Application for Conditional Use

Municipality of Anchorage
Planning Department
PO Box 196650
Anchorage, AK 99519-6650

Please fill in the information asked for below.

PETITIONER*	PETITIONER REPRESENTATIVE (IF ANY)
Name (last name first) Eklutna Inc.	Name (last name first) DOWL HKM
Mailing Address 16515 Centerfield Drive, Suite 201	Mailing Address 4041 B Street
Eagle River, AK 99577	Anchorage, AK 99503
Contact Phone: Day: 696-2828 Night:	Contact Phone: Day: 562-2000 Night:
FAX: 696-2845	FAX: 907-563-3953
E-mail: Jim@eklutnainc.com	E-mail: mmcnulty@dowlhkm.com

*Report additional petitioners or disclose other co-owners on supplemental form. Failure to divulge other beneficial interest owners may delay processing of this application.

PROPERTY INFORMATION

Property Tax #(000-000-00-000): 051-761-23-000; 052-241-08; 052-213-14

Site Street Address:

Current legal description: (use additional sheet if necessary) Please see attached.

Zoning: R-7 and T	Acreage: Approximately 75.16 Acres	Grid # NW2064, NW2065, NW1964

CONDITIONAL USE APPROVAL REQUESTED

Final: ☑ New ☐ Amendment

Concept: ☐ New ☐ Amendment

I hereby certify that (I am)(I have been authorized to act for) owner of the property described above and that I petition for a conditional use permit in conformance with Title 21 of the Anchorage Municipal, Code of Ordinances. I understand that payment of the application fee is nonrefundable and is to cover the costs associated with processing this application, and that it does not assure approval of the conditional use. I also understand that assigned hearing dates are tentative and may have to be postponed by Planning Department staff, the Planning and Zoning Commission or the Hearing Officer for administrative reasons.

02/12/2009	Michelle McNulty
Date	Signature (Agents must provide written proof of authorization)

Accepted by:	Poster & Affidavit:	Fee	Case Number

Application for conditional use continued

COMPREHENSIVE PLAN INFORMATION

Anchorage 2020 Urban/Rural Services: ☐ Urban ☐ Rural N/A

Anchorage 2020 West Anchorage Planning Area: ☐ Inside ☐ Outside N/A

Anchorage 2020 Major Urban Elements: Site is within or abuts: N/A

☐ Major Employment Center ☐ Redevelopment/Mixed Use Area ☐ Town Center
☐ Neighborhood Commercial Center ☐ Industrial Center
☐ Transit - Supportive Development Corridor

Eagle River-Chugiak-Peters Creek Land Use Classification:

☐ Commercial ☐ Industrial ☐ Parks/opens space ☐ Public Land Institutions
☐ Marginal land ☐ Alpine/Slope Affected ☐ Special Study
☐ Residential at _____ dwelling units per acre ✔ Development Reserve

Girdwood- Turnagain Arm N/A

☐ Commercial ☐ Industrial ☐ Parks/opens space ☐ Public Land Institutions
☐ Marginal land ☐ Alpine/Slope Affected ☐ Special Study
☐ Residential at _____ dwelling units per acre

ENVIRONMENTAL INFORMATION (All or portion of site affected)

Wetland Classification:	☑ None	☐ "C"	☐ "B"	☐ "A"	
Avalanche Zone:	☑ None	☐ Blue Zone	☐ Red Zone		
Floodplain:	☑ None	☐ 100 year	☐ 500 year		
Seismic Zone (Harding/Lawson):	☐ "1"	☐ "2"	☑ "3"	☐ "4"	☐ "5"

RECENT REGULATORY INFORMATION (Events that have occurred in last 5 years for all or portion of site)

☐ Rezoning - Case Number:

☐ Preliminary Plat ☐ Final Plat - Case Number(s):

☑ Conditional Use - Case Number(s): 2007-002-02 (Minor Amendment)

☐ Zoning variance - Case Number(s):

☑ Land Use Enforcement Action for Administrative Hearing No. 08-1342

☐ Building or Land Use Permit for

☐ Wetland permit: ☐ Army Corp of Engineers ☐ Municipality of Anchorage

DOCUMENTATION

Required:

☑ 25 copies of site plan to scale depicting: building footprints; parking areas; vehicle and pedestrian circulation; lighting; grading; landscaping; signage; drainage and project location.

☐ 25 copies of building plans to scale depicting: floor plans; building elevations; exterior colors and textures. N/A

☑ Narrative: explaining the project; planning objectives; construction and operation schedule; final ownership; PUD's only: gross and net density; private and common open space areas

Optional:

☐ Air quality impact ☐ Traffic impact analysis ☐ Economic impact analysis
☐ Soils Analysis ☐ Noise impact analysis ☐ Holding capacity of the land analysis

CONDITIONAL USE STANDARDS

The Planning and Zoning Commission may only approve the conditional use if the Commission finds that **all** of the following 4 standards are satisfied. Each standard must have a response in as much detail as it takes to explain how your project satisfies the standard. The burden of proof rests with you. Use additional paper if needed.

Explain how the proposed conditional use furthers the goals and policies of the comprehensive development plan and conforms to the comprehensive development plan in the manner required by AMC 21.05.

Please see attached.

Explain how the proposed conditional use conforms to the standards for that use in this title and regulations promulgated under this title.

Please see attached.

Explain how the proposed conditional use will be compatible with existing and planned land uses in the surrounding neighborhood and with the intent of its use district.

Please see attached.

Explain how the proposed conditional use will not have a permanent negative impact on the items listed below substantially greater than that anticipated from permitted development:

1. Pedestrian and vehicular traffic circulation and safety.

   Please see attached.

2. The demand for and availability of public services and facilities.

   Please see attached.

3. Noise, air, water or other forms of environmental pollution.

   Please see attached.

4. The maintenance of compatible and efficient development patterns and land use intensities.

   Please see attached.

Current Legal Description:

Tract 1, Village Park Subdivision filed under Plat No. 90-32 in the Anchorage Recording District, Third Judicial District, State of Alaska. Contains an area of 54.401 Acres more or less. Said Tract 1 is located within the SE1/4 of Section 24, T16N, R1W, S.M., Alaska.

A portion of Lot 15, Section 24, T16N, R1W, S.M., AK: Beginning at the northeast corner of said Lot 15; thence on the easterly line thereof S 00-01-00 E 1318.48 feet to the southeast corner of Lot 15; thence N 47-26-15 W 1172.88 feet on a non-radial line to a curve concave to the southeast having a radius of 2760.85 feet and whose center bears S 39-56-52 E, said curve being on the northwesterly line of Lot 15; thence northeasterly 452.84 feet on the arc of said curve through a central angle of 09-23-52; thence continuing on said northwesterly line N 59-27-00 E 519.55 to the northwest corner of Lot 15; thence N 89-59-00 E 46.66 feet to the point of beginning. Contains an area of 13.637 acres more or less.

A portion of the NW1/4 of the NE1/4 of Section 25, T16N, R1W, S.M., AK. Beginning at the northwest corner of said NW1/4; thence on the northerly line thereof S 89-59-00 E 729.25 feet; thence departing said northerly line S 47-26-15 E 368.71 feet to the northwesterly right of way line of the New Glenn Highway; thence on said northwesterly line S 42-33-45 W 493.10 feet; thence departing said northwesterly line N 47-26-15 W 905.97 feet to the point of beginning. Contains an area of 7.215 acres more or less.

Parcel boundary descriptions were created with only the use of record information.

AMENDED CONDITIONAL USE PERMIT APPLICATION
FOR NATURAL RESOURCE EXTRACTION
ALASKA AGGREGATE PRODUCTS, LLC

LOCATION

The area proposed for the conditional use permit (CUP) for natural resource extraction is described as Tract 1, Village Park Subdivision filed under Plat No. 90-32 in the Anchorage Recoding District, Third Judicial District, State of Alaska. Said Tract 1 is located within the SE 1/4 of Section 24, T16N, R1W, S.M., Alaska. Contains an area of 54.401 acres, more or less; a portion of Lot 15, Section 24, T16N, R1W, S.M., AK: beginning at the northeast corner of said Lot 15; thence on the easterly line thereof S 00-01-00 E 1318.48 feet to the southeast corner of Lot 15; thence N 47-26-15 W 1172.88 feet on a non-radial line to a curve concave to the southeast having a radius of 2760.85 feet and whose center bears S 39-56-52 E, said curve being on the northwesterly line of Lot 15; thence northeasterly 452.84 feet on the arc of said curve through a central angle of 09-23-52; thence continuing on said northwesterly line N 59-27-00 E 519.55 to the northwest corner of Lot 15; thence N 89-59-00 E 46.66 feet to the point of beginning. Contains an area of 13.637 acres more or less; and a portion of the NW1/4 of the NE1/4 of Section 25, T16N, R1W, S.M., AK. Beginning at the northwest corner of said NW1/4; thence on the northerly line thereof S 89-59-00 E 729.25 feet; thence departing said northerly line S 47-26-15 E 368.71 feet to the northwesterly right of way line of the New Glenn Highway; thence on said northwesterly line S 42-33-45 W 493.10 feet; thence departing said northwesterly line N 47-26-15 W 905.97 feet to the point of beginning. Contains an area of 7.215 acres more or less (Figure 1).

Statement of Planning Objectives/Description of Operations

The objective of the project is for Eklutna Inc. (Eklutna), and Alaska Aggregate Products (AAP) to conduct a natural resource extraction operation, on an approximately 76-acre area in Eklutna, Alaska. The site is owned by Eklutna and the natural resource extraction will be performed by AAP.

Eklutna is requesting a CUP to allow for natural resource extraction in the above-described area, which contains portions designated both R-7 (Intermediate Rural Residential) district and T

(Transition). Natural resource extraction is a permitted conditional use in both of these districts. Eklutna owns most of the adjacent lands (Figure 2).

The area is approximately 76-acres. Approximately 43-acres of this area is to be excavated and backfilled with unusable materials such as peats, clays, silts, and others that do not meet foundation specifications from civil construction projects throughout the area. In addition, the overburden and topsoil from the site will also be used as backfill material and will be used to cap previous mined section to be reseeded. Materials mined and processed on site will consist of only aggregate products; crushed, screened, and transported off site to be used on roadway and infrastructure projects.

Previously, a gravel extraction operation was approved on the land immediately to south of the proposed site (Attachment A - 2007-011 Resolution). The existing gravel extraction operation is part of a PC-district Master Plan Site Plan. The proposed site is in an area zoned R-7 and requires a CUP to extend the existing operations to this site. The existing gravel pit is operated by AAP and Eklutna owns the land. The existing operation, as approved, has been hindered by the in situ materials not being as good at depth as originally indicated by test borings. It is anticipated that mining operations at the existing gravel pit will move north to the proposed CUP site, after approval. The purpose of the CUP is to allow for additional gravel extraction to meet current contractual obligations, as well as future sales.

Based upon a recent geotechnical investigation (Attachment C), it is anticipated that the proposed CUP area contains good material. The area will be mined in sections throughout the next five to ten years, though the schedule will be controlled by the local market demand for aggregate products. The backfilling of the area will start as mining operations allow.

The project area, as a whole, encompasses a relatively large area, and therefore is broken into three phases (Figure 7). This submittal focuses on the second phase of the site, which is located in the northern portion of the site, north of the previously approved phase one (Figure 3). It is anticipated that site work and extraction on this site will begin in spring 2009, if approved.

Site Description

The area proposed for the CUP for natural resource extraction is legally described as T16N, R1W, S.M., Alaska; a portion of Lot 15, Section 24, T16N, R1W, S.M., AK: Beginning at the

northeast corner of said Lot 15; thence on the easterly line thereof S 00-01-00 E 1318.48 feet to the southeast corner of Lot 15; thence N 47-26-15 W 1172.88 feet on a non-radial line to a curve concave to the southeast having a radius of 2760.85 feet and whose center bears S 39-56-52 E, said curve being on the northwesterly line of Lot 15; thence northeasterly 452.84 feet on the arc of said curve through a central angle of 09-23-52; thence continuing on said northwesterly line N 59-27-00 E 519.55 to the northwest corner of Lot 15; thence N 89-59-00 E 46.66 feet to the point of beginning. Contains an area of 13.637 acres more or less; and a portion of the NW1/4 of the NE1/4 of Section 25, T16N, R1W, S.M., AK. Beginning at the northwest corner of said NW1/4; thence on the northerly line thereof S 89-59-00 E 729.25 feet; thence departing said northerly line S 47-26-15 E 368.71 feet to the northwesterly right of way line of the New Glenn Highway; thence on said northwesterly line S 42-33-45 W 493.10 feet; thence departing said northwesterly line N 47-26-15 W 905.97 feet to the point of beginning. Contains an area of 7.215 acres more or less. (Figure 1).

A 100-foot existing vegetated buffer will be maintained along the ARRC ROW and along the Glenn Highway. Where the proposed project area is adjacent to R-7 zoned property, a 200-foot existing vegetative buffer will be left between the gravel extraction area and the residentially zoned land.

Mining for aggregate processing purposes will begin in the southern portion of the site (Figure 6). The second section of gravel excavation operations will occur on the most northern portion of the site, so that a round-robin operation within the site will be created. The northern extraction area is proposed to be operated as a pit-run operation with no gravel extraction for processing will continue from the south in a northerly direction, while backfilling will be occurring from the north in a southerly direction. Specific activities associated with the proposed project are described below.

Description of Operations

Access. Access to the proposed site will be taken through the access point of the existing gravel extraction operation to the south of the proposed CUP site. Access to the site is through a locked gate at the northeast corner of the site on Eklutna Village Road (Figure 4). No trespassing signs and signs warning of mining operations will be posted at the entrance. The access roads through

the site are used by ARRC for maintenance of the nearby railroad tracks. Due to the proximity to the ARRC rail line, the site is regularly patrolled by ARRC personnel.

Clearing and Grubbing. Approximately 43-acres will be cleared of existing vegetation. Trees and roots will be removed and offered as firewood to Eklutna residents. The smaller trees, shrubs, and roots will be ground with mulching equipment and buried as backfill material. This process will be done in phases that coincide with the extraction plan.

Stripping. Approximately 43 acres will be stripped to expose the underlying gravel deposit. The topsoil/overburden varies in thickness from one to two feet. Any surplus material may be sold or blended.

Extraction. Extraction of aggregate will occur in five sections (Figure 6). Each section will begin after clearing and grubbing of the section is complete. Mining will begin in sections one and five. Mining in section one will occur from the south to the north. Material from section one will be used to produce processed materials. Mining in section five will begin at the northern portion of the site and will continue in a southerly direction. Material in section five will be taken off-site as pit-run for projects, and the mined area will be backfilled with unusable materials such as peats, clays, silts, and others. This will support an efficient round-robin operation. As mining proceeds in other sections, the overburden will be moved into the previously mined sections and capped with topsoil that has been stockpiled on-site. Approximately, a total of 1,500,000 cubic yards will be excavated from the proposed CUP site.

On average, 30-foot-high blocks will be mined in 2 or 3 passes with a loader and dozer. This will result in an average cut thickness of 10 to 15 feet. The use of the dozer in the extraction process will result in safe slopes that will be no steeper than 1.5:1. (This will be the working slope during excavation, as the site will be backfilled and regraded to match pre-excavation topography, the final slope will be graded back to match as close as possible the site's natural existing slope.) A large excavator or dragline would then be used to excavate the material, leaving a minimum of four-feet above the water table (Figure 7). After each section has been fully extracted, initial reclamation will be implemented. The reclamation of each section will coincide with extraction of the next section.

Access roads will be developed and maintained within the proposed gravel pit limits; speed limits will be posted for safety and to mitigate dust emissions. Watering as necessary to control dust will be done.

Well Data. Well data indicates that the majority of area residents are most likely getting water from a community well (Well 4 on Figure 7.) The well log for the community well shows the water table to be 48 feet deep. Other local well data shows the water table to range from a depth of 22 to 50 feet deep. AAP is currently working on a set of test borings on-site to determine the existing on-site water table depth. The borings will be drilled to water table depth or a maximum of 45 feet in depth.

Grading/Drainage. It is anticipated that water will remain on-site and infiltrate into the ground. No pumping or dewatering is assumed to be required. See Figure 5 for the Conceptual Grading/Drainage plan.

Processing. Process plant operations will include stockpiling, washing, and crushing to meet standard specifications for aggregate materials (Attachment B). The plant will remain at its current location, with the currently operated pit, leaving the maximum separation between residents of Eklutna Village and the processing Plant.

A loader will deliver the mined aggregate to the horizontal impact crusher, followed by screen decks transferring to cone crusher or vertical shaft impactor, and then screened into final form for delivery to clients. The set-up may change slightly depending on the product being produced. The material would then be stored in stockpiles and loaded into haul trucks with a front-end loader. The processing equipment will produce approximately 5,000 tons of aggregate per day.

Shipping. Aggregates will be shipped mostly by tandem, tri-axle, or tractor-trailer trucks. The trucks will be filled with front-end loaders and weighted prior to leaving the pit. Based on the quantity of material to be shipped, it is anticipated that truck volumes will be ten trucks per hour. On average, 60 to 90 loads per day will be hauled from the site. Speed limits will remain posted in the pit operations and processing areas and on all access roads.

Equipment Maintenance. The equipment maintenance area will maintain a zero-leak policy. All routine lubrication and fueling of equipment will be located on the existing gravel extraction

area, located to the southwest of the processing plant (Figure 4). Appropriate controls will be put in place to ensure there will be no surface or water table contamination. Major maintenance of equipment will be performed off-site.

