

Attachment F: General Mining and Reclamation Guidelines for Material Site 65-9-116-2 Bonanza Creek: Milepost 124.4 Dalton Highway

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State of Alaska
Department of Transportation and Public Facilities
General Mining and Reclamation Guidelines for
Material Site 65-9-116-2
Bonanza Creek: Milepost 124.4 Dalton Highway

The general Mining and Reclamation (M&R) Guidelines, detailed below, is for material site (MS) 65-9-116-2, also known as the Bonanza Creek or Bonanza Creek West. This referenced MS will be authorized under a Highway Easement Deed (HED), issued to the Alaska Department of Transportation and Public Facilities (DOT&PF) by the Federal Highway Administration.

MS 65-9-116-2 is located within the Bonanza Creek floodplain on the west side of the Dalton Highway near milepost (MP) 124.4, and; within the southwest $\frac{1}{4}$ of the northeast $\frac{1}{4}$ of Section 07, Township 21 North, Range 14 West, Fairbanks Meridian, USGS Quadrangle Bettles C-2 (Figure 1).

These M&R Guidelines shall be incorporated into the awarded contractor's M&R Plan. The contractor's M&R Plan will require DOT&PF's approval before the plan can be implemented. Additionally, any deviations or modifications to the approved M&R Plan via a modification request and must be approved in writing prior to its execution.

The Bonanza Creek MS, 65-9-116-2, has been identified by both the U.S. Fish and Wildlife Service (USFWS) and the Bureau of Land Management (BLM) as an area of high concern for the spread of invasive plant species. As such, the M&R Guidelines provided below deviate somewhat from general M&R practices. This is done in order to mitigate, to the extent practicable, the introduction and spread of invasive plant species within this MS.

General MS Information

In 2004, Golder Associates, Inc. (Golder) completed a geotechnical exploratory of this site to assess the quality and quantity of the material from this potential source. Their exploration program consisted of advancing eleven borings using solid flight augers, each boring extended to 30-foot depths, and selective samples were collected at varying depths from each of the borings. The drill pattern was spaced to provide representative coverage of an area that's approximately 35 acres, measured across an irregularly shaped site boundary that's about 1,500 feet long by 900 feet wide.

Golder's geotechnical report is enclosed and a brief summary of their findings is provided below:

Golder reported that all eleven borings encountered a thin surficial organic mat that averaged about 0.5 feet in depth. The organic mat was typically underlain by 0.5 feet to 2 feet of organic silt. Below the organic silt layer are fairly homogenous alluvial sandy gravels that contain occasional cobbles.

Golder's drill logs indicate that at the time of exploration program, May 18 through May 20, 2004, seasonal frost was present to a depth of approximately 2.5 feet to 4 feet below ground surface (bgs). Golder reported that groundwater was encountered at depths ranging from 6 feet to 13 feet bgs except for one boring, which Golder interpreted as being frozen and indicative of a small isolated area(s) of discontinuous permafrost within the site.

Mining and Reclamation Guidelines

The mining and processing method selection is at the discretion of the contractor. The contractor is responsible for visiting and inspecting the site and reviewing available site information prior to the selection of the mining method and equipment to be used. The contractor is responsible for the development and submittal for DOT&PF's approval of a project specific Mining and Reclamation (M&R) Plan.

Minimizing the Spread of Invasive Species

In order to minimize the spread of invasive plant species into MS 65-9-116-2 and the Bonanza Creek stream corridor, these M&R Guidelines include a focus on general revegetation and invasive species best management practices (BMPs), as well as specific mitigation measures for the development of the Bonanza Creek MS which will need to be included in the contractor's project specific M&R Plan.

The Bonanza Creek MS, 65-9-116-2, has been identified as an area of high concern for the spread of invasive plant species by federal agencies. Of particular concerns is the introduction of invasive plant species into the Kanuti National Wildlife Refuge (KNWR). The KNWR's eastern boundary is located approximately 7 miles downstream from MS 65-9-116-2 and Bonanza Creek has been identified as a potential pathway for the introduction and colonization of invasive species into the KNWR which currently has no invasive plant species identified within its boundary. For the purposes of this M&R Guidelines, the term "invasive plant species" refers to the invasive plant species listed in the Alaska Department of Natural Resources' (ADNR) list of Prohibited and Restricted Noxious Weeds, as well as species with an overall invasive ranking of 60 or higher on the Alaska Center for Conservation Science (ACCS) Non-Native Plant Species List (ADNR 2023; ACCS 2023a).

Prior to the Contractor's mobilization of equipment to the project site, all equipment must be pressure washed to ensure the respective piece of equipment is free of all soils and vegetative debris. This will minimize the introduction of invasive plant species into the project areas.

Only the equipment operating within the material site is allowed to be staged in this material site.

Access Roads, Work Pads and Facilities

Access to the mine site will need to be constructed directly from the Dalton Highway as shown on the project's Plans. However, the Delta-Salcha Soil and Water Conservation District (DSS&WCD) and the BLM have determined that invasive plants (predominantly white sweetclover (*Melilotus albus*) and Bird vetch (*Vicia cracca*)) are already present

along both sides of the Dalton Highway at this location and they exist approximately 30 feet past the highway's embankment toe of slope on each side. The Bonanza Creek MS appeared to have no invasive plant species. Therefore, as part of the construction of driveway access into MS 65-9-116-3, the Contractor is required to stockpile all vegetation and overburden removed from this area into a separate and segregated stockpile area. General details of what is expected of the segregated stockpile containing invasive plants and a pressure wash area are provided under their respective headings below.

Furthermore, in order to have a large enough area for crushing, screening, stockpiling and loading of material, the Contractor should anticipate that a minimum area of approximately 5 acres will be required. The Contractor is to site this work area so as not to preclude or hinder future development of unmined areas, and it is to be sited as far away from Bonanza Creek as possible.

Buffer Distance

Maintaining distance (buffer) between pit limits and adjacent lands or water bodies is intended to screen the site from adjacent land and to protect water quality and riparian habitats. Except where necessary to create access to the mining area from the highway, manage activities to eliminate disturbance within buffers. In this regard, development of MS 65-9-116-2 will require that a 100-foot-wide minimum buffer be established, clearly marked, and maintained from the active channel of Bonanza Creek, measured from the ordinary high water (OHW) level. This buffer is to be surveyed and clearly marked to the satisfaction of the engineer. No ground disturbance is allowed within this area. A 50-foot-wide buffer is also to be established as shown on Figure 1.

No mining activities, staging areas, processing area, stockpile areas, work pads, or any other actions, except for construction of a driveway/site access, are to occur within the buffers.

Vegetative Clearing, Stripping of Overburden, and Stockpiling Organic Material

No material or debris from outside of MS 65-9-116-2 is allowed to be brought into this site. This includes any temporary stockpiles produced outside of the material site.

Vegetative clearing is to be limited to an area that can be reasonably mined and allows for necessary operations in one season. The equipment and vehicles that traversed any areas containing invasive species must be pressure washed prior to working within the material site.

Additionally, in order to reduce the risk of infestation by spruce bark beetles, the shrubs and trees are to be mulched by mechanical means. At the Contractor's discretion, any trees having a diameter of 16-inches or greater may be salvaged from this site, but they must be removed from the MS within 90 days.

As previously stated, Golder reported that all eleven of their borings encountered a thin surficial organic mat, approximately 0.5 feet thick, which is then underlain by an organic

silt layer that's approximately 0.5 feet to 2 feet thick. Both the organic and the silt layer can be cleared simultaneously and stockpiled together in a location identified in the M&R Plan and approved by the Engineer. This organic/overburden stockpile is to be used as part of the stabilization and reclamation efforts, discussed under its respective heading.

As previously stated, an entirely separate and segregated stockpile is required for all vegetative materials and soil that contains or is suspected to contain any invasive plant species. This stockpile is to be sited as far away from Bonanza Creek as possible and is to be sited near the highway where invasive plants have already been identified (Figure 1). This stockpile is also required to be covered with black visqueen or other approved material and the cover be secured with an earth berm at the toe of the slope.

Establishing the Pressure Wash Station

To prevent the introduction of invasive plant species into MS 65-9-116-2, the Contractor is required to pressure wash all soil and vegetative debris from all equipment that has been operating within areas of known or suspect areas of invasive plants (i.e. within 50 feet of the toe of the highway embankment and any auxiliary road) prior to it being utilized within the MS. A temporary exception is that the equipment used for the construction the driveway/access, construction of the invasive plant species stockpile, and the construction of the pressure washing station can be postpone until those areas have been constructed. Immediately afterward, this equipment must be washed before can be utilized within this site.

The water used for pressure washing the equipment shall not drain outside the area that has been established for the pressure wash station, rather it must be contained within the water collection pit where the water will drain into. Entrance into and out of the pressure wash station should also be graded to prevent any water draining from the pressure wash station. The water collection area shall be sized appropriately so that it can store all the water that the Contractor anticipates would be needed to wash the equipment until this used water is able to percolate back into the alluvium within the water collection pit. Water contained within the pressure wash area cannot be reused for washing equipment.

Quarry Development

The side slopes of the pit above the water table, as well as the adjacent organic stockpiles, shall be no steeper than 3H:1V. Once the pit's side slopes are established and within seven calendar days after its completion, the contractor is required to apply the seed mix, fertilizer, and mulch using the recommendations of the Alaska Department of Natural Resources and the *Revegetation Manual of Alaska* (Wright 2008). Seed mixes will be applied between May 15 and August 15. These newly seeded areas will be protected from disturbance and will be watered and maintained. Any areas not showing satisfactory growth within 3 weeks of seeding will be reseeded; this includes all patches of bare soil measuring 10 square feet or greater and erosion gullies that are more than 4 inches deep. Erosion gullies more than 4 inches deep must be filled to grade prior to reseeded. Revegetation will not be considered complete until the 70 percent cover requirement is met following one complete growing season after revegetation activities occur.

