ by vol 1 Moisture	vation indica lume), ORG	tine grained s tes p200=75° ANICS prese	and, nonplastic, low %, Sa=25%, Gr=0%, nt to ~10% by volun	dry strength, brown gray, field FROZEN Ice as Vx (~10% ice he (rootlets)	0.2
-								\././	1					
-	_							\././	Groundwa	ter encounte	red at 5' while	e drilling		4.5
-	-		5				SP	/././				-	dry strength, gray, wet, medium	5.0
1			5	\mathbb{N}					dense					
1	SPT	2	8	ľŇ		13			: 2 p200=3%	o, Sa=63%, €	Gr=34%, Mo	sture=13%		
1			7	$ \rangle$										-
1								BOH	Notes:					—7.0
_														
_														
-														
-														
					i l		I		1					

A REAL PROPERTY OF	ATTON & PU		Cer	ntral I	Regi		SKA DOI aterials	F&PF	PRO	DG OF T	BER : 68606		HOLE	E # 42	2
Offs	ion / Lo et: 65F	7	ו: <i>514</i>			21011			Drill	ipment Type ing Method: d Crew: <i>N. B</i>	Hollow-Stem	Auger	Total Depth: 7.0 feet Date: 4/24/2006 - 4/24/2006 Geologist: <i>Keri A. Nutter</i>		
		Sam	nple D	ata						oundwater D	ata	Weather: Partly C	Cloudy		-
Depth (Feet)	Sample Type	er	Blow Count	e	/ery	ne	USCS Classification Frozen Zone	Soil Graphic	Depth in (ft.) Time Date	5 4/24/06		Grass Surface			
Depth	Samp	Number	Blow	Sample	Recovery	N-Value	USCS Class Froze	Soil G	Symbol	¥			ΔΤΕΡΙΔΙ		
0 -		1	1				PT		Peat (PT) b	orown, FRO	ZEN Ice			0.0	
1 -	SPT	1 1A	6 3 4	\mathbb{N}			ML SP-SM		crysta	ls ~1/4" thic =63%	k), ORGAN	CS present to 5% by	y brown, field observation Ice as Vr (~50% ice by volume, y volume ed, nonplastic, no dry strength,	0.3	
2									brown	, moist, loos ANICS (root	e, field obser	vation indicates p20	0=10%, Sa=90%, Gr=0%, trace of		
4 -														4.5	
5	<u>_</u>		7				SP			ter encounter			plastic, no dry strength, gray, wet, %, Sa=50%, Gr=45%	5.0	
6 -	SPT	2	8 7	X		15			2 Moisture			in indicates p200–37	70, 3a-3070, GI- 1 370	6.0	
7 -			7	/ \				BOH 7	Notes:						
-															
	CME Aut	o Hamn	ner [2		athea	ad Rope	e Method		0 lb. hammer wit	h 30 in. drop	340 lb. har	nmer with 30 in. drop	Sheet I	Number	

	TION & PU	all the								LC	og of t	EST HO	LE	HOL	.E # 43
				tral I	Regi	on Ma	SKA D terials	OT&F	ΡF		OJECT NUM OJECT: Hair		MP 3.5 to MP 25.3		
offse	et: 40F	cation R 40.0 fe	: 516							Dril	uipment Type ling Method: d Crew: <i>N. E</i>	Hollow-Sterr	Auger	Total Depth: 7.0 feet Date: 4/24/2006 - 4/24/2000 Geologist: Keri A. Nutter	6
		Sam	ple Da	ata						Gr	roundwater D	ata	Weather: Partly (Cloudy	
5	/pe		Ę				ion	ы	ic	Depth in (ft.)	5		Grass Surface		
	Sample Type	er	Blow Count	Sample	ery.	е	USCS Classification	Frozen Zone	Soil Graphic	Time Date	4/24/06				
	amp	Number	0 NO	amp	eco/	N-Value	SCS assi	oze	. G	Symbol	<u> </u>		-		
5) +	ů	ž	В	ů	Å	ż	50	ц	й				SUBSURFACE M		
-	SPT	1	10 8 4 6			12	ML			obser	vation indica	tes p200=70	nd, nonplastic, medi %, SA=30%, Gr=0% to 10% by volume (um dry strength, gray brown, fie %, FROZEN Ice as Vx (~5% ice roots)	ld 0.0 by
														
Ţ	,								. .		ter observed				4.5
Ī	-		6	\mathbb{N}			SP			SAND with	h Gravel (SF) coarse grav	vel, poorly graded, n	o dry strength, gray, wet, medium	$\frac{1}{1}5.0$
; _	SPT	2	9	IV		17				2 Moisture		ation mulca	es p200–370, 3a–73	0/0, 01-20/0	
	~	_	8			17									
' -			6	4				B	OH	Notes:					7.0
-															
								X							

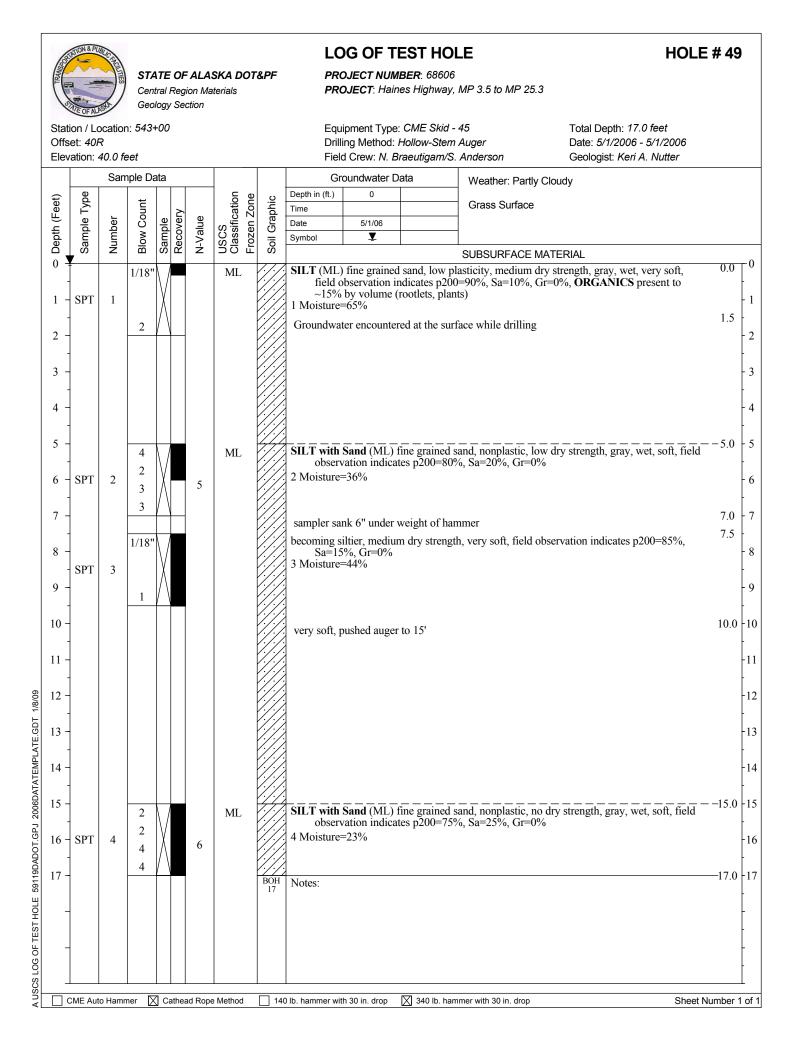
IRA	ATE OF AL	The second	Cen		Regi	on Ma	SKA DOT terials	&PF			/BER : 68606 nes Highway,	MP 3.5 to MP 25.3		
Offs	on / Lo et: <i>10F</i> ation: 4	र		+80					Drill	ing Method:	e: Mobile B-61 Hollow-Stem Braeutigam/T.	Auger	Total Depth: 6.5 feet Date: 11/17/2005 - 11/17/2005 Geologist: John Rego	
		Sam	ple D	ata					Gr	oundwater E	Data	Weather: Rain		
et)	Sample Type		nt		_		USCS Classification Frozen Zone	hic	Depth in (ft.) Time		5.0	Gravel Surface		
Ľ	ple 1	ber	Col	ole	ver	lue	S sifica	Grap	Date		11/22/05			
Deptn (Feet)	Sam	Number	Blow Count	Sample	Recovery	N-Value	USCS Classification Frozen Zone	Soil Graphic	Symbol		₽			
0 -	0,	2			-	2			CRAVEL	with Sand ()	GW) coarse a	SUBSURFACE MA	TERIAL onplastic, no dry strength, brown,	0.0
1 -	GRAB	1					GW		moist.	FILL	Gr=57%, Moi	-	onplastic, no dry strength, orown,	010
2 -														
- 3	SPT	2	14 20	M		24			becoming s Sa=40 2 Moisture)%, Gr=55%	y strength, de , SP-SM pres	nse, FILL , field ob ent bottom 1" of sam	servation indicates p200=5%, ple	2.5
			14	\mathbb{N}		34				//0				
4 -								/						-4.0
5 2	Z SPT	3	6	M			SM		SILTY SA 3 p200=38 ⁶	ND (SM) fir %, Sa=60%,	ne gravel, non , Gr=2%, Moi	plastic, no dry streng sture=22%	th, brown, moist, medium dense	5.0
5 -	51 1	5	7			15								-6.5
									Groundwat	pipe installed er measured	at 5' on 11/2.	2/05		
-														
-														

(all all all all all all all all all all	ATION & PU	ALC:NO									og of ti			HOLE	E # 4	5
LEAN A			Cen	tral l	Regi		SKA D aterials	OT&	PF		OJECT NUM OJECT: Hain		MP 3.5 to MP 25.3			
Offs	ion / Lo et: 35/ vation: 4	7	n: 526 [.]							Drill	ipment Type: ing Method: <i>I</i> d Crew: <i>N. B</i>	Hollow-Stem	Auger	Total Depth: 7.0 feet Date: 4/25/2006 - 4/25/2006 Geologist: Keri A. Nutter		
			ple D	ata							oundwater D	-	Weather: Partly C			-
et)	be		-				Б	ре	<u>io</u>	Depth in (ft.)	5	4.5		iouoy		
Depth (Feet)	e Ty	5	Joun	ω	ery	Ð	icati	I Zol	aph	Time Date	4/25/06	5/1/06	Grass Surface			
pth	Sample Type	Number	Blow Count	Sample	Recovery	N-Value	USCS Classification	Frozen Zone	Soil Graphic	Symbol	4/25/06	5/1/06 又				
	Sa	NU	B	Sa	Re	Ż	۳ ا ا	ЧЧ	So				SUBSURFACE MA	TERIAL		-
0 -		1	1	/ /			PT	in'i		Peat (PT) o	lark brown, r	noist, fibrou	5		0.0	
1 - 2 - 3 -	SPT 1 1 8 IA 15 6 Image: Second seco				ry strength, gray brown, field , FROZEN Ice as Nb, ttlets)	ſ 0.5 prown, field Nb,										
4 -									/./.							
Ż	Ľ							<u> </u>		Groundwa	ter encounter	ed at 5' while	e drilling		4.5	
5 <u>-</u> 6 -	SPT	2	4 5 8	M		13	SP				n Gravel (SP Im dense, fiel		-	no dry strength, dark gray, wet, 5, Sa=65%, Gr=30%	5.0	
- 7 –			7	$ \rangle$												
-											pipe installed er measured					
	CME Aut	o Hamn	ner [>	C:	athea	ad Rop	e Method		140) lb. hammer wit	h 30 in. drop	340 lb. han	nmer with 30 in. drop	Sheet I	Number	1

AND IN CONTRACT			Cen	tral I	Regi		SKA DC aterials)T&PF	PRO	DG OF TE	BER : 68606		HOLE	. # 4
Offs	ion / Lo et: 35F ration: 4	7		+00					Drill	ipment Type: ing Method: <i>I</i> d Crew: <i>N. Bi</i>	-ollow-Sterr	n Auger	Total Depth: 7.0 feet Date: 4/25/2006 - 4/25/2006 Geologist: <i>Keri A. Nutter</i>	
		Sam	ple Da	ata					Gr	oundwater Da	ata	Weather: Partly Cl	oudv	
21)	pe		t				USCS Classification	<u>e</u> e	Depth in (ft.)	6		Grass Surface		
nepin (reel)	Sample Type	Ъ	Blow Count	e	ery	ē	1 licat	Frozen zone Soil Graphic	Time Date	4/25/06				
hu	mpl	Number	S ≥	du	Recovery	N-Value	SCS assif	il Gr	Symbol	4/25/00		-		
	Sa	Nu	B	Sa	Re	Ż	ິວິວິ ເ	S S	-			SUBSURFACE MA	TERIAL	
) –			1	$\mathbf{\Lambda}$			PT		Peat (PT) c	dark brown, r	noist			0.0
1 - 2 - 3 - 1	SPT	1	3 14 5	X			ML		observ	vation indicat nt to ~10% by	es p200=70	% Sa=30% Gr=0%	strength, gray brown, field FROZEN Ice as Nb, ORGANIC	
1 -									cuttings be	coming sand	ier at 4'			4.0
5 -			4	\mathbb{N}			SP		SAND (SP) loose,) medium gra field observa	ined sand, p tion indicat	oorly graded, no dry s es p200=5%, Sa=95%	strength, dark gray, moist to wet, , Gr=0%	5.0
; _	-SPT	2	5	X		8			2 Moisture Groundwa	=22% ter encounter	ed at 6' whil	e drilling		6.0
, _			7	$ \rangle$								-		—7.0
-	CME Aut	o Hamn	ner D		athea	ad Rope	e Method	X 14	0 lb. hammer wit	th 30 in. drop	340 lb. hai	nmer with 30 in. drop	Sheet N	lumbe

No. II			Cen	tral I	Regi		SKA DC aterials	T&PF	PR	DG OF T OJECT NUM OJECT: Hair	BER : 68606		HOLE	# 4/	1
Offs	ion / Lo et: <i>301</i> ration:	7		+00					Dril	uipment Type ling Method: ld Crew: <i>N. E</i>	Hollow-Stem	Auger	Total Depth: 6.0 feet Date: 4/25/2006 - 4/25/2006 Geologist: <i>Keri A. Nutter</i>		
		Sam	ple D	ata					G	roundwater D	ata	Weather: Partly Clo	budy		
Deptn (Feet)	Sample Type	oer	Blow Count	ole	Recovery	lue	USCS Classification	graphic	Depth in (ft.) Time Date	4.5		Grass Surface			
Jept	Sam	Number	Blow	Sam	Seco	N-Value	lass	Soil Gra	Symbol	Ţ					_
ц 0 -	0)	2			ш	2			· Deet (DT)	douls huosse	EDOZEN L	SUBSURFACE MAT	ERIAL v volume), fibrous (rootlets present	0.0	_
- 1 - - 2 -	SPT	1	5 1 1 1	X		2	PT		to ~30	2% by volum =817%	e)	e as v x (~10% ice by	y volume), norous (roonets present	0.0	
3 -									change in	cuttings at 3'				-3.0	
4 - 1 5 -	L SPT	2	1 1 4			5	ML		SANDY S 2 p200=54 Groundwa	ILT (ML) fir %, Sa=46%, ater encounte	ne grained sat Gr=0%, Mo red at 4.5' wh	nd, nonplastic, no dry isture=44% ile drilling	onplastic, no dry strength, gray, moist to wet, firm =44% rilling		
6 -			3					BOH 6	Notes:					-6.0	
_															
_															
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_															
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_															
															1

A REAL PROPERTY OF	ATTON & PU		Cen	tral F	Regi	on Ma	SKA DC)T&PF	PRO	DJECT NUM	EST HO BER: 68606 bes Highway,		HOLI	E # 48	8
Offs	ion / Lo et: 40L vation: 4	-	n: 535 [.]	+00	Sec	tion			Drill	ing Method:	: CME Skid - Hollow-Stem raeutigam/S.	Auger	Total Depth: 7.0 feet Date: 4/25/2006 - 4/25/2006 Geologist: Keri A. Nutter		
		Sam	ple D	ata					Gr	oundwater D	ata	Weather: Partly C	loudy		
Depth (Feet)	Sample Type	Number	Blow Count	Sample	Recovery	N-Value	USCS Classification	Frozen Zone Soil Graphic	Depth in (ft.) Time Date Symbol	5 4/25/06	3.0 5/1/06 又	Grass Surface			
ტ 0 –	Sa	N	B	Sa	Re	ź	<u>∩</u> ö ı	ST S				SUBSURFACE MA	ATERIAL		-
1	SPT	1 1A	1 12 23 18				OL ML		very s presen 1 Moisture= SANDY SI observ	oft, field obs at (roots, pea =56% LT (ML) fir vation indica at to ~5% by	ervation indi t)	cates p200=80%, Sa nd, nonplastic, low d %, Sa=35%, Gr=0%	w dry strength, dark brown, moist, =20%, Gr=0%, ORGANICS ry strength, gray brown, field , FROZEN Ice as Nb, ORGANIC	0.5	
-									Groundwat	ter encounter	ed at 5' while	e drilling		4.5	
5 <u>-</u> 6 -	SPT	2	6 6 10	X		16	SP			Gravel (SP field observ		-	ry strength, gray, wet, medium %, Gr=25%	5.0	
-									Groundwat	r measured	l to 7' at 3' on 05/0	1/06			
_															
_		o Hamn	her D	Ca	thea	d Rone	e Method	140	0 lb. hammer wit	h 30 in dron	1 340 lb ban	mer with 30 in. drop	Shoot	Number	1

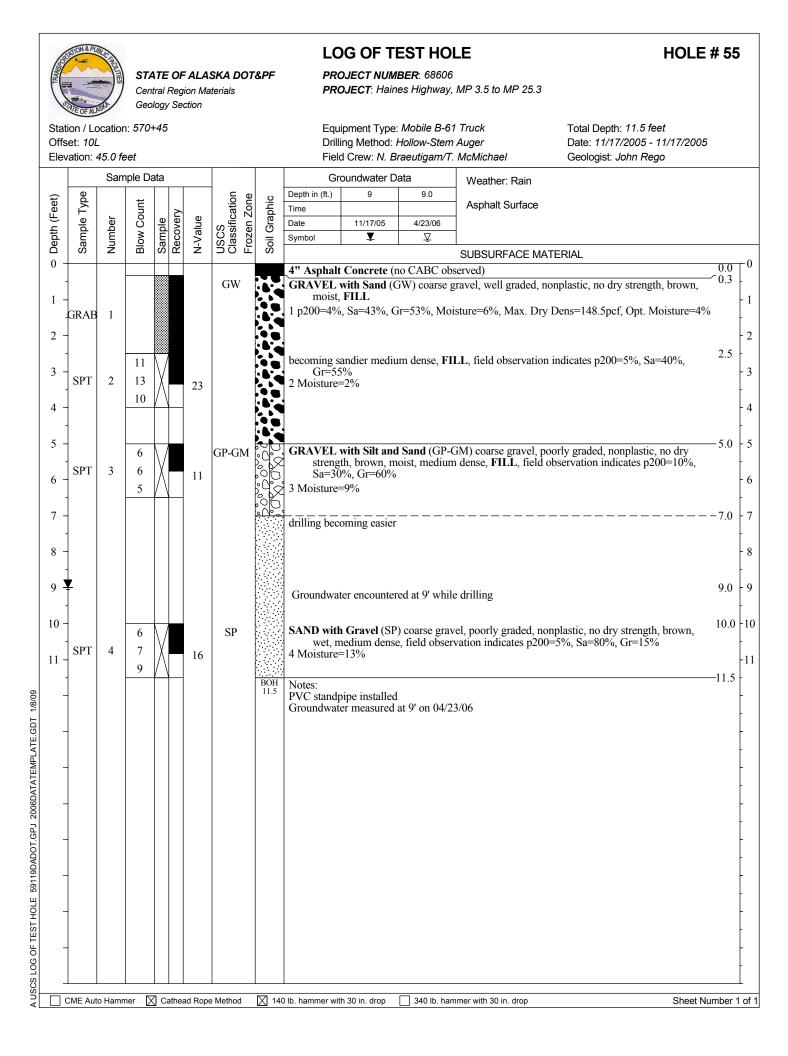


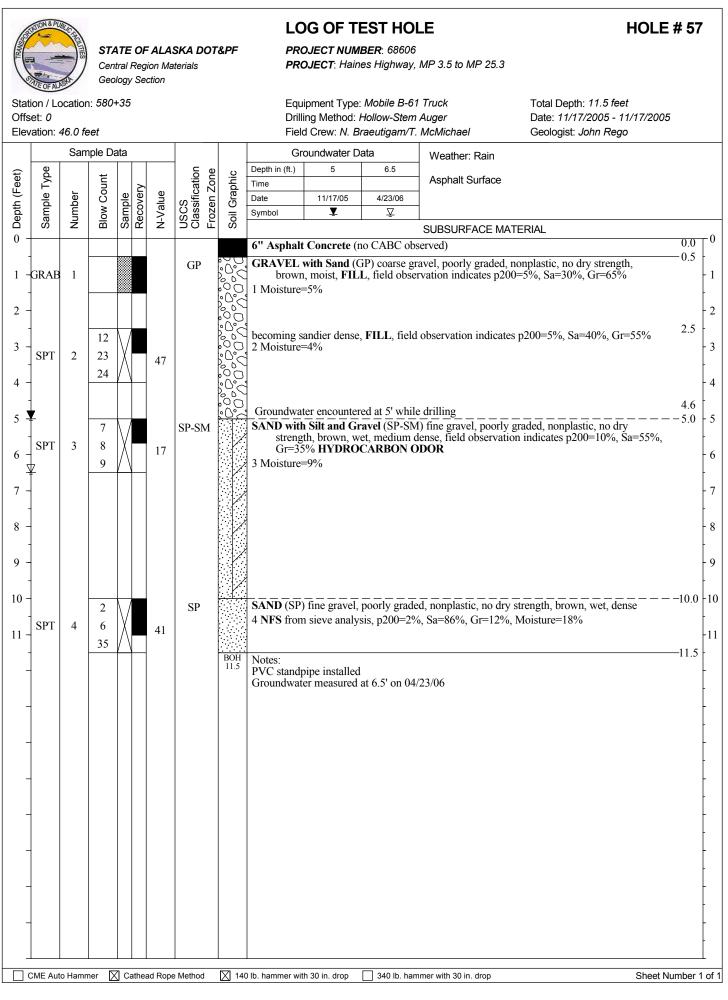
	ion / Lo		Geo	ology	' Sec	ction	nterials		PROJECT: Haines Highway, MP 3.5 to MP 25.3 Equipment Type: CME Skid - 45 Drilling Method: Hollow-Stem Auger Date: 4/25/2006 - 4/25/2006	
	ation:	40.0 fe							Field Crew: N. Braeutigam/S. Anderson Geologist: Keri A. Nutter	
nehili (reel)	Sample Type	Sam	Blow Count		Recovery	N-Value	USCS Classification	Frozen Zone Soil Graphic	Groundwater Data Weather: Partly Cloudy Depth in (ft.) 4.5 0.0 Time Grass Surface Date 4/25/06 5/1/06 Symbol ▼ ▽	
	s Z	ĬŽ		Š	Å	ż	ទីច	r y	SUBSURFACE MATERIAL Ice, soft, cloudy, colorless, trace roots and peat	0.0
- 1 - 2 - -	SPT	1	6 11 1 1	X			PT		Peat (PT) dark brown, FROZEN Ice as Vx (~25% ice by volume, random crystals) 1 Moisture=295%	- 1.0
3 -									pushed auger to 5'	3.5
1 - 1										4.5
5 - - 5 -	SPT	2	4 2 2 3	X		4	ML		Groundwater encountered at 4.5' while drilling SILT (ML) fine grained sand, nonplastic, low dry strength, gray, wet, soft, field observation indicates p200=90%, Sa=10%, Gr=0% 2 Moisture=37%	-5.0
7 -								BOH 7	Notes: PVC standpipe installed to 7' Groundwater measured at the surface on 05/01/06	-7.0
_										
_										
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_										
_										
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				tral I	Regi	on Ma	SKA D o Iterials	OT&I	ÞF	PR	OJECT NUM			HOL	.E # 51
Offs	ion / Lo et: 30F vation: 4	7	: 552-							Dril	lipment Type ling Method: d Crew: <i>N. B</i>	Hollow-Stem	Auger	Total Depth: 7.0 feet Date: 4/25/2006 - 4/25/2006 Geologist: <i>Keri A. Nutter</i>	3
		Sam	ple Da	ata						Gi	oundwater D	ata	Weather: Partly Cl	oudy	
Depth (Feet)	Sample Type	Number	Blow Count	Sample	Recovery	N-Value	USCS Classification	Frozen Zone	Soil Graphic	Depth in (ft.) Time Date Symbol	5 4/25/06		Grass Surface		
മ് 0 -	Š	ź	<u></u> 3	လိ	щ	ż	Sö PT		Sc III		dark brown, 1		SUBSURFACE MA	TERIAL	0.0
	SPT	1 1A 2	25 18 7 7 5 4 4				OL SM		JOH 7	obser ORG 1A Moistur Groundwa	ter encounter ND (SM) fir	tes p200=60' ent to ~50% red at 5' whil	%, Sa=30%, Gr=10% by volume (rootlets) e drilling	strength, brown gray, field , FROZEN Ice as Nb , y strength, gray, wet, field	0.5 4.5 7.0
-															

1 - SPT = 1 - 5	Dept Dept Time Soli Graphic Classification	
Sample Data Sample Data Samp	PT Pea 1 M AL SIL 1A Group 2 M BOH Not	Groundwater Data Weather: Partly Cloudy Depth in (ft.) 5 0.3 Fine
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	PT Pea 1 M AL SIL 1A Group 2 M BOH Not	Depth in (ft.) 5 0.3 Time
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	PT Pea 1 M AL SIL 1A Group 2 M BOH Not	Time Grass Surface Date 4/25/06 5/1/06 Symbol Image: Comparison of the symbol of
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	PT Pea 1 M AL SIL 1A Group 2 M BOH Not	SUBSURFACE MATERIAL SUBSURFACE MATERIAL Peat (PT) brown, FROZEN Ice as Nb 0. 1 Moisture=323% SILT with Sand (ML) fine grained sand, no to low plasticity, low dry strength, gray, moist, very soft IA p200=84%, Sa=16%, Gr=0%, Moisture=34%, Org=4% Groundwater encountered at 5' while drilling low plasticity, medium dry strength, wet, firm, field observation indicates p200= 80%, Sa=20%, Gr=0%, trace of ORGANICS (rootlets) 5. 2 Moisture=34% 7.
$\begin{array}{c c} & & & & & & & & & \\ \hline 1 & - & SPT & 1 \\ 2 & - & & & & \\ 3 & - & & & & \\ 4 & - & & & & \\ 5 & \blacksquare & & & & \\ 6 & - & SPT & 2 & & \\ 6 & - & SPT & 2 & & \\ & & & & & \\ 5 & \blacksquare & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ \end{array}$	AL SIL 1A Group Development 2 M	Peat (PT) brown, FROZEN Ice as Nb 0. 1 Moisture=323% 0. SILT with Sand (ML) fine grained sand, no to low plasticity, low dry strength, gray, moist, very soft 1. 1A p200=84%, Sa=16%, Gr=0%, Moisture=34%, Org=4% 1. Groundwater encountered at 5' while drilling 4. low plasticity, medium dry strength, wet, firm, field observation indicates p200= 80%, Sa=20%, Gr=0%, trace of ORGANICS (rootlets) 5. 2 Moisture=34% 7.
$1 - SPT 1 \\ 1A 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1$	ML SIL 1A Gro low 2 M	SILT with Sand (ML) fine grained sand, no to low plasticity, low dry strength, gray, moist, very soft 1. 1A p200=84%, Sa=16%, Gr=0%, Moisture=34%, Org=4% 4. Groundwater encountered at 5' while drilling 4. low plasticity, medium dry strength, wet, firm, field observation indicates p200= 80%, Sa=20%, Gr=0%, trace of ORGANICS (rootlets) 5. 2 Moisture=34% 7.
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	IA Gro low 2 M	SIL1 with Sand (ML) fine grained sand, no to low plasticity, low dry strength, gray, moist, very soft 1A p200=84%, Sa=16%, Gr=0%, Moisture=34%, Org=4% Groundwater encountered at 5' while drilling low plasticity, medium dry strength, wet, firm, field observation indicates p200= 80%, Sa=20%, Gr=0%, trace of ORGANICS (rootlets) 2 Moisture=34% Notes:
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Gro low 2 M	IA p200=84%, Sa=16%, Gr=0%, Moisture=34%, Org=4% Groundwater encountered at 5' while drilling 4. low plasticity, medium dry strength, wet, firm, field observation indicates p200= 80%, Sa=20%, Gr=0%, trace of ORGANICS (rootlets) 2 Moisture=34% Notes: 7.
3 - 4 - 5 = 3 $6 - SPT = 2 = 3$ $4 - 5 = 9$ $3 - 6 - 5PT = 2$	Gro low 2 M	Groundwater encountered at 5' while drilling 4. low plasticity, medium dry strength, wet, firm, field observation indicates p200= 80%, 5. Sa=20%, Gr=0%, trace of ORGANICS (rootlets) 2 Moisture=34% Notes: 7.
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2 M	5. Sa=20%, Gr=0%, trace of ORGANICS (rootlets) 2 Moisture=34%
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2 M	5. Sa=20%, Gr=0%, trace of ORGANICS (rootlets) 2 Moisture=34%
$5 \mathbf{\Psi}$ $6 - SPT 2 4$ $5 4$ 9	2 M	5. Sa=20%, Gr=0%, trace of ORGANICS (rootlets) 2 Moisture=34%
$6 = \begin{array}{c} 3 \\ -5 \\ -5 \\ -5 \\ -5 \\ -5 \\ -5 \\ -5 \\ $	2 M	5. Sa=20%, Gr=0%, trace of ORGANICS (rootlets) 2 Moisture=34%
$6 = \begin{array}{c} 3 \\ -5 \\ -5 \\ -5 \\ -5 \\ -5 \\ -5 \\ -5 \\ $	2 M	low plasticity, medium dry strength, wet, firm, field observation indicates p200= 80%, Sa=20%, Gr=0%, trace of ORGANICS (rootlets) 5. 2 Moisture=34% 7.
$6 = \begin{array}{ c c } SPT & 2 & 5 \\ \hline 4 & 5 \\ \hline 5 & 7 \\ \hline \end{array} $	BOH Not	2 Moisture=34%
$\begin{array}{c c} 6 & - & SPT \\ - & & & \\ \end{array} \begin{array}{c c} 2 & 4 \\ - & & \\ 5 & & \\ \end{array} \begin{array}{c c} 9 \\ - & & \\ \end{array} \begin{array}{c c} 9 \\ - & & \\ \end{array}$	BOH Not	Notes: 7.
		Notes
		Notes
	Gro	Groundwater measured at 3" on 05/01/06
+ $ $ $ $ $ $ $ $ $ $ $ $		
CME Auto Hammer X Cathead Rope Metr		

A DECEMBER OF			Cen	tral I		on Ma	SKA DC terials	T&PF	PR	OJECT NUM		LE MP 3.5 to MP 25.3	HOL	E # 53
Offs	ion / Lo et: 30F	7	: 561			uon			Dril	uipment Type ling Method: / ld Crew: <i>N. B</i>	Hollow-Stem	Auger	Total Depth: 7.0 feet Date: 4/25/2006 - 4/25/2006 Geologist: Keri A. Nutter	
		Sam	ple Da	ata					G	roundwater D	ata	Weather: Partly Cl	oudv	
et)	pe		Ħ				U	ic je	Depth in (ft.)	4.5		Grass Surface		
Depth (Feet)	Sample Type	٦	Blow Count	e	ery	ē	USCS Classification	Soil Graphic	Time Date	4/25/06				
pth	npl	Number	≥ S	Sample	Recovery	N-Value	CS	il Gr	Symbol	4/25/06		-		
	Sa	Nu	BIG	Sa	Re	ź	N C N	E S				SUBSURFACE MA	TERIAL	
0 -			4				РТ		Peat (PT)	brown, moist	, fibrous			0.0
-		1	3	W			ML	7.7./	SILT with	Sand (ML) f	fine grained s	and, nonplastic, low	dry strength, gray brown, field	-0.5
1 -	SPT	1A	8	ΙŇ			GP		obser	vation indicat	tes p200=759 ent to $\sim 20\%$	%, Sa=325%, Gr=0% by volume (roots)	, FROZEN Ice as Nb,	[1.0
-			8	$ \rangle \rangle$				60	1 Moisture		lit to *~2070	by volume (roots)		
2 -				()					GRAVEL	with Sand ((GP) fine grav	el, poorly graded, no	dry strength, brown, moist,	
-								00			ld observatio	n indicates p200=5%	, Sa=45%, Gr=50%	
3 -									A Moistu	re=9%				
-								.00	•					
4 -								200]					
1	<u> </u>								4	iter encounter	ed at 4.5' wh	ile drilling		4.5
5 -			-						SAND wit			-	watrongth grow wat madium	5.0
-			6	$\mathbb{N}/$			SP		dense	, field observ	ation indicat	es p200=5%, Sa=55%	y strength, gray, wet, medium 6, Gr=45%	
6 -	SPT	2	7	I X		13			2 Moisture			•		
-			6			15								
7 -			5	$\langle \rangle$				DOIL						7.0
								BOH 7	Notes:					
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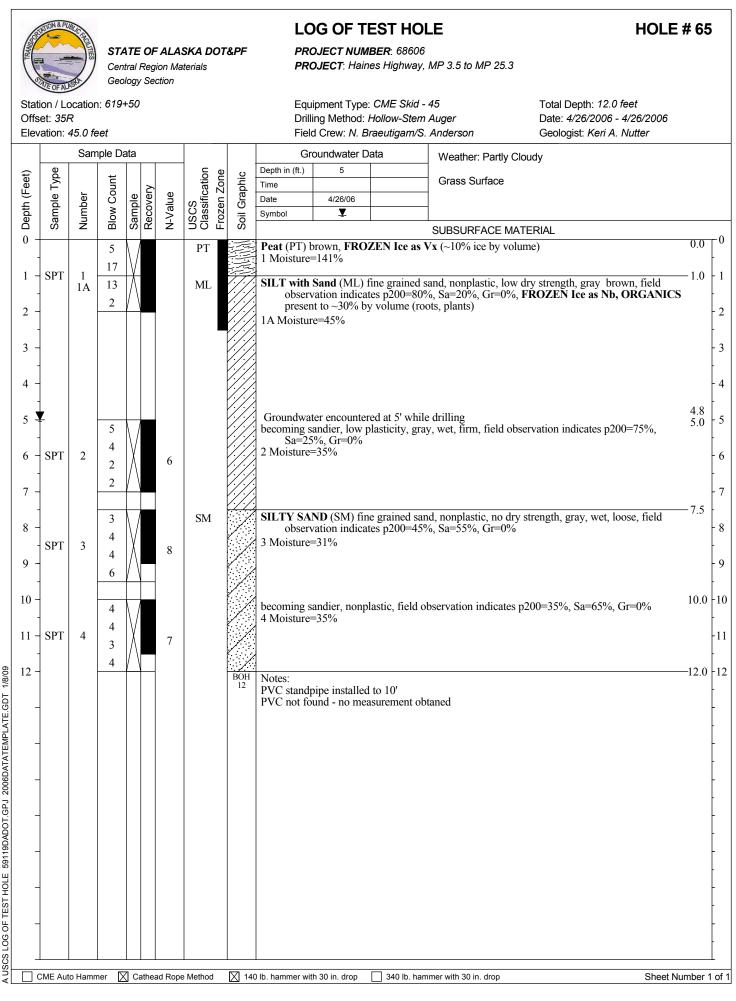
Station / Location: 595+80 Equipment Type: Mobile B-61 Truck Offset: 0 Drilling Method: Hollow-Stem Auger Elevation: 48.0 feet Field Crew: N. Braeutigam/T. McMichael Image: Station / Location: 595+80 Sample Data Image: Station / Location: 595+80 Groundwater Data Image: Station / Location: 695+80 Sample Data Image: Station / Location: 695+80 Image: Station / Location: 695+80 Image: Station / Location: 695+80 Sample Data Image: Station / Location: 695+80 Image: Station / Location: 705 Image: Station / Location: 705 Image: Station / Location: 705 Image: Station / Location: 705 Image: Station / Location: 705 Image: Station: 705 Image: Station / Location: 705 Image: Station: 705 Image: Station: 705 Image: Station: 705 Image: 705 Image: S	Ce MATERIAL Vel, well graded, nonplastic, no dry 0.0 1 2.3 2.3 2.7
Image: state of the state	Ce MATERIAL Vel, well graded, nonplastic, no dry 0.0 1 2.3 2.3 2.7
Image: Constraint of the second se	Ce MATERIAL Vel, well graded, nonplastic, no dry 0.0 1 2.3 2.3 2.7
0 GRAB 1 1 GW- GM GW- GM GW- GRAVEL with Silt and Sand (GW-GM) coarse grav strength, brown, moist, FILL 2 - GW- GM GW- GM GW- GRAVEL with Silt and Sand (GW-GM) coarse grav strength, brown, moist, FILL 1 - - - - 2 - - - - 1 - - - - 2 - - - - 3 - - - - 4 - - - - 4 - - - - 4 - - - - 2 - - - - 3 - - - - 4 - - - - 4 - - - - 5 - - - - 6 - - - - 6 - - - - 6	Image: Material interview 0.0 0 vel, well graded, nonplastic, no dry 0.3 1 2.3 2.3 2.7
0 GRAB 1 GW- GM GW- GM GW- GRAVEL with Silt and Sand (GW-GM) coarse grav strength, brown, moist, FILL 2 - GW- GM GW- GM GW- GRAVEL with Silt and Sand (GW-GM) coarse grav strength, brown, moist, FILL 1 - GW- GM GW- GRAVEL with Silt and Sand (GW-GM) coarse grav strength, brown, moist, FILL 1 - - GW- GM - 2 - - - 3 - - - 4 - - - 4 - - - 5 - - - 6 - - - 6 - - - 6 - - - 7 - - - 6 - - - 7 - - - 6 - - - 7 - - - 7 - - - 7 - - - 8 -	2.3
0 GRAB 1 1 GW- GM GW- GM GW- GRAVEL with Silt and Sand (GW-GM) coarse grav strength, brown, moist, FILL 2 - GW- GM GW- GM GW- GRAVEL with Silt and Sand (GW-GM) coarse grav strength, brown, moist, FILL 1 - - - - 2 - - - - 1 - - - - 2 - - - - 3 - - - - 4 - - - - 4 - - - - 4 - - - - 2 - - - - 3 - - - - 4 - - - - 4 - - - - 5 - - - - 6 - - - - 6 - - - - 6	2.3
GRAB 1 GRAB 1 GRAVEL with Silt and Sand (GW-GM) coarse grav strength, brown, moist, FILL 1 p200=8%, Sa=40%, Gr=52%, Moisture=6% difficulty drilling	vel, well graded, nonplastic, no dry 0.3 1 2.3 2.7
1 GM strength, brown, moist, FILL 2 - image: strength, brown, moist, FILL difficulty drilling difficulty drilling	2.3
difficulty drilling	2.3
$\sqrt{777}$	2.7
3 - SPT 2 BR Bedrock, (BR) no sample recovered, auger refusal at Notes:	- 3.0 - 3
No groundwater observed while drilling	
CME Auto Hammer 🔀 Cathead Rope Method 🔀 140 lb. hammer with 30 in. drop 🗌 340 lb. hammer with 30 in. drop	-

Description Descripti Descripti Description Description Descrip														
SATE	OF AL AS				-		terials		PR		ies nigriway,	MP 3.5 10 MP 25.3		
fset:	10R			+30					Dri	ling Method:	Hollow-Stem	Auger	Date: 11/18/2005 - 11/18/2005	
		Sam	ple Da	ata					G	roundwater D	Data	Weather: Rain		
	be		t				io	<u>ic</u>			4.0			
.	e]	Ŀ	Cour	e	ery	ē	1 Icat	raph			4/23/06	Asphalt Surface		
.]	mp	qur	NO NO	Idm	SCOV	Valı	SCS assi	ozei oil G						
6	ຶ່	ž	B	လိ	Å	ż	501	E S		•		SUBSURFACE MA	TERIAL	
		-					CIV		4" Aspha	t Concrete (no CABC obs	erved)		0.0
GR	AB	1							streng	gth, gray, mo	ist, FILL	, ,	well graded, nonplastic, no dry	
	PT	2		V		18	ML							-3.0
Ť			9	$ \rangle$		10			. 2 F4 110111	sieve analysi	s, p200–07%	, 5a-5270, 01-170, P	vioisture-2876	15
-									No ground PVC stand	pipe installed	1			1.5
-														
-														
_														
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1														

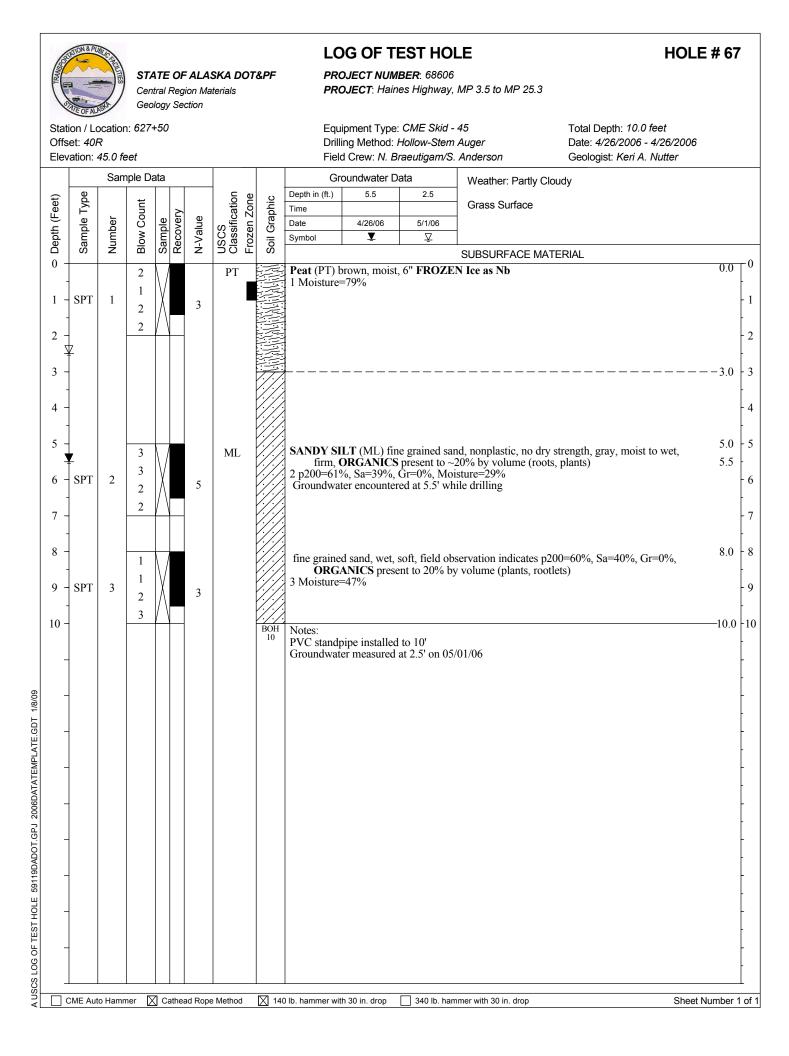
	ATION & PU	S. S			-		o <i>u a =</i> ==			_E # 62	2
TRA TRA		The second	Cen		Regi	on Ma	SKA DOT Iterials	&PF	PROJECT NUMBER : 68606 PROJECT : Haines Highway, MP 3.5 to MP 25.3		
Offs	ion / Lo et: 40F	7		+00					Equipment Type: CME Skid - 45Total Depth: 7.0 feetDrilling Method: Hollow-Stem AugerDate: 4/26/2006 - 4/26/200Field Crew: N. Braeutigam/S. AndersonGeologist: Keri A. Nutter	6	
		Sam	ple D	ata					Groundwater Data Weather: Partly Cloudy		
et)	ype		nt				USCS Classification Frozen Zone	Jic	Depth in (ft.) 4 4.5		
Depth (Feet)	Sample Type	ber	Blow Count	e	Recovery	ne	USCS Classification Frozen Zone	Soil Graphic	Time Glass Surface Date 4/26/06 5/1/06		
epth	amp	Number	No	Sample	eco	N-Value	ISC9 lass roze	ioil O	Symbol Y Y		
0 -	S	Z		S	œ	Z		S SOL	SUBSURFACE MATERIAL	0.0	_
-			3 9	\mathbb{N}			GP-GM		3" ORGANIC mat (roots, grass) GRAVEL with Silt and Sand (GP-GM) coarse gravel, poorly graded, no dry strength, brown, moist, medium dense, field observation indicates p200=10%, Sa=35%, Gr=5	0.5	
1 -	SPT	1 1A	5	ľ			ML	/./.	brown, moist, medium dense, field observation indicates p200=10%, Sa=35%, Gr=5	0% [1.0	
2 - 3 -			5						 SANDY SILT (ML) fine grained sand, nonplastic, low dry strength, brown gray, moist, stiff, field observation indicates p200=60%, Sa=40%, Gr=0%, FROZEN Ice as Nb. ORGANICS present to ~10% (rootlets) 1A Moisture=52% 	·	
4	<u>_</u>							· / · / ·	Groundwater encountered at 4' while drilling	4.0	
5 - 6 -	SPT	2	3 3 2	V		6		· / · / ·	becoming sandier, wet, firm, field observation indicates p200=55%, Sa=45%, Gr=0% 2 Moisture=24%	5.0	
- 7			3 5	$\langle \rangle$		Ū		/././.			
_								BOH 7	Notes: PVC standpipe installed to 7' Groundwater measured at 4.5' on 05/01/06		
_											
_											
_											
_											
-											
_											
_											
_											
			ner 🛛	< Ca		id Rope		140			_