Reclamation. Once an area of the pit is depleted of gravel and is no longer needed for processing or stockpiling, it will be reclaimed. The area will be re-contoured to match the topography that existed prior to excavation or in a manner consistent with the intended end-use of the property, which is in the range of 1 to 5 percent (Figure 8). Subsoil and topsoil will be replaced and the area will be seeded. It is anticipated that this will be left as open space, intended for recreational opportunities. The only structural development on the property may be at the most northern portion the site, which is intended to be a community center, developed by Native Village of Eklutna (NVE) sometime in the future.

Development Schedule with Phases and Dates

AAP would begin development of the gravel mining operation for the proposed site immediately upon approval of the CUP. Operations would be expected to occur between early April and late October and would occur Monday through Saturday; from 7:00 a.m. to 6:00 p.m. AAP is requesting a ten-year approval period for this CUP with a non-public hearing Planning and Zoning Commission review after five years.

Mining will begin in sections one and five (Figure 6). Mining in section one will occur from the south to the north. Mining in section five will begin at the northern portion of the site and will continue in a southerly direction. As mining proceeds in other sections, the overburden will be moved into the previously mined sections. It is anticipated that approximately 300,000 cubic yards of aggregate will be mined per year. Approximately 1,500,000 cubic yards of aggregate will be mined from the site over a five-year period. The 10-year approval is necessary to accommodate potential market demand shifts and reclamation.

Intent of Final Ownership

The surface estate for the site is owned by Eklutna, Inc. and they are expected to retain ownership. The subsurface estates are owned by Cook Inlet Region Incorporated (CIRI). AAP is developing these sites under an agreement with Eklutna, Inc. and CIRI.

Traffic and Pedestrian Circulation

The site will be accessed by an existing gated access road off Eklutna Village Road (Figure 4). The access road is gated and only AAP personnel or contractors involved in mining operations may access the site. Work crews access the site via the gated access road off Eklutna Village Road. During quarry operations periods, there would be approximately 60 to 90 project-related round trips a day on the Eklutna Village Road. The existing operation and the proposed site share common ownership and will be operated by AAP. As the existing gravel extraction operations will be moving to the proposed site, there will be no traffic increase in the area from haul trucks associated with the CUP then what currently exists in association with the existing operations. Basically, this will be an extension of the existing operation with the material being extracted just moved northward.

Eklutna owned lands are private, "no trespassing," signs are posted throughout their property and enforcement measures to deter trespassers are taken.

Vegetation and Land Use

The vegetation on the site varies based on topography. On the eastern portion of the site, vegetation consists of secondary growth alder near the center of the site and in areas previously disturbed by development no vegetative undergrowth. In undisturbed areas, the predominant vegetation is aspen, cottonwood, and spruce, with little or no vegetative undergrowth. In the upland areas, primary growth cottonwood and aspen trees are dominant with open, grassy undergrowth. Intermittent stands of black spruce are present in the uplands. Thick, secondary growth alders and devil's club are found in previously disturbed areas, such as vegetative cuts along utility rights-of-way. This vegetation is similar to the vegetation found on surrounding vacant lands.

The project site is located between the Glenn Highway and the ARRC tracks. The majority of lands in the vicinity are undeveloped. The residential portion in the NVE is located approximately 250 feet to the north of the extraction site.

21.50.020 General Standards for Conditional Use Approval

The authority hearing a conditional use application may approve the application only if it finds that the conditional use:

A. Furthers the goals and policies of the applicable Comprehensive Development Plan and conforms to the Comprehensive Development Plan in the manner required by Chapter 21.05.

The AAP proposed CUP site is located in an area covered by the Chugiak-Eagle River Comprehensive (CERC) Plan (Figure 1). The CERC Plan's land use plan map identifies the site, and most areas around it as Development Reserve. As well, lands to the west and northwest are also designated as Development Reserve. This designation is intended for areas that are generally suitable for development but where the location and absence of public facilities and lack of projected demand make near-term and intermediate-term development uncertain.

Lands to the east, across the New Glenn Highway, are classified as Commercial. The commercial designation provides for areas that are developed for commercial purposes and that are expected to remain commercial in the future, and for those lands that are best suited for commercial use in the future. It is the intent of the CERC Plan to concentrate commercial development at strategic locations, rather than allowing them to expand along major arterials.

The proposed use is consistent with these land use categories.

The proposed CUP is consistent with the goals and policies of the CERC Plan. In particular, the project promotes the goal related to parks, open space, greenways and recreation facilities development that calls for ensuring a wide range of recreational opportunities to all segments of the community. The long-term reclamation use of the area will provide open space and recreational opportunities for the residents of the NVE and shareholders of Eklutna. It is also consistent with the goal relating to preserving, restoring, protecting historic and archaeological sites determined to have local and/or state significance. It is expected that the long-term reclamation of the area may include restoration of cultural ties between residents of the NVE and the land.

Conforms to the specific standards for that use in this title and regulations promulgated under this title.

The CUP is in conformance with AMC 21.50.070. The proposed CUP area consists of lands zoned both R-7 (Intermediate Rural Residential) and T (Transition). The R-7 district is intended to encourage low-density residential development, and is intended for those land areas where large lot development is desirable as an adjunct to the more typical urban and suburban residential zoning districts. The Transition District is intended to include suburban and rural areas that, because of location in relationship to other development, topography or soil conditions, are not developing and are not expected to develop in the immediate future. The permitted uses in this district are intended to be as flexible as possible consistent with protection from incompatible uses. Natural resource extraction requires a CUP in both of these zoning districts.

A discussion of conformance with the standards of approval specific to natural resource extraction operations is discussed below under AMC 21.50.070.

B. Will be compatible with existing and planned land uses in the surrounding neighborhood and with the intent of its use district.

The proposed CUP is compatible with Eklutna long-range land use plans. The land immediately to the south of the proposed site currently operates as a gravel extraction operation and will be reclaimed. Most lands in the vicinity of the proposed project are currently undeveloped and owned by Eklutna (Figure 2). There is low-density residential development in the Thunderbird Heights area and in Eklutna Village. Due to the location of the site between the ARRC tracks and the Glenn Highway, the site will be reclaimed in a manner that is consistent with current and future land uses, associated with the NVE.

D. Will not have a permanent negative impact on the items listed below substantially greater than that anticipated from permitted development.

1. Pedestrian and Vehicular Traffic Circulation and Safety

The proposed CUP will not have a negative impact on pedestrian or vehicular traffic circulation and safety. The site will be accessed by an existing gated access road off

Eklutna Village Road (Figure 4). The access road is gated and only AAP personnel or contractors involved in mining operations may access the site. Work crews access the site via the gated access road off Eklutna Village Road. During quarry operations periods, there would be approximately 60 to 90 project-related round trips a day on the Eklutna Village Road. The existing operation and the proposed site share common ownership and will be operated by AAP. As the existing mining operations will be moving to the proposed site, there will be no traffic increase in the area from haul trucks associated with the CUP then what currently exists in association with the existing operations.

No pedestrians are allowed on-site, other than those workers engaged in mining operations.

2. The Demand for and Availability of Public Services and Facilities

The CUP site will not require any new public services or facilities.

3. Noise, Air, Water or Other Forms of Environmental Pollution

Operations are expected to occur between early April and late October and would occur Monday through Saturday; from 7:00 a.m. to 6:00 p.m. The processing area will be onsite and it is not expected that the CUP would substantively change traffic volumes or noise in the general area.

A Stormwater Pollution Prevention Plan (SWPPP) has been completed for the proposed CUP site. The SWPPP is implemented to reduce the potential for erosion, sedimentation and other water pollution. Although gravel extraction operations will result in additional air emissions from equipment use and vehicular traffic, measures will be put into place to mitigate the expected emissions so they will not adversely affect air quality in the area.

4. The maintenance of compatible and efficient development patterns and land use intensities

The proposed CUP will not change the maintenance of compatible and efficient development patterns and land use intensities. The proposed site is in an area that has historically been used for gravel extraction. Additional old gravel pits are located to the

northwest of the site and there is a current gravel extraction site adjacent to the south of the proposed site. The restoration of the site will result in open space between the ARRC tracks and the Glenn Highway.

21.50.070 Conditional Use Standards - Natural Resource Extraction

1. **Principal Access to the site shall minimize use of residential streets and access roads shall be treated to be dust free. Suitable traffic controls shall be established where access roads intersect arterials.**

   The site will be accessed by an existing gated access road off Eklutna Village Road (Figure 4). The access road is gated and only AAP personnel or contractors involved in mining operations may access the site. Work crews access the site via the gated access road off Eklutna Village Road. During quarry operations periods, there would be approximately 60 to 90 project-related round trips a day on the Eklutna Village Road. The existing operation and the proposed site share common ownership and will be operated by AAP. As the existing mining operations will be moving to onto the proposed site, there will be no traffic increase in the area from haul trucks associated with the CUP then what currently exists in association with the existing operations.

   Measures will be implemented to keep dust emissions minimized.

2. **Extraction operations will not pose a hazard to the public health and safety.**

   The proposed CUP would not pose a hazard to public health and safety. The sites are secured with locked gates and only AAP crews and contractors have access to the gravel pits and processing areas. Air emissions and water discharges from the sites are not expected to pose a hazard to public health and safety.

3. **The extraction operations will not generate noise, dust, surface water runoff, or traffic that will unduly interfere with surrounding land uses.**

   As described under the general standards above, most adjacent properties are undeveloped. The processing area is located on site. The CUP would not be expected to substantively change traffic volumes or noise in the general area.

   It is anticipated that normal operations will not generate significant amount of dust. This is primarily due to the fact that the gravel pit floor will be composed of relatively clean aggregate.

During gravel stripping and recovery operations, the stripping site will be water-sprayed as necessary to minimize any dust generated. Stockpiles will be kept wet during the loading operations, and as necessary. Conveyors associated with the processing equipment are misted to control dust, during operation.

Dust, associated with trucking out of material, will be mitigated by maintaining the access road and staging/loading areas.

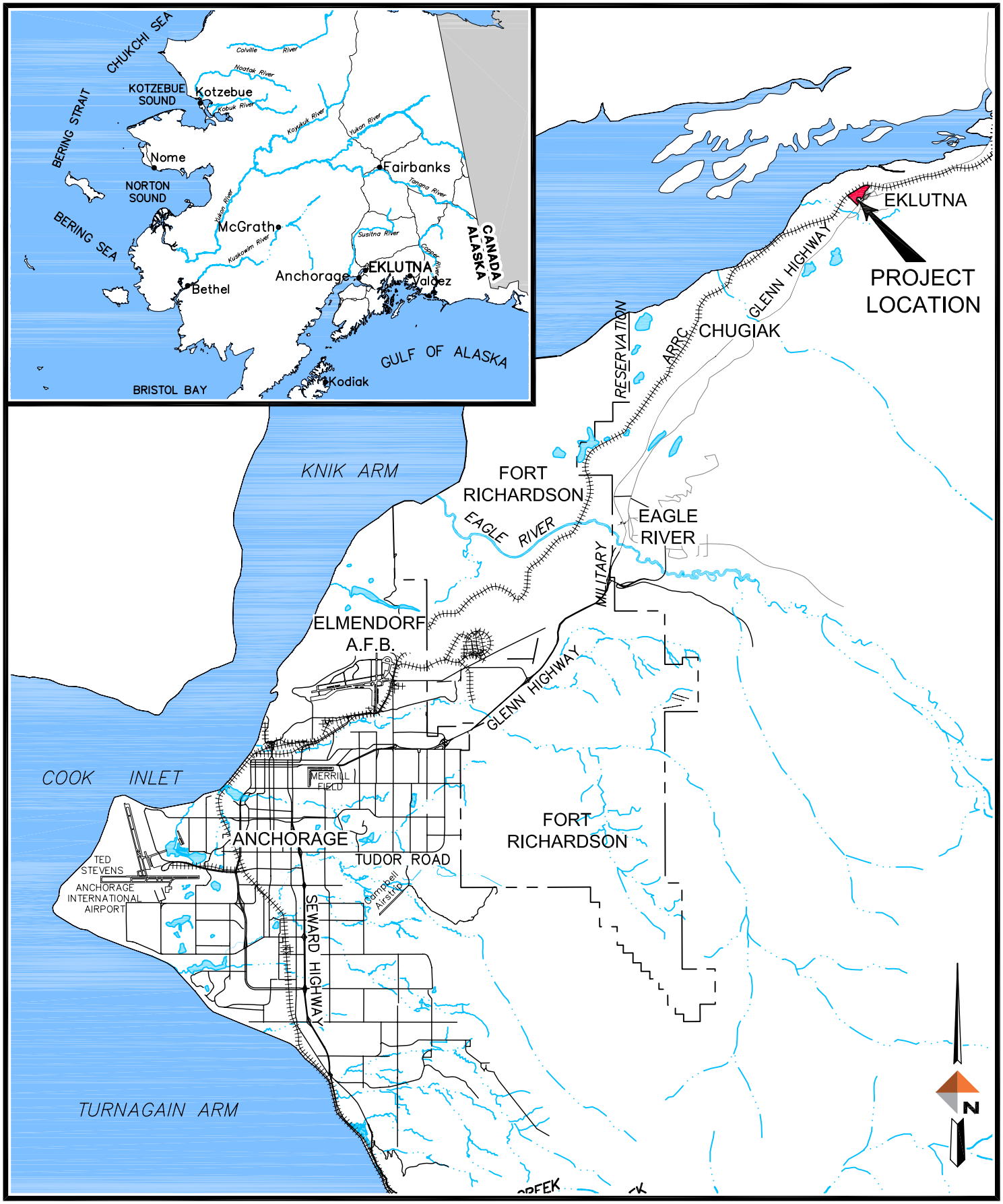
A SWPPP will be implemented to reduce the potential for erosion, sedimentation, and other water pollution. Measures will also be implemented to reduce the potential for dust. Although quarry operations will result in additional air emissions from equipment use and vehicular traffic, the expected emissions would not adversely affect air quality in the Anchorage area.

4. The restoration plan for the sites ensures that, after extraction operations cease, the site will be left in a safe, stable, and aesthetically acceptable condition.

Once an area of each pit is depleted of gravel and is no longer needed for processing or stockpiling, it will be reclaimed. The area will be recontoured to match the topography that existed prior to excavation or in a manner consistent with the intended end-use of the property (Figure 8). Subsoil and topsoil will be replaced and the area seeded with non-invasive plant species.

D59475.Amended.CUP Application.MJM.TCP.022309.mas

LIST OF FIGURES



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SCALE: NTS

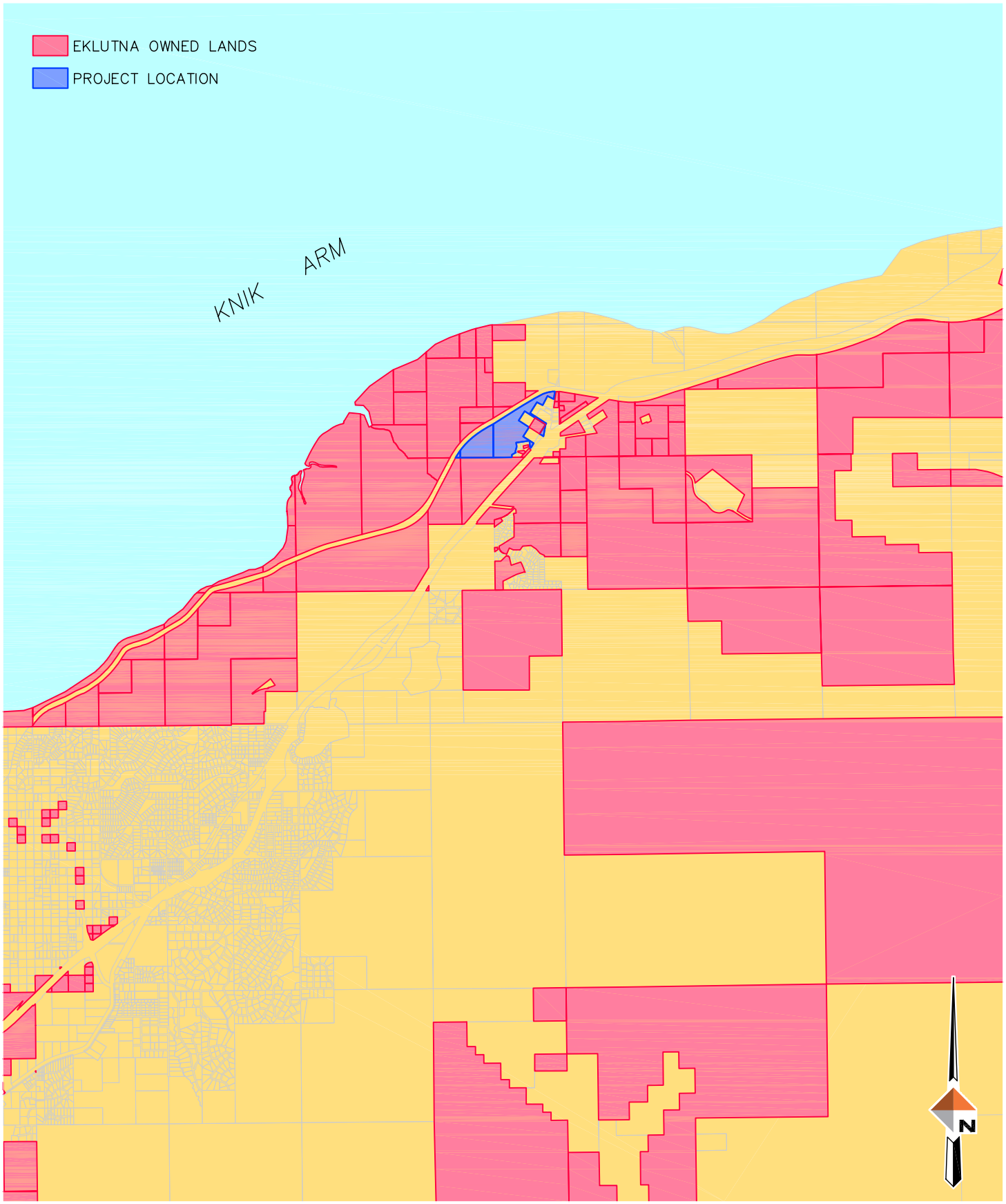
DOWL HKM

Vicinity Map

EKLUTNA GRAVEL PIT EXPANSION

Eklutna, Alaska

FIGURE 1



P:\Projects\D59475\Planning\SITE 1\EKLUTNA OWNERSHIP.dwg 2009-2-12

SCALE: 1"=1 mi.