Furthermore, once the 3:1 slope meets the groundwater level of the newly formed pond the grade is to change to a flatter slope for a horizontal distance of 10 feet below the waterline, see Figure 2. A rounded shaped shoreline (such as kidney-bean shape) is also required to the extent practicable, meaning a symmetrical pit such as a nice rectangular shaped pit with straight shorelines is not to occur.

After the pit's side slopes have been established, including the inundated area of the pit, the pit excavation is to be deepened to the maximum extent practicable, but no less than 25 feet depth. This depth requirement is to maximize the quantity of material that can be extracted from this material site.

However, because disturbed ground is the most susceptible to establishment and propagation of invasive plant species, the final grade of the pit's two or three side slopes and shoreline contouring should be completed before the major focus of gravel extraction commences. Soon after the exposed pit slopes have been graded (3H:1V), but no later than 7 calendar days, all disturbed ground along these side slopes are to be stabilized by applying seed mix, fertilizer, and mulch using the recommendations of the Alaska Department of Natural Resources and the *Revegetation Manual of Alaska* (Wright 2008). Only the sides from which the Contractor will be working may remain unstabilized until the mining is completed, but these may not be all 4 sides of the pit

Mining

Mining shall take place in general accordance to the following practices:

1. To prevent the introduction of invasive plant species into MS 65-9-116-2 (Bonanza Creek) the contractor is required to pressure wash all vehicles and equipment prior to mobilizing to the project.
2. Survey the material site and mark the buffer boundaries prior to breaking ground.
3. Do not place overburden above potential future resources.
4. Conduct mining activities to put materials to their optimum use. Expected full depth of excavation is to be no less than 25 feet.
5. The grade of the pit's furthest side slope and shoreline contouring should be completed and stabilized, have topsoil spread, and then seeded with mixture of seed, fertilizer and mulch within 7 days, before the major focus of gravel extraction commences. Any area not showing growth within 3 weeks of seeding will be reseeded.
6. All mining and stockpiling activities shall be performed in accordance with all applicable permits, including the Construction General Permit (CGP), associated Storm Water Pollution Prevention Plans (SWPPP) and any other permits associated with the project at hand.
7. Grade slopes above water table to 3H:1V or flatter.

8. Once the 3:1 slope meets the groundwater level of the newly formed pond the grade of the slope below the waterline is to change to flatten for a horizontal distance of 10 feet, see Figure 2.
9. A kidney-bean-like shape shoreline is required to the extent practicable.

Reclamation

Upon completion of the project, all facilities and equipment shall be removed. Garbage or other items such as guardrail, concrete, etc. shall not be brought to the MS or disposed of within the MS. Any solid waste generated from the mining operations must be removed from the site within 90 days.

Project Mining and Reclamation Plan

Prior to site use, the contractor or user shall submit a Project Mining and Reclamation Plan, in accordance with AS 27.19 and 11 AAC 97, to Alaska DOT&PF review. The M&R Plan shall describe the proposed plan of operation and shall be in compliance with guidelines listed here. Upon approval, the M&R Plan will be followed by the contractor and the DOT&PF Project Engineer. The M&R Plan should include the following:

Sketch Map

The sketch map shall include:

1. Site boundaries and access.
2. Proposed working limits and buffers, to be marked on the ground.
3. Side of the future pond that is to be stabilizing prior to mining activities.
4. Organic debris and overburden placement areas.
5. Work pad, stockpile locations, crusher site.
6. Scale of drawing, north arrow, and specific dimensions as appropriate.

Narrative

The narrative shall include:

1. Methods of extraction and processing.
2. Estimated quantities for material extraction.
3. Estimated acreage of usage.
4. Length and times of operation (day, month, year and working hours).
5. Air and water pollution control measures.
6. Reclamation measures.

Supplements and amendments

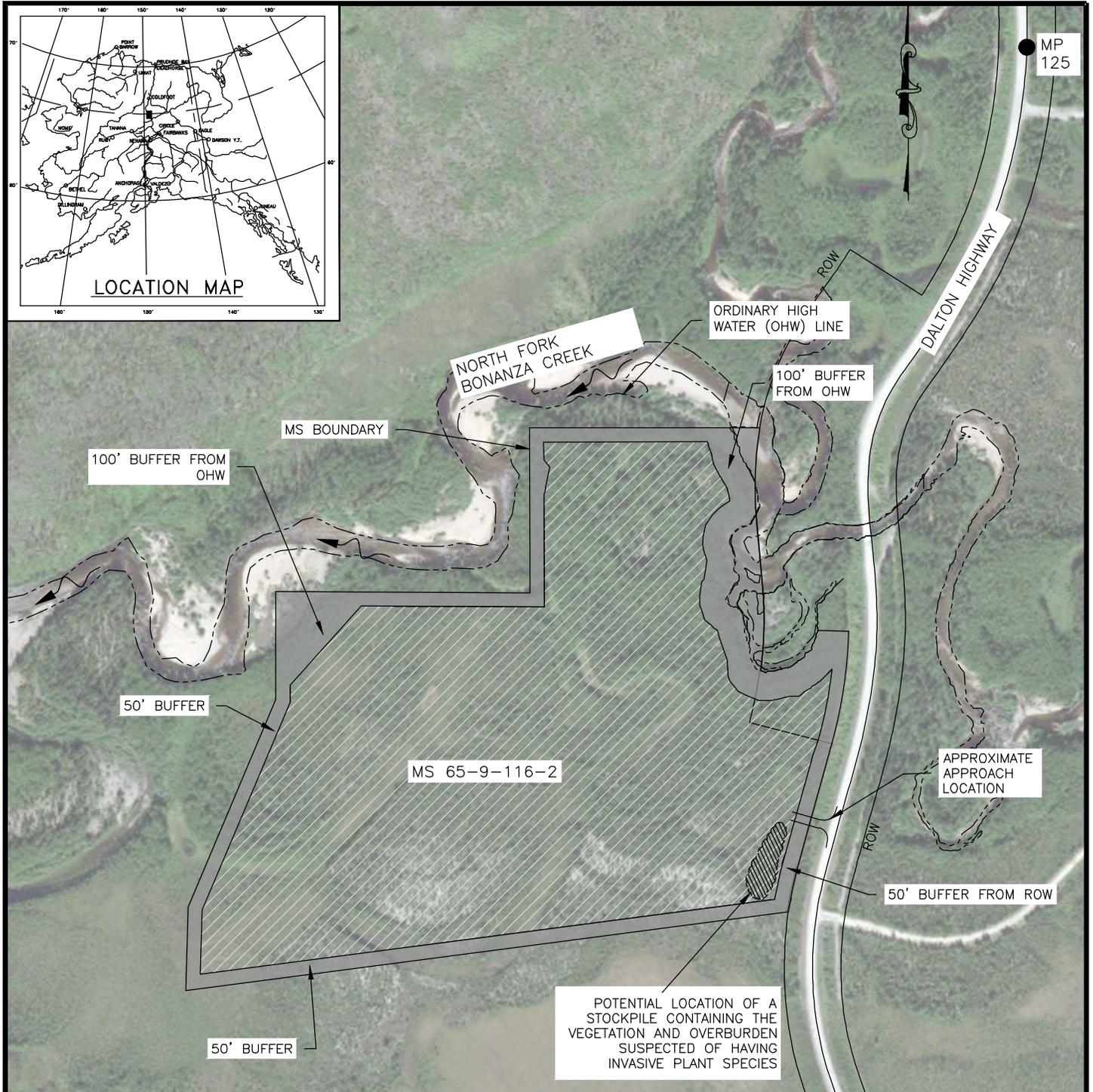
Any deviations or modifications to the approved M&R Plan via a modification request must be approved prior to its execution.

Attachments:

Figure 1: Plan View of MS 65-9-116-2.

Figure 2: Typical Cross Section in Unconsolidated Material Below Water Table.

