SITE SELECTION AND EVALUATION REPORT
Yakutat Community Health Center Yakutat, Alaska

June 2017
Project Number 428

ALASKA AREA NATIVE HEALTH SERVICE

INDIAN HEALTH SERVICE

DEPARTMENT OF HEALTH AND HUMAN SERVICES

SITE SELECTION AND EVALUATION REPORT
Yakutat Community Health Center Yakutat, Alaska

June 2017
Project Number 428

RECOMMEND APPROVAL:

Victoria Demmert, President
Yakutat Tlingit Tribe

6-18-2017
Date

Kelly B. Leseman, P.E., PMP
Alaska Area Native Health Service

6/26/2017
Date

APPROVAL:

Denman Ondelacy, P.E., Director
Office of Environmental Health and Engineering
Alaska Area Native Health Service

6-27-17
Date

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LIST OF ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
A/E	Architectural/Engineering
AANHS	Alaska Area Native Health Service
CATEX	Categorical Exclusion
CBY	City-Borough of Yakutat
DOT	Department of Transportation
ED	Environmental Determination
EMS	Emergency Medical Services
FAA	Federal Aviation Administration
HSPD	Homeland Security Presidential Directive
IHS	Indian Health Service
GCI	General Communication Incorporated
GSA	General Services Administration
gsf	gross square-foot
KTY	Kwaan Tribe if Yakutat
LEED	Leadership in Energy and Environmental Design
LHS	Large Health Station
PJD	Project Justification Document
POR	Program of Requirements
PCPV	Primary Care Provider Visits
SACF	Small Ambulatory Care Facilities
SEARHC	South East Alaska Regional Health Corporation
SSER	Site Selection and Evaluation Report
TDY	Temporary Duty
USDA	United States Department of Agriculture
YCHC	Yakutat Community Health Clinic
YTT	Yakutat Tlingit Tribe

I. EXECUTIVE SUMMARY:

a. Project Summary

A combined phase I and Phase II Site Selection Evaluation Report (SSER) was completed for the Yakutat Tlingit Tribe (YTT) as part of the Indian Health Service (IHS) project documents for the Joint Venture Construction Program (JVCP). The YTT JVCP is approved for 10,609-gross square-foot (gsf) facility which meets the requirements of the IHS Small Ambulatory Care Facilities (SACF) for a Large Health Station (LHS). The total space includes 8925-gsf of SACF-LHS plus qualifying derivatives and 1,981-gsf of approved deviations. The overall size includes a circulation factor of 15% and major mechanical of 10%.

The project is located on the Tribal property located at 115 Airport Road, Yakutat, AK 99689. It consists of 2.6 acres of developable land which the tribe received from the City-Borough of Yakutat (CBY). Location and Plat Maps are located in **Tab A**. The property is conveniently located near the center of Yakutat and close to the existing clinic, senior center, school, fire/police department, and the Power Company. All utilities except wastewater run immediately in front of the property along Airport Road with the exception of wastewater. The wastewater main is located approximately 500-foot north of the property.

The site selection process is described in the Phase I section of this report. Several sections of the Phase I roll over into the Phase II elements of this report and are noted where applicable.

b. Review Team

The SSER was completed by the YTT in conjunction with the Alaska Area Native Health Service (AANHS), CBY with special investigations/Reports conducted by Northern Geotechnical (Geotechnical Report), Bosworth Botanicals (Wetland Delineation Report), and Smithpong-Rosamond Architecture (Project Justification and Program of Requirements).

c. Conclusions and Recommendations

This SSER was completed in accordance to the IHS SSER guideline and satisfies all requirements set forth to meet the criteria for a 10,600-gsf primary care facility. The site location is suitable for building purposes. Subsurface characteristics are clean sandy-gravel which is typical of the Area. All site utilities are either directly adjacent to the site or within reasonable distance for service. The site is readily accessible and centrally located in the Yakutat community. This site is recommended for the proposed JVCP facility.

II. PHASE I: SITE SELECTION EVALUATION PROCESS

A site evaluation was conducted by the YTT to select the most appropriate site for the JVCP project. The selection process served multiple purposes including requirements for U.S. Department of Agriculture (USDA).

The process was a collaborate effort between YTT, the CBY, and the community members of Yakutat. The AANHS provided consultation throughout the evaluation-selection process. Five different sites were evaluated for consideration.

The basis for land requirements are found in the IHS Technical Handbook for Environmental Health & Engineering Volume II Health Care Facilities Planning, Part 13 Site Selection and Evaluation process.

The IHS's SSER guideline recommends a 9 to 1 ratio of space to facility footprint. Worst case scenario of a full single story building estimates a 2.25- acre site. The conceptual facility layout estimates a two story facility with an estimated 8,700 square foot print estimating 1.8 acres.

The following perimeters were considered and evaluated for each site:

a. Site Access: The location of the site was an important consideration. Factors that were considered include access during winter conditions (e.g. minimal grade during icing events), distance from public frontage road, proximity to power plant for possible waste heat use, access to airport for medivac patients, future expansion, location to existing utilities, and physical site conditions (topography, streams, flood potential, wetlands, etc...).

b. Site Ownership: The YTT is blessed to have willing community partners and in addition to YTT property, the CBY and Kwaan Tribe of Yakutat (KTY) offered property for consideration. Of the five sites considered, one was owned by the YTT, three by the CBY, and one by KTY.

   The selected site is 2.6 acres owned by the CBY. The property was approved by the CBY and ownership conveyed to YTT via quitclaim deed and has passed all ordnances needed to convey the property. A site-survey and plat map has been completed for Recording at the State Registers Office.

c. Physical Description: The Yakutat area has similar physical characteristics throughout the region. The area is common of hummocky terrain resulting in the advance and retreat of glaciers as resent as 200 years ago. Soil are free of

permafrost and typical of outwash sediments of sand, gravel, and cobbles. The area is heavily forested by large White Sitka Spruce.

d. Water and Wastewater: All required utilities are located along frontage road or within close proximity the property and, are adequate for the development of the new clinic. Details for service connects will be provided during the design phase.

e. Storm-water Management: Yakutat is a small rural community governed by the CBY. Yakutat receives an annual average 155 inches of rain. Although, the CBY does not have a formal storm-water management plan, it is proficient with dealing with storm-water management. The soil in Yakutat is welled drained glacial moraine deposits. Some ponding and accumulation of water may occur in low lining areas or drainage swells after large precipitation events. Drainage swales, channeling, and large ditches are throughout the community diverting storm-water runoff.

   The parcel where the clinic is located is well drained soil and drainage ditches parallel the length of the lot along airport road. A gravel pad will be developed during the design phase for the building location, graded for drainage, and will include space for parking and snow removal storage.

f. Solid Waste: Yakutat has a Class III Solid Waste Landfill certified by the Alaska Department of Environmental Conservation (ADEC). Waste disposal is through pickup service from the CBY. Medical Waste is red-bagged and shipped to a licensed facility. All other waste is disposed in the local landfill.

g. Power, Communication, and Data Systems: All required utilities are located along frontage road and are adequate for the development of the new clinic including power, communication and data systems. The JVCP location is also located near Yakutat's power plant which is evaluating the use of waste heat.

   Power is supplied via diesel generators power plant as is typically throughout rural Alaska. Communication and data are available from two providers; General Communication Inc. and Alaskacom.

h. Emergency Response System (EMS): Yakutat currently has a combined police, fire station, and EMS facility located approximately two blocks from the new JVCP location. The police force are paid positions employed by the CBY. All EMS and fire responders are volunteer positions. There is a lack of coordination for the EMS

and fire responders. YCHC staff are often called upon in EMS situations. An EMS coordinator is being requested as part of staffing package request.

i. An Environmental Determination was conducted to satisfy the requirements for multiple agencies involved with this project. It has been determined that this project qualifies under the Categorical Exclusion (CATEX) category. The complete Environmental Checklist and Environmental Determination are included as Tab D.

j. Available Services: The selected site is in proximity to the main central area of Yakutat with convenient access to all available services. Location is depicted in on the maps and site plans located in Tab A.

k. Sustainability: All applicable sustainability listed in the Phase I requirements have either been addressed in the Environmental Determination or are not applicable.

l. Energy Considerations: Several alternative energy sources will be considered including: solar, wind, bio-mass, waste-heat, and ground-heat. However, bio-mass and waste-heat are the only viable alternatives and will be considered during the design phase of the project.

m. Security: All applicable security requirements will be incorporated into the design as well as compliance with local zoning and ordinances. System shall be in full compliance with HSPD-12 requirements.

III. PHASE II

a. Basic Project Data

The Yakutat Tlingit Tribe is a small independent P.L. 93-638 Title V within the IHS's Alaska Area and operates limited services at the Yakutat Community Health Center (YCHC) located in the community of Yakutat, Alaska. Yakutat is located within the Mt. Edgecombe Service Unit and currently receives much of their medical services through interim providers from the South East Alaska Regional Health Corporation (SEARHC) who travel to Yakutat on an interim basis. Travel limitations, adverse weather conditions, and remote isolation contribute to unreliable services available through interim and Temporary Duty (TDY) providers. Travel from Yakutat to the IHS Mt. Edgecombe hospital in Sitka is even more difficult, involves multiple flights, and often involves expensive overnight stays.

The YCHC qualifies under the IHS Small Ambulatory Care Facility criteria for a Large Health Station (LHS). The new SACF-LHS will allow the YCHC to provide a more reliable, consistent, and higher level of care to the Yakutat Service Area. The Project Justification Documents (PJD) and Program of Requirements (POR) authorize a 10,906 square-foot Primary Care Facility with a staffing of 20.5 FTEs.

The new facility will provide space for primary care providers, dental services, behavior and mental health, social services, public health nursing, a wellness center, emergency medical services, and space for visiting specialty providers. It will also include additional space for itinerant quarters.

There are no Staff Quarters required with this project. There is adequate local housing for all permanent staff as described in Section III.I Housing of the PJD report. The SACF does allow itinerant quarters due to the high reliance of itinerant staff to meet the health care needs of the tribe. These are not leased facilities or used for long term occupancies. Itinerant quarters will be used on an as-needed basis when required. If the need for additional housing is required, it will be the responsibility of the YTT and not the IHS.

The facility will accommodate the projected workload of 2465 Primary Care Provider Visits (PCPV)s. The SACF-LHS criteria was used to determine the number of dental service minutes which is estimated less than 85,500 minutes. A full time dentist and dental assistant is included in the staffing package.

They will be no government vehicles or need for government vehicle parking. A small transport bus may be used for elderly patient travel but is normally parked at the Senior Center.

b. Site Size

The JVCP is located on a 2.6 acre parcel located in the central area of Yakutat. The building size is expected to have an 8,700-ft^2 foot print for a two story 10,900-ft^2 facility. The IHS guideline (as listed in Phase I) uses 9:1 ratio of land-size to building foot-print. This would require a minimum of 78,350-ft^2 (1.8 acres). The maps in Tab A shows the location of the property in relation to the community and the site map shows the proposed building layout on the lot.

The only special factor considered is additional area needed for snow storage. There are no need for other special consideration such as retention ponds, on-site wastewater treatment. However, should any additional issues arise, the lot is adequate to accommodate any additional requirements.

The site is an undeveloped lot but will be cleared and landscape to meet the requirements for a Level II General Services Administration (GSA) security rating.

c. Site Location:

The site is a 2.6 acre portion of USS 5630 and is located just southwest of the Ocean Cape/Forest Hwy 10 and Yakutat Airport Road intersection. It is conveniently located near the existing clinic, senior center, school, and Police, Fire & EMS Building. The adjacent lot is owned by the Federal Aviation Administration (FAA) and houses a defunct instrument tower. The YTT is pursuing ownership of the property. The property is located 115 Airport Road, Yakutat, AK 99689.

Figure 1 - Project area location map.

d. Site Access:

Site access will be from the main frontage road (Yakutat Airport Road). The only easements are on the roadway easement which includes corridors for utilities, drainage ditch, and State of Alaska-Department of Transportation (DOT) Right-of-Way.

e. Site Ownership:

The property has been conveyed to the YTT by the CBY via Quit Claim Deed.

f. Physical Description:

The project is 2.6 acres in an area primarily vegetated with mature, second growth Sitka spruce and hemlock trees. The project site has a slightly hummocky surface which generally slopes gradually down to the southeast. A shallow, sub-linear depression is located along the central and southern portions of the project site, which generally trends to the south-southeast. The Lot is located on a glacial moraine and consists of unsorted materials that ranges in size from boulders to silt-size particles. There is no known previous development. The material is very well drained. There is a small surface drainage towards the south end of the site.

g. Water & Wastewater.

Usage rates are based on the IHS design criteria of 30 gallons per patient visit and 20 gallons per employee. Wastewater is estimated at 80% water usage.

1. Water Usage:
   a. (2,465 PCPVs/yr)/(250 days/yr) x 30 gal per visit = 296 gpd
   b. (20.5 FTE) x (20 gal/FTE) = 410 gpd
   c. Projected Water Demand 706 gpd

2. Wastewater
   a. (706 gpd) x 80% = 565 gpd

h. Storm-water Management:

Storm-water considerations are described in Phase I of this report. The CBY does not have a formal storm-water management plan. However, with an annual precipitation of 155 inches/year, storm-water management is a common and important practice in the Yakutat area. Groundwater infiltration is extremely high as a result of the clean gravely and sandy soil conditions of the area. In addition, natural and man-made drainage swales direct any excess water into large channels for retentions or drainage to permanent streams.

Project specific storm-water management includes topographic sloping from the facility towards the oversized drainage ditch which parallels the frontage road. It is unlikely that an on-site retention pond will be needed but, will be assessed during the design phase of the project.

i. Solid Waste Disposal:

Yakutat has a Class III Solid Waste Landfill certified by the Alaska Department of Environmental Conservation (ADEC). Waste disposal is through pickup service from the

CBY. Medical Waste is red-bagged and shipped to a licensed facility. All other waste is disposed in the local landfill.

City wide snow plowing and removal are provided through a combination and CBY and State of Alaska services. On-site snow removal will be the responsibility of the YCHC

j. Power, Communication and Data Systems:

The Yakutat Community Health Center is located within the center of the community near the schools, fire department, and power generators. Power is provided through the CBY. Power demand is estimated as shown below:

10,900 ft^2 x (m^2/10.7639 ft^2) x 47 kwh/m^2/yr	= 47,594 kwh/yr
10,900 ft^2 x (m^2/10.7639 ft^2) x 0.11 kVA/m^2	= 111 KVA demand

The YCHC will require high speed internet, television, and telephone systems which are currently available through General Communication Inc. (GCI) and Alaskacom. Prior to the installation of telecommunication services, an engineer will inspect the site and determine the appropriate location for connection.

k. Emergency Response Services:

The community of Yakutat has a dedicated facility to house police, and fire vehicles. The facility doubles as the community police station and is located less than ¼ mile from the health facility site.

Yakutat is served by an all-volunteer fire department which is sponsored by the CBY but not organized.

Yakutat has an EMS vehicle but does not have and EMS staff or paramedics. Any emergency services are provided through the YCHC. The EMS vehicles are also used to transport patients during medivacs to the local airport.

The HSP supports an EMS program for the SACF which is recommended for Yakutat due to its remote isolation and lack of alternative EMS services.

l. Environmental Determination:

Several agencies including the IHS have been involved in this project. A comprehensive environmental determination has been completed to satisfy these requirements. The agencies including IHS have determined that this project and site qualifies as a CATEX status. The complete environmental determination is included under **Tab D**.

m. Demographics:

Alaska has an estimated 2016 population of 741,894, which shows an increase of 31,645 since the 2010 census or 4.5%. The Alaska Natives/Alaska Indians are expected to increase 33%.

The estimated Yakutat City and Borough 2010 census population is 662. Approximately 50% are AI/AN. The racial makeup of the service area population is predominantly Alaska Native and Caucasian and the median age is 39 with an equal split between male and female. The community is immersed in the local tribal (Tlingit) culture. The fishing season brings in tourists and fishery workers from around the world.

The age demographics are as follows:

- Under 5 years of age: 6.4%
- 5 to 19 years of age: 19.6%
- 19 to 65 years of age: 60.6%
- Over 65 years of age: 13.4%

The Yakutat annual unemployment rate fluctuates due to the seasonal nature of work in the area; predominately from the commercial and sport fishing industries. Unemployment rates typically range from 6% during fishing season to 15% during the winter months.

n. Leadership in Energy and Environmental Design (LEED) Considerations:

The YCHC will follow the policies as published in the 2016 IHS Architectural/Engineering Guideline. The construction estimate is less than the $10M threshold requiring LEED certification. However, the YTT intends to consider any energy saving and sustainability that may benefit the operation of the facility. The facility will also comply with all required Guiding Principles as listed in the guideline.

o. Sustainability Considerations:

This project will consider all applicable requirements for achieving sustainable design in accordance with guiding principles found in the *Federal Leadership on High Performance and Sustainable Buildings Memorandum of Understanding* and Guiding Principles as listed in the 2016 IHS Architect/Engineer Design Guide.

The YCHC project intends as part of meeting these requirements is seeking to utilize waste heat from the nearby power plant. Another example is to utilize lumber/timbers from the existing site into the design and construction of the facility.

p. Technical Evaluation:

The following technical evaluation confirms that the subject area is valid for this project.

Land size requirements meet the IHS guidelines and described in Site Selection Evaluation section of the Phase I analysis. The project site is approximately 2.6 acres which exceeds the estimated required size for the worst case scenario of a full single story building. The YTT is currently pursuing the property just to the west of the site for future development.

The existing utilities are adequate and have the capacity to provide the estimated clinic loads. All utilities are conveniently located and within reasonable access to the clinic site. A geotechnical investigation and wetland delineation study was conducted on the project site. The geotechnical investigation revealed favorable site conditions with no expected adverse conditions or special consideration such as clays, high-ground water, or permafrost. The geotechnical report is summarized in section q of this report and the full investigation is included in **Tab C**. The wetland delineation report revealed no wetland considerations for this site.

All applicable sustainability requirements as listed in the 2016 IHS A/E design guide will be implemented into the design and construction of the project and discussed in section o of this report.

The Environmental Determination (ED) was completed by the Alaska Area IHS Office which resulted in a Categorical Exclusion. The ED is included as **Tab D** of this report.

q. Geotechnical Investigation:

A geotechnical investigation was conducted in October 2016. The following is summary of the report. The complete report is included as **Tab C**.

In general, the sand/gravel soil identified across the project site are suitable for supporting conventional shallow foundation systems, such as poured concrete footings and/or thickened edge slab foundations, as well as any underground utilities and/or structural pavement sections. There is little to no risk of seismic liquefaction and/or seismically-induced slope failure at the project site. The sand/gravel soils are suitable for re-use as structural fill across the project site, assuming proper placement and compaction techniques are applied. Based on their initial observations of the soil gradation (both visual and textural), NGE-TFT estimates the sand/gravel soils to have little to no frost susceptibility. Furthermore, they anticipate there to be very little potential for ice lens development at the project site. As such, minimal foundation burial/insulation requirements and minimal structural pavement sections will be required to reduce the potential for differential settlements as a result of ice lens formation and/or subsequent thaw-related weakening of the bearing soils. Additionally, NGE-TFT estimates the sand/gravel soils to be relatively free-draining (i.e., exhibit relatively high

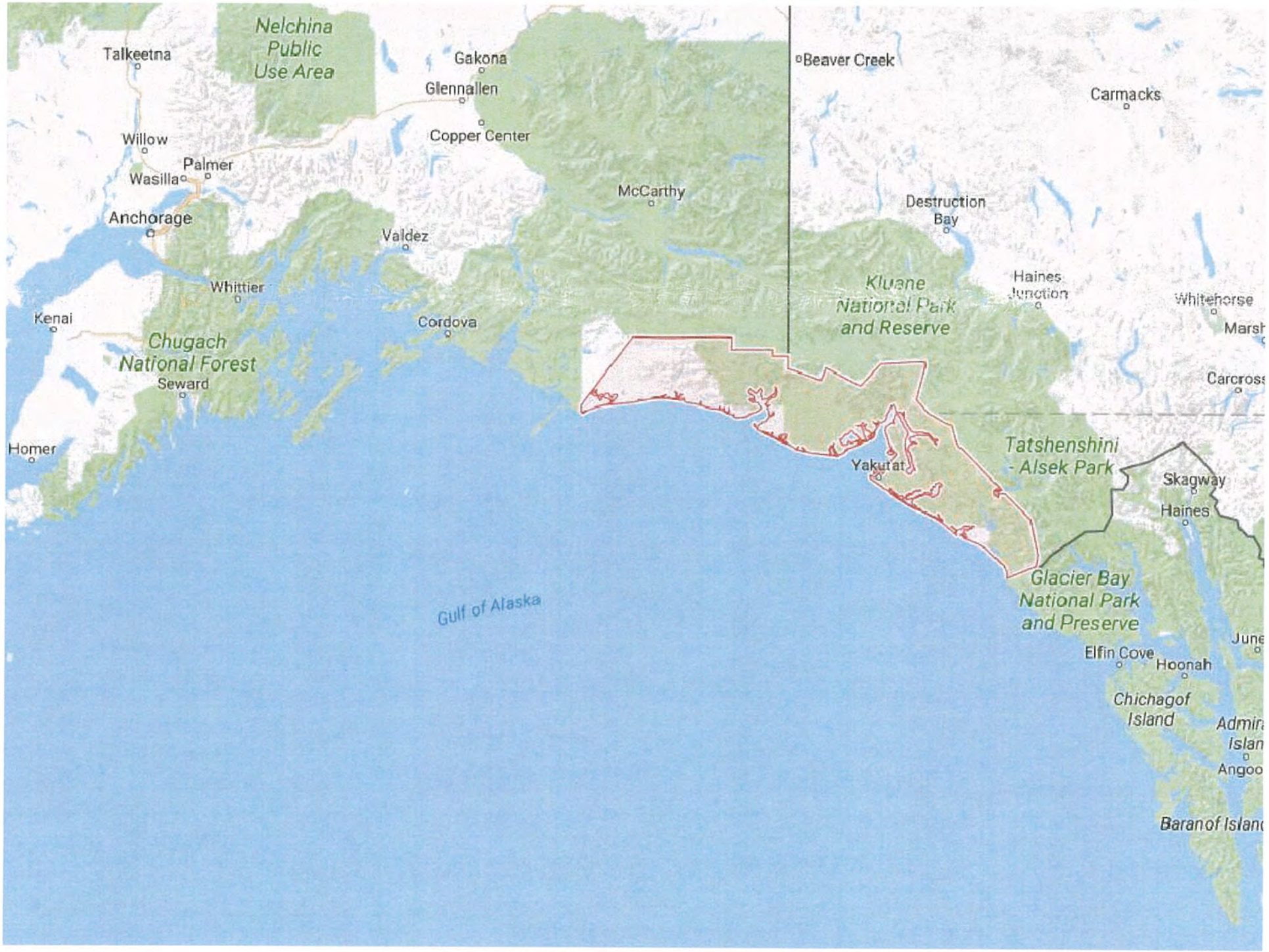
infiltration/percolation rates) and can likely support relatively uncomplicated storm-water/septic drain field designs. Please refer to NGE-TFT's comprehensive geotechnical report for the project site for details regarding the findings of their subsurface exploration and laboratory testing programs, along with their engineering conclusions and recommendations for the proposed YCHC.

r. Conclusion and Recommendations:

Through the Phase I Site Selection Process and Phase II Site Evaluation process, YTT has determined that the selected site is suitable and meets the IHS criteria for the proposed sized facility. There are no identified special considerations that need to be factored into the design or construction of this facility which, should be able to employ convention design methods to meet the 2016 IHS A/E Guideline criteria.

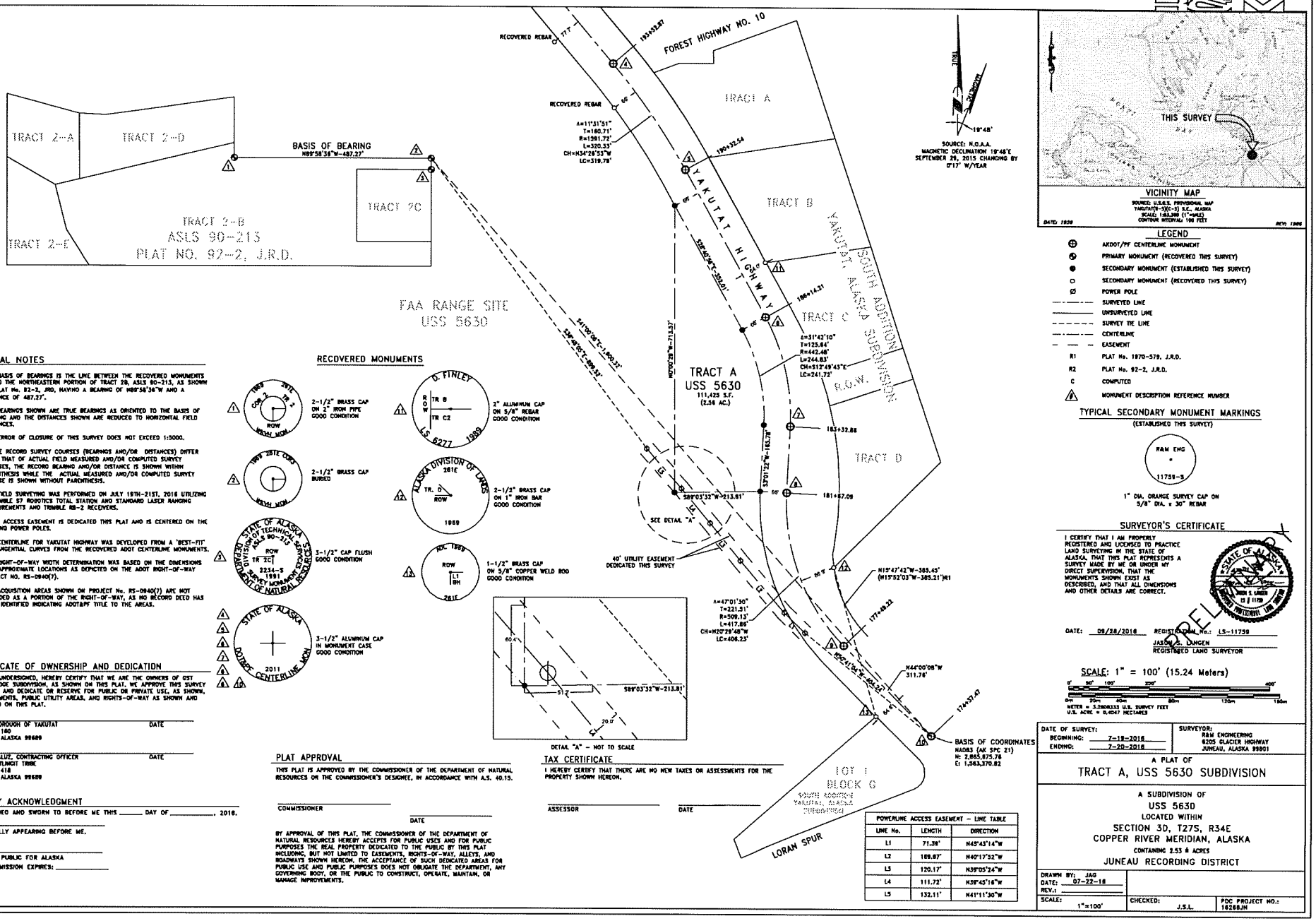
TAB A
MAPS

Yakutat-State of Alaska


Nelchina Public Use Area
Talkeetna
Gakona
Glennallen
Beaver Creek
Carmacks
Copper Center
Willow
Palmer
Wasilla
McCarthy
Destruction Bay
Anchorage
Valdez
Kluane National Park and Reserve
Haines Junction
Whitehorse
Whittier
Kenai
Cordova
Chugach National Forest
Seward
Carcross
Homer
Tatshenshini - Alsek Park
Yakutat
Skagway
Haines
Glacier Bay National Park and Preserve
Gulf of Alaska
Elfin Cove
Hoonah
Chichagof Island
Angoo
Baranof Island

PROPOSED YAKUTAT JOINT VENTURE CONSTRUCTION PROGRAM HEALTH CLINIC
CITY-BOROUGH OF YAKUTAT LOT

TAB B
SITE SURVEY/PLAT MAP



GENERAL NOTES

1. THE BASIS OF BEARINGS IS THE LINE BETWEEN THE RECOVERED MONUMENTS ALONG THE NORTHEASTERN PORTION OF TRACT 2B, ASLS 90-213, AS SHOWN ON PLAT No. 92-2, JRD, HAVING A BEARING OF N89°58'36"W AND A DISTANCE OF 487.27'.
2. ALL BEARINGS SHOWN ARE TRUE BEARINGS AS ORIENTED TO THE BASIS OF BEARING AND THE DISTANCES SHOWN ARE REDUCED TO HORIZONTAL FIELD DISTANCES.
3. THE ERROR OF CLOSURE OF THIS SURVEY DOES NOT EXCEED 1:5000.
4. WHERE RECORD SURVEY COURSES (BEARINGS AND/OR DISTANCES) DIFFER FROM THAT OF ACTUAL FIELD MEASURED AND/OR COMPUTED SURVEY COURSES, THE RECORD BEARING AND/OR DISTANCE IS SHOWN WITHIN PARENTHESIS WHILE THE ACTUAL MEASURED AND/OR COMPUTED SURVEY COURSE IS SHOWN WITHOUT PARENTHESIS.
5. THE FIELD SURVEYING WAS PERFORMED ON JULY 19TH-21ST, 2016 UTILIZING A TRIMBLE S7 ROBOTICS TOTAL STATION AND STANDARD LASER RANGING MEASUREMENTS AND TRIMBLE R8-2 RECEIVERS.
6. A 40' ACCESS EASEMENT IS DEDICATED THIS PLAT AND IS CENTERED ON THE EXISTING POWER POLES.
7. THE CENTERLINE FOR YAKUTAT HIGHWAY WAS DEVELOPED FROM A "BEST-FIT" OF TANGENTIAL CURVES FROM THE RECOVERED ADOT CENTERLINE MONUMENTS.
8. THE RIGHT-OF-WAY WIDTH DETERMINATION WAS BASED ON THE DIMENSIONS AND APPROXIMATE LOCATIONS AS DEPICTED ON THE ADOT RIGHT-OF-WAY PROJECT NO. RS-0940(7).
9. THE ACQUISITION AREAS SHOWN ON PROJECT No. RS-0940(7) ARE NOT INCLUDED AS A PORTION OF THE RIGHT-OF-WAY, AS NO RECORD DEED HAS BEEN IDENTIFIED INDICATING ADOT&PF TITLE TO THE AREAS.