DOWL HKM

Eklutna Land Ownership

EKLUTNA GRAVEL PIT EXPANSION

Eklutna, Alaska

FIGURE 2

P:\Projects\D59475\Planning\SITE 1\CUP PIT EXPANSION.dwg 2009-2-12

SCALE: 1"=500'

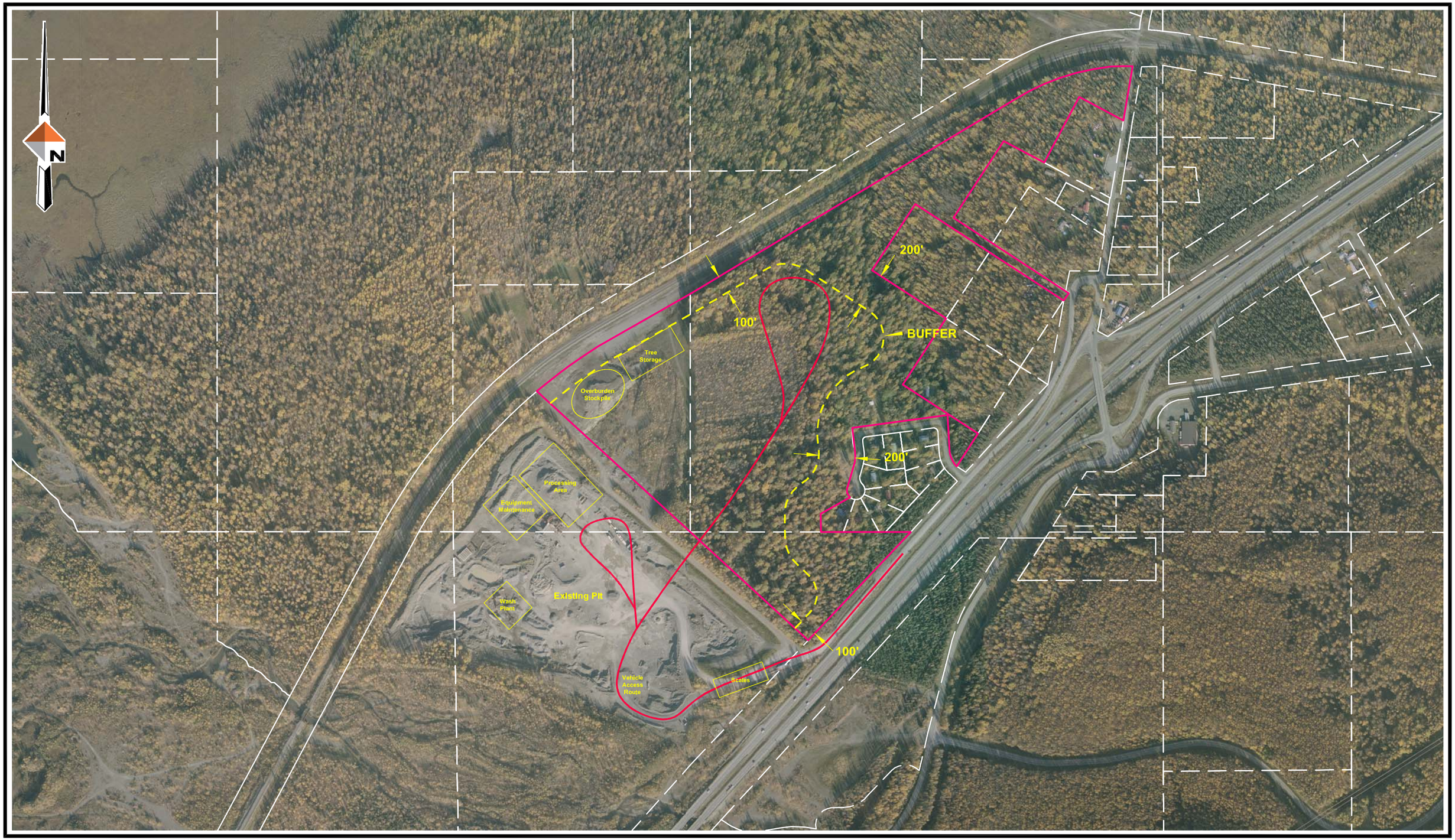
DOWL HKM

Fall 2008 Aerial Photography

EKLUTNA PIT EXPANSION

Eklutna, Alaska

FIGURE 3



P:\Projects\D59475\Planning\SITE 1\CUP PIT EXPANSION.dwg 2009-2-12

SCALE: 1"=500'

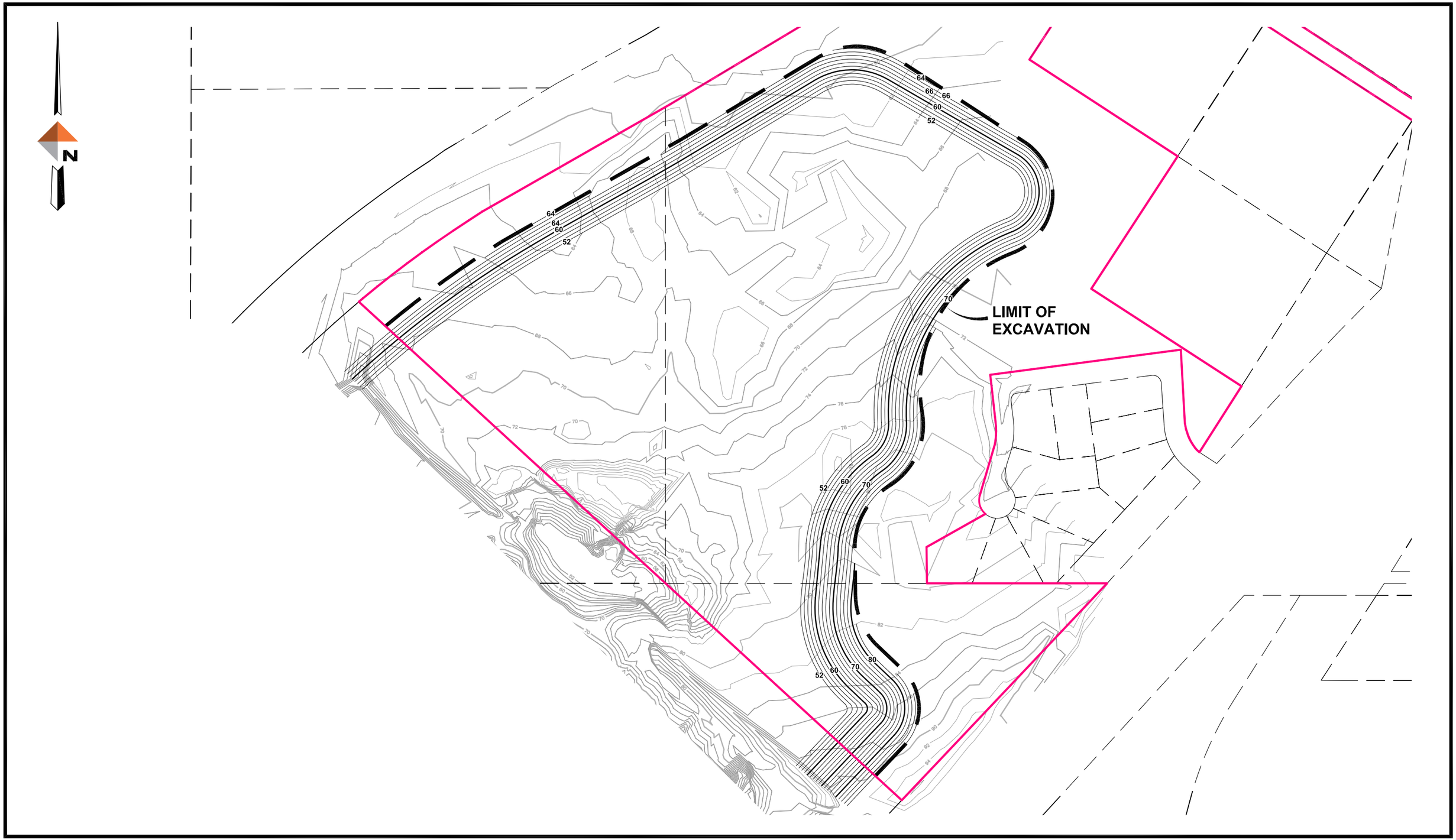
DOWL HKM

Conceptual Site Plan

EKLUTNA PIT EXPANSION

Eklutna, Alaska

FIGURE 4



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SCALE: 1"=250'

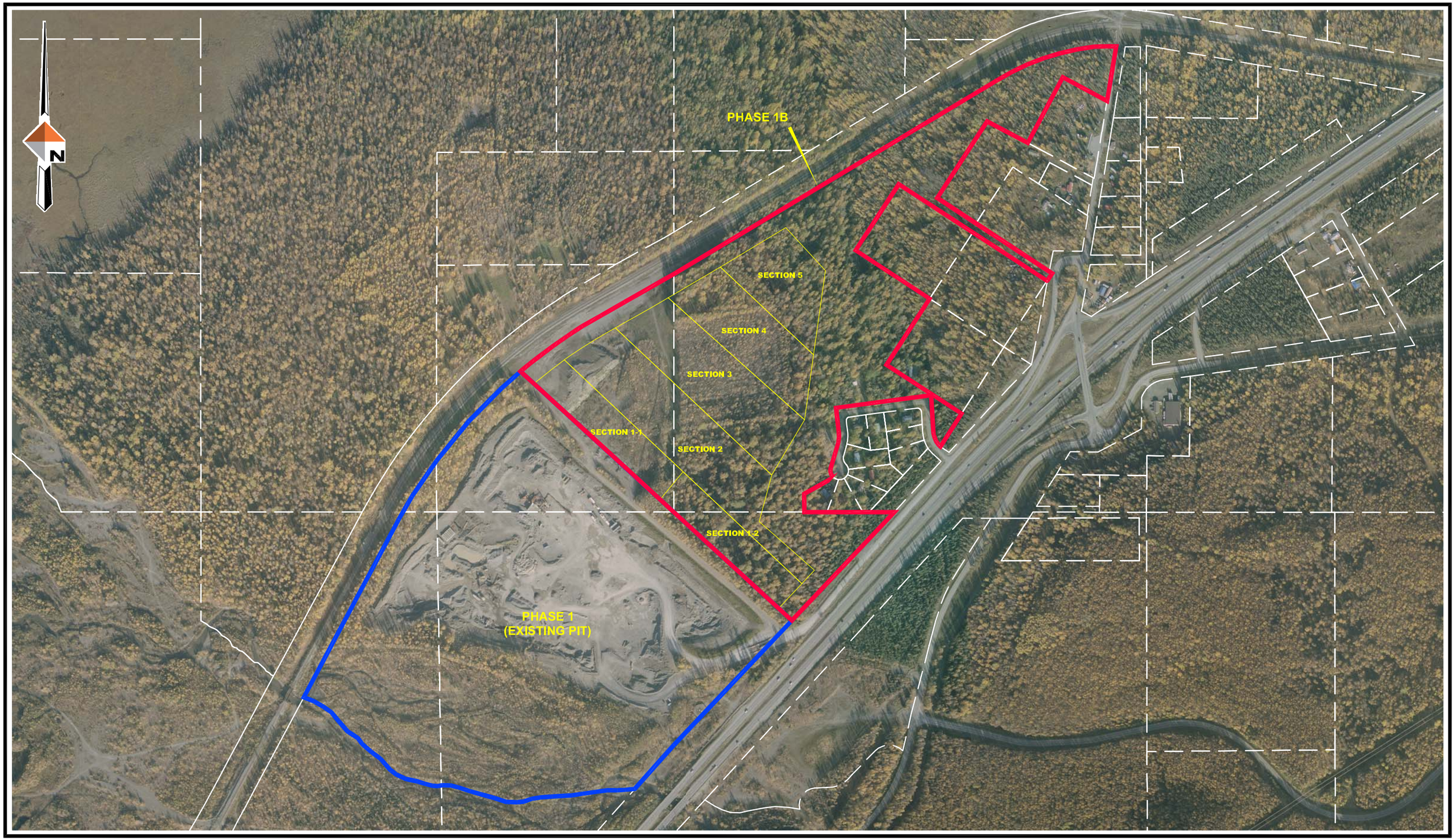
DOWL HKM

Conceptual Grading and Drainage Plan

EKLUTNA PIT EXPANSION

Eklutna, Alaska

FIGURE 5



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SCALE: 1"=500'

DOWL HKM

Phasing Plan

EKLUTNA PIT EXPANSION

Eklutna, Alaska

FIGURE 6

Well Number	Owner	Address	Well Depth	Static Water Level
1	Benjamin Mills	26301 Rusticate Dr.	270	44
2*	Clevey & Julia Cooper	26450 Eklutna Village Rd	61	39
3	Michael & Anna Curtis	26428 Eklutna Village Rd	50	35
4	Eklutna Village	Sec 24 T16N R1W	71	48
5	AAP	Onsite	164	50
6	AAP	Onsite	60	22
7	Eklutna Inc	Thunderbird Heights	95	29
8	Eklutna Inc	Thunderbird Heights	182	29

*This well is shared with Michael & Anna Curtis, 26520 Eklutna Village Road

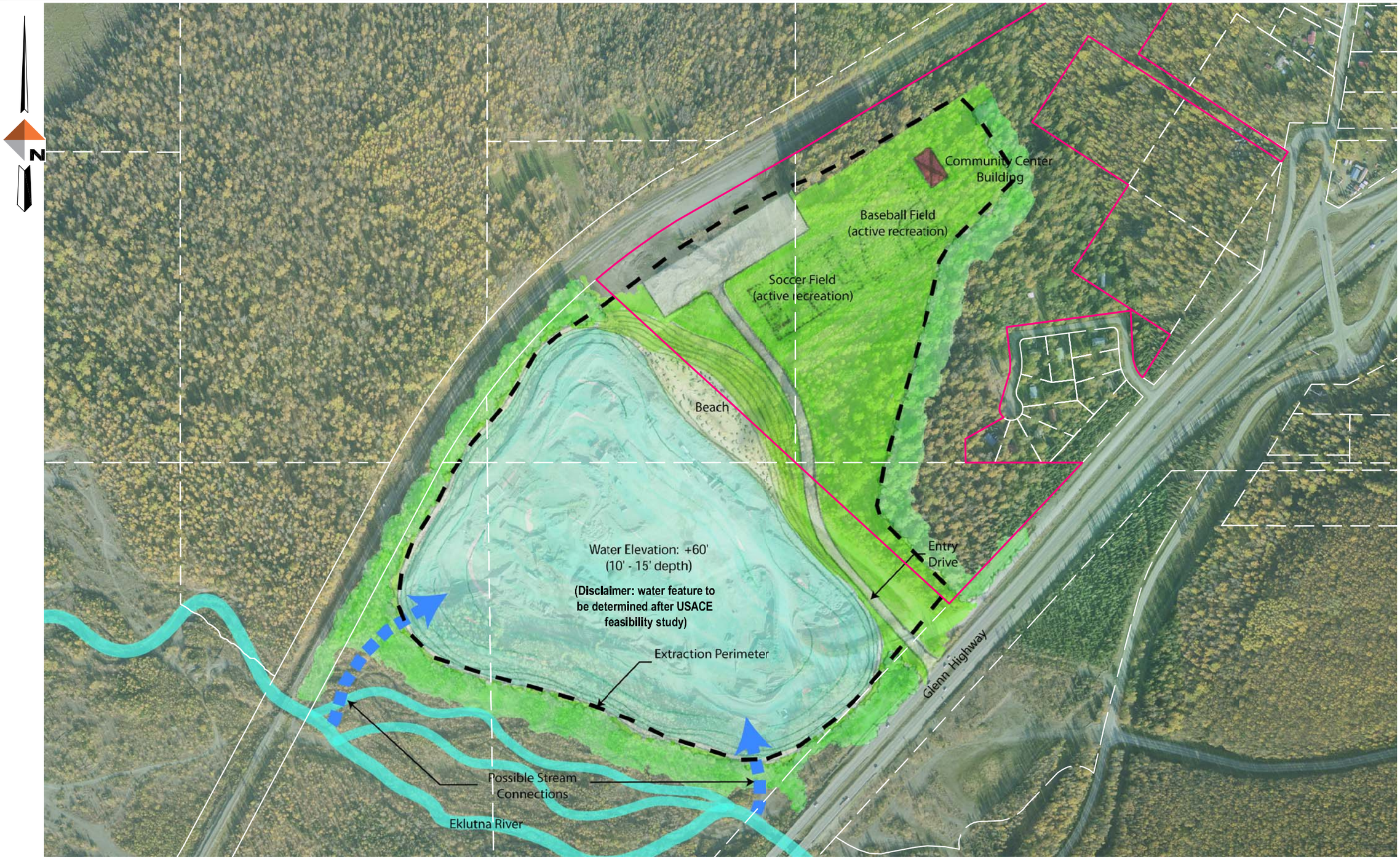
DOWL HKM

Figure 7 - Well Map

Birchwood, Alaska

Project Area
Parcels
Excavation Area
Streams
Wells
4ft Contour Lines

P:\Projects\D59475\GIS\Wells11x17.mxd (lgasek) 01/29/09



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SCALE: 1"=400'

DOWL HKM

Conceptual Reclamation Plan

EKLUTNA PIT EXPANSION

Eklutna, Alaska

FIGURE 8

LIST OF ATTACHMENTS

ATTACHMENT A

Resolution 2007-011

MUNICIPALITY OF ANCHORAGE
PLANNING AND ZONING COMMISSION RESOLUTION NO. 2007-011

A RESOLUTION ADOPTING A MASTER DEVELOPMENT PLAN FOR AN EXISTING PC, PLANNED COMMUNITY DISTRICT AND APPROVING A SITE PLAN FOR A NATURAL RESOURCE EXTRACTION FOR A PORTION OF SECTIONS 24 AND 25, T16N, R1W S. M. AK.