Golder Associates, Inc. 2004 Geotechnical Report



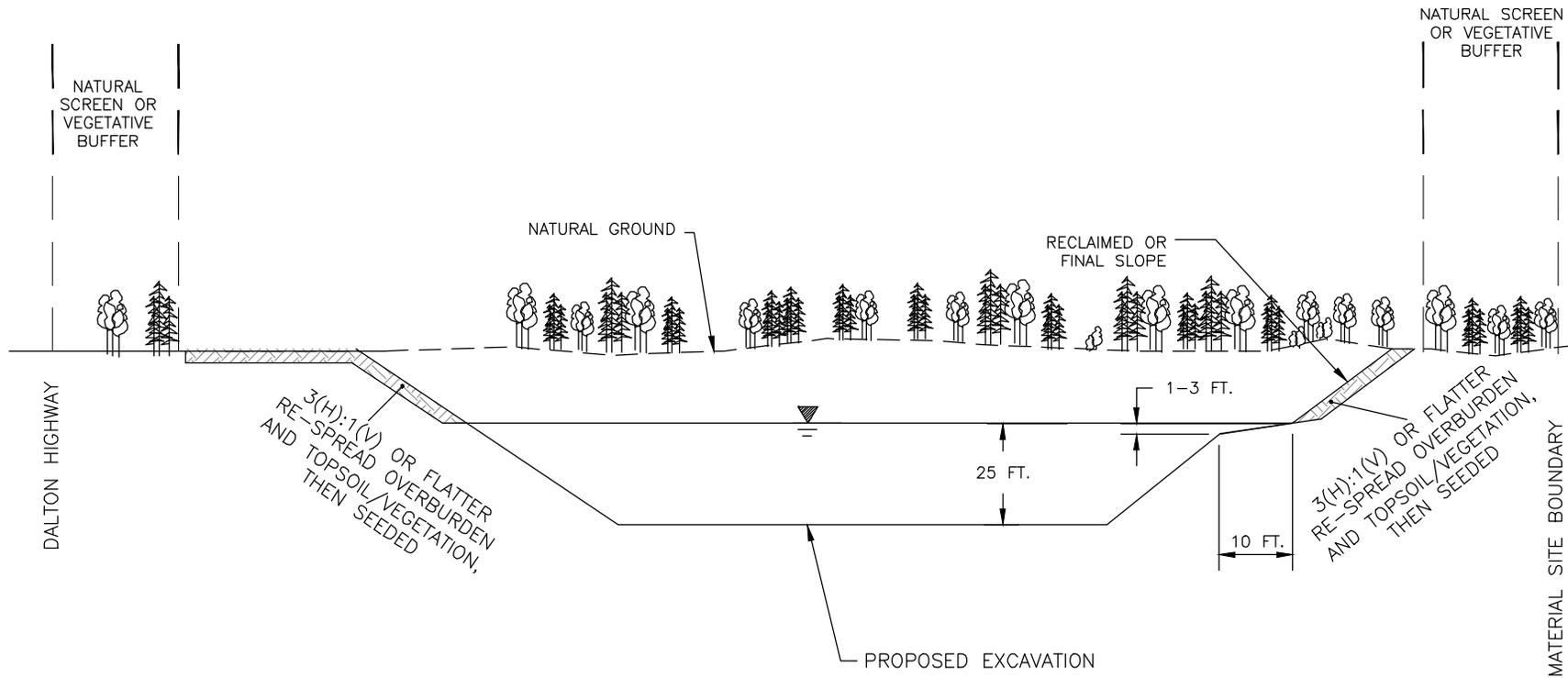
M.S. 65-9-116-2

WITHIN
USGS QUAD. BETTLES C2
T21N, R14W, FM
Section 7

Material site contains ~51 acres.

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES
MATERIAL SITE PLAN
M.S. 65-9-116-2

NORTHERN REGION	DATE: 12/12/23
SCALE NTS DRAWN BY: BAM	FIGURE 1



BONANZA CREEK
MS 65-9-116-2
TYPICAL CROSS SECTION OF MINING

NOT TO SCALE

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES	
DATA: WK	MINING RECLAMATION TYPICAL SECTION
DRAWN: BAM	
APPROVED: IH	PROJECT NO. N/A
DATE: 12-12-23	FIGURE 2

8.7 DH MP 124.4 – (BONANZA CREEK WEST)

8.7.1 Location and Access

This site is located on a very broad floodplain immediately to the west of the Dalton Highway at MP 124.4. It has not been previously developed for any purpose and has no existing access road. Access by tracked vehicle is possible by departing the highway embankment a few hundred feet south of the site and following the highway right-of-way to the north.

8.7.2 Description and Subsurface Conditions

This site is a relatively level abandoned floodplain deposit of sandy gravel. A few old channels cut through the site, some of which have seasonally ponded water. The overall site relief appears to be less than 10 ft. The floodplain on the south side of the river is bound by moderately steep silt-mantled slopes underlain by Paleozoic schists and phyllite of the Ruby-Arctic Alaska terrain. Granitic rocks of Cretaceous age outcrop on the north side of the river. Surface drainage shows historic channels of Bonanza Creek have at one time passed through the area, but no recent flows are indicated. Bonanza Creek appears fairly stable in its current channel.

The surface is mostly well-drained and partially forested with scattered to moderately dense spruce trees with a maximum height of about 30 ft. Sphagnum moss is present on much of the ground surface indicating good drainage. The site has an irregular shape but is approximately 1500 ft long, 900 ft wide, and covers approximately 35 acres. All eleven boreholes encountered a thin surficial organic mat with an average thickness of approximately 0.5 ft. This was typically underlain by 0.5 to 2 ft of organic silt. The organic silt was underlain by sandy gravel that extended to a depth of 30 ft, the maximum depth drilled. The gravel contained occasional cobbles. A water table was encountered at depths ranging from 6 to 13 ft except for one borehole which was frozen throughout.

8.7.3 Clearing and Stripping.

The site supports a forest of predominantly black spruce and a few birch trees. The forest cover ranges from scattered to moderately dense and the trees reach a maximum height of about 30 ft. Development of the site will require clearing of the trees and stripping of the organics and silt. The total overburden thickness averages approximately 1.5 ft.

8.7.4 Hydrogeology

Groundwater was encountered in all but one borehole with the water stabilizing at an average depth of approximately 9 ft. Considering the prevalence of permafrost in the region, it appears that there is significant groundwater. The groundwater is likely connected to and recharged by the active channel of Bonanza Creek. The groundwater gradient is to the west, parallel to the creek. Mining of the site will be impacted by groundwater.

8.7.5 Frozen Ground

The region has discontinuous permafrost. The proposed site has relatively little permafrost due to groundwater flow but permafrost is present in localized zones. The ground to the south of the site is likely underlain by mostly continuous permafrost. Seasonal frost penetration appears to be approximately 10 to 12 ft.

8.7.6 Land Status

The site is under the jurisdiction of the BLM. Other encumbrances may be associated with the site.

8.7.7 Quality of Materials

The predominant material that can be obtained from this site is sandy gravel. The gravel percentage is typically greater than 60% with more than 80% passing the 1 inch sieve, and 60% passing the half inch sieve. The fines content is relatively low, averaging approximately 5%, and the fines are non-plastic, meeting the criteria for Selected Material Type A. Since most of the gravel is less than 1 inch diameter, it may be marginal for crushing.

The degradation values are consistently good at 77, 77, and 77, meeting the criteria for any aggregate. LA Abrasion ranges from 34 to 35, suitable for any aggregate. Sodium sulfate soundness ranged from 3.4 to 4.6 for total of coarse and fine, also suitable for any material type. Overall the test results were very favorable and indicated that the material quality is suitable for Selected Material Type A and all surfacing aggregates, although some processing could be necessary to provide large enough material for crushing.

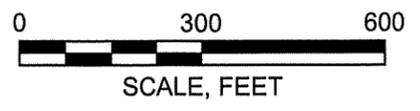
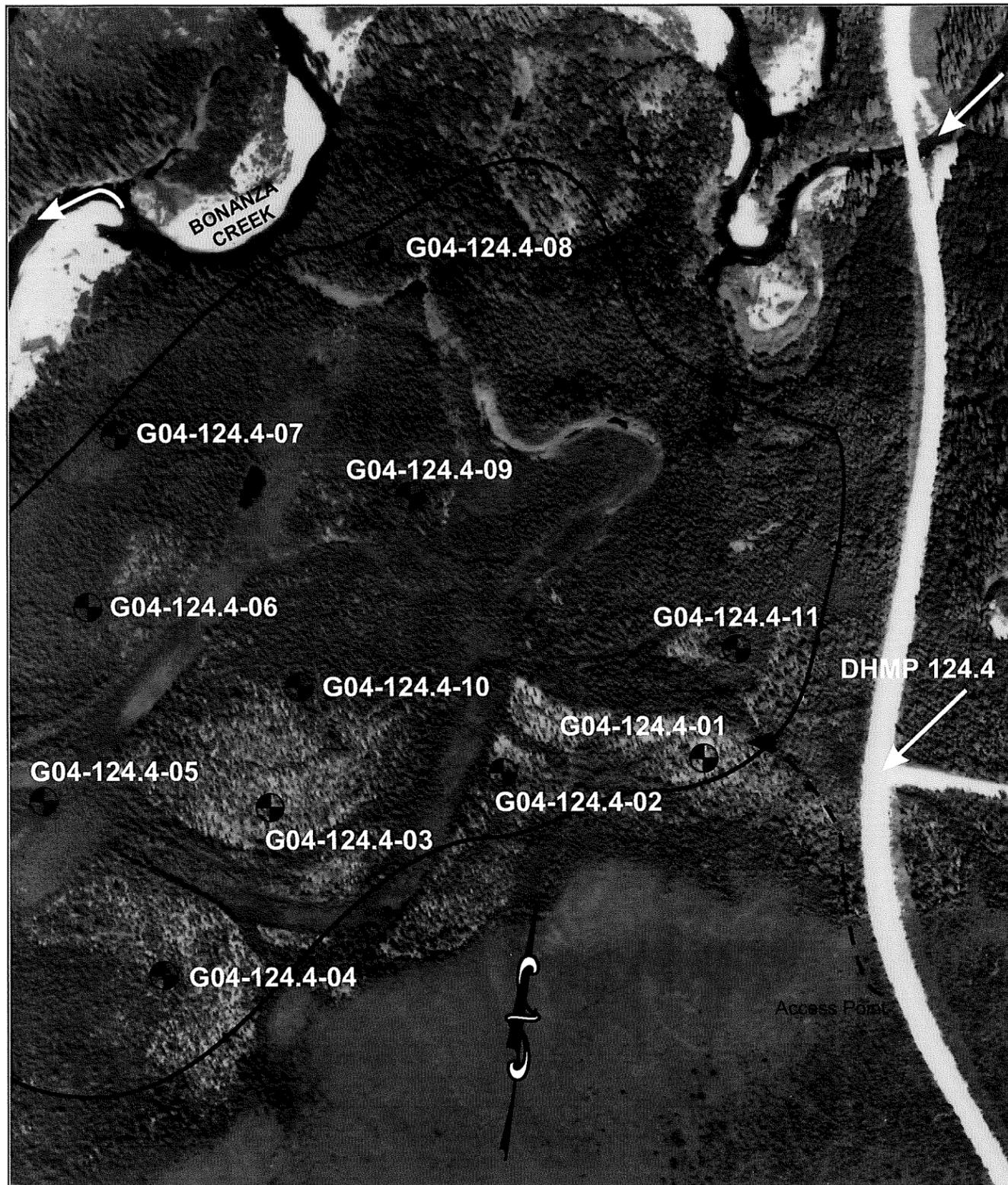
8.7.8 Mining Plan Guidelines

A contractor electing to utilize this site should review permits for fees, royalties, and stipulations. Prior to beginning extraction, present a mining plan for review and approval for the specific area to be mined.