RECOVERED MONUMENTS

1. 2-1/2" BRASS CAP ON 2" IRON PIPE GOOD CONDITION
2. 2-1/2" BRASS CAP BURIED
3. 3-1/2" CAP FLUSH GOOD CONDITION
4. 3-1/2" ALUMINUM CAP IN MONUMENT CASE GOOD CONDITION
5. 2" ALUMINUM CAP ON 5/8" REBAR GOOD CONDITION
6. 2-1/2" BRASS CAP ON 1" IRON BAR GOOD CONDITION
7. 1-1/2" BRASS CAP ON 5/8" COPPER WELD ROD GOOD CONDITION

LEGEND

- AKDOT/PF CENTERLINE MONUMENT
- PRIMARY MONUMENT (RECOVERED THIS SURVEY)
- SECONDARY MONUMENT (ESTABLISHED THIS SURVEY)
- SECONDARY MONUMENT (RECOVERED THIS SURVEY)
- POWER POLE
- SURVEYED LINE
- UNSURVEYED LINE
- SURVEY TIE LINE
- CENTERLINE
- EASEMENT
- R1 PLAT No. 1970-579, J.R.D.
- R2 PLAT No. 92-2, J.R.D.
- C COMPUTED
- 1 MONUMENT DESCRIPTION REFERENCE NUMBER

TYPICAL SECONDARY MONUMENT MARKINGS

(ESTABLISHED THIS SURVEY)

R&M ENG
11759-S

1" DIA. ORANGE SURVEY CAP ON 5/8" DIA. x 30" REBAR

SURVEYOR'S CERTIFICATE

I CERTIFY THAT I AM PROPERLY REGISTERED AND LICENSED TO PRACTICE LAND SURVEYING IN THE STATE OF ALASKA, THAT THIS PLAT REPRESENTS A SURVEY MADE BY ME OR UNDER MY DIRECT SUPERVISION, THAT THE MONUMENTS SHOWN EXIST AS DESCRIBED, AND THAT ALL DIMENSIONS AND OTHER DETAILS ARE CORRECT.

DATE: 09/26/2016 REGISTRATION No.: LS-11759

JASON S. LUNGEN
REGISTERED LAND SURVEYOR

SCALE: 1" = 100' (15.24 Meters)

0' 50' 100' 200' 400'
0m 20m 40m 80m 120m 160m

METER = 3.2808333 U.S. SURVEY FEET
U.S. ACRE = 0.4047 HECTARES

CERTIFICATE OF OWNERSHIP AND DEDICATION

WE, THE UNDERSIGNED, HEREBY CERTIFY THAT WE ARE THE OWNERS OF 0ST FOREST EDGE SUBDIVISION, AS SHOWN ON THIS PLAT. WE APPROVE THIS SURVEY AND PLAT AND DEDICATE OR RESERVE FOR PUBLIC OR PRIVATE USE, AS SHOWN, ALL EASEMENTS, PUBLIC UTILITY AREAS, AND RIGHTS-OF-WAY AS SHOWN AND DESCRIBED ON THIS PLAT.

CITY & BOROUGH OF YAKUTAT — DATE
P.O. BOX 160
YAKUTAT, ALASKA 99689

GAIL DABALUZ, CONTRACTING OFFICER — DATE
YAKUTAT TLINGIT TRIBE
P.O. BOX 418
YAKUTAT, ALASKA 99689

NOTARY ACKNOWLEDGMENT

SUBSCRIBED AND SWORN TO BEFORE ME THIS _____ DAY OF _____, 2016.

BY: _____
PERSONALLY APPEARING BEFORE ME.

_____
NOTARY PUBLIC FOR ALASKA
MY COMMISSION EXPIRES: _____

PLAT APPRDVAL

THIS PLAT IS APPROVED BY THE COMMISSIONER OF THE DEPARTMENT OF NATURAL RESOURCES OR THE COMMISSIONER'S DESIGNEE, IN ACCORDANCE WITH A.S. 40.15.

_____ _____
COMMISSIONER — DATE

BY APPROVAL OF THIS PLAT, THE COMMISSIONER OF THE DEPARTMENT OF NATURAL RESOURCES HEREBY ACCEPTS FOR PUBLIC USES AND FOR PUBLIC PURPOSES THE REAL PROPERTY DEDICATED TO THE PUBLIC BY THIS PLAT INCLUDING, BUT NOT LIMITED TO EASEMENTS, RIGHTS-OF-WAY, ALLEYS, AND ROADWAYS SHOWN HEREON. THE ACCEPTANCE OF SUCH DEDICATED AREAS FOR PUBLIC USE AND PUBLIC PURPOSES DOES NOT OBLIGATE THE DEPARTMENT, ANY GOVERNING BODY, OR THE PUBLIC TO CONSTRUCT, OPERATE, MAINTAIN, OR MANAGE IMPROVEMENTS.

TAX CERTIFICATE

I HEREBY CERTIFY THAT THERE ARE NO NEW TAXES OR ASSESSMENTS FOR THE PROPERTY SHOWN HEREON.

_____ _____
ASSESSOR — DATE

POWERLINE ACCESS EASEMENT - LINE TABLE		
LINE No.	LENGTH	DIRECTION
L1	71.39'	N45°43'14"W
L2	189.97'	N40°17'32"W
L3	120.17'	N39°05'24"W
L4	111.72'	N39°45'18"W
L5	132.11'	N41°11'30"W

DATE OF SURVEY:
BEGINNING: 7-18-2016
ENDING: 7-20-2016

SURVEYOR:
R&M ENGINEERING
6205 GLACIER HIGHWAY
JUNEAU, ALASKA 99801

A PLAT OF
TRACT A, USS 5630 SUBDIVISION

A SUBDIVISION OF
USS 5630
LOCATED WITHIN
SECTION 3D, T27S, R34E
COPPER RIVER MERIDIAN, ALASKA
CONTAINING 2.53 ± ACRES
JUNEAU RECORDING DISTRICT

DRAWN BY: JAG
DATE: 07-22-16
REV.:
SCALE: 1"=100'
CHECKED: J.S.L.
PDC PROJECT NO.: 16286JN

FILE:#

TAB C
GEOTECHNICAL REPORT

GEOTECHNICAL ENGINEERING REPORT

for the proposed

YAKUTAT COMMUNITY HEALTH CLINIC
YAKUTAT, ALASKA

Prepared for:

Yakutat Tlingit Tribe
606 Forest Hwy 10
PO Box 418
Yakutat, AK 99689

Prepared by:

Northern Geotechnical Engineering, Inc. *d.b.a.* Terra Firma Testing

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NGE-TFT Project # 4562-16

December 13, 2016 NGE-TFT Project #4562-16

Yakutat Tlingit Tribe
606 Forest Hwy 10
PO Box 418
Yakutat, AK 99689

Attn: Rhoda Jensen – Health Director

RE: GEOTECHNICAL ENGINEERING ASSESSMENT OF THE SITE OF THE PROPOSED YAKUTAT COMMUNITY HEALTH CLINIC, YAKUTAT, ALASKA

Rhoda,

We, Northern Geotechnical Engineering, Inc. *d.b.a.* Terra Firma Testing, have completed a geotechnical engineering assessment of the site of the proposed Yakutat Community Health Clinic in Yakutat, Alaska. Our assessment suggests that the project site is suitable for the proposed improvements assuming that the conclusions and recommendations that we present in the following report are considered during the design and construction processes.

The project site is underlain by shallow sand and gravel deposits which will adequately support the proposed improvements with minimal risk of differential movement. We did not identify any geotechnical or geological conditions within the shallow subsurface at the project site that could jeopardize and/or excessively complicate the proposed development, and from a geotechnical viewpoint, the project site has many favorable engineering characteristics that can lead to simplified design approaches and conventional construction practices. In the following report we provide a summary of our subsurface exploration and laboratory testing programs as well as detail our engineering conclusions and recommendations for the proposed health clinic.

We greatly appreciate the opportunity to provide you with our professional service. Please contact us directly with any questions or comments you may have regarding the information that we present in this report, or if you have any other questions, comments, and/or requests.

Sincerely,
Northern Geotechnical Engineering, Inc. *d.b.a.* Terra Firma Testing,

Andrew C. Smith, CPG
Senior Geologist

STATE OF ALASKA
49 TH
13 Dec 2016
Keith F. Mobley
CE - 5066
REGISTERED PROFESSIONAL ENGINEER

Keith F. Mobley, P.E.
President

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1.0 INTRODUCTION

In this report, we (Northern Geotechnical Engineering, Inc. *d.b.a.* Terra Firma Testing) present the results of a geotechnical engineering assessment that we conducted at the site of the proposed Yakutat Community Health Clinic (YCHC) located in Yakutat, Alaska; hereafter referred to solely as "the project site". We provided our professional service in accordance with the scope of service that we detail in our response to the YCHC Geotechnical Investigation Request for Proposal (RFP) that the Yakutat Tlingit Tribe (YTT) issued on October 25, 2016. We submitted our RFP response to the YTT on September 1, 2016 and the YTT contracted us to provide our proposed scope of service (by signed contract) on October 13, 2016. YTT subsequently issued us a written Notice to Proceed for our proposed scope of service on October 14, 2016.

YTT contracted us to conduct a geotechnical engineering assessment of the project in an effort to evaluate the suitability of the project site to support the proposed YCHC and to aid in the design and construction of the proposed site improvements.

In this report, we provide a summary of our subsurface exploration and laboratory testing programs as well as provide our geotechnical engineering conclusions and recommendations regarding the suitability of the project site to support the proposed YCHC. We also provide design and construction criteria for the proposed site improvements.

2.0 PROJECT OVERVIEW

The project site is located along the west side of the Yakutat Highway (a.k.a. Airport Road), just south of its intersection with Forest Highway 10 in Yakutat, Alaska (Figure 1). The legal description of the project site is Tract A of the United States Survey (USS) 5630 Subdivision, Yakutat, Alaska.

The project is approximately 2.5 acres in area and is primarily vegetated with mature, second growth Sitka spruce and hemlock trees. The project site has a slightly hummocky surface which generally slopes gradually down to the southeast. A shallow, sub-linear depression is located along the central and southern portions of the project site, which generally trends to the south-southeast. To the best of our knowledge, no current topographic surveys have been completed at the project site (as of our issuance of this report). R&M Engineers, Inc. (R&M), however, completed a boundary survey of the project site in July 2016 during which time R&M set boundary monuments (driven rebar with end caps) at the corners, and along the perimeter, of the project site.

The project site was reportedly logged for timber around the beginning of the 20th century, but no significant ground disturbances and/or other site developments (e.g., fill placement, borrow activities, etc.) are known to have occurred at the project site.

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Proposed improvements to the project site include construction of an approximately 14,000 ft^2 two-story, steel-framed medical clinic building and associated paved vehicle parking areas, driveways, and utilities. We have included a conceptual drawing of the proposed YCHC in Figure 2 of this report. From information we gathered from the RFP, and from conversations we have had with persons familiar with the project, it is our understanding that:

- the exact location/configuration/layout of the proposed YCHC detailed in Figure 2 is subject to revision, however, the proposed YCHC improvements will generally be located along the central portion of the project site;
- approximately 1.2 acres of the project site will be cleared of vegetation in preparation for the construction of the proposed improvements;
- varying amounts of cut/fill will be necessary to level the project site and achieve the final site grade;
- the remaining (undeveloped) portions of the project site will remain relatively undisturbed;
- the proposed clinic will be serviced by the local Yakutat public drinking water utility; and
- the proposed clinic will either be serviced by the local Yakutat sanitary sewer utility or an on-site septic system (location and configuration yet to be determined).

3.0 REGIONAL GEOGRAPHY, CLIMATE, AND GEOLOGY

3.1 Geography

The city and community of Yakutat, Alaska is situated primarily along the shores of Monti Bay, (at the mouth of the larger Yakutat Bay) along the northern coast of The Gulf of Alaska (Figure 1). The regional geography surrounding Yakutat is characterized by the Saint Elias Mountains to the north and northeast, which rise above large glaciers and extensive icefields, by Yakutat Bay and its connecting waterways to the north, and the Gulf of Alaska to the south. The area immediately surrounding (and including) Yakutat can be separated into two major geographic features:

1. the low hills and small lakes of the end moraines that rim the southeast shore of Yakutat Bay; and
2. the nearly flat plain of outwash deposits and shallow-water marine deposits, part of the Yakutat Foreland, extending from Yakutat to the Gulf of Alaska (Yehle, 1979).

3.2 Climate

The Yakutat area experiences a subarctic to subpolar oceanic climate, with monthly daily average temperatures ranging from approximately 22 °F in January to 54 °F in July. The Yakutat area receives an annual water equivalent average of approximately 155 inches of precipitation,

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150 inches of which generally falls in the form of snow. Permafrost soils do not generally occur in the Yakutat area, except near the margins of existing glaciers/icefield/moraines.

3.3 Geology

Glacial geology dominates the surficial deposits of the Yakutat area, and radiocarbon dating of organic material contained within recent glacial moraine deposits along the southeastern perimeter of Yakutat Bay suggest that the Yakutat area was covered by glacial ice as recently as 500 to 600 years ago (Yehle, 1979). As we previously mention, the area surrounding Yakutat is dominated by two primary geographic/geologic features:

1. End moraines deposits which form the rolling hills surrounding Monti Bay and along the southeast shore of Yakutat Bay (including the island archipelago just north of Monti Bay); and
2. Glacial outwash deposits which form the relatively flat plain stretching southeast from Yakutat out to the Yakutat Airport.

The end moraine deposits (1) consist generally of unstratified glacial till, which is a mixture of gravel and pebble-laden silt or sand, in varying proportions, and, subordinately, of cobbles, clay, some boulders, and rarely, organic material (Yehle, 1979).

The glacial outwash deposits (2) can be subdivided into two primary subunits: A) coarse-grained; and B) fined-grained deposits. We only provide a description of the coarse-grained outwash deposits as they are directly relevant to the project site. The coarse-grained subunit of the glacial outwash deposits consist primarily of sandy pebble gravel. Close to the end moraines deposits, cobble-rich gravel is a major constituent of the glacial outwash deposits, and some silty, sandy gravel is present, derived from direct melting of the glacier ice to form kame and other types of ice-contact deposits. Outwash deposits are bedded and moderately well sorted within individual beds. The overall thickness of the coarse-grained outwash may average 7m and range from 1 to 17m. The coarse outwash is thought to overlie delta-estuarine sediments and probably some buried morainal deposits. In many places organic deposits cover the coarse outwash deposits (Yehle, 1979).

4.0 PROJECT SITE ACTIVITIES

We conducted an initial reconnaissance of the project site on October 26, 2016 in an effort to locate the proposed test pit explorations, determine excavation equipment access, and gain a general sense of the conceptual layout of the proposed YCHC improvements. We were accompanied on our site reconnaissance by Captain Kelly Leseman; Indian Health Service Project Manager for the proposed YCHC project. Captain Leseman assisted us in determining the location of the six test pit explorations, which generally correspond to the conceptual location of the proposed YCHC improvements (Figure 2). We established the test pit exploration locations by making swing-tie measurements from the existing project site boundary survey

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monuments using a 300-ft cloth surveyor's tape and the conceptual site drawing detailed in Figure 2 of this report.

4.1 Subsurface Exploration

We coordinated and directed a subsurface exploration program at the project site on October 27, 2016 in an effort to help characterize the subsurface conditions within, and adjacent to, the proposed YCHC improvements. We contracted Pate Construction (PC) of Yakutat, AK who in turn mobilized a Hitachi EX150 tracked excavator and operator to the project site to excavate the six proposed test pit explorations. Under our direction, PC excavated the six test pit explorations to depths ranging from approximately 12 to 15 feet below the existing ground surface. We have detailed the approximate location of each test pit exploration in Figure 2 of this report. A geologist from our firm was present on-site during the entire subsurface exploration program to direct the subsurface exploration activities, log and photograph the geology of each test pit exploration, and collect representative soil samples for laboratory analysis. We sealed each soil sample that we collected during the subsurface exploration program inside of sealed plastic bags (to help preserve the moisture content of each soil sample) and submitted each soil sample to our Anchorage laboratory for further identification and analysis. Once exploration activities were complete, we directed PC to backfill each exploration with its respective spoils. No compactive effort was applied to the backfill. We have provided graphical exploration logs and photographs of each test pit exploration in Appendix A of this report. We also provide the results of our laboratory testing program in Appendix B of this report.

5.0 LABORATORY TESTING

We collected a total of 13 soil samples from the six test pit explorations that PC advanced at the project site and submitted all of the soil samples to our laboratory for further identification and geotechnical analysis. We tested select soil samples in accordance with the respective ASTM standard test methods including:

- moisture content analysis (ASTM D-2216);
- determination of fines content (a.k.a. P200 – ASTM D-1140); and
- grain size sieve and hydrometer analysis (ASTM D-6913 & D-422).

The laboratory test results, along with the observations we made during our subsurface exploration program, aid in our evaluation of the subsurface conditions at the project site and help us to assess the suitability of the subsurface materials located at the project site to support the proposed YCHC improvements. We have provided the results of our geotechnical laboratory analyses on the graphical exploration logs contained in Appendix A of this report and on the laboratory data sheets contained in Appendix B of this report.

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6.0 DESCRIPTION OF SUBSURFACE CONDITIONS

We compiled our field observations with the results from our laboratory analyses to produce graphical logs of each subsurface exploration (Appendix A). These graphical exploration logs depict the subsurface conditions that we identified at each exploration location and help us to interpret/extrapolate the subsurface conditions for areas adjacent to, and immediately surrounding, each exploration location across the project site.

6.1 General Subsurface Profile

In general, the project site is overlain by a relatively thin layer of organic material consisting primarily of varying amounts of mosses, fungi, decaying organic matter (leaf litter, woody debris, etc.), and root masses. The organic layer averages approximately 0.50 to 0.75 feet in thickness, with some locally thicker sections of decaying organic material where fallen tree trunks and/or tree stumps occur at the ground surface.

The surficial organic layer is directly underlain by a relatively thick deposit of poorly-graded to well-graded sand and gravel that extends to depths of at least 15 feet below the existing ground surface (bgs), and which likely extends much deeper. The sand/gravel deposits contain few cobble-sized particles ranging from 6 to 12 inches in diameter, and trace boulder-sized particles up to approximately 1 to 3 feet in diameter. The sand/gravel material has very low silt content (generally less than five percent by mass) and classifies as non-frost susceptible (NFS) to potentially frost susceptible (PFS) on the US Army Corps of Engineers Frost Design Soil Classification. Larger soil particles exhibit sub-rounded to rounded angularity and the deposit is massive, with some thinner interbeds of coarse sand (ranging from thinly to thickly bedded) and trace interbeds of silt (generally less than 2 to 3 inches in thickness). The consistency of the sand/gravel material appears to be relatively compact/dense, however, we did observe slight to moderate sloughing of excavation walls cut into the more sand-rich portions of the deposit. The sand/gravel soils were likely deposited during the most recent glacial retreat and are consistent with coarse-grained glacial outwash deposits found elsewhere in the Yakutat area (see Section 3.0 of this report for a more detailed geologic description of the coarse-grained glacial outwash deposits common to the Yakutat area).

6.2 Groundwater

We did not observe any indications of groundwater during our subsurface exploration program and we do not expect groundwater to occur (in any significant volumes) above a depth of 15 feet bgs anywhere across the project site.

6.3 Frozen Soils

We did not observe any indications of frozen soils (seasonal ground frost or permafrost) during our exploration program and we do not expect permafrost conditions to occur anywhere across the project site.

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7.0 ENGINEERING CONCLUSIONS

7.1 General Project Site Conclusions

Based on the findings of our subsurface exploration and laboratory testing programs, it is our conclusion that the sand/gravel soils (i.e., coarse-grained glacial outwash deposits – see Section 6.1 of this report for a more detailed description) which we observed across the project site are generally suitable to support the proposed improvements; provided that our concerns and recommendations that we present in this report are addressed by the design and construction processes.

In general, the project site has many desirable geotechnical/geological characteristics which can accommodate relatively uncomplicated designs and standard construction practices. Minimal excavation (i.e., surface grubbing) will be needed to expose the foundation bearing soils (i.e., sand/gravel soils), and the sand/gravel soils extend far below the bottom of any planned improvements. Varying amounts of mass grading, however, will be required to level the project site and bring it to the planned finished grade.

The sand/gravel soils that we identified across the project site are relatively dense and laboratory testing indicates that they have little to no frost susceptibility. Additionally, there is no readily available groundwater to be drawn towards the freeze front and build soil ice. Therefore, there is very little potential for ice lens development (and associated frost heaving forces and/or thaw-related settlements) at the project site. As a result, shallow foundations and pavement sections can both be constructed directly above the existing sand/gravel soils (or NFS structural fill) with minimal design and/or construction considerations to account for potential ice lens development.

Groundwater should generally not be encountered during the construction efforts. Furthermore, the project site is relatively well-drained, and should lend itself to relatively uncomplicated drainfield design. We detail our conclusions regarding the different geotechnical aspects of the design and construction of the proposed YCHC at the project site in the following subsections of this report.

7.2 Earthworks

As we detail in Section 6.1 of this report, the project site is overlain by a relatively thin layer of surficial organic material which is generally less than 0.50 to 0.75 feet in thickness. This organic material is unsuitable for supporting any of the proposed YCHC improvements and will need to be completely removed from the footprint of any improvements prior to construction. The organic material/soils are immediately underlain by sand/gravel deposits which are suitable for direct support of the proposed YCHC improvements; either in their native (i.e., undisturbed) state or placed as structural fill.

As we briefly discuss in Section 2.0 of this report, the project site has a slightly uneven, sloping surface, and as such, varying amounts of mass grading will be required to level the project site

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and bring it to the planned finished grade. The existing sand/gravel soils which occur across the project site are suitable for use as structural fill at the project site assuming that they are placed using proper placement and compaction techniques. Depending upon the planned finished grade for the project site, the site grading activities may consist entirely of cut/fill of on-site materials and/or structural fill may need to be imported to the project site from other sources.

The recommendations that we detail in this report assume that any structural fill (re-worked native soils or imported fill) used to bring the project site to grade will be NFS. NFS structural fill (similar to the native sand/gravel soils which occur on-site) should be readily available in the Yakutat area, and at a reasonable cost. However, we should be given sufficient notice if silt-rich (i.e., frost-susceptible) fill is to be used at the project site for any reason, as its usage will affect the recommendations that we present in this report.

7.3 Foundations

Conventional shallow foundations, such as poured-concrete footings, etc., can be constructed directly onto the existing (i.e., undisturbed) sand/gravel soils or properly placed structural fill located directly above the undisturbed sand/gravel soils. As we previously mention in Section 7.1 of this report, the sand/gravel soils that we identified at the project site have a very low potential for ice lens development. Therefore, foundations constructed directly onto the existing (i.e., undisturbed) sand/gravel soils or properly placed NFS structural fill (located directly above the undisturbed sand/gravel soils) will require relatively minimal burial and/or insulation to help protect them from frost damage.

7.4 Underground Utilities

Underground utilities can be founded directly onto the undisturbed sand/gravel soils (or properly placed structural fill) with little risk of differential settlement. While there is little risk of ice lens development at the project site, there is the potential for seasonal frost penetration (i.e., freezing ground temperatures) at the project site, especially in areas where there is a lack of insulating snow cover (e.g., plowed parking lots, exterior porticos, etc.). Utilities which are susceptible to freezing temperatures (i.e., water/sewer) should be buried sufficiently deep to protect them from freezing temperatures. Otherwise, they should be protected from freezing temperatures by incorporating appropriate amounts of artificial insulation into the utility trench backfill and/or by using some form of active freeze protection (i.e., thaw wires, active fluid circulation, etc.).

As we briefly mention in Section 7.1 of this report, we estimate that the sand/gravel soils which we identified across the project site will have relatively high permeability/infiltration rates. As such, the sand/gravel soils can likely dissipate large volumes of sewer discharge in relatively short time intervals and can likely support relatively simple septic and/or stormwater drain field designs. Percolation/infiltration testing will need to be conducted in the area of any proposed drain fields prior to any design efforts to characterize the hydraulic properties of the sand/gravel soils and properly size any drain fields, etc.

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7.5 Pavement

Pavement sections can be constructed directly onto the existing sand/gravel soils (either in their native state or placed as structural fill), or imported NFS structural fill, with minimal risk of differential movements due to ice lens development and/or thaw-related weakening of subgrade soils.

7.6 Settlements

Settlements for shallow foundations should be within tolerable limits, provided that they are placed directly onto the undisturbed sand/gravel soils (or properly placed structural fill located directly above the undisturbed sand/gravel soils). We anticipate a total settlement for shallow concrete foundations placed onto the undisturbed sand/gravel soils (or properly placed structural fill located above the undisturbed sand/gravel soils - as we discuss in Section 8.2 of this report) to be less than three-quarters (3/4) of an inch, with differential settlements comprising about one-half (1/2) of the total anticipated settlement. Settlement amounts could increase substantially if the structural fill material used to bring any foundation pads to grade is not properly compacted. Most of the settlements should occur as the building loads are applied, such that additional long-term settlements should be relatively small and within tolerable limits.

Settlements under driveways, parking areas, and street sections are expected to be vary more than under any buildings, especially where utility trenches are located. Proper earthwork is necessary to help reduce the settlement potential. The settlement potential can be reduced by performing all utility excavation and backfill efforts as early in the construction schedule as possible and placing any pavement as last in the construction schedule as possible.

7.7 Seismic Design Parameters

We have assumed that the International Building Code (IBC) 2012 will be used for the design of the proposed structure. The seismic site classification for the project site is D based on the relatively dense sand/gravel soil that we observed at the project site. We utilized the United States Geological Survey (USGS) Seismic Design Maps tool (http://earthquake.usgs.gov/designmaps/us/application.php) to calculate the seismic design parameters for the project site, which are F_a = 1.000 (S_s = 1.630) and F_v = 1.5000 (S_1 = 0.760). A copy of the USGS Design Maps report for the project site is contained in Appendix C of this report.

Based on our findings, we expect there to be no potential for soil liquefaction at the project site given the relatively coarse-grained nature of the sand/gravel deposits which occur across the project site and a relatively deep groundwater table.

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8.0 DESIGN RECOMMENDATIONS

We have presented our design recommendations in the general order that the project site will most likely be developed. Our design recommendations can be used in parts (as needed) for the final design of the proposed YCHC.

8.1 Earthworks

Our recommendations assume that any shallow foundations (i.e., poured-concrete footings) will be founded either directly onto the undisturbed sand/gravel soils or compacted NFS structural fill pads constructed directly above the undisturbed sand/gravel soils. Any structural fill materials used on-site should be compacted to a minimum of 95 percent of the modified Proctor density.

Any NFS sand/gravel material removed during the initial site grading and excavation activities, which does not contain any organic/deleterious material, can be re-used anywhere on-site as structural fill. Proper placement and compaction techniques need to be applied during the backfill process (see Section 9.1 of this report for more details). Additional laboratory testing may be required to verify the silt content and frost susceptibility of any excavated (i.e., on-site) soil for use in structural fill applications. Furthermore, the frost susceptibility of any imported structural fill material should be determined prior to import to the project site. As we mention in Section 7.1 of this report, our recommendations assume that any structural fill (re-worked native soils or imported fill) used to bring the project site to grade will be NFS. Use of silt-rich (i.e., frost susceptible) structural fill will require a re-evaluation of the recommendations that we preset in this report.

All earthworks should be completed with quality control inspection, including: bottom-of-hole inspections; fill gradation classification; and in-situ compacting testing. A bottom-of-hole inspection should be conducted by a qualified geotechnical engineer, geologist, or special inspector following site excavation activities (and before any foundation construction begins) in order to visually confirm the findings of this report and provide recommendations for any non-conforming conditions encountered during the excavation activities.

8.2 Shallow Foundations

For the purposes of this report, a shallow foundation can be considered any foundation which will require over-excavation of the existing surficial organic materials prior to structural fill placement and/or foundation construction.

8.2.1 Soil Bearing Capacity

Concrete foundations placed on either the undisturbed sand/gravel soils or on structural fill pads (constructed directly above the undisturbed sand/gravel soils) may be designed for an allowable soil bearing capacity of 3,000 pounds per square foot (psf). The soil bearing capacity may be increased by one-third (1/3) to accommodate short-term wind and/or seismic loads. Larger

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footings (smallest dimension greater than two feet in plan dimension) may be designed for greater bearing capacities at a rate of 300 psf for every additional horizontal linear foot of footing up to a maximum value of 5,300 psf.