Case 2007-002, Tax I.D. No. 052-231-07, 052-231-14, 052-241-08, 052-241-11

WHEREAS, a petition has been received from Eklutna Inc. to adopt a master development plan for an existing PC, planned community district and to approve a site plan for a natural resource extraction for a portion of sections 24 and 25, T16N, R1W S. M. AK, more particularly described as commencing at the northwest corner of the NE1/4 of the NW1/4 of Section 25, T16N, R1W, S. M. AK, said corner being the True Point of Beginning for this description; thence east on the north line thereof to the northeast corner of said NE1/4 of the NW1/4; thence S 45° 00" 00"E to the intersection of the northwesterly right-of-way line of the New Glenn Highway; thence southwesterly on said northwesterly right-of-way to the intersection the south line of the NW1/4 of said Section 25; thence west on said south line to the southwest corner of said NW1/4; thence north on the west line of said NW1/4 to the intersection of the southeasterly line of the Alaska Railroad right-of-way; thence northeasterly on said southeasterly line to the north line of said NW1/4 of Section 25; thence east on said north line to the True Point of Beginning, embracing an area of 117 acres more or less, and

WHEREAS, notices were published, posted and 67 public hearing notices mailed and a public hearing was held on February 12, 2007.

NOW THEREFORE BE IT RESOLVED, by the Municipal Planning and Zoning Commission that:

A. The Commission makes the following findings of fact:

1. The Planned Community district is intended to provide a system of land use regulation for large tracts of land under unified ownership or development control. The PC District requires a Master Development Plan reviewed by the Planning Commission and approved by the Assembly. The subject property was zoned PC district as a holding category by areawide rezoning and no master plan has been approved.

2. The purpose of this district classification is to provide for and allow flexibility in the selection of land use controls for the specific site proposed while protecting the public health, safety and welfare by ensuring that the development will be consistent with the

comprehensive plan and the holding capacity of the land. A PC district ordinance establishes the design and character of the development permitted within the district by specifying certain land use controls as part of the zoning map amendment process.

3. Eklutna has proposed master plan development criteria that provides for interim development and site preparation as natural resource extraction with a restoration and replanting plan. The restored property will be retained as open space until further development is proposed and the master plan amended.

4. Assembly approval of the master plan is required before development on the site may occur. Natural resource extraction is proposed as the first use to be implemented, and it is proposed to begin as soon as possible after Assembly master plan approval. The gravel extraction will be conducted in two stages: north of the Eklutna River initially, and south of the river at a later date.

5. The initial proposed master plan applied to the entire petition area of approximately 404 acres, but the proposed natural resource extraction site plan is only for the property currently zoned PC and north of the Eklutna River. Approximately 117 acres of the petition area is zoned PC. The natural resource extraction will require at least ten years to complete. Natural resource extraction south of the Eklutna River will require a separate site plan.

6. There is concern in the Chugiak-Eagle River area over the many excavation operations are located in the area. The visual impact of seeing one gravel pit after another is unsightly. This site was a natural resource extraction project in the 1970s. The petitioner has proposed a 100-foot buffer adjacent to the Glenn Highway, and a 100-foot buffer adjacent to the Alaska Railroad right-of-way to mitigate negative visual impacts. Appropriate buffers will be located on the north boundary adjacent to the Village of Eklutna, and on the south boundary adjacent to the Eklutna River.

7. The PC district requires that the applicant submit a master plan wherein the types of uses that are principal, accessory, and prohibited be identified. The intent of the PC district was to provide the opportunity for a master development plan and this application is the development of that plan. The project seems to be well thought out. The conditions should alleviate typical concerns.

8. Although the applicant desires to operate 24/7 in order to respond to economic demand, the Thunderbird Heights neighborhood is within earshot of the extraction operation and, from testimony on gravel extraction issues, sound carries uphill to, and impacts those properties. The imposition of the standard hours of operation conditions for this type of operation makes sense in this area.

9. The Commission recommended approval of the request to adopt the master development plan and to approval the natural resource extraction by a vote of five ayes, no nays, and two abstentions.

B. The Commission recommends the above captioned master development plan be approved by the Anchorage Assembly subject to the following condition(s):

ORDINANCE:

Paragraph A. Intent.

The PC District Master development Plan is intended for natural resource extraction and related industrial and accessory uses.

Paragraph B. Permitted Principal Uses and Structures.

1. Natural resource extraction subject to public hearing site plan review, by the Planning and Zoning Commission, using the requirements and criteria of AMC 21.15.030 and 21.50.070.

Paragraph C. Permitted Accessory Uses and Structures.

1. Open storage of gravel, silt, muck, peat, sand, topsoil and other materials normally associated with a natural resource extraction project. The open storage must be part of an active natural resource extraction operation located on the same lot or tract; or on an adjacent lot or tract under common ownership or control.

2. Open storage of trucks, trailers, conveyor belts and other heavy equipment normally associated with a natural resource extraction project. The open storage must be part of an active natural resource extraction operation located on the same lot or tract; or on an adjacent lot or tract under common ownership or control.

3. One dwelling unit associated with a caretaker or security function for a natural resource extraction.

4. Asphalt batching, concrete mixing, rock crushing, materials screening and other activities directly related and clearly subordinate to natural resource extraction.

5. Other uses and structures customarily accessory and clearly incidental to a natural resource extraction, including concrete and asphalt batch plants, as part of an active natural resource extraction operation located on the same lot or tract; or on an adjacent lot or tract under common ownership or control.

Paragraph D, Landscaping.

1. Screening landscaping adjacent to residential uses and zoning districts.

2. Buffer landscaping adjacent to commercial zoning districts.

3. Visual enhancement landscaping at the end of the project in all other areas not devoted to buildings, structures, drives, parking facilities, walks, or other authorized installations.

4. Creeks, waterways and wetlands shall be separated from natural resource operations by a 100 foot wide naturally vegetated buffer.

5. A 100 foot wide buffer shall be maintained on property adjacent to the Glenn Highway, and a 100 foot wide buffer shall be maintained on property adjacent to the Alaska Railroad right-of-way. The buffers shall contain the existing natural vegetation.

C. The Commission approves the above captioned site plan to allow natural resource extraction and related industrial uses for the first phase of the property, which is the property north of the Eklutna River, and a requirement for phase two south of the Eklutna River be subject to the conditional use requirements of AMC 21.15.030 and 21.50.070 and subject to the following condition(s):

1. A Notice of Zoning Action shall be filed with the State Recorder's Office. Proof of such shall be provided the Department of Community Planning and Development.

2. The only permitted principal use on the property is natural resource extraction subject to public hearing site plan review, by the Planning and Zoning Commission, using the criteria of AMC 21.15.030 and 21.50.070.

3. Accessory Uses and Structures are:

   a. Open storage of gravel, silt, muck, peat, sand, topsoil and other materials normally associated with a natural resource extraction project. The open storage must be part of an active natural resource extraction operation located on the same lot or tract; or on an adjacent lot or tract under common ownership or control.

   b. Open storage of trucks, trailers, conveyor belts and other heavy equipment normally associated with a natural resource extraction project. The open storage must be part of an active natural resource extraction operation located on the same lot or tract; or on an adjacent lot or tract under common ownership or control.

   c. Asphalt batching, concrete mixing, rock crushing, materials screening and other activities directly related and clearly subordinate to natural resource extraction.

   d. One dwelling unit associated with a caretaker or security function for a natural resource extraction.

   e. Other uses and structures customarily accessory and clearly incidental to a natural resource extraction.

4. Landscaping minimums shall be:

   a. Screening landscaping adjacent to residential uses and zoning districts.

   b. Buffer landscaping adjacent to commercial zoning districts.

   c. Visual enhancement landscaping at the end of the project in all other areas not devoted to buildings, structures, drives, parking facilities, walks or other authorized installations.

d. Creeks, waterways and wetlands shall be separated from natural resource operations by a 100 foot wide naturally vegetated buffer.

e. A 100 foot wide buffer shall be maintained on property adjacent to the Glenn Highway, and a 100 foot wide buffer shall be maintained on property adjacent to the Alaska Railroad right-of-way. The buffers shall contain the existing natural vegetation.

5. Other uses, and development criteria and review standards, such as lot size, yard requirements, building heights, etc., shall be determined during Master Plan amendment.

6. Trails along the Eklutna River and Edmonds Creek shall be accommodated. All trails shall be indicated at the time of platting.

7. A detailed revegetation plan has not been submitted. As the gravel in each area is exhausted, the property will be re-contoured to blend into natural terrain. Subsoil, topsoil and vegetation will be replaced, consistent with the proposed end use of the property. At this time, end use has not been specified. A close out inspection by Municipal staff, DNR and DEC shall be required.

8. Hours of operation for natural resource extraction, processing, loading, hauling and maintenance shall be during the hours of 7:00 a.m. to 6:00 p.m., Monday through Saturday, with no holiday or Sunday operations. The natural resource extraction site plan shall expire December 31, 2012. Extensions may be granted through a minor site plan amendment. The time extension would be granted after a non-public hearing if the Commission finds the operation has not violated the conditions of approval or has created environmental problems either on-site or off-site.

9. The final recommendations from the State of Alaska Department of Transportation Planning and Municipal Traffic Department for frontage road and Glenn Highway access shall be incorporated into this approval.

10. Resolve with Watershed Management the need for waterways, creeks, and wetlands mapping to the north of the creek.

11. Review and approval of a final Air Quality Plan by the Department of Health and Social Services, Air Quality Office. The plan shall include any dust mitigation measures on public roadways and on the roadways within the site; a copy of the approved plan shall be submitted to the Planning Department.

12. Provide a drainage plan, sedimentation and erosion control plan, and a plan for the treatment of stormwater runoff to Municipal Project Management and Engineering Section for review and approval. Include copies of any required AK-DNR or AK-DEC applications, permits or plans.

13. The restoration of the property shall be subject to a close-out review or shall be restored via a method approved by DHHS, DNR, DEC and PM&E.

14. A noise control permit application shall be submitted for review, to be approved by DHHS, with a copy to be provided to the Planning Department. Blasting is not allowed. All equipment used in these operations shall comply with Chapter 15.70 Noise Control of the Anchorage Municipal Code.

15. The operation of the site shall include the following:

    a. On-site personnel shall be formally trained on all aspects of the excavation operation.

    b. The telephone number of the contractor selected to perform the work, as well as a contact telephone number for the owners, shall be placed on site. The sign shall be of sufficient size to be visible from the adjacent roadways and, the view of the sign shall be unobstructed by equipment, machinery, vegetation and the like.

    c. On-site personnel shall have total authority to direct road clean-up and maintenance operations as needed. On-site personnel shall have the authority to call a sweeper, water truck and motor grader, as necessary, and to respond to specific site conditions or complaints.

    d. Circulation roads within the excavation area shall be maintained to minimize materials carried onto the adjacent properties.

e. The owners shall identify contact people to respond to public inquiries. The telephone numbers of the contact people shall be provided to the Chair of the Chugiak Community Council, representatives of the Village of Eklutna and Eklutna Inc., and to the Manager, Land Use Enforcement. The Community Council chairman and Land Use Enforcement shall be notified of any change in the contact personnel or business telephone number(s).

16. Beginning December 1, 2007, and every December 1 thereafter, the applicant shall submit an annual monitoring report to the Planning Department. The report shall contain the following information:

    a. A log of any complaints reported in the previous year and how the complaint was the resolved.

    b. An update on the amount of material removed during the previous year, and an update, if necessary, of any change to the proposed completion date.

17. At the end of the extraction process, a close-out inspection of the property with representatives of the Planning Department, DHHS and PM&E shall be conducted to evaluate the restoration and landscaping plans.

18. Neither gravel extraction nor processing, including the asphalt and concrete plants, may commence operation until final approval of the Master Plan by the Assembly.

19. Finalize the draft ordinance.

20. Submit, for the Planning Department file, letters of authorization from AK-DOT and AKRR for property access and transportation routes. Resolve with AK-DOT and the Municipal Traffic Engineer the need for a truck/tire wash station on site.

PASSED AND APPROVED by the Municipal Planning and Zoning Commission on the 12th day of February, 2007.

ADOPTED by the Anchorage Municipal Planning and Zoning Commission this 12th day of March 2007. If the secretary received a written request and intent to appeal, this written decision/resolution of the Planning and Zoning Commission is final and any party may appeal it within twenty (20)

days to the Board of Adjustment pursuant to Anchorage Municipal Code 21.30.030 and Anchorage Municipal Code of Regulations 21.10.304. If the secretary did not receive a written request and intent to appeal within seven (7) calendar days of the date the decision was made on the record, February 12, 2007, then this written decision is final and not appealable to any other administrative body. Final administrative decisions with no further administrative remedy may be appealed to the Superior Court within thirty (30) days.

Tom Nelson
Director

Toni Jones
Chair

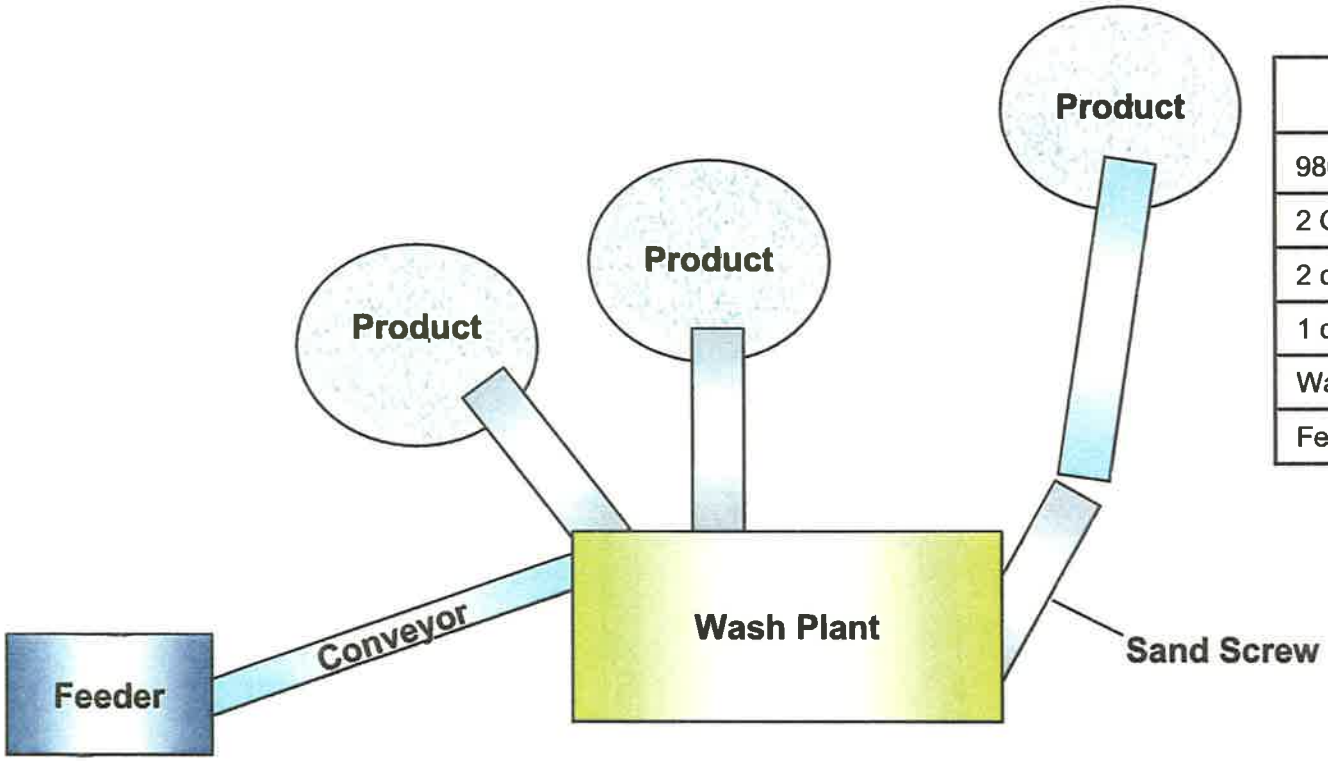
Case 2007-002; Tax I.D. No. 052-231-07, -14, 052-241-08, -11

ab

ATTACHMENT B

Photographs of Processing Operation

WASH PLANT SETUP



EQUIPMENT LIST	
980 Loader	
2 Operators	
2 conveyors 3'x 50'	
1 conveyor 1'x 100'	
Wash Plant 200 tph	
Feeder	

