MATANUSKA-SUSITNA BOROUGH

350 East Dahlia Avenue, Palmer, Alaska 99645 – 907-861-7874

PLATTING OFFICER
Fred Wagner

PLATTING
ADMINISTRATIVE SPECIALIST
Theresa Taranto

PLATTING TECHNICIANS
Amy Otto-Buchanan
Matthew Goddard
Chris Curlin

PLATTING ASSISTANT
Kayla Kinneen

ABBREVIATED PLAT AGENDA

CONFERENCE ROOM 110
350 EAST DAHLIA AVENUE, PALMER

REGULAR MEETING **8:30 A.M.** **June 14, 2023**

Public Participation: To participate in the Abbreviated Plat Hearing, you can attend in person, or you can submit written comments by email to platting@matsugov.us or by mail to Matanuska-Susitna Borough, Platting Division, 350 E. Dahlia Avenue, Palmer, AK 99645.

1. **INTRODUCTION**
   A. Introduction of Staff

2. **UNFINISHED BUSINESS:**
   (None)

3. **PUBLIC HEARINGS:**
   A. **BREEZY MEADOWS:** The request is to create two lots from Parcel 1, Waiver 99-36-PWm, Recorded at Book 1025, Page 956 to be known as **Breezy Meadows**, containing 5.00 acres +/- . The property is located west of N. Glenn Highway, south of E. Marsh Road, and north of E. Scott Road; (Tax ID # 18N02E32A039); within the NW ¼, NE ¼, Section 32, Township 18 North, Range 02 East, Seward Meridian, Alaska. In the Greater Palmer Community Council and in Assembly District #2. *(Petitioner/Owner: AMG & Associates, Staff: Chris Curlin, Case # 2023-060)*

THE ABBREVIATED PLAT HEARING WILL CONVENE AT **8:30 A.M.** on **June 14, 2023**, in **Conference Room 110** at the Dorothy Swanda Jones Building, 350 E. Dahlia Avenue, Palmer, Alaska.

Public Hearing Process

- **Platting Officer states/reads the case/item to be addressed into the record.**
- **Public Hearing Notices**: Secretary states the number of public hearing notices sent out and the date sent.
- **Staff Report:** The Platting Officer gives an overview of the project for the hearing and the public.
- **Public Testimony**: Members of the public are invited to sign in and testify before the officer.
  - 3-minute time limit per person for members of the public.
  - The time limit may be extended at the discretion of the Platting Officer.
- **The public hearing is closed by the Officer.** No further public input is appropriate.
- **Petitioner Comments**: Petitioner, or his/her representative, comes before the officer to discuss staff recommendations and compliance with Title 43 and other applicable regulations.
  - Testimony is limited to five (5) minutes for the petitioner/applicant.
  - The time limit may be extended at the discretion of the Platting Officer
- **Motion to Approve:** Motion to approve is made by the Platting Officer.
  - No further unsolicited input from petitioner is appropriate.
  - Conditions and Findings must be written for all decisions made regarding the action being taken, whether it passed or failed.
  - Decisions are final unless reconsidered by the platting board MSB 43.35.005 or appealed to the board of adjustments and appeals. MSB 43.35.015


3A

STAFF REVIEW AND RECOMMENDATIONS
PUBLIC HEARING
JUNE 14, 2023

ABBREVIATED PLAT:	BREEZY MEADOWS
LEGAL DESCRIPTION:	SEC 32, T18N, R02E, SEWARD MERIDIAN AK
PETITIONERS:	AMG & ASSOCIATES
SURVEYOR:	THE BOUTET COMPANY
ACRES: 5.0 ±	PARCELS: 2
REVIEWED BY:	CHRIS CURLIN CASE #: 2023-060

REQUEST: The request is to create two lots from Parcel 1, Waiver 99-36-PWm, Recorded at Book 1025, Page 956 to be known as BREEZY MEADOWS, containing 5.00 acres +/-. The property is located west of N. Glenn Highway, south of E. Marsh Road, and north of E. Scott Road; within the NW ¼, NE ¼, Section 32, Township 18 North, Range 02 East, Seward Meridian, Alaska.