The area is fairly flat (only a few feet of rolling relief) with good visibility for an access approach to the highway. The Dalton Highway is elevated through this area, requiring about 12 feet of fill to gain access. Drilling has indicated that the overburden is 1 to 2 feet thick over most of the area. The gravel below the overburden appears thawed, with the water table typically at a depth of 8 to 10 feet. There is room to leave a buffer between the creek and the new pit.

With roughly 35 acres identified with the previously mentioned conditions, the mine plan options are numerous. Pit access is to be gained from the east edge of the pit through a tree buffer (left for visibility screening). For drainage considerations, it may be best to initiate the pit face near the southwest quadrant of the pit and advance the pit to the north and east. This would allow for a 400-foot wide face with drainage away from the face to the southwest. Overburden can be windrowed to the south and north at the pit limits. The face could be advanced to the northeast. Future potential expansions of the pit would be a similar face advance, starting at the southwest and again advancing north. The entire pit area, based on a shallow 8' scrape, would generate in excess of 400,000 bank cubic yards of material. If additional material is needed or if a smaller footprint is desired, a groundwater control plan will need to be developed to take the pit deeper or else the material could be mined with an excavator.

Excavation of the sand and gravel can be to a depth of 30 ft or greater. After mining, grade the pit side slopes to 1.5H:1V and grade the overburden slopes to 2H:1V or flatter. The side slopes and working faces should be left at a maximum of 1.5H:1V between mining intervals.

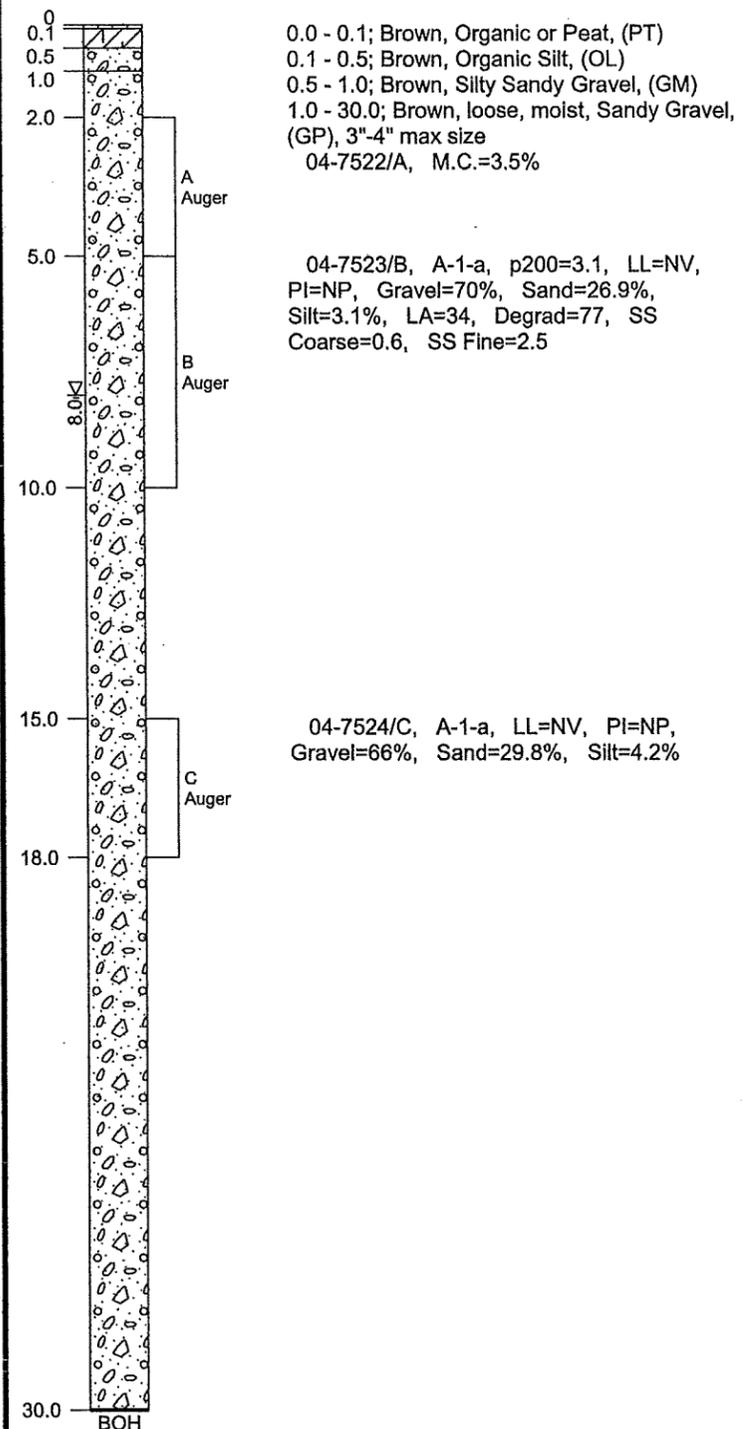


LEGEND:
 ⊕ GAI BOREHOLE LOCATION
 (APPROX.), TAKEN 5/04

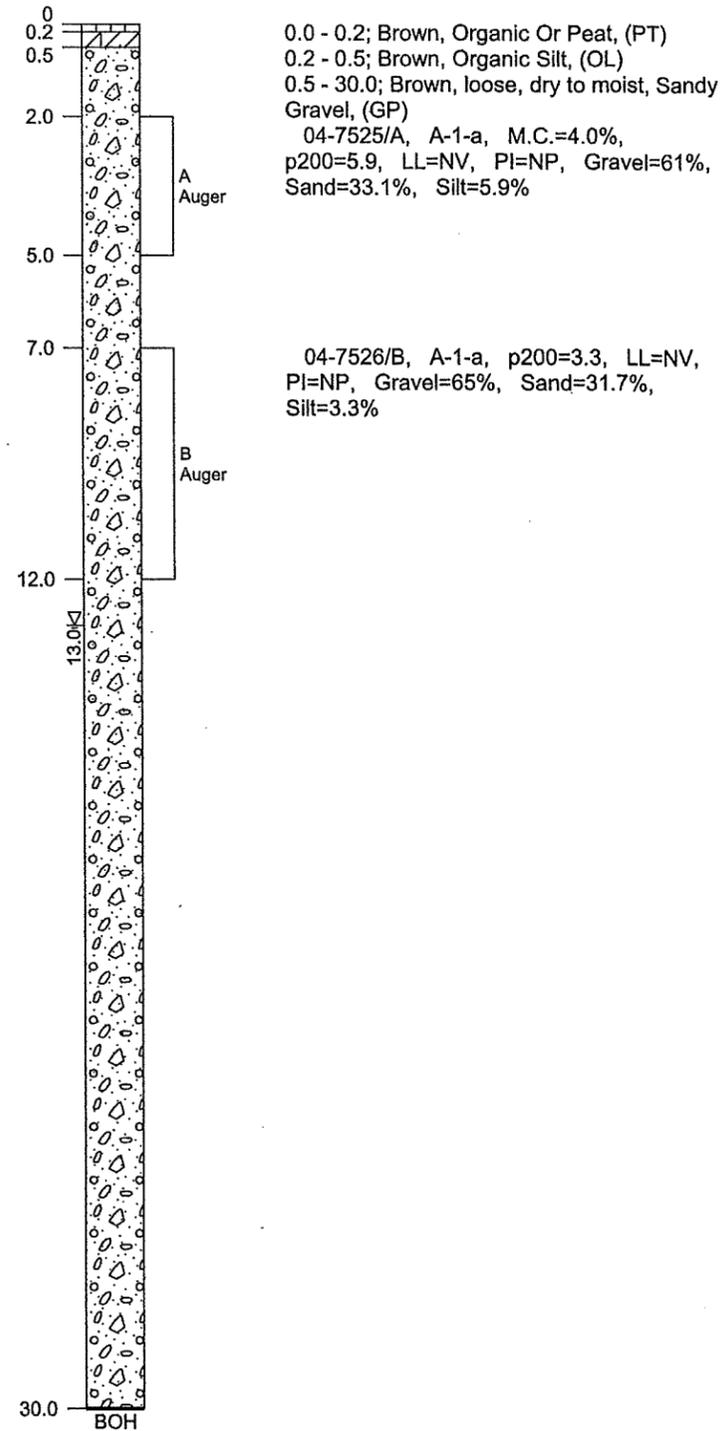
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Figure 8.7.1
**DALTON HIGHWAY MP 124.4
 BONANZA WEST**
 ADOT & PF / DALTON HIGHWAY / AK