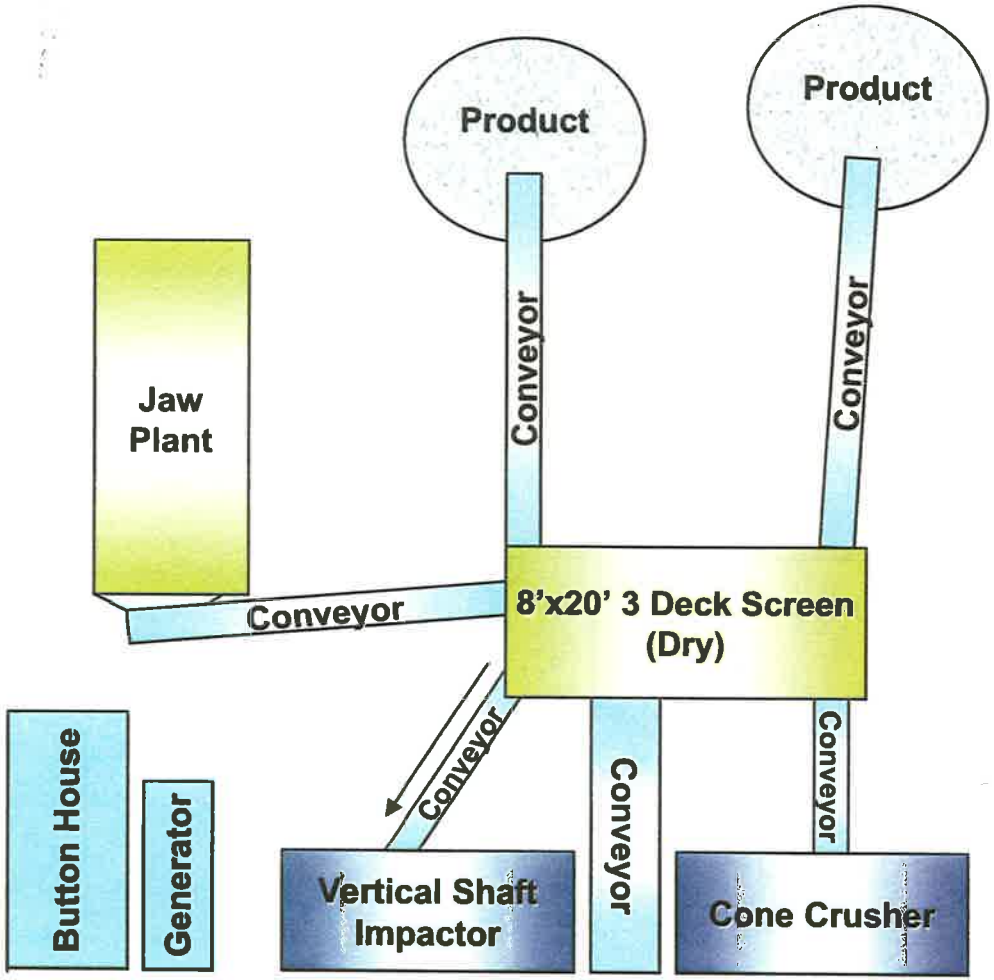
alaska aggregate PRODUCTS

ALASKA AGGREGATE PRODUCTS

EKLUTNA GRAVEL PIT

Drawn By:	Sht:
Date: 1/12/09	

CRUSHER SETUP



EQUIPMENT LIST	
100' Stacker	
6 50' Transfer Conveyors	
980 Loader	Feed Plant
980 Loader	Stock Pile
4 Operators	
500 tph Crusher	
8'x 20' Three Deck Screen	
Button House / Control Tower	
Generator (1000KW)	

alaska aggregate PRODUCTS

ALASKA AGGREGATE PRODUCTS

EKLUTNA GRAVEL PIT

Drawn By:	Sht:
Date: 1/12/09	

ATTACHMENT C

Geotechnical Investigation

DOWL HKM

PRELIMINARY

GEOTECHNICAL INVESTIGATION

GRAVEL PIT EXPANSION

EKLUTNA, ALASKA

DOWL HKM

February 11, 2009
W.O. D59475
Area 1
Report No. 4968

Mr. Fred Hargrave
Alaska Interstate Construction, LLC
601 West 5th Avenue, Suite 400
Anchorage, Alaska 99501

Subject: Preliminary Geotechnical Investigation
Gravel Pit Expansion, Eklutna, Alaska

Dear Mr. Hargrave:

On January 22, 2009, DOWL HKM excavated 9 test pits with the assistance of Alaska Interstate Construction, LLC (AIC). The test pits were excavated for the Eklutna Gravel Pit Expansion project, adjacent to the existing Alaska Aggregate Products (AAP) pit in Eklutna, Alaska. The test pits excavated were used to help determine if the subsurface material was suitable for extraction. During the investigation 9 test pits were excavated, sampled, and logged to depths of 22 to 27 feet in Sections 1 through 5 of the site. A vicinity map and sketch of the test boring locations has been attached as Figure A-1 and A-2, Appendix A.

Samples collected during the investigation were transported to our laboratory for further testing. Laboratory testing included visual classification, moisture contents, and mechanical analyses, the results of which are reported on the test boring logs in Appendix B, Test Pit Logs and Descriptive Guide, and in Appendix C, Laboratory Testing.

SITE CONDITIONS

Surface. The site is bounded by the Alaska Railroad to the north, Eklutna Village Road to the south, the Eklutna Gravel Pit to the west, and residential property to the east (Figure A-2, Test Pit Location Map). Historically, the northwestern portion of the site served as part of a military camp, Camp Mohawk, prior to 1950. Between 1975 and 1980 the camp was taken down, leaving debris behind. The military has since cleaned up the site. Today, the only evidence of the camp are some light poles and small trees in the northwest corner.

The site is almost completely forested, and relatively level with a slight downward slope to the north. Several trails cross through the site, and the existing gravel pit is visible along the western edge of the site.

Subsurface. Previous activity in the northwestern corner of the site has created variable subsurface conditions. Fill material was encountered only in Test Pit 8 to a depth of 10 feet, and consisted of silty sand with gravel (GM). The fill material contained nonplastic fines, a strong organic odor, cobbles to four inches, and debris including bricks, wire, and metal car parts.

Native mineral soil primarily consists of poorly graded gravel (GP, GP-GM) with lesser concentrations of poorly graded sands (SP), silty sands (SM) and sandy silts (ML). The poorly graded gravels have low frost susceptibility (non-frost susceptible [NFS] to F1) and cobbles to 12 inches in diameter. The poorly graded sands (SP) were observed as a three-foot layer in Test Pit 3. The sands

are NFS and contain gravel to three inches. Silty sands (SM) have a medium to high frost susceptibility (F3 to F4) and nonplastic fines. Sandy silts (ML) were observed as thin layers in-between layers of poorly graded gravels. The silts contain nonplastic to low plastic fines and are highly frost susceptible (F4). In Test Pit 5, coal was present within the silt layer.

Groundwater. Groundwater was not observed in any of the test pits while excavating.

If you have any questions regarding this letter or its use, or if we may provide additional services, please call.

Sincerely,
DOWL HKM

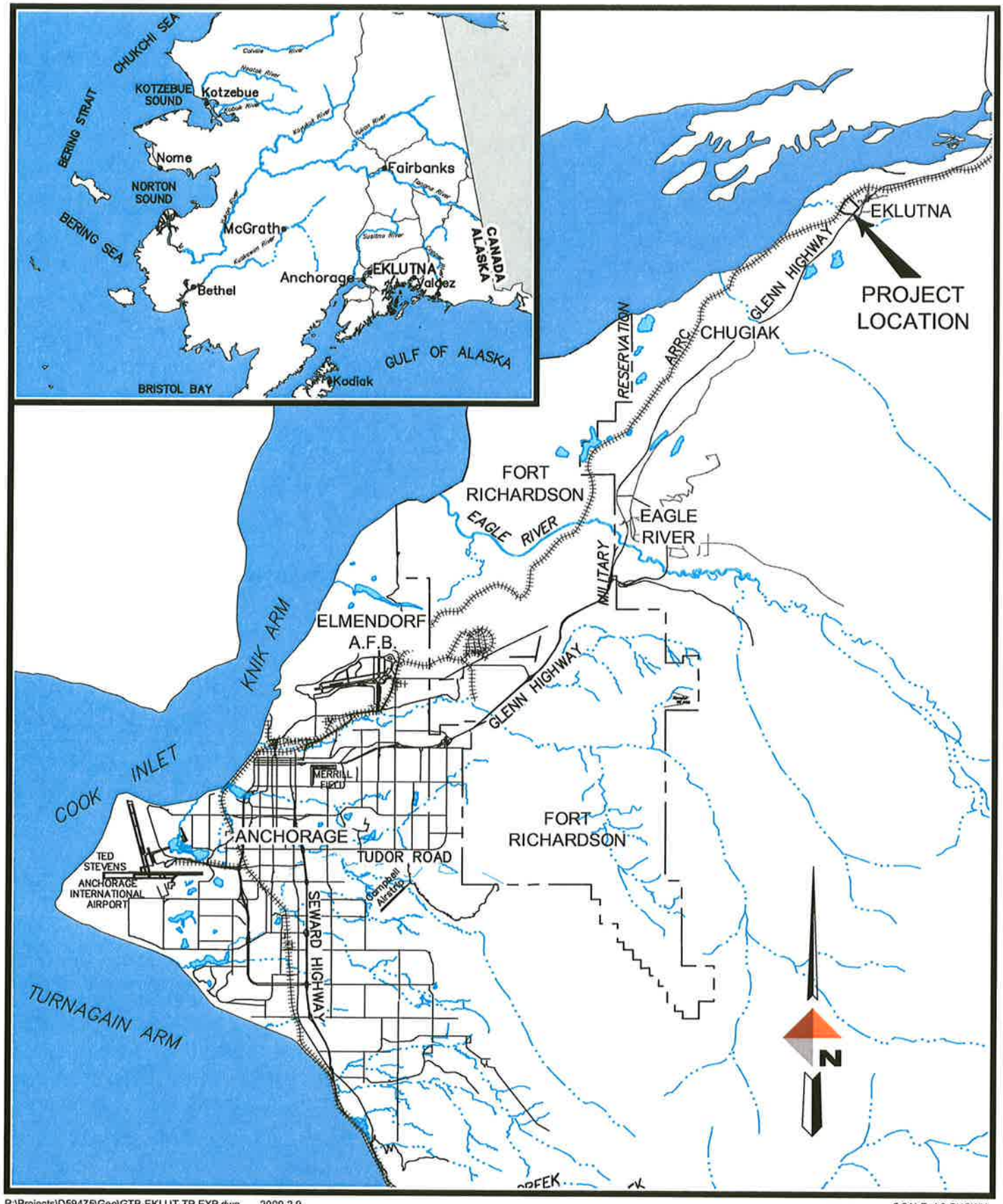
Maria E. Kampsen, P.E.
Geotechnical Engineer

Attachments: As stated

D59475.Hargrave.MEK.021109.tla

APPENDIX A

Vicinity and Test Boring Locations Map



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SCALE: AS SHOWN

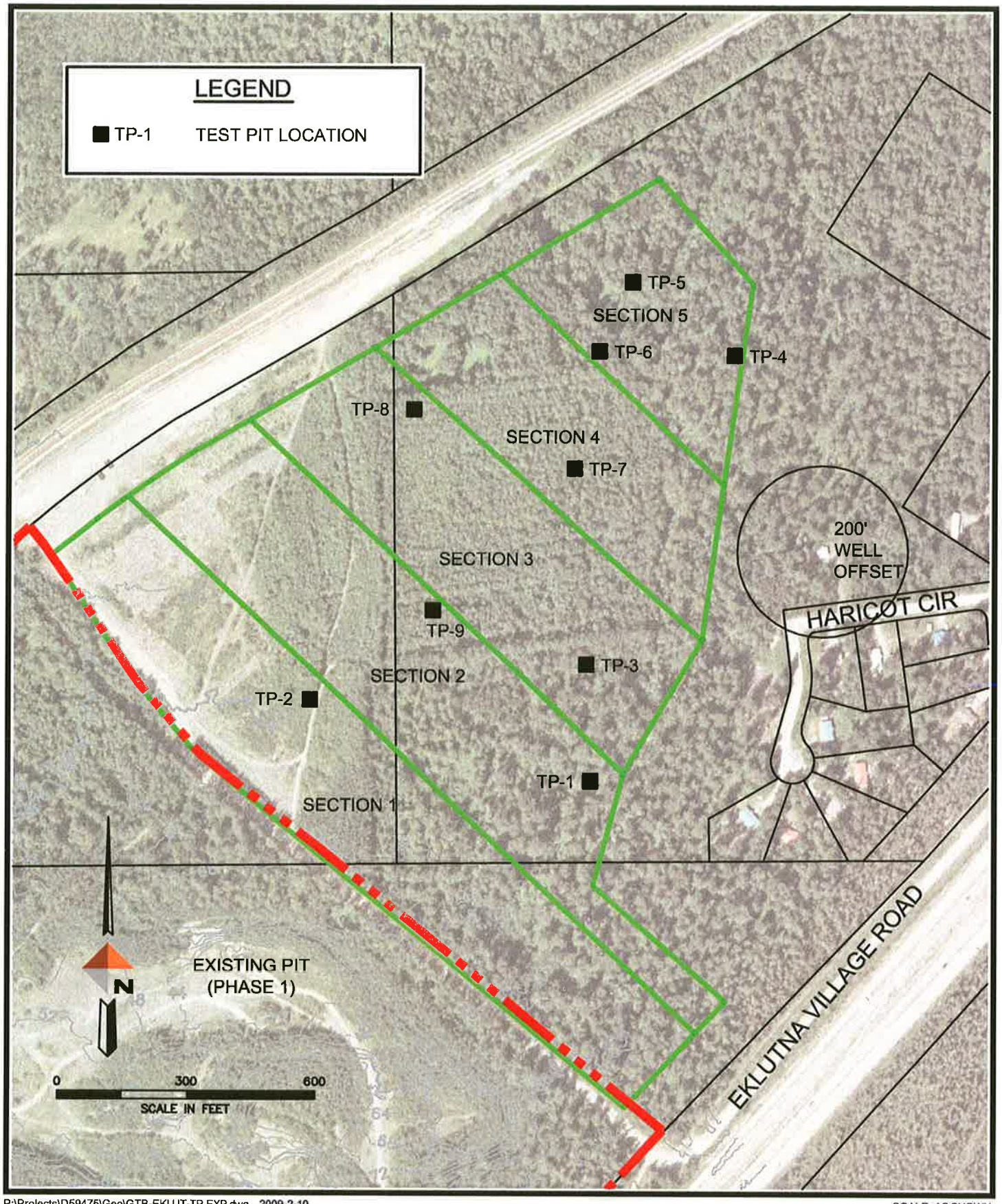
DOWL HKM

Vicinity Map

EKLUTNA GRAVEL PIT EXPANSION

Eklutna, Alaska

FIGURE A-1



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SCALE: AS SHOWN

DOWL HKM

Test Pit Location Map

EKLUTNA TEST PIT EXPANSION

Eklutna, Alaska

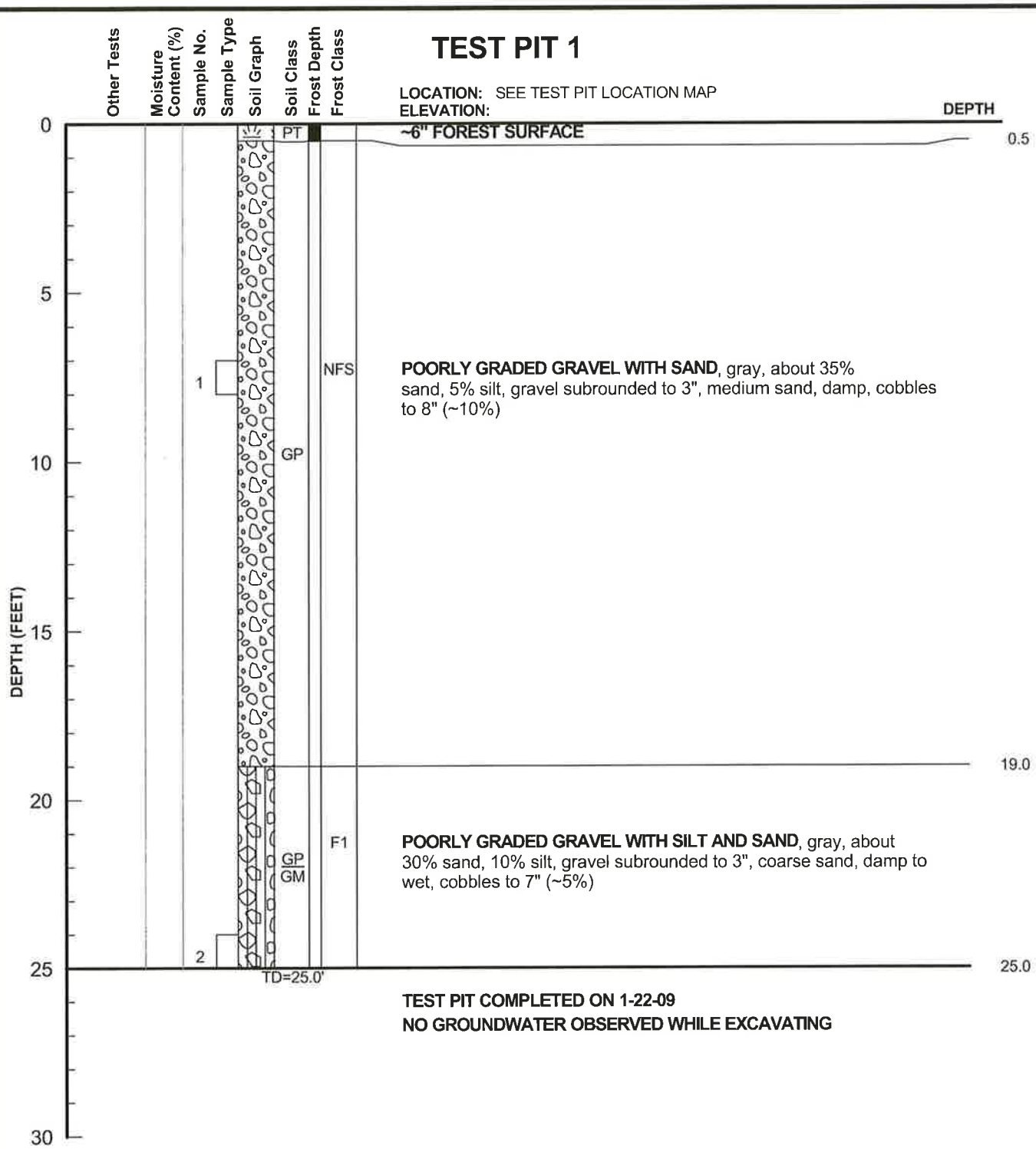
FIGURE A-2

APPENDIX B

Test Pit Logs and Descriptive Guide

TEST PIT 1

LOCATION: SEE TEST PIT LOCATION MAP
ELEVATION:



TEST PIT COMPLETED ON 1-22-09
NO GROUNDWATER OBSERVED WHILE EXCAVATING

KEY
TD = Total Depth
☐ = Grab Sample
◪ = SPT Sample
S = Shelby Tube - pushed
☒ = 2.5" I.D. Spoon Sample
340# weight, 30" fall

EQUIPMENT: Hitachi 450
OPERATOR: Chad Lewis
METHOD: Excavator

CLIENT: Alaska Interstate Construction
PROJECT: Eklutna Gravel Pit Expansion
LOGGED BY: Callie J. Keller
TEST PIT COMPLETED: 1-22-09
W.O. 1132.59475.01

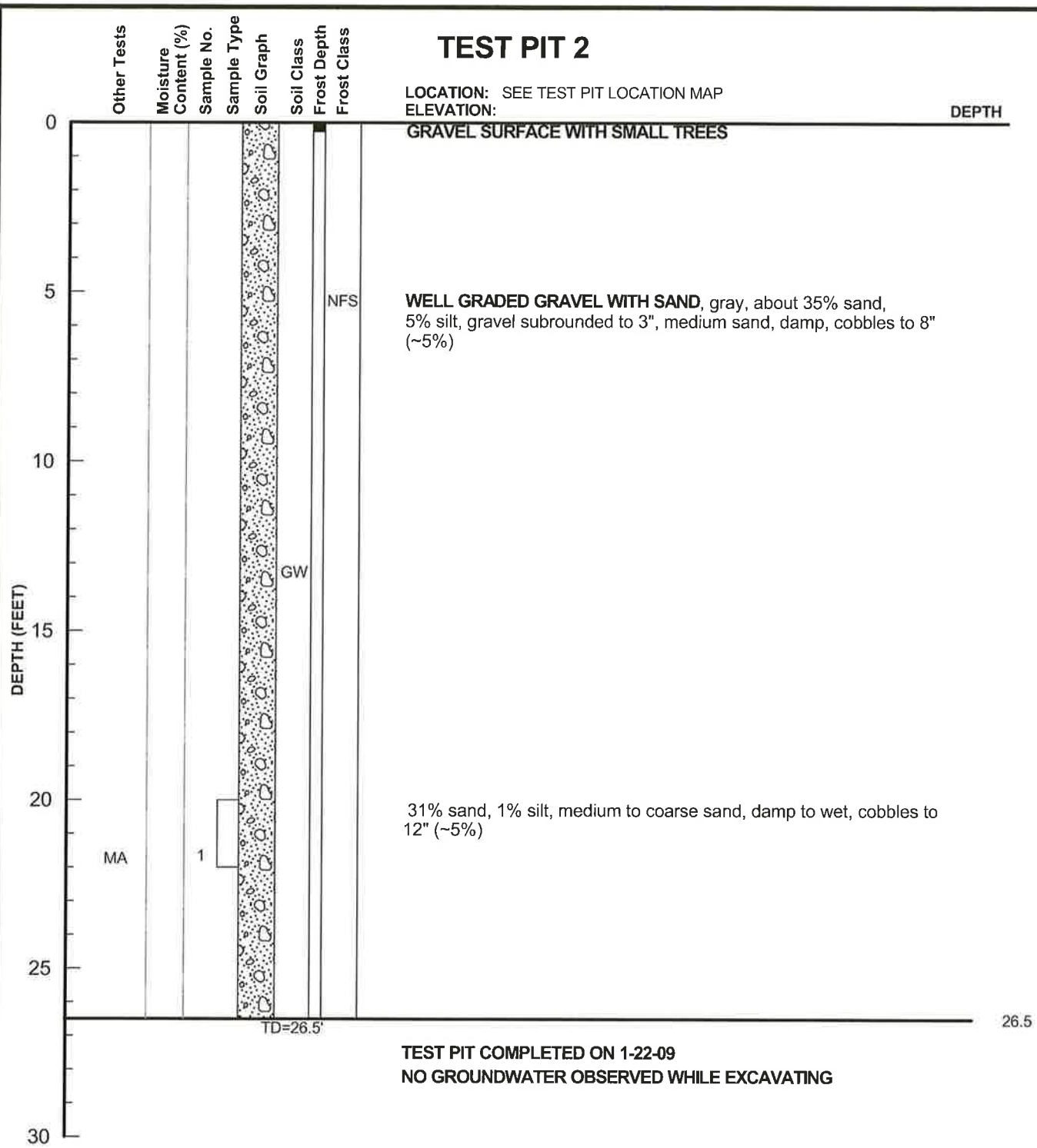
DOWL HKM

LOG OF TEST PIT 1

FIGURE B-1

TEST PIT 2

LOCATION: SEE TEST PIT LOCATION MAP
ELEVATION:



TEST PIT COMPLETED ON 1-22-09
NO GROUNDWATER OBSERVED WHILE EXCAVATING

KEY
MA = Mechanical Analysis
TD = Total Depth
☐ = Grab Sample
◪ = SPT Sample
S = Shelby Tube - pushed
⊠ = 2.5" I.D. Spoon Sample
340# weight, 30" fall

EQUIPMENT: Hitachi 450
OPERATOR: Chad Lewis
METHOD: Excavator

CLIENT: Alaska Interstate Construction
PROJECT: Eklutna Gravel Pit Expansion
LOGGED BY: Callie J. Keller
TEST PIT COMPLETED: 1-22-09
W.O. 1132.59475.01

DOWL HKM

LOG OF TEST PIT 2

FIGURE B-2

TEST PIT 3

LOCATION: SEE TEST PIT LOCATION MAP
ELEVATION:

Other Tests	Moisture Content (%)	Sample No.	Sample Type	Soil Graph	Soil Class	Frost Depth	Frost Class	DEPTH	
								~2" FOREST SURFACE	
					SP/SM		F2	**POORLY GRADED SAND WITH SILT AND GRAVEL**, brown, about 15% gravel, 10% silt, gravel subrounded to 3", medium sand, damp	1.5
		1			SP		NFS	**POORLY GRADED SAND WITH GRAVEL**, gray, about 30% gravel, 5% silt, gravel subrounded to 3", medium sand, damp	4.5
							NFS	**POORLY GRADED GRAVEL WITH SAND**, gray, about 35% sand, 5% silt, gravel subrounded to 3", medium sand, damp, cobbles to 8" (~ 5%)	
					GP				
		2						brown, coarse sand, damp to wet, cobbles to 7" (~ 5%)	
MA		3						34% sand, 2% silt, cobbles to 8" (~ 5%)	
				TD=22.0'					22.0

DEPTH (FEET): 0, 5, 10, 15, 20, 25, 30

TEST PIT COMPLETED ON 1-22-09
NO GROUNDWATER OBSERVED WHILE EXCAVATING

KEY
MA = Mechanical Analysis
TD = Total Depth
☐ = Grab Sample
◪ = SPT Sample
S = Shelby Tube - pushed
⊠ = 2.5" I.D. Spoon Sample
340# weight, 30" fall

EQUIPMENT: Hitachi 450
OPERATOR: Chad Lewis
METHOD: Excavator

CLIENT: Alaska Interstate Construction
PROJECT: Eklutna Gravel Pit Expansion
LOGGED BY: Callie J. Keller
TEST PIT COMPLETED: 1-22-09
W.O. 1132.59475.01

DOWL HKM

LOG OF TEST PIT 3

FIGURE B-3

TEST PIT 4

LOCATION: SEE TEST PIT LOCATION MAP
ELEVATION:

Other Tests	Moisture Content (%)	Sample No.	Sample Type	Soil Graph	Soil Class	Frost Depth	Frost Class	DEPTH	Description
					PT				~1' FOREST SURFACE
								1.0	
	4	1			GP		NFS		**POORLY GRADED GRAVEL WITH SAND**, brown, about 35% sand, 5% silt, gravel subrounded to 3", medium sand, damp, cobbles to 8" (~5%)
	30	2			ML		F4	9.8	**SANDY SILT**, mottled brown/gray, about 50% sand, nonplastic, fine sand, wet
								10.0	
					GP		NFS		**POORLY GRADED GRAVEL WITH SAND**, gray, about 35% sand, 5% silt, gravel subrounded to 3", medium to coarse, damp to wet, cobbles to 9" (~5%)
									cobbles to 10" (~5%)
					TD=27.0'			27.0	

DEPTH (FEET): 0, 5, 10, 15, 20, 25, 30

TEST PIT COMPLETED ON 1-22-09
NO GROUNDWATER OBSERVED WHILE EXCAVATING

KEY
TD = Total Depth
☐ = Grab Sample
◪ = SPT Sample
S = Shelby Tube - pushed
⊠ = 2.5" I.D. Spoon Sample 340# weight, 30" fall

EQUIPMENT: Hitachi 450
OPERATOR: Chad Lewis
METHOD: Excavator

CLIENT: Alaska Interstate Construction
PROJECT: Eklutna Gravel Pit Expansion
LOGGED BY: Callie J. Keller
TEST PIT COMPLETED: 1-22-09
W.O. 1132.59475.01

DOWL HKM

LOG OF TEST PIT 4

FIGURE B-4

TEST PIT 5

LOCATION: SEE TEST PIT LOCATION MAP
ELEVATION:

Other Tests	Moisture Content (%)	Sample No.	Sample Type	Soil Graph	Soil Class	Frost Depth	Frost Class	Description	Depth
					PT			~1' FOREST SURFACE	1.0
MA		1			GP		NFS	**POORLY GRADED GRAVEL WITH SAND**, brown, 34% sand, 4% silt, gravel subrounded to 3", medium sand, damp, cobbles to 6" (~5%)	9.0
	30	2			ML		F4	**SANDY SILT**, mottled brown/gray, about 30% sand, nonplastic, fine sand, damp to wet, coal present (~10%)	11.0
					GP		NFS	**POORLY GRADED GRAVEL WITH SAND**, brown, about 35% sand, 5% silt, gravel subrounded to 3", medium sand, damp, cobbles to 8" (~5%)	17.0
	34	3			ML		F4	**SANDY SILT**, mottled brown/gray, about 25% sand, low plasticity, wet, coal present (~10%)	21.0
					GP		NFS	**POORLY GRADED GRAVEL WITH SAND**, brown, about 35% sand, 5% silt, gravel subrounded to 3", medium sand, damp to wet, cobbles to 6" (~5%)	25.0

DEPTH (FEET): 0, 5, 10, 15, 20, 25, 30

TD=25.0'

TEST PIT COMPLETED ON 1-22-09
NO GROUNDWATER OBSERVED WHILE EXCAVATING

KEY
MA = Mechanical Analysis
TD = Total Depth
☐ = Grab Sample
◪ = SPT Sample
S = Shelby Tube - pushed
⊠ = 2.5" I.D. Spoon Sample
340# weight, 30" fall

EQUIPMENT: Hitachi 450
OPERATOR: Chad Lewis
METHOD: Excavator

CLIENT: Alaska Interstate Construction
PROJECT: Eklutna Gravel Pit Expansion
LOGGED BY: Callie J. Keller
TEST PIT COMPLETED: 1-22-09
W.O. 1132.59475.01

DOWL HKM

LOG OF TEST PIT 5

FIGURE B-5

TEST PIT 6

LOCATION: SEE TEST PIT LOCATION MAP
ELEVATION:

Other Tests	Moisture Content (%)	Sample No.	Sample Type	Soil Graph	Soil Class	Frost Depth	Frost Class	DEPTH	Description
					PT				~6" FOREST SURFACE
	24	1			SM		F3	0.5	**SILTY SAND**, brown, about 5% gravel, 20% silt, nonplastic, fine sand, damp, **ORGANICS** present to <5% by volume, (roots)
		2			GP		NFS	5.0	**POORLY GRADED GRAVEL WITH SAND**, brown, about 35% sand, 5% silt, gravel subrounded to 3", medium sand, damp, cobbles to 9"
									cobbles to 6"
								25.0	TD=25.0'

DEPTH (FEET): 0, 5, 10, 15, 20, 25, 30

TEST PIT COMPLETED ON 1-22-09
NO GROUNDWATER OBSERVED WHILE EXCAVATING

KEY
TD = Total Depth
☐ = Grab Sample
◪ = SPT Sample
S = Shelby Tube - pushed
⊠ = 2.5" I.D. Spoon Sample
340# weight, 30" fall

EQUIPMENT: Hitachi 450
OPERATOR: Chad Lewis
METHOD: Excavator

CLIENT: Alaska Interstate Construction
PROJECT: Eklutna Gravel Pit Expansion
LOGGED BY: Callie J. Keller
TEST PIT COMPLETED: 1-22-09
W.O. 1132.59475.01

DOWL HKM

LOG OF TEST PIT 6

FIGURE B-6

TEST PIT 7

LOCATION: SEE TEST PIT LOCATION MAP
ELEVATION:

Other Tests	Moisture Content (%)	Sample No.	Sample Type	Soil Graph	Soil Class	Frost Depth	Frost Class	Description	DEPTH
					PT			**~3" FOREST SURFACE**	0.3
					GP		NFS	**POORLY GRADED GRAVEL WITH SAND**, brown, about 40% sand, 5% silt, gravel subrounded to 2", medium sand, damp	3.0
					SM		F4	**SILTY SAND**, brown, about 45% silt, nonplastic, medium sand, damp, interbedded sand and silt layers	6.0
							NFS	**POORLY GRADED GRAVEL WITH SAND**, brown, about 35% sand, 5% silt, gravel subrounded to 3", medium sand, damp, cobbles to 6"	
					GP			cobbles to 8"	
MA	12	1 2			GP GM		F1	**POORLY GRADED GRAVEL WITH SILT**, tan, about 8% sand, 7% silt, gravel subrounded to 3", coarse sand, wet, cobbles to 9"	24.0 25.0

DEPTH (FEET): 0, 5, 10, 15, 20, 25, 30

TD=25.0'

TEST PIT COMPLETED ON 1-22-09
NO GROUNDWATER OBSERVED WHILE EXCAVATING

KEY
MA = Mechanical Analysis
TD = Total Depth
□ = Grab Sample
◪ = SPT Sample
S = Shelby Tube - pushed
⊠ = 2.5" I.D. Spoon Sample
340# weight, 30" fall

EQUIPMENT: Hitachi 450
OPERATOR: Chad Lewis
METHOD: Excavator

CLIENT: Alaska Interstate Construction
PROJECT: Eklutna Gravel Pit Expansion
LOGGED BY: Callie J. Keller
TEST PIT COMPLETED: 1-22-09
W.O. 1132.59475.01

DOWL HKM

LOG OF TEST PIT 7

FIGURE B-7

TEST PIT 8

LOCATION: SEE TEST PIT LOCATION MAP
ELEVATION:

Other Tests	Moisture Content (%)	Sample No.	Sample Type	Soil Graph	Soil Class	Frost Depth	Frost Class	DEPTH	
									GRAVEL SURFACE
	18	1			SM		F2		**FILL**, **SILTY SAND WITH GRAVEL**, gray, about 30% sand, 15% silt, nonplastic, gravel subrounded to 3", medium sand, **FROZEN, ICE AS Vc**, clear, randomly orientation, up 1/4" thick, **DEBRIS** present (brick, wire, car parts), strong odor, cobbles to 4" (~5%)
					ML		F4	10.0	**SANDY SILT**, brown, about 40% sand, low plasticity, fine sand, damp
MA		2			GW		NFS	14.0	**WELL GRADED GRAVEL WITH SAND**, brown, about 33% sand, 2% silt, gravel subrounded to 3", medium sand, damp, cobbles to 8" (~5%)
				TD=24.0'				24.0	

DEPTH (FEET): 0, 5, 10, 15, 20, 25, 30

TEST PIT COMPLETED ON 1-22-09
NO GROUNDWATER OBSERVED WHILE EXCAVATING

KEY
MA = Mechanical Analysis
TD = Total Depth
☐ = Grab Sample
◪ = SPT Sample
S = Shelby Tube - pushed
☒ = 2.5" I.D. Spoon Sample
340# weight, 30" fall

EQUIPMENT: Hitachi 450
OPERATOR: Chad Lewis
METHOD: Excavator

CLIENT: Alaska Interstate Construction
PROJECT: Eklutna Gravel Pit Expansion
LOGGED BY: Callie J. Keller
TEST PIT COMPLETED: 1-22-09
W.O. 1132.59475.01

DOWL HKM

LOG OF TEST PIT 8

FIGURE B-8

TEST PIT 9

LOCATION: SEE TEST PIT LOCATION MAP
ELEVATION:

Other Tests	Moisture Content (%)	Sample No.	Sample Type	Soil Graph	Soil Class	Frost Depth	Frost Class	DEPTH	
								GRAVEL SURFACE	
					GP		NFS	**POORLY GRADED GRAVEL WITH SAND**, brown, about 40% sand, 5% silt, gravel subrounded to 3", medium sand, damp, cobbles to 6" (~5%)	
					SM		F4	**SILTY SAND**, brown, about 40% silt, nonplastic, medium to fine sand, damp, interbedded layers of sand and silt	8.0 / 9.0
					GP		NFS	**POORLY GRADED GRAVEL WITH SAND**, brown, about 35% sand, 5% silt, gravel subrounded to 3", medium sand, damp, cobbles to 12" (~5%)	
								TD=25.0'	25.0

DEPTH (FEET): 0, 5, 10, 15, 20, 25, 30

TEST PIT COMPLETED ON 1-22-09
NO GROUNDWATER OBSERVED WHILE EXCAVATING

KEY
TD = Total Depth
☐ = Grab Sample
◪ = SPT Sample
S = Shelby Tube - pushed
☒ = 2.5" I.D. Spoon Sample
340# weight, 30" fall

EQUIPMENT: Hitachi 450
OPERATOR: Chad Lewis
METHOD: Excavator

CLIENT: Alaska Interstate Construction
PROJECT: Eklutna Gravel Pit Expansion
LOGGED BY: Callie J. Keller
TEST PIT COMPLETED: 1-22-09
W.O. 1132.59475.01

DOWL HKM

LOG OF TEST PIT 9

FIGURE B-9

TEST PIT LOG - DESCRIPTIVE GUIDE

Soil Descriptions - The soil description on the pit log is based on an interpretation of the field and laboratory visual classifications, along with the results of laboratory particle-size distribution analyses and Atterberg Limits tests which may have been performed.