8.2.2 Continuous Strip Footings and Spread Footings

Continuous strip footings and/or spread footings can be founded directly onto either: 1) the undisturbed sand/gravel soils, or 2) properly placed structural fill (located directly above the undisturbed sand/gravel soils). The minimum horizontal dimension for continuous strip footings should be 16 inches. The minimum horizontal dimension for spread footings should be 24 inches. Interior footings should extend a minimum of 12 inches below the finished floor grade (assuming a continuously heated building is maintained during winter months) to achieve the recommended allowable soil bearing capacity and help resist any lateral forces. Shallow foundation footings should extend laterally a minimum of one-eighth (1/8) of the footing width beyond any foundation walls to help resist any anticipated uplift/overturning forces (Figure 3). We discuss the effects of various uplift and lateral forces on foundations in more detail in Sections 8.2.4 and 8.2.5 of this report.

8.2.3 Thickened Edge Slab Foundations and Floor Slabs

Thickened edge slab foundations and/or floor slabs can also be founded directly onto the undisturbed sand/gravel soils or properly placed structural fill located directly above the undisturbed sand/gravel soils. The thickened edge (i.e., perimeter footing) of any thickened edge slab foundation should extend a minimum of 16 inches below the exterior finished grade to achieve the recommended allowable soil bearing capacity and help resist any lateral forces.

The top four to six inches of the structural pad located beneath the slabs should be free draining, with less than 3% passing the #200 sieve. This "blanket" will serve as a capillary break to help maintain a dry slab. Concrete floor slabs constructed directly on the undisturbed sand/gravel soils or on properly constructed granular fill pads (located directly above the undisturbed sand/gravel soils), as we described above, may be designed using a modulus of subgrade reaction of k_1=60 pci (k_1 is the value for a 1-ft × 1-ft rigid plate). For this project, the following equations can be used (with standard English units) to calculate the appropriate modulus of subgrade reaction for slabs bearing on the undisturbed sand/gravel soils or on properly placed granular structural fill located directly above the undisturbed sand/gravel soils:

$$k_{(B\,x\,B)} = k_1 \left(\frac{B+1}{2B}\right)^2 \qquad (1)$$

Where:

B = the slab width of a square slab in feet
k_1 = the modulus of subgrade reaction for a 1-ft × 1-ft rigid plate in pci
$k_{(B\,x\,B)}$ = the modulus of subgrade reaction for a square slab of width B in pci

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The following equation (2) can be used for a rectangular slab having the dimensions $B \times L$ (in feet) with similar bearing soils as the slab loading equation above (1).

$$k_{(B\,x\,L)} = \frac{k_{(B\,x\,B)}\left(1+0.5\frac{B}{L}\right)}{1.5} \quad (2)$$

Where:

$k_{(B\,x\,B)}$ = the modulus of subgrade reaction for a $B \times B$ square slab
$k_{(B\,x\,L)}$ = the modulus of subgrade reaction for $B \times L$ rectangular slab
B = the least horizontal dimension of a rectangular slab
L = the larger horizontal dimension of a rectangular slab

8.2.4 Footing Uplift

Shallow foundations should be buried sufficiently deep so as to resist any anticipated uplift/overturning forces (e.g. wind, seismic, frost jacking, etc.). The uplift capacity of a foundation is a function of its weight, configuration, and depth. The ultimate uplift capacity can be calculated by using 80 percent of the weight of the foundation plus 80 percent of the weight of the effective soil mass located above the footing. Figure 3 of this report illustrates the impact that effective soil mass has on the uplift capacity of a shallow foundation footing. An effective unit weight of 130 pcf can be used for granular structural backfill material. The ultimate uplift load includes any short-term load factors, so no increase in uplift capacity should be added for short-term loading.

8.2.4.1 Frost Heaving and Frost Protection

Frost heaving forces can generate significant footing uplift loads and it is difficult to predict the depth of frost penetration and extent of ice lens formation at any given site. As such, footings need to be buried sufficiently deep so as to resist any anticipated frost heaving uplift forces. As we previously mentioned in Section 7.1 of this report, there is little to no potential for ice lens formation at the project site (assuming that any structural fill used is NFS). As such, uplift forces resulting from frost heave will be negligible.

For the project site, the minimum burial depth for any uninsulated shallow foundation footings (heated or unheated) constructed directly onto the NFS sand/gravel soil (or NFS structural fill) should be 24 inches. Foundation burial requirements will increase if frost susceptible fill is used to bring any foundation pads to grade.

Insulation may be placed directly beneath of any floor slabs. However, no insulation should be placed directly beneath of any perimeter footings, as this can promote freezing of the foundation soils by preventing adequate heat transfer from the interior of a heated building to the foundation bearing soils. Alternatively, insulation can be placed along the exterior of any perimeter footings/stem walls and/or thickened edge slab foundations to help reduce the minimum burial

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depths required to help protect the foundation bearing soils from freezing. For this project, however, no foundation should be buried less than 16 inches below finished grade, even with the application of insulation (unless it is contained entirely within the footprint of a continuously heated structure – see Section 8.2.2. of this report for more details). We have provided our recommended insulation configurations for conventional strip/spread footings in Figure 4 of this report (configurations B and C). We have also provided our recommended insulation configurations for heated thickened edge slab floundations in Figure 4 of this report (configurations E and F).

8.2.5 Lateral Loads for Foundations and Retaining Walls

Retaining walls (such as perimeter foundation stem walls for buildings with basements or crawl spaces) must be designed to resist lateral earth pressures. The magnitude of the pressure exerted on a retaining wall is dependent upon several factors, including:

1) whether the wall is allowed to deflect after placement of backfill;
2) the type of backfill used;
3) compaction effort; and
4) wall drainage provisions.

Any foundation stem walls that are not designed to carry lateral loads should be backfilled on both sides simultaneously to prevent differential lateral loading of the foundation stem wall. We developed the unit weights provided in Table 1 of this report assuming that structural fill (containing less than ten percent fines) is used as backfill, and that the fill is compacted to at least 90 percent of the modified Proctor density.

An active-earth pressure condition will prevail (under static loading) if a retaining wall is allowed to deflect or rotate a minimum of 0.001 times by the wall height. An at-rest pressure condition will prevail if a retaining wall is restrained at the top and cannot move at least 0.001 times the wall height. Lateral forces exerted by wind or seismic activity may be resisted by passive-earth pressures against the sides of the foundation footings, exterior walls (below grade), and grade beams. Therefore, interior footings should extend a minimum of 12 inches below the finished floor grade (assuming a continuously heated building is maintained during winter months) to help resist any lateral forces.

In order to prevent water accumulation against the outside of any foundation or retaining wall, the wall must have a perimeter drainage system connected to an outlet that will not freeze closed at any time of the year. The top of the drainage piping must be located below the top of the footing for the foundation and/or retaining wall. Backfill used against the wall (and extending a minimum of one foot beyond the wall) must be free-draining with less than three percent fines. The top one-foot of backfill against the outside of a foundation and/or retaining wall should consist of relatively impermeable (fine-grained) material and be tightly compacted such that

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surface water is directed away from the foundation and/or retaining wall. A permeable geotextile fabric may be useful to prevent mixing of the impermeable (fine-grained) overburden and underlying free-draining (coarse-grained) backfill. Furthermore, the finished surface should slope away from any foundation and/or retaining wall with a grade between 1 to 2 percent, such that surface water is directed away from the foundation and/or retaining wall.

Seismic loading on foundation and/or retaining walls generally increases the lateral pressures on the wall and decreases the passive resistance. For foundation systems where the building foundation is continuous, the differential lateral movement between the soil and foundation is very small, and as such, essentially no excess lateral loading on the foundation wall is experienced. Foundation walls with a differential in backfill heights of over six feet (basements, crawl spaces, etc.) will experience seismic lateral loading from the inertial effects of seismic waves passing through the foundation.

The lateral soil pressures can be represented by equivalent fluid pressures. The pressure distribution is a function of wall restraint, seismic loading, and drainage conditions. Figure 5 presents the distribution diagrams for various loading conditions. Table 1 presents the unit weights to be used with Figure 5 for this project.

Table 1: Equivalent Fluid Specific Weight for Lateral Loading Design

LOADING CONDITION	DRAINED EQUIVALENT FLUID SPECIFIC WEIGHT		UN-DRAINED EQUIVALENT FLUID SPECIFIC WEIGHT	
	SPECIFIC WEIGHT (pcf)	**SYMBOL**	**SPECIFIC WEIGHT (pcf)**	**SYMBOL**
ACTIVE	35	t_1	24	t_2
AT-REST	55	t_3	38	t_4
PASSIVE	400	t_5	280	t_6
SEISMIC	16	t_7	9	t_8

Lateral forces may also be resisted by friction between the concrete foundations and the underlying soil. The frictional resistance may be calculated using a coefficient of friction of 0.4 between the concrete and soil.

8.3 Underground Utilities

In general, the soils in which deep utility trenches (6 to10 feet bgs) are to be constructed are composed of relatively dense/compact sand and gravel. Any gravity-fed utility trenches extending into the sand/gravel soils should be a minimum of three feet wide at the bottom of the trench with the utility piping located in the center of any trenches. Properly placed structural fill should be used to bring the gravity-fed utilities to the proper installation grade.

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Underground utilities which are susceptible to damage from freezing need to be frost-protected by sufficient amounts of backfill, insulation, and/or active freeze protection systems (e.g., heat tape, thaw wire, etc.); or some combination of the above. Any utilities which are susceptible to damage from freezing that are planned to be constructed less than eight feet below the planned finished grade should contain some level of additional frost-protection (e.g., insulation, active freeze protection systems, or a combination of both).

Any insulation used should conform to the specifications that we detail in Section 9.4 of this report and should extend a minimum of two feet (and a maximum of four feet) perpendicular to either side of the proposed utility alignment. The thickness of the insulation used will be a function of the burial depth. In general one inch of insulation is equal to approximately 12 inches of compacted NFS backfill. Underground utilities which are susceptible to damage from freezing should not be constructed within four feet of the planned finished grade (regardless of insulation measures or active freeze-protection systems).

8.4 Pavement Section

Pavement section thickness will be a function of the amount of cut/fill needed to achieve final grade. In general, the existing sand/gravel soils which occur across the project site have little to no frost susceptibility and there is little to no potential for ice lens development at the project site. As such, minimal engineered pavement sections will be required and the pavement sections can be constructed directly onto the existing NFS sand/gravels soils (in their native state or placed as structural fill) or NFS fill structural fill. We have provided a suitable pavement section for the project site in Table 2 of this report.

Table 2: Suitable Pavement Section Construction above the Existing NFS Material

SECTION THICKNESS	MATERIAL
2 INCHES MIN.	ASPHALT (CONC. PAVEMENT THICKNESS A FUNCTION OF REINFORCEMENT)
2 INCHES MAX.	NFS LEVELING COURSE (A.K.A. "D-1")
N/A	EXISTING NON-FROST SUSCEPTIBLE SOILS OR NFS STRUCTURAL FILL

Any leveling course used should be NFS in order to maintain a low potential for ice lens development within the leveling course. It is our experience that the "D1" leveling course material currently available in many portions of coastal Alaska (where highly fractured meta-sedimentary flysh-style deposits occur) may not be NFS following compaction, because the compaction with a vibratory compactor further increases the frost susceptibility of the leveling course by increasing the percentage of fine-grained material (due to degradation of the soil particles from the impact of the compaction equipment). As such, the leveling course thickness should be kept to two inches or less to reduce the potential for ice lens formation in the leveling

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course. All of these materials should be placed in thin lifts and each lift should be compacted to a minimum of 95 % of the modified Proctor density. As an alternative to "D1", recycled asphalt pavement (RAP) can be used. The residual oil in the RAP greatly reduces the frost susceptibility.

A geotextile fabric may be useful for the placement of fill material above any fine-grained subgrade soils, but it is not necessary for use within our recommended pavement section. Any geotextile fabric used for this project should conform to the specifications which we present in Table 3 of this report.

Table 3: Type B, Class 2 Geotextile Fabric Strengths

FABRIC PROPERTY	ASTM STANDARD USED TO DETERMINE STRENGTH	WOVEN FABRIC STRENGTH	NON-WOVEN FABRIC STRENGTH
GRAB STRENGTH	D4632	250	160
SEWN SEAM STRENGTH	D4632	225	140
TEAR STRENGTH	D4533	90	56
PUNCTURE STRENGTH	D6241	495	310

Note: Units in lbs per foot.

8.5 Surface Drainage

After the property is brought to grade it should be relatively flat, such that storm water will tend to accumulate and flow off the project site slowly. Water accumulation will have a detrimental effect on foundations, retaining structures, and pavement sections. Provisions should be included in the design to collect runoff and divert it away from any foundations, retaining structures, and pavement sections. The ground surface surrounding the proposed developments should be graded such that surface runoff is channeled away from foundations, retaining walls, and pavement sections. The soils on the surface should be tightly compacted to help reduce surface runoff infiltration. Roof, parking lot, and driveway drainage should be directed away from foundations. If storm sewer is available, tight-line connections from roof drain collectors should be made.

8.6 Insulation

Any subsurface insulation should consist of extruded polystyrene such as DOW Styrofoam™ Highload or UC Industries Foamular. Any subsurface insulation used under pavement sections or structural slabs should be closed cell, board stock with a minimum compressive strength of 60 psi at five percent deflection. Subsurface insulation around foundations should have a minimum compressive strength of 25 psi at five percent deflection. The insulation should not absorb more than two percent water per ASTM Test Method C-272. The thermal conductivity (k) of the insulation should not exceed 0.25 BTU-in/hr-ft^2-°F when tested at 75°F.

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9.0 CONSTRUCTION RECOMMENDATIONS

We have presented our construction recommendations in the general order that the project site will most likely be developed. Our construction recommendations are intended to aid the construction contractor(s) during the construction process.

9.1 Earthworks

Any and all fill material used should be placed at 95 percent of the modified Proctor density as determined by ASTM D-1557, unless we specifically state otherwise in other sections of this report. The thickness of individual lifts will be determined based on the equipment used, the soil type, and existing soil moisture content. Typically, fill material will need to be placed in lifts of less than one-foot in thickness. All earthworks should be completed with quality control inspection.

Any excavated native sand/gravel soils (which are free of organic material and have relatively low silt contents) which are stockpiled on-site (for later use as structural backfill) should be protected from additional moisture inputs (precipitation, etc.) through the use of plastic tarps, etc. Additional moisture inputs can have detrimental effects on the effort needed to achieve proper compaction rates.

9.2 Shallow Foundations

Care should be taken during foundation excavation activities to limit the disturbance of the bottom of any foundation excavations. The bottom of any foundation excavation should be moisture conditioned and proof-rolled as necessary to return the exposed soils to their original in-situ density.

In general, the soils in which the proposed foundation pads are to be constructed consist primarily of relatively permeable sand and gravel material. As such, any surface water (*e.g.*, from precipitation, snowmelt, etc.) that enters into foundation excavations will tend to dissipate relatively quickly. Excess water can, however, have a negative impact on any backfill and compaction efforts. Therefore, if surface water does accumulate in any open foundation excavations it can be controlled by excavating a shallow drainage trench around the perimeter of the excavation. The drainage trench will collect surface water and direct it to a sump area, which should be located outside of the foundation footprint. The excess water can then be pumped from the sump area and be discharged at an appropriate location away from the excavation and any other existing foundations.

It is imperative that shallow building foundations for heated structures remain in a thawed state for the entire construction period; even when dealing with soils that have little to no frost susceptibility. Foundation soils that are allowed to freeze during the initial construction (before the building is enclosed and heated) may be compromised by the development of ice lenses. Upon thawing, which may take several weeks or months, potential differential settlements could

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distort the structure resulting in damaged foundations, cracked sheetrock, skewed door frames, and broken windows. If construction extends into the winter months, temporary enclosures should be constructed which completely enclose warm foundations and heat should be applied to the enclosure to prevent freezing of the soils located beneath any warm foundation and/or floor slab.

9.3 Underground Utilities

We expect that utility trench wall stability in the moderately compact/dense sand/gravel to be moderate to poor, especially if utility trenches extend below the groundwater table. The contractor should be responsible for trench safety and regulation compliance. If groundwater is encountered during utility trench excavation then dewatering efforts may be required to facilitate proper utility installation and trench backfill.

All piping should be bedded per the manufacturer's recommendations, with the bedding material compacted to provide pipe support. Above the bedding materials, the backfill should be similar to, and compacted to the approximate density of, the surrounding soils.

9.4 Pavement

All of the earthwork within any areas to be paved should be completed as early in the construction schedule as possible, and the pavement placed as late in the construction schedule as possible. This will give the subgrade soils time to settle, compress, and stabilize prior to placement of the pavement. Any structural fill used should be placed in thin lifts (less than one foot in thickness) and each lift should be compacted to a minimum of 95 percent of the modified Proctor density. Prior to paving, any surface fill material should be re-leveled and re-compacted. All backfill and paving materials should be inspected and tested for material specification compliance and compaction.

Underground utility piping should be installed prior to construction of any pavement sections such that trenching is done through the subgrade soils only. This will help ensure that a uniform pavement section is maintained, which will reduce the potential for differential settlements along underground utility trench alignments.

The minimum thickness for any asphalt pavement surfaces is two inches. The minimum thickness of any concrete pavement surfaces will be a function of the reinforcement required. All applicable ACI and IBC standards should be followed.

9.5 Insulation

The satisfactory performance of any subsurface insulation is in part controlled by the details of construction including: 1) the care taken to ensure that the board stock lies flat on a smooth, level surface; and 2) the adjoining ends of the insulation are closely butted together. Any vertical joints should be staggered where more than one layer of insulation is used.

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9.6 Winter Construction

Proper placement and compaction of structural fill is not possible when fill material is frozen, and as such, frozen fill material should never be used for structural support unless it has been subsequently thawed and compacted to 95 percent of the modified Proctor density (throughout its vertical extent). Furthermore, subgrade soils (fill or native) need to be completely thawed prior to the placement and compaction of additional lifts of thawed fill material. In our professional experience, ambient soil temperatures need to be above 37 °F in order to achieve efficient compaction. It is extremely difficult to achieve compaction levels equal to 95 percent of the modified Proctor density in fill material that is between 32 °F to 37 °F. We discuss the risks associated with winter foundation construction in more detail in Sections 9.2 of this report

10.0 THE OBSERVATIONAL METHOD

A comprehensive geoprofessional service (e.g., geotechnical, geological, civil, and/or environmental engineering, etc.) should consist of an interdependent, two-part process comprised of:

Part I - pre-construction site assessment, engineering, and design; and

Part II - continuous construction oversight and design support.

This process, commonly referred to in the geoprofessional industry as "The Observational Method", was developed to reduce the costs required to complete a construction project, while simultaneously reducing the overall risk associated with the design and construction of the project.

In geotechnical engineering, Part I of the Observational Method (OM) begins with a geotechnical assessment of the site, which typically consists of some combination of literature research, site reconnaissance, subsurface exploration, laboratory testing, and geotechnical engineering. These efforts are usually documented in a formal report (e.g., such as this report) that summarizes the findings of the geotechnical assessment, and presents provisional geotechnical engineering recommendations for design and construction. Geotechnical assessment reports (and the findings and recommendations contained within) are considered provisional due to the fact that their contents are typically based primarily on limited subsurface information for a site. Most conventional geotechnical exploration programs only physically characterize a very small percentage of a given site, as it is typically cost prohibitive to conduct extensive (i.e. high density/frequency) exploration programs. As an alternative, geoprofessionals use the subsurface information available for a site to extrapolate subsurface conditions between exploration locations and develop appropriate provisional recommendations based on the inferred site conditions. As a result, the geoprofessional of record cannot be certain that the provisional recommendations will be wholly applicable to the site, as subsurface conditions other than those

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identified during the geotechnical assessment may exist at the site which could present obstacles and/or increased risk to the proposed design and construction.

Part II of the OM is employed by geoprofessionals to help reduce the risk associated with unidentified and/or unexpected subsurface conditions. Geoprofessionals accomplish Part II of the OM by providing construction oversight (e.g., construction observation, inspection, and testing). Part II of the OM is a valuable service, as the geoprofessional of record is available if unexpected conditions are encountered during the construction process (e.g., during excavation, fill placement, etc.) to make timely assessments of the unexpected conditions and modify their design and construction recommendations accordingly; thus reducing considerable cost resulting from potential construction delays and reducing the risk of future problems resulting from inappropriate design and construction practices.

Oftentimes, a client may be persuaded to use an alternative geoprofessional firm to conduct Part II of the OM for a given project; as some geoprofessional firms offer the same services at discounted prices in order to help them obtain the overall construction materials engineering and testing (CoMET) commission. The geoprofessional industry as a whole recommends against this practice. An alternative geoprofessional firm cannot provide the same level of service as the geoprofessional of record. The geoprofessional of record has (amongst other things) a unique familiarity with the project including; an intimate understanding of the subsurface conditions, the proposed design, and the client's unique concerns and needs, as well as other factors that could impact the successful completion of a construction project. An alternative geoprofessional firm is not aware of the inferences made and the judgment applied by the geoprofessional of record in developing the provisional recommendations, and may overlook opportunities to provide extra value during Part II of the geoprofessional service.

Clients that prevent the geoprofessional of record from performing a complete service can be held solely liable for any complications stemming from engineering omissions as a result of unidentified conditions. The geoprofessional of record may not be liable for any resulting complications that occur, as the geoprofessional of record was not able to complete their services. Furthermore, the replacement geoprofessional firm may also be found to have no liability for the same reasons.

We are available at any time to discuss the OM in more detail, or to provide you with an estimate for any additional construction observation and testing services required.

11.0 CLOSURE

We (Northern Geotechnical Engineering, Inc. d.b.a. Terra Firma Testing) prepared this report exclusively for the use of the Yakutat Tlingit Tribe and their consultants/contractors/etc. for use in the design and construction of the proposed YCHC improvements. We should be notified if significant changes are to occur in the nature, design, or location of the proposed improvements

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in order that we may review our conclusions and recommendations that we present in this report and, if necessary, modify them to satisfy the proposed changes.

This report should always be read and/or distributed in its entirety (including all figures, exploration logs, appendices, etc.) to ensure that all of the pertinent information has been adequately disseminated. Otherwise, an incomplete or misinterpreted understanding of the site conditions and/or our engineering recommendations may occur. Our recommended best practice is to make this report accessible, in its entirety, to any design professional and/or contractor working on the project. Any part of this report (e.g., exploration logs, calculations, material values, etc.) which is presented in the design/construction plans and/or specifications for the project should have an adequate reference which clearly identifies where the report can be obtained for further review.

Due to the natural variability of earth materials, variations in the subsurface conditions across the project site may exist other than those we identified during the course of our geotechnical assessment. Therefore, a qualified geotechnical engineer, geologist, and/or special inspector be on-site during construction activities to provide corrective recommendations for any unexpected conditions revealed during construction (see our discussion of the Observational Method in Section 10.0 of this report for more detail). Furthermore, the construction budget should allow for any unanticipated conditions that may be encountered during construction activities.

We conducted this evaluation following the standard of care expected of professionals undertaking similar work in the State of Alaska under similar conditions. No warranty, expressed or implied, is made.

12.0 REFERENCES CITED

Yehle, L. A., 1979, Reconnaissance Engineering Geology of the Yakutat Area, Alaska, with Emphasis on Evaluation of Earthquake and Other Geologic Hazards: United States Geological Survey Professional Paper 1074, 51 p.

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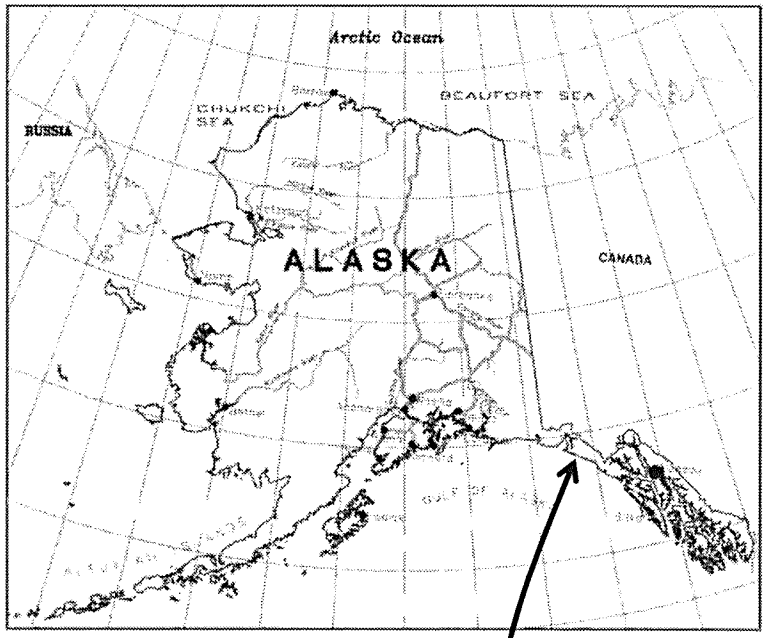
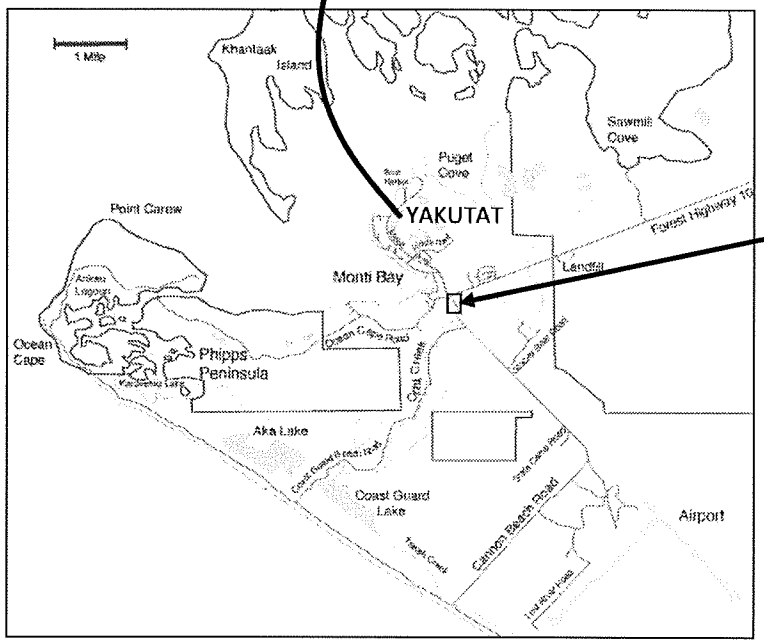
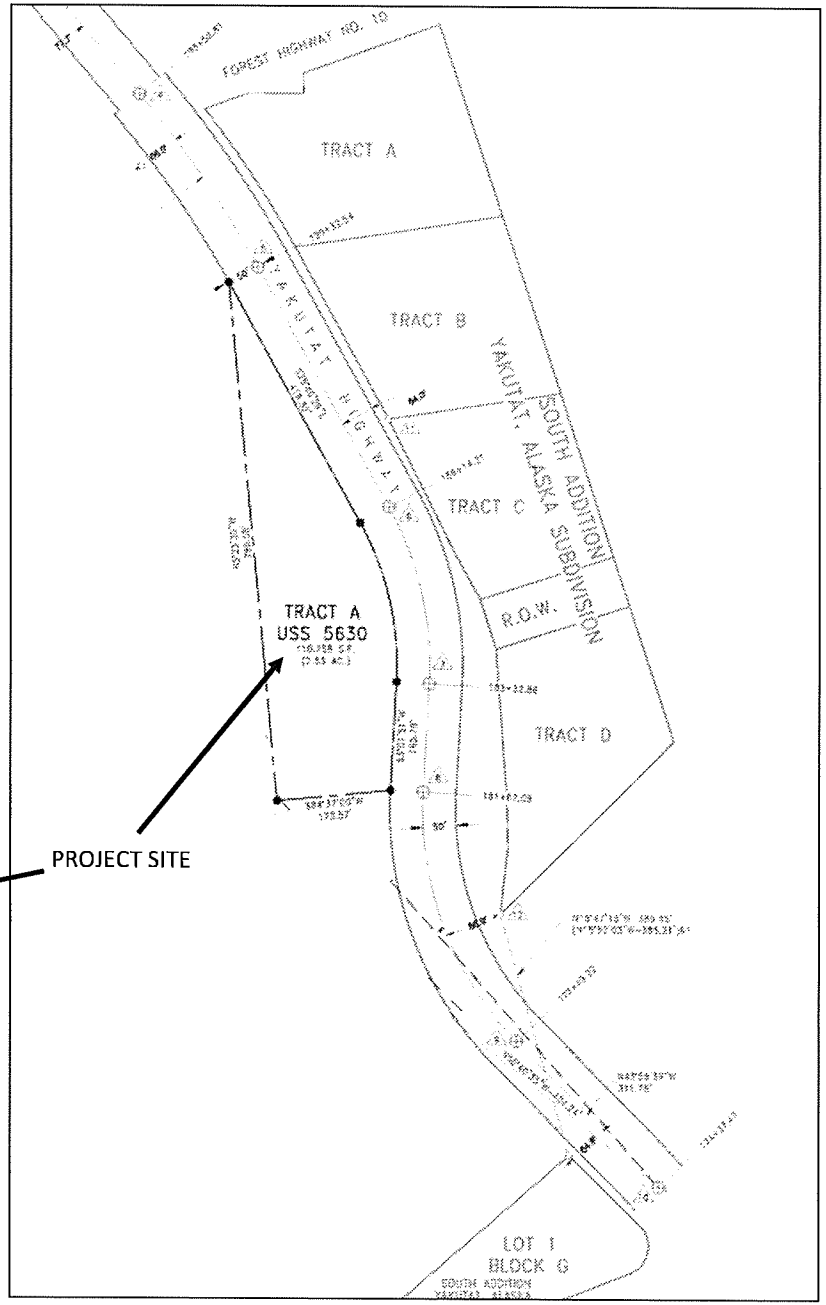
REPORT
FIGURES