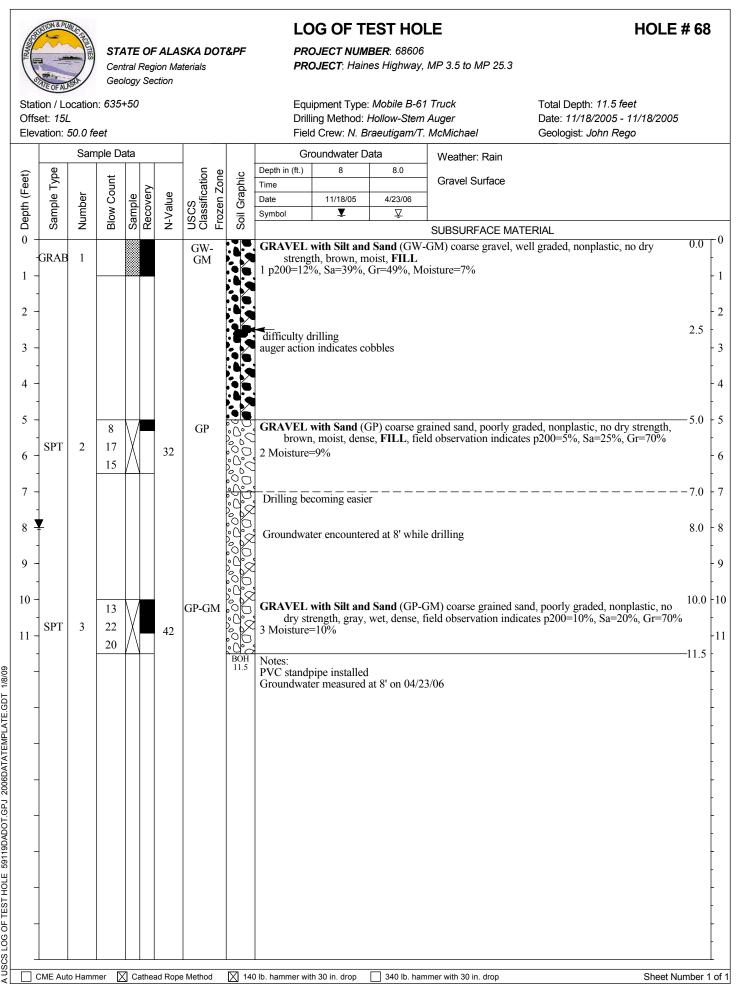
A CONTRACTOR OF	NOTE CALCULATE													
Offs	et: 45F	2		+00					Drill	ing Method:	Hollow-Stem	Auger	Date: 4/26/2006 - 4/26/2006	
		Sam	ple D	ata					Gr	oundwater D	ata	Weather: Partly Cl	oudy	
set)	ype		Int				ation	hic		7.5	4.3	Grass Surface		
Depth (Feet)	ole T	Jer	Cou	le	very	lue	S sifica	Grap		4/26/06	5/1/06			
Jepti	Samp	Ium	Blow	Samp	Seco	l-Va	JSC(Class	soil C	Symbol	Ţ	Ϋ́			
0 -	0)	2			ш.	2			SANDV SI	IT(MI)m	dium araina			0.0
- 1 2 - - 3 -	SPT	1	7 1			8	ML		moist, by vol	, firm, FROZ lume (rootlets	XEN Ice as V	\mathbf{x} (~10% ice by volur	me), ORGANICS present to ~15%	
4 <u>-</u> 5 -	Z		3				SM		SILTY SA	ND (SM) me field observa	dium grained	1 sand, nonplastic, no s n200=35% Sa=650	o dry strength, gray, moist to wet, % Gr=0% wood at tin of shoe	-5.0
6 - - 7 -	SPT	2	2	$\left \right\rangle$		4			2 Moisture	=32%				
- 8 - 8 - 9	SPT	3	2 4	X		6	SP		SAND with observ	h Gravel (SP vation indicat) fine gravel, tes p200=5%	poorly graded, no dr , Sa=70%, Gr=25%	y strength, gray, wet, loose, field	-7.5
-								BOH 9.5	Notes: PVC standy Groundwat	pipe installed er measured	to 9' at 4.3' on 05/	01/06		- 9.3
-				·										

No. 10	ALE OF AL	STA STA	Cen	tral	Regi		SKA DO aterials	' 1 QIFF			IBER : 68606 nes Highway,	MP 3.5 to MP 25.3			
Offs	ion / Lo et: <i>50F</i> ation: 4	7		+00					Drill	ing Method:	: CME Skid - Hollow-Stern Praeutigam/S	Auger	Total Depth: 7.0 feet Date: 4/26/2006 - 4/26/2006 Geologist: Keri A. Nutter		
		Sam	nple Da	ata	1 1					oundwater D	oata	Weather: Partly C	loudy		
Depth (Feet)	Sample Type		unt		>		USCS Classification	Soil Graphic	Depth in (ft.) Time	5		Grass Surface			
н (F	ple .	ber	Ö	ble	ver	alue	Sific	Grap	Date	4/26/06					
Dept	Sam	Number	Blow Count	Sample	Recovery	N-Value	JSC Clas	Soil	Symbol	Ţ					
0 -	•,	~				2			Deat (DT)	dark brown	FDOZEN L	SUBSURFACE MA		0.0	_
-			10	\mathbb{N}			PT		1 Moisture	=233%	FKUZEN I	$\frac{10\%}{10\%}$	y volume), norous	0.0	
1 -	SPT	1 1A	14 4 2	\bigwedge			ML		observ	vation indica t to 20% by	fine grained tes p200=80 volume (roo	%, Sa=20%, Gr=0%,	dry strength, brown gray, field FROZEN Ice as Nb, ORGANIC	— 1.0 S	
3 -															
-								/././							
4 -								<u> ././</u>						4.0	
_								\././	Groundwa	ter encounte	red at 5' whil	e drilling		4.5	
5	-		2	1			ML		1			-	ngth, gray, moist, soft, field ORGANICS present to ~30%	5.0	
6 -	SPT	2	2 2 1	$\left \right\rangle$		3			obser (rootle 2 Moisture	ets) by volun	tes p200=10 ne	%, Sa=90%, Gr=0%,	ORGANICS present to ~30%		
7 -			5	$ \rangle$				 	Notes:					-7.0	,
_		o Hamn				d Pop	e Method	X 14	0 lb. hammer wi			nmer with 30 in. drop	Oberta	lumber	



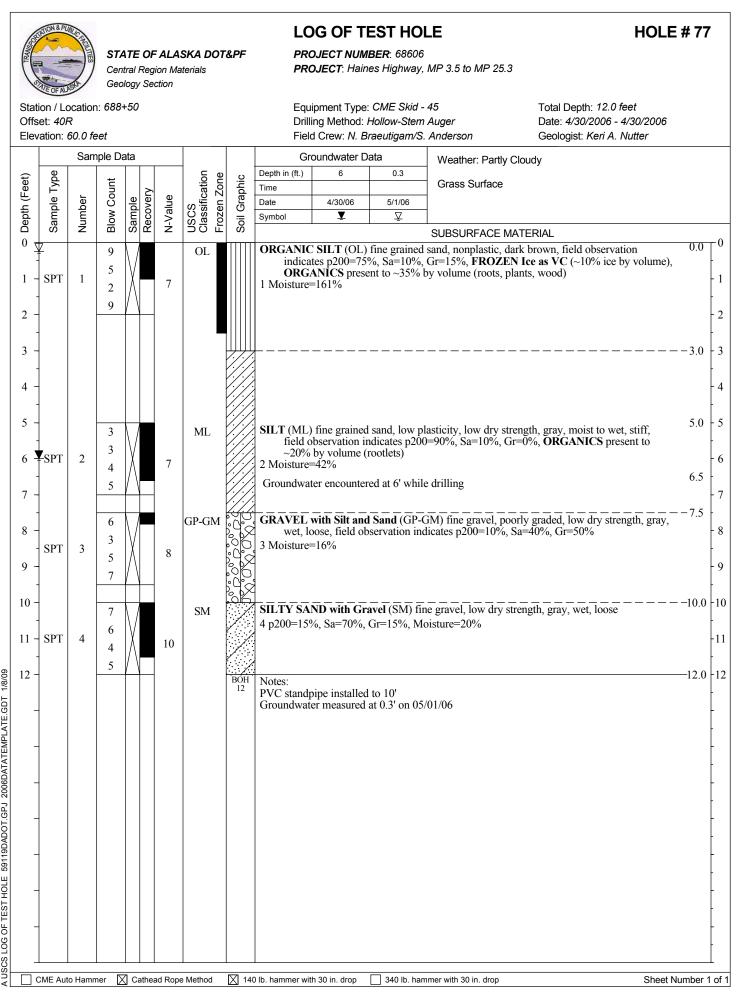
ORIATIO	IN & PUL	UCAL							LC	DG OF T	EST HO	LE	HOLE	# 66
				tral F	Regio	on Ma	SKA DO terials	T&PF		OJECT NUM OJECT: Hair		MP 3.5 to MP 25.3		
ffset:	35L	cation	: 622						Drill	ipment Type ing Method: d Crew: <i>N. B</i>	Hollow-Sterr	Auger	Total Depth: 7.0 feet Date: 4/26/2006 - 4/26/2006 Geologist: Keri A. Nutter	
		Sam	ple Da	ata					Gr	oundwater D	ata	Weather: Partly 0	Cloudy	
<u>}</u>	ype		nt				USCS Classification	ji ji	Depth in (ft.) Time	6		Grass Surface		
	Sample Type	ber	Blow Count	Sample	very	ne	USCS Classification	Soil Graphic	Date	4/26/06				
2	amp	Number	slow	amp	Seco	N-Value	JSC: Class		Symbol	Ţ		-		
;	0	2		0)	ĽĽ.	2			SILT with	Sand (MI)	fina aminad	SUBSURFACE M		0.0
- S	PT	1	3 6 5 6			11	ML		observ	vation indica it to 15% by	tes p200=85	%, Sa=15%, Gr=0%	v dry strength, brown gray, field , FROZEN Ice as Nb, ORGANICS	
- - - - - -	PT	2	5 6 9 13			15	SM	BOH 7	SILTY SA dense to ~5° Groundwat 2 Moisture Notes:	er encounter	arse gravel, , ation indicat (plants, woo ed at 6' while	nonplastic, no dry sti es p200=25%, Sa=7 d) e drilling	ength, brown gray, wet, medium 0%, Gr=5%, ORGANICS present	-5.0 -7.0





TRANSCO I	ALL OF ALL		Cen	tral I	Regi		SKA DO	T&PF	PR	OJECT NUM	EST HO BER: 68606 bes Highway,	L E MP 3.5 to MP 25.3	HOL	_E # 7'	1
Offs	ion / Lo et: 20L vation: 5			+05					Drill	ing Method:	: Mobile B-61 Hollow-Stem Praeutigam/T.	Auger	Total Depth: 6.5 feet Date: 11/18/2005 - 11/18/20 Geologist: John Rego	005	
		San	nple Da	ata					Gr	oundwater D	Pata	Weather: Rain			
(19	ype		t				USCS Classification Frozen Zone	hic	Depth in (ft.) Time		4.3	Asphalt Surface			
Ueptn (Feet)	Sample Type	Der	Blow Count	le	Recovery	lue	USCS Classification Frozen Zone	Soil Graphic	Date		4/23/06				
eptr	amp	Number	No	Sample	eco	N-Value	ISCS lass	oil	Symbol		Ţ				
ב 0 -	ω	2		0 S	œ	2		. ഗ		<u> </u>	GADG 1	SUBSURFACE MA	TERIAL	0.0	۲
-							GW-				no CABC obs		vell graded, nonplastic, no dry	^ 0.0	
1 - - 2 - - 3 -	GRAB	1					GM		streng 1 p200=9%	th, brown, m 5, Sa=45%, C	noist, FILL Gr=46%, Moi	sture=7%		3.0	•
- 4 <u>7</u> -	SPT Z	2	13 26 19	X		45	SP		SAND with browr 2 Moisture		coarse grainse, field observer	ned sand, poorly grad rvation indicates p200	led, nonplastic, no dry strength,)=5%, Sa=55%, Gr=40%		
5 -		_	14	\square					no sample	recovered -re	ock stuck in e	end of sampler		5.0)
- 5 -	SPT	3	23	$ \lambda $					difficulty d	Irilling				5.8	3
-			50/3"	T I	Н			BOH	auger refus	al at 6.5' in c	ompetent Be	drock			5
-															
- - -	CME Auto	o Hamn	ner [2		athea	ad Rope	e Method	× 14	0 lb. hammer wi	th 30 in. drop	340 lb. han	mer with 30 in. drop	Shee	et Numb	e

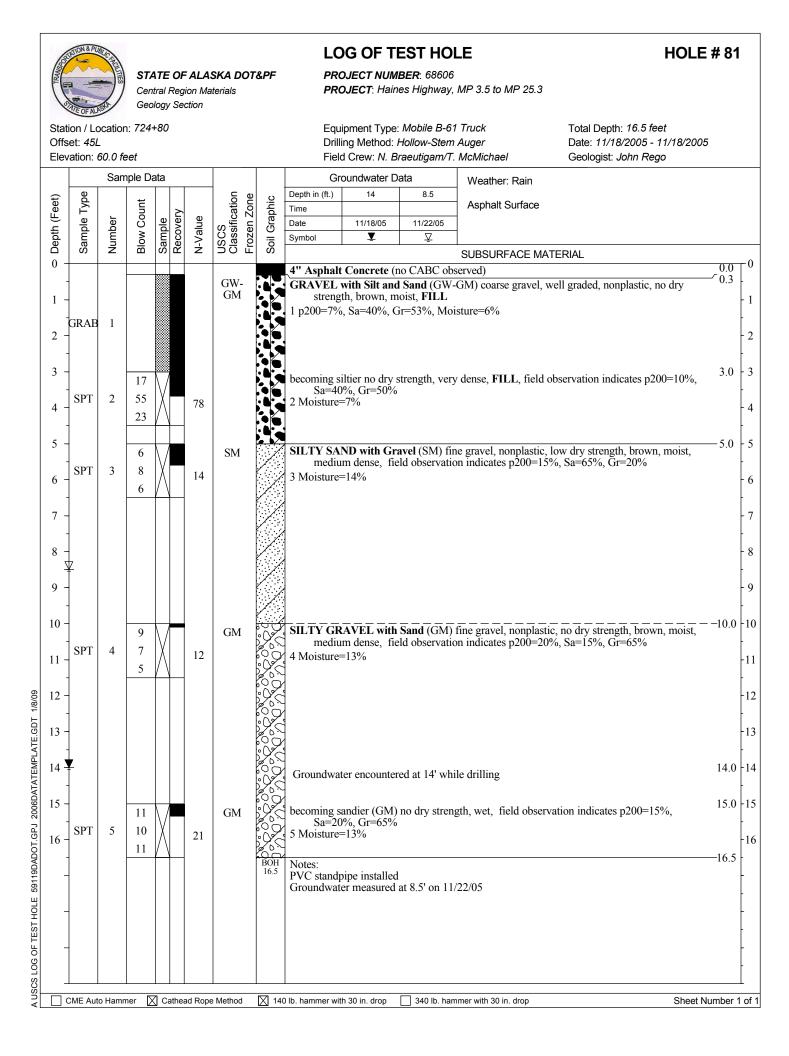
Man I S			Cen	tral		on Ma	SKA DOT terials	&PF	PROJECT NUMBER : 68606 PROJECT : Haines Highway, MP 3.5 to MP 25.3	
Offs	on / Lo et: <i>50F</i> ation: (7		+00					Equipment Type: CME Skid - 45Total Depth: 9.5 feeDrilling Method: Hollow-Stem AugerDate: 4/30/2006 - 4.Field Crew: N. Braeutigam/S. AndersonGeologist: Keri A. N	/30/2006
Feet)	Sample Type		nple D		ery .	(J)	USCS Classification Frozen Zone	aphic	Groundwater Data Weather: Partly Cloudy Depth in (ft.) 6 Grass Surface	
Depth (Feet)	sample	Number	Blow Count	Sample	Recovery	N-Value	USCS Classification Frozen Zone	Soil Graphic	Date 4/30/06 Symbol ¥	
0 -	SPT	1	2 3 1 1			4	ML		SUBSURFACE MATERIAL SILT (ML) fine grained sand, low plasticity, low dry strength, gray, moist, soft, fi observation indicates p200=95%, Sa=5%, Gr=0% 1 Moisture=44%	eld 0.0
3 - 4 - 5 -			1				SP-SM		SAND with Silt (SP-SM) fine gravel poorly graded no dry strength gray, moist	5.0
6 - 7 -	SPT	2	1 4 1			5			 SAND with Silt (SP-SM) fine gravel, poorly graded, no dry strength, gray, moist ploose, field observation indicates p200=10%, Sa=85%, Gr=5% 2 Moisture=21% Groundwater encountered at 6' while drilling SAND with Silt and Gravel (SP-SM) coarse gravel, poorly graded, nonplastic, lo 	6.0
8 - - 9 - -	SPT	3	8 8 9 4			17	SP-SM	BOH 9.5	 SAFD with shi and Graver (SF-SM) coarse graver, poorry graded, nonplastic, to strength, gray, wet, medium dense 3 p200=7%, Sa=71%, Gr=22%, Moisture=19% Notes:	9.5



THAT IS	ALE OF AL		Cen	tral I		on Ma	SKA DOT	&PF		OJECT NUM OJECT: Hain		MP 3.5 to MP 25.3		
Offs	ion / Lo et: <i>30F</i> ation: (7		+00					Drill	ipment Type: ing Method: <i>I</i> d Crew: <i>N. B</i>	Hollow-Stem	Auger	Total Depth: <i>12.0 feet</i> Date: <i>4/30/2006 - 4/30/2006</i> Geologist: <i>Keri A. Nutter</i>	
		Sam	ple Da	ata					Gr	oundwater D	ata	Weather: Partly C	Cloudy	
et)	Sample Type		Ţ				USCS Classification Frozen Zone	hic	Depth in (ft.) Time	5	0.0	Grass Surface		
۱ (Fe	le T	er	CoL	le	very	ne	ifica D	grap	Date	4/30/06	5/1/06	-		
Depth (Feet)	amp	Number	Blow Count	Sample	Recovery	N-Value	SCS lass	Soil Graphic	Symbol	¥	Σ			
0 7 0 7		Ż	B	ŝ	Ř	Ż	50 Ē	Ň				SUBSURFACE MA	ATERIAL	
0 -	-		1	\mathbb{N}			PT	1.1.1		prown, moist		1 1 1 .		$- \int_{0.3}^{0.0}$
1 -	SPT	1	1 2 1	$\left \right\rangle$			ML		observ	vation indicat e (rootlets)	ine gravel, no tes p200=809	onplastic, low dry st %, Sa=15%, Gr=5%	rength, gray, moist, soft, field , ORGANICS present to ~20% by	
3 -														
4 -								<u> </u>						4.5
5	L							/././.		ter encounter		-		5.0
6 -	SPT	2	2 3 3	M		6	SP-SM		SAND with streng 2 Moisture=		f) medium gr , loose, field	ained sand, poorly gobservation indicate	graded, nonplastic, low dry s p200=10%, Sa=90%, Gr=0%	5.0
7 -			3	\square										7.5
8 - - 9 - -	SPT	3	3 3 1 11			4	SM		SILTY SA loose, 3 Moisture=	field observa	avel (SM) fin ation indicate	e gravel, nonplastic s p200=15%, Sa=50	, low dry strength, brown, wet, very %, Gr=35%	T
0 - 1 -	SPT	4	11 16 12			28	GP-GM		GRAVEL wet, n 4 Moisture=	nedium dense	Sand (GP-Ce, field obser	GM) coarse gravel, p vation indicates p20	oorly graded, no dry strength, gray 0=10%, Sa=40%, Gr=50%	, –10.0
- 12			11					BOH 12	Notes: PVC standt Groundwat	pipe installed er measured	to 10' at the surface	e on 05/01/06		12.0

None II	ATION & PU		Cen	tral I	Regi	ion Ma	SKA D aterials	ота	&PF	Pł	OG OF T ROJECT NUM ROJECT: Hain	BER : 68606			HOLE # 79
Offs	ion / Lo et: 15F	7				ction				Dr	uipment Type illing Method: eld Crew: <i>N. B</i>	Hollow-Stem	Auger	Total Depth: 3.0 feet Date: 11/18/2005 - 11 Geologist: John Rego	
		San	nple Da	ata						6	Groundwater D	ata	Weather: Rain		
Depth (Feet)	Sample Type	ber	Blow Count	ple	Recovery	lue	USCS Classification	Frozen Zone	Soil Graphic	Depth in (ft.) Time Date			Asphalt Surface		
Jept	Sam	Number	Blow	Sample	Seco	N-Value	USC Class	-roz	Soil (Symbol					
0 -	0,	-		-	-	-		_	0,	4" Asnha	Ilt Concrete (1	o CABC ob	SUBSURFACE MA	TERIAL	0.0
1 2 3	GRAB SPT	1 2	-50/4"	X			GP BR			brow 1 p200=4 No samp	with Sand (C vn, moist, FIL %, Sa=45%, C le recovered -b (BR) auger ret	L Br=51%, Mo	isture=4%	nonplastic, no dry strength	2.4
	CME Aut	o Hamr	ner 🔀	Ca	athea	ad Rope	e Method	d	140) lb. hammer v	vith 30 in. drop	340 lb. han	nmer with 30 in. drop		Sheet Number ?

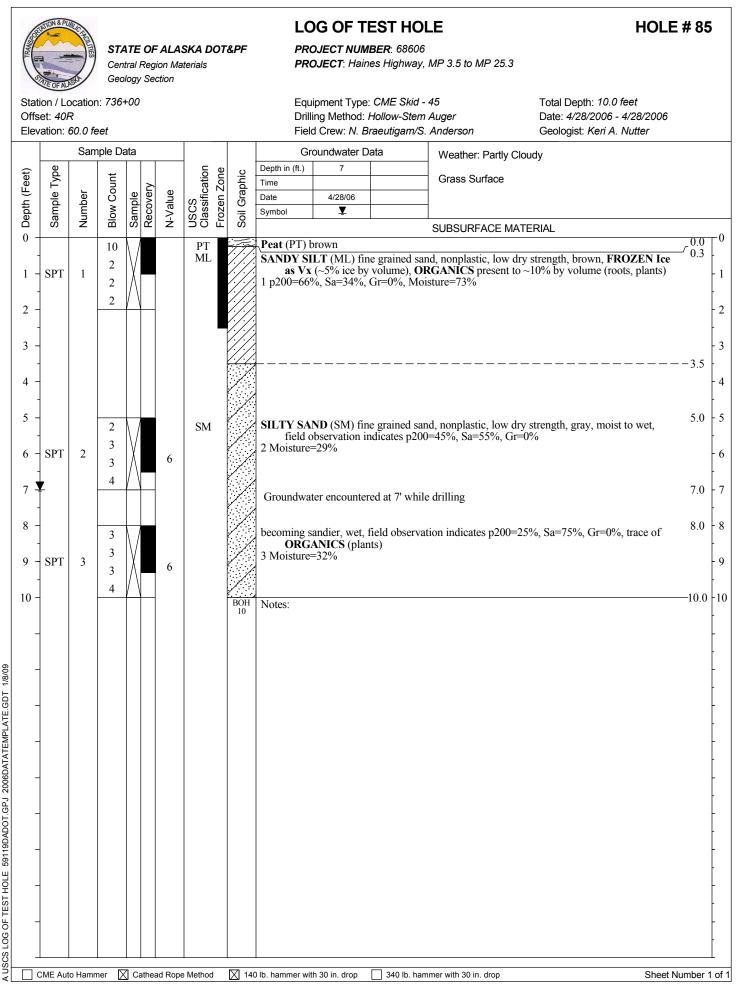
(Sel	ATION & PUBL	C.C.					LOG	OF TEST	PIT	TEST PIT	# 80
IPANIS)) Ce		= ALASK ion Materi ction		r&PF		T NUMBER : T : Haines Hig	68606 µhway, MP 3.5 to MP 25.3		
Offs	ion / Loc et: 50R vation: 60	ation: 707					Hole Type		hi Z-Axis 135 Backhoe mer	Total Depth: <i>11.0 feet</i> Date: <i>4/21/2006 - 4/21/2006</i> Geologist: <i>Keri A. Nutter</i>	
		Sample D	Data			Gi	roundwater D	ata	Weather: Partly Cloudy		
Depth (Feet)	ole Type	Field Number	ole	USCS Classification Frozen Zone	Soil Graphic	Depth in (ft.) Time Date	6.5 4/21/06		Grass Surface		
Jepth	Sample .	-ield	Sample	JSC9 Class Froze	Soil O	Symbol	Ţ		1		
0 -	0)	ш	0		0	Deat (DT)	dark brown, 1	moist	SUBSURFACE MATERIA	AL	0.0
-				РТ		reat (F1)	uark brown, i	llioist			-0.5
1 - 2 - 3 -	GRAB	1		SP		SAND with p200=4%,	h Gravel (SP Sa=52%, Gr	?) coarse grav =44%, Moist	rel, poorly graded, medium ure=6%	dry strength, brown gray, moist	1.0
4 - 5 -				GM		SILTY GF	RAVEL with vation indica	Sand (GM) tes p200=25°	coarse gravel, nonplastic, b %, Sa=20%, Gr=55%	brown, moist to wet, field	—4.0
- 6 _						Groundwa	ter encounter	red at 6.5' wh	ile excavating		6.0
7 -						becoming s	siltier, no dry	strength, we	t, field observation indicate	es p200=35%, Sa=15%, Gr=50%,	7.0
8 -	GRAB	2				cobbl Moisture=3	es to 4" (~2%	() ()	,	,,,,,	
9 -						0					0.5
10 -	GRAB	3		GP			with Sand (C	GP) coarse gi	ravel, poorly graded, no dry % Sa=15% Gr=75%	v strength, brown, wet, field	— 9.5 10.0
11 -					BOH 11	Moisture=1 Notes:	14%		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
_											
-											
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										Sheet N	lumber 1

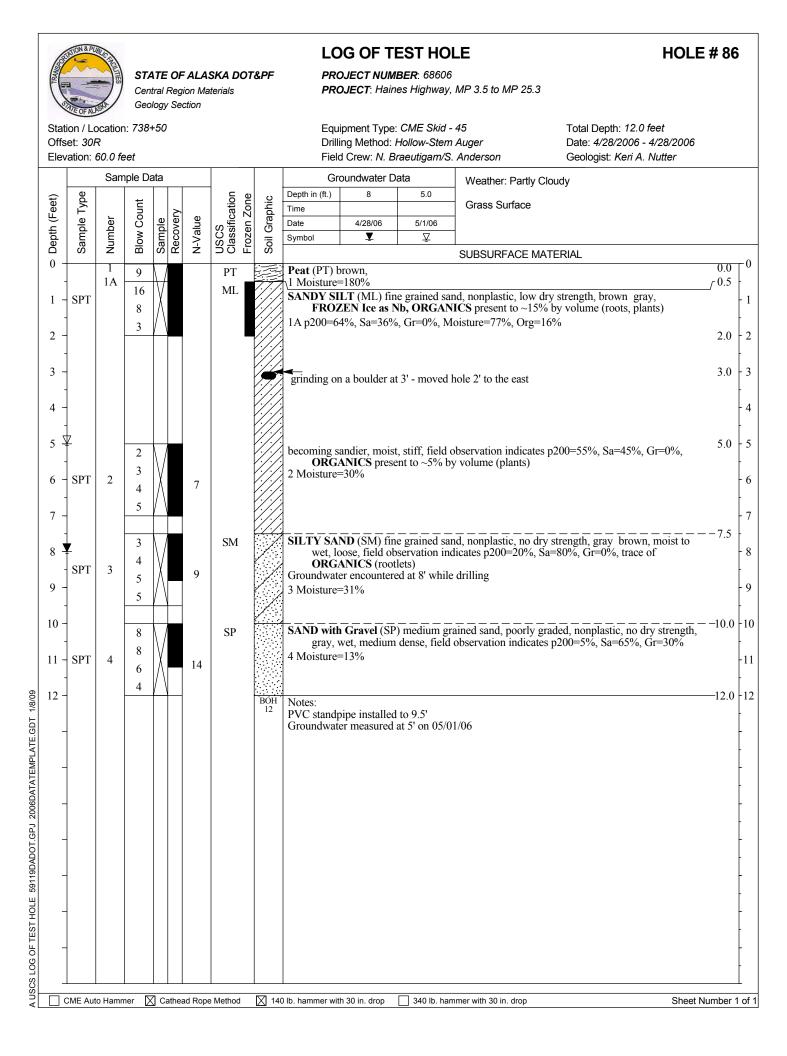


SELLAT S	TON & PUL		CT.		<u>ог</u>	A1 A4	SKA DOT				EST HO	LE	HOLE	# 82
I Sol	EOEN		Cen		egic	on Ma	SKA DOT terials	& <i>PF</i>				MP 3.5 to MP 25.3		
ffse	t: 110	cation R 65.0 fe		+00					Drilli	ng Method:	: CME Skid - Hollow-Stem raeutigam/S.	Auger	Total Depth: <i>11.5 feet</i> Date: <i>4/26/2006 - 4/26/2006</i> Geologist: <i>Keri A. Nutter</i>	
		Sam	ple Da	ata					Gro	oundwater D	ata	Weather: Partly Cl	oudy	
	ype		Int				USCS Classification Frozen Zone	hic	Depth in (ft.) Time	5.5	2.5	Forest Surface		
	Sample Type	ber	Blow Count	ple	Recovery	alue	USCS Classification Frozen Zone	Soil Graphic	Date	4/26/06	5/1/06			
•	Sam	Number	Blow	Sample	Sec	N-Value	JSC Clas:	Soil 6	Symbol	Ţ	Σ			
+		-	-		-	-	PT		Peat (PT) d	ark brown, 1	noist	SUBSURFACE MA	IERIAL	0.0
+							F I	7.7.7	1 cat (1 1) a	urk brown, i	noist			-0.5
-								\././.						
									drill action	indicates col	bbles			1.5
$\overline{1}$														2.5
_			2	\mathbb{N}			ML		SILT with smoist,	Sand (ML) of hard, field of the second secon	coarse gravel	, medium plasticity, n idicates p200=75%, S	nedium dry strength, light brown, Sa=20%, Gr=5%	2.5
	SPT	1	7	Ň		36		/././.	1 Moisture=	=31%			·····, · ·	
-		-	29	/				\. <u>/.</u> /.						
+								/././.						
1		ŀ	16				SP-SM		SAND with	Silt and Gr	avel (SP-SM	1) coarse gravel, poor	ly graded, no dry strength, brown,	-5.0
Ŧ	SPT	2	14	X		30	or own		moist	to wet, dense	2			
1			16	/		30			Groundwat	, Sa=58%, C er encounter	or=34%, Mot red at 5.5' wh	ile drilling		6.0
1		Ī												
														-8.0
-			16	$\mathbb{N}/$			GP		GRAVEL v dense.	with Sand (C field observ	GP) coarse gr ation indicat	avel, poorly graded, l es p200=5%, Sa=40%	ow dry strength, brown, wet, very 6, Gr=55%, sampler full with heave	
-	SPT	3	31	1Å i		85		00	- blow	counts may	not be repres	sentative	·, · · · · · · · · · · · · · · · · · ·	-
+		-	54	$\left\{ +\right\}$	_				3 Moisture=	=9%				
-		ł	17				GM		SILTY GR	AVEL with	Sand (GM)	fine gravel, medium o	dry strength, brown, wet, medium	-10.0
1	SPT	4	16	IV			Gin		dense,	field observ	ation indicat	es p200=15%, Sa=40	%, Gr=45%	
-		4Å	12	\mathbb{N}			SM	<u>00</u>	1		e gravel, no	drv strength, brown, v	vet, medium dense, field	
1		Ī		\square				BOH 11.5	observ	ation indicat	tes p200=159	%, Sa=75%, Gr=10%	,	ſ ^{11.5}
									4A Moisture Notes:	e=23%				
									PVC standp	oipe installed	to 11' at 2.5' on 05	/01/06		
									Groundwalt	11111111111111111	at 2.5 011 03	101/00		
-														
+														
1														
1														
-														
CN	ME Auto	o Hamm	ier 🛛	Cat	head	d Rope	Method	140	0 lb. hammer with	h 30 in. drop	340 lb. han	nmer with 30 in. drop	Sheet N	umber 1

In the second	ALE OF AL		Cen	tral		on Ma	SKA DO terials	T&PF			EST HOI BER: 68606 bes Highway,	MP 3.5 to MP 25.3			3
Offs	ion / Lo et: 40F vation: 0	7		+50					Drill	ing Method:	: CME Skid - Hollow-Stem raeutigam/S.	Auger	Total Depth: 12.0 feet Date: 4/28/2006 - 4/28/200 Geologist: <i>Keri A. Nutter</i>	6	
		Sam	ple D	ata					Gr	oundwater D	ata	Weather: Partly Clo	budy		-
er)	/pe		ıt				USCS Classification Frozen Zone	ic	Depth in (ft.)	7.5		Grass Surface			
ц.	Sample Type	Ŀ	Blow Count	e	Recovery	P	ficat	Graphic	Time Date	4/28/06					
Ueptn (Feet)	Idmi	Number	No.		SCO	N-Value	USCS Classific Frozen	i G	Symbol	<u> </u>					
	Sa	Ŋ	m	Sa	Å	ż	٦Ö ٿ	Soil				SUBSURFACE MAT	ERIAL		
0 -			5				PT	50	Peat (PT) l					$\frac{0.0}{0.3}$	-
- 1 - 2 - 3 -	SPT	1	7 1 2	X			GM		SILTY GR observ 1 Moisture	vation indica	Sand (GM) tes p200=35%	coarse gravel, nonplas %, Sa=30%, Gr=35%,	stic, low dry strength, brown, fi FROZEN Ice as Nb	eld ^{0.3}	
- 4 - - 5 -			3						no sample	recovered - c	lriving a rock	ahead of sampler		5.0	
- 6 - - 7 -	SPT		2 4 3			6						-			
1	_		6					000	Groundwa	ter encounter	ed at 7.5' wh	ile drilling		7.5	
8 -			7	\mathbb{N}											
- - (SPT		6 3	Å		13			L Lo X	recovered - c	lriving a rock	ahead of sampler		8.5	
0 -	SPT	2	2 5 4	X		9				andier, field =36%	observation i	ndicates p200=25%, \$	Sa=35%, Gr=40%	10.0)
2 -			3					BOH 12	Notes:					12.0)
_															
_															
-															

North Contraction			Cen	tral	Regi		SKA Do aterials	DT&PF	PR	OG OF TI OJECT NUM OJECT: Hain	BER : 68606	L E MP 3.5 to MP 25.3	HOLE	# 84	1
Offs	ion / Lo et: 30F ration: 0	7		+00					Dri	uipment Type: Iling Method: <i>I</i> Id Crew: <i>N. B</i>	Hollow-Stem	Auger	Total Depth: <i>12.0 feet</i> Date: <i>4/28/2006 - 4/28/2006</i> Geologist: <i>Keri A. Nutter</i>		
		Sam	ple D	ata					G	roundwater D	ata	Weather: Partly Clo	udy		-
et)	ype		nt				USCS Classification	Jic De	Depth in (ft.)	5.5	4.5	Grass Surface	-		
Depth (Feet)	Sample Type	er	Blow Count	e	'ery	e	fica	Frozen Zone Soil Graphic	Time Date	4/28/06	5/1/06				
spth	dma	Number	MO	Sample	Recovery	N-Value	SCS	oze oil G	Symbol	Ţ	Σ				
ے 0 –	Š	ž	B	လြိ	Å	ż	50	т v				SUBSURFACE MAT	ERIAL		ļ
0 -			2	1			PT	17	Peat (PT)					$- \int_{0.3}^{0.0}$	
1 -	SPT	1	1 1 4	X			ML		SILT (ML field 1 Moisture	observation in	sand, nonpla ndicates p200	astic, low dry strength, =90%, Sa=10%, Gr=(brown gray, moist, very soft, %	0.5	
3 - 4 - 5	Z														
5 -			2					·/·/	no sample	recovered - d	lriving a rock	ahead of sampler		5.0	
-			2 9	$\left \right\rangle $						ater encounter				5.5	
6 -	SPT		7	X				K K	1			0		-6.0	
7 -			5						drilling ac	tion indicates	gravel			6.5	
8 - 9 -	SPT		1 6 6	X		7			no sample	e recovered - d	lriving a rock	ahead of sampler		8.0	
- - 10 - 11 -	SPT	2	3 4 5	X		9	GM		SILTY G wet, 2 2 Moisture	loose, field ob	Sand (GM) oservation inc	fine grained sand, non licates p200=25%, Sa=	plastic, low dry strength, brown, =40%, Gr=45%	10.0	
12 -			6					BOH 12	PVC stand	lpipe installed ter measured	to 9.5' at 4.5' on 05/	/01/06		—12.0	
-															
		o Hamn	ner N			ad Ron	e Method	14	40 lb. hammer w	ith 30 in drop	340 lh han	mer with 30 in. drop	Sheet N	umber	

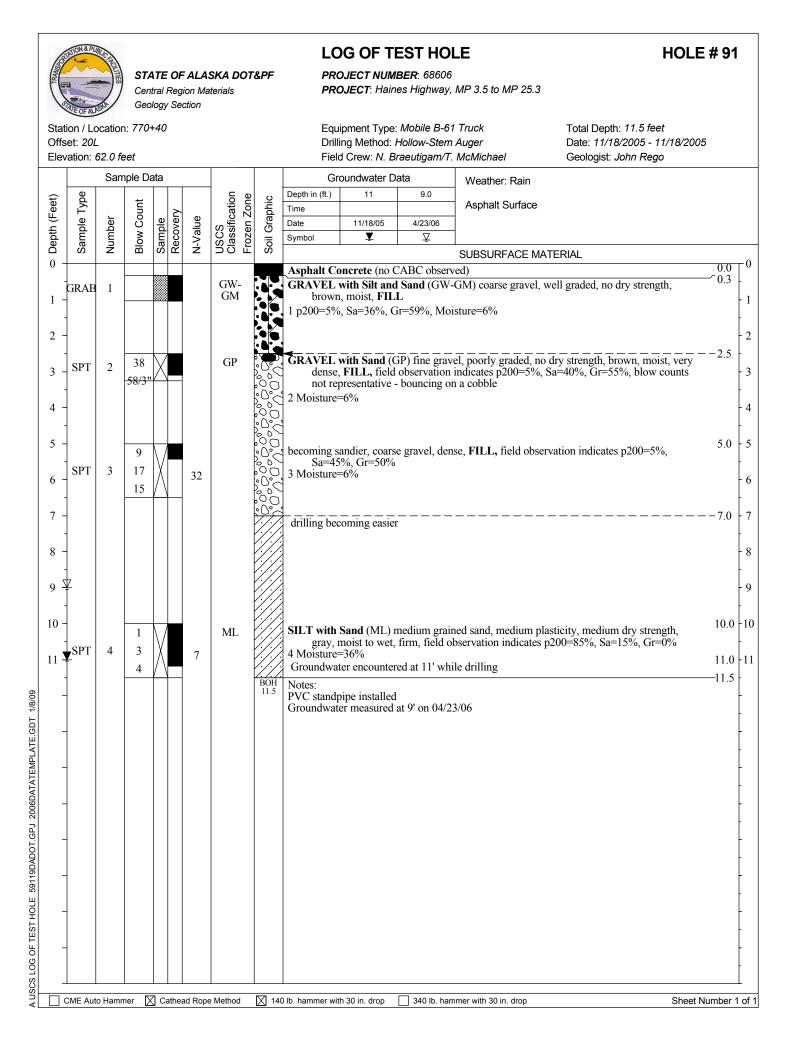


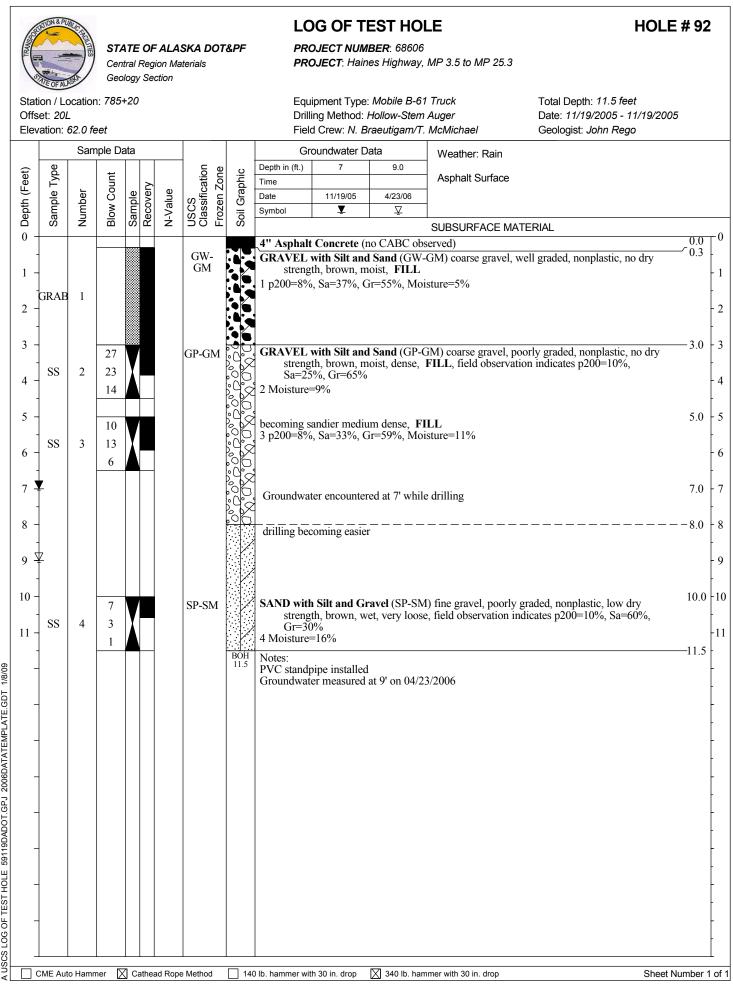


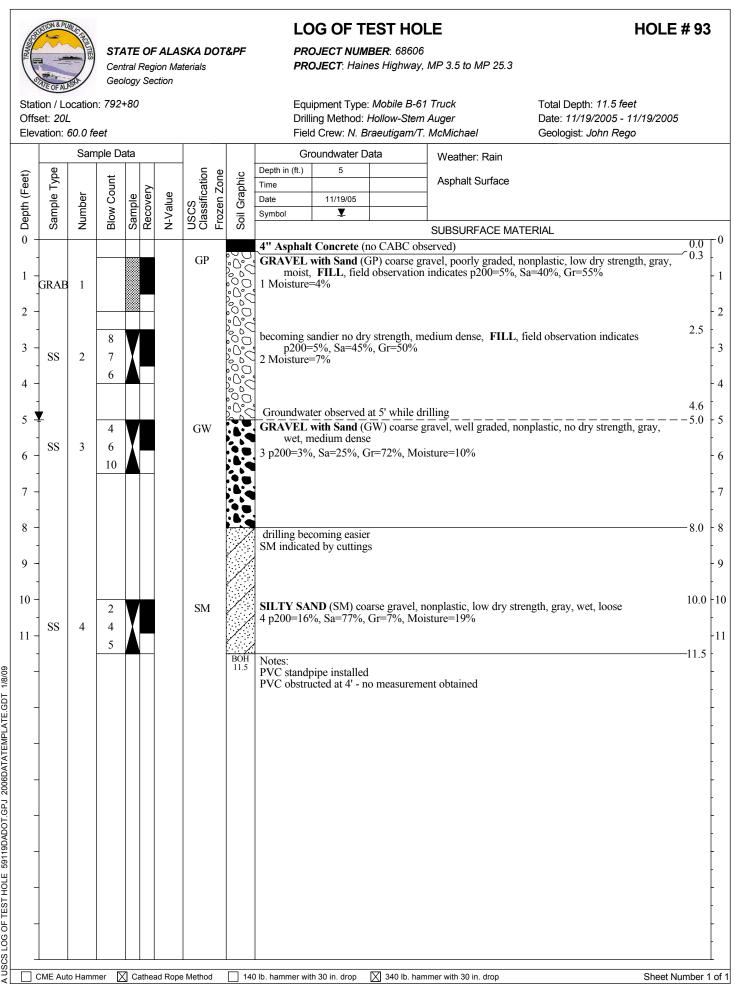
No. of Concession, No. of Conces	ATE OF AL			tral I	Regi	ion Ma	SKA DO aterials	T&PF	PR	OG OF T OJECT NUN OJECT: Hain	1BER : 68606		HOLE	E # 87	7
Offs	ion / Lo et: 35F ation: (7		+00					Dri	uipment Type Iling Method: Id Crew: <i>N. E</i>	Hollow-Stem	Auger	Total Depth: <i>4.0 feet</i> Date: <i>4/27/2006 - 4/27/2006</i> Geologist: <i>Keri A. Nutter</i>		
		Sam	ple Da	ata					G	iroundwater [Data	Weather: Partly 0	Cloudy		_
Depth (Feet)	Sample Type	er	Blow Count	e	'ery	е	USCS Classification	Soil Graphic	Depth in (ft.) Time Date			Grass Surface			
epth	amp	Number	ow (Sample	Recovery	N-Value	SCS	oze oil G	Symbol			-			
0 -	ö	Ż	BI	ű	Ř	Ż	SP	ΞŎ				SUBSURFACE M	ATERIAL astic, low dry strength, brown,	0.0	
	SPT	1	16 5 9			21		BOH 4	grinding o	on a rock, mo n a rock at 4' water observ	ved hole 2' to , no sample a	the east ttempted	=0%, FROZÉN Ice as Nb	3.0 3.5 —4.0	
-	CME Aut						e Method	14							-