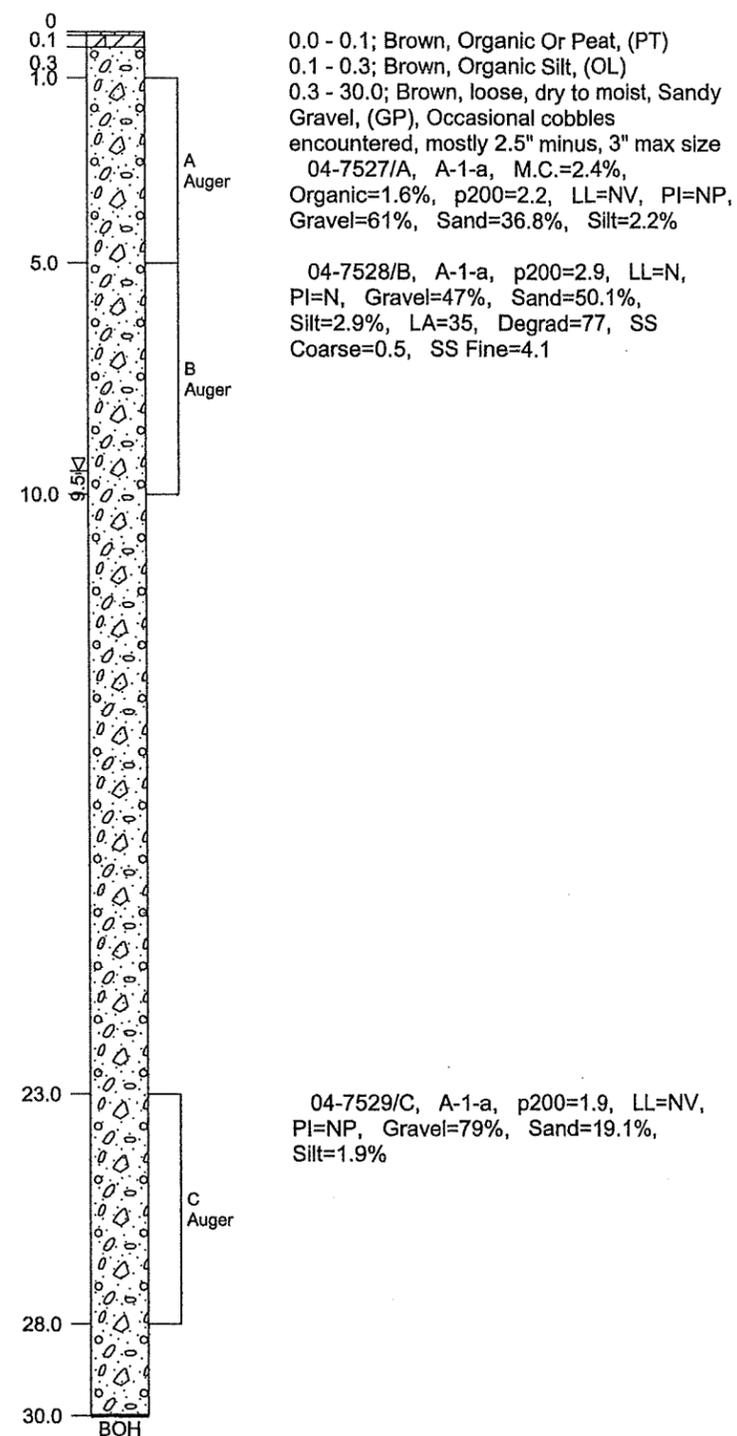
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 5/18/04



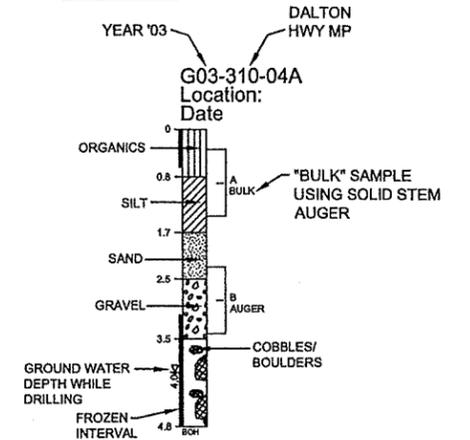
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 5/18/04



G04-124.4-03
 Location: DALTON HWY MP 124.4/BONANZA WEST
 5/18/04



LEGEND:



NOTES:

- 1) All depths are shown in feet.
- 2) Lithology contacts were often inferred based on drilling action.

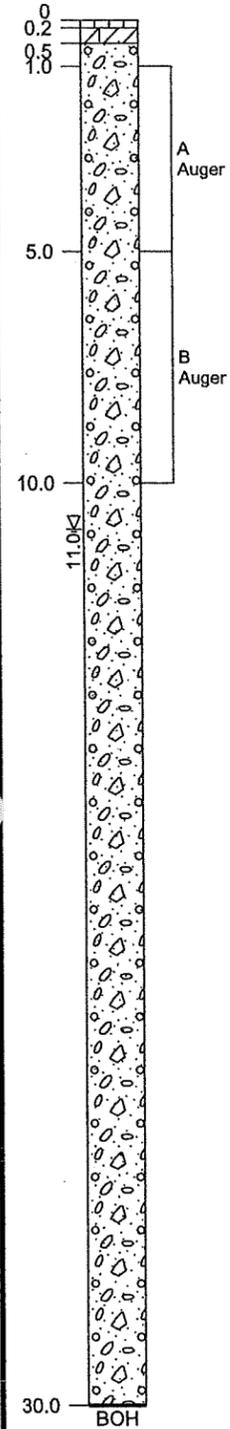
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REVIEW							



FIGURE 8.7.2

G04-124.4-04

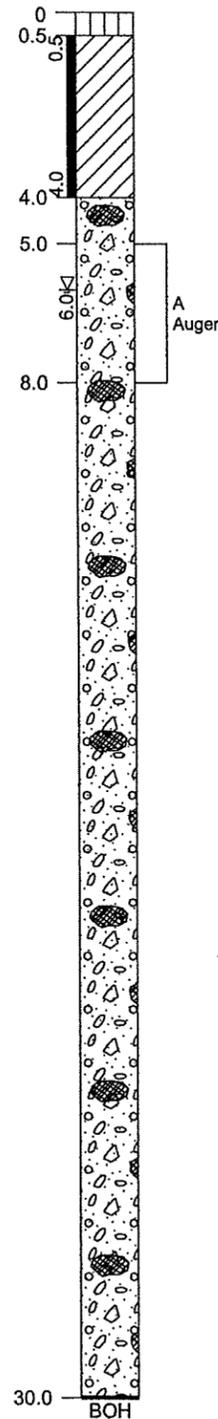
Location: DALTON HWY MP 124.4/BONANZA WEST
5/19/04



0.0 - 0.2; Dark brown, Organic Or Peat, (PT)
0.2 - 0.5; Brown, Organic Silt, (OL)
0.5 - 30.0; Brown, loose, moist to wet, Sandy Gravel, (GP), Occasional cobbles encountered, 3" max size
04-7530/A, A-1-a, M.C.=2.8%, Organic=0.6%, p200=3.0, LL=NV, PI=NP, Gravel=50%, Sand=47%, Silt=3.0%
04-7531/B, A-1-a, p200=2.8, LL=NV, PI=NP, Gravel=63%, Sand=34.2%, Silt=2.8%

G04-124.4-05

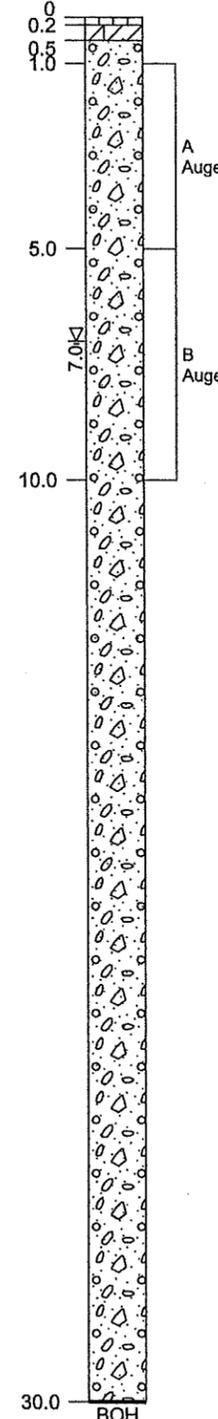
Location: DALTON HWY MP 124.4/BONANZA WEST
5/19/04



0.0 - 0.5; Dark brown, wet, Organic Or Peat, (PT)
0.5 - 4.0; Gray, frozen (ice rich, Vr-Vs), wet when thawed, Silt Vr - Vs
4.0 - 30.0; Brown, loose, wet, Sandy Gravel w/ Cobbles, (GP-GW), Cobbles mostly 3" minus, 5" max size
04-7532/A, A-1-a, p200=4.8, LL=NV, PI=NP, Gravel=67%, Sand=28.2%, Silt=4.8%

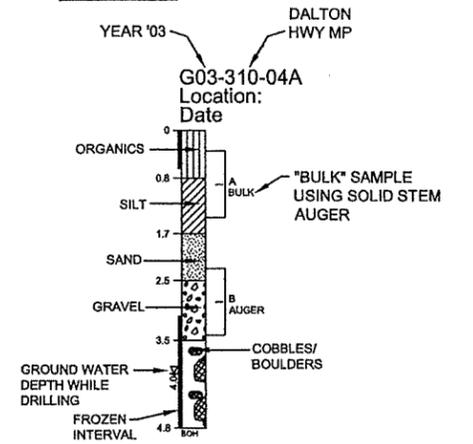
G04-124.4-06

Location: DALTON HWY MP 124.4/BONANZA WEST
5/19/04



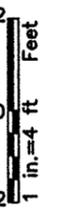
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0.5 - 30.0; Brown, loose, moist to wet, Sandy Gravel, (GP), Occasional cobbles, 4" max size
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LEGEND:



NOTES:

- 1) All depths are shown in feet.
- 2) Lithology contacts were often inferred based on drilling action.