The soil classification is based on ASTM Designation D2487 "Standard Test Method for Classification of Soils for Engineering Purposes" and ASTM D2488 "Standard Practice for Description and Identification of Soils (Visual - Manual Procedure)" and the soil frost classification is based on the system developed by the U.S. Army Corps of Engineers. Outlines of these classification procedures are presented on the following pages.

The soil color is the subjective interpretation of the individual logging the test pit.

The plasticity of the minus No. 40 fraction of the soil is described and the fine-grained soils are identified from manual tests using the following table as a guide:

Soil Symbol	Dry Strength	Dilatancy	Toughness
ML	none to low	slow to rapid	low or thread cannot be formed
CL	medium to high	none to slow	medium
MH	low to medium	none to slow	low to medium
CH	high to very high	none	high

Plasticity Description	Criteria
Nonplastic	A 1/8" (3.2mm) thread cannot be rolled at any water content.
Low	A thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

Laboratory Atterberg Limits tests usually are performed on a few of the plastic soils and results are reported on the test pit log. These laboratory tests are performed in accordance with ASTM D4318 "Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils."

The shape of the gravel particles is described based on this guide:

Angular: particles have sharp edges and relatively plane sides with unpolished surfaces.
Subangular: particles are similar to angular but have somewhat rounded edges.
Subrounded: particles exhibit nearly plane sides but have well-rounded corners and edges.
Rounded: particles have smoothly curved sides and no edges.

The size of gravel and sand particles is described using this guide:

	Gravel	Sand
Coarse:	Passes 3" (75 mm) sieve, retained on 3/4" (19 mm) sieve	Passes No. 4 sieve, retained on No. 10 sieve
Medium:	N/A	Passes No. 10 sieve, retained on No. 40 sieve
Fine:	Passes 3/4" (19 mm) sieve, retained on No. 4 sieve	Passes No. 40 sieve, retained on No. 200 sieve

The soil moisture is described as:

dry:	powdery, dusty, no visible moisture.
damp:	enough moisture to affect the color of the soil; moist.
wet:	water in pores but not dripping; capillary zone above water table.
saturated:	dripping wet, contains significant free water, or sampled below water table.

Soil Layer Boundaries - Generally, there is a gradual transition from one soil type to another in a natural soil deposit, and it is difficult to determine accurately the boundaries of the soil layers.

- A *diagonal line* between soil layers on the graphic pit log indicates the general region of transition from one soil layer to another.
- A *horizontal line* between soil layers indicates a relatively distinct transition between soil types was observed in the recovered samples and from a visual examination of the pit walls.

Sample Interval - The sample interval is shown graphically on the test pit log and generally is accurate to about 0.5 foot (0.15 meter).

Frost Depth and Soil Temperatures - If frozen ground is encountered during excavating, the interval of frozen soil is shown graphically on the test pit log. Generally, the temperature of a few soil samples is measured and shown on the pit log. These sample temperatures only give a qualitative indication of the *in situ* soil temperatures. The temperature of samples can be influenced significantly by the ambient air temperature.

Soil Moisture Content - Generally, laboratory soil moisture content tests are performed on all recovered samples. Only about 30 grams of the minus No. 4 material typically is used for the moisture content test, so results reported on the log may not reflect accurately the *in situ* moisture content of gravelly soils.

Groundwater - The depth to groundwater observed during excavating generally is shown on the test pit log. The depth to groundwater observed during excavating can differ significantly from the depth to the actual groundwater table, particularly in fine-grained soils.

Grab Samples - Grab samples are obtained of the distinct soil layers. The sample depth and interval indicated on the test pit log should be considered an approximation.

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES
ASTM DESIGNATION: D2487
Based on the Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification: Group Symbol	Soil Classification: Group Name[B]
Coarse-Grained Soils More than 50% retained on #200 sieve	Gravels More than 50% of coarse fraction retained on #4 sieve	Clean Gravels Less than 5% fines[C]	$Cu \geq 4$ and $1 \leq Cc \leq 3^E$	GW	Well-graded gravel[F]
			$Cu < 4$ and/or $1 > Cc > 3^E$	GP	Poorly graded gravel[F]
		Gravel with Fines More than 12% fines[C]	Fines classify as ML or MH	GM	Silty gravel[F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel[F,G,H]
	Sands 50% or more of coarse fraction passes #4 sieve	Clean Sands Less than 5% fines[D]	$Cu \geq 6$ and $1 \leq Cc \leq 3^E$	SW	Well-graded sand[I]
			$Cu < 6$ and/or $1 > Cc > 3^E$	SP	Poorly graded sand[I]
		Sands with Fines More than 12% fines[D]	Fines classify as ML or MH	SM	Silty Sand[G,H,I]
			Fines classify as CL or CH	SC	Clayey Sand[G,H,I]
Fine-Grained Soils 50% or more passes the #200 sieve	Silts and Clays Liquid limit less than 50	Inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean Clay[K,L,M]
			PI < 4 or plots below "A" Line[J]	ML	Silt[K,L,M]
		Organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OL	Organic Clay[K,L,M,N]
			Liquid limit - not dried	OL	Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line	CH	Fat clay[K,L,M]
			PI plots below "A" line	MH	Elastic silt[K,L,M]
		Organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OH	Organic clay[K,L,M,P]
			Liquid limit - not dried	OH	Organic clay[K,L,M,Q]
Highly organic soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

A Based on the material passing the 3-in. (75mm) sieve.

B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

C Gravels with 5 to 12% fines require dual symbols:
- GW-GM well-graded gravel with silt
- GW-GC well-graded gravel with clay
- GP-GM poorly graded gravel with silt
- GP-GC poorly graded gravel with clay

D Sands with 5 to 12% fines require dual symbols:
- SW-SM well-graded sand with silt
- SW-SC well-graded sand with clay
- SP-SM poorly graded sand with silt
- SP-SC poorly graded sand with clay

E $Cu = \frac{D_{60}}{D_{10}}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

F If soil contains ≥ 15% sand, add "with sand" to group name.

G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

H If fines are organic, add "with organic fines" to group name.

I If soil contains ≥ 15% gravel, add "with gravel" to group name.

J If Atterberg Limits plot in hatched area, soil is a CL-ML, silty clay.

K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel", whichever is predominant.

L If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.

M If soil contains ≥30% plus No. 200, predominantly gravel, add "gravelly" to group name.

N PI ≥ 4 and plots on or above "A" line.

O PI < 4 or plots below "A" line.

P PI plots on or above "A" line.

Q PI plots below "A" line.

DESCRIPTION OF FROZEN SOILS (Visual-Manual Procedure) ASTM Designation: D4083

Part I Description of Soil Phase	Classify Soil Phase by ASTM D2487 or D2488				
Part II Description of Frozen Soil		Group Symbol	Subgroup Description	Subgroup Symbol	Field Identification
	Segregated ice is not visible by eye	N	Poorly bonded or friable	N_f	Identify by visual examination. To determine presence of excess ice, use procedures under Note 2 and hand magnifying lens as necessary. For soils not fully saturated, estimate degree of ice saturation; medium, low. Note presence of crystals or of ice coatings around larger particles.
			No excess ice	N_b	
			Well-bonded	N_{bn}	
			Excess ice	N_{be}	
	Segregated ice is visible by eye (ice 1-inch (25 mm) or less in thickness)	V	Individual ice crystal or inclusions	V_x	For ice phase, record the following when applicable: Location, Orientation, Thickness, Length, Spacing, Structure, Color, Size, Shape, Hardness, Pattern of arrangement
			Ice coatings on particles	V_c	
			Random or irregularly oriented ice formations	V_r	
			Stratified or distinctly oriented ice formations	V_s	
			Uniformly distributed ice	V_u	Estimate volume of visible segregated ice present as percentage of total sample volume.
Part III Description of Substantial Ice	Ice (greater than 1-inch (25 mm) in thickness)	ICE	Ice with soil inclusions	ICE + Soil Type	Designate material as ICE (Note 3) and use descriptive terms as follows, usually one item from each group, where applicable: **Hardness**: HARD, SOFT [of mass, not individual crystals]; **Structure** (Note 4): CLEAR, CLOUDY, POROUS, CANDLED, GRANULAR, STRATIFIED; **Color** (Examples): COLORLESS, GRAY, BLUE; **Admixtures** (Examples): CONTAINS FEW THIN SILT INCLUSIONS
			Ice without soil inclusions	ICE	

Note 1: Frozen soils in the N group may, on close examination, indicate presence of ice within the voids of the material by crystalline reflections or by a sheen on fractured or trimmed surfaces. The impression received by the unaided eye, however, is that none of the frozen water occupies space in excess of the original voids in the soil. The opposite is true of frozen soils in the V group.

Note 2: When visual methods may be inadequate, a simple field test to aid in evaluation of the volume of excess ice can be made by placing some frozen soil in a small jar, allowing it to melt, and observing the quantity of supernatant water as a percentage of total volume.

Note 3: Where special forms of ice such as hoarfrost can be distinguished, more explicit description should be given.

Note 4: Observer should be careful to avoid being misled by surface scratches or frost coating on the ice.

DEFINITIONS

1) Ice coatings on Particles - discernible layers of ice found on or below the larger soil particles in a frozen soil mass.
2) Ice Crystal - a very small individual ice particle visible in the face of a soil mass. Crystals may be present alone or in combination with other ice formations.
3) Clear Ice - ice that is transparent and contains only a moderate number of air bubbles.
4) Cloudy Ice - ice that is translucent or relatively opaque due to the content of air or for other reasons, but which is essentially sound and impervious.
5) Porous Ice - ice that contains numerous voids, usually interconnected and usually resulting from melting at air bubbles or along crystal interfaces from presence of salt or other materials in the water, or from the freezing of saturated snow. Though porous, the mass retains its structural unity.
6) Candled Ice - ice that has rotted or otherwise formed into long columnar crystals, very loosely bonded together.
7) Granular Ice - ice that is composed of coarse, more or less equidimensional crystals weakly bonded together.
8) Ice Lenses - lenticular ice formations in soil occurring essentially parallel to each other, generally normal to the direction of heat loss, and commonly in repeated layers.
9) Ice Segregation - the growth of ice within soil in excess of the amount that may be produced by the in-place conversion of the original void moisture to ice. Ice segregation occurs most often as distinct lenses, layers, veins, and masses, commonly, but not always, oriented normal to the direction of heat loss.
10) Well-Bonded - a condition in which the soil particles are strongly held together by the ice so that the frozen soil possesses relatively high resistance to chipping or breaking.
11) Poorly-Bonded - a condition in which the soil particles are weakly held together by the ice so that the frozen soil has poor resistance to chipping and breaking.
12) Thaw Stable - the characteristics of frozen soils that, upon thawing, do not show loss of strength in comparison to normal, long-time thawed

FROST DESIGN SOIL CLASSIFICATION

Frost[2] Group	Kind of Soil	Percentage Finer than 0.02 mm by Weight	Typical Soil Types Under Unified Soil Classification System
NFS[3]	(a) Gravels Crushed stone Crushed rock	0 to 1.5	GW and GP
	(b) Sands	0 to 3	SW and SP
PFS[4] (MOA NFS)	(a) Gravels Crushed stone Crushed rock	1.5 to 3	GW and GP
(MOA F2)	(b) Sands	3 to 10	SW and SP
S1 (MOA F1)	Gravelly soils	3 to 6	GW, GP, GW-GM, and GP-GM
S2 (MOA F2)	Sandy soils	3 to 6	SW, SP, SW-SM, and SP-SM
F1	Gravelly soils	6 to 10	GM, GW-GM, and GP-GM
F2	(a) Gravelly soils	10 to 20	GM, GW-GM, and GP-GM
	(b) Sands	6 to 15	SM, SW-SM, and SP-SM
F3	(a) Gravelly soils	Over 20	GM and GC
	(b) Sands, except very fine silty sands	Over 15	SM and SC
	(c) Clays, PI>12		CL and CH
F4	(a) All silts		ML and MH
	(b) Very fine silty sands	Over 15	SM
	(c) Clays, PI>12		CL and CL-ML
	(d) Varved clays and other fine-grained, banded sediments		CL , ML, CH and SM

---

[1] Berg, Richard and Thadeus Johnson, "Revised Procedure for Pavement Design Under Seasonal Frost Conditions," Special Report 83-27, U.S. Army Corps of Engineers, Cold Research and Engineering Laboratory, September 1983.

[2] Corps of Engineers Frost groups directly correspond to the Municipality of Anchorage soil frost classification groups, except as noted.

[3] Non Frost-Susceptible.

APPENDIX C

Laboratory Testing

ALASKA TESTLAB
A Division of DOWL LLC

Client: Alaska Aggregate Products, LLC

Project: Eklutna Gravel Study, Sites 1 & 2

Location: Test Pit 2

Sample 1

Depth 20' - 22'

Engineering Classification: Well Graded GRAVEL with Sand, GW

Frost Classification: NFS MOA

PARTICLE-SIZE

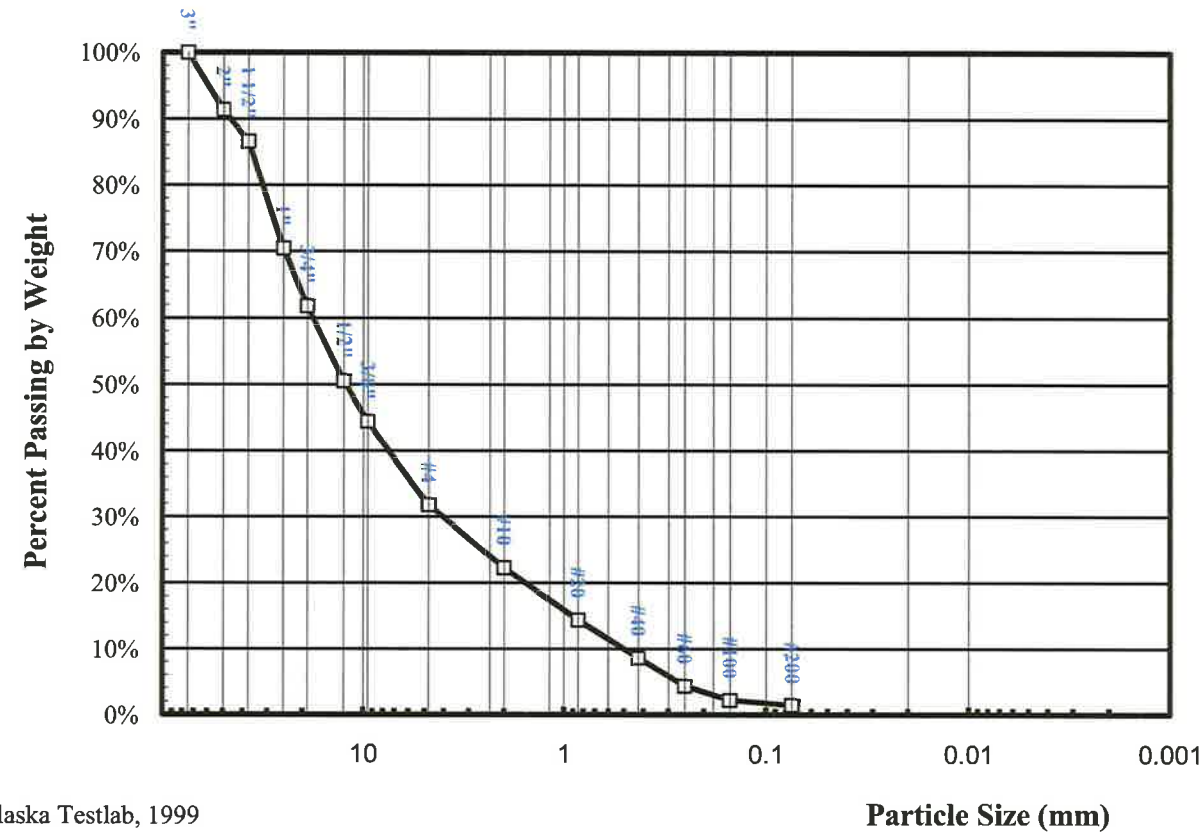
DIST. ASTM D422

W.O. D59475

Lab No. 2009-57

Received: 1/23/09

Reported: 1/29/09



SIZE	PASSING	SPECIFICATION
+3 in Not Included in Test = ~%		
3"	100%	
2"	91%	
1 1/2"	87%	
1"	70%	
3/4"	62%	
1/2"	51%	
3/8"	44%	
No. 4	32%	
Total Wt. = 23540g		
No. 8		
No. 10	22%	
No. 16		
No. 20	14%	
No. 30		
No. 40	9%	
No. 50		
No. 60	4%	
No. 80		
No. 100	2%	
No. 200	1.4%	
Total Wt. of Fine Fraction = 439.98g		
0.02 mm		