TRANSCO			Cen	tral	Regi		SKA DO sterials	T&PF	PR		IBER : 68606		н	DLE # 88
Offs	ion / Lo et: 25L	-	n: 743			21011			Dril	ling Method:	:: Mobile B-6 Hollow-Stem Braeutigam/T	Auger	Total Depth: 6.5 feet Date: 11/18/2005 - 11/18 Geologist: John Rego	//2005
		San	nple Da	ata					G	roundwater E	Data	Weather: Rain		
et)	ype		ut				USCS Classification Frozen Zone	ic ic	Depth in (ft.)			Asphalt Surface		
Depth (Feet)	Sample Type	er	Blow Count	e	very	ne	USCS Classification Frozen Zone	Soil Graphic	Time Date					
epth	amp	Number	No	Sample	Recovery	N-Value	ISC6	oil	Symbol			-		
ロ 0 -	ഗ	Z	8	S	R	z		ο Γ				SUBSURFACE MA	ATERIAL	
· .		1					GW-				no CABC ob d Sand (GW		well graded, nonplastic, no dry	$\frac{0.0}{0.3}$
1 -	GRAB	1					GM		streng	gth, brown, n	noist, FILL	. –	wen graded, nonplastic, no dry	,
-	-								1 p200=8%	%, Sa=38%, G	Gr=54%, Mo	isture=3%		
2 -														
-	CDT	h												2.5
3 -	SPT	2	50/3"	ŕŕ	\square				no sample auger action	recovered -b	ouncing on a cobbles	cobble		2.7
-														
4 -														
•														
5 -														5.0
-	SPT	3	28	X					becoming s	siltier very de	ense, FILL,	field observation ind esentative -bouncing	icates p200=10%, Sa=35%,	5.0
6 -			50/4"	ľ					3 Moisture	=9%	-	solitative bounding		
							BR		1	(BR) auger r	efusal at 6.5'			6.5
_								BOH 6.5	110105.	water observ	ed while drill	ing		0.0
-														
-														

A DECEMBER OF	ANTON & PU		Cen	tral F		on Mate	KA DO1 erials	"&PF	LOG OF TEST HOLE PROJECT NUMBER: 68606 PROJECT: Haines Highway, MP 3.5 to	HOLE # 90
Offs	ion / Lo et: 0 vation: 6			+65					Equipment Type: <i>Mobile B-61 Truck</i> Drilling Method: <i>Hollow-Stem Auger</i> Field Crew: <i>N. Braeutigam/T. McMicha</i>	Total Depth: 7.0 feet Date: 11/18/2005 - 11/18/2005 el Geologist: John Rego
		Sam	ple D	ata					Groundwater Data Weathe	r: Rain
et)	be		t				ion De	<u>.</u>	h in (ft.)	Surface
Depth (Feet)	Sample Type	۲. N	Blow Count	e	ery	Ð	USCS Classification Frozen Zone	Soil Graphic	Asphan	Surface
pth	du	Number	≷	Sample	Recovery	N-Value	SCS assif assif	Ū	bol	
_	Sa	Nu	E E	Sa	Re	ź		So		RFACE MATERIAL
0 -									Asphalt Concrete (no CABC observed)	0.0
1 -	GRAB	1					GW- GM		AVEL with Silt and Sand (GW-GM) coar strength, brown, moist, FILL 200=7%, Sa=43%, Gr=50%, Moisture=6%	se gravel, well graded, nonplastic, no dry 0.3 Max. Dry Dens=148.5pcf, Opt. Moisture=5%
-										2.0
3 -	SPT	2	55	X					sample recovered -bouncing on a cobble	3.0
- 4 -										
5 -			8				GP-GM	न्यूर्ट	AVEL with Silt and Sand (GP-GM) coars	e grained sand poorly graded nonplastic
-			9	$\backslash /$		ľ	JF-OM	i S	medium dry strength, brown, moist, field	e grained sand, poorly graded, nonplastic, observation indicates p200=10%, Sa=30%,
6 -	SPT	3	7	X			ML	20	Gr=60%, 3 Moisture=8%	-6.0
-		3A	2	$ \rangle\rangle$			IVIL		T with Sand (ML) medium grained sand, 1 gray, moist, field observation indicates p2	00=80%, Sa=20%, Gr=0%, ORGANICS
7 -			2	- 1				BOH	present ~5% by volume (plants), 3A Mois	sture=36% ~ 7.0
-									C standpipe installed C obstructed -no measurement obtained	
_										
_										
_										
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_										
_										
-			I					1		

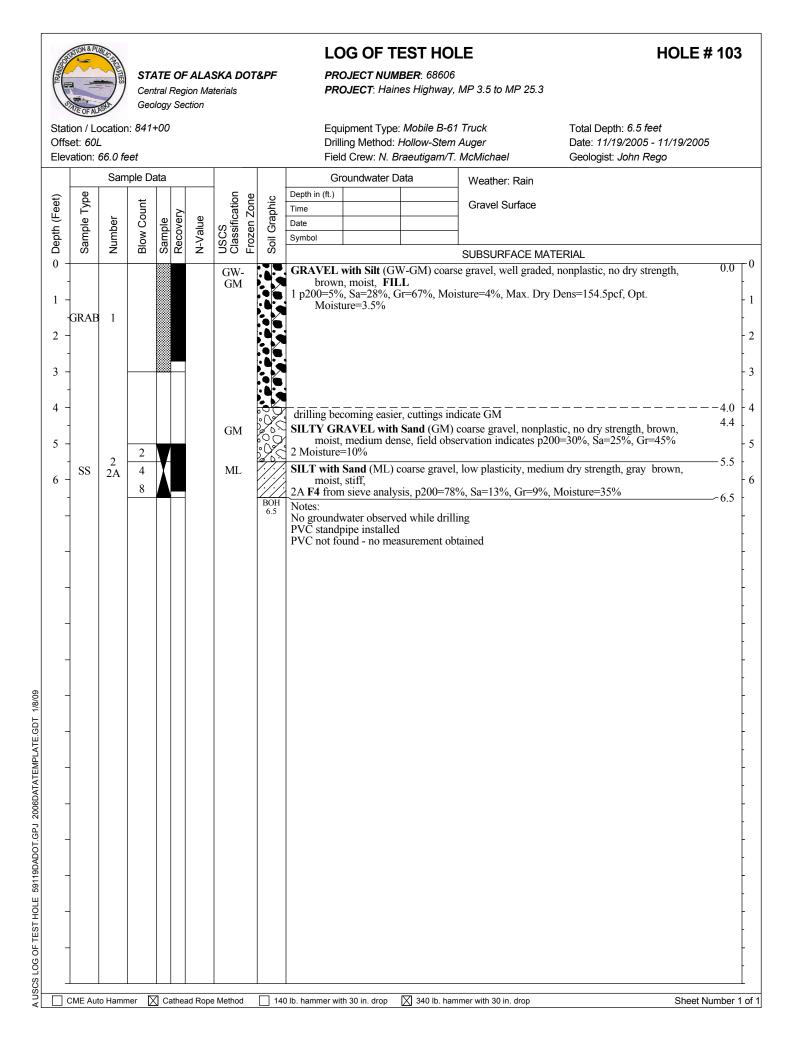




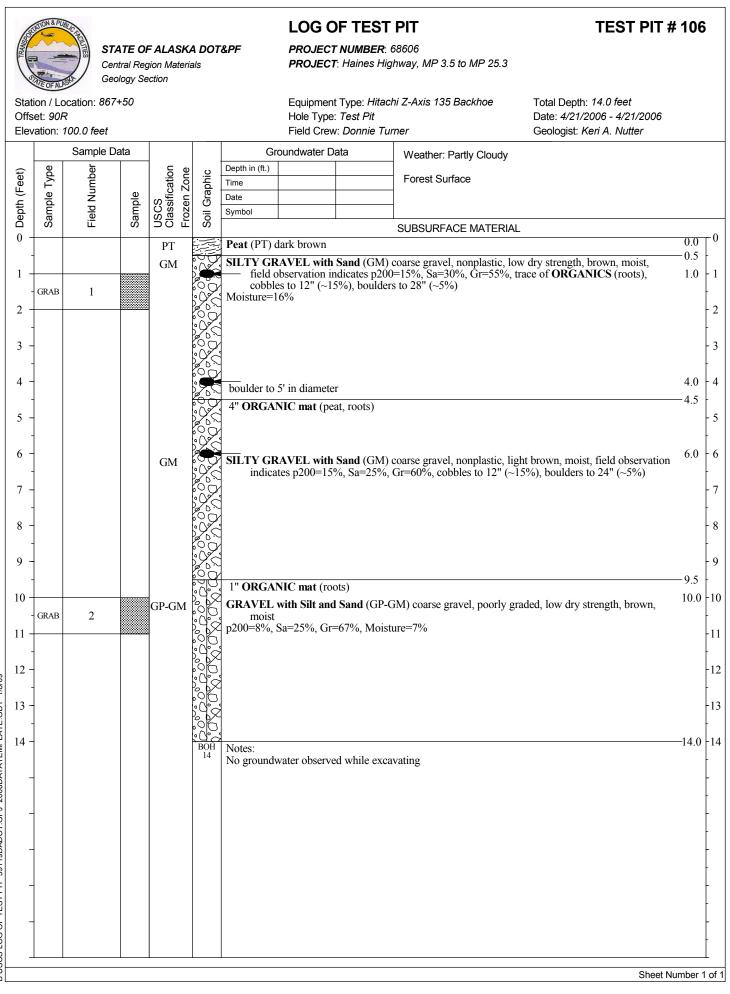


		Cen	tral	Reg		SKA D	ют	&PF	PR	DG OF T OJECT NUM OJECT: Hair	IBER : 68606			OLE # 101
Station / Lo Offset: 40L Elevation: 6			+00	1					Dril	uipment Type lling Method: ld Crew: <i>N. E</i>	Hollow-Sten	n Auger	Total Depth: 2.5 feet Date: 4/30/2006 - 4/30 Geologist: <i>Keri A. Nutt</i>	
	Sam	ple Da	ata						G	roundwater [Data	Weather: Partl		
et)		ıt				ion	ы	<u>.</u>	Depth in (ft.)			Grass Surface		
Deptn (Feet) Sample Type	Ŀ	Blow Count	e	ery	e	USCS Classification	Frozen Zone	Soil Graphic	Time Date					
	Number	0 MO	Sample	Recovery	N-Value	SCS assi	ozel	oi G	Symbol			-		
^م ڌ ب	ź	В	ů	Å	ż	50	ц	Ň				SUBSURFACE	MATERIAL	
,		2	$\Lambda /$											0.0 0.5
- SPT		1/12"	IV.						4 *		-	rom auger flights	•	1.0
-	-		\mathbb{A}			PT			•]			$Vx (\sim 10\% \text{ ice by})$		1.5
-GRAB	-	2				ML	,	/././	ORG	ANICS	-	nd, nonplastic, gra OR, no sample ob	ay, moist, very soft, trace of	
								2.5	Notes: No ground	water observ	ed while dril	ling		
CME Auto	Home	uor N			ad Dec.	e Method	4		0 lb. hammer wi	ith 30 in door	240 11 1-	nmer with 30 in. drop		Sheet Number

TRANSO			Cen		Regi	on Ma	SKA DO aterials	T&PF	PR	OJECT NUM		L E MP 3.5 to MP 25.3	HOLE #	¥ 102	2
Offs	ion / Lo set: 40P vation: 0	7	n: 828						Drill	ipment Type: ing Method: <i>I</i> d Crew: <i>N. Bi</i>	Hollow-Stem	Auger	Total Depth: 7.0 feet Date: 4/30/2006 - 4/30/2006 Geologist: Keri A. Nutter		
		Sam	ple D	ata					Gr	oundwater Da	ata	Weather: Partly Cl	loudy		
et)	ype		ut				USCS Classification	2 .ic	Depth in (ft.)	5	1.0	Grass Surface			
Depth (Feet)	Sample Type	er	Blow Count	e	Recovery	е	USCS Classification	Soil Graphic	Time Date	4/30/06	5/1/06				
spth	dmi	Number	No.	Sample	ŝ	N-Value	SCS	oil G	Symbol	Ţ	Σ	-			
	Sa	٦٢	Ē	Sa	Å	ż	Söů	S S				SUBSURFACE MA	TERIAL		
0 -			1	$\mathbf{\Lambda}$			PT		Peat (PT)	lark brown, I	FROZEN Ic	e as Vx (~10% ice by	y volume)	0.0	
	7	1A	1	W			ML	1.7.7	1 Moisture	=488%	···· · · · · · · · · · · · · · · · · ·		ow dry strength, gray brown,	0.5	
1 -	₽ SPT	1	1	١Å				/././	moist.	verv soft, fie	eld observation	on indicates p200=85	% Sa=15% Gr=0%		
-			4	$ \rangle \rangle$					ORG	ANICS prese	ent to $\sim 15\%$ b	by volume (plants, ro	otlets)		
2 -				+					A Moistur	e=32% indicates col	bles			2.0	
-								////		minicales col	50103				
3 -								/././							
-								(././							
4 -								/././							
-								/././	Groundwa	ter encounter	ed at 5' while	e drilling		4.5	
5	F		10					[///					araded aray wet medium dones	5.0	1
-			10	$\left \right $			SP-SM		field of	bservation in	aver (SP-SM dicates p200	=10%, Sa=75%, Gr	graded, gray, wet, medium dense, =15% n sample observed		
6 -	SPT	2	9	V		14			very strong	HYDROCA	RBON ODO	DR , rainbow sheen or	n sample observed		
-			5			14									
7 -			13	$ \rangle$					1					-7.0	,
, -								BOH 7	Notes: PVC standa	oipe installed				7.0	
_									Groundwat	er measured	at 1' on 05/0	1/06			
_															
-															
-															
-															
-															
_															
_															
_															
_															
-	1														
_															
_															-
_		o Hamn	or N	71 c	thoo	d Done	e Method	X 14	0 lb. hammer wit	h 20 in dron		mer with 30 in. drop	Shoot	lumber	



and a second				tral I	Regi	on Ma	SKA DOI terials	&PF	LOG OF TEST HOLEHOLE # 1PROJECT NUMBER: 68606PROJECT: Haines Highway, MP 3.5 to MP 25.3	04
Offs	ion / Lo et: 10L ration:	_	n: 850∙						Equipment Type: Mobile B-61 TruckTotal Depth: 6.5 feetDrilling Method: Hollow-Stem AugerDate: 11/19/2005 - 11/19/2005Field Crew: N. Braeutigam/T. McMichaelGeologist: John Rego	
Depth (Feet)	Sample Type	Sam	Blow Count		Recovery	N-Value	USCS Classification Frozen Zone	Soil Graphic	Groundwater Data Weather: Rain Depth in (ft.) Asphalt Surface Time Asphalt Surface Date Asphalt Surface	
0 -	S	z	8	S	£	z	⊃o 正 GP-GM			0.0
1 -	GRAB	1							strength, brown, moist, FILL , field observation indicates p200=10%, Sa=30%, Gr=60%	
3 - 4 -	SS	2	14 9 7	X			GW- GM		 GRAVEL with Silt and Sand (GW-GM) coarse gravel, well graded, nonplastic, no dry strength, brown, moist, medium dense, FILL 2 p200=9%, Sa=29%, Gr=62%, Moisture=5% 	.5
5 6	SS	3 3A	8 8 35				GP ML	BOH 6.5	GRAVEL with Sand (GP) coarse gravel, poorly graded, nonplastic, no dry strength, brown, moist, dense, FILL , field observation indicates p200=5%, Sa=45%, Gr=50% <u>3 Moisture=7%</u> 5ILT with Sand (ML) fine gravel, low plasticity, no dry strength, gray brown, moist, hard,	
-										



(all all all all all all all all all all	INTION & PUL	S.C. TROUTING	ST	4 <i>TE</i>	OF	ALA	SKA DO	T&PF			EST HO	LE	HOLE #	<i>‡</i> 10
-			Cer		Regi	on Ma	aterials					MP 3.5 to MP 25.3		
Offs	ion / Lo et: 0 vation: 8		n: 876						Dri	ling Method:	e: Mobile B-6 Hollow-Stem Braeutigam/T.	Auger	Total Depth: 7.0 feet Date: 11/19/2005 - 11/19/2005 Geologist: John Rego	i
		San	nple D	ata					G	roundwater E	Data	Weather: Rain		
er)	ype		t				USCS Classification Frozen Zone	je je	Depth in (ft.)			Asphalt Surface		
uepin (reel)	Sample Type	er	Blow Count	e	/ery	е	USCS Classification Erozan Zona	Soil Graphic	Time Date					
unda	amp	Number	MO	Sample	Recovery	N-Value	SCS	oil G	Symbol					
5) -	ő	Ż	B	ő	ñ	Ż	30 ŭ	ۍ :				SUBSURFACE MA	TERIAL	
, _							GW-		~4" Aspha	alt Concrete	(no CABC o	bserved)	well graded, no dry strength,	-0.0
1 -	GRAB	1					GM		brow	n, moist, FI	LL Gr=52%, Mo		wen graded, no dry strength,	
2 -		1												
3 -			10				GW-		becoming	sandier (GW	-GM) low dry	strength, dense, FI	LL, field observation indicates	3.0
1 -	SS	2	18				GM		p200 2 Moisture	=10%, Sa=4: =12%	5%, Gr=45%			
4 -			26											
5 -			10				GM				GM) coarse g	ravel, low dry streng	th, brown, moist, medium dense,	-5.0
- 5 -	SS	3	13					200] FILI		Gr=41%, M			
J _			14					20°S	-	, ,	,			6.6
7 -								BOH		sal at 7' in co	ompetent Bed	rock		-7.0
-								BOH 7	Notes: No ground	water observ	ed while drill	ing		
									No ground	water observ		ing		
_														
-														
_														
_														
_														
-														
_														
-														
_														
			I				I		I					
_				< Ca			e Method		0 lb. hammer w		X 340 lb. han			umbe

	TION & PU	ALC: FE							LC	og of ti	EST HOI	E	HOLE	# 108
S III			Cen		Regi	on Ma	SKA DOT terials	&PF		OJECT NUM OJECT: Hain		MP 3.5 to MP 25.3		
ffse	on / Lo et: 45L ation: 8	-		+35					Drill	ipment Type: ing Method: <i>I</i> d Crew: <i>N. Bi</i>	Hollow-Stem	Auger	Total Depth: <i>11.5 feet</i> Date: <i>11/19/2005 - 11/19/200</i> Geologist: <i>John Rego</i>	05
			ple Da	ata					1	oundwater D		Weather: Rain		
, İ	/pe		rt				ion ne	jc	Depth in (ft.)	8	8.0	Asphalt Surface		
-	Sample Type	er	Blow Count	e	very	an	USCS Classification Frozen Zone	Soil Graphic	Time Date	11/19/05	4/23/06			
	amp	Number	low	Sample	Recovery	N-Value	JSCS Class	ioi O	Symbol	¥	₽			
+	0)	2	ш	0	Ľ.	2		0)	4" Asphali	t Concrete (n	A CAPC abo	SUBSURFACE MAT	ERIAL	0.0
-							GP-GM		GRAVEL	with Silt and	Sand (GP-C	M) coarse gravel, po	orly graded, nonplastic, no dry	0.3
-(GRAB	1							streng Gr=50 1 Moisture=)%	oist, FILL,	field observation indi	cates p200=10%, Sa=40%,	
-			11				GW-		GRAVEL	with Silt and	Sand (GW-	GM) coarse gravel, w	ell graded, nonplastic, no dry	2.5
-	SS	2	9	Y			GM		streng	th, brown, m 5, Sa=32%, G	oist, medium	dense, FILL	5 , I , J	
			20						2 p200-0%	5, 5a−5270, O	n −02 /0, IVIOI	5.010-070		
				$ \uparrow$]									
_			<u> </u>						haamina -	iltion domas	field obcom	tion indicates = 200-1	$00/ S_0 - 200/ C_{} - 600/$	5.0
+	SS	3	24 20						3 Moisture		neiu observa	non mulcates p200=1	0%, Sa=30%, Gr=60%	
+	55	3	20 15											
+			10		\neg									
1									SP-SM ind	licated by cut	tings			7.0
1	<u> </u>										1	1		8.0
+									Groundwa	ter encounter	ed at 8' while	drilling		5.0
-														
+														
-			5				SP-SM		SAND with	n Silt and Gr	avel (SP-SM) coarse gravel, poorl	y graded, nonplastic, no dry	10.0
	SS	4	9						streng 4 p200=6%	th, brown, w b, Sa=53%, G	er, medium d ir=41%, Moi	sture=12%		
			10	A				BOH	Noter					
-								11.5	Notes: PVC standp	pipe installed				
									Groundwat	er measured	at 8' on 04/23	8/06		
+														
1														
_														
+														
1														
-														
1							L	I	I					

TRANSCO							SKA DOT terials	&PF	P	OG OF 1 ROJECT NUI ROJECT: Hai	MBER : 68606			[:] 109
	ion / Lo	cation	Geo	ology	Sect				E	quipment Typ	e: Mobile B-6	1 Truck	Total Depth: 8.0 feet	
	et: 0 ation: 8	38.0 fe	eet							rilling Method eld Crew: <i>N.</i>		-	Date: 11/19/2005 - 11/19/2005 Geologist: John Rego	
		Sam	ple D	ata						Groundwater	-	Weather: Rain		
et)	be		t				ion De	<u>.</u>	Depth in (ft.))				
Depth (Feet)	Sample Type	er	Blow Count	e	ery	e	USCS Classification Frozen Zone	Soil Graphic	Time Date			Asphalt Surface		
epth	dme	Number	NO NO	Sample	Recovery	N-Value	SCS assi ozei	oil G	Symbol			_		
മ് 0 -	s	ź	ā	Š	ж	ż	зо г	, Х				SUBSURFACE MA	ATERIAL	
U -							GW-		4" Aspha	alt Concrete	(no CABC ob	served)	well graded, nonplastic, no dry	-0.0
1 -	GRAB	1					GM- GM		strei	ngth, brown, 1 %, Sa=43%,	noist. FILL		well graded, nonplastic, no dry	
2 -														
-							GM		SILTVG	BAVEL wit	h Sand (GM)	coarse gravel nonn	astic no dry strength brown	-2.5
3 -	SS	2	9 12	V			UNI	000	moi	st, medium de 70%	ense, FILL, f	ield observation indi	astic, no dry strength, brown, cates p200=15%, Sa=15%,	
-	55	2	7						2 Moistu					
4 -								000						
-														5.0
5 -			8	V			GP-GM	100	GRAVE	L with Silt an	d Sand (GP-	GM) coarse gravel, p	oorly graded, nonplastic, no dry tion indicates p200=10%,	-5.0
6 -	SS	3	22	X				00	Sa=	40%, Gr=50%	6	FILL, neid observa	uon mulcales p200–10%,	
-			11						3 Moistu					-6.5
7 -							SM		SILTY S	rved in cuttin AND with G	ravel (SM) co	barse gravel, low plas	ticity, medium dry strength, light	6.7
-	GRAB	4							brov 4 p200=2	vn, moist, ver 5%. Sa=47%	y dense . Gr=28%. M	oisture=14%		7.6
8 -	SS		50/0'	1				BOH	no SS sa Notes:	mple obtained	l, auger refus	al at 8' in competent l	Bedrock	8.0 ر
								8	No groun	dwater observ	ed while dril	ling		
_									PVC stan	dpipe installe tructed at 7' -	d no measurem	ent obtained		
_														
_														
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(S)	ATION & PUBLIC						LOGC	OF TEST	PIT	TEST PIT	# 11
A COLOR)) Cer		FALASI nion Mate		ſ&PF		T NUMBER : T: Haines Hig	68606 hway, MP 3.5 to MP 25.3	3	
Offs	on / Loc et: 200L ation: 72	ation: 909		cuon			Hole Type		hi Z-Axis 135 Backhoe mer	Total Depth: <i>10.0 feet</i> Date: <i>4/18/2006 - 4/18/2006</i> Geologist: <i>Keri A. Nutter</i>	
		Sample D)ata			G	roundwater D	ata	Weather: Partly Cloudy		
הכטווו וו ככון	e Type	Field Number	0	USCS Classification	Frozen zone Soil Graphic	Depth in (ft.) Time	7		Forest Surface		
- hu	Sample ⁻	eld N	Sample	SCS assif	ozer oil Gr	Date Symbol	4/18/06		-		
5) –	Š	Ë	S	301	Ξ Ő			-1	SUBSURFACE MATER	IAL	
, _					2" ORGA	NIC mat				0.0
l – 2 –	GRAB	1		ML		SILT with classi volun Moisture=4	ne, free ice to	fine grained states p200=8: ~5%), ORG	and, nonplastic, no dry st 5%, Sa=15%, Gr=0%, FR ANICS present to ~15%	rength, brown gray, moist, field ROZEN Ice as Vx (~20% ice by (roots, branches to 4" in diameter)	1.0
3 -	GRAB	2		OL					sand, nonplastic, brown, re=129%, Org=62%	moist to wet	— 3.0
l -						p200–93%	o, Sa−4%, GI	-170, Moistu	le–129%, OIg–62%		
5 -											
-											
5 -											
, 1											7.0
-						Groundwa	iter encounter	ed at 7' while	e excavating		7.0
3 -											
-											
) -	GRAB	3		SP		SAND (SP) medium gra ANICS (woo	ained sand, p	oorly graded, no dry stren	igth, gray, wet, trace of	9.0
0 -		5			BOH	Moisture=	19%				
					BOH 10	Notes:					
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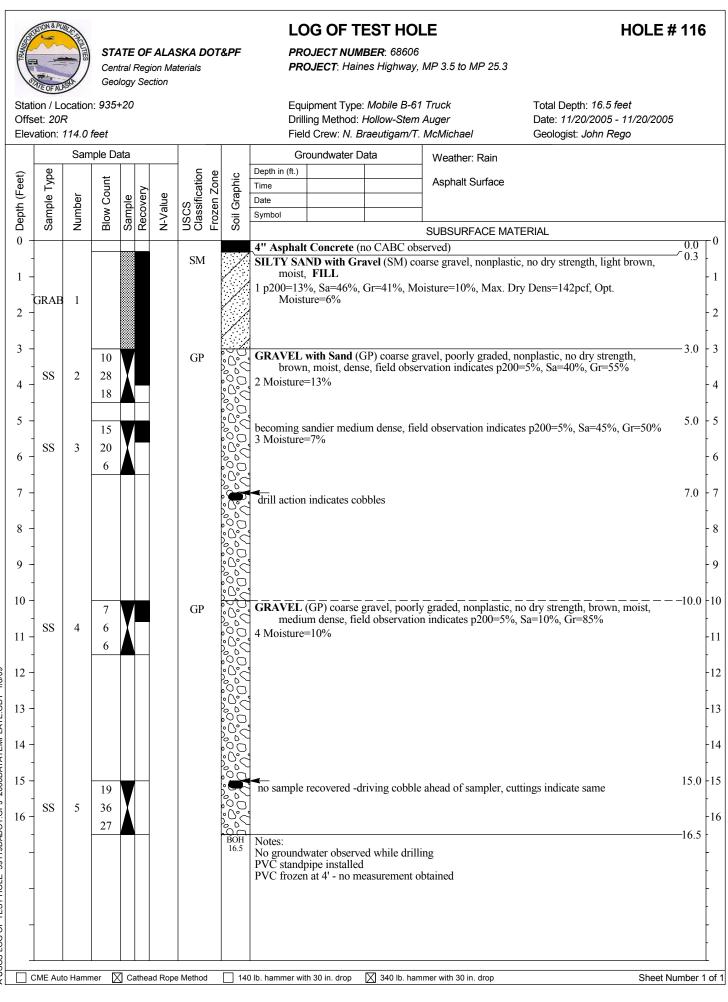
ALL OF ALL)) Centi		ALASK ion Materia ction		&PF	PROJEC	DF TEST T NUMBER: (T: Haines Hig		TEST PIT	# 11
ation / Lo fset: 310 evation: 7		00				Hole Type		ni Z-Axis 135 Backhoe ner	Total Depth: 8 <i>.0 feet</i> Date: 4/18/2006 - 4/18/2006 Geologist: Keri A. Nutter	
	Sample Da				Gr	roundwater D	Data	Weather: Partly Cloudy		
Sample Type	Field Number	Sample	USCS Classification Frozen Zone	il Graphic	Depth in (ft.) Time Date Symbol			Forest Surface		
Sa	Fie	Sa	Cla Cla	Soil				SUBSURFACE MATERIA	L	
- - - GRAB	1		ML		SILT with	vation indica nt to ~30% (1	fine grained s	and, nonplastic, low dry stra 6, Sa=20%, Gr=0%, FROZ s to ~3" in diameter)	ength, brown gray, moist, field EN Ice as Nb, ORGANICS	0.0
- GRAB	2		SP-SM		trace of	of ORGANI	A) medium gr CS (wood, ba =1%, Moistu	urk)	no dry strength, gray, moist,	
- GRAB	3		ML	BOH 8	observ	vation indica ne (rootlets)	fine grained s ttes p200=85%	and, low plasticity, medium %, Sa=15%, Gr=0%, ORG A	dry strength, gray, moist, field ANICS present to ~ 10% by	7.0
-					No ground	water observ	ed while exca	vatıng		
-										

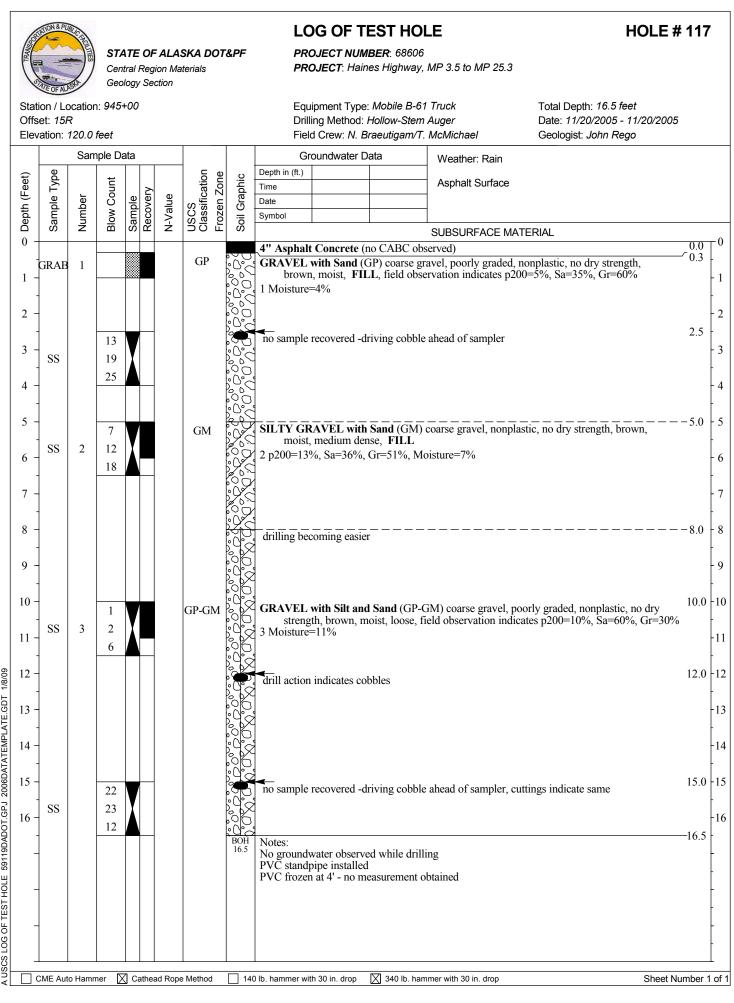
(all all all all all all all all all all	ATION & PUBL	ACT OF				LOG	OF TEST	PIT	TEST PIT	# 112	2
)) Ce		F ALASH gion Mater ection			T NUMBER : T : Haines Hig	68606 hway, MP 3.5 to MP 25.3			
Offse	et: 310L	cation: 915 <u>-</u> 6.0 feet	5+00			Hole Type	nt Type: <i>Hitac</i> e: <i>Test Pit</i> w: <i>Donnie Tu</i>	hi Z-Axis 135 Backhoe mer	Total Depth: <i>9.0 feet</i> Date: <i>4/18/2006 - 4/18/2006</i> Geologist: <i>Keri A. Nutter</i>		
		Sample D	Data			Groundwater I	Data	Weather: Partly Cloudy			_
nepin (reel)	Sample Type	Field Number	ole	USCS Classification	Soil Graphic	Depth in (ft.) 4 Time 4/18/06		Grass Surface			
nepu	Samp	Field	Sample	USC: Class	Soil 0	Symbol T		SUBSURFACE MATERIAL			
) 					: : : : : : : : : : : : : : : : : : : :			SUBSURFACE MATERIAL	-	0.0	
1 -	GRAB	1		РТ		Peat (PT) brown, FRO Moisture=178%	ZEN Ice as '	Vx (~30% ice by volume, cry	ystals ~1/4" in diameter)	1.0	
2 -	GRAB	2		ML		SILT with Sand (ML)	fine grained s tes p200=759	and, nonplastic, low dry stre %, Sa=25%, Gr=0%, ORGA	ngth, gray, moist to wet, field NICS present to ~30% by		
4 ¥	-					Groundwater encounte	red at 4' while	e excavating		4.0	
- - -											
7 - - 8 -						test pit walls collapsing				7.0 8.0	
	GRAB	3			· · · · · · · · · · · · · · · · · · ·	ORGANICS present to Moisture=28%	o ~20% by vo	lume (rootlets)		-9.0	
									Sheet	lumber	1

	TION & PUB	See 1					LOG	OF TEST	PIT	TEST PIT #	113	3
)) Cen		F ALASK gion Maten		&PF		T NUMBER : T : Haines Hig	68606 ghway, MP 3.5 to MP 25	5.3		
ffse	et: 290	cation: 916					Hole Type		hi Z-Axis 135 Backhoe rner	Total Depth: <i>8.0 feet</i> Date: <i>4/18/2006 - 4/18/2006</i> Geologist: <i>Keri A. Nutter</i>		
		Sample Da	ata			Gr	oundwater D	Data	Weather: Partly Clou	dy		
-	Sample Type	Field Number	Sample	USCS Classification Frozen Zone	Soil Graphic	Depth in (ft.) Time Date	3 4/18/06		Grass Surface			
	San	Field	San	USC Clas	Soil	Symbol	Ţ		SUBSURFACE MATE	RIAL		_
1				PT		Peat (PT) b	orown, FRO	ZEN Ice as			0.0	T
-	GRAB	1		SM		SILTY SA field o presen Moisture=2	nt to ~25% b	ne and coarse ndivates p20 y volume (ro	grained sand, nonplasti 0=20%, Sa=80%, Gr=09 otlets)	c, no dry strength, light brown gray, %, FROZEN Ice as Nb, ORGANICS	1.0	
_	_						.070				-2.5	
1	-					Groundwa	ter encounte	red at 3' whil	e excavating		3.0	
-				SP		SAND (SP) p200=) medium gr =5%, Sa=959	ained sand, p %, Gr=0%, C	oorly graded, light brow DRGANICS present to ~	n, wet, field observation indicates -10% by volume (rootlets, bark)	3.5	
-						test pit wal	lls collapsing	g at 5'			-5.0	
-	GRAB	2		SM		SILTY SA ORG	ND (SM) fit ANICS pres	ne grained sa ent (rootlets) br=0%, Mois	nd, nonplastic, no dry st	rength, gray, wet, trace of	7.0	
-					BOH 8	p200=26%, Notes:	, Sa=/4%, C	ir=0%, Mois	ture=20%		~8.0	-
-												
-												-
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-												
												-
										Sheet Nu	mber	1

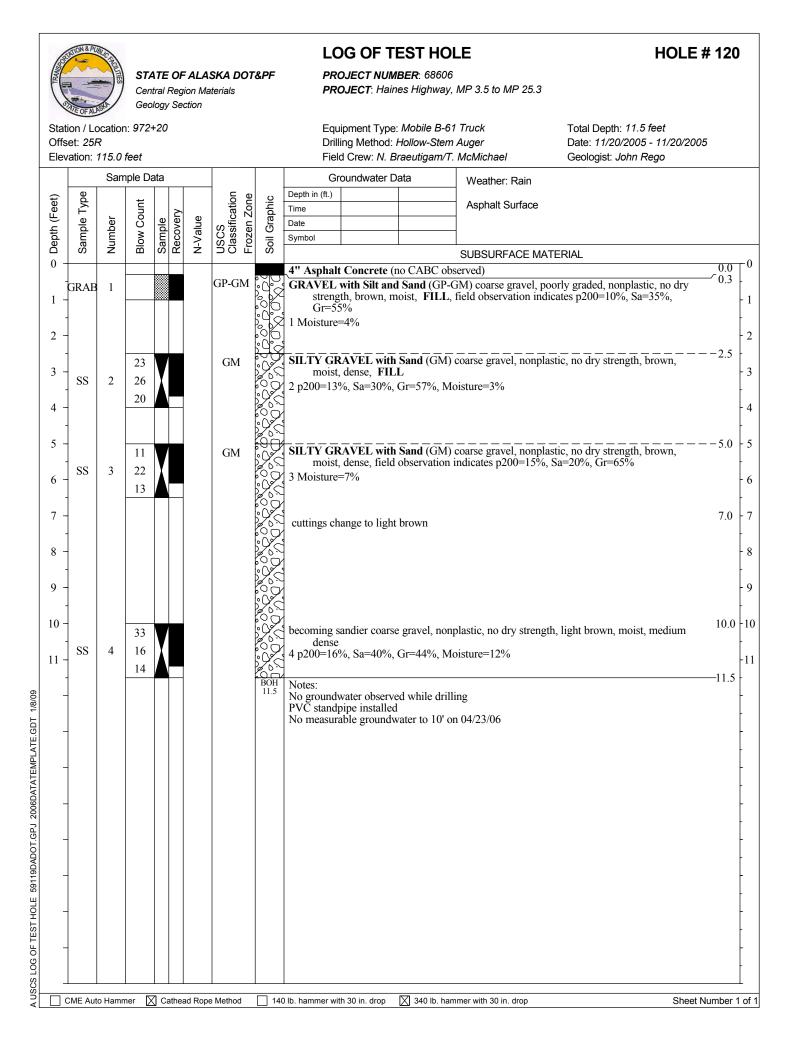
Station & PUBLICS				LOG	OF TEST	PIT	TEST PIT #	‡ 114
Ce	entral Reg	ALASK			CT NUMBER : 6 C T : Haines Higi	8606 hway, MP 3.5 to MP 25.3		
Station / Location: 91 Dffset: 200L Elevation: 85.0 feet	eology Se 9+50	ction		Hole Typ	nt Type: <i>Hitach</i> e: <i>Test Pit</i> w: <i>Donnie Tur</i>	ni Z-Axis 135 Backhoe ner	Total Depth: 9.0 feet Date: 4/18/2006 - 4/18/2006 Geologist: Keri A. Nutter	
Sample	Data			Groundwater		Weather: Partly Cloudy		
Lepth (Feet) Sample Type Field Number	Sample	USCS Classification Frozen Zone	Soil Graphic	Depth in (ft.) 3 Time Date 4/18/06 Symbol ¥		Grass Surface		
	Sar	Cla	Soi			SUBSURFACE MATERIAL		
		PT		Peat (PT) brown, FRO	DZEN Ice as N	l b, fibrous		0.0
2 - GRAB 1 3 - GRAB 1		SM		wet, ORGANIC p200=26%, Sa=57%, 0	S present to ~1: Gr=17%, Mois	5% by volume (rootlets) ture=30%	y strength, brown gray, moist to	-2.0 3.0
4				Groundwater encounte	ered at 3' while	excavating		
6 - GRAB 2 7		GM			h Sand (GM) o indicates p200	coarse gravel, nonplastic, no =15%, Sa=40%, Gr=45%, c	dry strength, gray brown, wet, obbles to 4" (~2%)	— 6.0 7.0
GRAB 3		SM		SILTY SAND (SM) fi indicates p200=1 Moisture=18%	ne grained san 5%, Sa=85%, (d, nonplastic, no dry strengtl Gr=0%	h, gray, wet, field observation	8.0
							Sheet N	umber