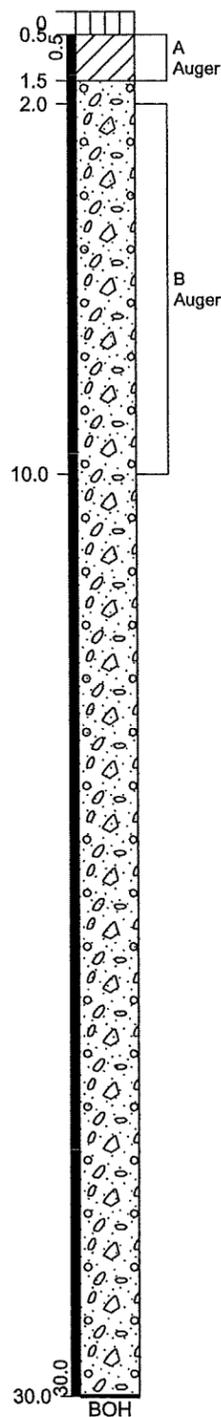
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CHECK				FIGURE 8.7.3			
REVIEW							



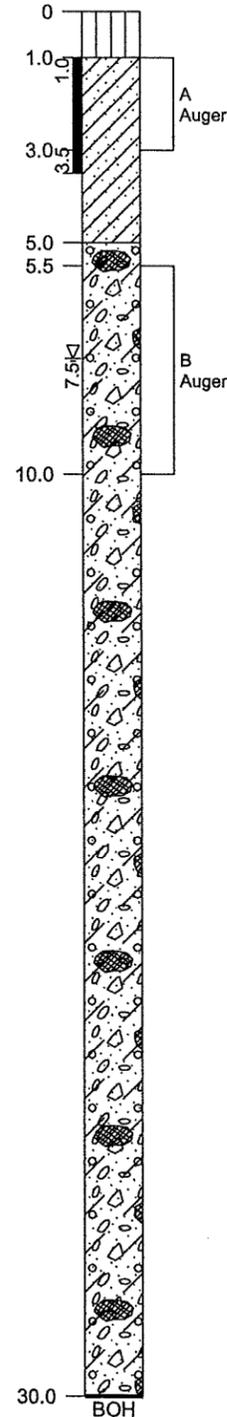
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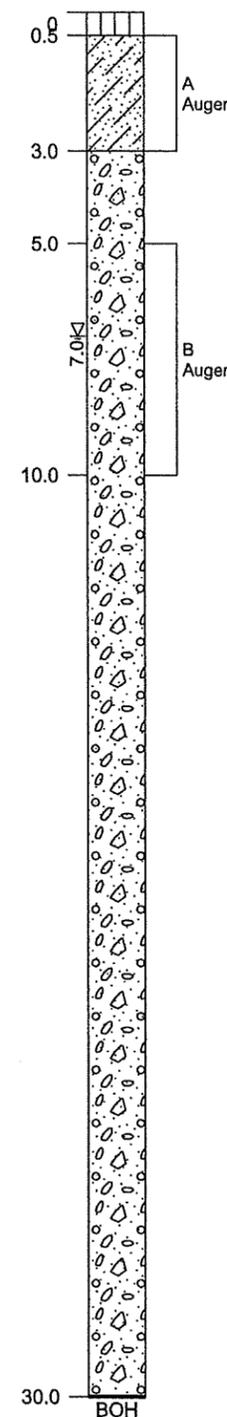
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 Location: DALTON HWY MP 124.4/BONANZA WEST
 5/19/04



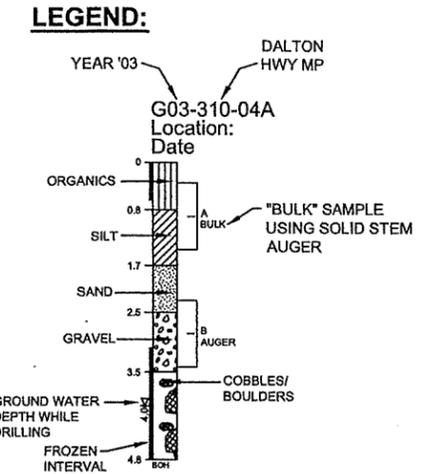
0.0 - 0.5; Dark brown, Organic or Peat, (PT)
 0.5 - 1.5; Gray, frozen (ice rich, Vr-Vs), wet when thawed, Silt, (ML)
 04-7535/A, A-4 (0), M.C.=110.7%, Organic=12.2%, p200=67.6, LL=NV, PI=NP, Gravel=0%, Sand=32.4%, Silt=67.6%
 1.5 - 30.0; Light brown, frozen (Nf), moist to wet when thawed, Sandy Gravel (GP), Mostly 1" minus, 2" max size
 04-7536/B, A-1-a, p200=6.9, LL=NV, PI=NP, Gravel=50%, Sand=43.1%, Silt=6.9%



0.0 - 1.0; Dark brown, wet, Organic Or Peat, (PT)
 1.0 - 5.0; Gray, frozen (ice rich, Vr-Vs), wet when thawed, Sandy silt (ML)
 04-7537/A, A-4 (0), M.C.=77.9%, Organic=8.9%, p200=74.5, LL=NV, PI=NP, Gravel=0%, Sand=25.5%, Silt=74.5%
 5.0 - 30.0; Gray, wet, Silty Sandy Gravel w/ Cobbles, (GP-GM), 4" max size
 04-7538/B, A-1-b, p200=17.7, LL=NV, PI=NP, Gravel=54%, Sand=28.3%, Silt=17.7%

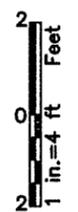


0.0 - 0.5; Dark brown, Organic Or Peat, (PT)
 0.5 - 3.0; Brown, loose, moist, Silty Sand, (SW-SM)
 04-7539/A, A-2-4, M.C.=8.7%, Organic=1.2%, p200=10.2, LL=NV, PI=NP, Gravel=8%, Sand=81.8%, Silt=10.2%
 3.0 - 30.0; Brown, loose, moist to wet, Sandy Gravel, (GP), Occasional cobbles, 4" max size
 04-7540/B, A-4-a, p200=3.9, LL=NV, PI=NP, Gravel=55%, Sand=41.1%, Silt=3.9%



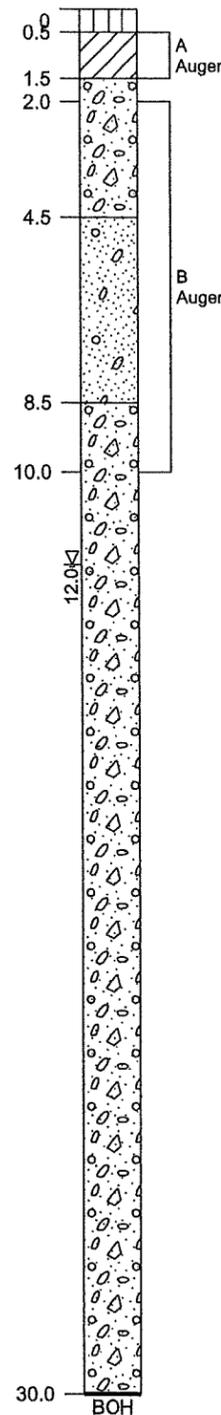
NOTES:
 1) All depths are shown in feet.
 2) Lithology contacts were often inferred based on drilling action.

1) No groundwater encountered while drilling.



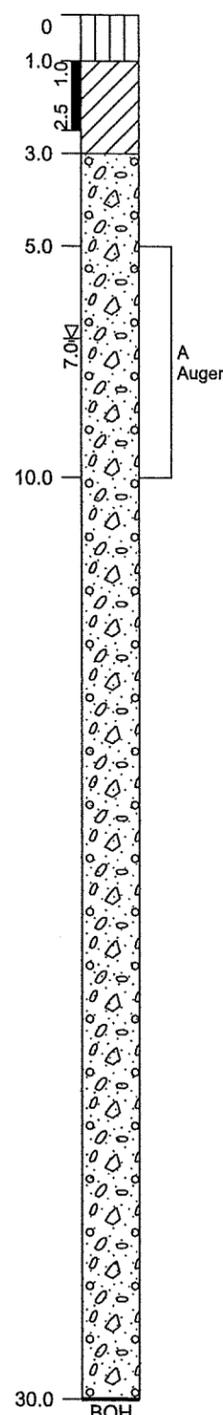
PROJECT			
ADOT & PF DALTON HIGHWAY MATERIAL SITES- PHASE III DH DMP 90 TO 290 and 341 and 344, ALASKA			
TITLE			
SUMMARY OF BOREHOLE LOGS 7-9 MP 124.4			
PROJECT No.	023-5548	FILE No.	5548-Phase3_BHS
DESIGN	--	SCALE	AS SHOWN REV. 0
CADD	ACM	02/16/05	
CHECK			
REVIEW			
 Golder Associates Anchorage, Alaska		FIGURE 8.7.4	

G04-124.4-10
 Location: DALTON HWY MP 124.4/BONANZA WEST
 5/20/04



0.0 - 0.5; Dark brown, wet, Organic Or Peat, (PT)
 0.5 - 1.5; Gray, moist to wet, Silt, (ML)
 04-7541/A, A-4 (0), M.C.=35.5%,
 Organic=6.4%, p200=87.4, LL=Nv,
 PI=NP, Gravel=0%, Sand=12.6%,
 Silt=87.4%
 1.5 - 4.5; Brown, loose, moist, Sandy Gravel,
 (GP), Occasional cobbles, 4" max size
 04-7542/B, A-1-a, p200=3.1, LL=Nv,
 PI=NP, Gravel=56%, Sand=40.9%,
 Silt=3.1%, LA=35, Degrad=77
 4.5 - 8.5; moist, Gravelly Sand, (GP), Course
 sand
 8.5 - 30.0; Brown, loose, moist, Sandy Gravel,
 (GP), Occasional cobbles, 4" max size

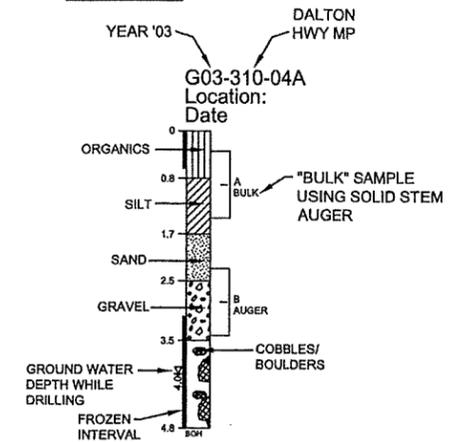
G04-124.4-11
 Location: DALTON HWY MP 124.4/BONANZA WEST
 5/20/04



0.0 - 1.0; Dark brown, wet, Organic Or Peat,
 (PT)
 1.0 - 3.0; Gray, frozen (Visible ice), wet when
 thawed, Silt, (ML)
 3.0 - 30.0; Brown, loose, wet, Sandy Gravel,
 (GP), Occasional cobbles, mostly 2" minus, 4"
 max size
 04-7543/A, A-1-a, p200=7.1, LL=Nv,
 PI=NP, Gravel=54%, Sand=38.9%,
 Silt=7.1%, LA=35, Degrad=77

1) Sample A was combined
 with G04-124.4-10 B for LA
 and deg tests.