David L Andersen

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

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ALASKA TESTLAB
A Division of DOWL LLC

Client: Alaska Aggregate Products, LLC

Project: Eklutna Gravel Study, Sites 1 & 2

Location: Test Pit 3

Sample 3

Depth 21' - 22'

Engineering Classification: Poorly Graded GRAVEL with Sand, GP

Frost Classification: NFS MOA

PARTICLE-SIZE

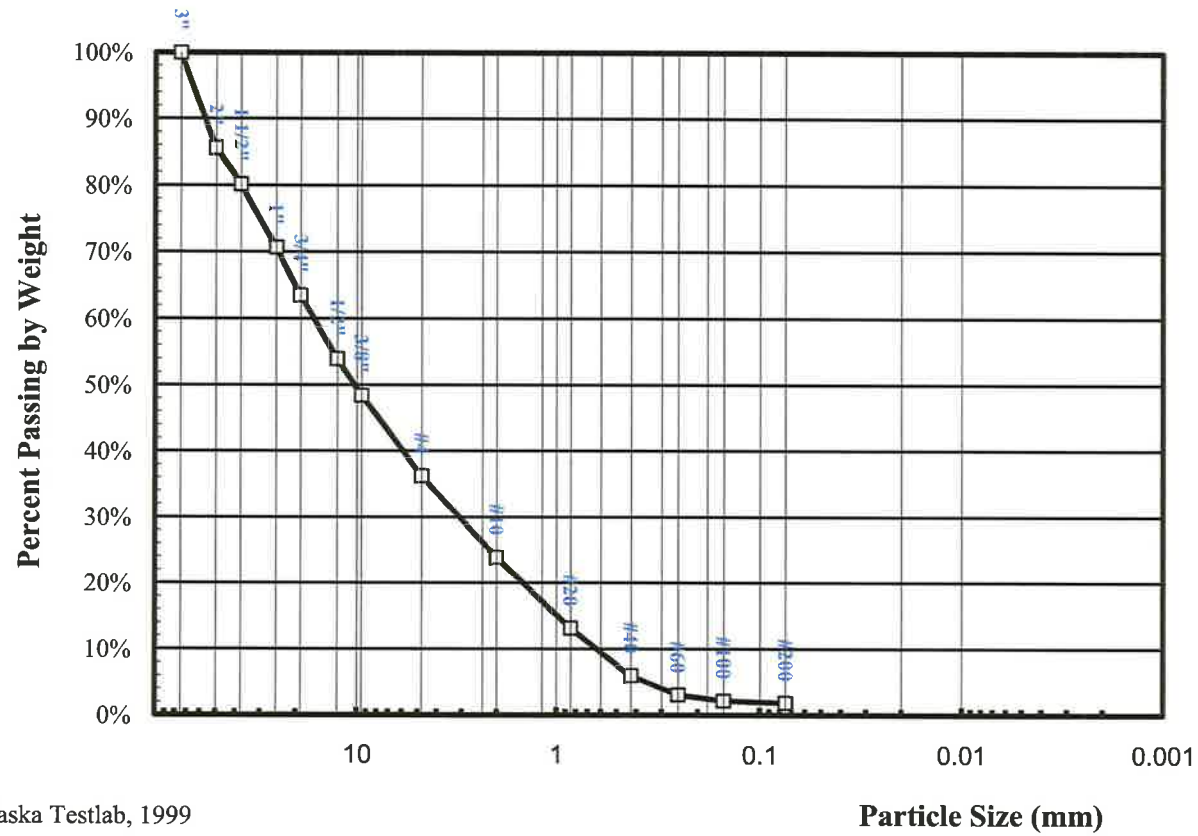
DIST. ASTM D422

W.O. D59475

Lab No. 2009-58

Received: 1/23/09

Reported: 1/29/09



SIZE	PASSING	SPECIFICATION
+3 in Not Included in Test = ~%		
3"	100%	
2"	86%	
1 1/2"	80%	
1"	71%	
3/4"	63%	
1/2"	54%	
3/8"	48%	
No. 4	36%	
Total Wt. = 27574g		
No. 8		
No. 10	24%	
No. 16		
No. 20	13%	
No. 30		
No. 40	6%	
No. 50		
No. 60	3%	
No. 80		
No. 100	2%	
No. 200	1.9%	
Total Wt. of Fine Fraction = 332.95g		
0.02 mm		

David L Andersen

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

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ALASKA TESTLAB
A Division of DOWL LLC

Client: Alaska Aggregate Products, LLC

Project: Eklutna Gravel Study, Sites 1 & 2

Location: Test Pit 5

Sample 1

Depth 3' - 4'

Engineering Classification: Poorly Graded GRAVEL with Sand, GP

Frost Classification: Not Measured

PARTICLE-SIZE

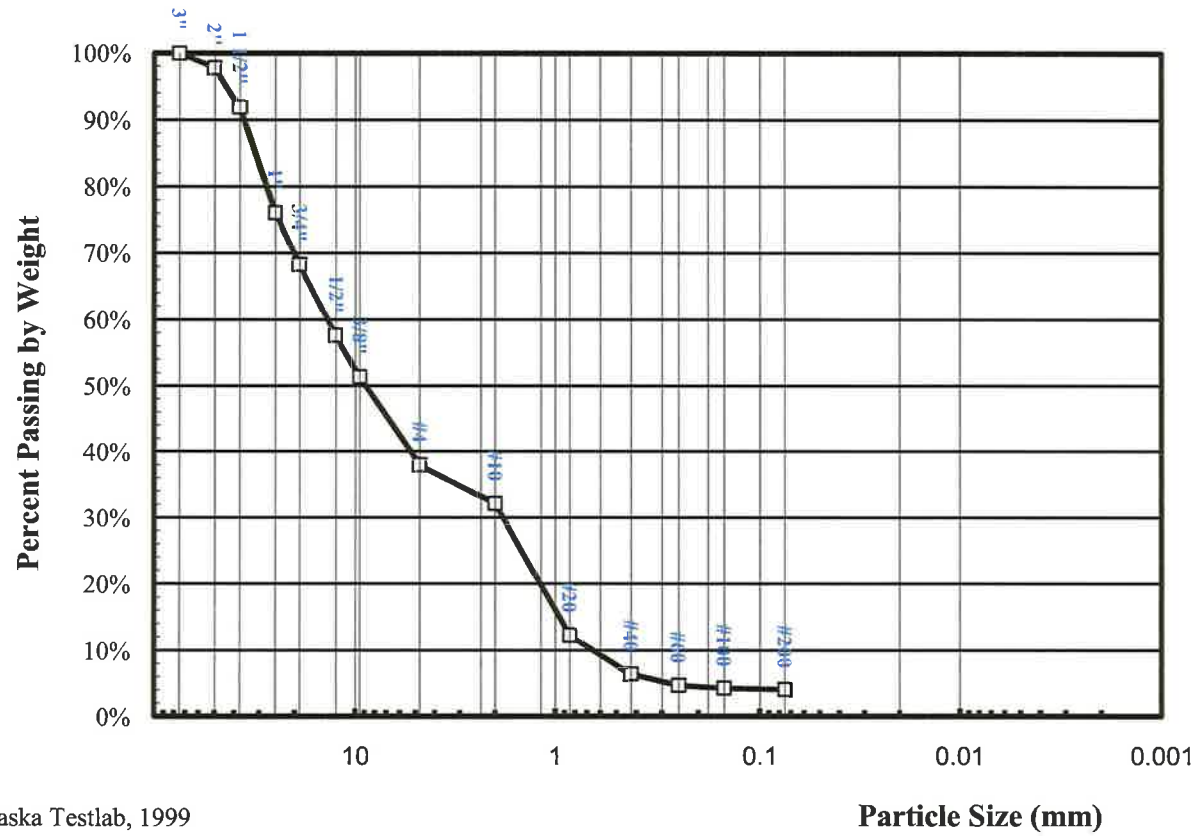
DIST. ASTM D422

W.O. D59475

Lab No. 2009-59

Received: 1/23/09

Reported: 1/29/09



SIZE	PASSING	SPECIFICATION
+3 in Not Included in Test = ~%		
3"	100%	
2"	98%	
1 1/2"	92%	
1"	76%	
3/4"	68%	
1/2"	58%	
3/8"	51%	
No. 4	38%	
Total Wt. = 21440g		
No. 8		
No. 10	32%	
No. 16		
No. 20	12%	
No. 30		
No. 40	6%	
No. 50		
No. 60	5%	
No. 80		
No. 100	4%	
No. 200	4.1%	
Total Wt. of Fine Fraction = 451.94g		
0.02 mm		

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ALASKA TESTLAB
A Division of DOWL LLC

Client: Alaska Aggregate Products, LLC

Project: Eklutna Gravel Study, Sites 1 & 2

Location: Test Pit 7

Sample 2

Depth 25'

Engineering Classification: Poorly Graded GRAVEL with Silt , GP-GM

Frost Classification: Not Measured

PARTICLE-SIZE

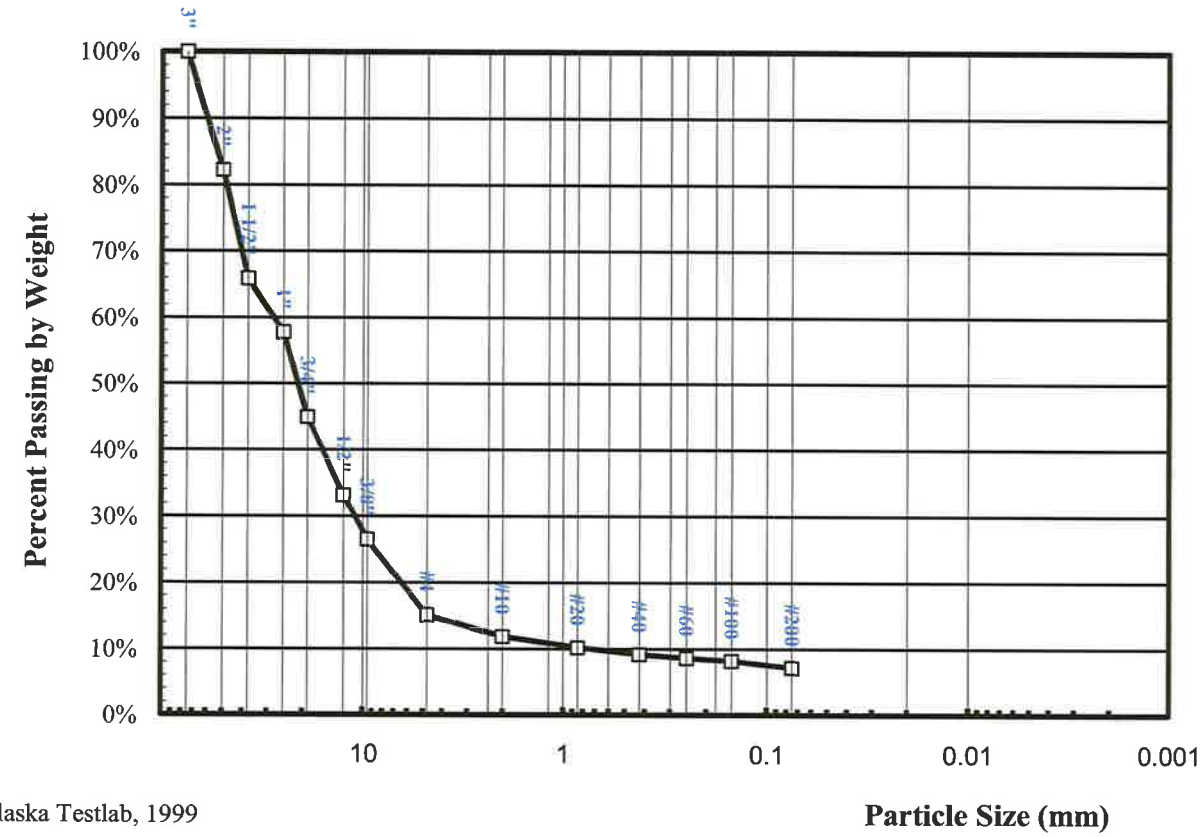
DIST. ASTM D422

W.O. D59475

Lab No. 2009-60

Received: 1/23/09

Reported: 1/29/09



SIZE	PASSING	SPECIFICATION
+3 in Not Included in Test = ~%		
3"	100%	
2"	82%	
1 1/2"	66%	
1"	58%	
3/4"	45%	
1/2"	33%	
3/8"	27%	
No. 4	15%	
Total Wt. = 1550.5g		
No. 8		
No. 10	12%	
No. 16		
No. 20	10%	
No. 30		
No. 40	9%	
No. 50		
No. 60	9%	
No. 80		
No. 100	8%	
No. 200	7.2%	
Total Wt. of Fine Fraction = 234.8g		
0.02 mm		

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ALASKA TESTLAB
A Division of DOWL LLC

Client: Alaska Aggregate Products, LLC

Project: Eklutna Gravel Study, Sites 1 & 2

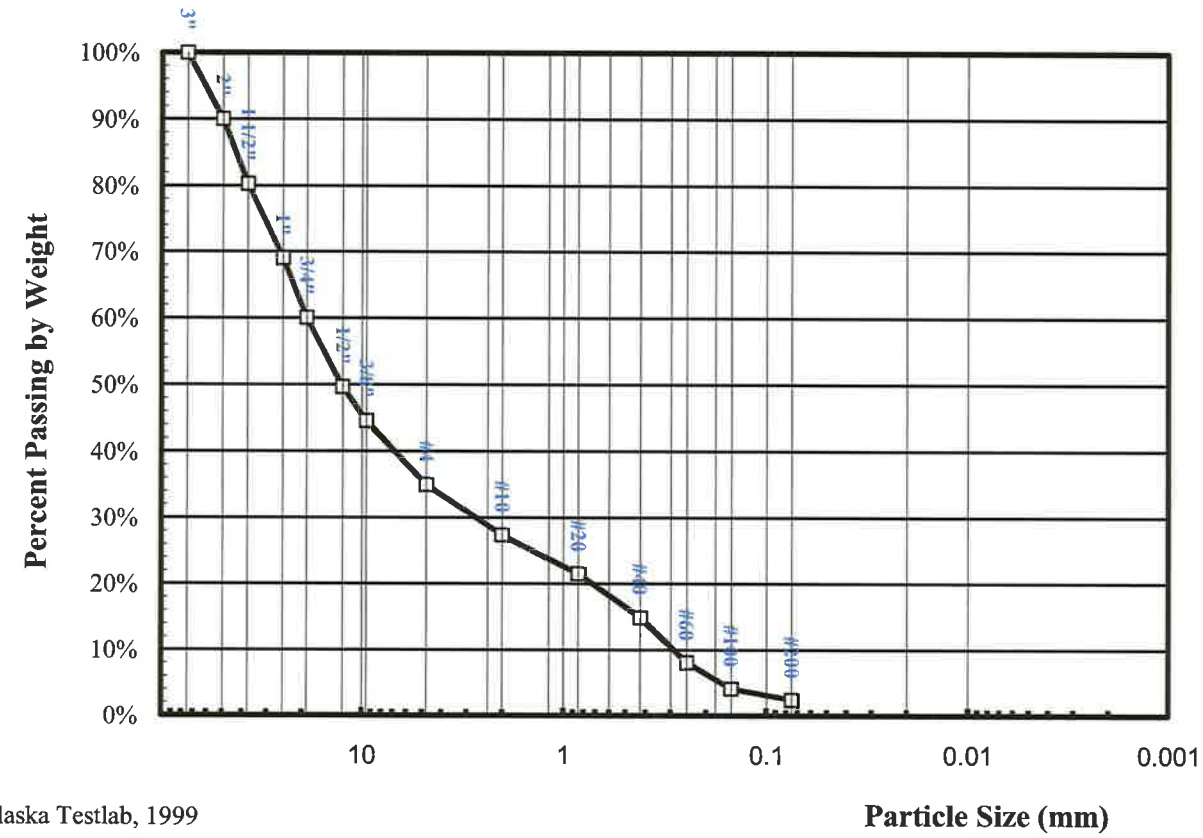
Location: Test Pit 8

Sample 2

Dpeht 16' - 17'

Engineering Classification: Well Graded GRAVEL with Sand, GW

Frost Classification: NFS MOA



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PARTICLE-SIZE

DIST. ASTM D422

W.O. D59475

Lab No. 2009-61

Received: 1/23/09

Reported: 1/29/09

SIZE	PASSING	SPECIFICATION
+3 in Not Included in Test = ~%		
3"	100%	
2"	90%	
1 1/2"	80%	
1"	69%	
3/4"	60%	
1/2"	50%	
3/8"	45%	
No. 4	35%	
Total Wt. = 20326g		
No. 8		
No. 10	27%	
No. 16		
No. 20	22%	
No. 30		
No. 40	15%	
No. 50		
No. 60	8%	
No. 80		
No. 100	4%	
No. 200	2.4%	
Total Wt. of Fine Fraction = 460.4g		
0.02 mm		

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