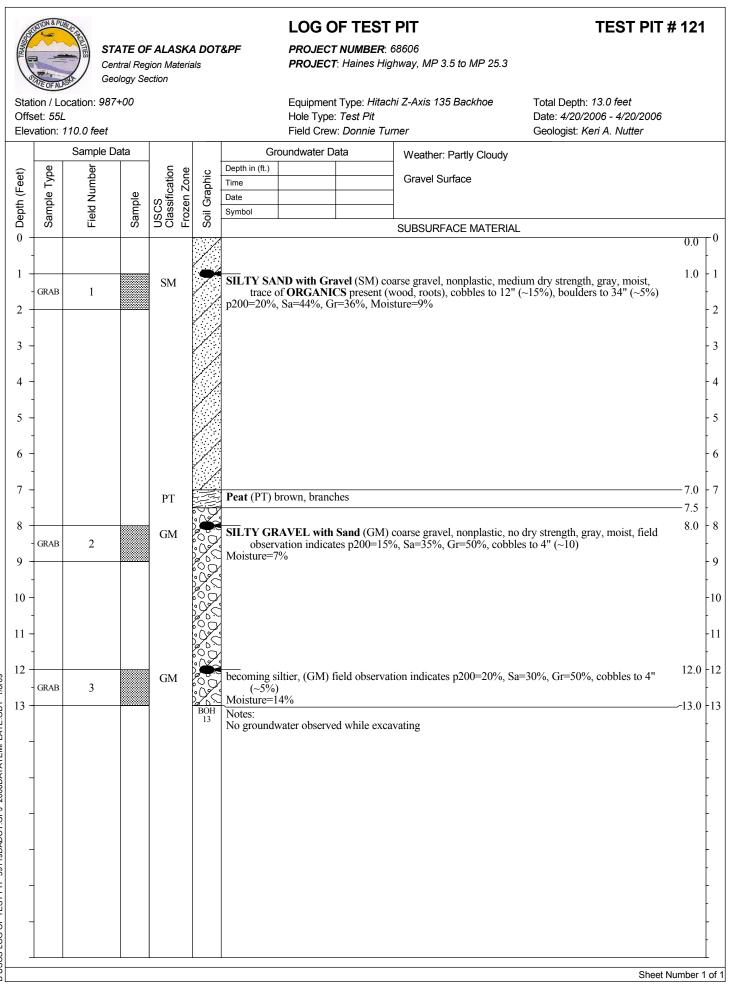
18	ATION & PUB	C.A.					LOG	OF TEST	PIT	TEST PIT	# 11 :
TRANS)) Ce	ntral Reg	ALASK		&PF		T NUMBER : (T : Haines Hig	58606 hway, MP 3.5 to MP 25.3		
Offs	et: 100	cation: 922	ology Se 2+50	ection			Hole Type		hi Z-Axis 135 Backhoe mer	Total Depth: 7.0 feet Date: 4/18/2006 - 4/18/2006 Geologist: Keri A. Nutter	
		Sample D	Data			Gr	oundwater D		Weather: Partly Cloudy		
Leptn (Feet)	Sample Type	Field Number	Sample	USCS Classification Frozen Zone	Soil Graphic	Depth in (ft.) Time Date	7 4/18/06		Grass Surface		
nep	San	Field	Sam	USC Clas	Soil	Symbol	Ţ		SUBSURFACE MATERIA	J	
0 -				PT		Peat (PT) b	orown, FRO	ZEN Ice as I			0.0
- 1 - 2 - 3 -				SM		indica ~20%	tes p200=20	%, Sa=60%, roots, plants)	Gr=20%, 6" FROZEN Ice	brown, moist, field observation e as Nb, ORGANICS present to	0.5
-					200	ONGAIN	C mat (10015)			
1 - - 5 -	GRAB	1		GP		(~5%))	GP) coarse gr =62%, Moist		n gray, moist, cobbles to 4"	4.0
- 6					00000						
-						Groundwa	ter encounter	ed at 7' while	excavating		6.5
-											
-											





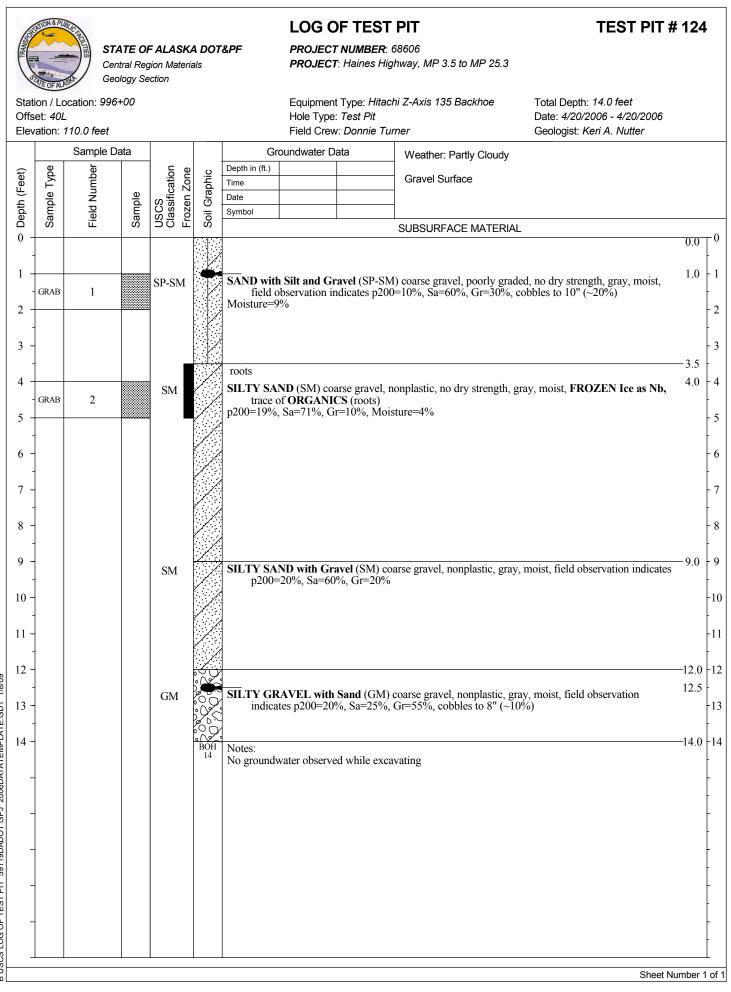
			Cen	tral I	Regi	on Ma		&PF	LOG OF TEST HOLE PROJECT NUMBER: 68606 PROJECT: Haines Highway, MP 3.5 to MP 25.3	HOLE # 118
STATE OF ALASKA DOTSPF Central Region Materials Geology Section PROJECT NUMBER: 68606 PROJECT: Haines Highway, MP 3.5 to MP 25.3 Station / Location: 953+20 Offset: 107 Equipment Type: Mobile B-61 Truck Drilling Method: Hollow-Stem Auger Dilling Method: Hollow-Stem Auger Stemation Dilling Method: Hollow-Stem Auger SubSURFACE MATERIAL Groundwater Data Method: Hollow-Stemation Dilling Method: Hollow-Stemation Statter=12% Statter Stemation Dilling Method: Hollow-Stemation Stemation Dilling Method: Hollow-Stemation Stemating Dilling Method: Hollow-Stemation Stemation Dilling Method: Hol										
		Sam	ple D	ata					Groundwater Data Weather: Rain	
th (Feet)	ıple Type	lber	v Count	ıple	overy	alue	SS Ssification Zen Zone	Graphic	Asphalt Surface	
Dep	San	Nun	Blov	San	Rec	N-N	USC Clas Froz	Soil		
0 +										0.0
2 - 3 -				X			GM		strength, gray, moist, FILL p200=12%, Sa=42%, Gr=46%, Moisture=6% ILTY GRAVEL with Sand (GM) coarse gravel, nonplastic, no dry strenvery dense, FILL , field observation indicates p200=15%, Sa=35%, 4	rigth, gray, moist, Gr=50%
5 -	SS	3	11 31				GM		ILTY GRAVEL with Sand (GM) coarse gravel, nonplastic, no dry strer moist, dense, field observation indicates p200=15%, Sa=15%, Gr=70	5.0 st.
7 -									lotes:	6.6 7.0
-										
-										
			ner 🔉				e Method		hammer with 30 in. drop 🛛 340 lb. hammer with 30 in. drop	Sheet Number





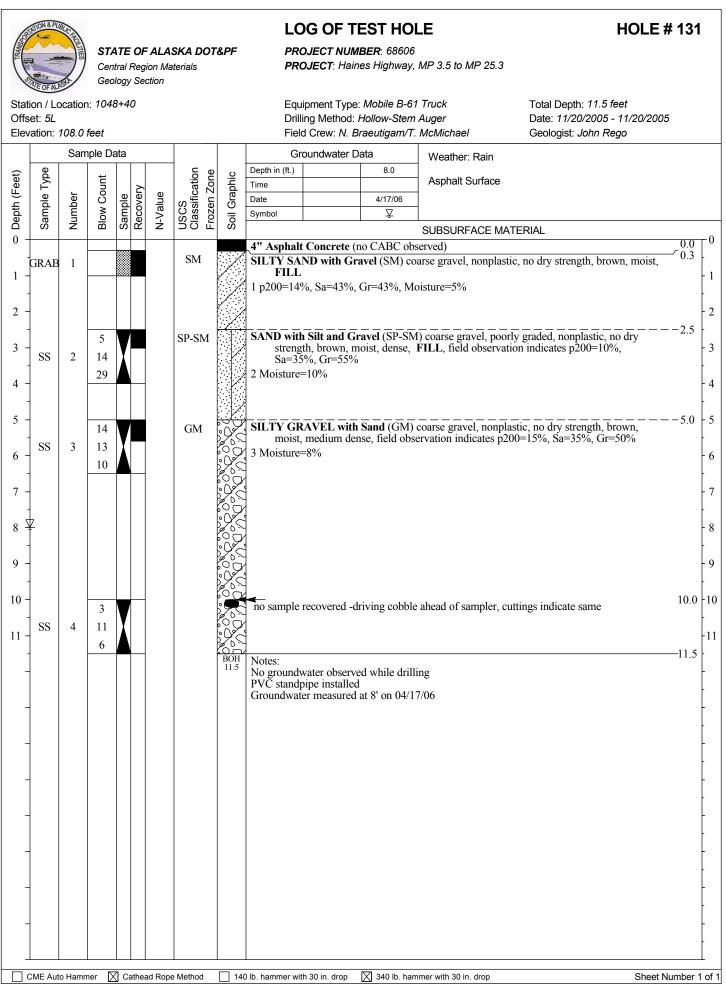
SALE OF	ALAST			tral I	Regi	on Ma	SKA DOT terials				IBER : 68606 nes Highway,	MP 3.5 to MP 25.3		
ation / ffset: 5 evation	OL			+ <i>00</i>					Dril	ling Method:	: Mobile B-61 Hollow-Stem traeutigam/S.	Auger	Total Depth: <i>14.5 feet</i> Date: <i>4/22/2006 - 4/22/2006</i> Geologist: <i>Keri A. Nutter</i>	
) e		Sam	ple Da	ata			L e	U	Gi Depth in (ft.)	roundwater D)ata	Weather: Rain		
Sample Type		er	Blow Count	e	ery	e	USCS Classification Frozen Zone	Graphic	Time Date			Gravel Surface		
ampl	•	Number	0 MO	Sample	Recovery	N-Value	USCS Classific Frozen	Soil G	Symbol					
ů _		ž	В	ű	Ř	Ż	30 1	Ň				SUBSURFACE MA		- 0.0
- -GRA -	ΔB	1					SM		moist 1 p200=22	trace of OR	GANICS (ro	ots)	ic, medium dry strength, gray, Dry Dens=141pcf, Opt.	0.0
SS	•	2	12 26 19				GM		SILTY GF dense 2 Moisture	e, field observ	Sand (GM) vation indicate	coarse gravel, nonpla es p200=15%, Sa=40	astic, no dry strength, gray, moist, 0%, Gr=45%	-3.0
SS		3	13 14 20						becoming r actior 3 Moisture	n indicates co	r, field observ bbles	ation indicates p200	=15%, Sa=30%, Gr=55%, drill	5.0
ss		4 4A	7 5 5	Y			SP-SM	08 	field of 4 Moisture	observation i ≔4%	ndicates p200	=10%, Sa=60%, Gr	ry strength, gray, moist, loose, =30%	8.5
		-	5				5.01		to ~10 4A Moistur becoming r	, field observ 0% by volum re=14% more gravelly	ation indicate e (roots)	s p200=30%, Sa=50	%, Gr=20%, ORGANICS present	10.0
ss		5	12 20						5 Moisture	=8%				
ss		6	10 38 15	Y			GM		SILTY GF very 6 6 Moisture	dense, field o	Sand (GM) bservation in	coarse gravel, nonpla dicates p200=15%, S	astic, no dry strength, gray, moist, Sa=40%, Gr=45%	-12.5
-		-						BOH 14.5	Notes: No ground PVC stand	water observe pipe installed				14.0 —14.5
-														

STATE OF ALL	Cent		- ALASK ion Materia ction		⁻ &PF	PROJECT	F TEST NUMBER: 6 Haines Higi		TEST PIT #	‡ 123
ffset: 50L	ocation: 991+ - 110.0 feet	+50				Hole Type:		i Z-Axis 135 Backhoe ner	Total Depth: <i>14.0 feet</i> Date: <i>4/20/2006 - 4/20/2006</i> Geologist: <i>Keri A. Nutter</i>	
	Sample Da	ata			Gr	oundwater Da	ita	Weather: Partly Cloudy		
Sample Type	Field Number	Sample	USCS Classification Frozen Zone	Soil Graphic	Depth in (ft.) Time Date Symbol			Gravel Surface		
Sa	Fie	Sa	US Cla Fro	S				SUBSURFACE MATERI	AL	0.0
- - - GRAB	1		GP-GM		GRAVEL moist 24" Moisture=6	, field observa	Sand (GP-G tion indicate	M) coarse gravel, poorly s p200=10%, Sa=35%, G	graded, no dry strength, gray, r=55%, cobbles to 12", boulders to	2.0
-										-4.0 5.0
- GRAB	2		SP-SM		SAND with obser Moisture=5	vation indicate) coarse grav es p200=10%	el, poorty graded, no dry 6, Sa=80%, Gr=10%, FR	strength, gray, moist, field OZEN Ice as Nb	
- - - - - - -					DEBRIS I	present (alumi	num can)			9.0
-			GP-GM	• • •	CRAVEL	with Silt and	Sand (GP G	M) coarse gravel poorly	graded, gray, moist, field	—12.0
-			GP-GM		obser	vation indicate	es p200=10%	6, Sa=30%, Gr=60%	gradea, gray, moist, neta	
3 - -					DFRRIS	oresent (alumi	num can)			13.5
↓ -				BOH 14	Notes:	water observed	· · · ·	vating		—14.0
-										

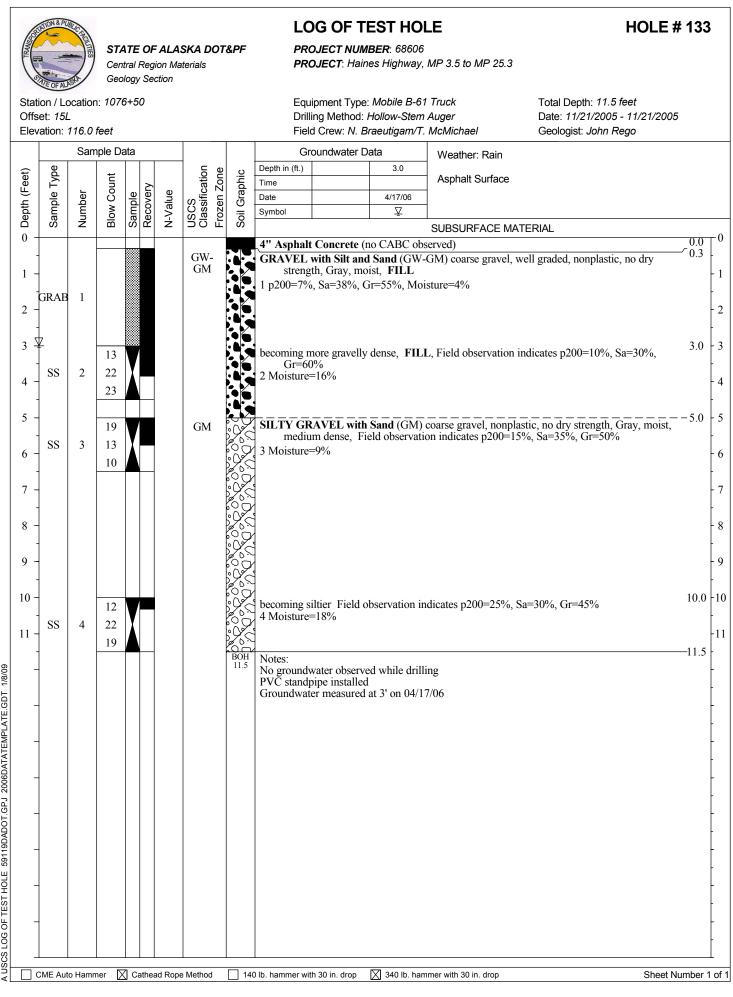


STON & PU	Cen		= ALASK nion Materia ection		-&PF	PROJEC	OF TES CT NUMBER CT: Haines H		TEST PIT #	¥ 12
set: 50F	ocation: 1010 R 120.0 feet	0+00				Hole Typ	ent Type: <i>Hita</i> be: <i>Test Pit</i> ew: <i>Donnie 1</i>	achi Z-Axis 135 Backhoe ^r urner	Total Depth: 9 <i>.0 feet</i> Date: <i>4/19/2006 - 4/19/2006</i> Geologist: <i>Keri A. Nutter</i>	
	Sample Da	ata			Gr	oundwater		Weather: Partly Cloudy		
Sample Type	Field Number		USCS Classification Frozen Zone	Soil Graphic	Depth in (ft.) Time Date			Grass Surface		
Sam	Field	Sample	USC Clas Froz	Soil	Symbol			SUBSURFACE MATER	ΙΑΙ	
-										0.
- GRAB	1		GM		SILTY GR of OF p200=15%	RAVEL wit RGANICS p , Sa=34%, 0	th Sand (GM present to 2' Gr=51%, Mo	1) coarse gravel, nonplastic, (roots), cobbles to 12" (~20 pisture=8%	low dry strength, gray, moist, trace %)	3.
-					boulders to	5 36"				6.
-										
-				BOH 9	Notes: No ground	water observ	ved while ex	cavating		—9.
-										
-										
-										
_										

I IIIII				tral F	Regio	on Ma	SKA DO	ſ&PF	PF	ROJECT NU			HOLE # 12
Offs	ion / Lo et: 40L ation: 1			6+50	0				Dr	quipment Typ illing Method eld Crew: <i>N</i> .	: Hollow-Ste		Total Depth: 7.5 feet Date: 11/20/2005 - 11/20/2005 Geologist: John Rego
		Sam	ple Da	ata						Groundwater		Weather: Rain	
() ()	be		Ę					<u>.</u>	Depth in (ft.)				
Ueptn (Feet)	Sample Type	Ŀ	Blow Count	e	ery	e	USCS Classification Frozen Zone	Soil Graphic	Time Date			Asphalt Surface	
btn	ldm	Number	NO NO	Sample	Recovery	N-Value	SCS assit	Ū	Symbol			_	
	Sa	Ŋ	B	Sa	Å	ż		S			-	SUBSURFACE M	ATERIAL
0 -							GW-			lt Concrete			\int_{0}^{0}
1	GRAB SS SS	1 2 3	11 17 13 12 14 10				GM GP-GM		becoming Gr=2 2 Moistur 3 Moistur difficulty auger refi	ngth, brown, %, Sa=42%, sandier med 45% e=13% L with Silt an ngth, brown, 50% e=5%	moist, FILI Gr=50%, M ium dense, 1 nd Sand (GP moist, mediu	oisture=6%, Max. Dr FILL, field observatio -GM) coarse gravel, p im dense, field observ Bedrock	well graded, nonplastic, no dry 0. y Dens=147pcf, Opt. Moisture=5% 3. on indicates p200=10%, Sa=45%, 5. poorly graded, nonplastic, no dry 5. poorly indicates p200=10%, Sa=40%, 6. 7.
_													
_													

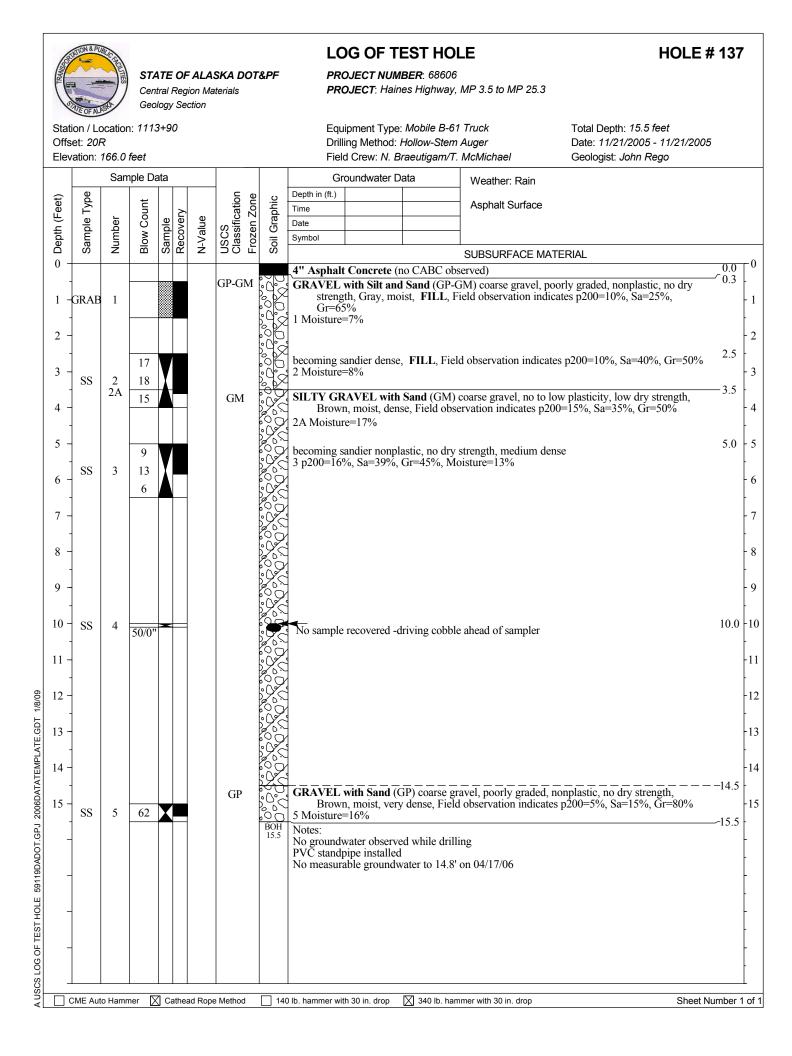


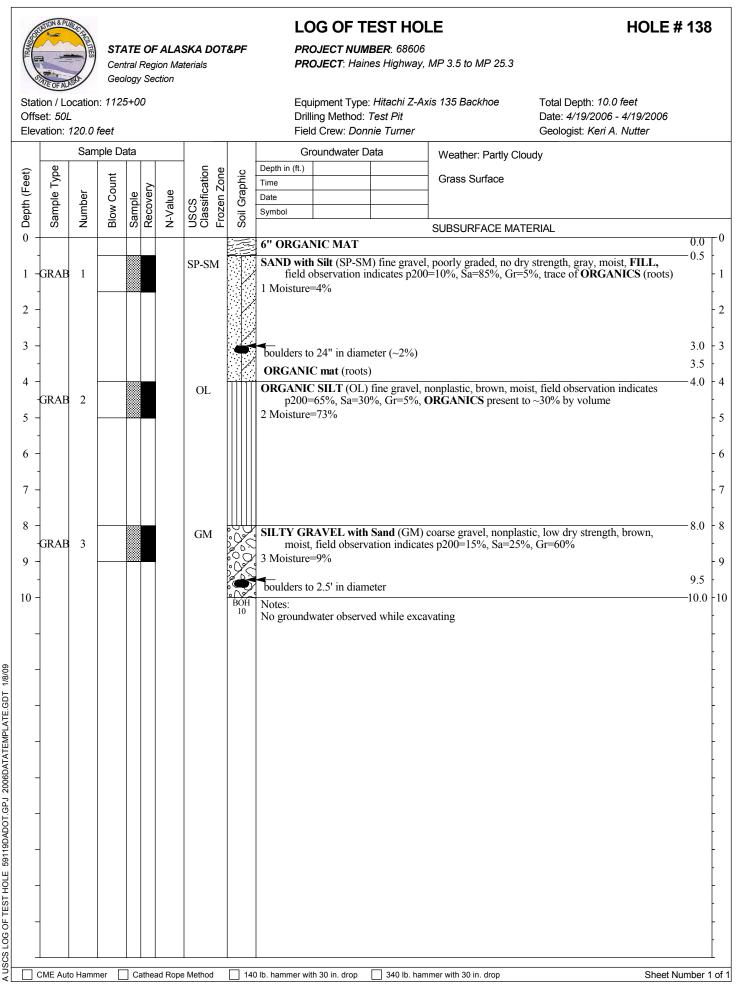
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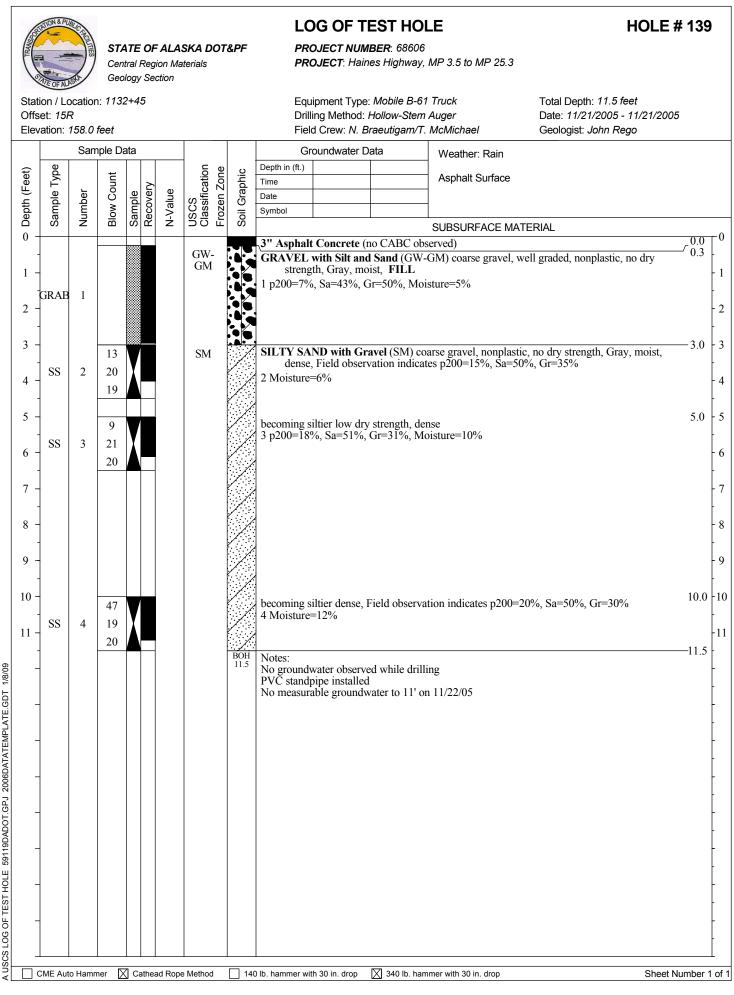


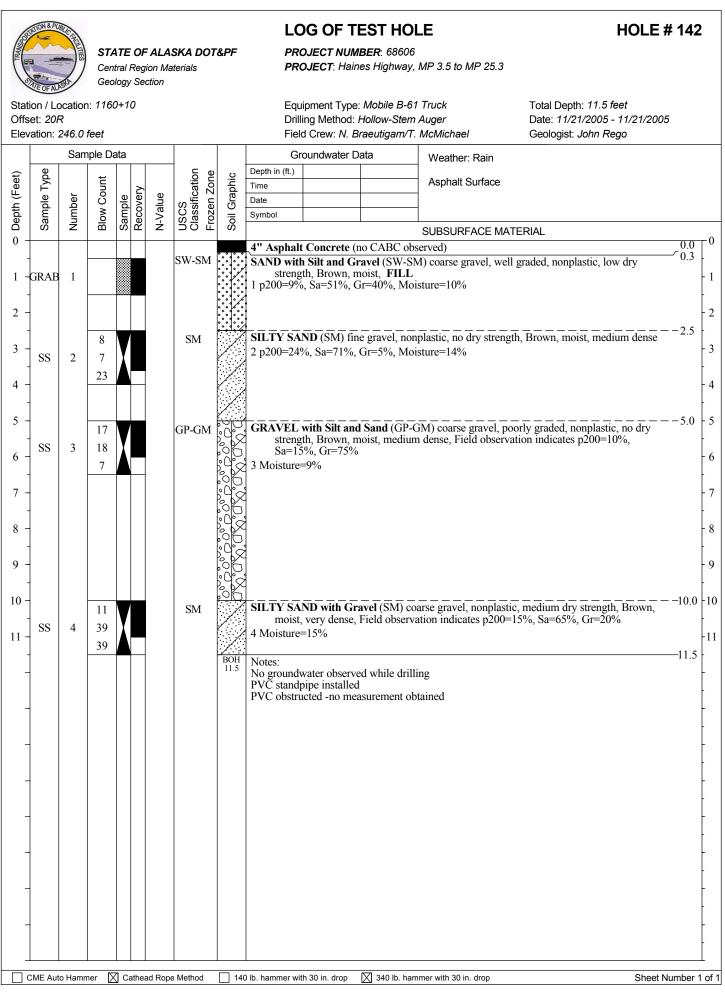
	ATION & PUL	al Criter								OG OF T			HOLE #	134
S III		and a second	Cer		Regi	on Ma	SKA DO aterials	T&PF		ROJECT NUN ROJECT: Haii		6 , MP 3.5 to MP 25.3		
Offs	ion / Lo et: 45L ation: 1		n: <i>10</i> 8						D	quipment Type rilling Method: eld Crew: <i>N. E</i>	Hollow-Sterr	n Auger	Total Depth: 7.5 feet Date: 11/20/2005 - 11/20/2005 Geologist: John Rego	
		Sar	nple D	ata					1	Groundwater [Weather: Rain		
e	be		, ,					<u>ں</u>	Depth in (ft.))				
nepui (reel)	Sample Type	5	Blow Count	0	Р.	Ð	USCS Classification Frozen Zone	Graphic	Time			Asphalt Surface		
	mple	Number	O ≷	Sample	Recovery	N-Value	CS Issif	Ū	Date Symbol			_		
I	Sa	Nu	BG	Sa	Re	ź	US S Cles	Soil				SUBSURFACE MA	TERIAL	
) -							CW			alt Concrete ($\int_{0.0}^{0.0}$
							GW- GM		GRAVE	L with Silt an ngth, Gray, mo	d Sand (GW	-GM) coarse gravel, w	vell graded, nonplastic, no dry	0.2
1 -									1 p200=1	1%. Sa=41%.		oisture=6%, Max. Dr	v Dens=151pcf. Opt.	
	GRAB	1							Moi	sture=5.5%) =,,,	
2 -									•					
]					•
3 -	SS	2	60						becoming	more gravelly	very dense,	FILL, Field observat	tion indicates p200=10%,	3.0
, 1			20/0'						Sa= 2 Moistur	35%, Gr=55% re=5%)			10
1 -											entative -bou	ncing on a cobble		4.0
.]														-5.0
5 -			14	V			GP-GM		GRAVE	L with Silt an	d Sand (GP-	GM) coarse gravel, po	porly graded, nonplastic, no dry ates p200=10%, Sa=30%, Gr=60%	
5 -	SS	3	21	X				06	3 Moistu		Jist, delise, r		ales p200–10%, Sa–50%, OI–00%	6.0
,]			21						Difficult	y drilling				0.0
7 -								.00	c					
'								lok	Auger re	fusal at 7.5' in	competent E	Bedrock		7.1 -7.5
								BOH 7.5	Notes:	dwater observ	ad while dril	ling		- 1.5
												5		
_														
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4														
-														
_	CME Auto		N	71			e Method		0 lb. hammer		5-70	mmer with 30 in. drop	Sheet Nu	

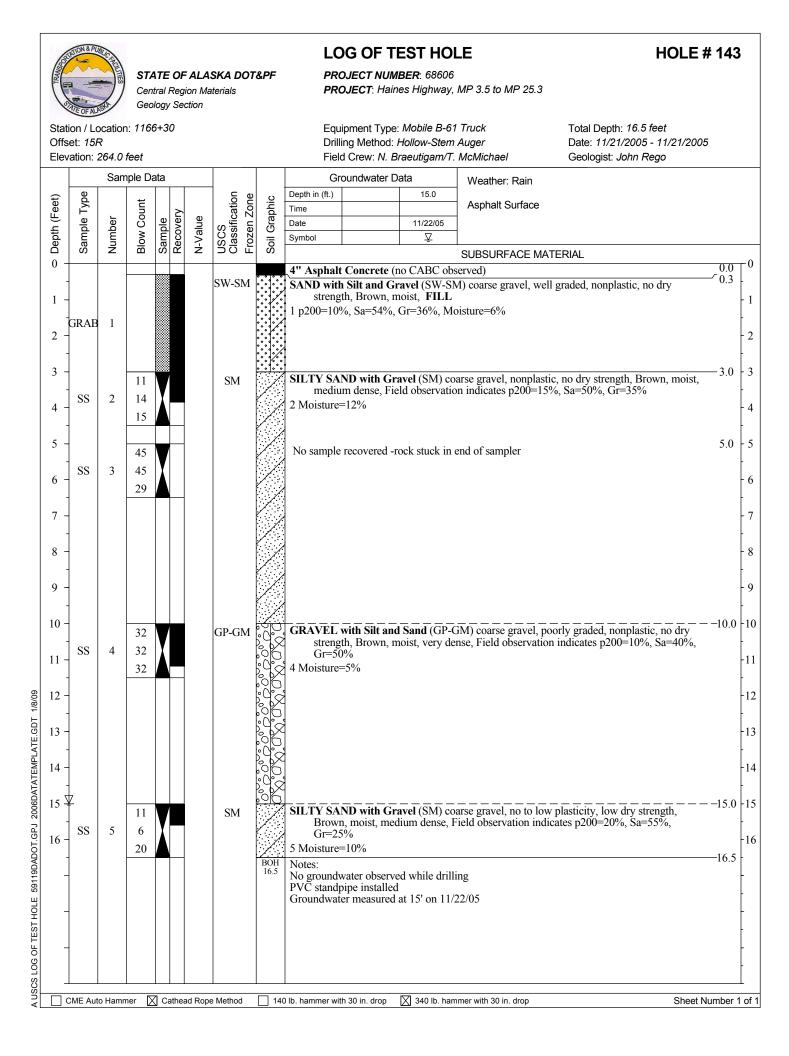
			Cen	tral	Reg	ion Ma	SKA DO aterials	"&PF	PR	OJECT NUM	EST HO BER: 68606 es Highway,	_E MP 3.5 to MP 25.3	HOLE #	ŧ 135	5
ffse	on / Lo et: 30F	र	n: <i>109</i> .			ction			Dril	ing Method:	: CME Skid - Hollow-Stem raeutigam/S.	Auger	Total Depth: 8.5 feet Date: 5/1/2006 - 5/1/2006 Geologist: Keri A. Nutter		
	е	Sam	ple D	ata				0		oundwater D		Weather: Partly Clo			
הכלווו לו ככו/	Sample Type	Number	Blow Count	Sample	Recovery	N-Value	USCS Classification Frozen Zone	il Graphic	Time Date Symbol			Grass Surface			
) - -	Sa	NU	2 2	Sa	Re	N-N	OL NG P	Soil	ORGANIO	C SILT (OL)	fine gravel, 1 tes p200=709	SUBSURFACE MAT nonplastic, medium di Sa=20% Gr=10%	TERIAL ry strength, brown, field , FROZEN Ice as Nb,	0.0	
	SPT	1	10 20						ORG 1 Moisture	ANICS prese	ent (roots, pe	at)		-1.5	
2 -			31						drill action	indicates co	bles			2.0	
- - + -									drill action	indicates co	bles			4.0	
-	SPT		12 17 10			27			no sample	recovered - c	lriving a rock	ahead of sampler		6.0	
/ _ - 3 _	SPT	2	5 6 10 15	X		25	GM		SILTY GF moist 2 Moisture	RAVEL with , dense, field =6%	Sand (GM) observation	coarse gravel, nonpla ndicates p200=15%,	stic, medium dry strength, brown, Sa=35%, Gr=50%	7.0	
-			10		v			BOH 8.5	Notes: No ground	water observe	ed while drill	ng		-8.5	
-															
-															
_															
_															
-															
-															
] C	ME Aut	o Hamn	ner [Ca	athea	ad Rope	e Method	14	0 lb. hammer wi	th 30 in. drop	340 lb. ham	mer with 30 in. drop	Sheet N	umber	1



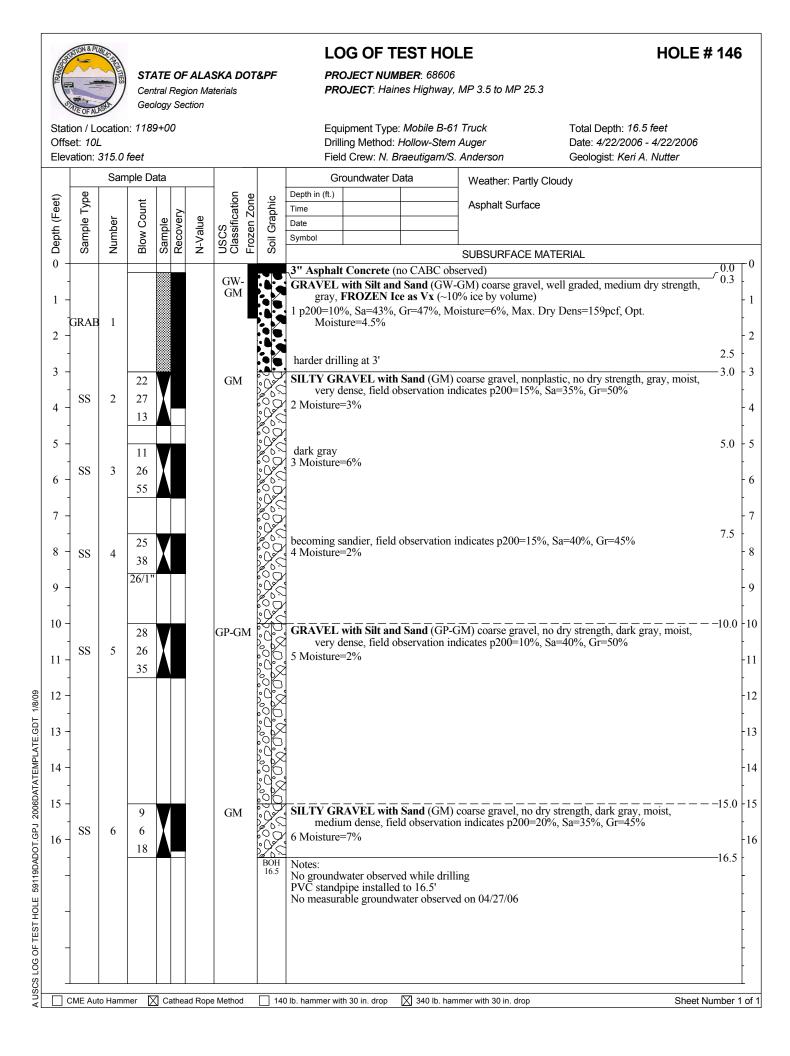


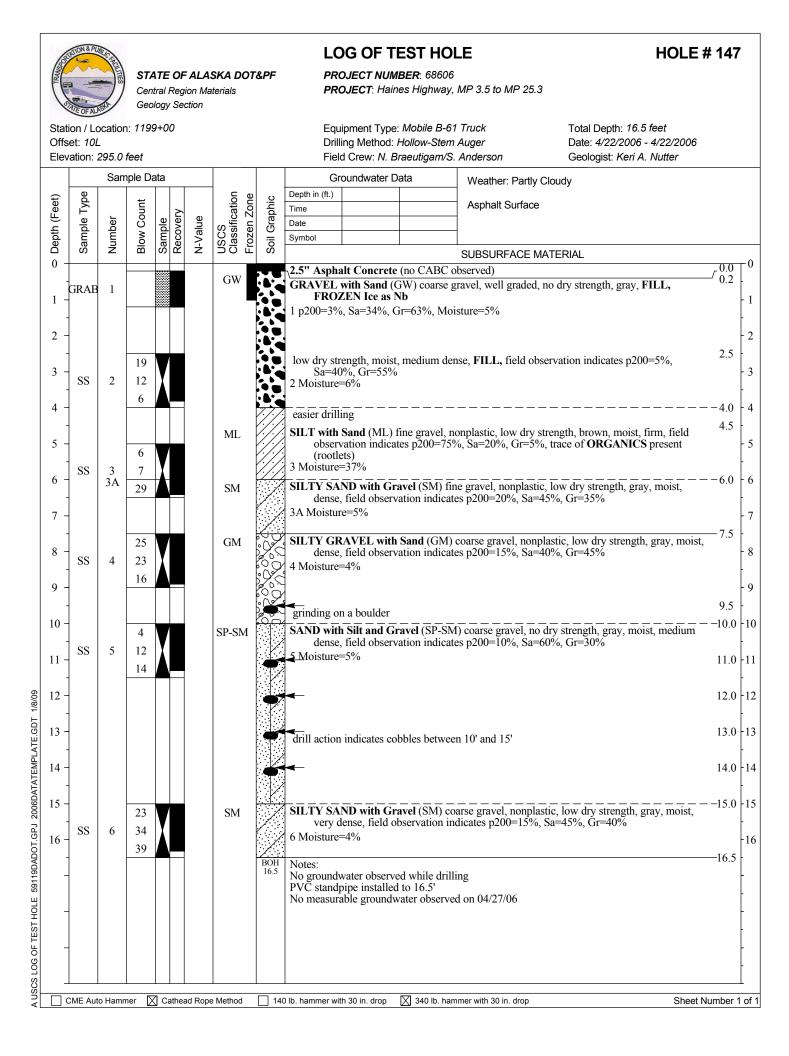


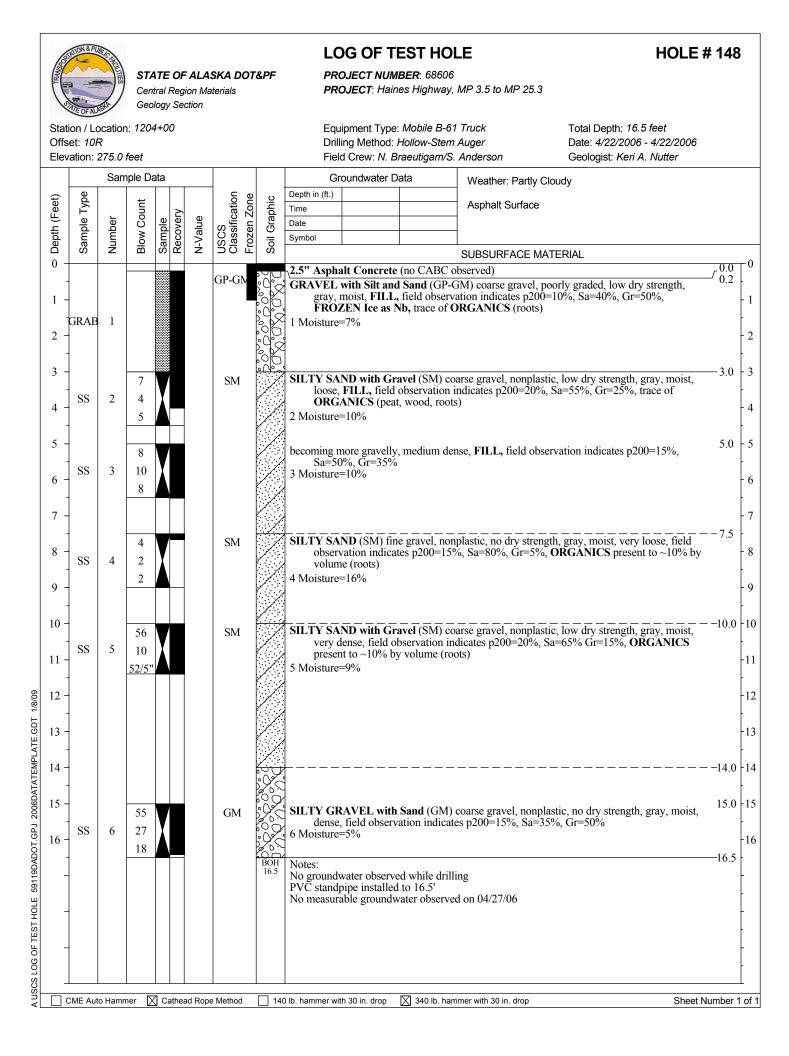




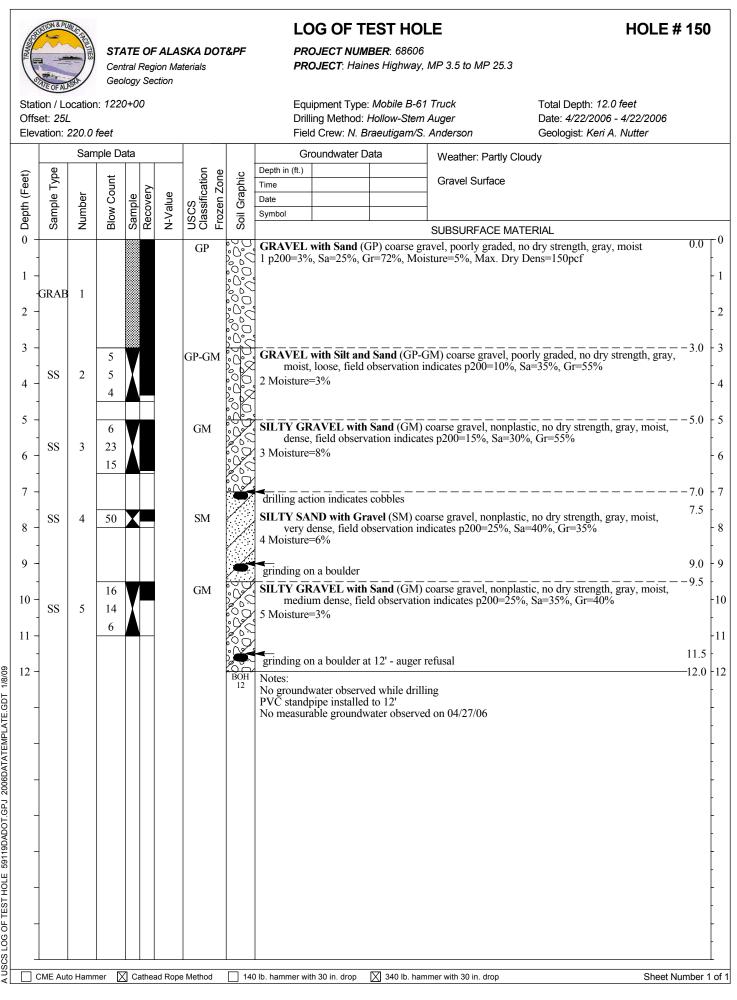
	ATION & PO	C TE			c -		ow			HOLE # 14
S II		and a state	Cen	tral I		on Ma	SKA DOT Iterials	r&PF	PROJECT NUMBER: 68606 PROJECT: Haines Highway, MP 3.5 to MP 25.3	
Offs	on / Lo et: 10F ation: 2	7	ו: <i>117</i> 4						Equipment Type: <i>Mobile B-61 Truck</i> Drilling Method: <i>Hollow-Stem Auger</i> Field Crew: <i>N. Braeutigam/T. McMichael</i>	Total Depth: 5.5 feet Date: 11/21/2005 - 11/21/2005 Geologist: John Rego
			nple Da	ata						
t)	e	Curr	-				L L D	0	in (ft.)	
Depth (Feet)	Sample Type	J.	Blow Count	0	Ś	e	USCS Classification Frozen Zone	Soil Graphic	Asphalt Surface	
pth	mple	Number	N N	Sample	COVE	N-Value	sCS assif	ii G	ol	
	Sa	N	B	Sa	Re	ź	NO R	ŝ	SUBSURFACE MAT	
0 -							6 14		sphalt Concrete (no CABC observed)	0.0 a low dry strength Gray maist
1 -	GRAB	1					SM		FY SAND with Gravel (SM) coarse gravel, nonplasti FILL 00=14%, Sa=43%, Gr=43%, Moisture=6%	c, low dry strength, Gray, moist,
			1.5						VEL with Sit and Sand (CD CM) against group in	
3 -	SS	2	15 80	X			GP-GM		VEL with Silt and Sand (GP-GM) coarse gravel, po strength, Gray, moist, very dense, field observation in Gr=75%, pisture=15%	ndicates p200=10%, Sa=15%,
4 -								.00	vcounts not representative -bouncing on a cobble	
5 -	66	2						600	ample recovered -bouncing on a boulder	4.9
-	SS	3	95/4"					BOH	lder encountered - auger refusal at 5.5'	5.3 7 5.5
_								5.5	s: groundwater observed while drilling	
-										