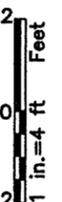
LEGEND:



NOTES:

- 1) All depths are shown in feet.
- 2) Lithology contacts were often inferred based on drilling action.

1) Sample B was combined
 with G04-124.4-11 A for LA
 and deg tests.



PROJECT		ADOT & PF	
DALTON HIGHWAY MATERIAL SITES- PHASE III		DH DMP 90 TO 290 and 341 and 344, ALASKA	
TITLE		SUMMARY OF BOREHOLE LOGS 10 & 11 MP 124.4	
PROJECT No.	023-5548	FILE No.	5548-Phase3_BHS
DESIGN	--	SCALE	AS SHOWN REV. 0
CADD	ACM	02/16/05	
CHECK			
REVIEW			



FIGURE 8.7.5

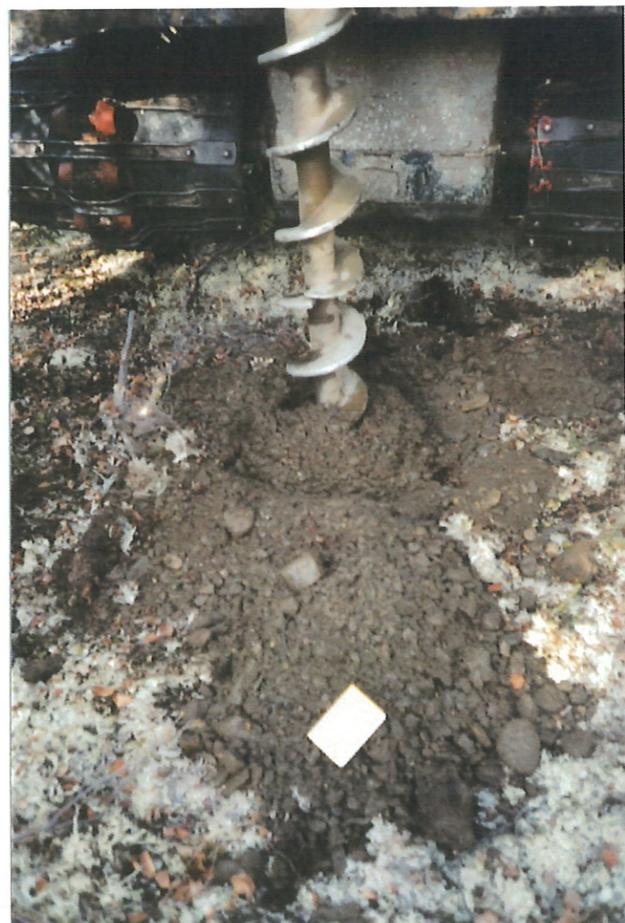


Figure 8.7.6
**DALTON HIGHWAY MP 124.4
BONANZA WEST**

Dalton Hwy/ADOT&PF/AK

TABLE 8.7.1
STATE OF ALASKA DEPARTMENT OF TRANSPORTATION - NORTHERN REGION
LABORATORY TESTING REPORT - BONANZA WEST - DH MP 124.4

PROJECT NAME: DALTON H/W MAT'L SITE RECONN.
 LEDGER CODE: 30304622
 AKSAS NUMBER: 61062
 SAMPLED BY: T. OTTLEY (GOLDER ASSOC.)
 SOURCE: BONANZA WEST - DH MP 124.4

TEST HOLE NO.	G04-124.4-01	G04-124.4-01	G04-124.4-01	G04-124.4-02	G04-124.4-02	G04-124.4-03	G04-124.4-03
DEPTH (feet)	2.0-5.0	5.0-10.0	15.0-18.0	2.0-5.0	7.0-12.0	1.0-5.0	5.0-10.0
STATION (LOCATION)	MP 124.4						
OFFSET (feet)	N/A						
LAB NO. / SAMPLE NO.	04-7522 / A	04-7523 / B	04-7524 / C	04-7525 / A	04-7526 / B	04-7527 / A	04-7528 / B
DATE SAMPLED	18-May-04	18-May-04	18-May-04	18-May-04	18-May-04	19-May-04	19-May-04
% Passing							
3"							100
2"		100	100				99
1"		83	88	97	94	91	88
Gravel							
3/4"		74	78	92	86	79	83
1/2"		56	60	71	68	60	73
3/8"		47	50	58	56	53	66
Sand							
#4		30	34	39	35	39	53
#10		21	25	29	28	28	35
#40		12	14	19	14	10	16
#50		10	11	16	10	6	10
#100		5	7	10	6	3	5
Silt/Clay							
#200		3.1	4.2	5.9	3.3	2.2	2.9
Hydro							
0.02 mm							
0.005							
0.002							
LIQUID LIMIT		NV	NV	NV	NV	NV	NV
PLASTIC INDEX		NP	NP	NP	NP	NP	NP
AASHTO CLASSIFICATION		A-1-a	A-1-a	A-1-a	A-1-a	A-1-a	A-1-a
SOIL DESCRIPTION		Gr	SaGr	SaGr	SaGr	slOrgSaGr	SaGr
NATURAL MOISTURE	3.5			4.0		2.4	
ORGANICS						1.6	
SP.GR. (FINE)							
SP.GR. (COARSE)							
MAX DRY DENSITY (pcf)							
OPTIMUM MOISTURE							
L.A. ABRASION			34				35
DEGRADATION FACTOR			77				77
SODIUM SULF. (CRSE)			0.6				0.5
SODIUM SULF. (FINE)			2.5				4.1

REMARKS:

1) Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

NOTES:

1) Gr=Gravel or Gravelly, Sa=Sand or Sandy, Si=Silt or Silty, Cl=Clay or Clayey, Org=Organic, sl.=slightly.

TABLE 8.7.1
STATE OF ALASKA DEPARTMENT OF TRANSPORTATION - NORTHERN REGION
LABORATORY TESTING REPORT - BONANZA WEST - DH MP 124.4

PROJECT NAME: DALTON H/W MAT'L SITE RECONN.
 LEDGER CODE: 30304622
 AKSAS NUMBER: 61062
 SAMPLED BY: T. OTTLEY (GOLDER ASSOC.)
 SOURCE: BONANZA WEST - DH MP 124.4

TEST HOLE NO.	G04-124.4-03	G04-124.4-04	G04-124.4-04	G04-124.4-05	G04-124.4-06	G04-124.4-06	G04-124.4-07
DEPTH (feet)	23.0-28.0	1.0-5.0	5.0-10.0	5.0-8.0	1.0-5.0	5.0-10.0	0.5-1.5
STATION (LOCATION)	MP 124.4						
OFFSET (feet)	N/A						
LAB NO. / SAMPLE NO.	04-7529 / C	04-7530 / A	04-7531 / B	04-7532 / A	04-7533 / A	04-7534 / B	04-7535 / A
DATE SAMPLED	19-May-04						
% Passing							
3"	100			100			
2"	99		100	99		100	
1"	84	100	87	82	100	84	
Gravel							
3/4"	76	94	78	75	90	71	
1/2"	52	79	62	57	71	49	
3/8"	41	68	53	49	63	40	
Sand							
#4	21	50	37	33	43	26	
#10	15	38	28	24	29	18	
#40	8	15	12	12	10	6	88
#50	6	10	8	10	7	4	85
#100	3	5	4	7	4	2	79
Silt/Clay							
#200	1.9	3.0	2.8	4.8	3.9	1.2	67.6
Hydro							
0.02 mm							
0.005							
0.002							
LIQUID LIMIT	NV						
PLASTIC INDEX	NP						
AASHTO CLASSIFICATION	A-1-a	A-1-a	A-1-a	A-1-a	A-1-a	A-1-a	A-4 (0)
SOIL DESCRIPTION	Gr	SaGr	SaGr	Gr	slOrgSaGr	Gr	OrgSaSi
NATURAL MOISTURE		2.8			5.2		110.7
ORGANICS		0.6			1.1		12.2
SP.GR. (FINE)			2.71				
SP.GR. (COARSE)			2.69				
MAX DRY DENSITY (pcf)			142.0				
OPTIMUM MOISTURE			5.2				
L.A. ABRASION	35*						
DEGRADATION FACTOR	77*						
SODIUM SULF. (CRSE)	0.5*						
SODIUM SULF. (FINE)	4.1*						

REMARKS:

1) Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

NOTES:

1) Gr=Gravel or Gravelly, Sa=Sand or Sandy, Si=Silt or Silty, Cl=Clay or Clayey, Org=Organic, sl.=slightly.