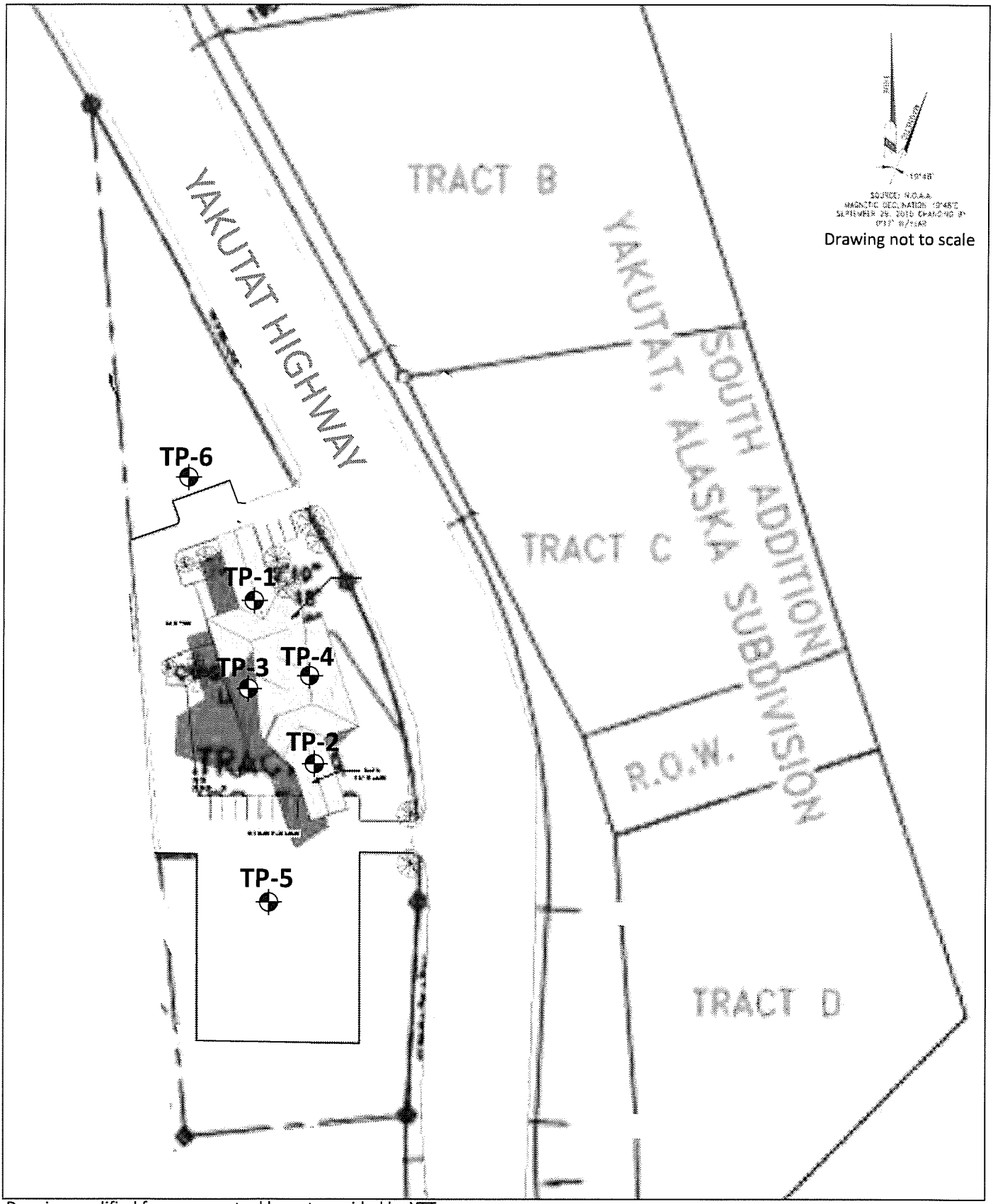




PROJECT SITE

NORTHERN GEOTECHNICAL ENGINEERING, INC.
TERRA FIRMA TESTING

FIGURE TITLE: PROJECT SITE LOCATION	
PROJECT NAME: YAKUTAT COMMUNITY HEALTH CLINIC	PROJECT ID: 4562-16
PROJECT LOCATION: YAKUTAT, ALASKA	FIGURE NUMBER: 1



Drawing not to scale

Drawing modified from conceptual layout provided by YTT

⊕ = Approx. location of test pit exploration

NORTHERN GEOTECHNICAL ENGINEERING, INC.
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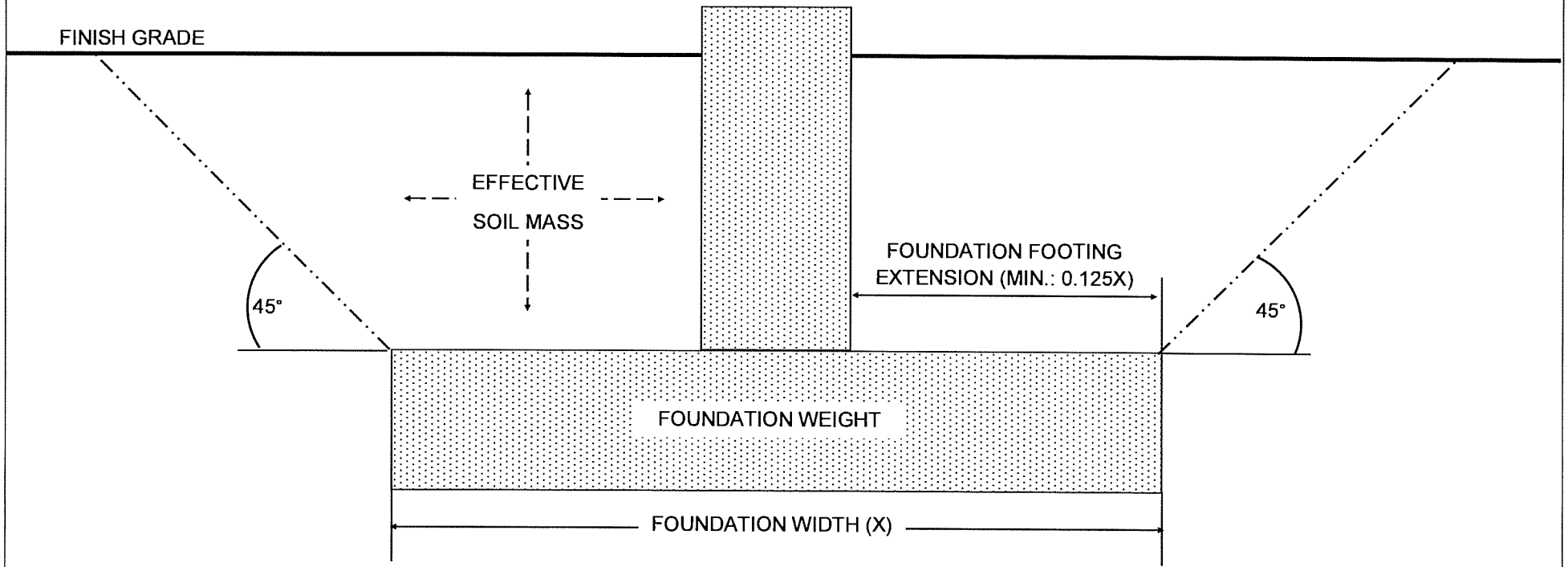
FIGURE TITLE: CONCEPT SITE LAYOUT AND EXPLORATION LOCATIONS	
PROJECT NAME: YAKUTAT COMMUNITY HEALTH CLINIC	PROJECT ID: 4562-16
PROJECT LOCATION: YAKUTAT, ALASKA	FIGURE NUMBER: 2

UPLIFT CAPACITY = 0.8 x (EFFECTIVE SOIL WEIGHT + WEIGHT OF FOUNDATION)

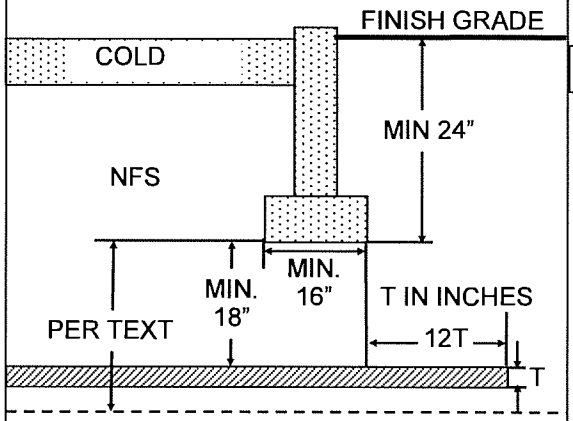
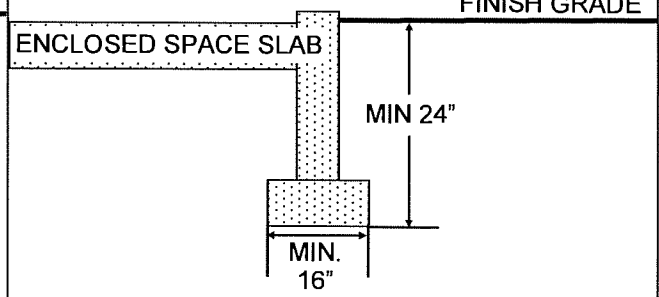
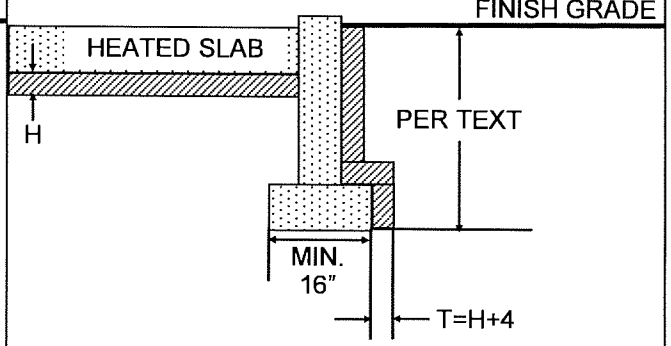
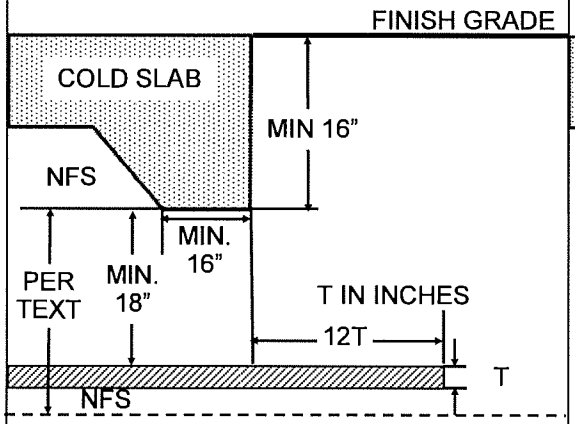
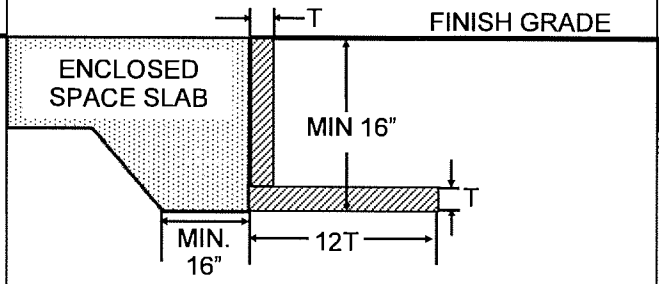
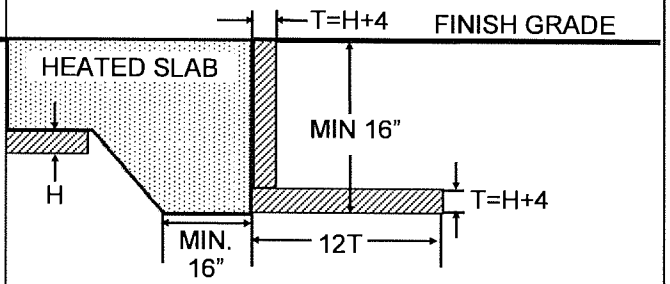


= FOOTING / STEM WALL

DIAGRAM NOT TO SCALE

NORTHERN GEOTECHNICAL ENGINEERING, INC.
TERRA FIRMA TESTING

FIGURE TITLE: UPLIFT CAPACITY DIAGRAM	
PROJECT NAME: YAKUTAT COMMUNITY HEALTH CLINIC	PROJECT ID: 4562-16
PROJECT LOCATION: YAKUTAT, ALASKA	FIGURE NUMBER: 3

	COLD SLAB	ENCLOSED (HEATED) SPACE SLAB	HEATED (RADIANT) SLAB
STRIP FOOTING	 NOTE: MUST BE PLACED ON NFS MATERIAL INSULATION OPTIONAL TO REDUCE DEPTH OF NFS CONFIGURATION A	 SOILS PREPARED AS DESCRIBED IN TEXT NOTE: IF INSULATION IS PLACED UNDER SLAB USE CONFIGURATION C CONFIGURATION B	 T AND H IN INCHES SOILS PREPARED AS DESCRIBED IN TEXT CONFIGURATION C
SLABE ON GRADE	 NOTE: MUST BE PLACED ON NFS MATERIAL INSULATION OPTIONAL TO REDUCE DEPTH OF NFS CONFIGURATION D	 T IN INCHES. T≥2" SOILS PREPARED AS DESCRIBED IN TEXT CONFIGURATION E	 T AND H IN INCHES SOILS PREPARED AS DESCRIBED IN TEXT NOTE: DO NOT INSULATE FOOTING SURFACES BELOW SLAB THE THICKNESS OF INSULATION "H" CAN BE CHANGED TO OBTAIN DESIRED INSULATION BENEATH SLAB CONFIGURATION F

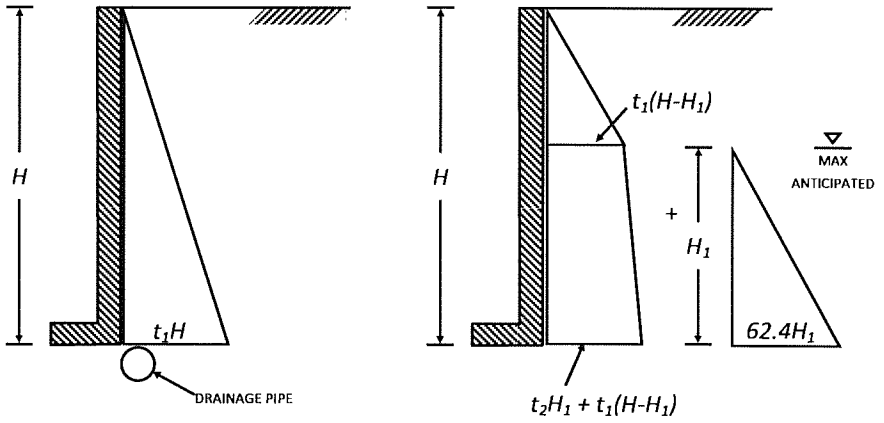
= FOOTING / STEM WALL / SLAB = INSULATION

CONFIGURATIONS NOT TO SCALE

NORTHERN GEOTECHNICAL ENGINEERING, INC.
TERRA FIRMA TESTING

FIGURE TITLE: FOUNDATION INSULATION CONFIGURATIONS	
PROJECT NAME: PROPOSED YAKUTAT COMMUNITY HEALTH CLINIC	PROJECT ID: 4562-16
PROJECT LOCATION: YAKUTAT, ALASKA	FIGURE NUMBER: 4

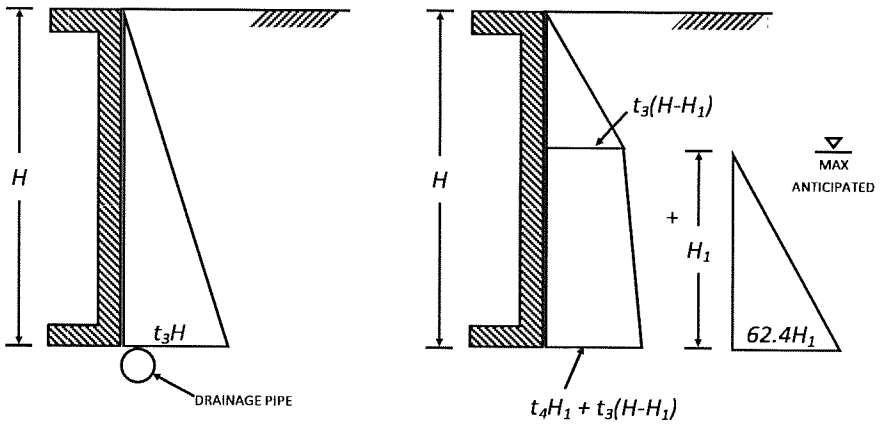
ACTIVE PRESSURE CONDITION



WITH DRAINAGE

WITHOUT DRAINAGE

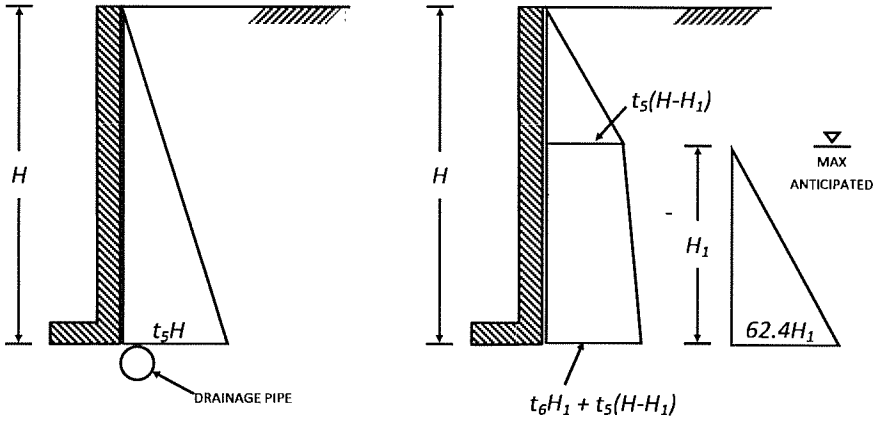
AT-REST PRESSURE CONDITION



WITH DRAINAGE

WITHOUT DRAINAGE

PASSIVE PRESSURE CONDITION

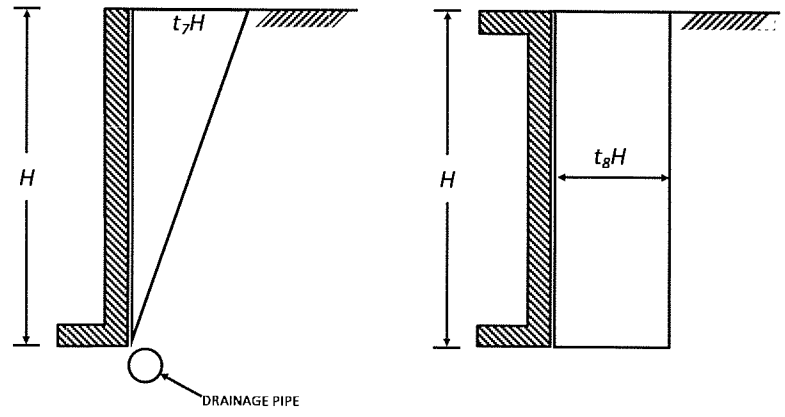


WITH DRAINAGE

WITHOUT DRAINAGE

NOTE: WALLS CAN BE EITHER FREE OR RESTRAINED AT THE TOP FOR THE PASSIVE PRESSURE CONDITION. EQUATIONS ARE ONLY VALID FOR UNITS OF $t_{1\text{-}8}$ (PCF) AND $H\text{-}H_1$(FT).

SEISMIC



ACTIVE

AT-REST

NOTE: SEISMIC LOADS ARE VALID FOR WALLS RETAINING LESS THAN 8 FEET VERTICAL OF EARTH. THE SEISMIC LOAD IS ADDED TO ACTIVE & AT-REST CONDITIONS AND IS SUBTRACTED FROM PASSIVE CONDITIONS.

NORTHERN GEOTECHNICAL ENGINEERING, INC.
TERRA FIRMA TESTING

FIGURE TITLE: LATERAL RETAINING WALL PRESSURES	
PROJECT NAME: YAKUTAT COMMUNITY HEALTH CLINIC	PROJECT ID: 4562-16
PROJECT LOCATION: YAKUTAT, ALASKA	FIGURE NUMBER: 5

APPENDIX A

GRAPHICAL SUBSURFACE EXPLORATION LOGS AND PHOTOGRAPHS

Northern Geotechnical Engineering Inc.
d.b.a. Terra Firma Testing
11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

EXPLORATION TP-1

NGE-TFT PROJECT NAME: Yakutat Community Health Clinic
NGE-TFT PROJECT NUMBER: 4562-16
PROJECT LOCATION: Yakutat, AK
EXPLORATION CONTRACTOR: Pate Co.
EXPLORATION EQUIPMENT: Hitachi EX 150
EXPLORATION METHOD: Test Pit Excavation
SAMPLING METHOD: Grab Sample
LOGGED BY: A. Smith
DATE/TIME STARTED: 10/27/2016 @ 10:05:00 AM
DATE/TIME COMPLETED: 10/27/2016 @ 10:30:00 AM
EXPLORATION LOCATION: See report Figure 2
GROUND ELEVATION: Not Known
▽ GROUNDWATER (ATD): N/E
▼ GROUNDWATER (): N/A
EXPLORATION COMPLETION: Backfilled with spoils.
WEATHER CONDITIONS: Overcast, calm, 36°F

DEPTH (ft)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	LAB RESULTS
0.0			Surface organics and root masses			
			WELL GRADED GRAVEL WITH SAND (GW), olive brown to olive gray, damp, subrounded to rounded gravel, gravel up to 3" in diameter, few cobbles and trace boulders 1-2 ft in diameter, coarse sand, massive, GLACIAL OUTWASH			
2.5						
					S1	S1 MC = 4.4% 57.0% gravel, 38.8% sand, 4.2% silt P0.02 = 2.1% FC = PFS
5.0						
7.5						
10.0					S2	S2 MC = 2.7% P200 = 1.5%

Bottom of test pit at 12.0 ft bgs.

Always refer to our complete geotechnical report for this project for a more detailed explanation of the subsurface conditions at the project site and how they may affect any existing and/or prospective project site development.

(Continued Next Page)

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11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

PHOTO APPENDIX

CLIENT Yakutat Tlingit Tribe **PROJECT NAME** Yakutat Community Health Clinic

PROJECT NUMBER 4562-16 **PROJECT LOCATION** Yakutat, AK

Exploration TP-1
Soil Profile

Exploration TP-1
Bottom of Hole

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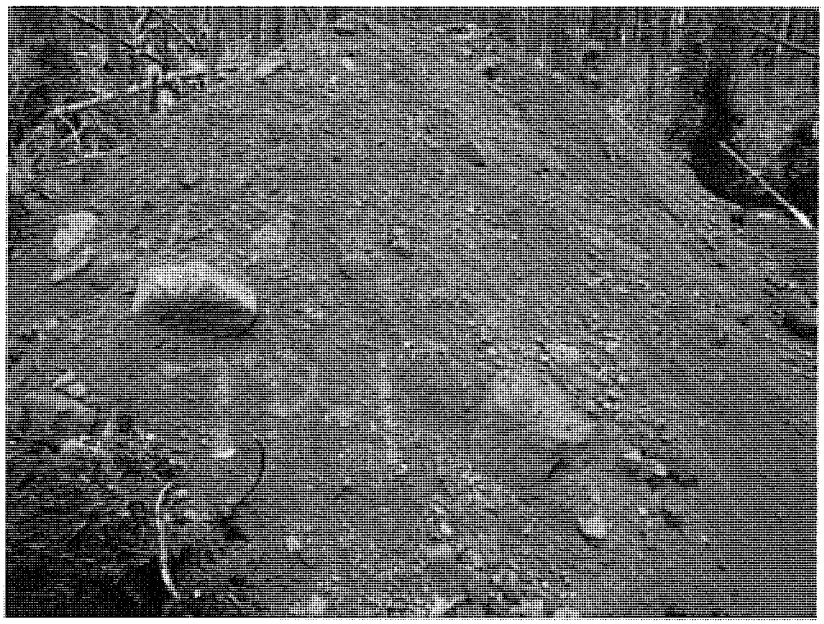
11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

PHOTO APPENDIX

CLIENT Yakutat Tlingit Tribe **PROJECT NAME** Yakutat Community Health Clinic

PROJECT NUMBER 4562-16 **PROJECT LOCATION** Yakutat, AK



Exploration TP-1
Spoils

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d.b.a. Terra Firma Testing
11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

EXPLORATION TP-2

NGE-TFT PROJECT NAME: Yakutat Community Health Clinic
NGE-TFT PROJECT NUMBER: 4562-16
PROJECT LOCATION: Yakutat, AK
EXPLORATION CONTRACTOR: Pate Co.
EXPLORATION EQUIPMENT: Hitachi EX 150
EXPLORATION METHOD: Test Pit Excavation
SAMPLING METHOD: Grab Sample
LOGGED BY: A. Smith
DATE/TIME STARTED: 10/27/2016 @ 2:15:00 PM
DATE/TIME COMPLETED: 10/27/2016 @ 2:40:00 PM
EXPLORATION LOCATION: See report Figure 2
GROUND ELEVATION: Not Known
GROUNDWATER (ATD): N/E
GROUNDWATER (): N/A
EXPLORATION COMPLETION: Backfilled with spoils.
WEATHER CONDITIONS: Overcast, calm, 36°F

DEPTH (ft)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	LAB RESULTS
0.0			Surface organics and root masses			
			POORLY GRADED GRAVEL WITH SAND (GP), olive brown to olive gray, damp, subrounded to rounded gravel, gravel up to 3" in diameter, few cobbles and trace boulders 1-2 ft in diameter, interbedded with sand layers 1-4" thick, coarse sand, massive, GLACIAL OUTWASH		S1	S1 MC = 4.5% 51.0% gravel, 45.4% sand, 3.5% silt P0.02 = 1.5% FC = NFS
2.5						
5.0						
7.5						
10.0						
12.5					S2	S2 MC = 6.5% P200 = 1.9%
			Bottom of test pit at 14.0 ft bgs.			

Always refer to our complete geotechnical report for this project for a more detailed explanation of the subsurface conditions at the project site and how they may affect any existing and/or prospective project site development.

(Continued Next Page)

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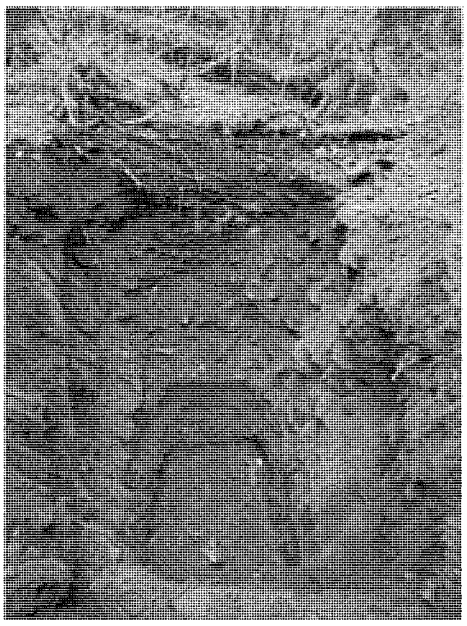
11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

PHOTO APPENDIX

CLIENT Yakutat Tlingit Tribe **PROJECT NAME** Yakutat Community Health Clinic

PROJECT NUMBER 4562-16 **PROJECT LOCATION** Yakutat, AK

Exploration TP-2
Soil Profile



Exploration TP-2
Bottom of Hole

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11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

PHOTO APPENDIX

CLIENT Yakutat Tlingit Tribe **PROJECT NAME** Yakutat Community Health Clinic

PROJECT NUMBER 4562-16 **PROJECT LOCATION** Yakutat, AK

Exploration TP-2
Spoils

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d.b.a. Terra Firma Testing
11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

EXPLORATION TP-3

NGE-TFT PROJECT NAME: Yakutat Community Health Clinic
NGE-TFT PROJECT NUMBER: 4562-16
PROJECT LOCATION: Yakutat, AK
EXPLORATION CONTRACTOR: Pate Co.
EXPLORATION EQUIPMENT: Hitachi EX 150
EXPLORATION METHOD: Test Pit Excavation
SAMPLING METHOD: Grab Sample
LOGGED BY: A. Smith
DATE/TIME STARTED: 10/27/2016 @ 1:30:00 PM
DATE/TIME COMPLETED: 10/27/2016 @ 2:05:00 PM
EXPLORATION LOCATION: See report Figure 2
GROUND ELEVATION: Not Known
▽ GROUNDWATER (ATD): N/E
▼ GROUNDWATER (): N/A
EXPLORATION COMPLETION: Backfilled with spoils.
WEATHER CONDITIONS: Overcast, calm, 36°F

DEPTH (ft)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	LAB RESULTS
0.0			Surface organics and root masses			
			POORLY GRADED SAND WITH GRAVEL (SP), olive brown to olive gray, damp, subrounded to rounded gravel, gravel up to 3" in diameter, few cobbles and trace boulders 1-3 ft in diameter, coarse sand, massive, GLACIAL OUTWASH			
2.5						
					S1	S1 MC = 4.5% 47.7% gravel, 50.8% sand, 1.5% silt
5.0						
7.5						
10.0						
12.5					S2	S2 MC = 4.1% P200 = 1.3%

Bottom of test pit at 14.0 ft bgs.