State of AL)) Cen		- ALASK iion Materia ction		&PF	PROJECT	F TEST NUMBER: Haines Hig		TEST PIT #	¢ 14
ffset: 20L	ocation: 120 260.0 feet	9+00				Hole Type:		hi Z-Axis 135 Backhoe mer	Total Depth: <i>5.5 feet</i> Date: <i>4/19/2006 - 4/19/2006</i> Geologist: <i>Keri A. Nutter</i>	
	Sample Da	ata			Gi	roundwater Da	ata	Weather: Partly Cloudy		
Sample Type	Field Number	Sample	USCS Classification Frozen Zone	Soil Graphic	Depth in (ft.) Time Date Symbol			Gravel Surface		
Saı	Fie	Sai	Cla Cla	Soi	Cymbol			SUBSURFACE MATERIA	-	
- - - - - - - - -	1		SM		SILTY SA ORG	o 15" in diame ND with Gra ANICS (roots , Sa=53%, Gr	ivel (SM) co		dry strength, gray, moist, trace of	2.0 3.0
-						ult excavating		Sure-870		5.0
-				BOH 5.5	Notes: No ground	water observed	d while exca	wating		-5.5
-										
-										
-										
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A USCS LOG OF TEST HOLE 59119DADOT.GPJ 2006DATATEMPLATE.GDT

	TION & PUT	Cent		- ALASK nion Materia		&PF	PROJECT	DF TEST T NUMBER: T: Haines Hig		TEST PIT #	# 151
Offse	et: 110	cation: 1223 0L 205.0 feet	3+50				Hole Type		chi Z-Axis 135 Backhoe Imer	Total Depth: 11.5 feet Date: 4/20/2006 - 4/20/2006 Geologist: <i>Keri A. Nutter</i>	
		Sample Da	ata			Gr	roundwater D		Weather: Partly Cloudy		
(i)	/be	ber		ne n	ic	Depth in (ft.)			Forest Surface		
Depth (Feet)	Sample Type	Field Number	e	USCS Classification Frozen Zone	Soil Graphic	Time Date					
epth	amp	ield I	Sample	SCS lassi roze	oil G	Symbol			-		
$\begin{bmatrix} \square \\ 0 \end{bmatrix}$	S	Щ	S		S .				SUBSURFACE MATERIA	L	0.0
-				PT		Peat (PT)	brown, moist				0.0
1 -						ORGANI	C mat (roots))			-1.0
-					000	UNGAIN)			ŀ
2 3 4 5 6	GRAB	1		GM		obser	vation indicat	Sand (GM) tes p200=20	coarse gravel, nonplastic, n %, Sa=25%, Gr=55%, trace	o dry strength, gray, moist, field of ORGANICS (roots), boulders	2.0
7 - - 8 - - 9 -						2" ORGA	NIC mat				-7.5
0 -	GRAB	2		SM		SILTY SA COA p200=16%	ND with Gr L, cobbles to , Sa=43%, G	avel (SM) co 6" (~15%) r=41%, Mo	oarse gravel, nonplastic, no isture=11%	dry strength, gray, moist, trace of	10.0
-					BOH 11.5	Notes:					-11.5
-							water observe				-
				ı		L				Sheet N	

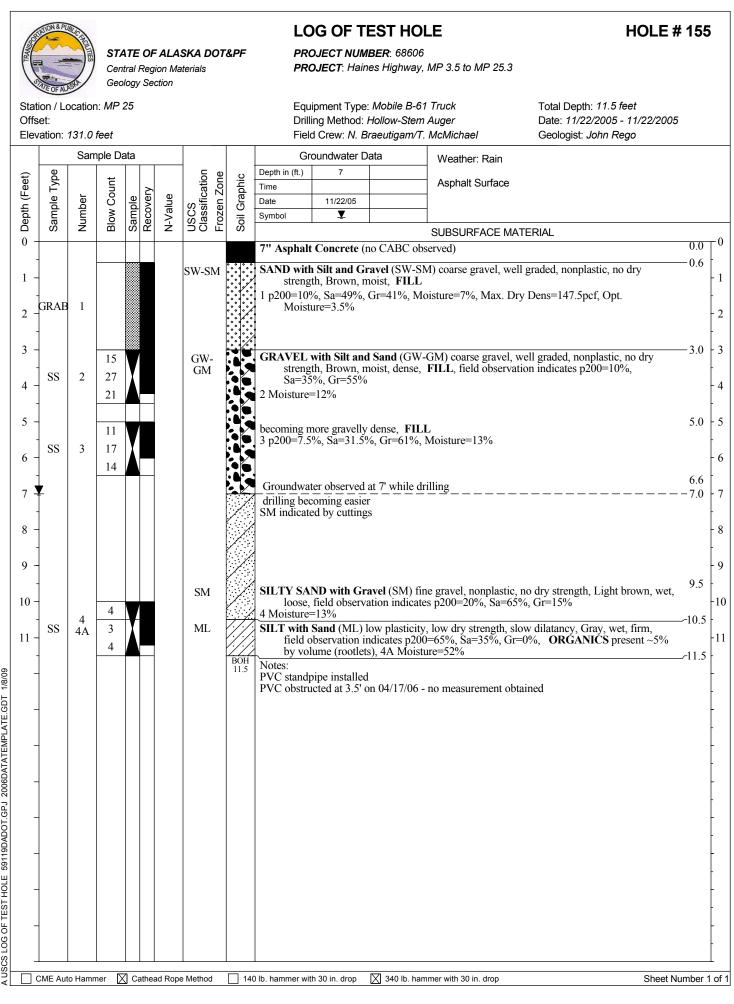
B USCS LOG OF TEST PIT 59119DADOT.GPJ 2006DATATEMPLATE.GDT 1/8/09

		Cent		F ALASK/ gion Materia		&PF	PROJECT	DF TEST		TEST PIT :	# 152	2
Offs	et: 520	cation: 1228 0L 175.0 feet	3+00				Hole Type		hi Z-Axis 135 Backhoe mer	Total Depth: <i>12.0 feet</i> Date: <i>4/20/2006 - 4/20/2006</i> Geologist: <i>Keri A. Nutter</i>		
		Sample Da	ata			Gr	roundwater D		Weather: Partly Cloudy			
et)	Type			u u	<u>.</u>	Depth in (ft.)						
Depth (Feet)	le Ty	Field Number	<u>e</u>	USCS Classification Frozen Zone	Graphic	Time Date			Forest Surface			
epth	Sample ⁻	eld h	Sample	SCS lassi ozei	Soil G	Symbol			_			
	ũ	Ш	Ű						SUBSURFACE MATERI	AL		-0
-				PT		Peat (PT)	brown, FRO	ZEN Ice as	Vx		0.0 - 0.5	-
1 -												- 1
-						q						-
2 -				GM		SILTY GR indica	RAVEL with ates p200=15	Sand (GM) %, Sa=35%,	coarse gravel, nonplastic, Gr=50%, cobbles to 8" (~	gray, moist, field observation 15%), boulders to 24" (~10%)	2.0	- 2 - 3
4 -												- 4
-					•00 •00							
5 -						2" ORGA	NIC mat (bra	anches and r	oots)		<u> </u>	- 5
6 -				-							6.0	- 6
-	GRAB	1		SP-SM		cobble	es to 8" (~5%	5)		aded, no dry strength, gray, moist,	0.0	
7 -						p200=9%,	Sa=54%, Gr=	=37%, Mois	ture=7%			- 7
-												-
8 -												- 8
9 -						2" ORGA	NIC mat (bra	anches and r	oots)		<u> </u>	- 9
10 -											10.0	10
-				GM		SILTY GF	RAVEL with ates p200=159	Sand (GM) %. Sa=40%.	coarse gravel, nonplastic, gr=45%, cobbles to 10" (gray, moist, field observation ~10%), boulders to 14" (~2%)	10.0	- 10
11 -						•						-11
-												-
12 -					BOH	Notes:					-12.0	-12
					12	No ground	water observe	ed while exca	avating			-
-												
_												-
												-
-												
												-
-												F
												f
-												
-												
-												
										Sheet N	Number 1	1 of 1

B USCS LOG OF TEST PIT 59119DADOT.GPJ 2006DATATEMPLATE.GDT 1/8/09

A DECEMBER OF	ATE OF ALM)) Cen		F ALASK gion Mater ection		&PF	PROJECT	DF TEST T NUMBER: (T: Haines Hig		TEST PIT	# 153	5
Offs	et: 800	cation: 123. L 50.0 feet	2+00				Hole Type		hi Z-Axis 135 Backhoe ner	Total Depth: <i>13.0 feet</i> Date: <i>4/20/2006 - 4/20/2006</i> Geologist: <i>Keri A. Nutter</i>		
		Sample D	ata			Gr	oundwater D	ata	Weather: Partly Cloudy			
Depth (Feet)	Sample Type	Field Number	Sample	USCS Classification Frozen Zone	il Graphic	Depth in (ft.) Time Date Symbol			Forest Surface			
ב 0 –	ŝ	Ë	Š	20 5	Soil		•	-	SUBSURFACE MATERIA			
,				PT		Peat (PT) l diame		ZEN Ice as V	Vx (~20% ice by volume), t	pranches and roots to 4" in	0.0	
	GRAB	1		ML		p200=	=55%, Sa=35 ne (roots)	ne gravel, non 5%, Gr=10%,	plastic, low dry strength, gr FROZEN Ice as Nb, OR(ay, field classification indicates GANICS present to ~15% by	— 1.0	-
_						2" ORGA	NIC mat (ro	ots)			-4.0	-
-							the mat (10	0.3)				ļ
				GM		SILTY GR indica	AVEL with tes p200=15	Sand (GM) %, Sa=40%,	coarse gravel, nonplastic, gr Gr=45%, boulders to 24" (~	ray, moist, field observation ~5%)	5.0	
-												
-						1" ORGA	NIC mat (ro	ots)				
-											8.0	
-	GRAB	2		SM		SILTY SA p200=17%	ND with Gr , , Sa=77%, G	avel (SM) co r=6%, Moist	arse gravel, nonplastic, no c ure=10%	lry strength, dark gray, moist	0.0	-
-												
' -												ľ
-								-4-)				,
-					205		NIC mat (ro	ots)				
2 -	GRAB	3		GM		SILTY GR observ Moisture=9	vation indicat	Sand (GM) tes p200=159	coarse gravel, nonplastic, no %, Sa=30%, Gr=55%, cobb	o dry strength, gray, moist, field les to 6" (~10%)	12.0	
3 -				3	BOH 13	Notes:					-13.0	'
_						No ground	water observe	ed while exca	vating			
1												
-												
-												

(S)		(FE									EST HOI	LE	HOLE # 1	54
		and a second		tral F	Regi	on Ma	SKA DOT aterials	&PF			IBER : 68606 nes Highway,	MP 3.5 to MP 25.3		
Offse	on / Lo et: ation: 1		n: <i>125</i> :						Dril	ling Method:	: Mobile B-61 Hollow-Stem Braeutigam/T.	Auger	Total Depth: 6.5 feet Date: 11/22/2005 - 11/22/2005 Geologist: John Rego	
		Sam	ple Da	ata					G	roundwater D	ata	Weather: Rain		
a İ	be						– L – E – E	U	Depth in (ft.)					
Leptn (reet)	Sample Type	<u>ر</u>	Blow Count		Ž	a)	USCS Classification Frozen Zone	Soil Graphic	Time			Asphalt Surface		
	nple	Number	U ≷	Sample	Recovery	N-Value	CS ssifi zen	ŭ	Date Symbol					
	Sar	Nur	B	Sar	Rec	^-Z	USCS Classification Frozen Zone	Soi	Symbol			SUBSURFACE MA	TERIAI	
) +									4" Asphal	t Concrete (no CABC obs		0).0).3
	SRAB SS SS	1 2 3 3 A	13 24 18 5 7 8				GP-GM ML SM		1 p200=89 GRAVEL streng Sa=4: 2 Moisture SILT with obser (rootl 3 Moisture SILTY SA moist 3A Moistu Notes: No ground PVC stand	with Silt and gth, Brown, r 5%, Gr=45% =4% Sand (ML) vation indica ets) =42% ND (SM) me , medium der re=19% water observe pipe installed	Gr=45%, Moi I Sand (GP-C noist, dense, low plasticity tes p200=75% edium grained nse, Field obs ed while drilli	GM) coarse gravel, po FILL, Field observat , low dry strength, Gr %, Sa=25%, Gr=0%, d sand, nonplastic, no ervation indicates p2	orly graded, nonplastic, no dry tion indicates p200=10%, ary Brown, moist, stiff, Field Organics present ~5% by volume	3.0 1.5 5.8 5.5
-														



A USCS LOG OF TEST HOLE 59119DADOT.GPJ 2006DATATEMPLATE.GDT

	ATION & PUBL	CTE I					LOG C	OF TEST	PIT	TEST PIT	# 156
S III)) Cer		F ALASK gion Materi		&PF		T NUMBER : T: Haines Hig	68606 µhway, MP 3.5 to MP 25.3		
Offs	et: 440L	ation: 124					Hole Type		hi Z-Axis 135 Backhoe mer	Total Depth: 10.5 feet Date: 4/19/2006 - 4/19/2006 Geologist: Keri A. Nutter	
		Sample D	ata			Gi	roundwater D	ata	Weather: Partly Cloudy		
Depth (Feet)	Sample Type	Field Number	0	USCS Classification Frozen Zone	Soil Graphic	Depth in (ft.) Time	9		Grass Surface		
spth	ample	eld N	Sample	SCS assif ozen	ii G	Date Symbol	4/19/06		-		
≝ 0 -	Š	ій.	S	SO F	М			•	SUBSURFACE MATERIA		
-				SM		SILTY SA	ND (SM) me ates p200=20	edium graine %, Sa=80%,	d sand, nonplastic, light bro Gr=0%, trace of ORGANI	wn, moist, field observation CS (roots)	0.0 0.5
1 -											
2 -	GRAB	1		SP		SAND with p200=1%,	h Gravel (SP Sa=65%, Gr=) coarse grav =34%, Moist	rel, poorly graded, no dry str ure=4%	rength, gray, moist	2.0
3 -						r					
4 -											
5 -											
6 -											
-						•					
7 -					•	becoming r	nore gravelly	, field observ	vation indicates p200=5%, S	a=50%, Gr=45%, cobbles to 6"	7.0
8 -						(~10%	/0)				
-											
9 4	<u>,</u>					Groundwa	ter encounter	ed at 9' while	e excavating		9.0
10 -											
-					BOH	Notos					
-					BOH 10.5	Notes:					
-											
_											
-											
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-											
_											
-											

	ATION & PUB	A THE					OF TEST		TEST PIT :	# 157
LEAN L)) Cei	ATE OF ntral Reg ology Se	ion Mate	KA DO erials		TNUMBER : 6 T: Haines Higl	8606 way, MP 3.5 to MP 25.3		
Offse	et: 2801	cation: 124				Equipmen Hole Type Field Crew		ner	Total Depth: 9.0 feet Date: 4/19/2006 - 4/19/2006 Geologist: Keri A. Nutter	
		Sample D	Data			Groundwater D	ata	Weather: Partly Cloudy		
Depth (Feet)	Type	Field Number		USCS Classification	Frozen Zone Soil Graphic	Depth in (ft.) 8 Time		Forest Surface		
pth (Sample ⁻	N N P	Sample	CS ssifi	I Gra	Date 4/19/06 Symbol ¥				
	Sar	Fie	Sar	LSU Cla	Soi Fro			SUBSURFACE MATERIAL		
0 +				PT		Peat (PT) brown, FRO	ZEN Ice as V	x (~5% ice by volume)		0.0
†	GRAB	1		ML		SILT with Sand (ML) to observation indicativolume (roots)	fine grained sates p200=75%	and, nonplastic, low dry stre b, Sa=25%, Gr=0%, ORGA	ngth, brown, moist, field NICS present to ~15% by	
2 -						Moisture=41%				
3 -										-3.0
										5.0
4 -				SP		SAND with Gravel (SP p200=5%, Sa=40%) coarse grave 6, Gr=55%, co	el, poorly graded, gray, mois obbles to 5" (~5%)	t, field observation indicates	4.0
6 -										
-										
7 -										
-	,					Groundwater encounter	ed at 8' while	excavating		7.5
8 -	GRAB	2				becoming more gravelly (~2%) Moisture=6%	, field observa	tion indicates p200=5%, Sa	=30%, Gr=65%, cobbles to 6"	8.0
9 +					BOH 9	Notes:				9.0
					9					
-										
_										
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-										
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1										
		-								

S		and and and and and and and and and and					LUG	OF TEST	PII	TEST PIT	7 150
TRANK)) Ce		= ALASI nion Mate		T&PF		T NUMBER : (T : Haines Hig	68606 hway, MP 3.5 to MP 25.3		
Offse	et: 150L	ation: 125					Hole Type		hi Z-Axis 135 Backhoe mer	Total Depth: 8.5 feet Date: 4/19/2006 - 4/19/2006 Geologist: Keri A. Nutter	
		Sample D	Data			G	roundwater D	Data	Weather: Partly Cloudy	v	
Depth (Feet)	Type	Field Number		USCS Classification	Frozen zone Soil Graphic	Depth in (ft.) Time	6		Forest Surface		
pth	Sample ⁻	N ble	Sample	SCS assif	ozen il Gr	Date Symbol	4/19/06				
≝ 0 -	Sa	Fie	Sa	55.	E S				SUBSURFACE MATERIA		
				ML	. <u> </u> . . .	SILT with p200	Sand (ML) ====================================	fine grained s 0%, Gr=0%, I	and, nonplastic, brown gra FROZEN Ice as Vx (~30%	ay, field observation indicates 6 ice by volume)	0.0
1 -	GRAB	1		GP		cobb	les to 4" (~10	%)		v strength, brown gray, moist,	—1.0
2 +						p200=3%,	Sa=39%, Gr	=58%, Moist	ure=6%		
3 -					00	e					
-											
4 -											
5 -											
-						Ground	tor anonet-	rad at 61	avaquating		5.5
6 4	<u> </u>						ater encounter more gravelly		e excavating bservation indicates p200=	5%, Sa=30%, Gr=65%	6.0
	GRAB	2				Moisture=	6%	,,	I I I I I I I I I I I I I I I I I I I		
7								~			—7.5
8 -	GRAB	3		ML		SILT with indic Moisture=	ates p200=75	fine grained s %, Sa=25%,	Gr=0%, ORGANICS pres	rength, gray, wet, field observation sent to 25% by volume (rootlets)	
					BOH 8.5	Notes:	3270				8.5
-											
-											
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_											
-											
				1		1					

COLINION & PUBLIC					LOG C	OF TEST	PIT	TEST PIT	# 159
))) Central	E OF ALAS Region Mate		"&PF		TNUMBER : T: Haines Hig	68606 hway, MP 3.5 to MP 25.3		
Station / Loca Offset: 560L Elevation: 12	ation: 1242+0				Hole Type		hi Z-Axis 135 Backhoe mer	Total Depth: 10.5 feet Date: 4/19/2006 - 4/19/2006 Geologist: Keri A. Nutter	
	Sample Data			Gr	oundwater D	ata	Weather: Partly Cloudy		
Depth (Feet) Sample Type	Field Number	Sample USCS Classification	Frozen Zone Soil Graphic	Depth in (ft.) Time Date	10 4/19/06		Grass Surface		
	Fiel	US(US(Cla;	Soil	Symbol	<u> </u>		SUBSURFACE MATERIAL	-	
0		PT		Peat (PT) b					0.0
1 - GRAB 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 -	1	GP		becoming n	5%		avel, poorly graded, no dry s , Sa=35%, Gr=60%, cobbles ration indicates p200=5%, Sa		7.0
				Groundwat Notes:	ter encounter	ed at 10' whi	le excavating		10.0

APPENDIX C

Laboratory Test Results

DIST. ASTM D422 W.O. D59119D Lab No. 2006-684 Received: 6/1/06 Reported: 6/12/06 size PASSING SPECIFICATION 11
W.O. D59119D Lab No. 2006-684 Received: 6/1/06 Reported: 6/12/06 size PASSING SPECIFICATION 31"
Lab No. 2006-684 Received: 6/1/06 Reported: 6/12/06 size passing specification 13"
Received: 6/1/06 Reported: 6/12/06 size Passing Specification #3.in.Not Included in Test = -3%
Reported: 6/12/06 size Passing specification #3.in.Not.Included in Test = -3%
SIZE PASSING SPECIFICATION #3 in Not Included in Test = - 36
+3 In Not Included in Test = .≫. 1."
2"
1 1/2"
:1"
3/4" 100%
3/8" 99%
No. 4 96%
toniwestrageneration
No 10 02%
No. 20 81%
No. 40 71%
No. 50 No. 60 48%
No. 100 24%
No. 200 15%
Foull Wt. of Fine Fraction = 305.6g
2" 11" 3/4" 1/2" 3/8" 3/8" 3/8" 3/8" 3/8" 3/8" 1/2" No. 40 No. 40 No. 20 No. 20

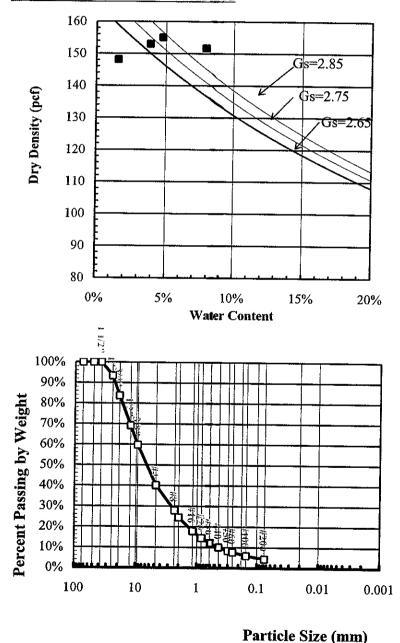


Client: ADOT&PF Southeast Region Project: Haines Highway Location: Test Boring 15

Sample 1

Depth 0.5'-3'

Engineering Classification: Well Graded GRAVEL with Sand, GW Frost Classification: Not Measured



Lab No. 2005-2940 Received: 12/2/05 Reported: 12/19/05

W.O. D59119D

MODIFIED PROCTOR

AASHTO T-180 B

Uncorrected Maximum Density: 155.1 pcf Optimum Water Content: 4.8 %

Corrected Density: 156.5 pcf Corrected Optimum: 4 %

Moist Preparation Mechanical Compaction

SIZE	PASSING	SPECIFICATION
	ided in Test = ~0%	
3"		
2"		
1 1/2"	100%	
1"	93%	
3/4"	84%	
1/2"	69%	
3/8"	60%	
No. 4	40%	
Total Wt. ÷16)65g	
No. 8	28%	
No. 10		
No. 16	18%	
No. 20	15%	
No. 30	12%	
No. 40	10%	
No. 50	8%	
No. 60	8%	
No. 80		
No.100	6%	
No.200	4.4%	
Total Wt. of Fit	e Fraction = 566.2	g
0.02 mm		

David L Andersen

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	Client: ADOT&PF Southeast Region	PARDICIDE-SIZE
	ighway	DIST. ASTM D422
Location: Test Boring 18		W.O. D59119D
Sample 1		Lab No. 2006-686
Depth 0.1' - 3'		Received: 6/1/06
Engineering Classification: Well Graded GRAVEL with Silt and Sand, GW-GM	d, GW-GM	Reported: 6/12/06
Frost Classification: Not Measured		SIZE PASSING SPECIFICATION
1 [/2" 2"		3"
		2" 100%
90%		"2"
1/7		
80%		3/4" 91%
		1/2" 78%
20%		3/8" 69%
		No. 4 48%
		Total Wt = 29371g
20%		No. 8
isse		No. 10 33%
30%		No. 20 23%
20%		No. 40 17%
		No. 50
		No. 80
0%		No. 100 11%
100 10 10 0.1	0.01 0.001	No. 200 8.3%
© Alaska Testlab, 1999	Particle Size (mm)	Total Wt of this Fracklon = 353g
David L. Andersen, P.E., Technical Advisor		

Client: ADOT&PF Southeast Region Proiect: Haines Highway	M.O	Lab No. 2005-2941	Received: 12/2/05	Silt and Sand. GP-GM Reported: 12/19/05	SIZE PASSING SPECIFICATION H3 In Not Included In Test = -%	311	2"	1 1/2"		3/8" 65%	No. 4 46%	Total Wt. = 2636g	No. 8 32%			No. 40			0.1 0.01 0.001 <u>No. 200 8.1%</u>	Particle Size (mm) 0.02 mm
A DIVISION OF DOWL LLC Project:	19	Sample 1	Depth 0.3'-1'	Engineering Classification: Poorly Graded GRAVEL with Silt and Sand, GP-GM	Frost Classification: Not Measured	3		%06	80%	eig			50% F	40%	juə juə			0% tauted at at at the set of a	100 10 1	© Alasƙa Testlab, 1999

PARTICLE-SIZE DIST ASTW D422 W.O. D59119D	Lab No. 2006-687 Received: 6/1/06 Reported: 6/12/06 SIZE PASSING SPECIFICATION 13 in Not Included in Test = %	7 2 1 1/2 3/4" 96% 3/4" 96% 3/4" 96% 3/8" 74% No. 4 No. 4 No. 10 42% No. 10 42% No. 26% No. 26% No. 32% No. 30 No. 40 26% No. 32% No. 50 No. 50 No. 60 21% No. 100 13% No. 100 No. 100 No. 50 No. 100 No. 50 No. 100 No. 100 No. 100 No. 100 No. 50 No. 100 No. 50 No. 500 No.	Detail Write mine F
A DIVISION OF BOIND 20 Client: ADOT&PF Southeast Region A DIVISION OF DOWLALE Project: Haines Highway Location: Test Boring 20 Samula 7	Depth 3' - 4.5' Depth 3' - 4.5' Engineering Classification: Silty SAND with Gravel, SM Frost Classification: Not Measured	riges V verses frasser	Partic

PARTICLE-SIZE	W.O. D59119D	Lab No. 2005-2942 Received: 12/2/05	Reported: 12/19/05	SIZE PASSING SPECIFICATION #3 in Not Included in Test = >%	2" 100%	'2"	1" 85% 3/4" 78%		3/8" 52% No. 4 36%	t; ⇔ 4931g	No. 8 26% No. 10 24%		No. 20 18% No. 30 1602		No. 60 12% No. 80	1 No. 200 Total WL of Fine Fraction = 5 10 60	0.02 mm	
ALASKA Client: ADOT&PF Southeast Region A DIVISION OF DOWLLLE Project: Haines Highway		Depth 0'-1'	<u>Engineering Classification: Poorly Graded GRAVEL with Silt and Sand, GP-GM</u> Frost Classification: Not Measured				80%	70%	90%			14 P.	30%	P20%		1.0	David L. Andersen. P.E., Technical Advisor	

-

PARFICLE-SIZE DIST. ASTM D422 W.O. D50119D	Lab No. 2005-2944 Received: 12/2/05	Reported: 12/20/05	SIZE PASSING SPECIFICATION 13 in Not Included in Test 4 2% 3"	2" 11/2" 1000/		3/4" 95% 1/2" 85%		No. 4 55% Total Wit = 189095	No. 8 39%	No. 10 36% No. 16 28%		No. 30 21% No. 40 18%	No. 60 14% No. 80	No. 100	01 No. 200 8.4% Pout Wr. of Fine Fraction = 566 66	0.02 mm	
Client: ADOT&PF Southeast Region		ed SAND with Silt and Gravel, SW-SM													1 0.01 0.01 0.001	Particle Size (mm)	
ALASK TESTL A DIVISION OF DOWL Location: Test Boring 29	Sample 1 Depth 0.3' - 2.5'	Engineering Classification: Well Graded SAND with Silt and Gravel, SW-SM	Frost Classification: Not Measured		20%	80%	20%	60%			:ent		10%	0% Бава 4 4 4 4 1 10 300		© Alaska Testlab, 1999 David L Andersen	David L. Andersen, P.E., Technical Advisor

ALASKA Client: ADOT	Client: ADOT&PF Southeast Region		PARHICLE-SIZE
A DIVISION OF DOWL LLC Project: Haines Highway	s Highway		DIST. ASTM D422
Location: Test Boring 30			W.O. D59119D
Sample 1			Lab No. 2005-2945
Depth 0.3'-1'			Received: 12/2/05
Engineering Classification: Well Graded GRAVEL with Silt and	Silt and Sand, GW-GM		Reported: 12/19/06
Frost Classification: Not Measured			SIZE PASSING SPECIFICATION
1 1/			+3 in Not included in Test = - %
			3"
			/2"]
80%			
eige			3/8" 64%
			No. 4 44%
		1	Total Wt. = 4063g
5 0%			No. 8 32%
issi			No. 10 30%
P ^a 40%		- 1	No. 16 24%
			No. 20 20%
30%			No. 30 17%
P.			
#in			
			No. 60 11%
<u>}</u>			No. 80
0% Eselse è s' e l'alles e a l'à l'àsles à l'à l'àsle			No. 100 8%
100 10 10 1 0.1	0.01 0	0.001	No. 200 5.7%
😋 Alaska Testlab, 1999	Particle Size (mm)		Total Wit of Tine Fraction = 547.1g
David L Andersen			
David L. Andersen, P.E., Technical Advisor			



Client: ADOT&PF Southeast Region Project: Haines Highway

Location: Test Boring 31

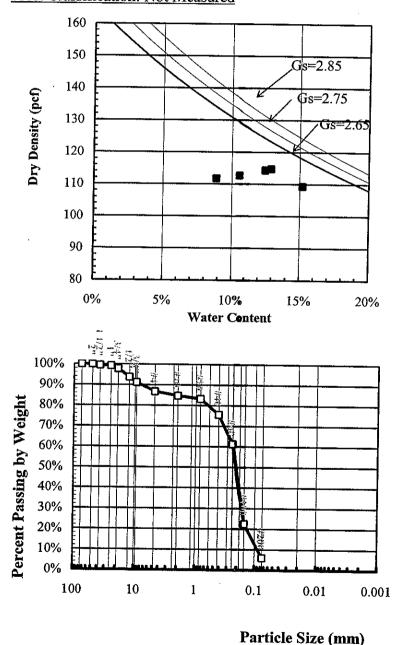
Sample 1

Depth 0' - 3'

MODIFIED PROCTOR ASTM D 1557 B

W.O. D59119D Lab No. 2006-688 Received: 6/1/06 Reported: 6/8/06

Engineering Classification: Poorly Graded SAND with Silt, SP-SM Frost Classification: Not Measured



Uncorrected Maximum Density: 115 pcf Optimum Water Content: 13 %

Moist Preparation Mechanical Compaction

SIZE	PASSING	SPECIFICATION
+3 in Not Inch	ided in Test = -0%	
3"		<u> </u>
2"	100%	
1 1/2"	100%	
1"	99%	
3/4"	98%	
1/2"	94%	
3/8"	91%	
No. 4	87%	
Total Wt. ⇒32	015g	
No. 8		
No. 10	85%	
No. 16		
No. 20	83%	
No. 30		
No. 40	76%	
No. 50		
No. 60	61%	
No. 80		
No.100	22%	
No.200	6%	
Total Wt. of Fin	e Fraction = 401.4	
0.02 mm		

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Client: ADOT&PF Southeast Region	Highway DIST: ASTM D422	W.O. D59119D	Lab No. 2005-2946	Received: 12/2/05	Reported: 12/19/05	SIZE PASSING SPECIFICATION 14344 Morthelinded Screener 202	3"	2"	/2" 1	3/4" 92% 1/2" 75%		No. 4 40%	Total Wt = 23976g	No. 8 27%	No. 10 24%			No. 40 9%		••••••••••••••••••••••••••••••••••••••	0.01 0.001 No. 200 4.8%	Particle Size (mm)
ALASKA Client: ADOT&I	A DIVISION OF DOWL LLC Project: Haines Highway	Location: Test Boring 32	Sample 1	Depth 0.3'-2.5'	Engineering Classification: Well Graded GRAVEL with Sand, GW	Frost Classification: Not Measured	[" [/2" [(; ;				70%					30%	•••••	20%			100 · 10 1 0.1	© Alaska Testlab. 1999

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Image: Signation of Down LLE Project: Haines Highway Image: Signation of Signat	 F Jow L L B Project: Haines Highway W.O. W.O. W.O. W.O. W.O. W.O. W.O. W.O.	ALASKA Client: ADOT&PF Southeast Region	PARTICLE-SIZE
oring 33 e1 0.5 - 3 siferation: Well Graded GRAYEL with Silt and Sand, GW-GM on: Not Measured on: Not Measured	virg 33 e1 0.5 - 3 sifeation: Well Graded GRAVEL with Silt and Sand, GW-GM affication: Well Graded GRAVEL with Silt and Sand, GW-GM on: Not Measured and Model GRAVEL with Silt and Sand, GW-GM on: Not Measured and CW-GM and CW-	TESTLAB vision of DOWLLLC	DIST. ASTM D422
e1 0.5 - 3' Sifeation: Well Graded GRAVEL with Silt and Sand, GW-GM m: Not Measured m: Not Measured 1.12" Receive Reporte Reporte 1.12" 1.1	e1 0.5 - 3 Siferation: Well Graded GRAVEL with Silt and Sand, GW-GM on: Not Measured on: Not Measu	Location: Test Boring 33	W.O. D59119D
0.5 - 3' Receive sifeation: Well Graded GRAVEL with Silt and Sand, GW-GM on: Not Measured	0.5 · 3' Sification: Well Graded GRAVEL with Silt and Sand, GW-GM on: Not Measured on: Not Measured Not Me	Sample 1	Lab No. 2006-689
sification: Well Graded GRAVEL with Silt and Sand, GW-GM on: Not Measured	sification: Well Graded GRAVEL with Silt and Sand, GW-GM on: Not Measured	Depth 0.5' - 3'	Received: 6/1/06
00: Not Measured 11/2"	00: Not Measured 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1	raded GRAVEL with	Reported: 6/12/06
112 ² 2 ¹	Particle Size (mm)	Frost Classification: Not Measured	SIZE PASSING SPECIFICATION
	10 1 0.1 0.1 0.0 10 1 0.1 0.1 0.0 0.0	f 1/2 2'	H3 Jnt Not Included In Test 年 2%
	lersen	ቲ	
	lersen		
	10 1 0.1 0.01 Particle Size (nm)		
	lersen		
	In the second se		
	10 1 0.1 0.01 0.00		
	10 1 0.1 0.01 Particle Size (mm)		
	line 1 0.1 0.01 0.001 0.		Total Wt = 22683g
	In the second se		
	In the second se		
	In 10 1 0.01 0.001 (0.01 0.001 (0.01 0.001 (0.01 0.001 (0.001 (0.01 0.001 (0.00		
	10 1 0.01 0.001 0.		
	IO 1 0.01 0.001 0.		
	10 1 0.01 0.001 Particle Size (mm)	20%	
	10 1 0.1 0.01 0.001 Particle Size (mm)		
	10 1 0.1 0.01 0.001 Particle Size (mm)		
10 1 0.1 0.01 0.001 Doutiele Size America	10 1 0.1 0.01 0.001 Particle Size (mm)		
Douticle Circ (man)	Particle Size (mm)	10 1 0.1 0.01	No. 200 6.9%
			Total Wt. of Fine Fraction = 575g
	David L Andersen		0.02 mm

ITESTLAB Vision of DOWLLLC Project: Haines Highway	DIST: ASTM: D422
Location: Test Boring 34	W.O. D59119D
Sample 1	Lab No. 2005-2947
Depth 0.5'-1.5'	Received: 12/2/05
Engineering Classification: Poorly Graded GRAVEL with Silt and Sand, GP-GM	Reported: 12/19/06
Frost Classification: Not Measured	SIZE PASSING SPECIFICATION
[" [/2"	145 Jp. Not Included in Test #296 accession of the pro-
	2"
90%	1 1/2" 100%
	1" 99%
	3/4" 90%
	1/2" 71%
	3/8" 61%
	No. 4 42%
	t. = 5135g
50%	No. 8 30%
	No. 10 28%
40%	No. 16 22%
300	
	No. 30 16%
	No. 40 14%
-#16 #50 #6	No. 50 12%
	No. 60 11%
	No. 80
	No. 100 9%
100 10 1 0.1 0.01 0.001	No. 200 7.2%
	Total Wt. of Fine Fraction = 606.8g
✓ Auaska i csuao, 1999	0.02 mm