2) * Test was done on combined sample (04-7528 and 04-7529)

TABLE 8.7.1
STATE OF ALASKA DEPARTMENT OF TRANSPORTATION - NORTHERN REGION
LABORATORY TESTING REPORT - BONANZA WEST - DH MP 124.4

PROJECT NAME: DALTON H/W MAT'L SITE RECONN.
 LEDGER CODE: 30304622
 AKSAS NUMBER: 61062
 SAMPLED BY: T. OTTLEY (GOLDER ASSOC.)
 SOURCE: BONANZA WEST - DH MP 124.4

TEST HOLE NO.	G04-124.4-07	G04-124.4-08	G04-124.4-08	G04-124.4-09	G04-124.4-09	G04-124.4-10	G04-124.4-10
DEPTH (feet)	2.0-10.0	1.0-3.0	5.5-10.0	1.0-3.0	5.0-10.0	0.5-1.5	2.0-10.0
STATION (LOCATION)	MP 124.4						
OFFSET (feet)	N/A						
LAB NO. / SAMPLE NO.	04-7536 / B	04-7537 / A	04-7538 / B	04-7539 / A	04-7540 / B	04-7541 / A	04-7542 / B
DATE SAMPLED	31-Oct-03	19-May-04	19-May-04	19-May-04	19-May-04	20-May-04	20-May-04
% Passing			100				
3"			98				
2"			78				
1"	99		67		92		94
Gravel			57	100	85		86
3/4"	94		53	98	69		71
1/2"	82				61		64
3/8"	73		46	92	45		44
#4	50		42	86	39	100	34
#10	38		35	56	23	99	12
Sand		99	33	37	16	98	8
#40	17	99	26	16	7	90	5
#50	14	99	17.7	10.2	3.9	87.4	3.1
#100	10	95					
#200	6.9	74.5					
Silt/Clay							
Hydro							
0.02 mm							
0.005							
0.002							
LIQUID LIMIT	NV						
PLASTIC INDEX	NP						
AASHTO CLASSIFICATION	A-1-a	A-4 (0)	A-1-b	A-2-4	A-1-a	A-4 (0)	A-1-a
SOIL DESCRIPTION	SaGr	OrgSaSi	SiSaGr	slOrgsl.SiSa	SaGr	OrgSi	SaGr
NATURAL MOISTURE		77.9		8.7		35.5	
ORGANICS		8.9		1.2		6.4	
SP.GR. (FINE)			2.61				
SP.GR. (COARSE)			2.72				
MAX DRY DENSITY (pcf)			127.7				
OPTIMUM MOISTURE			7.3				
L.A. ABRASION							35
DEGRADATION FACTOR							77
SODIUM SULF. (CRSE)							
SODIUM SULF. (FINE)							

REMARKS:

1) Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

NOTES:

1) Gr=Gravel or Gravelly, Sa=Sand or Sandy, Si=Silt or Silty, Cl=Clay or Clayey, Org=Organic, sl.=slightly.

TABLE 8.7.1
STATE OF ALASKA DEPARTMENT OF TRANSPORTATION - NORTHERN REGION
LABORATORY TESTING REPORT - BONANZA WEST - DH MP 124.4

PROJECT NAME: DALTON H/W MAT'L SITE RECONN.
 LEDGER CODE: 30304622
 AKSAS NUMBER: 61062
 SAMPLED BY: T. OTTLEY (GOLDER ASSOC.)
 SOURCE: BONANZA WEST - DH MP 124.4

TEST HOLE NO.	G04-124.4-11						
DEPTH (feet)	5.0-10.0						
STATION (LOCATION)	MP 124.4						
OFFSET (feet)	N/A						
LAB NO. / SAMPLE NO.	04-7543 / A						
DATE SAMPLED	20-May-04						
% Passing	3"						
	2"						
	1"	92					
Gravel	3/4"	85					
	1/2"	70					
	3/8"	62					
	#4	46					
	#10	38					
Sand	#40	16					
	#50	13					
	#100	10					
Silt/Clay	#200	7.1					
Hydro	0.02 mm						
	0.005						
	0.002						
LIQUID LIMIT	NV						
PLASTIC INDEX	NP						
AASHTO CLASSIFICATION	A-1-a						
SOIL DESCRIPTION	sl.SiSaGr						
NATURAL MOISTURE							
ORGANICS							
SP.GR. (FINE)							
SP.GR. (COARSE)							
MAX DRY DENSITY (pcf)							
OPTIMUM MOISTURE							
L.A. ABRASION	35*						
DEGRADATION FACTOR	77*						
SODIUM SULF. (CRSE)							
SODIUM SULF. (FINE)							

REMARKS:

1) Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

NOTES:

1) Gr=Gravel or Gravelly, Sa=Sand or Sandy, Si=Silt or Silty, Cl=Clay or Clayey, Org=Organic, sl.=slightly.

2) * Test was done on combined sample (04-7542 and 04-7543)

COMPACTION REPORT

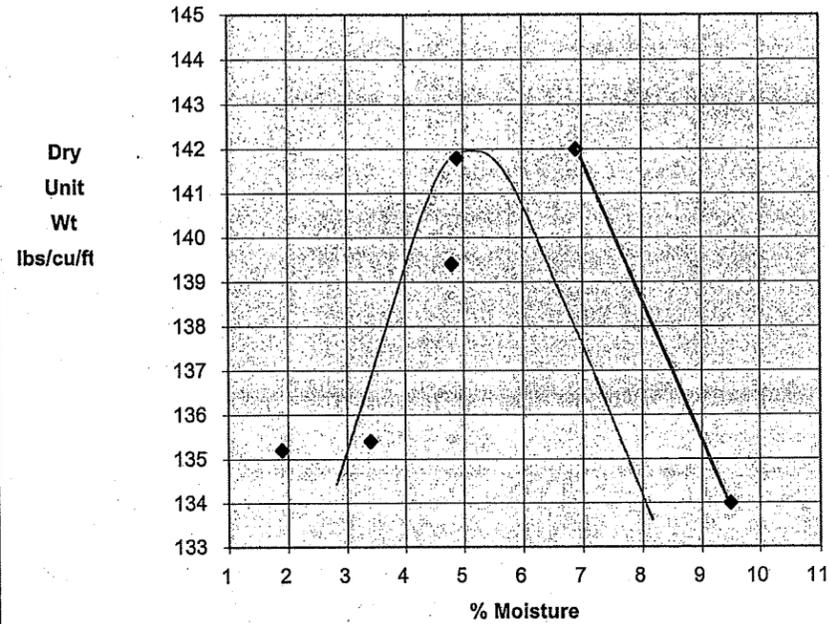
Lab Number: 04-7531

Project: DALTON H/W MAT'L SITE RECONN.

Source: MP 124.4

Field #: B

MOISTURE / DENSITY RELATIONS



Dry Unit Wt	1	2	3	4	5	ZAV	ZAV
lbs/cu/ft	135.2	135.4	139.4	141.8		134	142
kg/cu/m	2166	2169	2233	2271		2147	2275
% Moisture	1.9	3.4	4.8	4.9		9.5	6.9
Free Moist:		sweat	bleed	bleed			
ASTM D-1557	Reg Lab						
AASHTO T-180D	lbs/cu/ft	kg/cu/m	Field				
**Max. Density	142						
Opt. Moist	5.2						

Signature: *Stephen T. Miccitt* 10-4-04
Steve Miccitt

Regional Laboratory Supervisor

Accept Unaccept

*Sector face rammer used Accept/Assur Comparison

**Without 3/4" Correction Conforms to Specs

Signature:

Quality Assurance Inspector

COMPACTION REPORT

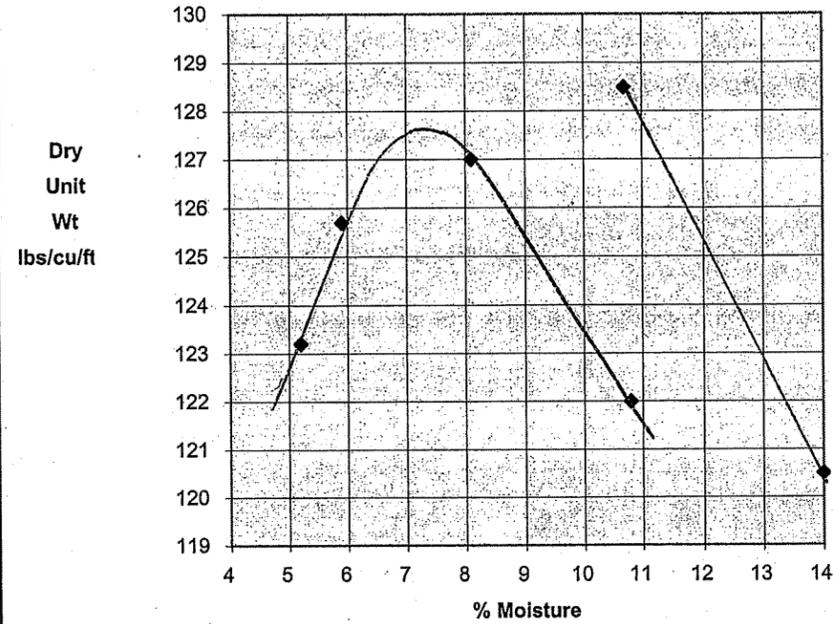
Lab Number: 04-7538

Project: DALTON H/W MAT'L SITE RECONN.

Source: MP 124.4

Field #: B

MOISTURE / DENSITY RELATIONS



Dry Unit Wt	1	2	3	4	5	ZAV	ZAV
lbs/cu/ft	123.2	125.7	127	122		120.5	128.5
kg/cu/m	1974	2014	2034	1954		1930	2058
% Moisture	5.2	5.9	8.1	10.8		14	10.7
Free Moist:							

ASTM D-1557	Reg. Lab	
AASHTO T-180D*	lbs/cu/ft	kg/cu/m
**Max. Density	127.7	
Opt. Moist	7.3	

Signature: *Stephen T Meierotto*
 Steve Meierotto
 Regional Laboratory Supervisor
 10-4-04

*Sector face rammer used Accept/Assur Comparison
 **Without 3/4" Correction Conforms to Specs

Accept	Unaccept

Signature:

Quality Assurance Inspector