Always refer to our complete geotechnical report for this project for a more detailed explanation of the subsurface conditions at the project site and how they may affect any existing and/or prospective project site development.

(Continued Next Page)

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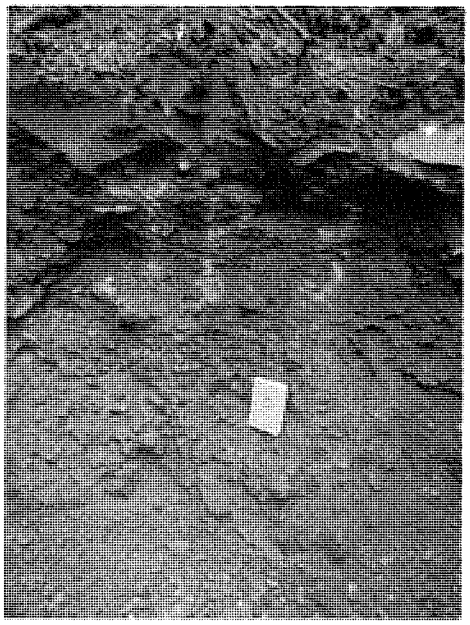
11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

PHOTO APPENDIX

CLIENT Yakutat Tlingit Tribe **PROJECT NAME** Yakutat Community Health Clinic

PROJECT NUMBER 4562-16 **PROJECT LOCATION** Yakutat, AK



Exploration TP-3
Soil Profile

Exploration TP-3
Bottom of Hole

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11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

PHOTO APPENDIX

CLIENT Yakutat Tlingit Tribe **PROJECT NAME** Yakutat Community Health Clinic

PROJECT NUMBER 4562-16 **PROJECT LOCATION** Yakutat, AK

Exploration TP-3
Spoils

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d.b.a. Terra Firma Testing
11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

EXPLORATION TP-4

NGE-TFT PROJECT NAME: Yakutat Community Health Clinic
NGE-TFT PROJECT NUMBER: 4562-16
PROJECT LOCATION: Yakutat, AK
EXPLORATION CONTRACTOR: Pate Co.
EXPLORATION EQUIPMENT: Hitachi EX 150
EXPLORATION METHOD: Test Pit Excavation
SAMPLING METHOD: Grab Sample
LOGGED BY: A. Smith
DATE/TIME STARTED: 10/27/2016 @ 11:45:00 AM
DATE/TIME COMPLETED: 10/27/2016 @ 12:15:00 PM
EXPLORATION LOCATION: See report Figure 2
GROUND ELEVATION: Not Known
▽ GROUNDWATER (ATD): N/E
▼ GROUNDWATER (): N/A
EXPLORATION COMPLETION: Backfilled with spoils.
WEATHER CONDITIONS: Overcast, calm, 36°F

DEPTH (ft)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	LAB RESULTS
0.0			Surface organics and root masses			
			POORLY GRADED SAND WITH GRAVEL (SP), loose, olive brown olive gray, damp, subrounded to rounded gravel, gravel up to 3" in diameter, few cobbles and trace boulders 1-2 ft in diameter, coarse sand, massive, GLACIAL OUTWASH		S1	S1 MC = 13.2% P200 = 2.0%
2.5						
					S2	S2 MC = 5.3% 47.5% gravel, 48.2% sand, 4.3% silt
5.0						
7.5						
10.0						
12.5					S3	S3 MC = 3.6% P200 = 3.9%

Bottom of test pit at 13.0 ft bgs.

Always refer to our complete geotechnical report for this project for a more detailed explanation of the subsurface conditions at the project site and how they may affect any existing and/or prospective project site development.

(Continued Next Page)

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11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

PHOTO APPENDIX

CLIENT Yakutat Tlingit Tribe **PROJECT NAME** Yakutat Community Health Clinic

PROJECT NUMBER 4562-16 **PROJECT LOCATION** Yakutat, AK

Exploration TP-4
Soil Profile

Exploration TP-4
Bottom of Hole

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11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

PHOTO APPENDIX

CLIENT Yakutat Tlingit Tribe **PROJECT NAME** Yakutat Community Health Clinic

PROJECT NUMBER 4562-16 **PROJECT LOCATION** Yakutat, AK

Exploration TP-4
Spoils

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d.b.a. Terra Firma Testing
11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

EXPLORATION TP-5

NGE-TFT PROJECT NAME: Yakutat Community Health Clinic
NGE-TFT PROJECT NUMBER: 4562-16
PROJECT LOCATION: Yakutat, AK
EXPLORATION CONTRACTOR: Pate Co.
EXPLORATION EQUIPMENT: Hitachi EX 150
EXPLORATION METHOD: Test Pit Excavation
SAMPLING METHOD: Grab Sample
LOGGED BY: A. Smith
DATE/TIME STARTED: 10/27/2016 @ 3:20:00 PM
DATE/TIME COMPLETED: 10/27/2016 @ 4:08:00 PM
EXPLORATION LOCATION: See report Figure 2
GROUND ELEVATION: Not Known
▽ GROUNDWATER (ATD): N/E
▼ GROUNDWATER (): N/A
EXPLORATION COMPLETION: Backfilled with spoils.
WEATHER CONDITIONS: Overcast, calm, 36°F

DEPTH (ft)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	LAB RESULTS
0			Surface organics and root masses			
			POORLY GRADED GRAVEL WITH SAND (GP), olive brown to olive gray, damp, subrounded to rounded gravel, gravel up to 3" in diameter, few cobbles and trace boulders 1-3 ft in diameter, coarse sand, massive, GLACIAL OUTWASH			
					S1	S1 MC = 4.0% 50.6% gravel, 46.7% sand, 2.7% silt P0.02 = 1.5% FC = NFS
5						
10						
					S2	S2 MC = 3.8% P0.02 = 2.1%
15			Bottom of test pit at 15.0 ft bgs.			

Always refer to our complete geotechnical report for this project for a more detailed explanation of the subsurface conditions at the project site and how they may affect any existing and/or prospective project site development.

(Continued Next Page)

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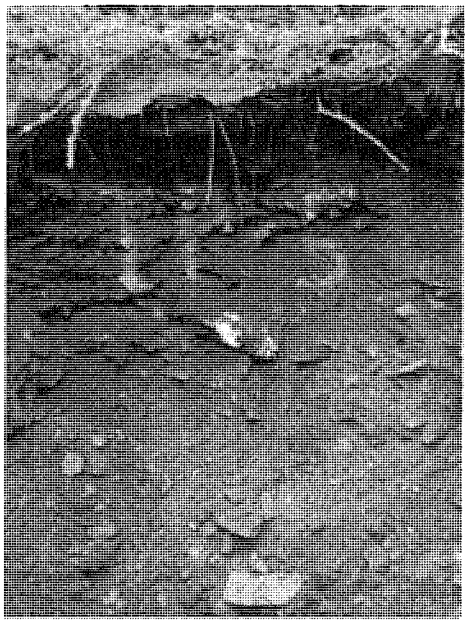
11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

PHOTO APPENDIX

CLIENT Yakutat Tlingit Tribe **PROJECT NAME** Yakutat Community Health Clinic

PROJECT NUMBER 4562-16 **PROJECT LOCATION** Yakutat, AK



Exploration TP-5
Soil Profile

Exploration TP-5
Bottom of Hole

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11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

PHOTO APPENDIX

CLIENT Yakutat Tlingit Tribe **PROJECT NAME** Yakutat Community Health Clinic

PROJECT NUMBER 4562-16 **PROJECT LOCATION** Yakutat, AK

Exploration TP-5
Spoils

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d.b.a. Terra Firma Testing
11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

EXPLORATION TP-6

NGE-TFT PROJECT NAME: Yakutat Community Health Clinic
NGE-TFT PROJECT NUMBER: 4562-16
PROJECT LOCATION: Yakutat, AK
EXPLORATION CONTRACTOR: Pate Co.
EXPLORATION EQUIPMENT: Hitachi EX 150
EXPLORATION METHOD: Test Pit Excavation
SAMPLING METHOD: Grab Sample
LOGGED BY: A. Smith
DATE/TIME STARTED: 10/27/2016 @ 10:50:00 AM
DATE/TIME COMPLETED: 10/27/2016 @ 11:15:00 AM
EXPLORATION LOCATION: See report Figure 2
GROUND ELEVATION: Not Known
GROUNDWATER (ATD): N/E
GROUNDWATER (): N/A
EXPLORATION COMPLETION: Backfilled with spoils.
WEATHER CONDITIONS: Overcast, calm, 36°F

DEPTH (ft)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	LAB RESULTS
0.0			Surface organics and root masses			
			SANDY GRAVEL (GP), olive brown to olive gray, damp, subrounded to rounded gravel, gravel up to 3" in diameter, few cobbles with trace boulders up to 1-2 ft in diameter, coarse sand, massive, GLACIAL OUTWASH			
2.5					S1	S1 MC = 8.1% P200 = 0.9%
			Approx. 2 in thick silt layer			
5.0						
7.5						
10.0						
12.5					S2	S2 MC = 3.2% 58.8% gravel, 39.6% sand, 1.6% silt
			Bottom of test pit at 13.0 ft bgs.			

Always refer to our complete geotechnical report for this project for a more detailed explanation of the subsurface conditions at the project site and how they may affect any existing and/or prospective project site development.

(Continued Next Page)

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11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

PHOTO APPENDIX

CLIENT Yakutat Tlingit Tribe **PROJECT NAME** Yakutat Community Health Clinic

PROJECT NUMBER 4562-16 **PROJECT LOCATION** Yakutat, AK

Exploration TP-6
Soil Profile

Exploration TP-6
Bottom of Hole

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11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

PHOTO APPENDIX

CLIENT Yakutat Tlingit Tribe
PROJECT NAME Yakutat Community Health Clinic
PROJECT NUMBER 4562-16
PROJECT LOCATION Yakutat, AK

Exploration TP-6
Spoils

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d.b.a. Terra Firma Testing
11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

EXPLORATION LEGEND

CLIENT Yakutat Tlingit Tribe

NGE-TFT PROJECT NAME Yakutat Community Health Center

NGE-TFT PROJECT NUMBER 4562-16

PROJECT LOCATION Yakutat, AK

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)


GPS: Sandy Gravel


GW: USCS Well-graded Gravel


ML: USCS Silt


SPG: Gravelly Sand


TOPSOIL: Topsoil

SAMPLER SYMBOLS


Grab Sample

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
MC - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
P200 - PERCENT PASSING NO. 200 SIEVE
P0.02- PERCENT PASSING 0.02mm SIEVE
PP - POCKET PENETROMETER (TSF)
S/U - CASING STICK-UP

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION
▽ Water Level at Time Drilling, or as Shown
▼ Water Level After 24 Hours, or as Shown

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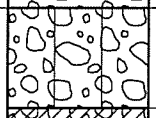
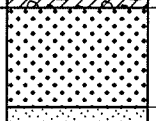
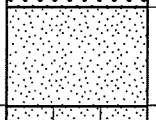
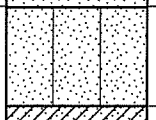
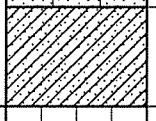
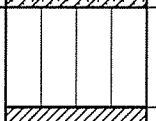
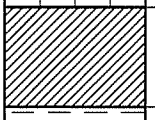
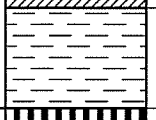
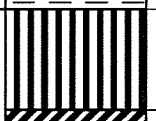
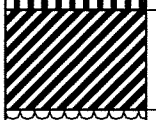
d.b.a. Terra Firma Testing
11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

SOIL CLASSIFICATION CHART

CLIENT Yakutat Tlingit Tribe **PROJECT NAME** Yakutat Community Health Center

NGE-TFT PROJECT NUMBER 4562-16 **PROJECT LOCATION** Yakutat, AK

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.
DIAGONAL LINES INDICATE UNKNOWN DEPTH OF SOIL TRANSITION.

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d.b.a. Terra Firma Testing
11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934
Fax: 907-344-5993

EXPLORATION LOG KEY

CLIENT Yakutat Tlingit Tribe **PROJECT NAME** Yakutat Community Health Center

NGE-TFT PROJECT NUMBER 4562-16 **PROJECT LOCATION** Yakutat, AK

SAMPLER SYMBOLS


SPT w/ 140# Hammer
30" Drop and 2.0" O.D. Sampler


Modified SPT w/ 340# Hammer
30" Drop and 3.0 O.D. Sampler


Grab Sample


Shelby Tube Sample


Rock Core Sample


Direct Push Sample


No Recovery

N/E Not Encountered

WELL SYMBOLS


1" Slotted Pipe
Backfilled with Silica Sand


1" PVC Pipe
Backfilled with Auger Cuttings


1" PVC Pipe
with Bentonite Seal


Capped Riser

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No. 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No. 4 (4.5 mm)
Sand	No. 4 (4.5 mm) to No. 200
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074 mm)

COMPONENT PROPORTIONS

DESCRIPTIVE TERMS	RANGE OF PROPORTION
Trace	1-5%
Few	5-10%
Little	10-20%
Some	20-35%
And	35-50%

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch
DAMP	Some perceptible moisture; below optimum
MOIST	No visible water; near optimum moisture content
WET	Visible free water, usually soil is below water table

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COHESIONLESS SOILS			COHESIVE SOILS		
DENSITY	N (BLOWS/FT)	APPROXIMATE RELATIVE DENSITY (%)	CONSISTENCY	N (BLOWS/FT)	APPROXIMATE UNDRAINED SHEAR STRENGTH (PSF)
VERY LOOSE	0-4	0-15	VERY SOFT	0-1	< 250
LOOSE	5-10	15-35	SOFT	2-4	250-500
MEDIUM DENSE	11-25	35-65	MEDIUM STIFF	5-8	500-1000
DENSE	26-50	65-85	STIFF	9-15	1000-2000
VERY DENSE	> 50	85-100	VERY STIFF	16-30	2000-4000
			HARD	> 30	> 4000

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EXPLORATION LOG KEY

CLIENT Yakutat Tlingit Tribe **PROJECT NAME** Yakutat Community Health Center

NGE-TFT PROJECT NUMBER 4562-16 **PROJECT LOCATION** Yakutat, AK

FROST DESIGN SOIL CLASSIFICATION

FROST GROUP (USACOE)	FROST GROUP (M.O.A.)	SOIL TYPE	% FINER THAN 0.02mm BY MASS	TYPICAL SOIL TYPES UNDER UNIFIED SOIL CLASSIFICATION SYSTEM
NFS*	NFS*	(A) GRAVELS CRUSHED STONE CRUSHED ROCK (B) SANDS	0 - 1.5 0 - 3	GW, GP SW, SP
PFS*	NFS*	(A) GRAVELS CRUSHED STONE CRUSHED ROCK	1.5 - 3	GW, GP
	F2	(B) SANDS	3 - 10	SW, SP
S1	F1	GRAVELLY SOILS	3 - 6	GW, GP, GW-GM, GP-GM
S2	F2	SANDY SOILS	3 - 6	SW, SP, SW-SM, SP-SM
F1	F1	GRAVELLY SOILS	6 - 10	GM, GW-GM, GP-GM
F2	F2	(A) GRAVELLY SOILS (B) SANDS	10 - 20 6 - 15	GM, GW-GM, GP-GM SM, SW-SM, SP-SM
F3	F3	(A) GRAVELLY SOILS (B) SANDS, EXCEPT VERY FINE SILTY SANDS (C) CLAYS, PI>12	Over 20 Over 15 ------	GM, GC SM, SC CL, CH
F4	F4	(A) ALL SILTS (B) VERY FINE SILTY SANDS (C) CLAYS, PI<12 (D) VARVED CLAYS AND OTHER FINE GRAINED, BANDED SEDIMENTS	------ Over 15 ------ ------	ML, MH SM CL, CL-ML CL & ML; CL, ML, & SM; CL, CH, & ML; CL, CH, ML, & SM

*Non-frost susceptible
*Possibly frost susceptible, but requires lab testing to determine frost design soils classification.

ICE CLASSIFICATION SYSTEM

GROUP	ICE VISIBILITY	DESCRIPTION		SYMBOL	
N	SEGREGATED ICE NOT VISIBLE BY EYE	POORLY BONDED OR FRIABLE		Nf	
		WELL BONDED	NO EXCESS ICE	Nb	Nbn
			EXCESS MICROSCOPIC ICE		Nbe
V	SEGREGATED ICE IS VISIBLE BY EYE AND IS ONE INCH OR LESS IN THICKNESS	INDIVIDUAL ICE CRYSTALS OR INCLUSIONS		Vx	
		ICE COATINGS ON PARTICLES		Vc	
		RANDOM OR IRREGULARY ORIENTED ICE		Vr	
		STRATIFIED OR DISTINCTLY ORIENTED ICE		Vs	
		UNIFORMLY DISTRIBUTED ICE		Vu	
ICE	ICE IS GREATER THAN ONE INCH IN THICKNESS	ICE WITH SOILS INCLUSIONS		ICE + Soil Type	
		ICE WITHOUT SOILS INCLUSIONS		ICE	

APPENDIX B

LABORATORY TEST RESULTS

Summary of Laboratory Test Results

Yakutat Community Health Clinic

Yakutat, AK

NGE-TFT Project #:4562-16

Exploration ID	Sample Number	Depth Interval (ft) Top	Depth Interval (ft) Bottom	Moisture Content ASTM D2216 (% By Dry Mass)	Particle Size Analysis ASTM C136/D422/D6913 (% By Mass) Gravel	Sand	Silt/Clay	Passing #200 ASTM D1140 (% By Mass)	Passing 0.02mm ASTM D422 (% By Mass)	Frost Class.	Unified Soil Classification ASTM D2487
TP1	S1	3.00	4.00	4.4	57	38.8	4.2		2.1	PFS	(GW) Well-graded gravel w/ sand
TP1	S2	11.00	12.00	2.7				1.5			
TP2	S1	1.00	2.00	4.5	51.1	45.4	3.5		1.5	NFS	(GP) Poorly-graded gravel w/ sand
TP2	S2	13.00	14.00	6.5				1.9			
TP3	S1	3.00	4.00	4.5	47.7	50.8	1.5		N/A	N/A	(SP) Poorly-graded sand w/ gravel
TP3	S2	13.00	14.00	4.1				1.3			
TP4	S1	0.50	0.75	13.2				2.0			
TP4	S2	4.00	5.00	5.3	47.5	48.2	4.3		N/A	N/A	(SP) Poorly-graded sand w/ gravel
TP4	S3	12.00	13.00	3.6				3.9			
TP5	S1	3.00	4.00	4.0	50.6	46.7	2.7		1.5	NFS	(GP) Poorly-graded gravel w/ sand
TP5	S2	14.00	15.00	3.8				2.1			
TP6	S1	2.00	3.00	8.1				0.9			
TP6	S2	12.00	13.00	3.2	58.8	39.6	1.6		N/A	N/A	(GP) Poorly-graded gravel w/ sand

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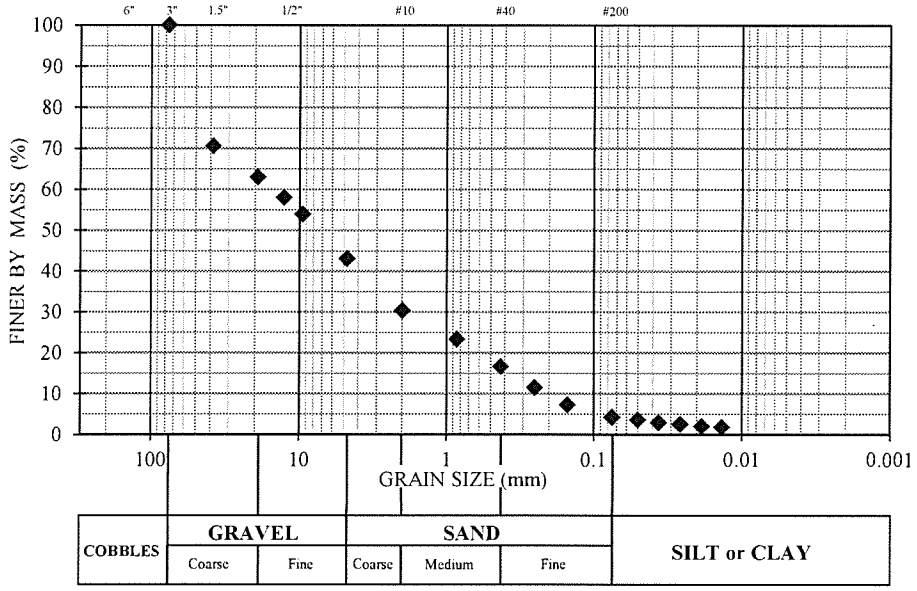
PROJECT CLIENT:	YTT
PROJECT NAME:	Yakutat CHC
PROJECT NO.:	4562-16
SAMPLE LOC.:	TP1
NUMBER/ DEPTH:	S1 / 3 '- 4'
DESCRIPTION:	Well-graded gravel w/ sand
DATE RECEIVED:	10/31/2016
TESTED BY:	JA
REVIEWED BY:	ACS

% GRAVEL	57.0	USCS	GW
% SAND	38.8	USACOE FC	PFS
% SILT/CLAY	4.2	% PASS. 0.02 mm	2.1
% MOIST. CONTENT	4.4	% PASS. 0.002 mm	N/A
UNIFORMITY COEFFICIENT (C_u)		70.8	
COEFFICIENT OF GRADATION (C_c)		1.2	
ASTM D1557 (uncorrected)		N/A	
ASTM D4718 (corrected)		N/A	
OPTIMUM MOIST. CONTENT. (corrected)		N/A	

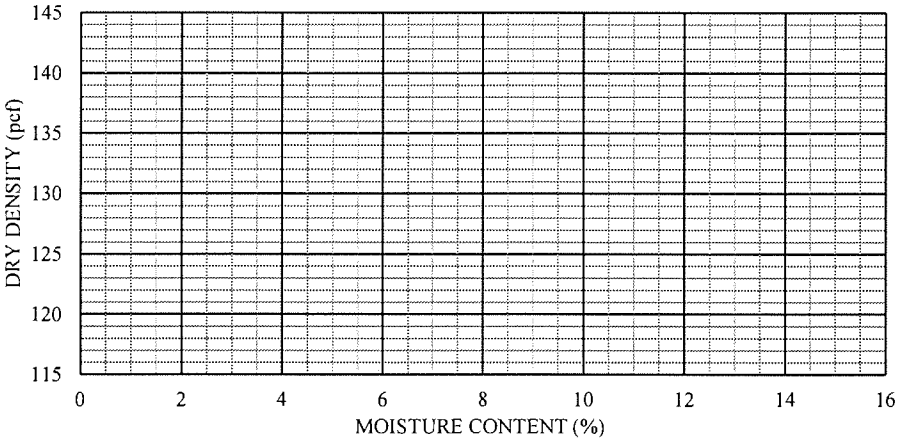
PARTICLE SIZE ANALYSIS ASTM D422 / C136



SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
76.20	3"	100	
38.10	1.5"	71	
19.00	3/4"	63	
12.70	1/2"	58	
9.50	3/8"	54	
4.75	#4	43	
2.00	#10	30	
0.85	#20	23	
0.43	#40	17	
0.25	#60	11	
0.15	#100	7	
0.075	#200	4.2	

MOISTURE-DENSITY RELATIONSHIP ASTM D1557



HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
0.5		
1	0.0503	3.7
2	0.0363	2.9
4	0.0259	2.5
8	0.0187	2.0
15	0.0136	1.8
30		
60		
250		
1440		

HYDRAULIC COND. (ASTM D2434)	N/A
DEGRADATION (ATM T-313)	N/A
PLASTICITY INDEX ASTM 4318	N/A

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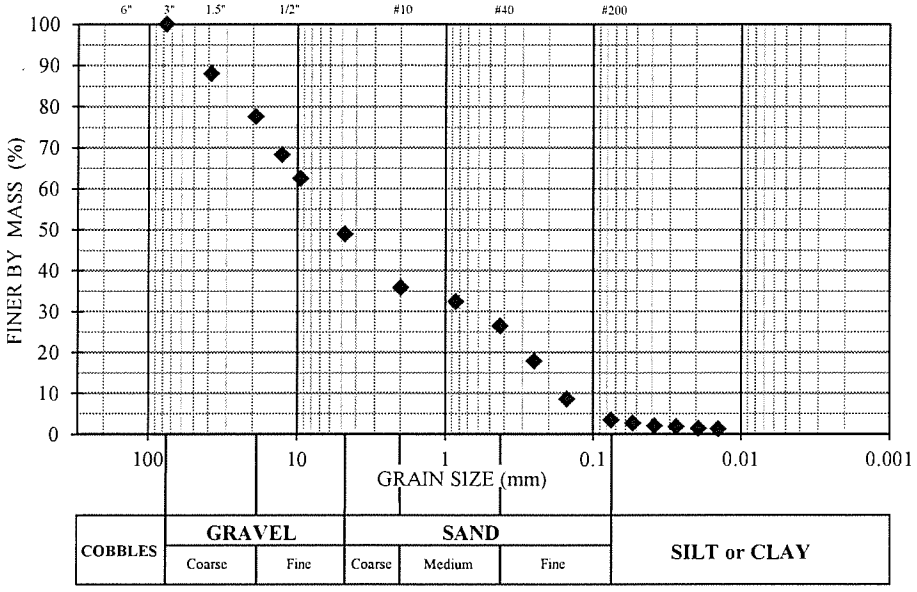
PROJECT CLIENT:	YTT
PROJECT NAME:	Yakutat CHC
PROJECT NO.:	4562-16
SAMPLE LOC.:	TP2
NUMBER/ DEPTH:	S1 / 1' - 2'
DESCRIPTION:	Poorly-graded gravel w/ sand
DATE RECEIVED:	10/31/2016
TESTED BY:	JA
REVIEWED BY:	ACS

% GRAVEL	51.1	USCS	GP
% SAND	45.4	USACOE FC	NFS
% SILT/CLAY	3.5	% PASS. 0.02 mm	1.5
% MOIST. CONTENT	4.5	% PASS. 0.002 mm	N/A

UNIFORMITY COEFFICIENT (C_u)	52.2
COEFFICIENT OF GRADATION (C_c)	0.3
ASTM D1557 (uncorrected)	N/A
ASTM D4718 (corrected)	N/A
OPTIMUM MOIST. CONTENT. (corrected)	N/A

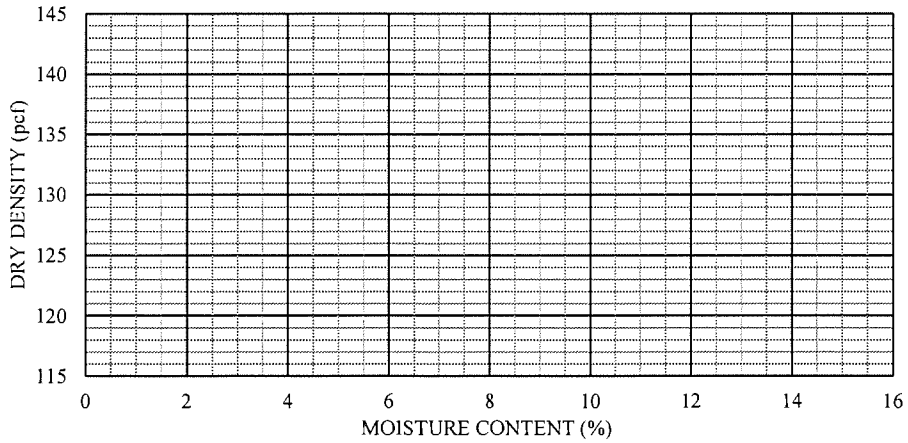
PARTICLE SIZE ANALYSIS ASTM D422 / C136



SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
76.20	3"	**100**	
38.10	1.5"	**88**	
19.00	3/4"	**78**	
12.70	1/2"	**68**	
9.50	3/8"	**62**	
4.75	#4	**49**	
2.00	#10	**36**	
0.85	#20	**32**	
0.43	#40	**26**	
0.25	#60	**18**	
0.15	#100	**9**	
0.075	#200	**3.5**	

MOISTURE-DENSITY RELATIONSHIP ASTM D1557



HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
0.5		
1	0.0535	2.7
2	0.0382	2.0
4	0.0272	1.9
8	0.0193	1.4
15	0.0142	1.3
30		
60		
250		
1440		

HYDRAULIC COND. (ASTM D2434)	N/A
DEGRADATION (ATM T-313)	N/A
PLASTICITY INDEX ASTM 4318	N/A

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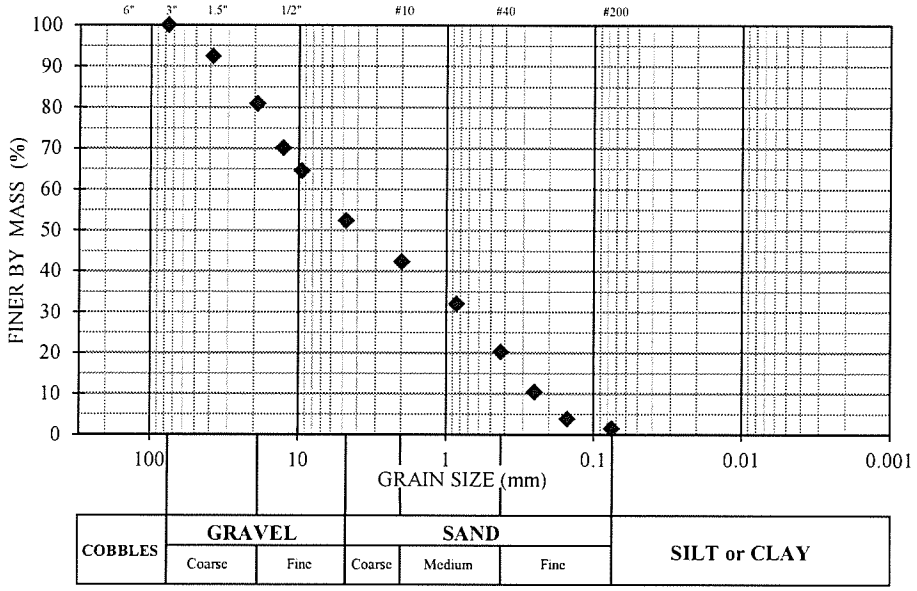
PROJECT CLIENT:	YTT
PROJECT NAME:	Yakutat CHC
PROJECT NO.:	4562-16
SAMPLE LOC.:	TP3
NUMBER/ DEPTH:	S1 / 3 '- 4'
DESCRIPTION:	Poorly-graded sand w/ gravel
DATE RECEIVED:	10/31/2016
TESTED BY:	JA
REVIEWED BY:	ACS