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ALASKA Client: ADOT&PF Southeast Region	utheast Region	PARHCLE-SIZE
	ay	DIST. ASTM D422
Location: Test Boring 35		W.O. D59119D
Sample 1		Lab No. 2005-2948
Depth 0'-2.5'		Received: 12/2/05
Engineering Classification: Well Graded GRAVEL with Silt and Sand, GW-GM	<u>W-GM</u>	Reported: 12/19/05
Frost Classification: Not Measured		SIZE PASSING SPECIFICATION
1 1 1/2" 2"		#3 in Not Included in Test # 2% (
		2" 100%
%06		2" 1
80%		
2i9)		
		ŀ
		r:+27599
300/		
20%		
#200		
		No. 80
	• • •	No. 100 12%
100 10 1 0.1	0.01 0.001	0,
		Total Wt. of Fine Fraction = 527 8g
© Alaska Testlab, 1999 Part	Particle Size (mm)	0.02 mm
David L. Andersen David L. Andersen. P.E Technical Advisor		

a dan an area

an of DOWLLLE Project: Haines Highway initio 33 5-6.2 5-7.2 5	Haines Highway Haines Highway W.O. D591191 Lab No. 2005- Received: 12/1 Received: 12/1 Reported: 12/1 Particle Size (mm) Particle Size (mm) 0.0 mo. 10 mo.	LASK	PARHCLE-SIZE
wig 35 w.O. D591191 e2 affection: Silty GRAVEL with Sand, GM s:fection: Silty GRAVEL with Sand, GM Reported: 12/1 on: Not Measured affection: Silty GRAVEL with Sand, GM on: Not Measured affection: Silty GRAVEL with Sand, GM on: Not Measured affection: Silty GRAVEL with Sand, GM on: Not Measured affection: Silty GRAVEL with Sand, GM on: Not Measured affection: Silty GRAVEL with Sand, GM on: Not Measured affection: Silty GRAVEL with Sand, GM on: Not Measured affection: Silty GRAVEL with Sand, GM on: Not Measured affection: Silty GRAVEL with Sand, GM on: Not Measured affection: Silty GRAVEL with Sand, GM on: Not Measured affection: Silty GRAVEL with Sand, GM on: Not Measured affection: Silty GRAVEL with Sand, GM on: Not Measured affection: Silty GRAVEL with Sand, GM affection: Silty GRAVEL with Sand, GM affection: Silty GRAVEL with Sand, GM affection: Silty GRAVEL with Sand, GM affection: Silty GRAVEL with Sand, GM affection: Silty GRAVEL with Sand, GM affection: Silty GRAVEL with Sand, GM affection: Silty GRAVEL with Sand, GM affection: Silty GRAVEL with Sand, GM affect	virus 35 w.O. D.59119] e2 5-6.2' 5-6.2' Received: 12/2 sife ention: Silty GRAVEL with Sand. GM Reported: 12/1 on: Not Measured State in the sand. GM on: Not Measured State	Division of DOWL LLC	DIST: ASTM D422
e 2 5-6.2' sifeation: Silty GRAVEL with Sand GM on: Not Messured m: Not Messured M: Not Mitter M: Mitter M: Not Mitter M: Mitter	e ² 5-6.2' sifeation: Sity GRAVEL with Sand.GM on: Not Measured on: Not Measured Not	Location: Test Boring 35	W.O. D59119D
5-6.2' Received: 12/2 siferation: Silty GRAVEL with Sand, GM In Not Measured m. Not Measured In Not Measured m. In Not Measured In Not Measured m. In Not Measured In Not Measured m. In Not Measured In Not Measured m. In Not Measured In Not Measured m. In Not Measured In Not Measured m. In Not Measured In Not Measured m. In Not Measured In Not Measured m. In Not Measured In Not Measured m. In Not Measured In Not Measured m. In Not Measured In Not Measured m. In Not Measured In Not Measured m. In Not Measured In Not Measured m. In Not Measured In Not Measured m. In Not Measured<	<i>S</i> -6.2' Efficient Silty ORAVEL with Sand. GN siferation: Silty ORAVEL with Sand. GN on: Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : Not Measured <i>m</i> : <i>m</i> : Not Measured <i>m</i> : <i>m</i> : <i>m</i> : <i>m</i> : Not Measured <i>m</i> : <i>m</i> :	Sample 2	Lab No. 2005-2949
siferation: Silty GRAVEL with Sand, GM on: Not Measured are resentations are resen	sifeation: Sity GRAYEL with Sand. GN on: Not Measured on: Not Measured Not M	Depth 5'-6.2'	Received: 12/2/05
01: Not Measured 21: 1.45800 1: 1.12 21: 1.12 1: 1.12 21: 1.12 1: 1.12 11: 1.12 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1	001: Not Measured 11. 11. 11. 11. 11. 11. 11. 11. 11. 11.	Engineering Classification: Silty GRAVEL with Sand, GM	Reported: 12/19/05
¹ 1 1 1 1 1 1 1 1 1 1 1 1 1	¹ 1 1 1 1 1 1 1 1 1 1 1 1 1	Frost Classification: Not Measured	SIZE PASSING SPECIFICATION
10 1 0.01 0.01	10 1 0.01 0.01	Ι.,	±3 th. Not Included in Test = ->9. 3"
10 1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1	10 1 0.01 0.01 0.01		2*
10 1 0.1 0.1 0.01 0.001	10 1 0.1 0.0 1 0.01 0.00		1 1/2"
10 1 0.1 0.01 0.001	10 1 0.01 0.01 0.01		
10 1 0.1 0.01 0.001	10 1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1		
10 1 0.1 0.1 0.01 0.001	10 1 0.1 0.01 0.001		
10 1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1	10 1 0.1 0.01 0.001	10% M	
10 1 0.01 0.01 0.01 Particle Size (nm)	10 1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1	60%	
10 1 0.1 0.01 10 0.1 0.01 0.01	10 1 0.01 0.01		t ÷ 245g
10 1 0.01 0.001	10 1 0.1 0.01 0.001		
10 1 0.01 0.001	10 1 0.1 0.01 0.001	40%	
10 1 0.01 0.001	10 1 0.01 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001		
10 1 0.01 0.001	10 1 0.01 0.001 0.001 0.001 0.001		
10 1 0.01 0.001	10 1 0.01 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001		
10 1 0.01 0.001 0.001 Particle Size (mm)	10 1 0.1 0.01 0.001		
10 1 0.1 0.01 0.001 Particle Size (mm)	10 1 0.1 0.01 0.001 Particle Size (mm)	10%	
10 1 0.1 0.01 0.001 Particle Size (mm)	10 1 0.1 0.01 0.001 Particle Size (mm)		
10 1 0.1 0.01 0.001 Particle Size (mm)	10 1 0.1 0.01 0.001 Particle Size (mm)		
Particle Size (mm)	Particle Size (mm)	10 1 0.1 0.01	No. 200 35%
	David I Andersen		1001 mm
David L. Andersen, P.E., Technical Advisor			

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PARTICLE-SIZE DIST. ASTM:D422 W.O. D59119D	Lab No. 2005-2950 Received: 12/2/05 Reported: 12/19/05 size passing specification 13.in Not Included in Test = -%	No. 200 6.9% Total WL of Fine Fraction = 5107g 0.02 mm
A DIVISION OF DOWLALE Project: Haines Highway Location: Test Boring 37	Sample 1 Depth 0.5'-1.5' <u>Engineering Classification: Well Graded GRAVEL with Silt and Sand, GW-GM</u> <u>Frost Classification: Not Measured</u>	© Alaska Testlab, 1999 © Alaska Testlab, 1999 David L. Andersen, P.E., Technical Advisor

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east Region	DIST. ASTM D422	W.O. D59119D	Lab No. 2005-2951	Received: 12/2/05	Reported: 12/19/05	SIZE PASSING SPECIFICATION	3"	2"	1 1/2"	7000 y	3/8" 95%	No. 4 93%	À: =:378:1g			No. 30 86%		No. 60 82%	No. 100	0.01 0.001 No. 200 65%	Particle Size (mm) 0.02 mm	
Client: ADOT&PF Southeast Region	LC Project: Haines Highway				Ţ					-100 9 9		D							 •	1 0.1 0.	Particle	
ALASK	A Division of DOWL L	Location: Test Boring 37	Sample 3	Depth 5'-6.5'	Engineering Classification: Sandy SILT, ML	rrost Classification: r4	3/ 1/2 3/4" 		2006 2006	80%	20%			50% F	2258°	30%	Pe	 10%		100 10	© Alaska Testlab, 1999	David L Andersen

PARTICLE-SIZE DIST. ASTM D422 W.O. D59119D	Lab No. 2006-690 Received: 6/1/06 Reported: 6/12/06	SIZE PASSING SPECIFICATION #3.in.Not.Included in Test = 3% 2" 2"	1" 3/4" 1/2" 3/8" 100% No. 4 97%	Totai Wu = 359.58 No. 8 No. 10 87% No. 16 No. 20 65% No. 30	No. 40 33% No. 50 No. 60 15% No. 80 No. 100 6%	No. 200 3.1% Total Wr. of Fine Fraction = 350.1g 0.02 mm
T E S T L LABKA Client: ADOT&PF Southeast Region A DIVISION OF DOWL LLC Project: Haines Highway Location: Test Boring 38	Sample 2A Depth 6' - 7' <u>Engineering Classification: Poorly Graded SAND, SP</u> Frost Classification: Not Measured	3/8"		ercent Passing l		9 dersen E., Technical A

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kegion PARHICLE-SIZE	DIST. ASTM D422	W.O. D59119D	Lab No. 2006-691	Received: 6/1/06	Reported: 6/12/06	size Passing specification #3 in Not Included in Test = %	3"	2"	1 1/2" 1 m	3/4" 100%	3/8" 84%	No. 4 66%	Total Wr. = 270.9g	No. 8	No. 10 50%		No. 20 34%	No. 30	No. 50	No. 60 11%	No. 100 5%	0.001 No. 200 3.1%	Total Wr. at this Fraction = 178.78	
ASKA Client: ADOT&PF Southeast Region	T L A B DOWLLLC Project: Haines Highway				<u>Enset Classification: Poorly Graded SAND with Gravel, SP</u>		/2"									5		#***	#6			10 1 0.1 0.01	Particle Size (mm)	
ALA		LOCATION: LEST BOTING 41	Sample 2	Depth 5' - 7'	Engineering Classification: Frost Classification: Not Mr.		- 14		%06	80%	gi9	60%		ing 50%		P P P P P P P P P P	30%	Per	20%	10%		100	© Alaska Testlab, 1999	

and I are

Location: Test Boring 44 Sample 1 Bepth 0.5-1.5' Ensinearing Classification: Well Graded GRAVEL with Sand. GW From Classification: Not Measured 100% 0.00% 0.00% 0.00% 0.00 100% 0.00% 0.00% 0.00 100% 0.00% 0.00% 0.00 100% 0.00%	DIST. ASTM D422	W.O. D59119D	Lab No. 2005-2952	Received: 12/2/05	Reported: 12/19/05	SIZE PASSING SPECIFICATION 43 in Not included in Test =	3"	2"	1 1/2" 100%	1" 98%	3/4" 89%	1/2" 69%	3/8" 60%	No. 4 43%	/t = 7353g	No. 8 32%	No. 16 22%	No. 30 17%	No. 50 10%	No. 60 8%	No. 80	• • • • No. 100 6%	0.001 No. 200 4.6%	Total Wr. of Fine Fraction # 5417g
	0 0				with													#2	ń	163	Ţ Ţ			Particle Size (mm

and allowed

÷

ring 44 e 3 5'-6.5' 5'-6.5' sification: Silty SAND *## *# *# *# *# **	TLG Project: Haines Highway W.O. D. Lab No. AND. S.M. W.O. D. Lab No. AND. S.M. W.O. D. Lab No. Receive Reporte Receive Reporte Receive Reporte Reporte State Record State Record State Record No. 10 No. 10 No. 10 No. 20 No. 20	V N V	PARHICLE-SIZE
ring 44 e3 5-6.5' 5-6.5' 5-6.5' 5-6.5' <u>5-6.5'</u> <u>5-6.5'</u> <u>5-6.5'</u> <u>5-6.5'</u> <u>1-10' <u>1-10'</u> <u>1-10' <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10'</u> <u>1-10</u></u></u>	AD. S. D. Lab No. D. L	f DOWL LLC	DIST. ASTM D422
e3 5-6.5' Sr.6.5' Sr.6.5' Sr.6.5' In Not Measured In Not Measu	ADD.SM ADD.SM Lab No. Receive Reporte Repor	cation: Test Boring 44	W.O. D59119D
5-6.5 sifeation: Siltv SAND. SM on: Not Measured no: Not Measured no: Not Measured no: Not Measured no: Not Measured no: Not Measured no: Not Measured no: Not Measured no: Not Measured no: Not Measured no: Not Measured no: Not Measured no: Not Measured no: Not Measured no: Not Measured no: Not Measured no: No: No: No: No: No: No: No: No: No: N	AND.SM AND.SM Receive Reporte Repor	Sample 3	Lab No. 2005-2953
sification: Silv SAND. SM on: Not Measured	AND. SM AND. SM Provide the second	Depth 5'-6.5'	Received: 12/2/05
001. Not Measured 112 112 112 112 112 112 112 112 112 112	Image: second	AND	Reported: 12/19/05
^{1/1} ^{1/1}	Principal de la construction de	ost Classification: Not Measured	SIZE PASSING SPECIFICATION
10 1 0.1 0.1 Particle Size (nm)	Image: state stat	#1 #1 # 3/8 1/2 3/4"	#3 the Not the index to Test # 2%
10 1 0.1 0.01 0.001	I 0.1 0.01 0.01 I 0.1 0.01 0.00		2"
10 1 0.1 0.01 0.001	I 0.1 0.01 0.01 I 0.1 0.01 0.01		1 1/2"
10 1 0.1 0.01 0.001 Period Per	I 0.0 0.0 0.0 Particle Size (mm) 0.0 0.0 0.0		1 ¹¹
10 1 0.01 0.001	1 0.0 0.0 0.0 Particle Size (mm) 0.0 0.0 0.0	80%	
10 1 0.1 0.01 0.001	I 0.1 0.01 0.01 Particle Size (mm)		
10 1 0.1 0.01 0.01 10 0.1 0.01 0.01 0.01	1 0.1 0.01 0.01 Particle Size (mm) 0.01 0.01 0.01		
10 1 0.1 0.01 0.01 Particle Size (mm)	1 0.1 0.01 0.01 Particle Size (mm) 0.01 0.01 0.01	60%	
10 1 0.01 0.01 0.001 Particle Size (mm) 0.01 0.01 0.001	I 0.1 0.01 0.001 Particle Size (mm) 0.01 0.001		ît∵≑:424.1g
10 1 0.1 0.01 0.001 Particle Size (mn)	I 0.01 0.01 Particle Size (mm)	20%	
10 1 0.01 0.01 0.001 Particle Size (mm)	I 0.01 0.001 Particle Size (mm) 0.001	40%	
10 1 0.01 0.001 0.001	1 0.01 0.001		
10 1 0.01 0.001 0.001 Particle Size (mm)	1 0.1 0.01 0.001		
10 1 0.01 0.001 0.001 Particle Size (mm)	a 0.01 0.001 0.001 0.001 0.001		
10 1 0.01 0.001 0.001 Particle Size (mm)	1 0.1 0.01 0.001 Particle Size (mm)		
10 1 0.1 0.01 0.001 Particle Size (mm)	1 0.1 0.01 0.001 Particle Size (mm) 0.001 0.001		
. 10 1 0.1 0.01 0.001 Particle Size (mm)	1 0.1 0.01 0.001 Particle Size (mm)		
Particle Size (mm)	Particle Size (mm)		
Particle Size (mm)	Particle Size (mm)		INO. 200 38% Trial Wr at this Baselini = 414 86
	avid L Andersen		0.02 mm
David L. Andersen, P.E., Technical Advisor			

a harden

gion	DIST. ASTM D422	W.O. D59119D I ab No. 2006-603	Received: 6/1/06	Reported: 6/12/06	SIZE PASSING SPECIFICATION	3"	2"	1"	3/4" 17.0"	3/8"	No. 4 100%	Total Wr. = 333.6g	No. 10 100%		No. 20 100% No. 30	No. 40 98%	No. 50		83%	0.001 No. 200 54%	Total WC of Fine Fraction = 333.5g
Client: ADOT&PF Southeast Region	LLC Project: Haines Highway			WL		; #40 #20 #10													<u>kanakakatan kanakana ang kanakanan kanakanan kanakanan kanakanan kanakana</u>	1 0.1 0.01	Particle Size (mm)
ALASK	A Division of DOWL	Location: Test Boring 47 Samule 2	Depth 4' - 6'	Engineering Classification: Sandy SILT, ML	Frost Classification: F4	#4 		20%0	80%		€00%	8 pÀ	mise. %	Rq 1 40%	30%	Per Per		10%	0% to the second se	100 10	© Alaska Testlab, 1999

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A Division of DOWL LLC Project: Haines Highway Location: Test Boring 52 Sample 1A Depth 1' - 2' Engineering Classification: SILT with Sand, ML Frost Classification: F4	DIST. ASTM D422
ocation: Test Boring 52 Sample 1A Depth 1'- 2' <u>ngineering Classification: SILT with Sand, ML</u> rost Classification: F4	
Sample 1A Depth 1' - 2' <u>ngineering Classification: SILT with Sand, ML</u> rost Classification: F4	W.U. D911950
Depth 1' - 2' ngineering Classification: SILT with Sand, ML rost Classification: F4	Lab No. 2006-696
ngineering Classification: SILT with Sand, ML rost Classification: F4	Received: 6/1/06
rost Classification: F4	Reported: 6/8/06
	SIZE PASSING SPECIFICATION
#100 #40 #20 #10 #4	3 ⁿ
	2"
	1 1/2"
	11
	3/4"
	1/2"
70% eige	3/8"
	No. 4 100%
	Total WE + 301 3g (CONTRACTOR CONTRACTOR)
2228°C	No. 10 100%
	No 20 100%
30%	
Pe	No. 40 100%
	No. 50
10%	No. 60 100%
	No. 80
0% Falsakala la la turses a ta talakala k at talaka a talaka a t	No. 100 99%
100 10 1 0.1 0.01 0.001	No. 200 84%
© Alaska Testlab, 1999	Lotal Wtr of Fine Fraction = 112.5g 0.02 mm



Client: ADOT&PF Southeast Region Project: Haines Highway Location: Test Boring 55

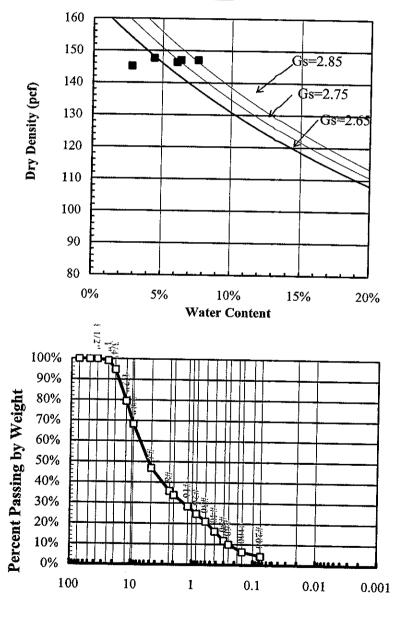
Sample 1

Depth 0.3'-2.5'

MODIFIED PROCTOR AASHTO T-180 B

W.O. D59119D Lab No. 2005-2954 Received: 12/2/05 Reported: 12/20/05

Engineering Classification: Well Graded GRAVEL with Sand, GW Frost Classification: Not Measured



Uncorrected Maximum Density: 147.7 pcf Optimum Water Content: 4.4 %

Corrected Density: 148.5 pcf Corrected Optimum: 4 %

Moist Preparation Mechanical Compaction

SIZE	PASSING	SPECIFICATION
	ided in Test = ~0%	
3"		· · · · · · · · · · · · · · · · · · ·
2"		
1 1/2"	100%	
1"	99%	
3/4"	95%	
1/2"	79%	
3/8"	68%	
<u>No. 4</u>	47%	
Total Wt: ⇒ 13	665g	
No. 8	36%	
No. 10		
No. 16	28%	
No. 20	25%	
No. 30	21%	
No. 40	16%	
No. 50	12%	
No. 60	10%	
No. 80		
No.100	6%	
No.200	4.3%	
lotal Wt. of Fin	e Fraction = 556.2	2
0.02 mm		

Particle Size (mm)

David L Andersen

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4040 B Street Anchorage Alaska 99503 • 907/562-2000 • 907/563-3953

10 1 0.0 0.01
1 0.1 0.01 0.001 0.001 0.001
<u></u>

I D D D D D D D D D D D D D D D D D D D	LASK	PARHCLE-SIZE
oring 60 e1 0.3-1' stification: Well Graded GRAVEL with Silt and Sand. GW-CM on: Not Measured on: Not Measur	f Dowi Lic	DIST. ASTM D422
e ¹ 0.3-1 ⁻ Sification: Well Graded GRAVEL with Silt and Sand. GW-GM on: Not Measured On: Not Measured District for the state of	Location: Test Boring 60	W.O. D59119D
0.3-1 ⁻ sification: Well Graded GRAVEL with Silt and Sand. GW-GM on: Not Measured 0.1 Not Measured	Sample 1	Lab No. 2005-2956
Selfcation: Well Graded GRAVEL with Silt and Sand, GW-GM on: Not Measured On: Not Measured	Depth 0.3'-1'	Received: 12/2/05
Particle Size (mm)	raded GRAVEL with	Reported: 12/20/05
¹⁰ ¹⁰ ¹⁰ ¹⁰ ¹⁰ ¹⁰ ¹⁰ ¹⁰	riosi Classification: Not Measured	SIZE PASSING SPECIFICATION #5 in Not included in Test + ->>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
10 1 0.01 Particle Size (mm)	ŀ	3"
10 1 0.1 0.1 0.01 0.000 0.001		
10 1 0.01 0.001		
10 1 0.01 0.001 0.		
10 1 0.01 0.001		
10 1 0.1 0.01 0.001		
10 1 0.0 0.01 0.00 1 0.		
10 1 0.01 0.001 1.001 0.001		$t_{1} = 4727g_{1}$
10 1 0.01 0.001		
10 1 0.01 0.01 10 0.1 0.01 0.01		
10 1 0.0 0.001 0.0		
10 1 0.01 0.001 0.	30%	
10 1 0.01 0.001		
10 1 0.01 0.001 Particle Size (mm)		
10 1 0.1 0.01 0.001 0.001 Particle Size (mm)		
10 1 0.1 0.01 0.001 Particle Size (mm)		
10 1 0.1 0.01 0.001 0.001 Particle Size (mm)	Leis Leis le seles	
Particle Size (mm)	10 1 0.1 0.01	
		Total WC of Fine Fraction = 564.1g

and they

A Division of DOWL LLC Project: Haines Highway Location: Test Boring 61 Sample 1 Depth 0.3'-3' Engineering Classification: Well Graded GRAVEL with Silt and Sand, GW-GM Frost Classification: Not Measured	DIST. ASTM D422 W.O. D59119D
m: Well Graded GRAVEL with Silt and Sand, GW-GM Measured	V.O. D59119D
	Lab No. 2005-2957
	Received: 12/2/05
	Reported: 12/19/05
	SIZE PASSING SPECIFICATION +3 in Not Included in Test +->%
	-
	" 100%
90%	1 1/2" 100%
	96%
80%	4" 90%
	'2" 75% ·
3/8	8" 65%
	No. 4 46%
	Total Wt. = 32873 <u>8</u>
	No. 8 36%
	No. 10 34%
	No. 16 28%
300%	
	No. 30 22%
20%	No. 40 18%
	No. 50 15%
	No. 60 14%
	No. 80
	No. 100 10%
100 10 1 0.1 0.01 0.001 No.	No. 200 7.4%
© Alaska Testlab, 1999	Total Wir of Fine Fraction = 500.8g
_	11111 7A

ion PARHCEE-SIZE	DIST. ASTM D422	W.O. D59119D I ab No. 2005-2058	Received: 12/2/05	Reported: 12/20/05	SIZE PASSING SPECIFICATION H3 in Not Included in Test = -36	3*	2"	1 1/2"			3/8" 99%	No. 4 99%	Total Wt:= 245.1g	No. 8 98%	No. 10 97%	No. 16 96%	No. 20 95%	No. 30 94%		No. 60 92%		No. 100 89%	0.001 No. 200 67%	<u>*</u>	
SKA Client: ADOT&PF Southeast Region	T L A B DOWLLLC Project: Haines Highway			andy SILT, ML		#1 #1() #8 #4				#20													10 1 0.1 0.01	Particle Size (mm)	
4	A DIVISION OF I I. A DIVISION OF I	Sample 2	Depth 3'-4.5'	Engineering Classification: Sandy SILT, ML Frost Classification: Ed	3/4				80%	6. Ju.,		× ×		50% F		4 J 3	30%		20%		0%	00	100	© Alaska Testlab, 1999	

PARHICLE-SIZE	W.O. D50110D	Lab No. 2006-697	Received: 6/1/06	Reported: 6/12/06	SIZE PASSING SPECIFICATION #3 in Not included in Test = ->%	3"	2"	1 1/2"	1" 3//"	#/C	3/8"	No. 4 100%	Total WV: = 131.5g	No. 8	No. 10 99%		No. 20 97%	No. 30 No. 40 95%	No. 60 91%	No. 100 82%	<u>No. 200 67%</u>	Total Wt. of the Fraction = $131.3g$ 0.02 mm	
	LLLC Project: Haines Highway			T. ML		# #2(#10			102 102	#20											I 0.1 0.01 0.001	Particle Size (mm)	
	A DIVISION OF DOWL Location: Test Boring 63	Sample 1	Depth 0' - 2'	Engineering Classification: Sandy SILT, ML	rtost Classification: r4	100%		90%	80%		3i 9/	60%		5 0%		40%	30%	Per	10%		100 10	© Alaska Testlab, 1999	David L Andersen

and the second

PARITCLE-SIZE DIST.ASTWD422 W.O. D59119D Lab No. 2006-698 Received: 6/1/06	Keported: 6/12/06 size Passing specification #3 in Not Included in Test + 2%	1 1/2" 1 1/2" 3/4" 1/2" 3/8" 1/2" 3/8" No. 4 100% No. 8 No. 10 No. 10 No. 10 No. 20 No. 20 No. 20 No. 20 No. 40 No. 20 No. 20 No. 40 No. 50 No. 60 99% No. 100 93% No. 100 93% No. 100 93%	0.02 mm
Region		0.00	ze (mm)
Client: ADOT&PF Southeast Region Project: Haines Highway	ж ж	0.1	Particle Size (mm)
	#60 #40 C #20 C #10 C		
A DIVISION OF DOWL Location: Test Boring 67 Sample 2 Depth 5' - 7' Hadineering Classification: Sandy, SULT	cation: F4		© Alaska Testlab, 1999 David L Andersen David L Andersen DE Technical Advisor
A DIVISION O Location: Test Boring 67 Sample 2 Depth 5' - 7'	Frost Classification: F4	Percent Passing by Weight	© Alaska Testlab, 1999 David L Andersen David L Andersen P F Technics

Location: Test Boring 68 Sample 1 Depth 0'-1' Engineering Classification: Well Graded GRAVEL with Silt and Sand, GW-GM	
	W.O. D59119D
	Lab No. 2005-2959
	Received: 12/2/05
	Reported: 12/20/05
Frost Classification: Not Measured	SIZE PASSING SPECIFICATION #3.1h Not Included in Test #-2%
2""	3"
	2"
00% ···································	1 1/2" 100%
80%	
	No. 4 51%
	No. 8 41%
	0
	No. 16 33%
	No. 20 30%
	No. 30 27%
20%	
	No. 60 20%
	No. 100 16%
100 10 1 0.1 0.01 0.001	No. 200 12%
© Alaska Testlab. 1999	Total WE of Fine Praction = 549 1g
	0.02 mm

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ALASKA Client: ADOT&PF Southeast Region	PARHICLE-SIZE
	DIST. ASTM D422
Location: Test Boring 71	W.O. D59119D
Sample 1	Lab No. 2005-2960
Depth 0.3'-3'	Received: 12/2/05
Engineering Classification: Well Graded GRAVEL with Silt and Sand, GW-GM	Reported: 12/19/05
Frost Classification: Not Measured	SIZE PASSING SPECIFICATION
1 1/.	in Not Incl
3/4 I" 2"	3"
	2" 1
	1/2" 84%
20%	3/8" 75%
	No. 4 54%
	Total Wr. = 23764g
50% F	No. 8 41%
	No. 10 37%
	No. 20 26%
30%	
20% E	
	No. 60 15%
	No. 80
0% Талатын кылатын кылатын кылатын кылатын калатын ка	No. 100 12%
100 10 1 0.1 0.01 0.001	
	Total Wt. of Fine Fraction = 619.1 g
© Alaska I estlad, 1999	0.02 mm
David L Andersen	
David L. Andersen, P.E., Technical Advisor	

Image: Section of Definition	ion: Test Boing 76 Sample 3 Depth 75 - 9.5' Sample 3 Depth 75 - 9.5' Test Boing 76 Sample 3 Depth 75 - 9.5' Test Boing 76 Sample 3 Depth 75 - 9.5' Test Boing 76 Sample 3 Depth 75 - 9.5' Test Boing 76 Depth 75 - 9.5' Test Boing 76 Depth 75 - 9.5' Test Boing 76 Depth 75 - 9.5' Receive Reporte Reporte Sample 3 Depth 75 - 9.5' Receive Reporte Sample 3 Depth 75 - 9.5' Receive Receive Reporte Sample 3 Depth 75 - 9.5' Receive	LASK	PARTICLE-SIZE
oring 76 e3 7.5 - 9.5' Bification: Poorly Graded SAND with Silt and Gravel. SP.SM e3 fication: Poorly Graded SAND with Silt and Gravel. SP.SM on: Not Measured	Graded SAND with Silt and Gravel. SP-SM Graded SAND with Silt and Gravel. SP-SM Receive Reporter Repor	f DOWL LLC	DIST. ASTM D422
e3 7.5 - 9.5' sifeation: Poorly Graded SAND with Silt and Gravel. SP-SM on: Not Measured on: Not Measured in Secret Secret SP-SM on: Not Measured in Secret Secret SP-SM Secret Secret Spect Secret Spect Secret Spect Secret Spect Secret Spect Secret Spect Secret Spect S	Craded SAND with Sit and Gravel, SP-SM Craded SAND with Sit and Gravel, SP-SM I Receive Reporte R	Location: Test Boring 76	W.O. D59119D
7.5 - 9.5' sification: Poorly Craded SAND with Silt and Gravel. SP-SM on: Not Measured	Craded SAND with Silt and Cravel. SP-SM Craded SAND with Silt and Cravel. SP-SM Reporte Re	Sample 3	Lab No. 2006-699
sification: Poorly Graded SAND with Silt and Gravel. SP-SM on: Not Measured	Graded SAND with Silt and Gravel. SP-SM	Depth 7.5' - 9.5'	Received: 6/1/06
01. Not Measured 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	37 37 38 38 39 39 39 39 39 30 39 30 39 36 39 36 39 36 39 36 39 36 39 36 39 36 30 36	Engineering Classification: Poorly Graded SAND with Silt and Gravel, SP-SM	Reported: 6/12/06
^{1/1}	1 0.1 0.01 0.01 1 0.1 0.01 0.001	rost Classification: Not Measured	SIZE PASSING SPECIFICATION
10 1 0.01 0.01 10 0.1 0.01 0.01	I 0.01 0.01 0.01 I 0.01 0.01 0.01	3/4"	3"
10 1 0.01 0.01 0.01 0.00 0.00 0.00 0.00	1 0.1 0.01 0.01 1 0.1 0.01 0.01		2"
10 1 0.1 0.01 0.001	1 0.1 0.0 0.0 1 0.1 0.0 0.0	90%	1 1/2"
10 1 0.1 0.01 0.001	1 0.1 0.0 0.00		1"
10 1 0.1 0.01 0.001	I 0.0 0.0		
10 1 0.0 1 0.01 0.001	1 0.0 0.001		
10 1 0.0 1 0	1 0.0 0.01 0.001		
10 1 0.0 1 0.0 1 0.00 Particle Size (mm)	1 0.0 0.001	60%	
10 1 0.1 0.1 0.01 0.001	1 0.1 0.01 0.001		۰. ب
10 1 0.0 1 0.01 0.001	1 0.1 0.01 0.001 Particle Size (mm) 0.01 0.001	20%	
10 1 0.1 0.01 0.001	1 0.1 0.01 0.001 Particle Size (mm) 0.01 0.001	40%	
10 1 0.01 0.001	1 0.0 0.001 0.001		
10 1 0.0 0.01 0.001 Particle Size (mm)	1 0.1 0.01 0.001	30%	
10 1 0.01 0.001	1 0.1 0.01 0.001	20%	
10 1 0.01 0.001 0.001	1 0.1 0.01 0.001 Particle Size (mm)		No. 50
10 1 0.01 0.001 0.001 0.001	1 0.1 0.01 0.001 Particle Size (mm)		
10 1 0.1 0.01 0.001 Particle Size (mm)	1 0.1 0.01 0.001 Particle Size (mm)		
10 1 0.01 0.001 0.001	1 0.1 0.1 0.01 0.001 Particle Size (mm)		
Particle Size (mm)	Particle Size (mm)	10 1 0.1 0.01	No. 200 6.7%
	-		Total Wt. of Phile Fraction = 329.9g
	JAVIU L AIIUCISEII id I Andereen DE Tenhuisel Adrisee		

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PARTICLE-SIZE DIST. ASTIM D422 W.O. D59119D W.O. D59119D Lab No. 2006-700 Received: 6/1/06 Reported: 6/1/06 Size PASSING SPECIFICATION 5: inNot included in Test = -26 3" 2" 11/2" 11/2" 3/4" 1/2" 3/4" 1/2" 3/4"	4 Wr = 34728 20 50 50 00 00 00 00 00 00 00 00 00 00 00
Client: ADOT&PF Southeast Region L C Project: Haines Highway I Gravel, SM	0.1 0.01 0.001
ALASI ion: Test Boring 77 Sample 4 Depth 10' - 12' Classification: Silty SAND with Classification: Not Measured	Percent Passing by We by We by We by We by We by Bow by Bow by Bow by Bow by Bow by Bow by Bow by Bow by Bow by Bow by We be by Bow by Bow by Bow by Bow by Breach Picer Passing by We by Bow by Breach Picer Passing by We by Bow by Breach Picer Passing by We by Bow by Breach Picer Passing by We be by Breach Picer Passing by We by Breach Picer Passing by We be by Breach Picer Pi

east Region PARTICLE-SIZE DIST. ASTM D422 W.O. D59119D Lab No. 2005-2961 Received: 12/2/05 Reported: 12/20/05	SIZE PASSING SPECIFICATION 15 100% 11/2 98% 11/2 98% 11/2 98% 11/2 98% 11/2 98% 11/2 67% 3/4 77% 3/4 77% 1/2 62% No. 4 49% No. 4 49% No. 10 35% No. 10 35% No. 10 35% No. 10 29% No. 10 35% No. 10 29% No. 10 29% No. 10 5% No. 40 15% No. 60 10% No. 80 No. 100	of Fine Fra
Client: ADOT&PF Southeast Region TESTLADOVC POWLLLE Project: Haines Highway Location: Test Boring 79 Sample 1 Depth 0.5'-1.5' Engineering Classification: Poorly Graded GRAVEL with Sand, GP	train of the set of t	100 10 10 10 0.1 0. © Alaska Testlab, 1999 Particle

Contain Test Boing 80: Significant of Down Lot Borner Highway Lotation: Test Borner 80: Sample 1 Lotation: Test Borner 80: Sample 1 Sample 1 Depth 12: Depth 12: Entertine Flagsway	ALASKA Client: ADOT&PF Southeast Region	Southeast Region	PARTICLE-SIZE
Dring 80 e1 1 - 2 if ab No. Lub No.	Division of DOWL LLC	ghway	DIST. ASTM D422
e1 1-2' sifeation: Poorly Gravel SAND with Gravel SP on: Not Measured on: Not Measured	Location: Test Boring 80		W.O. D59119D
1'-2' Receive sifeation: Poorly Gradel SAND with Gravel.SP on: Not Measured	Sample 1		Lab No. 2006-701
sification: Poorty Graded SAND with Gravel. SP on: Not Measured	Depth 1' - 2'		Received: 6/1/06
001. Not Measured 21 21 21 21 21 22 23 24 24 26 24 26 26 26 26 26 26 26 26 26 26	Graded SAND with 6		Reported: 6/12/06
1 21 1 1 21 1	Frost Classification: Not Measured		SIZE PASSING SPECIFICATION
Particle Size (nun)			13 in Not included in Test + 2%
10 1 0.01 0.001	3" (*4
10 1 0.01 0.001 Particle Size (nun)			
10 1 0.01 Particle Size (mm)			
10 1 0.0 1 0.01 Particle Size (mm)	1/2		
10 1 0.1 0.01 0.001 Particle Size (mn)			
10 1 0.1 0.01 0.001			
10 1 0.01 0.01 0.01 1.01 1.01 1.01 1.01			
10 1 0.01 0.01 Particle Size (mn)			
10 1 0.01 0.001			Total Wi + 28912g
10 1 0.01 0.01 0.001			No. 8
10 1 0.01 0.01 0.001			
10 1 0.01 0.001			No. 16
10 1 0.01 0.01 0.001			
10 1 0.01 0.001	30%		No. 30
10 1 0.01 0.001 0.001 Particle Size (mm)			
10 1 0.01 0.001			No. 50
10 1 0.01 0.001 0.001 Particle Size (mm)			
10 1 0.1 0.01 0.001 0.001 10 10 10 10 10 10 10 10 10 10 10 10			No. 80
10 1 0.1 0.01 0.001 Particle Size (mm)	0% Texterial at a fair three a fair to be a fair a f		
Particle Size (mm)	10 1		
Particle Size (mm)			Total Wt of the Fraction = 426g
		Particle Size (mm)	0.02 mm

and a local second

Client: ADOT&PF Southeast Region	Project: Haines Highway D422	W.O. D59119D	Lab No. 2005-2962	Received: 12/2/05	with Silt and Sand, GW-GM Reported: 12/19/05	SIZE PASSING SPECIFICATION H3 in Not Included in Test = -%	3"	2"	'2" 1	1" 97% 2.4" 0.10°	112" 77%		No. 4 47%	I 0141, WL = 262878	No. 8 35%	No. 10 33%	No. 16 27%		No. 40	No. 50 14%	. No. 100 9%	9		rarucle Size (mm)
LASK	A Division of DOWL LLC	Location: Test Boring 81	Sample 1	Depth 0.3'-3'	Engineering Classification: Well Graded GRAVEL with	Frost Classification: Not Measured	100% -0 -0 -1		60%	80%		ei2			50% [20%	10%	0%	100 10 1	© Alacka Teerlah 1000	C CARACTER & COLOROS, T.V.V.

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PARTICLE-SIZE	DIST. ASTW D422 W.O. D59119D	Lab No. 2006-702	Received: 6/1/06	Reported: 6/8/06	SIZE PASSING SPECIFICATION =3 in Not Included in Test = -%	3"		2" 1	1" 88% 3/4" 88%			No. 4 66%		No 10 48%		No. 20 33%		No. 50 22%	No. 60 15%		No. 100 11% No. 200 8.1%	Thine I	0.02 mm
c							Γ						-			<u>.</u>					0.001		D)
Client: ADOT&PF Southeast Region	hway			W-SM																	0.01		rarucie size (mm)
ant: ADUI & PF	Project: Haines Highway			Engineering Classification: Well Graded SAND with Silt and Gravel, SW-SM														+16	206	P	0.1	F	7 4
	U L L			d SAND with S												200	#40						
			51	ion: Well Grade	t Measured		-3/2		۶. ۲												10		
	lvlslon n: Test Boring	Sample 2	Depth 5' - 6.5'	ring Classificati	Frost Classification: Not Measured	/2" (1 %06	\$0%		70%	۷% ۲		20%	40%		30%	20%	10%		100	atlah 1000	Sudu, 1999
	A D I Location			Enginee	Frost CI					рţ	[gi9	M	g by	nis	2as	1u9	919 ⁰	I				@ Alacka Teatlab 1000	o riasha I c

David L. Andersen, P.E., Technical Advisor

broisect: Hailes Hi #40 #40 #40 #40 #40 #40 #40 #40		#3 in Not included in Test # 2% 3" 2" 1 1 3/4" 1/2" 3/8" 1/2"	No. 4 100% Total Wt = 108.2g No. 8 No. 10 100% No. 10 100% No. 16 No. 20 99% No. 30 No. 30	No. 40 99% No. 50 98% No. 60 98% No. 80 94% 0.01 0.001 66%	Doutiolo Siro (man)
A Division of Doright Location: Test Boring 85 Sample 1 Depth 0.3' - 2' Encineering Classification: Sandy S Frost Classification: Sandy S 90% 90% 90% 90% 90% 90% 90% 90% 90% 90%	f D D V L V	# 100 #60 #40 #20 #10 #4			Par

115 al 11

A Division of DOWL LLC Project: Haines Highway	
option: Tort Doring Of	DIST. ASTM D422
	W.O. D59119D
Sample 1A	Lab No. 2006-705
Depth 0.5' - 2'	Received: 6/1/06
Engineering Classification: Sandy SILT, ML	Reported: 6/8/06
FTOST Classification: F4	SIZE PASSING SPECIFICATION
#40 #20 #10 #4 3/8"	#4 III. we included in test # 2% concerning on a
	2"
	1 1/2"
	1"
	3/4"
	1/2"
	3/8" 100%
	No. 4 100%
8 p.	Total WU = 261.7%
	No. 10 99%
	No. 20 99%
	No. 40 98%
	No. 50 07%
	No. 100 89%
100 10 1 0.1 0.01 0.001	No. 200 64%
© Alaska Testlab, 1999	Total Wt. of Fine Fraction = 118.1g

	lient: ADOT&F	Client: ADOT&PF Southeast Region		PARTI	PARTICLE-SIZE
A Division of DOWL LLC Pr	Project: Haines Highway	lighway		DIST.	DIST. ASTM D422
Location: Test Boring 88				W.O. D59119D	19D
Sample 1				Lab No. 2005-2963)5-2963
Depth 0.3'-1'				Received: 12/2/05	2/2/05
Engineering Classification: Well Graded GRAVEL with	rith Silt and Sand, GW-GM	d, GW-GM		Reported: 12/20/05	2/20/05
Frost Classification: Not Measured				SIZE PASSI	PASSING SPECIFICATION
I 1/2"				#3 in Not included in Test = -% 3"	i Test = -%
			r	2"	
				1 1/2" 10	100%
				1" 9	95%
80%				3/4" 8	89%
					74%
eige				3/8" 6	63%
				No. 4 4	46%
			1	Total Wt = 3929g	
50% 50%				No. 8 3	36%
				No. 10 3.	35%
40%					30%
					27%
30%					24%
20%					20%
·····	+100				16%
10%	1			No. 60 1:	15%
]			No. 80	
0% Errise à si si si dans a la sella dans da la				No. 100 1	11%
100 10 1	0.1	0.01 0	0.001	No. 200 8.4	8.4%
© Alaska Testiab. 1999		Particle Size (mm)		Total Wit. of Fine Energon # 529.38	etion # 529.3g
				0.02	
David L Andersen					
David L. Andersen, P.E., Technical Advisor					

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Client: ADOT&PF Southeast Region Project: Haines Highway

Location: Test Boring 90

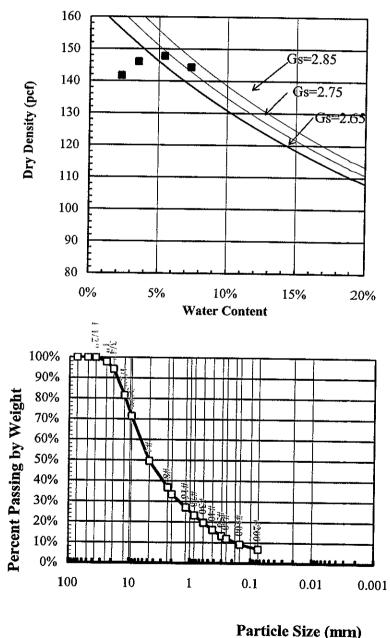
Sample 1

Depth 0.3'-3'

MODIFIED PROCTOR AASHTO T-180 B

W.O. D59119D Lab No. 2005-2964 Received: 12/2/05 Reported: 12/19/05

Engineering Classification: Well Graded GRAVEL with Silt and Sand, GW-GM Frost Classification: Not Measured



Uncorrected Maximum Density: 147.8 pcf Optimum Water Content: 5.4 %

Corrected Density: 148.5 pcf Corrected Optimum: 5 %

Moist Preparation Mechanical Compaction

SIZE	PASSING	SPECIFICATION
+3 in Not Incl	ided in Test = ~0%	
3"		· · · · · · · · · · · · · · · · · · ·
2"		
1 1/2"	100%	
1"	98%	
3/4"	94%	
1/2"	81%	
3/8"	71%	
<u>No.</u> 4	50%	
Total Wt: ⇒24	979g	
No. 8	37%	
No. 10		
No. 16	27%	
No. 20	23%	
No. 30	20%	
No. 40	16%	
No. 50	13%	
No. 60	12%	
No. 80		
No.100	9%	
No.200	6.8%	
Fotal Wt. of Fir	e Fraction = 530.2	g
0.02 mm		

David L Andersen

C Alaska Testlab, 1999 David L. Andersen, P.E., Technical Advisor

	SIZE PASSING SPECIFICATION #3 int Not Included in Test % 3" 100% 1 1/2" 95%	3/4" 90% 1/2" 70% 3/8" 59% No. 4 41% Point-Wt +5222.1g No. 8 27% No. 8 27% No. 10 25% No. 16 20% No. 20 18%	No. 30 15% No. 40 12% No. 50 10% No. 60 9% No. 100 7% No. 200 5.4%	af The
A DIVISION OF DOWLALE Project: Haines Highway Location: Test Boring 91 Sample 1 Depth 0.3'-1' Engineering Classification: Well Graded GRAVEL with Silt and Sand, GW-GM Frost Classification: Not Measured		theight Weight Weight 3% % % % % % % % % % % % % % % % % % %	Per 20% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0	© Alaska Testlab, 1999 David L Andersen

second second second

David L. Andersen, P.E., Technical Advisor

PARTICLE-SIZE DIST.ASTW/D422 W.O. D59119D W.O. 2005-2967 Received: 12/2/05 Reported: 12/19/05	SA9	No. 100 11% No. 200 7.6% Foul W. of Fine Fraction = 606.9g 0.02 mm
ALASKA Client: ADOT&PF Southeast Region A DIVISION OF DOWLLLC Project: Haines Highway Location: Test Boring 92 Sample 1 Depth 0.3'-3' Engineering Classification: Well Graded GRAVEL with Silt and Sand, GW-GM	High W view of the second seco	100 10 1 0.1 0.01 0.001 © Alaska Testiab, 1999 Barticle Size (mm) Particle Size (mm) David L. Andersen, P.E., Technical Advisor David L. Andersen, P.E., Technical Advisor

	east Region	PARTICLE-SIZE
A Division of DOWL LLC Project: Haines Highway		DIST. ASTM D422
Location: Test Boring 92		W.O. D59119D
Sample 3		Lab No. 2005-2968
Depth 5'-6.5'		Received: 12/2/05
Engineering Classification: Poorly Graded GRAVEL with Silt and Sand, GP-GM	MD	Reported: 12/19/05
Frost Classification: Not Measured		SIZE PASSING SPECIFICATION #3 in Not Included in Test = -96
2" — """		3"
		2"
90%		1 1/2" 100%
		1" 96%
80%		3/4" 86%
		1/2" 71%
giə		3/8" 60%
		No. 4 41%
		Total W1: + 1143.9g
50% 50%		No. 8 29%
		No. 10 26%
40%		No. 16 21%
300, 100,		No. 20 19%
		No. 30 16%
20%		No. 40 15%
		No. 50 13%
┦		No. 60 12%
		No. 80
		No. 100 10%
100 10 10 0.1 0.1	0.01 0.001	No. 200 8.2%
© Alaska Testlah. 1999		Total WL of Fine Fraction = 464.3g
	I AI UCIE DIZE (RIIII)	0.02 mm
David L Andersen		
David L. Andersen, P.E., Technical Advisor		

Tiet Boring 93 Sample 3 Sample 3	LLLE Project: Haines Highway W.O. D. Inded GRAVEL with Sand GW W.O. D. Receive Receive Receive Receive <th>LASK</th> <th>PARTICLE-SIZE</th>	LASK	PARTICLE-SIZE
by C. D. D. Lab No. 5'-6.5' Effection: Well Graded GRAVEL with Sand GW Strength Sand GW Strength Strength Sand GW Strength Strength Sand GW Strength Strength Sand GW Strength Strength Sand GW Strength Strength Sand GW Strength Strength Sand GW Strength Strength Sand GW Strength Strength Sand GW Strength Strength Sand GW Strength Sand GW Strength Strength Sand GW Strength Sand G	Particle Size (mm) Particle	f Dowl LLC	DIST. ASTM D422
e ³ S ^{-6.5} sification: Well Graded GRAVEL with Sand. GW sification: Well Graded GRAVEL with Sand. GW on: Not Measured ¹¹¹ ¹¹²	Lab No. Preceive Reporter Reporte	n: Test Boring 93	W.O. D59119D
5-6.5 sifeation: Well Graded GRAVEL with Sand. GW on: Not Measured on: Not Measur	Preceive fraction of the fract	Sample 3	Lab No. 2005-2969
sification: Well Graded GRAVEL with Sand, GW on: Not Measured On: Not Measured	Praded GRAVEL with Sand. GW	Depth 5'-6.5'	Received: 12/2/05
001. Not Measured 011. Not Measured 012 11/2" 11/2" 11/2" 11/2" 11/2" 11/2" 11/2" 11/2" 11/2" 11/2" 11/2" 11/2" 11/2" 11/2" 11/2" 11/2" 10. 4 No. 4 No. 1 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 20 No. 20	1 37 37 2 11/2" 11/2" 1 11/2" 11/2" 1 0.0 0 0.4 1 0.10 0.0 0 0 1 0.1 0.0 0 0 0 0 1 0.1 0.0 0		Reported: 12/19/05
1/2"	1 0.0 0.0 0.0 1 0.0 0.0 0.0	lassification: Not Measured	
10 1 0.01 Large (mm)	1 0.0 0.0		+3 in Not Included in Test ⇒ -%. 3"
IO 1 0.1 0.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1	1 0.1 0.01 0.01		2"
10 1 0.1 0.1 Particle Size (mm)	1 0.1 0.01 0.01		
10 1 0.01 0.01 0.0	1 0.1 0.0 Particle Size (nm)		
10 1 0.1 0.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1	1 0.1 0.01 0.01 Particle Size (mm) 0.01 0.01 0.01		
10 1 0.1 0.01 0.001	1 0.1 0.01 0.001		
10 1 0.1 0.1 0.01 0.001	1 0.1 0.01 0.01 Particle Size (mm) 0.01 0.01 0.01		
10 1 0.01 0.01 0.001	1 0.1 0.01 1 0.1 0.01 1 0.1 0.01		
10 1 0.1 0.01 0.001	1 0.1 0.01 0.001 Particle Size (mm) 0.01 0.001		h = 1072g
10 1 0.01 0.01 0.001	1 0.1 0.01 0.01 1 0.1 0.01 0.001		
10 1 0.1 0.01 0.001	1 0.1 0.01 0.001		
10 1 0.01 0.001 0.001	1 0.0 0.001		
10 1 0.01 0.001 0.001 0.001	1 0.1 0.01 0.001	300,	-
10 1 0.1 0.01 0.001	1 0.1 0.01 0.001		
10 1 0.01 0.001 0.001 0.001	1 0.1 0.01 0.001	20%	
10 1 0.1 0.01 0.001	1 0.1 0.01 0.001	++20 ++20 116	
10 1 0.01 0.001 0.001 0.001 Particle Size (mm)	1 0.1 0.01 0.001 Particle Size (mm)		
10 1 0.1 0.01 0.001 Particle Size (mm)	1 0.1 0.01 0.001 Particle Size (mm)		No. 80
10 1 0.1 0.01 0.001 Particle Size (mm)	1 0.1 0.01 0.001 Particle Size (mm)		
Particle Size (mm)	Particle Size (mm)	10 1 0.1 0.01	No. 200 3.1%
			Total Wr. of Fine Prestion = 304 7g.
	L Andersen		
David L. Andersen, P.E., Technical Advisor			

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PARTICLE-SIZE DIST. ASTM: D422 DIST. ASTM: D422 DIST. ASTM: D422 W.O. D59119D W.O. D59119D Lab No. 2005-2970 Received: 12/2/05 Reported: 12/19/05 SIZE PASSING SPECIFICATION SIZE PASSING SPECIFICATION SIZE PASSING SPECIFICATION	No. 200 16% Total Wr. of Fine Fraction ≈ 517.6g 0.02 mm
A DIVISION OF DOWL LLC Project: Haines Highway Location: Test Boring 93 Sample 4 Depth 10-11.5' Engineering Classification: Silty SAND, SM Frost Classification: Not Measured	9 dersen E., Technical A



Client: ADOT&PF Southeast Region Project: Haines Highway Location: Test Boring 103

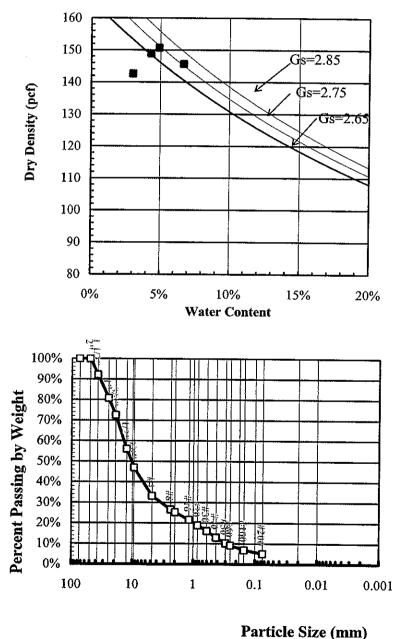
Sample 1

Depth 0'-3'

MODIFIED PROCTOR AASHTO T-180 B

W.O. D59119D Lab No. 2005-2971 Received: 12/2/05 Reported: 12/19/05

Engineering Classification: Well Graded GRAVEL with Silt and Sand, GW-GM Frost Classification: Not Measured



Uncorrected Maximum Density: 150.7 pcf Optimum Water Content: 4.9 %

Corrected Density: 154.5 pcf Corrected Optimum: 3.5 %

Moist Preparation Mechanical Compaction

SIZE	PASSING	SPECIFICATION
+1 in Not Incl	uded in Test = ~0%	
3"		
2"	100%	
1 1/2"	92%	
1"	81%	
3/4"	72%	
1/2"	56%	
3/8"	47%	
No. 4	33%	
Total Wt: ⇒ 19	860g	
No. 8	27%	
No. 10		
No. 16	22%	
No. 20	19%	
No. 30	16%	
No. 40	13%	
No. 50	10%	
No. 60	9%	
No. 80		
No.100	7%	
No.200	5.1%	
Total Wt. of Fi	ne Fraction = 549.1	g
0.02 mm		

David L Andersen

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A Division: Test Boring 103 Division: Test Boring 103 Location: Test Boring 103 Sample 2A Sample 2A Depth 5.5'6.5' Breatineering Classification: SLT with Sand. ML W.O. D59119D Location: Test Boring 103 Sample 2A Depth 5.5'6.5' Bepth 5.5'6.5' Engineering Classification: SLT with Sand. ML Frost Classification: SLT with Sand. ML Frost Classification: F4 Brow 2005- 100% Top 60% 60% Top 60% 60% Top 60% 60% Top 60% 50% SW 50% <th>DIST. ASTM D422 W.O. D59119D W.O. D59119D Lab No. 2005-2972 Received: 12/2/05 Reported: 12/19/05 Size PASSING SPECIFICATION Filt Not Included in Test=-3% 3"</th>	DIST. ASTM D422 W.O. D59119D W.O. D59119D Lab No. 2005-2972 Received: 12/2/05 Reported: 12/19/05 Size PASSING SPECIFICATION Filt Not Included in Test=-3% 3"
TIT with Supervisional and the second	59119D . 2005-2972 :d: 12/2/05 :d: 12/19/05 PASSING SFECIFICATION IO0% 96% 93% 91% 89%
	. 2005-2972 cd: 12/2/05 dd: 12/19/05 PASSING SFECIFICATION Ided in Test - % 95% 93% 91% 89%
+200 +200 +100 +100 +100 +100 +100 +100	cd: 12/2/05 cd: 12/19/05 Passing specification 100% 96% 93% 91% 89%
#200 #200 #30 #30	d: 12/19/05 PASSING SPECIFICATION Ided in Test
	PASSING SPECIFICATION Ided in Test = ->% 100% 96% 93% 91% 89%
	100% 96% 93% 92% 91% 89%
2000 2005 2006 2006 2006 2006 2006 2006 2006 2007 2006 2007 2006 2007	100% 96% 93% 91% 89%
90% 80% 70% 60% 60% 50% 50% 50% 50% 70% 70% 70% 70% 70% 70% 70% 70% 70% 7	100% 96% 93% 92% 91% 89%
80%	96% 93% 92% 91% 89%
70%	93% 92% 91% 89%
70% 50% 60% 60% 60% 70% 70% 70% 70% 70% 70% 70% 70% 70% 7	92% 91% 35 <u>8</u> 89%
60% F F F F F F F F F F F F F F F F F F F	91% 33.5g 89%
50%	33.5 <u>8</u> 89%
	0//60
	88%
40%	87%
	87%
	86%
20%	86%
	85%
	85%
100 10 10 10 No. 200 No. 200	83%
	tov. 200 Total Wr. of Ethis Fracelon = 499 7e
© Alaska Testlab, 1999 0.02 mm	

ALASKA Client: ADOT&PF Southeast Region	PARTICLE-SIZE
A Division of DOWL LLC Project: Haines Highway	DIST. ASTM D422
Location: Test Boring 104	W.O. D59119D
Sample 2	Lab No. 2005-2973
Depth 2.5'-4'	Received: 12/2/05
Engineering Classification: Well Graded GRAVEL with Silt and Sand, GW-GM	Reported: 12/19/05
Frost Classification: Not Measured	SIZE PASSING SPECIFICATION
3"	in Not Incl
	2" 78% 11/2" 530/
	1 1/2 2 2 2 / 0
	=
	3/8" 44%
	No. 4 38%
3/4	Total WL = 1317.2g
	No. 8 32%
	No. 10 30%
	No. 16 26%
30%	
20%	
	No. 50 17%
	No. 60 16%
	No. 80
	No. 100 12%
100 10 1 0.1 0.01 0.001	No. 200 9.2%
© Alaska Testlah. 1999	Total Wt. of Fine Fraction = 503g
	0.02 mm
David L Andersen	
David L. Andersen, P.E., Technical Advisor	

construction of a second

FOULLLE Project: Haines Highway WO. D. W.O. D. W.O. D. Rescrice Reporte Resured 9.8 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 0.1 10 0.1 10 0.1 10 1 10 1 10 1 10 0.1 10 0.1 10 0.0 10 0.0 10 0.0 10 0.0 10 0.0 10 0.0 10 0.0 10 0.0 10 0.0 10 0.0 10 0.0 10 0.0 10	ASK	PARTICLE-SIZE
ring 106 e.2 10 - 11' 10 - 11' 10 - 11' Receive Reporte on: Not Measured not Measur	H N N N N N N N N N N N N N N N N N N N	DIST. ASTM: D422
e ² 10 - 11' 10 - 11' 10 - 11' 10 - 1' 10 - 1' 10 - 1' 10 - 1' 11	Location: Test Boring 106	W.O. D59119D
10 - 11' sifeation: Poorly Chaded GRAYEL with Silt and Sand. GP-GM on: Not Measured on: Not Measured Not Measured	Sample 2	Lab No. 2006-706
sification: Poorly Chadded GRAYEL with Silt and Sand, GP-GM on: Not Measured on: Not Measured	Depth 10' - 11'	Received: 6/1/06
001. Not Measured 101. Not Measured 112"	Engineering Classification: Poorly Graded GRAVEL with Silt and Sand, GP-GM	Reported: 6/8/06
lersen	Frost Classification: Not Measured	SIZE PASSING SPECIFICATION
lersen		+3 in Not Included in Test = - %
Prive the second		
lersen	2	
10 1 0.0 0.0		
In the second se	80%	
Image: line state s		
lefent		
In the second se		
Percent Provide A and a second and a second a s		· 0
IO 1 0.01 0.001 0.		
IO 1 0.1 0.1 0.01 0.001		
erson		
I0 1 0.01 0.001 0.	30%	
10 1 0.01 0.001 Particle Size (mm)	**20 F	
10 1 0.1 0.01 0.001 lefsen		
10 1 0.1 0.01 0.001 Particle Size (mm)		
10 1 0.1 0.01 0.001 Particle Size (mm)		
¹⁰ 1 0.1 0.01 0.001 Particle Size (mm)		
Particle Size (mm)	10 1 0.1 0.01	No. 200 7.7%
David L Andersen		Total Wr. of Fine Fraction + 370.8g 0.02 mm
David L. Andersen P. E. Technical Advisor	David L Andersen PE Technical Advisor	

Client: ADOT&PF Southeast Region Project: Haines Highway	W.O. 2005-2974 Lab No. 2005-2974	Received: 12/2/05	Silt and Sand, GW-GM Reported: 12/20/05	SIZE PASSING SPECIFICATION #3.in.Not.Included in Test =	3"	2" 100%	3/4" 93%	3/8" 69%	No. 4 48%	Total WU: = 21607g	No. 8 40%	No. 10 37%			No. 40	 No. 80	No. 100 10%	0.1 0.01 0.001 0.001 No. 200 7.2%	Particle Size (mm)	
ALASKA Cid TESTLAB A Division of DOWL LLC Pro	Sample 1	Depth 0.3'-3'	Engineering Classification: Well Graded GRAVEL with Silt and Sand, GW-GM	Frost Classification: Not Measured	;" 2" 0 %001		80%	8i9			50%	issu	40%				0%	100 10 1	© Alaska Testlab, 1999	

and discon-

LASK	PARHCLE-SIZE
A DIVISION OF DOWL LLC Project: Haines Highway	DIST ASTMD422
Location: Test Boring 107	W.O. D59119D
Sample 3	Lab No. 2005-2975
Depth 5'-6.5'	Received: 12/2/05
Engineering Classification: Silty GRAVEL with Sand, GM	Reported: 12/19/05
rtost Classification: Not Measured	SIZE PASSING SPECIFICATION
2"	3"
	2" 100%
60%	1 1/2" 89%
	1" 79%
80%	3/4" 75%
	1/2" 69%
	3/8" 67%
	No. 4 59%
	Total Wt. = 1399g
50%	No. 8 52%
SSE	No. 10 50%
	No. 16 45%
11÷	
20%	
	No. 60 30%
100 10 10 0.01 0.001	No. 200 19%
© Alaska Testlab, 1999	1011.WL of Hine Fraction = 539.2g
David L. Andersen, P.E., Technical Advisor	

and succession

PARTICLE-SIZE	DIST ASTM D422 W.O. D50110D	Lab No. 2005-2976	Received: 12/2/05	Reported: 12/19/05	SIZE PASSING SPECIFICATION +3 in Not Included in Test = -% 3" 1004		/2"	1" 64%	3/4" 60%	1/2" 53%	3/8" 48%	No. 4 38%	1. = 1660.1	No. 8 31%	No. 10 29%			No. 30 20%	No. 40 16%		No. 60 11%	No. 80	No. 100 8%	No. 200 5.7%	Total Wt. of The Fraction = 631 9g	0.02 mm	
ASKA Client: ADOT&PF Southeast Region	T L A B DOWL LLC Project: Haines Highway			Engineering Classification: Well Graded GRAVEL with Silt and Sand, GW-GM	isured															*	203	ļ		10 1 0.1 0.01 0.001		Particle Size (mm)	tvisor
	A DIVISION OF Location: Test Boring 108	Sample 2	Depth 2.5'-4'	Engineering Classification:	Frost Classification: Not Measured	100%	20% 20%		80%		3/4	20% E		in 50%		40%	30% <mark> </mark>		P 20%		10%		0%	100	@ Alada Taulat 1000	🗢 Alaska Lesuao, 1999	David L Andersen David L. Andersen, P.E., Technical Advisor

PARTICLE-SIZE DIST. ASTM D422	W.O. D59119D Lab No. 2005-2977	Received: 12/2/05	Reported: 12/19/05	SIZE PASSING SPECIFICATION +3 in Not Included in Test = 26	5" 211 1000/	/2"	3/4" 82%	1/2" 75%	3/8" 70%	No. 4 59%	Total WU = $2214.2g$	No. 8 48%						No. 60 13%			No. 200 5.8%	1.0041 Wite of thing Fraction = 528/2 generation	
ast Region																					0.01 0.001	Particle Size (mm)	
Client: ADOT&PF Southeast Region Project: Haines Highway			ith Silt and Gravel, SP-SN														*10	263- 07	8		.0 1.0	Particle	
ASA ASA ASA ASA ASA ASA ASA ASA ASA ASA			Poorly Graded SAND w	easured						#			≠		*3					10	T OT		
A Division of	Location: Test Boring 108 Sample 4	Depth 10'-11.5'	Engineering Classification: Poorly Graded SAND with Silt and Gravel, SP-SM	Frost Classification: Not Measured		1 1/2 0 0 0	80%		eie	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		50% [ISSE	40%	30% <mark> </mark>	P 20%		10%		100	001	© Alaska Testlab, 1999	David L Andersen

David L. Andersen, P.E., Technical Advisor

on: Test Boring 109 Sample 1 Depth 0.5'-1.5' Erring Classification: Well Graded GR Classification: Not Measured 100% 60% 60% 60% 60% 60% 60% 60% 100% 10	ALASK	PARTICLE-SIZE
w.o. D e1 0.5-1.5' sifeation: Well Graded GRAVEL with Silt and Sand, GW-GM as filterinon: Well Graded GRAVEL with Silt and Sand, GW-GM on: Not Measured on: ot Measured on Not Measured Not Mea	T L A B D O V L L L C L L L C	DIST. ASTM D422
e I 0.5-1.5' sification: Well Graded GRAVEL with Silt and Sand, GW-GM on: Not Measured On: Not Measured On: Not Measured The Sand, GW-GM On: Not Measured The Sand GRAVEL with Silt and Sand, GW-GM On: Not Measured The Sand GRAVEL with Silt and Sand, GW-GM Sand GRAVEL with Silt and Sand, GW-GM No. 10 No. 20 No.	Location: Lest Borring 109	W.O. D59119D
0.5-1.5 sification: Well Graded GRAVEL with Silt and Sand, GW-GM on: Not Measured On: Not Measured On: Not Measured On the Sand, GW-GM State Size (mm) Control Comparison Control Control	Sample 1	Lab No. 2005-2978
Sification: Well Graded GRAVEL with Silt and Sand, GW-GM on: Not Measured On: Not Measured	Depth 0.5'-1.5'	Received: 12/2/05
Particle Size (nm)	Engineering Classification: Well Graded GRAVEL with Silt and Sand, GW-GM	Reported: 12/19/05
Particle Size (nun)	FIOST Classification: Not Measured	SIZE PASSING SPECIFICATION #3 in Not included in Test = 2%
1 1 1 1 1 1 1 1 1 10 1 0.1 0.01 0.01 Particle Size (num)	{	3"
I O I O O I O O O O O O O O O O O O O O		2"
10 1 0.01 0.01 Particle Size (mm)		
10 10 0.1 0.01 0.0		
10 1 0.01 0.001		
10 1 0.1 0.01 0.001		
10 1 0.01 0.01 0.01 0.01 0.001		
10 1 0.01 0.01 0.001 Particle Size (mn)		
10 1 0.1 0.01 0.001		Total Wt. = 4857g
10 1 0.01 0.001 0.001		
10 1 0.01 0.01 0.01 Particle Size (mm)		
10 1 0.01 0.01 0.001 First of the second sec		
10 1 0.01 0.01 0.001	30%	
10 1 0.01 0.01 0.001		
10 1 0.01 0.001 Particle Size (mm)		
10 1 0.01 0.001		
10 1 0.01 0.001 0.001 Particle Size (mm)		
10 1 0.1 0.01 0.001		No. 80
10 1 0.01 0.001 10 0.001 10 0.001 10 0.001 10 0.001		
Particle Size (mm)	10 1 0.1 0.01	
rarucle Size (mm)		Total Wt. of Fine Fraction = 521.68
		0.02 mm
	David L. Andersen, P.E., Technical Advisor	

and and an

Part Region Part CLF-SIZE vay DIST. ASTM D422 W.O. D59119D W.O. 2005-2979 Received: 12/2/05 Received: 12/2/05 Reported: 12/19/05 STE< FASSING SFECIFICATION	H3 in Nos included in Tester ->% 3" 3" 2" 11/2" 100% 11" 95% 3/4" 91% 1/2" 84% 3/8" 81% No. 4 72% No. 6 64% No. 10 64% No. 10 64% No. 10 64% No. 20 55% No. 4 72% No. 20 55% No. 40 48% No. 50 43% No. 50 43% No. 50 41% No. 60 41% No. 80 No. 80	No. 100 33% 0.01 0.001 No. 200 25% Particle Size (mm) 0.02 mm 0.02 mm
ALASIMA Client: ADOT&PF Southeast Region I UISION OF DOWLLLC Project: Haines Highway Location: Test Boring 109 Sample 4 Depth 7-8' Engineering Classification: Silty SAND with Gravel, SM Frost Classification: Not Measured	This is the set of th	0% 10% 100 10 1 0.1 0.1 Parti

PARTICLE-SIZE DIST.ASTM D422 W.O. D59119D W.O. D59119D Lab No. 2006-707 Received: 6/1/06 Reported: 6/08/06	31 31 31 31 32 31 31 11/2" 1 1/2" 3/4" 3/4" 3/4" 100% 1/2" 3/8" 1/2" 99% No. 4 99% No. 10 99% No. 20 99% No. 40 99% No. 50 99% No. 60 99% No. 60 99% No. 100 99% No. 100 99%	of Hine F
ALASKA Client: ADOT&PF Southeast Region T E S T L LOG Project: Haines Highway Location: Test Boring 110 Project: Haines Highway Sample 2 Depth 3' - 3.5' Fugineering Classification: Organic SILT (OL) Frost Classification: F4	Habe a constraint of the second of the seco	1001010.00.001Image: Image of Alaska Testiab, 1999Image of Alaska Testiab, 1999Image of Alaska TestiabImage of Alaska TestiabIm

4	V	Client: ADOT&PF Southeast Region	<u> </u>	PARHCLE-SIZE
A Division of DO	T L A B DOWLLLC Project: Haines Highway	Highway	<u>1,1,2,1,2,1,2,1,2</u>	DIST. ASTM D422
Location: Test Boring 111				W.O. D59119D
Sample 2			Ι	Lab No. 2006-708
Depth 4' - 5'				Received: 6/1/06
Engineering Classification: Poorly	Engineering Classification: Poorly Graded SAND with Silt, SP-SM		[Reported: 6/8/06
Frost Classification: Not Measured	<u>اط</u>		<u></u>	SIZE PASSING SPECIFICATION
3/8"	#		<u>1 (1</u>	3"
				2"
%06				1 1/2"
				1"
80%	20		<u>(</u>)	3/4"
			1	1/2"
eig			<u></u>	3/8" 100%
				No. 4 99%
				Cotal Wt. + 1975g
n 50%	0		<u> </u>	No. 8
				No. 10 95%
P. 40%			<u> </u>	No. 16
6 nt			<u> </u>	No. 20 77%
6LC	#11		4	No. 30
P. 20%			4	No. 40 53%
			<u> </u>	
10%			<u> </u>	No. 60 34%
			<u> </u>	
			<u> </u>	No. 100 20%
100 10	1 0.1	0.01 0.001		No. 200 6.9%
© Alaska Testlab, 1999		Particle Size (mm)	<u>FI</u>	Potal Wt. of Rine Fratelon = 485,8 <u>6</u>
	-]	
David L Andersen				
David L. Andersen, P.E., Technical Advisor				

A DIVISION OF DOWL LLC Project: Haines Highway Location: Test Boring 113 Sample 2 Depth 7' - 8' Engineering Classification: Silty SAND , SM Frost Classification: Not Measured	hway	DIST. ASTM D422	
: Silty SAND , SM feasured			D422
#10 #10		W.O. D59119D	
AND. SM #10		Lab No. 2006-709	6
#10		Received: 6/1/06	
#10		Reported: 6/8/06	
#10 #4		SIZE PASSING SPECI #3 in Not Included in Test ↔ 2%	SPECIFICATION
		3"	
		2"	
		1 1/2"	
		1" 21/1"	
		1/2"	
eig		3/8"	
		No. 4 100%	
		Total Wt. = 1723&	
50%			
2228 200 200 200		No. 10 100%	
		No. 15 No. 20 99%	
30%			
Pd 20%		No. 40 92%	
		No. 50	
	-	No. 100 52%	
100 10 10 1 0.1	0.01 0.001	No. 200 26%	
© Alaska Testlab, 1999 Par	Particle Size (mm)	<u>1999 Weisser weisser war weisen in 462:38</u> 0.02 mm	2.38

PARTICLE-SIZE DIST ASTM D422	W.O. D59119D	Lab No. 2006-710	Received: 6/1/06	Reported: 6/8/06	SIZE PASSING SPECIFICATION +3 in Not Included in Test + ->%	3"	2" 1 1/2" 100%	3/4" 92%	1/2" 89%	3/8" 87%	No. 4 83%	Total WE $\approx 2148g$	No. 8	No. 10 79%		No. 20 74%	No. 30		No. 60 54%	No. 80	 0.001 No. 200 26%	Fourth W.r. of Fine Fraction $+ 436.5g$ 0.02 mm	
Client: ADOT&PF Southeast Region				D with Gravel, SM				 2			*					++2*					1 0.1 0.01	Particle Size (mm)	
	Location: Test Boring 114	Sample 1	Depth 2' - 3'	Engineering Classification: Silty SAND with Gravel, SM	F10St Classification: Not Measured		3-80 1/2 4 4 1/2	80%		8 i9 /	00%				4 th	30% H	Per	70%0	10%		100 10	© Alaska Testlab, 1999	David L Andersen

	W.O. D59119D Lab No. 2006-711 Pereived: 6/1/06
Engineering Classification: Poorly Graded GRAVEL with Sand, GP Frost Classification: Not Measured	Reported: 6/8/06
	3" 100% 2" 92% 1 1/2" 85% 1" 73%
	100. 4 38% Total Wt. 7 68521g No. 8 No. 10 32% No. 16
	No. 60 13% No. 80 No. 100 7%
1 0.1 0.01 0.001	No. 200 3.4% Total Wt. of Phie Fraction = 386.3∞
Particle Size (mm)	0.02 mm

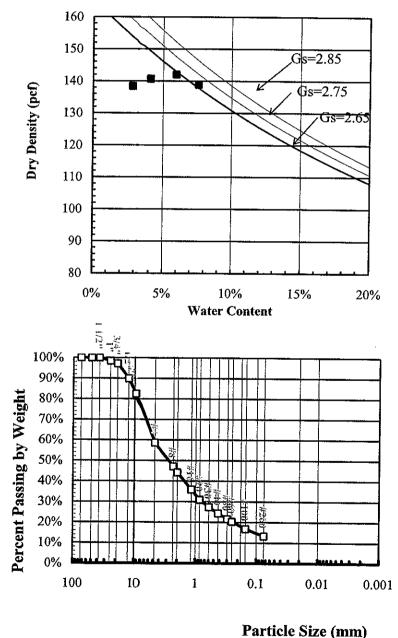


Client: ADOT&PF Southeast Region Project: Haines Highway Location: Test Boring 116

Sample 1

Depth 0'-3'

Engineering Classification: Silty SAND with Gravel, SM Frost Classification: Not Measured



MODIFIED PROCTOR AASHTO T-180 B

W.O. D59119**D** Lab No. 2005-2980 Received: 12/2/05 Reported: 12/20/05

Uncorrected Maximum Density: 142 pcf Optimum Water Content: 6 %

Moist Preparation Mechanical Compaction

SIZE	PASSING	SPECIFICATION
	ided in Test = -0%	
3"		
2"		
1 1/2"	10 0%	
1"	9 8%	
3/4"	9 7%	
1/2"	90 %	
3/8"	82%	
No. 4	59%	
Total Wt: ⇒21	453g	
No. 8	4 7%	
No. 10		
No. 16	36%	
No. 20	31%	
No. 30	27%	
No. 40	24 %	
No. 50	22 %	
No. 60	20%	
No. 80		
No.100	17%	
No.200	13%	
Total Wt. of Fir	e Fraction = 597.8	g
0.02 mm	_	

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PARTICLE-SIZE DIST. ASTM D422 DIST. ASTM D422 DIST. ASTM D422 W.O. D59119D Lab No. 2005-2981 Received: 12/2/05 Reported: 12/20/05 SIZE PASSING SPECIFICATION ASSING SPECIFICATION	2" 100% 1 1/2" 77% 1" 73% 3/4" 67% 3/8" 58% No. 4 49% No. 4 49% No. 8 41% No. 10 40% No. 10 40% No. 20 33% No. 20 33% No. 20 33% No. 20 33% No. 20 23% No. 20 23% No. 80 No. 100 18% No. 200 13%	0.02 mm
IKA Client: ADOT&PF Southeast Region ULLLE Project: Haines Highway IRAVEL with Sand, GM		Particle Size (mm)
Clien ALASIA Clien DIVISION OF DOWL LLC Proje Location: Test Boring 117 Sample 2 Depth 5'-6.5' Engineering Classification: Silty GRAVEL with Sand, G Frost Classification: Not Measured	Percent Passing by Weight	© Alaska Testlab, 1999 David L Andersen David L. Andersen, P.E., Technical Advisor

and a base

on PARTICLE-SIZE	DIST.ASTMID422	W.O. D59119D	Lab No. 2005-2983	Received: 12/2/05	Reported: 12/20/05	SIZE PASSING SPECIFICATION	in Not Incl	3" 100%	2" 88%	1 1/2" 82%	1" 68%	3/4" 64%	1/2" 55%	3/8" 51%	No. 4 43%	Total: WU:= 2537g	No. 8 36%						No. 60 23%	No. 100 18%		Total Wr. of Fine Fraction = 559g
Client: ADOT&PF Southeast Region	Project: Haines Highway				GM																#1		<u>"</u>		0.1 0.01	Particle Size (mm)
ASKA	T L A B Dowl L L C C	120			Engineering Classification: Silty GRAVEL with Sand.	ot Measured												, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,,,,,,		**************************************					10 1	
		Location: Test Boring 120	Sample 2	Depth 2.5'-4'	Engineering Classificati	Frost Classification: Not Measured	3	3" 				80%		gi9\ %0\	09%		in 50%	SSE	4 0%	цээ		20%	10%	0% Ealer 1 a	100	© Alaska Testlab, 1999

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PARTICLE-SIZE DIST.ASTM D422 W.O. D59119D Lab No. 2005-2984 Received: 12/2/05	Reported: 12/20/05 size Passing specification #3." 2." 1.1/2" 100%	1" 83% 3/4" 79% 1/2" 72% 3/8" 66% No. 4 56% No. 4 56% No. 10 45% No. 10 45% No. 20 38% No. 20 38% No. 20 35% No. 20 29% No. 40 32% No. 29% No. 60 27% No. 60 27% No. 80	of line F
T E T E T E E T E E T E E T E E T E E T E E T E E T E E T E E T E E T E E T E	Frost Classification: Not Measured	Percent Present promote the set of the set o	1001010.10.010.001Image: Image of the state

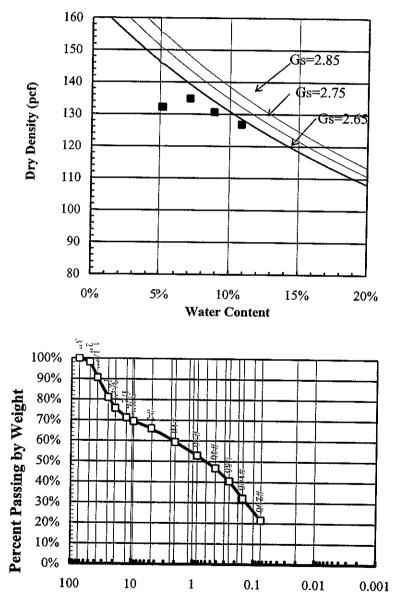
an of DOWL LLC Project: Haines Highway wing [2] 1'-2' 1'-2' Rece <u>sifecation: Silty SAND with Gravel. SM</u> n: Not Measured <u>m: Not Measured</u> <u>m: Not Measured</u>	an of DOWL LLC Project: Haines Highway wing 121 al al al al al al al al al al	a fon of DOWL LLC Project: Haines Highway tabring 121 mple 1 mple 1	₹	PARTICLE-SIZE
e 1 1'-2 Sification: Silty SAND with Gravel. SM n: Not Measured n: Not	e1 1-2 1-2 Receive sife and the first showing first showing first showing first showing first showing the section showing the section and the section and the section showing the secti	AND with Gravel. SM AND with Gravel. SM Receive Reporter Reporter Reporter Receive Reporter Reporter Receive Reporter Reporter Receive	vision of DOWL LLC Project: Haines Highway 1: Test Boring 121	W.O. D59119D
1' - 2' Receive sintention: Silty SAND with Gravel. SM m: Not Measured Sintention: Silty SAND with Gravel. SM m: Not Measured Sintention: Silty SAND with Gravel. SM m: Not Measured Sintention: Silty SAND with Gravel. SM m: Not Measured Sintention: Silty SAND with Gravel. SM m: Not Measured Sintention: Silty SAND with Gravel. SM m: Not Measured Sintention: Silty SAND with Gravel. SM m: Not Measured Sintention: Silty SAND with Gravel. SM m: Not Measured Sintention: Silty Sand m: Not Measured Sintention: Silty Sand </th <th>I' - 2: Receive Reports m: Not Measured m: Not Measured n: Not Measured m: Not Measured n: Not Measured m: Not Measured n: Not Measured m: Not Measured n: Not Measured m: Not Measured n: Not Measured m: Not Measured n: Not Measured m: Not Measured n: Not Measured m: Not Measured n: Not Measured m: Not Measured n: Not Measured m: Not Measured <t< th=""><th>AND with Gravel. SM</th><th>Sample 1</th><th>Lab No. 2006-712</th></t<></th>	I' - 2: Receive Reports m: Not Measured m: Not Measured n: Not Measured m: Not Measured n: Not Measured m: Not Measured n: Not Measured m: Not Measured n: Not Measured m: Not Measured n: Not Measured m: Not Measured n: Not Measured m: Not Measured n: Not Measured m: Not Measured n: Not Measured m: Not Measured n: Not Measured m: Not Measured <t< th=""><th>AND with Gravel. SM</th><th>Sample 1</th><th>Lab No. 2006-712</th></t<>	AND with Gravel. SM	Sample 1	Lab No. 2006-712
aification: Silty SAND with Gravel. SM m: Not Measured m: Not Measured	sification: Silv SAND with Gravel. SM m. Not Measured m. AND with Gravel. SM associated and the second seco	Depth 1' - 2'	Received: 6/1/06	
m: Not Measured state 11/2" 11/2" 11/2" 10/1" 11/2"	Dir. Not Measured	Image: state stat	ring Classification: Silty SAND with Gravel, SM	Reported: 6/8/06
111 1	Image: state stat	1 0.01 0.01 0.01 1 0.01 0.01 0.01	assification: Not Measured	SIZE PASSING SPECIFICATION #31#1Not Included to Test 41:298
10 1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1	10 1 01 01 01 10 1 01 01 01 01 10 0 0 0 0 0 0 Particle Size (mm) 0 0 0 0 0 0	1 0.1 0.0 0.1 1 0.1 0.0 0.0 1 0.1 0.0 0.0		3" 100%
10 1 0.0 0.0	10 1 0.01 0.01	1 0.1 0.0 0.0 0.0 1 0.0 0.0 0.0 0.0		
10 1 0.1 0.01 0.01	10 1 0.01 0.001 0.001 0.000 0.	1 0.1 0.0 1 0.1 0.0 1 0.1 0.0 1 0.0 0.0	%06	
I 0 1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1	I0 I0 0.1 0.01 0.01 I0 0.1 0.01 0.01 0.01	#10 10 10 10 1 0.0 0.01 0.00		
10 1 0.1 0.01 0.001	10 1 0.1 0.01 0.01 0.01 0.01 0.01 0.01	1 0.1 0.01 0.001		
10 10 0.1 0.1 0.01 0.01 10 1 0.1 0.1 0.01 0.01	10 1 0.01 0.01 0.001	1 0.1 0.01 0.001		
10 1 0.1 0.01 0.001	I0 I0 0.01 0.01 I0 0.01 0.01 0.01	1 0.0 0.001		
10 1 0.1 0.1 0.1 0.01 0.01 0.01 0.01 0.	10 1 0.1 0.01 0.01 10 1 0.1 0.01 0.01	1 0.1 0.01 0.01 1 0.1 0.01 0.001		No. 8
10 1 0.1 0.01 0.001	I0 1 0.01 0.001	1 0.1 0.01 0.001 Particle Size (mm) 0.01 0.001		
10 1 0.01 0.001	I0 1 0.01 0.001	1 0.0 0.001 0.001		No. 16
10 1 0.01 0.001	10 1 0.01 0.001 Particle Size (mm)	1 0.1 0.01 0.001 Particle Size (mm)		
10 1 0.01 0.001	10 1 0.01 0.001	1 0.1 0.001 Particle Size (mm)		
10 1 0.01 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001	10 1 0.01 0.001 Particle Size (mm)	1 0.1 0.01 0.001		
10 1 0.1 0.01 0.001 Particle Size (mm)	10 1 0.1 0.01 0.001 Particle Size (mm)	1 0.1 0.01 0.001 Particle Size (mm)		
10 1 0.1 0.01 0.001 Particle Size (mm)	10 1 0.1 0.01 0.001 Particle Size (mm)	1 0.1 0.01 0.001 Particle Size (mm)		
10 1 0.1 0.01 0.001 Particle Size (mm)	10 1 0.1 0.01 0.001 Particle Size (mm)	1 0.1 0.01 0.001 Particle Size (mm)	0% [_
Particle Size (mm)	Particle Size (mm)	Particle Size (mm)	10 1 0.1 0.01	No. 200 20%
				Total Wt. of Fine Fraction = 375.6g 0.02 mm



Client: ADOT&PF Southeast Region Project: Haines Highway Location: Test Pit 122 Sample 1

Depth 0' - 3'

Engineering Classification: Silty SAND with Gravel, SM Frost Classification: Not Measured



MODIFIED PROCTOR ASTM D 1557 B

W.O. D59119D Lab No. 2006-713 Received: 6/1/06 Reported: 6/8/06

Uncorrected

Maximum Density: 134.9 pcf Optimum Water Content: 7.1 %

Corrected Density: 141 pcf Corrected Optimum: 5.5 %

Moist Preparation Mechanical Compaction

SIZE	PASSING	SPECIFICATION
	ided in Test=-0%	
3"	100%	<u> </u>
2"	98%	
1 1/2"	91%	
1"	81%	
3/4"	76%	
1/2"	71%	
3/8"	69%	
No. 4	66%	
Total Wt. ⇒.14	489g	
No. 8		
No. 10	59%	
No. 16		
No. 20	53%	
No. 30		
No. 40	47%	
No. 50		
No. 60	40%	
No. 80		
No.100	32%	
No.200	22%	
Total Wt. of Fin	e Fraction ≈ 752.1	g
0.02 mm		<u> </u>

David L Andersen

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4040 B Street Anchorage Alaska 99503 • 907/562-2000 • 907/563-3953

Particle Size (mm)

	PARTICLE-SIZE
A DIVIBION OF DOWL LLC Project: Haines Highway	DIST ASTWID422
Location: Test Boring 124	W.O. D59119D
Sample 2	Lab No. 2006-673
	Received: 6/1/06
Engineering Classification: Silty SAND, SM	Reported: 6/7/06
Frost Classification: Not Measured	SIZE PASSING SPECIFICATION
 3/4 1/2"	and the properties of the prop
	2"
	1 1/2" 100%
	1" 98%
	3/4" 96%
	1/2" 94%
2i9	3/8" 93%
	No. 4 90%
	Total WE = 3088g
50%	No. 8
	No. 10 86%
40%	No. 16
J.	No. 20 77%
	No. 30
20%	No. 40 64%
	No. 50 No. 60 1002
0%	No. 100 35%
100 10 1 0.1 0.01 0.001	No. 200
	Total WE of The F
© Alaska Testlab, 1999	0.02 mm
David L Andersen	
David L. Andersen, P.E., Technical Advisor	

2"

ical Advisor 1040 B Street Anchorage Alaska 99503 • 907/562-2000 • 907/563-3953

David L. Andersen, P.E., Technical Advisor



Client: ADOT&PF Southeast Region Project: Haines Highway

Location: Test Boring 129

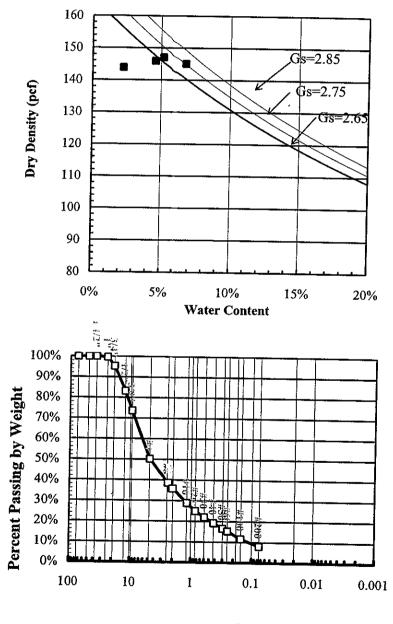
Sample 1

Depth 0.2'-3'

MODIFIED PROCTOR AASHTO T-180 B

W.O. D59119D Lab No. 2005-2985 Received: 12/2/05 Reported: 12/20/05

Engineering Classification: Well Graded GRAVEL with Silt and Sand, GW-GM Frost Classification: Not Measured