% GRAVEL	47.7	USCS	SP
% SAND	50.8	USACOE FC	N/A
% SILT/CLAY	1.5	% PASS. 0.02 mm	N/A
% MOIST. CONTENT	4.5	% PASS. 0.002 mm	N/A
UNIFORMITY COEFFICIENT (C_u)		32.0	
COEFFICIENT OF GRADATION (C_c)		0.3	
ASTM D1557 (uncorrected)		N/A	
ASTM D4718 (corrected)		N/A	
OPTIMUM MOIST. CONTENT. (corrected)		N/A	

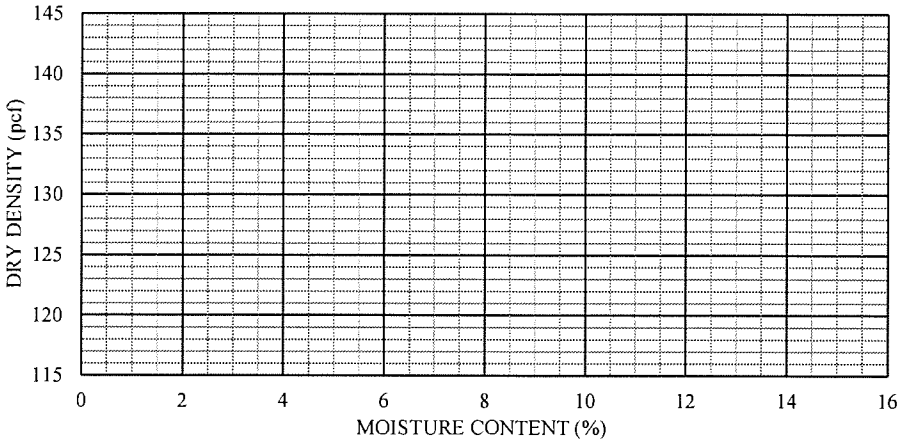
PARTICLE SIZE ANALYSIS ASTM D422 / C136



SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
76.20	3"	100	
38.10	1.5"	92	
19.00	3/4"	81	
12.70	1/2"	70	
9.50	3/8"	64	
4.75	#4	52	
2.00	#10	42	
0.85	#20	32	
0.43	#40	20	
0.25	#60	10	
0.15	#100	4	
0.075	#200	1.5	

MOISTURE-DENSITY RELATIONSHIP ASTM D1557



HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
0.5		
1		
2		
4		
8		
15		
30		
60		
250		
1440		

HYDRAULIC COND. (ASTM D2434)	N/A
DEGRADATION (ATM T-313)	N/A
PLASTICITY INDEX ASTM 4318	N/A

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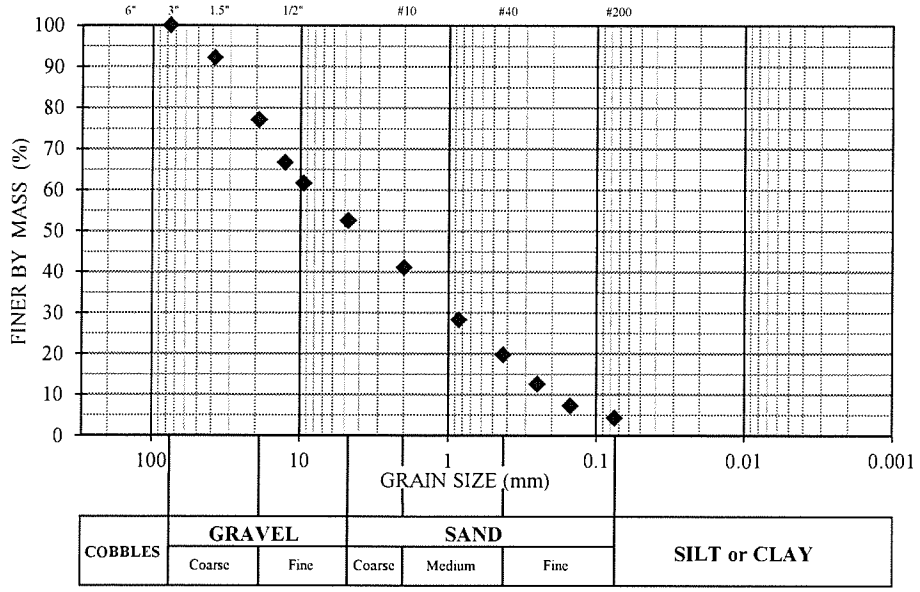
PROJECT CLIENT:	YTT
PROJECT NAME:	Yakutat CHC
PROJECT NO.:	4562-16
SAMPLE LOC.:	TP4
NUMBER/ DEPTH:	S2 / 4' - 5'
DESCRIPTION:	Poorly-graded sand w/ gravel
DATE RECEIVED:	10/31/2016
TESTED BY:	JA
REVIEWED BY:	ACS

% GRAVEL	47.5	USCS	SP
% SAND	48.2	USACOE FC	N/A
% SILT/CLAY	4.3	% PASS. 0.02 mm	N/A
% MOIST. CONTENT	5.3	% PASS. 0.002 mm	N/A

UNIFORMITY COEFFICIENT (C_u)	43.0
COEFFICIENT OF GRADATION (C_c)	0.6
ASTM D1557 (uncorrected)	N/A
ASTM D4718 (corrected)	N/A
OPTIMUM MOIST. CONTENT. (corrected)	N/A

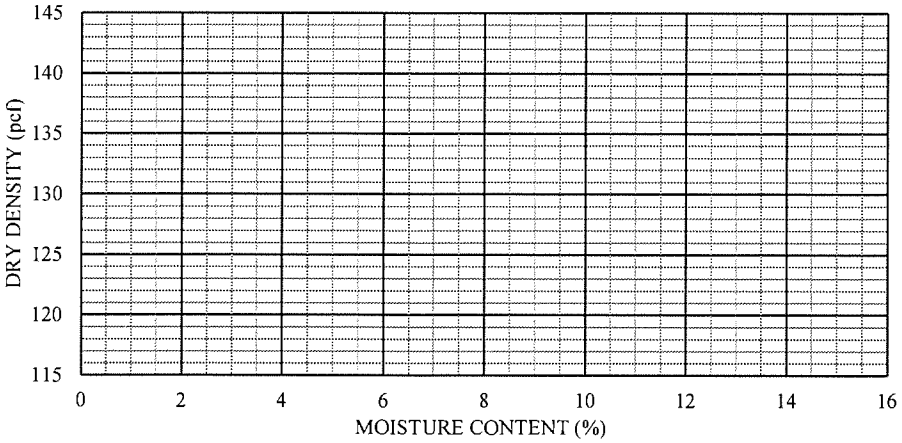
PARTICLE SIZE ANALYSIS ASTM D422 / C136



SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
76.20	3"	100	
38.10	1.5"	92	
19.00	3/4"	77	
12.70	1/2"	67	
9.50	3/8"	62	
4.75	#4	53	
2.00	#10	41	
0.85	#20	28	
0.43	#40	20	
0.25	#60	13	
0.15	#100	7	
0.075	#200	4.3	

MOISTURE-DENSITY RELATIONSHIP ASTM D1557



HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
0.5		
1		
2		
4		
8		
15		
30		
60		
250		
1440		

HYDRAULIC COND. (ASTM D2434)	N/A
DEGRADATION (ATM T-313)	N/A
PLASTICITY INDEX ASTM 4318	N/A

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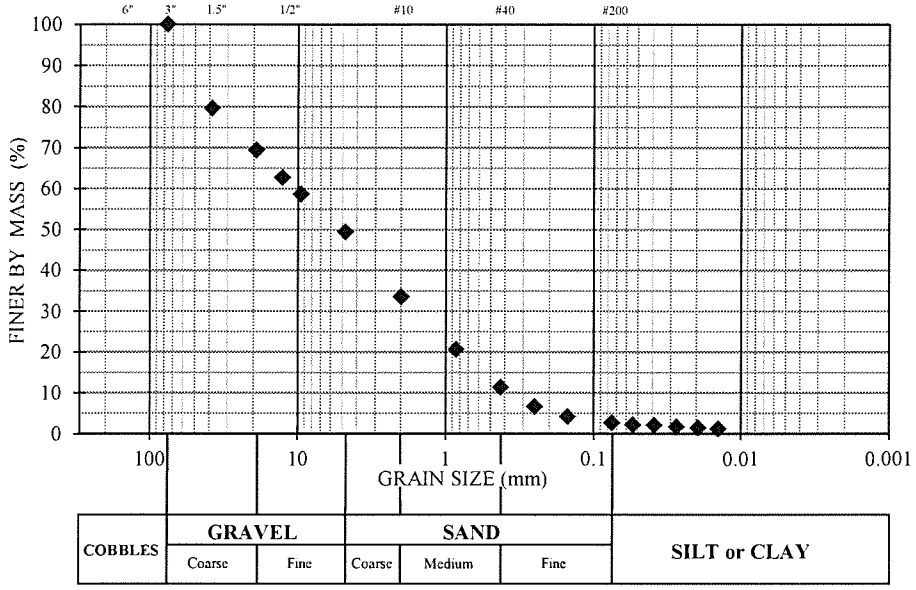
PROJECT CLIENT:	YTT
PROJECT NAME:	Yakutat CHC
PROJECT NO.:	4562-16
SAMPLE LOC.:	TP5
NUMBER/ DEPTH:	S1 / 3' - 4'
DESCRIPTION:	Poorly-graded gravel w/ sand
DATE RECEIVED:	10/31/2016
TESTED BY:	JA
REVIEWED BY:	ACS

% GRAVEL	50.6	USCS	GP
% SAND	46.7	USACOE FC	NFS
% SILT/CLAY	2.7	% PASS. 0.02 mm	1.5
% MOIST. CONTENT	4.0	% PASS. 0.002 mm	N/A

UNIFORMITY COEFFICIENT (C_u)	28.3
COEFFICIENT OF GRADATION (C_c)	0.7
ASTM D1557 (uncorrected)	N/A
ASTM D4718 (corrected)	N/A
OPTIMUM MOIST. CONTENT. (corrected)	N/A

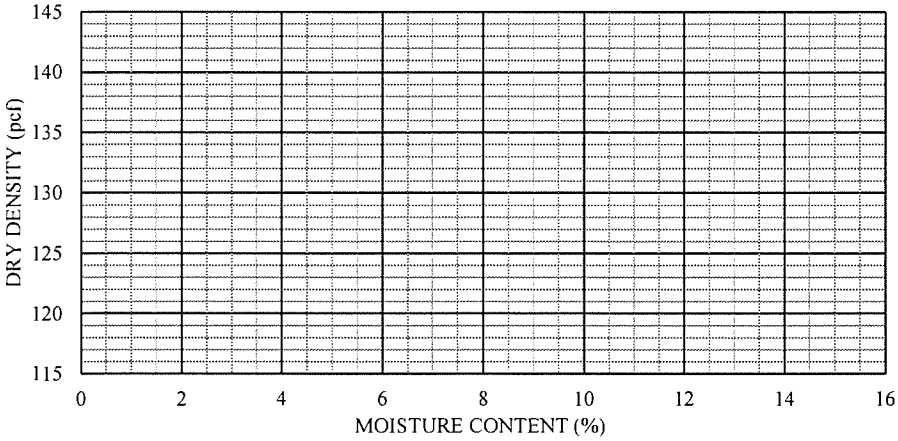
PARTICLE SIZE ANALYSIS ASTM D422 / C136



SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
76.20	3"	100	
38.10	1.5"	80	
19.00	3/4"	69	
12.70	1/2"	63	
9.50	3/8"	59	
4.75	#4	49	
2.00	#10	33	
0.85	#20	21	
0.43	#40	11	
0.25	#60	7	
0.15	#100	4	
0.075	#200	2.7	

MOISTURE-DENSITY RELATIONSHIP ASTM D1557



HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
0.5		
1	0.0542	2.2
2	0.0387	2.1
4	0.0274	1.7
8	0.0195	1.4
15	0.0142	1.2
30		
60		
250		
1440		

HYDRAULIC COND. (ASTM D2434)	N/A
DEGRADATION (ATM T-313)	N/A
PLASTICITY INDEX ASTM 4318	N/A

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NORTHERN GEOTECHNICAL ENGINEERING, INC. / TERRA FIRMA TESTING

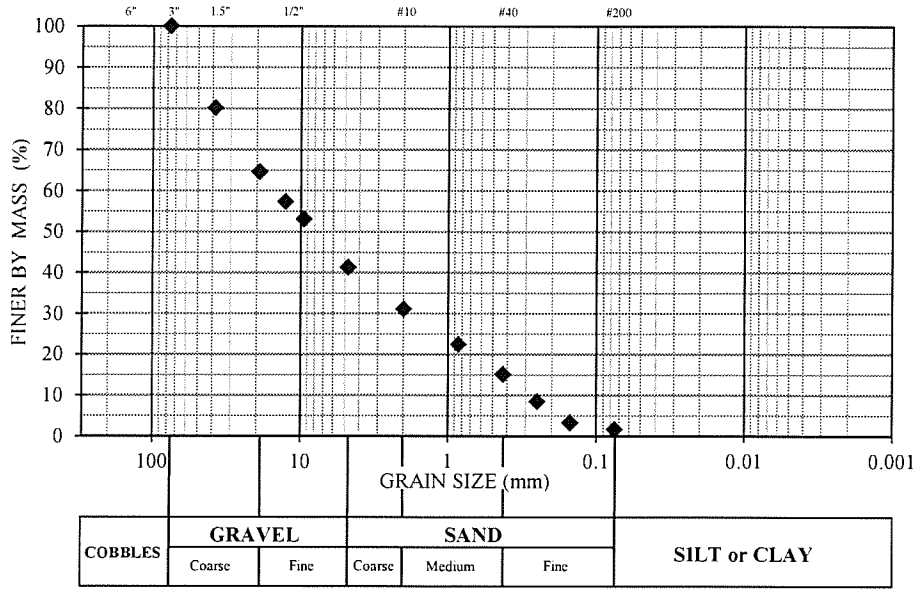
Laboratory Testing · Geotechnical Engineering · Instrumentation · Construction Monitoring Services · Thermal Analysis

PROJECT CLIENT:	YTT
PROJECT NAME:	Yakutat CHC
PROJECT NO.:	4562-16
SAMPLE LOC.:	TP6
NUMBER/ DEPTH:	S2 / 12' - 13'
DESCRIPTION:	Poorly-graded gravel w/ sand
DATE RECEIVED:	10/31/2016
TESTED BY:	JA
REVIEWED BY:	ACS

% GRAVEL	58.8	USCS	GP
% SAND	39.6	USACOE FC	N/A
% SILT/CLAY	1.6	% PASS. 0.02 mm	N/A
% MOIST. CONTENT	3.2	% PASS. 0.002 mm	N/A

UNIFORMITY COEFFICIENT (C_u)	51.8
COEFFICIENT OF GRADATION (C_c)	0.8
ASTM D1557 (uncorrected)	N/A
ASTM D4718 (corrected)	N/A
OPTIMUM MOIST. CONTENT. (corrected)	N/A

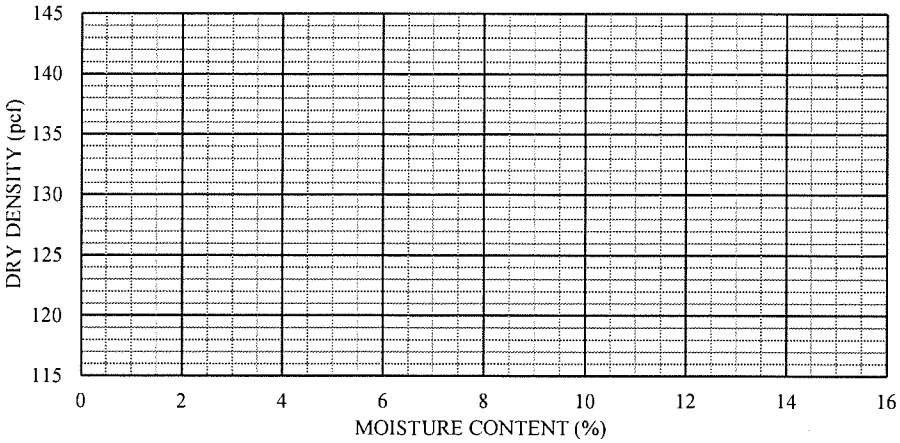
PARTICLE SIZE ANALYSIS ASTM D422 / C136



SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
76.20	3"	100	
38.10	1.5"	80	
19.00	3/4"	65	
12.70	1/2"	57	
9.50	3/8"	53	
4.75	#4	41	
2.00	#10	31	
0.85	#20	22	
0.43	#40	15	
0.25	#60	8	
0.15	#100	3	
0.075	#200	1.6	

MOISTURE-DENSITY RELATIONSHIP ASTM D1557



HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
0.5		
1		
2		
4		
8		
15		
30		
60		
250		
1440		

HYDRAULIC COND. (ASTM D2434)	N/A
DEGRADATION (ATM T-313)	N/A
PLASTICITY INDEX ASTM 4318	N/A

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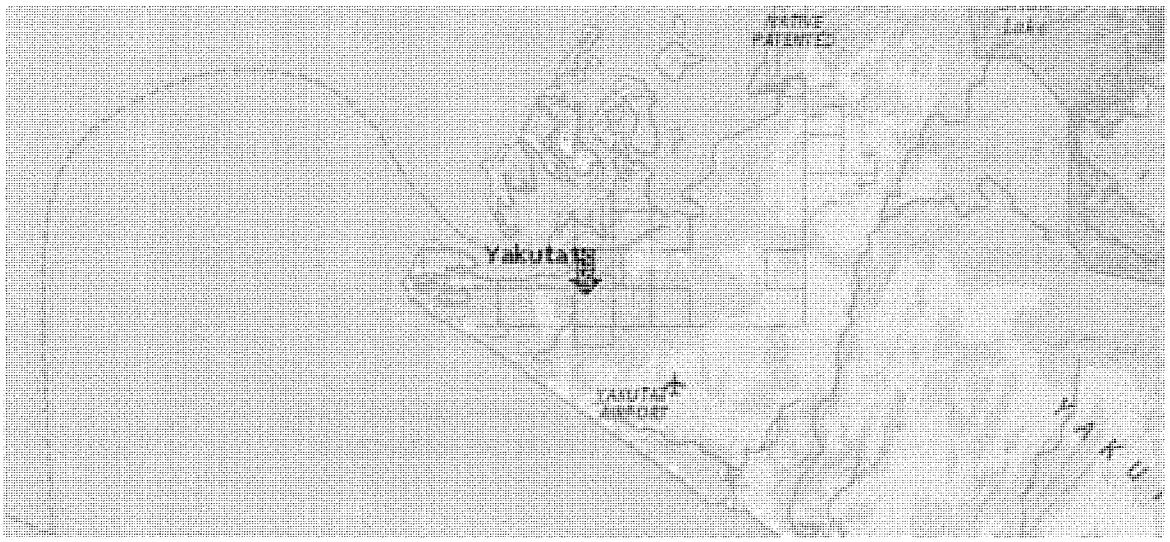
APPENDIX C

USGS SEISMIC SITE CLASSIFICATION REPORTS

USGS Design Maps Summary Report

User-Specified Input

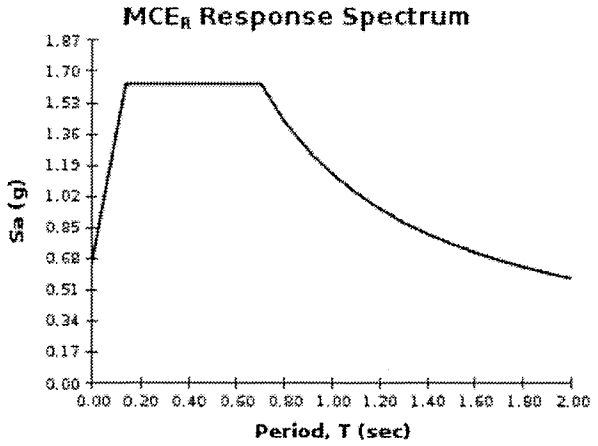
Report Title	Yakutat Community Health Clinic Tue November 22, 2016 17:07:50 UTC
Building Code Reference Document	2012/2015 International Building Code (which utilizes USGS hazard data available in 2008)
Site Coordinates	59.54535°N, 139.72716°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

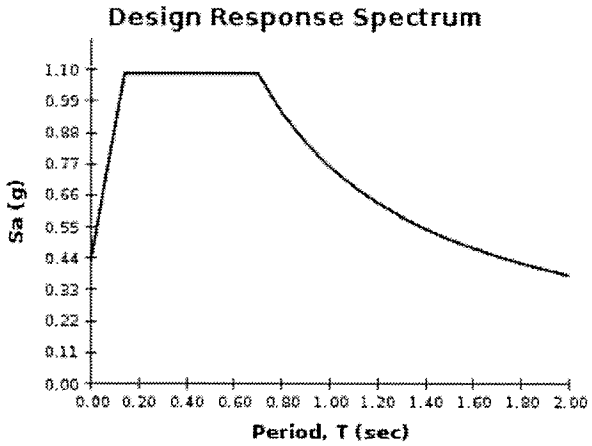


USGS-Provided Output

S_S =	1.630 g	S_{MS} =	1.630 g	S_{DS} =	1.086 g
S_1 =	0.760 g	S_{M1} =	1.139 g	S_{D1} =	0.760 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





USGS Design Maps Detailed Report

2012/2015 International Building Code (59.54535°N, 139.72716°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 1613.3.1 — Mapped acceleration parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_s) and 1.3 (to obtain S_1). Maps in the 2012/2015 International Building Code are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 1613.3.3.

From Figure 1613.3.1(4) [1]	S_s = 1.630 g
From Figure 1613.3.1(5) [2]	S_1 = 0.760 g

Section 1613.3.2 — Site class definitions

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Section 1613.

2010 ASCE-7 Standard – Table 20.3-1
SITE CLASS DEFINITIONS

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content $w \geq 40\%$, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 1613.3.3 — Site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters

TABLE 1613.3.3(1)
VALUES OF SITE COEFFICIENT F_a

Site Class	Mapped Spectral Response Acceleration at Short Period				
	$S_S \leq 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \geq 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_S

For Site Class = D and S_S = 1.630 g, F_a = 1.000

TABLE 1613.3.3(2)
VALUES OF SITE COEFFICIENT F_v

Site Class	Mapped Spectral Response Acceleration at 1-s Period				
	$S_1 \leq 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \geq 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.760 g, F_v = 1.500

Equation (16-37): $S_{MS} = F_a S_S = 1.000 \times 1.630 = 1.630$ g

Equation (16-38): $S_{M1} = F_v S_1 = 1.500 \times 0.760 = 1.139$ g

Section 1613.3.4 — Design spectral response acceleration parameters

Equation (16-39): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 1.630 = 1.086$ g

Equation (16-40): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 1.139 = 0.760$ g

Section 1613.3.5 — Determination of seismic design category

TABLE 1613.3.5(1)
SEISMIC DESIGN CATEGORY BASED ON SHORT-PERIOD (0.2 second) RESPONSE ACCELERATION

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \leq S_{DS} < 0.33g$	B	B	C
$0.33g \leq S_{DS} < 0.50g$	C	C	D
$0.50g \leq S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 1.086 g, Seismic Design Category = D

TABLE 1613.3.5(2)
SEISMIC DESIGN CATEGORY BASED ON 1-SECOND PERIOD RESPONSE ACCELERATION

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \leq S_{D1} < 0.133g$	B	B	C
$0.133g \leq S_{D1} < 0.20g$	C	C	D
$0.20g \leq S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.760 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 1613.3.5(1) or 1613.3.5(2)" = E

Note: See Section 1613.3.5.1 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 1613.3.1(4)*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/IBC-2012-Fig1613p3p1(4).pdf
2. *Figure 1613.3.1(5)*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/IBC-2012-Fig1613p3p1(5).pdf

TAB D
ENVIRONMENTAL DETERMINATION
SHPO

INDIAN HEALTH SERVICE
ALASKA AREA NATIVE HEALTH SERVICE

ENVIRONMENTAL REVIEW AND DETERMINATION

Yakutat Tlingit Tribe, Joint Venture Health Clinic
Yakutat, Alaska

September 2016

Background

The Yakutat Tlingit Tribe (YTT) proposes to construct a new community health clinic under the Indian Health Service (IHS) Joint Venture Construction Program. The YTT will obtain construction funding from the U.S. Department of Agriculture (USDA), Health Resources and Services Administration (HRSA), and other funding sources. The IHS will provide staffing funds once the clinic is constructed. The Yakutat Community Clinic will be an approximately 10,000 square-foot health clinic on a new 2.5-acre site. Land will be conveyed from the Yakutat City Borough to YTT for the purpose of developing the new clinic.

Environmental Issues

Environmental concerns were addressed in consultation with local, State, and Federal authorities and agencies. The environmental review indicates that the following stipulations and mitigations apply to this project.

1. As the project is anticipated to disturb more than one acre of land, a Notice of Intent for permit coverage under the National Pollutant Discharge Elimination System (NPDES) Stormwater Program must be submitted to the Alaska Department of Environmental Conservation (ADEC) and the corresponding Storm Water Pollution Prevention Plan (SWPPP) followed during construction.
2. Project activities that may result in runoff entering waters of the U.S. or wetlands will require a jurisdictional determination and Section 404 Permit from the U.S. Army Corps of Engineers.
3. Dispose of construction waste at the Yakutat Landfill or other ADEC permitted solid waste facility. Coordinate use of the landfill with the landfill operator.
4. If the project will require excavation dewatering, an ADEC Excavation Dewatering General Permit will be required.
5. Follow U.S. Fish and Wildlife Service's (USFWS) Construction Advisory for Protecting Migratory Birds, and if an eagle's nest is observed within 660 feet of the project area during construction, notify the IHS.
6. Construction activities that include vegetation clearing must comply with the Migratory Bird Treaty Act (MBTA) by adhering to the USFWS's land clearing timing guidance for Alaska located at http://www.fws.gov/alaska/mbsp/mbm/index.htm ("Construction Advisory for Protecting Migratory Birds PDF").
7. Land exposed during construction must be revegetated or covered with coarse fill to prevent erosion of soil and sedimentation of down-gradient water bodies, and other control measures for preventing storm water pollution, such as installing straw wattles and silt fencing around storm water conveyances, must be implemented as needed.

8. If hazardous wastes or petroleum products are discovered or spilled during construction, construction must stop and the contamination must be reported to ADEC's Spill Prevention and Response (SPAR) and the IHS.

Finding

The record was reviewed to identify potential extraordinary or exceptional circumstances, which would invalidate the categorical exclusion. Based on the review, no extraordinary or exceptional circumstances exist which would require an Environmental Assessment. In accordance with the Department of Health and Human Services policies and procedures in General Administration Manual, Part 30, the Council on Environmental Quality regulations at 40 CFR 1500-1508, and procedures the IHS published in the Federal Register for Categorical Exclusion (I) (58 Fed. Reg. 569-01, 571 (January 6, 1993), the proposed project belongs to a category of actions which normally do not significantly impact the human environment and is excluded from further environmental review. Stipulations and mitigations noted under 'Environmental Issues' must be completed.

In the event of an unforeseen discovery, the YTT has agreed to stop construction activity in the area of the discovery and to notify the appropriate authority and the IHS. In addition, the YTT must notify the appropriate authority and the IHS if a change in the project or project scope occurs which could change this environmental determination or could adversely impact the environment.

Kevin R. Bingley, P.E.
NEPA Review Officer
Alaska Area Native Health Service

9/6/16
Date

Yakutat Community Health Clinic	
Scope of Review	The Yakutat Tlingit Tribe (YTT) will vacate the leased space used to operate the Yakutat Community Clinic and construct a new ~10,000 square-foot health clinic at a new site in Yakutat, Alaska, through the Indian Health Service (IHS) Joint Venture Construction Program.