Uncorrected Maximum Density: 147 pcf Optimum Water Content: 5 %

Moist Preparation Mechanical Compaction

SIZE	PASSING	SPECIFICATION
	ided in Test = -0%	
3"		
2"		
1 1/2"	100%	
1"	100%	
3/4"	95%	
1/2"	83%	
3/8"	74%	
No. 4	50%	
Total Wt. ⇒ 20	974g	
No. 8	39%	
No. 10		
No. 16	29%	
No. 20	25%	
No. 30	22%	
No. 40	19%	
No. 50	17%	
No. 60	15%	
No. 80		
No.100	12%	
No.200	8%	
lotal Wt. of Fin	e Fraction = 615.8	
0.02 mm		

Particle Size (mm)

David L Andersen

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Southeast Region	hway DIST. ASTM D422	W.O. D59119D	Lab No. 2005-2986	Received: 12/2/05	Reported: 12/20/05	SIZE PASSING SPECIFICATION		2"	1 1/2"	1" 100%	3/4" 98%	1/2" 85%	3/8" 76%	No. 4 57%	Total Wt. + 3746.9g	No. 8 48%	No. 10 45%	No. 16 40%			No. 60 22%	No. 80	No. 100 18%	0.01 0.001 No. 200 14%	Particle Size (mm)	
ALASKA Client: ADOT&PF Southeast Region	A DIVISION OF DOWL LLC Project: Haines Highway	Location: Test Boring 131	Sample 1	Depth 0.3'-1'	Engineering Classification: Silty SAND with Gravel, SM	FIOST Classification: Not Measured	3-4" 9-1 () () () () () () () () () ()		2 %06		80%							40%	330%		10%			100 10 10 0.1	© Alaska Testlab, 1999	

ring 133 rring 133 v 1 O C C C C C C C C C C C C C C C C C C	LASK	PARHICIEL-SIZIE
oring [33 e1 0.3-3' sification: Well Graded GRAVEL with Silt and Sand, GW-GM on: Not Measured on: Not Measur	Division of DOWL LLC	DIST, ASTM D422
e1 0.3-3' Sification: Well Gravel Gravel with Silt and Sand. GW-GM on: Not Measured on: Not Measured 0.1-1 0	Location: Test Boring 133	W.O. D59119D
0.3'-3' sification: Well Graded GRAVEL with Silt and Sand, GW-GM on: Not Measured on: Not Measured 0.1' 0	Sample 1	Lab No. 2005-2987
sification: Well Graded GRAVEL with Silt and Sand, GW-GM on: Not Measured in the state of the st	Depth 0.3'-3'	Received: 12/2/05
01. Not Measured 11. 12. 13. 14. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15	raded GRAVEL with	Reported: 12/20/05
111-1 1112" 1112" 1112" 1112" 1112" 1112" 112" 1112" 112" 1112" 112" 1112" 112" 1112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 112" 113" 112" 114" 112" 115" 112" 10 10.10 10 10.10 10 10.10 10 10.10 10.10 10.10	Frost Classification: Not Measured	
¹⁰ 10 10 10 10 10 10 10 10 10 10		in Not Incl
10 1 0.01 Particle Size (mm)		3"
10 1 0.1 0.1 Particle Size (mm)		
10 1 0.01 Barticle Size (mm)	90% E	
10 1 0.1 0.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1		
10 1 0.01 0.001 0.		
10 1 0.01 0.01 0.001		
10 1 0.1 0.01 0.001		
10 1 0.01 0.001		ùt ≐ 21867g
10 1 0.01 0.01 0.001		
10 1 0.01 0.01 0.01 0.01 1.001 0.001		
10 1 0.01 0.01 0.0		
10 1 0.1 0.01 0.001 Particle Size (mm)		
10 1 0.01 0.001 0.001 0.001		
10 1 0.01 0.001 Particle Size (mm)	20%	
10 1 0.01 0.001 0.001	*10	
10 1 0.01 0.001 0.001 Particle Size (mm)		
10 1 0.1 0.01 0.001 Particle Size (mm)		No. 80
10 1 0.01 0.001 0.001 Particle Size (mm)		
Particle Size (mm)	10 1 0.1 0.01	No. 200 7.3%
		Total Write Fraction # 584 7g



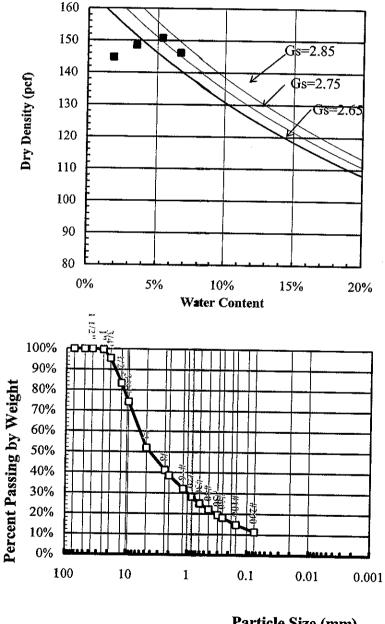
Client: ADOT&PF Southeast Region Project: Haines Highway Location: Test Boring 134 Sample 1

Depth 0.2'-3'

MODIFIED PROCTOR AASHTO T-180 B

W.O. D59119D Lab No. 2005-2988 Received: 12/12/05 Reported: 12/16/05

Engineering Classification: Well Graded GRAVEL with Silt and Sand, GW-GM Frost Classification: Not Measured



Uncorrected Maximum Density: 151 pcf Optimum Water Content: 5.5 %

Moist Preparation Mechanical Compaction

SIZE	PASSING	SPECIFICATION
	uded in Test = -0%	
3"		
2"		
1 1/2"	100%	
1"	100%	
3/4"	95%	
1/2"	83%	
3/8"	74%	
No. 4	52%	
Total Wt; ⇒21	702g	
No. 8	41%	
No. 10		
No. 16	32%	
No. 20	28%	
No. 30	25%	
No. 40	22%	
No. 50	19%	
No. 60	18%	
No. 80		
No.100	15%	
No.200	11%	
Total Wt: of Fin	e Fraction = 559.9	
0.02 mm		

Particle Size (mm)

David L Andersen © Alaska Testlab, 1999 David L. Andersen, P.E., Technical Advisor

ALASKA Client: ADOT&PF Southeast Region	PARTICLE-SIZE
A DIVISION OF DOWLLLC Project: Haines Highway Location: Test Boring 137	DIST. ASTM D422 W.O. D59119D
Sample 3	Lab No. 2005-2989
Depth 5'-6.5'	Received: 12/2/05
<u>Engineering Classification: Silty GRAVEL with Sand, GM</u> Frost Classification: Not Monared	Reported: 12/20/05
	SIZE PASSING SPECIFICATION #3 int Not Included in Test = -%
	3" 2"
	z 1 1/2" 100%
	1" 86%
	3/4" 84%
	1/2" 77%
	No. 4 55%
50%	No. 8 45%
	~
	No. 16 37%
	No. 40 27%
	No. 60 23%
	No. 100 20%
100 10 1 0.1 0.01 0.001	No. 200 16%
© Alaska Testlab, 1999 Particle Size (mm)	Total WL of This Fraction = 570 4g
David I Andersen	
David L. Andersen, P.E., Technical Advisor	

Client: ADOT&PF Southeast Region	Project: Haines Highway D422	W.O. D59119D	Lab No. 2005-2990		h Silt and Sand, GW-GM Reported: 12/20/05	SIZE PASSING SPECIFICATION	3"	2" 100%	1 1/2" 98%	1" 94%	3/4" 88%	1/2" 76%	3/8" 67%	No. 4 50%	Total WC + 22119g	No. 8 39%	No. 10 37%	No. 16 31%		No. 40		•	0.1 0.01 0.001 No. 200 7%	Particle Size (mm)
LASKA	T C L A B D O K L L L L L L L L L L L L L L L L L L	Location: Test Boring 139	Sample 1	Depth 0.3'-3'	Engineering Classification: Well Graded GRAVEL with	r 10st Classification: Not Measured	1/2" 2" [[] ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;				80%	2004				in 50% [+ + + + + + + + + + + + + + + + + +		40%	30%				100 10 1	© Alaska Testlab, 1999

second second

A DIVISION OF DOWL LLC Project: Haines Highway Location: Test Boring 139	DIST. ASTM D422 W.O. D59119D
Sample 3	Lab No. 2005-2991
Depth 5'-6.5'	Received: 12/2/05
Engineering Classification: Silty SAND with Gravel, SM	Reported: 12/20/05
Frost Classification: Not Measured	size PassinG specification
	3"
	1 1/2" 100%
3	
	NO. 4 09% Total W. = 1954e
	No. 8 60%
	No. 10 58%
	No. 16 52%
	No. 40 40%
	No. 60 32%
	No. 100 26%
10 1 0.1 0.01 0.001	No. 200 18%
© Alaska Testlab, 1999	Total Wr. of Phile Fraction = 305.1 g

Clear: ADOT&PF Southeast Region Contained 142 Carton of Down Long Contained 142 Carton Test Boring 142 Sample 1 Depth 0.5'-1.5' Entrementing Classification: Well Graded SAND with Silt and Gravel. SW-SM Propert 0.5'-1.5' Entrementing Classification: Not Measured 100%

David L. Andersen, P.E., Technical Advisor

Client: ADOT&PF Southeast Region	DD PARALICIE-SIZE
A DIvision of DOWLLIC Project Haines Highway	
1: Test Boring 142	W.O. D59119D
Sample 2	Lab No. 2005-2993
Depth 2.5'-4'	Received: 12/2/05
Engineering Classification: Silty SAND, SM	Reported: 12/20/05
	SIZE PASSING SPECIFICATION H3 in Not Included in Test = 2%
/2" /4" [3*
	HC.
	1 1/2"
	4 T
	3/4" 100%
	1/2" 99%
	3/8" 99%
	No. 4 95%
	Total W1: 51413.8g
50%	No. 8 89%
	No. 10 87%
	No. 16 82%
	No. 20 78%
	No. 30 73%
20%	
	No. 50 58%
	No. 60 54%
	No. 80
	No. 100 39%
100 10 1 0.1 0.1 0.01	0.001 No. 200 24%
🔿 Alacta Taatlah 1000	
e ruaska I teudu, 1999 Particle Size (mm)	m) 0.02 mm
David L Andersen	
David L. Andersen, P.E., Technical Advisor	

PARTICEL-SIZE	DIST. ASTW D422	W.O. D59119D	Lab No. 2005-2994	Received: 12/2/05	Reported: 12/20/05	SIZE PASSING SPECIFICATION	13.110 Not Included in Test 중 2% 이 이 이 이 이 이 이 이 이 이 이 이 이 이 이 이 이 이	2"	1 1/2" 100%	1" 99%	3/4" 97%	1/2" 89%	3/8" 82%	No. 4 64%	Total Wt. = 18281 g	No. 8 50%				No. 30 28%		No. 60 17%	No. 80	No. 100 13%	No. 200 10%	Total Wt. of Fine Fraction = 595.1 g 0.02 mm	
on								Γ																	0.001	m)	
Client: ADOT&PF Southeast Region	ighway				MS-MS																				0.01	Particle Size (mm)	
Client: ADOT&P	Project: Haines Highway			:	1 Silt and Gravel, SW-SM															#6 #60 #50	#20 001-	┲			0.1		
KA	00 L L				aded SAND with										#		#16	720	#30						1		
		1 1	10 10		thcation: Well G		3, 2 1 ** 1/2*																	ç	10		rsen
A	A Division of Incention: Tack Rowing 1/2	Location. Lest Dott			Engineering Classification: Well Graded SAND with Silt Frost Classification: Not Meaningd	0110011100010 10017			60%		80%	10%		لم س		50%	SB ⁶		30%	Pei	0/07	10%		100	100	© Alaska Testlab, 1999	David L Andersen

David L. Andersen, P.E., Technical Advisor

A Division of Dove Line Highway controm: Test Boring 14 Sample 1 Sample 1	Provide the propert Haines Highway oring 144 e1 W.O.D. e1 W.O.D. Receive <u>sifecation: Sity SAND with Gravel. SN</u> or. Not Measured or. Not Measured Oring 144 W.O.D. Receive Reporte	JUVELED Froject: Haines Highway ion: Test Boring 14 Sample 1 0.5-2: Classification: Silty SAND with Gravel. SM 0.5-2: Classification: Silty SAND with Gravel. SM 0.5-2: 0.0% 0% 0% 0% 0% 0% 0% 0% 0% 0%	ASK	PARTICLE-SIZE
oring 144 e1 E1 E1 E1 E2 E2 E2 E2 E2 E2 E2 E2 E2 E2	oring 144 e1 Lab No. D us. Not Measured on. Not Measured on. Not Measured on. Not Measured on. Not Measured on. Not Measured on. Not Measured on. Not Measured on. Not Measured on. Not Measured on. Not Measured on. Not Measured on. Not Measured on. Not Measured on. Not Measured on. Not Measured on. Not Measured on. Not Measured on. Not Measured on Not Measured on Not Measured on Not Measured on Not Measured on Not Measured on Not Measured on Not Measured on Not Measured on Not Measured on Not Measured on Not Measured on Not Measured on Not Measured on Not Measured on Not Measured on Not Measured on Not Measured Not	W.O. D. Lab No. Lab No. Lab No. Receive Reporte structure is interesting in the structure structure is interesting in the structure structure structure is interesting in the structure st	T L A B D O V L L L C	DIST. ASTM D422
e 1 Sification: Silty SAYD with Gravel. SM on: Not Measured on: Not Measured and Model State Size (mun) State State Size (mun) State	e1 sification: Silty SAND with Gravel.SM on: Not Measured on: Not Measured Not Measu	Lab No. Preceive and the formed state and the form		W.O. D59119D
sification: Silty SAND with Gravel. SM on: Not Measured on: Not Measured	sification: Silty SAND with Gravel. SM on: Not Measured on: Not Measured	AND with Gravel. SM Processing Processin	Sample 1	Lab No. 2005-2995
sification: Silty SAND with Gravel. SM on: Not Measured on: Not Measured	sification: Silty SAND with Gravel. SM on: Not Measured on: Not Measured	AND with Gravel. SM Particle Size (run) Particle	0.5'-2'	Received: 12/2/05
01. Not Measured 11.12" 11.	01. Not Measured 10. Not Measured 11. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	Image: state stat	ngineering Classification: Silty SAND with Gravel, SM	Reported: 12/20/05
Datic Size (mm)	Particle Size (num)	I 0.1 0.0 0.0 I 0.1 0.0 0.0	rost Classification: Not Measured	SIZE PASSING SPECIFICATION
10 1 0.1 Particle Size (mu)	Jo 1 0.1 Dotted for the state (mm)	1 0.1 0.0 1 0.1 0.0		#5 in Not Included in Test =
10 1 0.1 0.01 Particle Size (mu)	Particle Size (mm)	1 0.1 0.0 0.0 1 0.1 0.0 0.0		2"
10 1 0.1 0.01 D.001	10 1 0.01 0.001	1 0.0 0.001		
10 1 0.1 0.1 0.1 Particle Size (mm)	10 1 0.0 1 0.01 Particle Size (mm)	1 0.1 0.01 0.01 1 0.1 0.01 0.001		
lo i 0.0 0.01 0.001	IO I 0.01 0.001	1 0.1 0.01 Particle Size (mm) 0.01		
10 1 0.1 0.01 Particle Size (mm)	IO 1 0.1 0.1 Particle Size (mu)	1 0.1 0.01		
10 1 0.0 0.0	IO I 0.1 0.01 0.001	1 0.1 0.01 0.01 Particle Size (mm)		
10 1 0.1 0.01 0.001	lo 1 0.1 0.01 0.001	1 0.1 0.01 0.01 1 0.01 0.01 0.01		t di ct
10 1 0.01 0.01	10 1 0.01 0.001	1 0.1 0.01 0.01 1 0.1 0.01 0.001		37
10 1 0.01 0.001	10 1 0.1 0.01 0.001	1 0.1 0.01 0.01 Particle Size (mm)		
10 1 0.01 0.001	10 1 0.01 0.001	1 0.1 0.01 0.001 Particle Size (mm) 0.01 0.001 0.001		
10 1 0.01 0.001	10 1 0.0 1 0.01 0.001	1 0.1 0.01 Particle Size (mm)		
10 1 0.01 0.001	10 1 0.01 0.001	1 0.1 0.01 0.001 Particle Size (mm) 0.001 0.001 0.001		
10 1 0.01 0.001 0.001 0.001 Particle Size (mm)	10 1 0.01 0.001 Particle Size (mm)	a 0.0 0.001	20%	
10 1 0.01 0.001 Particle Size (mm)	10 1 0.01 0.001 Particle Size (mm)	1 0.1 0.01 0.001 Particle Size (mm)		
10 1 0.1 0.01 0.001 Particle Size (mm)	10 1 0.1 0.01 0.001 Particle Size (mm)	1 0.1 0.01 0.001 Particle Size (mm)		
10 1 0.1 0.01 0.001 Particle Size (mm)	10 1 0.1 0.01 0.001 Particle Size (mm)	1 0.1 0.01 0.001 Particle Size (mm)		
10 1 0.1 0.01 0.001 Particle Size (mm)	10 1 0.1 0.01 0.001 Particle Size (mm)	1 0.1 0.01 0.001		
Particle Size (mm)	Particle Size (mm)	Particle Size (mm)	10 1 0.1 0.01	No. 200 14%
	Javid L Andersen	avid L Andersen d L. Andersen, P.E., Technical Advisor		Total WE of Fine Fraction # 565.1 g



Client: ADOT&PF Southeast Region Project: Haines Highway Location: Test Boring 146

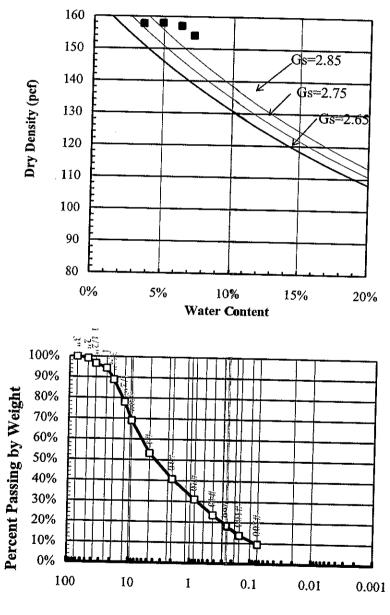
Sample 1

Depth 0.3' - 3'

MODIFIED PROCTOR ASTM D 1557 B

W.O. D59119D Lab No. 2006-675 Received: 6/1/06 Reported: 6/7/06

Engineering Classification: Well Graded GRAVEL with Silt and Sand, GW-GM Frost Classification: Not Measured



Uncorrected Maximum Density: 158 pcf Optimum Water Content: 4.9 %

Corrected Density: 159 pcf Corrected Optimum: 4.5 %

Moist Preparation Mechanical Compaction

SIZE	PASSING	SPECIFICATION
+3 in Not Inch	ided in Test = -0%	
3"	100%	<u> </u>
2"	99%	
1 1/2"	97%	
1"	94%	
3/4"	89%	
1/2"	78%	
3/8"	69%	
No. 4	53%	
Total Wt: ⇒ 298	65g	
No. 8		
No. 10	41%	
No. 16		
No. 20	31%	
No. 30		
No. 40	23%	
No. 50		
No. 60	18%	
No. 80		
No.100	14%	
No.200	9.5%	
otal Wt. of Fini	e Fraction = 788.7g	
0.02 mm		<u> </u>

David L Andersen

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Particle Size (mm)

Discrete Discretive W.O. D. W.O. D. W.O. D. Receive Receive Reports 3.8 3.4" 1.1/2" 3.4" 1.1/2" 1.1/2" 3.8" No. 4 No. 10 No. 4 No. 20 No. 20 No. 10 No. 10 No. 20 No. 20 No. 200 No. 20 No. 200 No. 20 No. 200 No. 20 No. 200 No. 20 No. 20 No. 20 </th <th>Client: ADOT&PF Southeast Region</th>	Client: ADOT&PF Southeast Region
Lab No. Receive Reporte Reporte <td< td=""><td>Project: Haines Highway</td></td<>	Project: Haines Highway
Particle Size 3.1 8128 3.1 8128 3.1 91 1.1 11 1.1	
0.1 0.01 0.001	with Sand, GW
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0.1 0.01 0.01 0.01 0.001	
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0.01 0.001 Particle Size (mm)	1
	0.01
	Particle Size (mm)

David L. Andersen, P.E., Technical Advisor

3/8" 76% No. 4 69% No. 8 No. 10 63% No. 10 63% No. 20 52% No. 30 No. 50 No. 50	A DIVISION OF DOWL LLE Project: Haines Highway Location: Test Boring 149 Sample 1 Depth 3' - 4' Engineering Classification: Silty SAND with Gravel, SM Frost Classification: Not Measured	DIST. ASTM D422 W.O. D59119D Lab No. 2006-677 Received: 6/1/06 Reported: 6/7/06 Size Passing specification #3 100% 2" 96% 1 1/2" 94% 1 1/2" 87% 3/4" 84%
	#130 #60 #460 #460	462182

LICIT CONTRACT Client: ADUL&PF Southeast Kegion	
DIVISION OF DOWL LLC Project: Haines Highway	DIST. ASTM D422
Location: Test Boring 150	W.O. D59119D
Sample 1, Depth 0' - 3'	Lab No. 2006-678
Maximum Index Density ASTM $D4253 = 150.0 \text{ pcf}$	Received: 6/1/06
Engineering Classification: Poorly Graded GRAVEL with Sand, GP	Reported: 6/8/06
Frost Classification: NFS MOA	SIZE PASSING SPECIFICATION #3 in Not Included in Test = ⇒%
1 2" 3" [3" 100%
	2" 98%
	1 1/2" 92%
ght 70%	1/2" 43%
19 Mei	No. 4 28%
	Vt. ÷ 25722
50% F 1 20%	No. 8
	No. 10 23%
30%	No. 20 19%
	No. 30 No. 40 14%
#40-1	
#163	No. 60 9%
	No. 80 No. 100
100 10 1 0.1 0.01 0.001	No. 200 2.7%
© Alaska Testlab, 1999 Particle Size (mm)	Total Wt. of Fine Fraction = 519g 0.02 mm

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PARTICLE-SLZE DIST: ASTM D422 W.O. D59119D W.O. D59119D Lab No. 2006-679 Received: 6/1/06 Reported: 6/7/06		No. 100 24% No. 200 16% Fould Wr. of Fine Fraction = 334g 0.02 mm
A DIVISION OF DOWLALS Client: ADOT&PF Southeast Region A DIVISION OF DOWLALS Project: Haines Highway Location: Test Boring 151 Sample 2 Depth 10' - 11' Engineering Classification: Silty SAND with Gravel. SM	The second se	0% 0% 0 10 10 0

heast Region / PARTICLE-SIZE DIST.ASTMD422 W.O. D59119D Lab No. 2006-680 Received: 6/1/06 Renorted: 6/7/06		Particle Size (mm) 0.02 100.50 0.01 0.001 16% 0.02 mm 0.02 mm
A DIVISION OF DOWLALE Project: Haines Highway Location: Test Boring 152 Sample 1 Depth 6' - 7' Engineering Classification: Poorly Graded SAND with Silt and Gravel, SP-SM	Percent Passing by Weight 100 Lassing by Weight 100 Lassing by Weight 20% 00% 00% 00% 00% 00% 00% 00% 00% 00%	10% 10% 10% 10 10 10 0.1 0% 10 10 1 0.1 100 10 1 0.1 David L Andersen

Cient: ADOT&PF Southeast Region Test: Haines Highway Location: Test Boring 153 Sample 2 Bepth % - 9' Depth %	0% 0.1 0.1 0.01 0.001 100 10 1 0.1 0.01 0.001 © Alaska Testlab, 1999 Particle Size (mm)

and the second

ALASKA Client: ADOT&PF Southeast Region	PARHICLE-SIZE
A DIVISION OF DOWL LLC Project: Haines Highway	DIST. ASTM: D422
Location: Test Boring 154	W.O. D59119D
Sample 1	Lab No. 2005-2996
Depth 0.3'-3'	Received: 12/2/05
Engineering Classification: Well Graded SAND with Silt and Gravel, SW-SM	Reported: 12/20/05
Frost Classification: Not Measured	SIZE PASSING SPECIFICATION
1 1/2	43 in Not included in these 4 2% and a line of the second s
	ی: عد
	1 1/2" 100%
	1" 98%
	3/4" 93%
	1/2" 83%
eige	3/8" 74%
	No. 4 55%
	Total Wt. = 21660g
50% F	No. 8 41%
20%	
¥100	
	No. 60 14%
	-
100 10 1 0.1 0.01 0.001	No. 200 8%
© Alaska Testlab. 1999	Total Wr. of This Fraction + 565.9g
	TILLI ZVV
David L Andersen David L. Andersen, P.E., Technical Advisor	



Client: ADOT&PF Southeast Region Project: Haines Highway Location: Test Boring 155

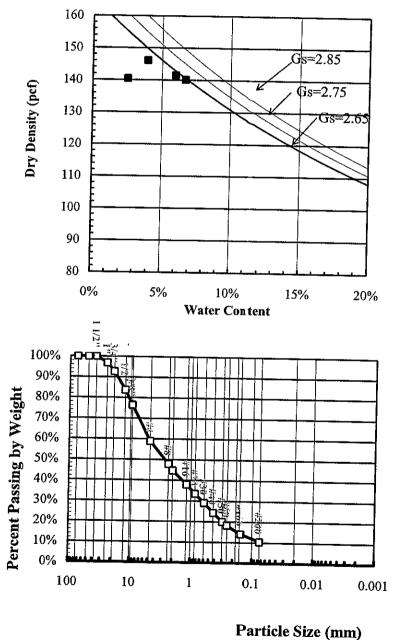
Sample 1

Depth 0.6'-3'

MODIFIED PROCTOR AASHTO T-180 B

W.O. D59119D Lab No. 2005-2997 Received: 12/2/05 Reported: 12/19/05

Engineering Classification: Well Graded SAND with Silt and Gravel, SW-SM Frost Classification: Not Measured



Uncorrected Maximum Density: 146.1 pcf Optimum Water Content: 4 %

Corrected Density: 147.5 pcf Corrected Optimum: 3.5 %

Moist Preparation Mechanical Compaction

SIZE	PASSING	SPECIFICATION
	ided in Test = -0%	
3"		
2"		
1 1/2"	100%	
1"	97%	
3/4"	93%	
1/2"	84%	
3/8"	76%	
No. 4	59%	
Total Wt; ⇒ 226	518g	
No. 8	48%	
No. 10		
No. 16	38%	
No. 20	33%	
No. 30	29%	
No. 40	24%	
No. 50	20%	
No. 60	18%	
No. 80		
No.100	14%	
No.200	10%	
otal Wt. of Fin	e Fraction = 577g	
0.02 mm		

David L Andersen

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Client: ADOT&PF Southeast Region	Project: Haines Highway W.O. D59119D W.O. D59119D	Lab No. 2005-2998		INCOULIC	SIZE PASSING SPECIFICATION +3 in Not Included in Test +	2"	1 1/2" 100%	1" 90%		3/8" 54%		1011 WEF 14/12/6	0		No. 30 21%	Two: 50 14%	No. 60		0.01 0.001	Particle Size (mm)	_
	n of DOWL LLC	Sample 3 Douth st & st	Engineering Classification: Well Graded GRAVEL with Silt and Sand. GW-GM	Frost Classification: Not Measured	1 1/2"			80%	ght 20%		ρλ Λ	50% F		30%			\dashv	00	100 10 10 0.1	© Alaska Testlab, 1999	David L Andersen

: ç.,,

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A DIVISION OF DOWL LLC Project: Haines Highway Location: Test Boring 156 Sample 1 Depth 2' - 3' Fnoincering Classification: Dorder Graded & AND with Canada Cassification: Dorder Graded & AND with Canada Cas	DIST. ASTM D422
ion: Test Boring 156 Sample 1 Depth 2' - 3' eering Classification: Doordy Graded SAND with Cannol Sh	
Sample 1 Depth 2' - 3' eering Classification: Doculy Graded SAND with Graced su	W.U. D59119D
Depth 2' - 3' eering Classification: Doorly Graded SAND with Graved CD	Lab No. 2006-682
eering Classification: Doorly Graded & AND with Carried an	Received: 6/1/06
	Reported: 6/8/06
Frost Classification: NFS MOA	SIZE PASSING SPECIFICATION
{/2'' 2''	<u>19 11 11 11 11 11 11 11 11 11 11 11 11 1</u>
	2" 100%
	1 1/2" 98%
	1" 91%
	3/4" 85%
	3/8" 73%
60%	No. 4 66%
	Total Wt. + 197128
	No. 10 62%
30%	No. 20 51%
20%	No. 40 22%
	No. 60 6%
7200	
0% قوامدة ما ما ما المعدد ما ما ما ما ما ما ما ما ما ما ما ما ما	No. 100 3%
100 10 1 0.1 0.01 0.001	No. 200 1.2%
© Alaska Testlab. 1999	Total Wt. at Fine Fraction = 363.1g
	0.02 mm

ALASKA Client: ADOT&PF Southeast Region	PARHCEE-SIZE
A DIVISION OF DOWL LLC Project: Haines Highway	DIST, ASTM D422
Location: Test Boring 158	W.O. D59119D
Sample 1	Lab No. 2006-683
Depth 1' - 2'	Received: 6/1/06
Engineering Classification: Poorly Graded GRAVEL with Sand, GP	Reported: 6/8/06
Frost Classification: Not Measured	SIZE PASSING SPECIFICATION
I 1/2"	
	1 1/2" 100%
	1" 80%
	3/4" 70%
	1/2" 61%
0%0/	
	No. 4 42%
	Total: Wr. = 53999g (1000000000000000000000000000000000000
SSE	No. 10 30%
30%	No. 20 1.9% No. 30
#20 	No. 40 11%
	No. 50
	No. 60 7%
1	
	No. 200 3.3% Trivial WP: 36th::::::::::::::::::::::::::::::::::::
© Alaska Testlab, 1999	0.02 mm
David L Andersen	
David L. Andersen, P.E., Technical Advisor	

APPENDIX D

Debris Flows

HAINES HIGHWAY DEBRIS FLOWS MP 19 AND MP 23

Debris Flow Areas

The section of the Haines Highway currently planned for upgrades traverses two alluvial fans – one at about Milepost (MP) 19 and one at about MP 23. Both fans began to form after the last retreat of the glaciers that formed the Chilkat River valley, and are active geologic features that periodically produce large flow slides that cover portions of the highway. The fans were formed by deposition of eroded materials whose sources are in the valleys and cirques above the steep walls of the Chilkat River valley. This valley is bordered on the east by the steep walls of the Takshanuk Mountains, which rise abruptly from an elevation of about 100 feet to over 5,000 feet above sea level in a distance of about 9,000 feet. The surface slopes of the cones are fairly gentle and vary from about 10 percent to about 15 percent. The apexes of the cones are at about elevation 1,000 feet. The base of the fan at MP 19 is about 1.5 miles wide, and the fan at MP 23 is about 2.0 miles wide at its base. Both fans terminate on the banks of the Chilkat River (Figure 1).

The soils that comprise the alluvial deposits of the fans come from the steep rock walls of the incised valleys above the fans. They generally are loose and well graded, and are composed of particles that range in size from fine sand and silt to boulders up to six feet or more in diameter. The creeks that produced the fans normally flow at low volumes and velocities in well defined channels (Figure 2). However, during periodic storms that occur over the barren watersheds above the fans or on the remnants of winter snow packs in those areas, the flows of the streams increase dramatically can produce flow slides that reach the highway. The forces developed in the floodway during those times are large enough to dislodge and transport boulders up to six feet in diameter. This process has been occurring since the foreseeable future. The amount of material that reaches the highway during these annual events typically is constrained within the catchment areas and does not impact the normal use of the highway. However, occasionally large slides occur and significant volumes (100,000+ cubic yards) of soil and rock scoured from the stream channels flow down the fans and across

the highway. Debris flows which have crossed the highway during those rare events have been reported to reach depths of six to twelve feet at the center of their leading edge and have had breadths of up to 900 feet.

State of Alaska, Department of Transportation and Public Facilities (DOT&PF) personnel responsible for maintenance of the highway indicate minor flow slides, of which limited quantities of material may overtop the road, generally are annual occurrences. However, major slides, such as the November 2005 event, where as much as 12 feet of debris covered the road, are rare – perhaps on the order of 30 to 50 years between occurrences.

Effects of Slides

The effects of flow slides on the highway are threefold:

- 1. Safety to the traveling public,
- 2. Disruption of surface transportation, and
- 3. Costs of clean up and repairs to the highway.

When debris flows are large enough to overtop and cross the highway, it is possible that vehicles could be struck causing injury to the occupants and damage to vehicles. Apparently this occurred during the last major slide at MP 23 (November 2005). A passenger car was caught in the slow moving debris flow and its lone occupant was barely able to get out of the car and reach safety with help of other travelers stopped near the perimeter of the slide. It is our understanding that no one has been seriously injured to date, but the unpredictability of the slides suggests that debris being suddenly washed onto the road could cause a danger to motorists.

When flow slides cross the road embankment, traffic is disrupted until the debris is removed. Disruption of traffic on this highway can have serious impact on the normal flow of people and goods in Alaska.

Current Control Measures

During recent years the DOT&PF has made attempts to control the flooding and periodic debris flows in these areas by excavating catchments upstream of and adjacent to the highway and by installing large diameter culverts below the highway (Figure 3). The arch

culvert at MP 19 is about 10' by 6.5" and the culvert at MP 23 is about 8' by 6'. They also created a catchment berm (Figure 4) near the top of the fan at MP 23 in hopes of reducing the amount of debris that would reach the highway. Reportedly, these measures have been successful in stopping the smaller, more frequent debris flows from covering the highway. However, an unusually large event in November 2005, filled the roadside catchment at Mile 23 and covered the highway to depths up to 12 feet (Figure 5).

When small events occur, DOT&PF personnel remove the accumulated debris adjacent to the road embankment and within the pipe culverts. The culverts in these areas are significantly oversized to allow equipment to remove the debris that may fill and plug the culverts. Generally, it only takes a few days to remove the slide material, and there is little or no impact to the traveling public. However, during the major slide that occurred in November 2005, it took maintenance crews two and a half days to reopen just one lane of the highway. Moreover, it took another two to three weeks to clear the rest of the debris from the highway because of the onset of freezing weather. Removal of material within the catchment area took about three months because of weather constraints.

Optional Control Measures

There are four options for dealing with the debris flows that periodically cross the highway:

- 1. Do nothing more than continue with the current mitigation and control measures,
- 2. Improve the size and extent of the catchments and increase the number and size of culverts,
- 3. Elevate the road along its current alignment where it crosses the areas susceptible to debris slides, and
- 4. Relocate the road upslope from its current alignment and construct a bridge over the streams that are the sources of the flow slides.

Each option has different initial costs and long-term maintenance costs. Typically the options with the lower initial construction costs will have higher maintenance costs.

Option 1 – Continue with Current Control Measures

This option would be limited to incorporating the current mitigation measures into the new highway improvements with little or no change to the current configuration of catchments and culverts. Maintenance of the upper and lower catchment areas would remain essentially the same as the current program.

Option 2 – Improve Catchments and Culverts

The current single culverts at MP 19 and MP 23 are in place only to allow passage of the streams below the road. They are not intended to allow passage of slide materials and to protect the road from being overtopped. They were sized principally to allow maintenance crews to use small equipment to remove debris that fills the culverts when slides occur. The performance of culverts during debris flows could be improved by including cast-in-place concrete headwalls at the upstream ends of the culverts. However, this improvement would only be a help in cleaning out the culvert after a slide.

Installation of additional culverts likely would only make cleanup after a slide more difficult and more costly, since small equipment would be required to remove the debris out of the additional culverts. The additional culverts would have little effect on mitigating the potential for a large debris slide to overtop the road.

Two measures could be taken to lessen the chance of debris slides overtopping the road during construction of the new highway improvements. The catchments adjacent to the road could be extended in length, widened and perhaps deepened to accommodate a larger volume of debris, and the centerline grade of the road could be raised as much as is practical in the areas currently subject to debris slides. These two improvements would be relatively inexpensive to construct and would allow larger volumes of slide debris to accumulate before crossing the road. These simple measures would lessen the probability of overtopping the road during the more frequent, smaller events, but still would require removal of slide debris after each event.

Option 3 – Elevated Road

The surest way to mitigate the likelihood of slide debris covering the highway in the future would be to elevate the road in the areas subject to debris flows. This approach would have high initial construction costs, but could be designed to allow future debris flows to pass below the highway and not pose a danger to the traveling public nor close the road to traffic.

Two approaches to elevating the sections of the road subject to overtopping by flow slides are:

Option 3A - Conventional bridge structures, and Option 3B - Precast component arch bridges.

<u>Option 3A</u>. If a conventional bridge were utilized to allow the passage of flow slides, the bridge span(s) would have to be long enough to accommodate potentially large slides. It is likely bridges would have to span 100 to 200 feet to allow large slides to pass. Furthermore, some stream training and long-term maintenance of those improvements likely would be required to insure flow slides would remain in a path directed to the elevated section of the road.

Bridge supports (piers and abutments) would have to be continuous walls essentially perpendicular to the direction of potential debris flow to minimize the dynamic forces of flowing slide debris on the structures. Individual column supports are not recommended because of the potential for damage during the passage of slide debris. Furthermore, bridge piers of this nature and location would have to be founded deep enough below grade to mitigate the potential for scour of their foundations during passage of debris flows. For this reason pile foundations may have to be used to support the bridge abutments and piers.

It is likely the bottom of bridge deck components would have to be on the order of 12 to 15 feet above the surrounding ground to allow passage of slide debris. This situation would require approach ramps at each end of the elevated sections. The sides of the approach ramps might have to be supported by retaining walls if the available right-of-way and/or the surrounding topography limit the width of ramp embankment fills. In addition to high construction costs this approach also would significantly lengthen the time of construction beyond that of an earthwork only approach.

<u>Option 3B.</u> Precast concrete arch structures (Figure 6) would serve the same purposes as conventional bridges; however, they would have advantages of somewhat lower costs and much shorter construction periods. The other elements of conventional bridge design and construction also would apply to the precast arch approach.

Option 4 – Realign Road Upslope

Another way to control the likelihood of debris flows crossing the highway would be to realign the road well upslope from its current location at both areas affected by debris flows, and to construct bridges across the streams that flow down the alluvial fans. We do not believe this approach has practical merit for several reasons:

- The length of bridges would not be significantly shorter that those at the current location of the road;
- This approach would require hundreds of feet of new road up and down the alluvial fans;
- It is likely new right-of-way would have to be acquired; and
- Construction costs of both the bridges and the approaches likely would be significantly more than those along the current alignment.

Each option also would have to account for any environmental factors and restrictions that might affect construction of planned improvements.

Recommendations

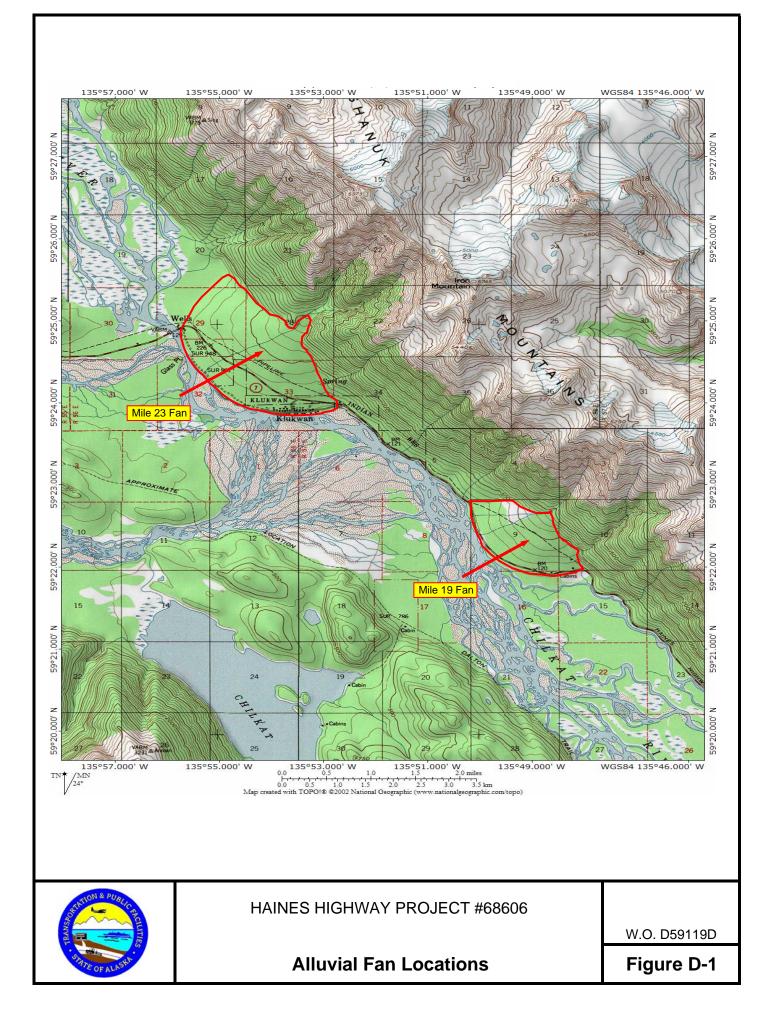
Table D-1 compares the relative costs and impacts on maintenance costs and on public safety of the four options discussed above. Based on this summary, we recommend Option 2. This option requires a substantial amount of earthwork, but by raising the elevation of the roadway and increasing the catchment size, the frequency of debris flowing across the road should decrease, thus increasing public safety.

Whichever option is selected, we recommend:

- 1. The catchment areas on the upstream side of the highway be expanded in length and breadth to allow larger storage areas for slide debris, and
- 2. A topographic survey (aerial) of the two alluvial fans be provided to evaluate the need and the practicality of performing stream training upslope from the highway. Stream training may be required to control the path of future flows to insure they reach the catchment areas.

	Option	Initial Costs	Annual O&M Costs	Earthwork and Construction	Additional Construction Time (weeks)	Closure Time (per Slide) (days)	Safety Improvement Over Existing
1.	Do Nothing	\$0	\$50,000 to \$100,000	\$0	None	1 to 2	None
2.	Improve Catchments and Culverts	\$50,000	\$50,000	\$250,000	2	1 to 2	Minor
3.	Elevate Road (Bridges) A. Conventional Bridge (100 ft to 200 ft) B. Precast Arch Bridges (100 ft to 200 ft)	\$3,000,000 to \$6,000,000 \$1,500,000 to \$3,000,000	\$25,000 \$25,000	\$500,000	4 to10 2 to 4	0	Higher Higher
4.	Realign Road Upslope and Bridge Creeks	\$10,000,000+	Unknown	\$1,000,000	12 to 16	0	Higher

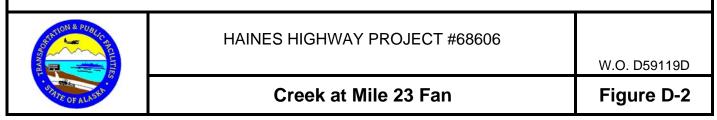
FIGURES





A. Creek Floodway and Channel Upstream of Mile 23 Fan.







A. Creek Passing through Culvert Below Highway (Upstream).



B. Creek Passing through Culvert Below Highway (Downstream).

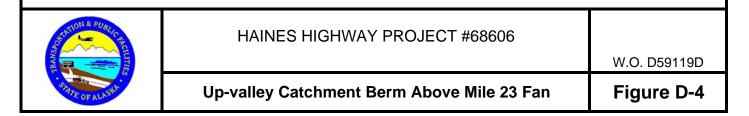




A. Catchment Berm (Note Size of Boulder Left of Center).



B. Catchment Berm (Nearby View).





A. Culvert Plugged with Debris and Flood Waters Overtopping Road.



B. Roadside Catchment Filled with Flow Slide Debris and Road Buried.