Considerations	Basis for Determination with Documentation
1. Will the proposed action result in a known violation or continuance of a violation of applicable (Federal, Tribal, State or local) laws or requirements for protection of environment or public health and safety?	NO. The proposed project will be in compliance with all applicable laws and requirements and will have the appropriate regulatory approvals. All actions will be in accordance with the Indian Health Service design and sustainability guidelines, the State of Alaska DEC, and subject to the State of Alaska Fire Marshal as the Authority having Jurisdiction.
2. Will the proposed action result in a conflict with existing or proposed federal, Tribal, state, and local land use plans?	NO. The Joint Venture Clinic is a nationally competitive federal program. Approval for the Tribe to apply to participate was authorized by Tribal Resolution 2014-16. Formal invitation and notice to proceed from the federal government was authorized in a September 18, 2015 letter from IHS to YTT. The site selected for the clinic is owned by The Yakutat City-Borough. Approximately 3.5 acres is being conveyed to the Tribe specifically for this project and was selected because of the location, access to utilities, and suitable soil for building. The proposed project aligns with the long range land use plans for the community of Yakutat and YTT.
3. Is there a controversy with respect to environmental effects of the proposed action based on reasonable and substantial issues?	NO. Two public hearings were conducted to gather input from the community. Five sites were initially identified and two were selected for consideration based on the community's input. There were no objections to the top two sites selected.
4. Is the proposed action significantly greater in scope than normal for the area or does it have significant unusual characteristics?	NO. The proposed builds and staffs a Joint Venture Clinic. This project is typical in scope for the IHS Facilities program. The clinic will be built according to the IHS design and sustainability standards including LEED (Leadership in Energy and Environmental Design) certification.
5. Does the proposed action establish a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects?	NO. The proposed project will not result in any cumulative impacts that will result in degradation of environmental concerns as outlined in NEPA.
6. Does the proposed action have significant adverse direct or indirect effects on park land, other public lands, or areas of recognized scenic or recreational value?	NO. The Borough of Yakutat is located near numerous protected areas of Chugach National Forest, Glacier Bay National Park, Glacier Bay Wilderness, Tongass National Forest, Wrangell-St. Elias National Park and Preserve, Wrangell-Saint Elias Wilderness, and the Russell Fjord Wilderness. The proposed project is within the established boundaries of the community and will not adversely affect any of the protected lands. -National Wildlife Refuge (http://alaska.fws.gov/nwr/map.htm) -USDOI NPS (http://www.nps.gov/state/ak/) -Alaska Department of Natural Resource Division of Parks and Outdoor Recreation, Individual State Parks (http://www.dnr.state.ak.us/parks/units/index.htm)

7. Does the proposed action include construction of a new municipal solid waste landfill at a new solid waste disposal site?	NO. This project does not address the need for constructing a new municipal solid waste landfill.
8. Will the proposed action create a need for additional capacity at solid waste disposal facilities?	NO. Yakutat has a Class III Solid Waste Landfill permitted by the State of Alaska. Recycling of construction debris will be used in order to meet the requirements of the LEED certification. Operation of the clinic is not expected to create or increase any significant additional solid waste disposal.
9. Does the proposed action include construction of a new wastewater treatment facility that will discharge treated sewage effluent to the waters of the U.S.	NO. The project does not include the construction of a new wastewater treatment facility.
10. Will the proposed action create a need for additional capacity at wastewater treatment facilities?	NO. The new clinic will replace the existing community clinic. Increased capacity for wastewater treatment is not needed.
11. Will the proposed action create a need for additional capacity in the drinking water supply?	NO. The new clinic will replace the existing community clinic. Increased capacity for drinking water is not needed.
12. Are there other considerations about the proposed action that could adversely affect the environment and/or public health and safety?	NO. The proposed project will not adversely affect the environment and/or public health and safety. Building materials will be consistent with those that are standard for rural Alaska health care clinics. This project will result in a positive impact to public health by improving the quality of health care available to the residents of Yakutat.
13. Will the proposed action create a need for additional capacity in health care facilities and for health care services?	NO. The project will provide additional capacity for Yakutat's health care program by constructing a new health care facility. The new clinic is designed to meet the health care needs of the residents of Yakutat.
14. Will the proposed action create a need for additional energy supply or generation?	NO. The construction and operation of the proposed clinic will not create a need for additional energy supply or generation as adequate energy generation exist in the existing electrical grid. The proposed clinic is expected to use less energy than the existing clinic as IHS sustainability and LEED standards will be employed in the design and construction of the facility. Additionally, the project will be looking at possible renewable energies to meet federal and LEED guidelines.
15. Will the proposed action create a need for additional capacity in educational facilities?	NO. This project is not anticipated to increase the need for educational facilities as the population of Yakutat is not anticipated to change as a result of this project.
16. Will the proposed action create a need for additional capacity in transportation systems?	NO. Yakutat is a small community with a very limited closed road system. The proposed project will not create a need for any additional transportation or transportation systems. The project will use existing roads during construction and clinic operation.

17. Historic Preservation: a. Does the proposed action involve the purchase, construction, alteration, renovation, or lease of a building or portion of a building that is more that 50 years old?	No. Consultation with the Alaska SHPO concluded on 8/23/16. The consultation found that the project will have no effect on historic structures.
b. Will the proposed action adversely affect properties listed, or eligible for listing, on the National Register of Historic Places?	No: Consultation with the Alaska SHPO concluded on 8/23/16. The project's effects on the following historic properties were reviewed: Yakutat and Southern Railroad Historic District (YAK-00041), Yakutat Landing Field (YAK-00072), 28th Engineer Road (YAK-00117), and Infantry Road (YAK-00118). The review found that No Adverse Effect is anticipated. The locations reviewed for effect include the site of the proposed clinic, as well as the borrow sites located at the 1) eastern side of Orca Avenue, 2) north side of Airport Road, and 3) east of Dangerous Ridge Road.
18. Endangered Species Act: Is the proposed action likely to adversely affect a plant or animal species listed on the Federal or applicable state list of endangered or threatened species or a specific critical habitat of an endangered or threatened species?	No. The community of Yakutat is located near the coast and not in the vicinity of any known endangered species or critical habitats. However, the USFWS' Information for Planning and Conservation (IPaC) tool (accessed 2/24/2016) indicates birds protected under the Migratory Bird Treaty Act (MBTA) may occur in the vicinity of the project area, which include Arctic Tern, Bald Eagle, Black Oystercatcher, Fox Sparrow, Kittlitz's Murrelet, Lesser Yellowlegs, Marbled Godwit, Marbled Murrelet, Olive-sided Flycatcher, Pink-footed Shearwater, Fufous Hummingbird, Short-billed Dowitcher, and Short-eared Owl. If construction activities should require vegetation clearing, to ensure compliance with the MBTA, construction will follow the USFWS's land clearing timing guidance for Alaska located at http://www.fws.gov/alaska/mbsp/mbm/index.htm ("Construction Advisory for Protecting Migratory Birds PDF"). (http://alaska.fws.gov/fisheries/endangered/listing.htm) – Alaska Region Endangered Species Listing.
19. Will the proposed action require major sedimentation and erosion control measures?	NO. Soil exposed during construction will be revegetated or covered with coarse fill to prevent soil erosion and sedimentation of receiving water bodies. Other erosion control measures, such as installing straw wattles around storm drains, will be implemented as needed in accordance with LEED certification requirements and IHS A/E Design Guidelines.
20. Will the proposed action violate a storm water permit or a wastewater discharge permit either for construction or on-going operations?	No. The proposed project will disturb approximately 2 acres of land and will require submittal of a notice of intent (NOI) for coverage under ADEC's 2016 storm water permit for construction activities permit and prepare a Storm Water Pollution Prevention Plan (SWPPP). Construction activities are not located close to any drinking water wells, water treatment systems, or wastewater treatment systems.
21. Safe Drinking Water Act: Will the proposed action impact an EPA designated sole source aquifer?	No. Currently there are no designated sole source aquifers in Alaska. (http://cfpub.epa.gov/safewater/sourcewater/sourcewater.cfm)

22. Wetlands and Water Resources (lakes, rivers, ponds, streams, etc.): Will the proposed action violate a Section 404 (Clean Water Act) permit for actions in a wetland and/or Section 10 (Rivers and Harbors Act) permit for actions in a stream or river?	No. A review of the USFWS Wetland Online Mapper (accessed 05/05/16) indicates that no estuarine, marine and freshwater wetlands exist at the proposed project location. A wetland delineation was completed in August 2016, which found that the site consists of upland vegetation and hydric soils. A small lower portion, 0.36 acres, of the site contained standing water after several days of rain, but the soil and vegetation profile matched the upland section and did not match a wetland profile. If wetlands are found to exist and will be impacted by the project (directly or through runoff), then a jurisdictional determination and Section 404 Permit from the U.S. Army Corps of Engineers (USACE) are required.
23. Floodplains: a. Is the proposed action located in either a 100-year or, for critical actions, a 500-year floodplain? (If Flood Insurance Rate Maps do not exist for the project site, a floodplain survey or consultation may be required. Also may need to consider if the facility will require flood insurance).	NO. Based on the USACE Floodplain Data, no known flooding has occurred in Yakutat and at the site for the new clinic. The USACE also identifies potential erosion areas in the Yakutat region; none which occurs in the vicinity of the proposed site (map from report attached). (http://www.poa.usace.army.mil/About/Offices/Engineering/FloodplainManagement.aspx)
b. Will the proposed action adversely impact flood flows in a floodplain or support development in a floodplain?	NO. The project will not occur within a floodplain.
24. Existing site: Would the proposed action involve the purchase, construction or lease of new facilities (including portable facilities and trailers), substantially increase the capacity of an existing health care facility?	The existing health clinic leases approximately 4,100sf of building space in an existing 8,200sf building which they will vacate and turn back to the owner. The new clinic will provide a needed increase capacity in the health care available to the residents to Yakutat in order to meet present and projected future demand through 2025.
25. New site: Does the proposed action involve purchase, construction, or lease of new facilities (including portable facilities and trailers) where such action is for buildings equal to or more than 12,000 square feet (1080 square meters) of useable space when more than 5 acres (2 hectares) of surface land area are involved at a new site?	NO. The proposed facility will be approximately 10,000 square-feet with a proposed lot of less than 2 acres at a different site near the existing health clinic.
26. New site: Does the proposed action involve purchase, construction, or lease of health care facilities (other than buildings) for projects equal to or more than 5 acres (2 hectares) of surface land area at a new site?	NO. The proposed facility will be constructed at an existing clinic site and be approximately 10,000 square-feet with a proposed lot of less than 2 acres.

27. Does the proposed action involve the sale or transfer of real property, on which any hazardous substance was stored for one year or more, known to have been released, or disposed of? (Provide relevant documentation for any hazardous substance releases. See 40 CFR 373.2(b), 302.4, and 261.30 for reportable quantities.)	NO. There are no known hazardous materials either stored or released on the proposed site. The site has not been previously used for commercial or private development.
28. Does the proposed action involve the sale or transfer of real property, on which underground or above ground storage tanks are located?	NO. The proposed project does not involve the sale or transfer of real property on which storage tanks are located The site has not been previously used for any commercial or private development. The ADEC UGST Database Facility Search does not reveal any UST at the proposed location.
29. Will the proposed action violate Tribal, local, state, or federal law on the use and storage of hazardous substances or the transportation, storage, and disposal of hazardous wastes or medical wastes? (Activities that may generate reportable quantities include air conditioning repair and service, pesticide application, motor pools, automobile repair, welding, landscaping, agricultural activities, print shops, hospitals, clinics, & medical centers. Repair, renovation, or demolition activities can generate waste that has asbestos-containing materials, asbestos, lead-based paint, PCBs, CFCs, etc.)	No. The proposed project will not violate local, state, or federal law on the use and storage of hazardous substances or transportation, storage, and disposal of hazardous wastes or medical wastes. All medical wastes from the operation of the clinic will be disposed of in accordance with local, state, and federal laws. The space currently utilized for existing health clinic will be vacated for the owner to repurpose.
30. Will the proposed action adversely affect community air pollution for a long period of time?	No. 18AAC50, Air Quality Control, Alaska Department of Environmental Conservation. This project is not located in an area subject to the conformity rule per the State of Alaska Implementation Plan.
31. If the proposed action is implemented, will it have a disproportionately high and adverse human health or environmental impact on the Tribe, low-income populations, or minority populations?	No. This project will benefit the health and environment for the tribe and the community as a whole by increasing access of health care services.
32. Will the proposed action adversely affect community noise levels?	No. The Project Manager will ensure community noise levels are not adversely affected with no blasting and limiting heavy equipment usage to daytime (10) hours.

33. Wilderness Act: Will the proposed action adversely impact a Wilderness Area?	No. This site is not located in a wilderness area in Alaska. Database accessed 2/24/16. (http://www.wilderness.net/index.cfm?fuse=NWPS)
34. Farmland Protection Policy Act: Will the proposed action convert significant agricultural lands to non-agricultural uses and exceed 160-point score on the farmland impact rating?	No. There are no Prime or Unique farmlands in the State of Alaska. Further, there are no Farmlands of Statewide Importance. (http://www.ak.nrcs.usda.gov/technical/soils/soilslocal.html)
35. Coastal Zone Management Act: Will the proposed action directly affect a Coastal Zone in a manner inconsistent with the State Coastal Zone Management Plan?	No. The Alaska Coastal Management Program no longer exists as of July 1, 2011. Alaska Coastal Zone and Coastal District boundaries, National Oceanic and Atmospheric Administration, June 2005. (www.alaskacoast.state.ak.us)
36. Wild and Scenic Rivers Act: Will the proposed action affect a wild, scenic, or recreational river area or create conditions inconsistent with the character of the river? (A consideration for activities that are in or near any wild and scenic waterway including construction of stream/river crossings, intake structures, outfalls, etc.)	No. This project is not a "Water Resource Project" that will impact a wild, scenic, or recreational river, hence will not create conditions that are inconsistent with the character of the river. (http://www.rivers.gov/index.php)

THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Natural Resources
DIVISION OF PARKS & OUTDOOR RECREATION
Office of History & Archaeology
550 West 7th Ave., Suite 1310
Anchorage, Alaska 99501-3565
Main: 907.269.8721
http://dnr.alaska.gov/parks/oha

June 28th, 2016

File No.: 3130-1R IHS
2016-00927

Kevin Bingley
Alaska Area Native Health Service
4141 Ambassador Dr., Suite 300
Anchorage, AK 99508-5928

SUBJECT: Joint Venture Construction Program (JVCP), Construction of New Health Clinic, Yakutat Tlingit Tribe, Yakutat

Dear Mr. Bingley:

The Alaska State Historic Preservation Office (AKSHPO) received your correspondence on June 17th, 2016. Upon review, we are unable to concur at this time. We offer the following comments:

1. The finding of effect provided (no historic properties affected) does not take into consideration the potential effects to the Historic District as a whole (YAK-00072). Generally, if a project is encompassed by the boundaries of a historic property we recommend that the agency address whether the disturbance, alteration, or addition proposed would or would not have an 'adverse effect' on the historic property.
2. The project involves construction of a 10,000 square foot clinic. It is unclear based on the scope of work provided whether this will involve any of the following:
    a. Demolition of existing buildings.
    b. Ground-disturbing activities in previously undeveloped areas.
    c. Utility connections.
    d. Use of a material source.
3. The potential to affect previously unidentified archaeological resources was not addressed in the provided documentation.

Please provide further information pertaining to the above mentioned considerations. We look forward to reviewing it once available. Thank you for the opportunity to comment and review. Please contact Mckenzie Johnson at 269-8726 or mckenzie.johnson@alaska.gov if you have any questions or if we can be of further assistance.

Sincerely,

Judith E. Bittner
State Historic Preservation Officer

JEB: msj

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Alaska Area Native Health Services
4141 Ambassador Drive
Anchorage, Alaska 99508-5928

FINDINGS OF SECTION 306108 REVIEW

TO: Judith Bittner, SHPO
DNR/Division of Parks and Outdoor Recreation
Office of History and Archaeology
550 West 7th Avenue, Suite 1310
Anchorage, Alaska 99501

June 17, 2016

The Indian Health Service (IHS) is proposing a Joint Venture Construction Program (JVCP) project for Yakutat, Alaska. For this project, the IHS is the Lead Federal Agency and the U.S. Department of Agriculture is a cooperating agency. Additionally, the Health Resources and Services Administration (HRSA) is funding a portion of the clinic's construction. The authorized IHS Official is Kevin Bingley (907.729.3610; Kevin.Bingley@ihs.gov).

SCOPE OF UNDERTAKING: The Yakutat Tlingit Tribe (YTT) will vacate the leased space used to operate the Yakutat Community Clinic and construct an approximately 10,000 square-foot health clinic on a new 2.5-acre site. Land will be conveyed from the Yakutat City Borough to the Yakutat tribe for the purpose of developing the new clinic. The USDA will provide funds for construction and the IHS is providing funding for the staffing of the new clinic.

AREA OF POTENTIAL EFFECT (APE): A map of the APE is attached for review.

APE SITE REVIEW: The following sites are located in the APE and reviewed for effect.

Site No.	*AHRS ID*	*Site Name*	*Age*	*Description*
1	YAK-00041	Yakutat and Southern Railroad Historic District	1940-1971	Associated with the cannery operation in Yakutat. The district includes a cannery building, the original Lima engine and the tender, ballast dump cars, flat bed/stake cars, fish loading facilities, a maintenance complex, rail alignments, several engines, cars and bridges, a pile driver, the Situk trestle, wheel sets, 3 turntables and a storage shed. The district area is an eleven-mile-long corridor, that extends from the Yakutat town site to Johnson's Slough at the mouth of the Situk River, and a mile-long spur at Lost River. The district has been determined to be eligible for the NRHP (DOE-K).
2	YAK-00072	Yakutak Landing Field	1940-1946	This site is a polygon delineating an auxiliary airfield and staging area, including two 7400' runways for pursuit and bombardment planes traveling between Alaska and the lower 48 states. Significance of the site complex is its association with the Aleutian Campaign of WWII. Facilities included in the site complex are a dock and wharfage including a warehouse, and a minor naval air facility with a seaplane ramp at Monti Bay. Also included are living quarters, barracks, a mess hall, operations building, storage, radio communications facilities, hangars. Contributing sites include YAK-00091, and YAK-00092. Determined to be eligible for the NRHP (DOE-S).
3	YAK-00117	28th Engineer Road	WWII?	Associated with the Yakutat Landing Field, YAK-00072.
4	YAK-00118	Infantry Road	WWII?	Associated with the Yakutat Landing Field, YAK-00072

Roger Harritt, Cultural Resources Manager, ANTHC, reviewed relevant literature and other material as a basis for making a determination of the effects of this project on the cultural resources in the vicinity of the project APE.

AGENCY FINDINGS: **No Historic Properties Affected**. The project APE is an undeveloped area that abuts the west side of the Yakutat/Airport Road, YAK-00117, south of the core area of the community. No adverse effects are anticipated to the YAK-00117 road alignment as a result of the proposed project. Although it is within the YAK-00072 site polygon, the location was not developed in conjunction with the installations of the WWII facilities in the vicinity, and therefore no effects to the Yakutat Landing Field site is anticipated as a result of the proposed project. The proposed clinic location is approximately 50m south of the YAK-00041 site polygon, and 100m north of YAK-00118.

In compliance with Section 306108 of the National Historic Preservation Act (54 U.S.C. 306108; 16 USC 470*f*) and 36CFR§800, the IHS, has completed a Historical Property review for this undertaking. The finding applies only to the undertaking as defined under this notification and any changes to the undertaking will require further Section 306108 Review in accordance with 36CFR§800.4. SHPO has 30 days after receipt of this letter to complete a review and provide comments. If no comments are received, then the IHS will assume concurrence and proceed with project planning and implementation without further SHPO consultation. In the event of a discovery, all construction activities will cease in the immediate area of the finds pending further consultations between the IHS, Alaska SHPO, and the Tribe.

6/17/2016

Roger Harritt — Date
Cultural Resources Manager, ANTHC

Concurrence & Approval of Finding:

6/17/16

Kevin Bingley, PE — Date
IHS, Deputy SFC Director

SHPO Concurrence:

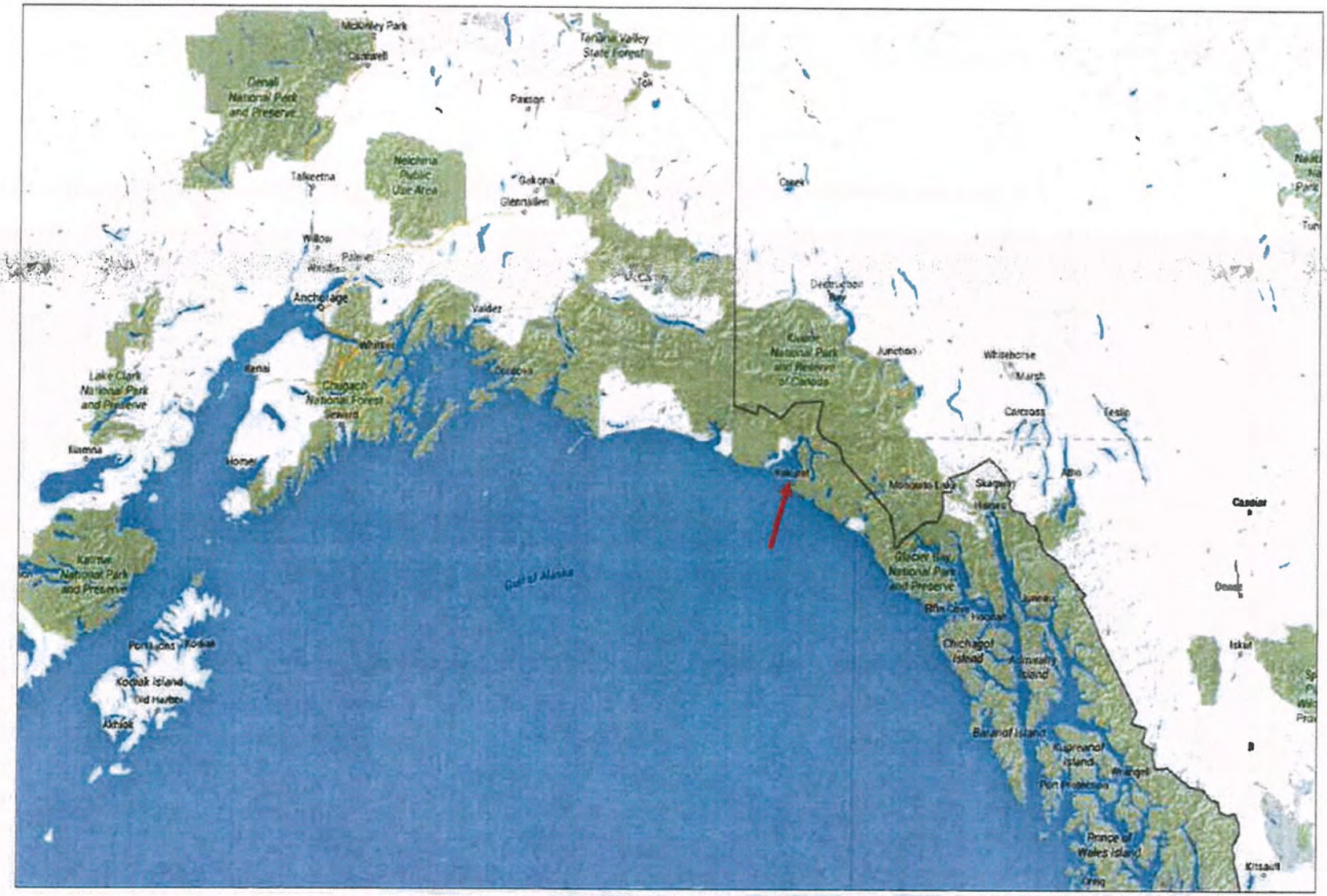


Figure 1. Location of Yakutat in the northeastern Gulf of Alaska (U.S.G.S. YAK C5).

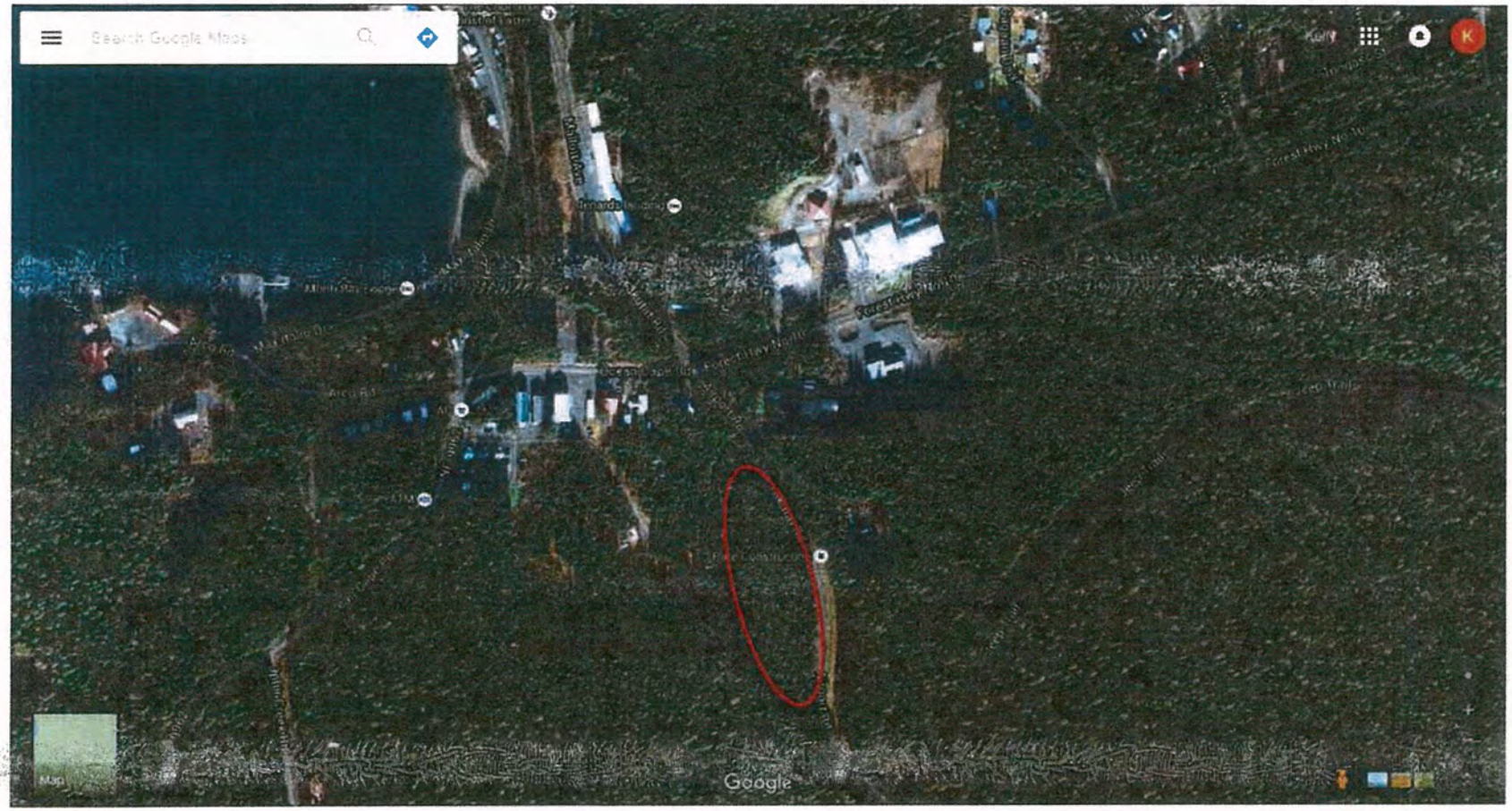


Figure 2. Yakutat, proposed location of the new health clinic, in a 3.5-acre area south of the community core area.

SECTION 306108 REVIEW
WITH THE YAKUTAT TLINGIT TRIBE (YTT)
AND
INDIAN HEALTH SERVICE (IHS)

The IHS is proposing the following project in Yakutat, Alaska for the new clinic development project.

SCOPE OF UNDERTAKING: The Yakutat Tlingit Tribe (YTT) will vacate the leased space used to operate the Yakutat Community Clinic and construct a new approximately 10,000 square-foot health clinic on a new 2.5-acre site. Land will be conveyed from the Yakutat City Borough to YTT for the purpose of developing the new clinic. The U.S. Department of Agriculture (USDA) will provide funds for construction and the IHS is providing funding for the staffing of the new clinic.

AREA OF POTENTIAL EFFECT (APE): The Preliminary APE, as created through tribal cooperation, is detailed below. A Preliminary APE map is attached for review

APE SITE REVIEW: The following sites have been identified in the Preliminary APE.

Site No.	*AHRS ID*	*Site Name*	*Age*	*Description*
1	YAK-00041	Yakutat and Southern Railroad Historic District	1940-1971	Associated with the cannery operation in Yakutat. The district includes a cannery building, the original Lima engine and the tender, ballast dump cars, flat bed/stake cars, fish loading facilities, a maintenance complex, rail alignments, several engines, cars and bridges, a pile driver, the Situk trestle, wheel sets, 3 turntables and a storage shed. The district area is an eleven-mile-long corridor that extends from the Yakutat town site to Johnson's Slough at the mouth of the Situk River, and a mile-long spur at Lost River. The district has been determined to be eligible for the NRHP (DOE-K).
2	YAK-00072	Yakutat Landing Field	1940-1946	This site is a polygon delineating an auxiliary airfield and staging area, including two 7400' runways for pursuit and bombardment planes traveling between Alaska and the lower 48 states. Significance of the site complex is its association with the Aleutian Campaign of WWII. Facilities included in the site complex are a dock and wharfage including a warehouse, and a minor naval air facility with a seaplane ramp at Monti Bay. Also included are living quarters, barracks, a mess hall, operations building, storage, radio communications facilities, hangars. Contributing sites include YAK-00091, and YAK-00092. Determined to be eligible for the NRHP (DOE-S).
3	YAK-00117	28th Engineer Road	WWII?	Associated with the Yakutat Landing Field, YAK-00072.
4	YAK-00118	Infantry Road	WWII?	Associated with the Yakutat Landing Field, YAK-00072

PRELIMINARY FINDING:

No impact is anticipated to Historic or cultural resources

In compliance with Section 306108 of the National Historic Preservation Act (54 USC 306108) and 36CFR§800, the IHS has initiated a Historical Property review for this project. The effect on cultural, spiritual, and historical properties as anticipated by the IHS representative and the tribe is outlined above. The IHS is documenting the above finding as preliminary consultation with the tribe. These findings apply only to the project as defined under the Scope of Undertaking, and any changes to the project will require further Section 306108 Review in accordance with 36 CFR 800.4. In the event of a discovery, all construction activities will cease in the immediate area of the finds pending further consultations between the IHS, Alaska SHPO, and the Tribe.

IHS Representative:

Name: _____

Title: SFC Deputy Area Director - AANHS

Date: 6/17/16

Tribal Representative:

Name: _____

Title: President

Date: 6-15-2016

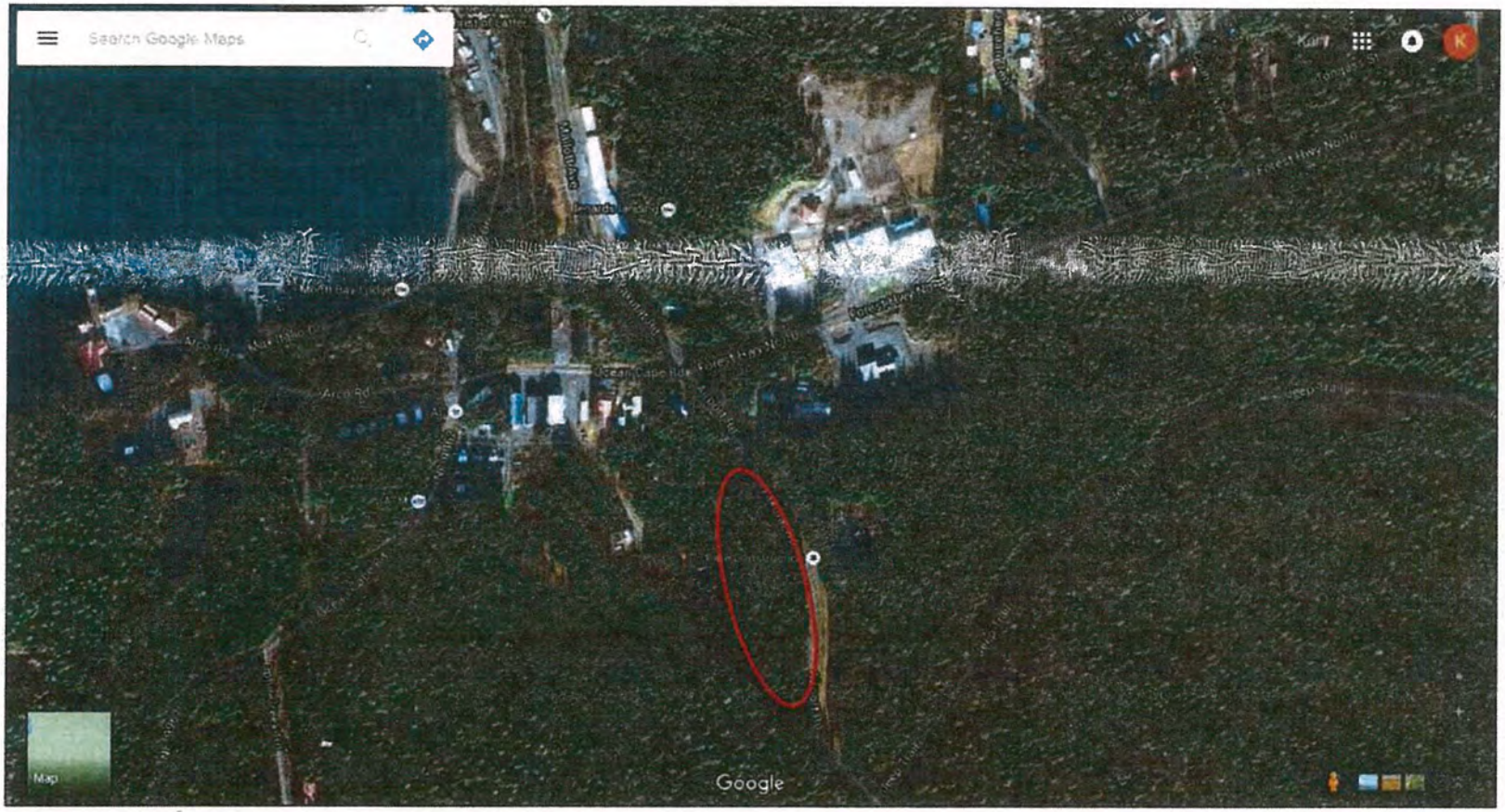


Figure 1. Yakutat, proposed location of the new health clinic, in a 3.5-acre area south of the community core area.

TAB E
WETLAND DELINEATION REPORT

Wetland Delineation Report for Yakutat Tlingit Tribe/IHS Joint Project - Yakutat, AK

Bosworth Botanical Consulting

August 2016

For:

Gail Dabaluz
S'eenaakw'
Executive Director
Yakutat Tlingit Tribe
PO Box 418 • Yakutat, Alaska 99689
• T: 907.784.3238, Ext. 102 • F: 907.784.3595

Table of Contents

Introduction

This wetland delineation report and map are in support of the US Army Corps of Engineers wetland permit for planning and development of a joint project between the Yakutat Tlingit Tribe and the Indian Health Service. This report was revised after geotechnical studies were done of the project area and data was provided to Bosworth Botanical Consulting. (Appendix A)

Location

The proposed 2.5 acre parcel is found in Yakutat, Alaska. It is on the west side of the Yakutat Airport Road just north of the Ophir Creek crossing and south of the intersection of the Airport Road and Ocean Cape Rd..

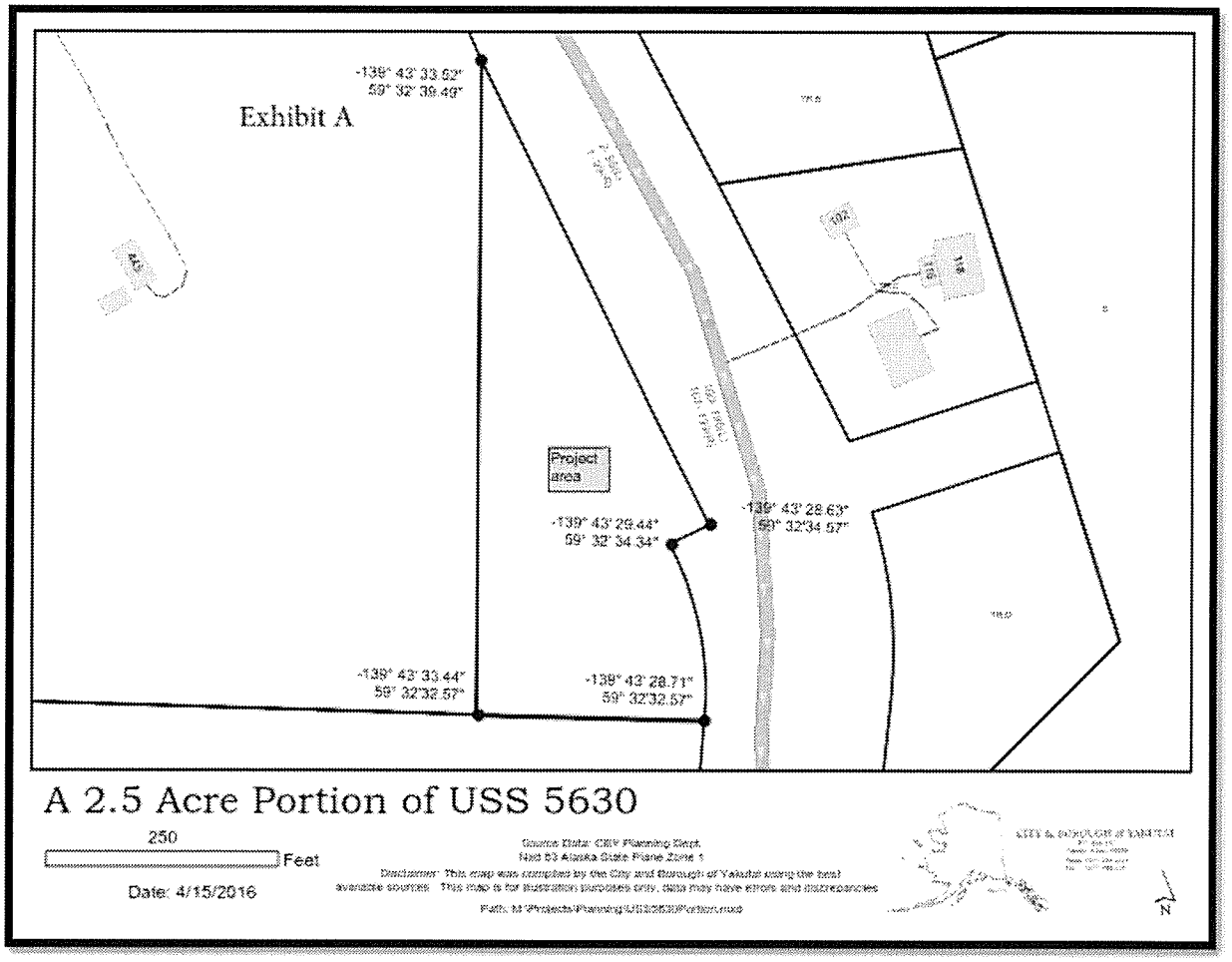


Figure 1 - Project area location map.

Methods

Climate

The Yakutat project area was visited for mapping and delineation on July 29, 2016. The weather at that time was overcast and warm with temperatures in the high 50's and low 60's F°. Rainfall for the 6 days before the field visit was heavy - a total of 6.7 inches. Geotechnical studies of the project area were done October 27-28, 2016. Rainfall for the week before the geotechnical studies were done was approximately 5 inches.

Wetland Field Methods

Wetlands areas were mapped using the "triple parameter" method described in the U.S. Army Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory, 1987) as supplemented by the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region - November 2007.* Wetlands are required to have a prevalence of wetland hydrology, hydric soils, and hydrophytic vegetation. Jurisdictional wetlands are determined when positive indicators of all of these three criteria are present. The "routine determination delineation" methodology was used . The wetland boundaries and classifications described herein represent best professional opinion.

Sample points were done at either side of any significant changes in vegetation, soils or hydrology. At each sample point, the wetland status of that point was determined by observing indicators of hydrophytic vegetation, hydric soil, and wetland hydrology. Once representative sample points were done further wetland boundaries were marked with a GPS waypoint.

Vegetation

Sample plot vegetation was divided into three strata; tree, shrub, and forb, and each layer was classified using the prevalence index (a weighted-average wetland indicator status of all plant species in the sample plot) and the dominance test (more than 50% of the dominant plant species across all strata are rated obligate, facultative wet, or facultative). The 2012 U.S. Army Corps of Engineers *National Wetland Plant List –Alaska Region* was used to classify plants.

Hydrology

Hydrology was determined using two methods: (1) visually, if the water table is at or above the surface, or (2) with a soil pit. (Data from geotechnical investigations done later in the fall was also used.) The presence of standing water, depth to free water in the soil pit, and depth to saturated soils was recorded. Other primary and secondary hydrology indicators were recorded, such as presence of watermarks, sediment deposits, drift deposits, iron deposits, hydrogen sulfide odor, geomorphic position, and drainage patterns in wetlands.

Soil

Soil pits were dug to a depth of 12-16 inches, or to bedrock or glaciomarine sediment refusal, to determine if indicators of hydric soils were present. Soil colors were determined from a moist sample with the Munsell Soil Color Chart. Sample site data sheets are included in Appendix A.

Table 1 - Indicators of the Three Wetland Parameters

Parameter	Indicators
Wetland Vegetation	Dominant vegetation consists of wetland-adapted plant species, based on one or more of the following indicators: • Dominance Test: more than 50% of dominant vegetation is of facultative, facultative wetland, or obligate status as determined from the National List of Plant Species Occurring in Wetlands (Lichvar et al. 2014). • Prevalence Index: Prevalence index is 3.0 or less. The prevalence index is a weighted average that takes into account plant abundance and indicator status. • Plant morphological characteristics are evident.
Hydric Soils	A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding that persist long enough during the growing season to develop anaerobic conditions in the upper part of the soil. Hydric soils generally exhibit one or more of the following indicators: • Histosol (highly organic soil) • Histic epipedon (organic soil surface layer) • Sulfidic material (rotten-egg odor) • Aquic or peraquic moisture regime (saturation during the growing season); • Soil matrix colors that indicate a loss or movement of organic matter, iron, or manganese • The presence of redoximorphic features, which are locations within the soil structure of iron and manganese depositions and depletions • The presence of oxidized iron and manganese in specific abundance and distribution.
Wetland Hydrologic Conditions	Wetland hydrologic conditions, indicated by one or more of the following indicators: • Surface inundation visible on ground or aerial imagery; • Standing water or saturated soils at or above a depth of 12 inches • Surface water • High water table • Oxidized rhizospheres along living roots • Drift deposits • Water-stained or surface-scoured leaves • Wetland drainage patterns • Geomorphic position • Facultative-neutral test • Stunted or stressed plants.

Polygon acreages were calculated in GIS. Final delineation map was done in GIS.

Project and Project Area Description

Geology and Geomorphology

The project area is gently sloping to the south. It is found on well-drained proximal outwash sediments of sands, gravels and cobbles formed from the Little Ice Age advance of ice into Yakutat Bay retreating less than 200 years ago. There is a five foot deep and ~60 foot wide outwash flood channel across the southern part of the project area that has a bed of alluvial sorted large cobbles and gravels.

Watersheds

There are no surface streams that cross the project area but an outwash flood channel does cross the project area. The channel has no input or output streams but the channel is deep enough that for short periods after periods of heavy rain the water table reaches - and in some spots exceeds - the surface. A road berm at its lower end precludes any surface drainage out of the channel.

The project area is within the Ophir Creek watershed. Topographic maps and aerial photographs of the area indicate that the channel is large in relation to current stream flows in Ophir Creek. These oversized channels were formed by melt water streams that were much larger than the present Ophir Creek. Ed Neal at the USGS (1995) writes that Ophir Creek stream flow appears to be sustained primarily from rain and snow- melt percolating into outwash deposits, moving laterally as ground water, and then discharging into the stream channel. Ophir Creek terminates at Summit Lake where it discharges to Tawah Creek which drains into the North Pacific Ocean.

Soils

The glacier pulled back from the moraine just north of the project area less than 200 years ago. The soils are young and relatively undeveloped and are generally Entisols. Over most of the project area two to four inches of peat has accumulated over sands and gravels.

In the outwash flood channel there is shallow peat over boulders with sand and gravels.

Figure 2 - Four inches of course peat over unsaturated sand with fine gravel.

Vegetation

Upland Sitka Spruce Forest

The typical upland vegetation of the project area is a second-growth Sitka spruce - FACU (*Picea sitchensis*) forest with an understory of devils club - FACU (*Oplopanax horridum*), salmonberry -FACU (*Rubus spectabilis*),early and Alaska blueberry - FAC (*Vaccinium ovalifolium and V. alaskaense),* trailing raspberry - FAC (*Rubus pedatus*), spiny wood fern - FACU (*Dryopteris dilatata*), oak fern - FACU (*Gymnocarpium dryopteris*), and dwarf dogwood -FACU (*Cornus canadensis).*

Figure 3 - Typical upland Sitka spruce forest in the project area.

Outwash flood channel Sitka Spruce Forest

The vegetation in the outwash flood channel is very similar to that on the outwash material. In areas disturbed by fallen trees there are more disturbance-adapted species such as skunk currant - FACU (*Ribes bracteosum*), red elderberry- FACU (*Sambucus racemosa*) and lady fern - FAC (*Athyrium felix-femina*).

Figure 4 - Detail of outwash flood channel understory vegetation - dwarf dogwood, lady fern, oak fern, salmonberry - primarily upland vegetation.

Table 2 - Plant Species List (Lichvar, 2014)

Scientific name	common name	Indicator status[1]
Alnus rubra	red alder	FAC
Alnus sinuata	Sitka alder	FAC
Athyrium felix-femina	lady fern	FAC
Cornus canadensis	dwarf dogwood	FACU
Dryopteris dilatata	spiny wood fern	FACU
Gymnocarpium dryopteris	oak fern	FACU
Menzisia ferruginea	false azalea	FACU
Oplopanax horridus	devil's club	FACU
Picea sitchensis	Sitka spruce	FACU
Ribes bracteosum	skunk current	FACU
Rubus pedatus	trailing raspberry	FAC
Rubus spectabilis	salmonberry	FACU
Sambucus racemosa	red elder	FACU
Streptopus amplexifolius	twisted stalk	FAC

[1] See Table 3 for abbreviation definitions

Tiarella trifoliata	foamflower	FAC
Tsuga heterophylla	western hemlock	FAC
Vaccinium ovalifolium	early blueberry	FAC

Table 3 - Indicator code table (Lichvar, 2012)

Indicator Code	Type	Comment
OBL	Obligate Wetland	Almost always occur in wetlands. With few exceptions, these plants (herbaceous or woody) are found in standing water or seasonally saturated soils (14 or more consecutive days) near the surface.
FACW	Facultative Wetland	Usually occur in wetlands, but may occur in non-wetlands. These plants predominately occur with hydric soils, often in geomorphic settings where water saturates the soils or floods the soil surface at least seasonally.
FAC	Facultative	Occur in wetlands and non-wetlands. These plants can grow in hydric, mesic, or xeric habitats. The occurrence of these plants in different habitats represents responses to a variety of environmental variables other than just hydrology, such as shade tolerance, soil pH, and elevation, and they have a wide tolerance of soil moisture conditions.
FACU	Facultative Upland	Usually occur in non-wetlands, but may occur in wetlands. These plants predominately occur on drier or more mesic sites in geomorphic settings where water rarely saturates the soils or floods the soil surface seasonally.
UPL	Obligate Upland	Almost never occur in wetlands. These plants occupy mesic to xeric non-wetland habitats. They almost never occur in standing water or saturated soils. Typical growth forms include herbaceous, shrubs, woody vines, and trees.
NI	No indicator	Insufficient information was available to determine an indicator status.

Results

Table 4 - Sample point table (COE data sheet - Appendix A).

SAMPLE POINT	HABITAT	COWARDIN CLASS	HGM CLASS	PJD[2]	Rational for PJD
SP-1	Young second growth Sitka spruce forest - well-drained outwash sediments	-	-	No	-
SP-2	Young second growth Sitka spruce forest - well-drained outwash sediments	–	–	No	–
SP-3	Young second growth Sitka spruce forest - well-drained outwash flood channel sediments	-	-	No	-

Conclusions

The project area is all upland with upland vegetation, soils and hydrology. The outwash flood channel has upland vegetation (Sitka spruce/red elderberry/salmonberry/devils club/lady fern/dwarf dogwood) and a young upland soil with a shallow layer (0.5 - 0.8 feet) of peat over well-drained boulders, gravels and sand. The water table at the time of the visit, which was the day after 6 days of heavy rain, was just at the surface in the lowest parts of the outwash flood channel. Geotechnical investigations by IHS in late October 2016 showed the water table in the outwash flood channel to be at least 15 ft. below surface with no groundwater, seeps, or moisture observed.

[2] Preliminary Jurisdictional Determination

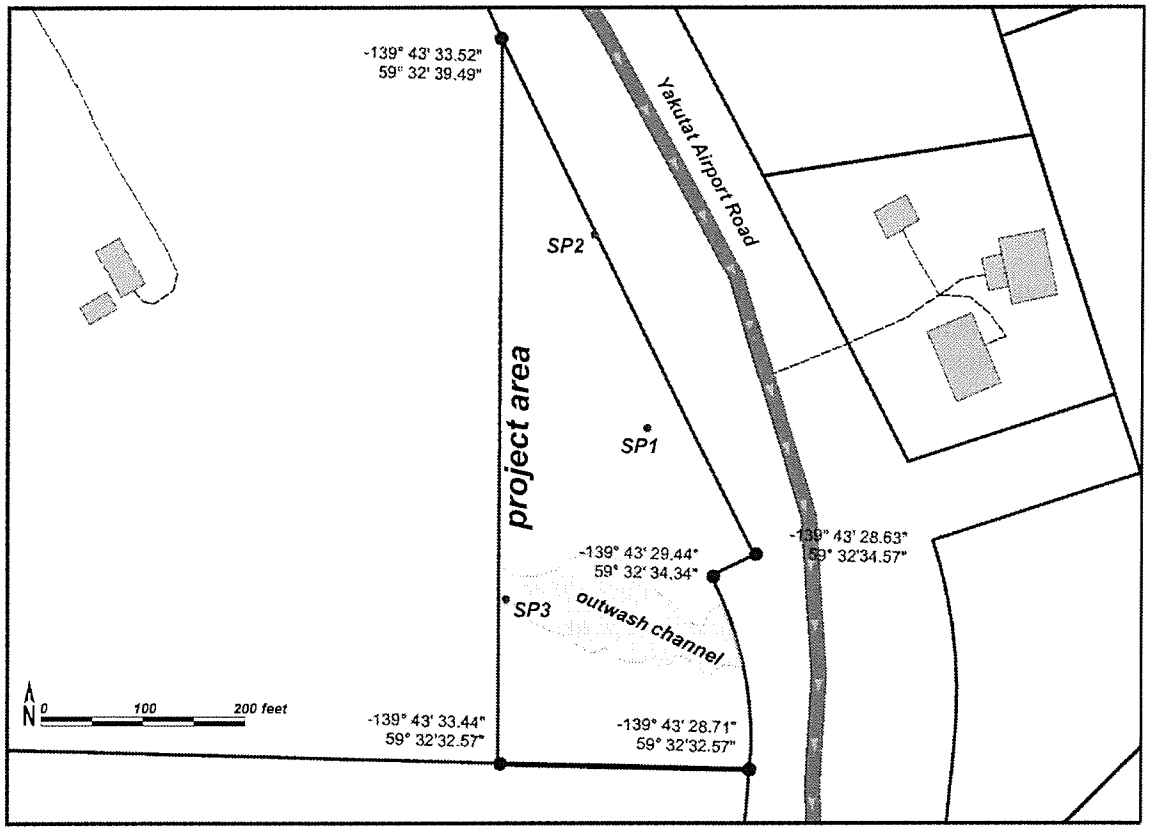


Figure 5 - Wetland delineation map - SP = Sample points and the pink area is the outwash channel.

References

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States.* Office of Biological Services, USDI Fish and Wildlife Service. Washington, D.C. FES/OBS-79-31. 131pp.

Hulten, E. 1968. *Flora of Alaska and Neighboring Territories.* Stanford University Press, Stanford, California. 1008 pp.

National Wetlands Working Group/ edited by: B.G. Warner and C.D.A. Rubec, 1997. *The Canadian Wetland Classification System, Second Edition.* Wetland Research Centre, University of Waterloo, Waterloo, Ontario.

Lichvar, Robert W. and John T. Kartesz. 2012. *North American Digital Flora: National Wetland Plant List, version 2.4.0* (https://wetland_plants.usace.army.mil). U.S. Army Corps of Engineers, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH, and BONAP, Chapel Hill, NC.

Lichvar, R.W., M. Butterwick, N.C. Melvin, and W.N. Kirchner. 2014. *State of Alaska - Wetland Plant List - The National Wetland Plant List: 2014 Update of Wetland Ratings.* Cold Region Research and Engineering Lab. US Army Corps of Engineers. 1-42

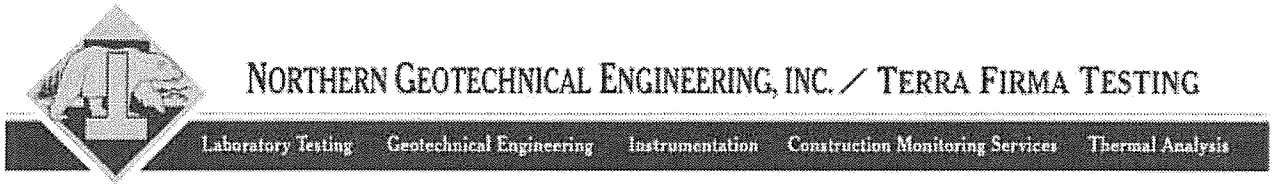
Neal, G. Edward. 1995. *Hydrologic Investigation of the Ophir Creek Watershed Near Yakutat, Alaska.* U.S. Geological Survey. Open-file Report 98-199.

Shepard, Michael E.. March 1995. *Plant Community Ecology and Classification of the Yakutat Foreland, Alaska.* Alaska Natural Heritage Program, Univ. of Alaska Anchorage and Environment and Natural Resources Institute and the USFS Chatham Area.

U.S. Army Corps of Engineers. 1987. *Corps of Engineers Wetland Delineation Manual.* Technical Report Y-87-1, US Army Waterways Experiment Station, Vicksburg, MS.

US Army Corps of Engineers, Oct. 2007. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region,* Environmental Laboratory, ERDC/EL TR-06-x, US Army Engineer Research and Development Center, Vicksburg, MS.

Appendix A – Project Area Geotechnical Report



November 7, 2016

Yakutat Tlingit Tribe 606 Forest Hwy 10 PO Box 418 Yakutat, AK 99689

Attn: Rhoda Jensen – Health Director

NGE-TFT Project #4562-16

RE: SUMMARY OF SUBSURFACE EXPLORATION FINDINGS AND GENERAL GEOTECHNICAL ENGINEERING CONCLUSIONS FOR THE SITE OF THE PROPOSED YAKUTAT COMMUNITY HEALTH CLINIC, YAKUTAT, ALASKA.

Rhoda,

We, Northern Geotechnical Engineering, Inc. d.b.a. Terra Firma Testing, have prepared this letter to briefly summarize our findings from a subsurface exploration program that we recently completed at the site of the proposed Yakutat Community Health Clinic (YCHC). In this letter we also provide generalized geotechnical engineering conclusions regarding the suitability of the project site for the proposed improvements. The information that we present in this letter is intended to be used (in part) to help supplement an Indian Health Service (IHS) Site Selection Evaluation Report (SSER), and should not be used to make final design and construction decisions regarding the proposed improvements. design and construction of the proposed improvements.

Geotechnical Summary Narrative

The site of the proposed Yakutat Community Health Clinic (YCHC), hereafter referred to as "the project site", is approximately 2.5 acres in area and is primarily vegetated with mature, second growth Sitka spruce and hemlock trees. The topography of the project site generally slopes gradually down to the southeast with a shallow, sub-linear depression located along the central and southern portions of the project site, which generally trends to the south-southeast. The project site was reportedly logged for timber around the beginning of the 20th century, but no significant ground disturbances and/or other site developments (e.g., fill placement, etc.) are known to have occurred at the project site.

Northern Geotechnical Engineering, Inc. d.b.a. Terra Firma Testing (NGE-TFT) conducted a site reconnaissance and subsurface exploration program at the project site from October 26-27, 2016 during which time they directed the excavation of six test pit explorations at select locations across the project site. NGE-TFT was accompanied during their field efforts by Captain Kelly Leseman; Indian Health Service Project Manager for the proposed YCHC project. Captain

Leseman assisted NGE-TFT in the determination of the six test pit locations, which generally correspond to the conceptual location of the proposed YCHC improvements.

NGE-TFT's subsurface exploration efforts suggest that the project site is overlain by a relatively thin layer of organic material consisting primarily of varying amounts of mosses, decaying organic matter (leaf litter, woody debris, etc.), and root masses. The organic layer averages approximately 0.5 to 0.75 feet in thickness, with some locally thicker sections of decaying organic material where fallen tree trunks and/or tree stumps occur at the ground surface. The surficial organic layer is directly underlain by a relatively thick deposit of sand and gravel that extends to depths of at least 15 feet below the existing ground surface (bgs). The sand/gravel soils were likely deposited during the last glacial retreat and are consistent with coarse-grained glacial outwash deposits found elsewhere in the Yakutat area. NGE-TFT did not observe any indications of groundwater in any of the six test pit explorations, and

groundwater likely occurs at depths greater than 15 feet across the entire project site. NGE-TFT did not observe any frozen soils during their subsurface exploration effort and they do not expect permafrost to occur anywhere across the project site.

In general, the sand/gravel soils that NGE-TFT identified across the project site are suitable for supporting conventional shallow foundation systems, such as poured concrete footings and/or thickened edge slab foundations, as well as any underground utilities and/or structural pavement sections. There is little to no risk of seismic liquefaction and/or seismically-induced slope failure at the project site. The sand/gravel soils are suitable for re-use as structural fill across the project site, assuming proper placement and compaction techniques are applied. Based on their initial observations of the soil gradation (both visual and textural), NGE-TFT estimates the sand/gravel soils to have little to no frost susceptibility. Furthermore, they anticipate there to be very little potential for ice lens development at the project site. As such, minimal foundation burial/insulation requirements and minimal structural pavement sections will be required to reduce the potential for differential settlements as a result of ice lens formation and/or subsequent thaw-related weakening of the bearing soils. Additionally, NGE-TFT estimates the sand/gravel soils to be relatively free-draining (i.e., exhibit relatively high infiltration/percolation rates) and can likely support relatively uncomplicated stormwater/septic drain field designs.

Please feel free to contact me directly at 907-771-9507 with any questions or comments that you may have regarding the information that we present in this letter or if you need any additional information in support of the IHS SSER.

Sincerely, Northern Geotechnical Engineering, Inc. d.b.a. Terra Firma Testing,

Andrew C. Smith, CPG Senior Geologist

Appendix B - Scanned Sample Site Data Sheets