EXHIBITS

Vicinity Map and Aerial Photos	**EXHIBIT A** – 4 pgs
Soils Report	**EXHIBIT B** – 50 pgs

AGENCY COMMENTS

Department of Public Works Pre-Design Division	**EXHIBIT C** – 1 pg
AKDOT&PF	**EXHIBIT D** – 2 pgs
AKF&G	**EXHIBIT E** – 1 pg
City of Palmer	**EXHIBIT F** – 1 pg
City of Palmer Fire Chief	**EXHIBIT G** – 2 pgs
Utilities	**EXHIBIT H** – 5 pgs

DISCUSSION: This platting action is creating two lots from Parcel 1, Waiver 99-36-PWm, existing Tax Parcel A39. Access for proposed lots will be from E. Scott Road.

Soils Report: (**Exhibit B**) A soils report was submitted by Northern Geotechnical Engineering, LLC, pursuant to MSB 43.20.281(A). Timothy Alley, PE with The Boutet Company, INC, states in his summary that both lots contain 10,000 square feet of contiguous usable septic area and 10,000 square feet of contiguous building area. The developer is requesting sewer service from the City of Palmer.

Comments: Department of Public Works Pre-Design Division (**Exhibit C**) notes both lots should share a common access unless otherwise approved by AKDOT&PF.
ADOT&PF: (**Exhibit D**) Has no objection to proposed lot subdivision, requests a 50' right of way dedication, and states that ADOT&PF will permit consolidated shared access between two lots. ADOT&PF requests a plat note stating, "Subsequent subdivision of lots will require continued use of shared access and utilities.

ADOT&PF also notes that development plans for Scott Road will elevate road use and traffic counts. Shared use will mitigate potential future conflict along collector level roadways. *Platting staff notes that right of way cannot be dedicated on an abbreviated plat.*

ADF&G has no objections. **(Exhibit E)**

City of Palmer: **(Exhibit F)**
Community Development notes if subdivision were inside city limits and zoned R-4, High Density Residential, the minimum required lot width would be 60' and the minimum required lot area per dwelling unit would be 2,700 square feet per unit.
Planning and Zoning notes that the proposed platting action is scheduled to be reviewed at the June 15, 2023, Planning and Zoning Commission meeting and that any additional comments will be forwarded at that time.
City of Palmer Fire Chief attached a separate letter **(Exhibit G)** to City of Palmer's response stating there should be two separate and approved fire apparatus access roads or all dwelling units are to be equipped throughout with an approved automatic sprinkler system and the number of dwelling units on a single fire apparatus access road shall not be increased unless fire apparatus access roads will connect with future development, as determined by the fire code official. Fire chief is satisfied with roadway width, so long as the roadway is capable of supporting a load of fire apparatus weighing at least 75,000 pounds.
Public Works is currently working on a separate issue with the developer to connect to city sewer.

Utilities: **(Exhibit H)** GCI has no comments. Enstar has no comments or recommendations. MTA requests a 15' utility easement in the south 15' of proposed lots 1 & 2. MEA did not respond. *Platting staff notes that utility easements cannot be granted on an abbreviated plat.*

Public: At the time of this write-up there were no comments from the public in response to the Notice of Public Hearing.

At the time of staff report write-up, there were no responses to the Request for Comments from US Army Corps of Engineers; Community Council Greater Palmer; Fire Service Area #132 Greater Palmer; Road Service Area #16 South Colony; MSB Emergency Services, Community Development, Assessments or Planning; or MEA.

CONCLUSION: The preliminary plat of **BREEZY MEADOWS** is consistent with AS 29.40.070 Platting Regulations and MSB 43.15.025 Abbreviated Plats. There were no objections from any federal or state agencies, Borough departments, or utilities. Legal and physical access exists to the proposed lots, consistent with MSB 43.20.100 Access Required, MSB 43.20.120 Legal Access and MSB 43.20.140 Physical Access. Frontage for the subdivision exists, pursuant to MSB 43.20.320 Frontage. A soils report was submitted, pursuant to MSB 43.20.281(A).

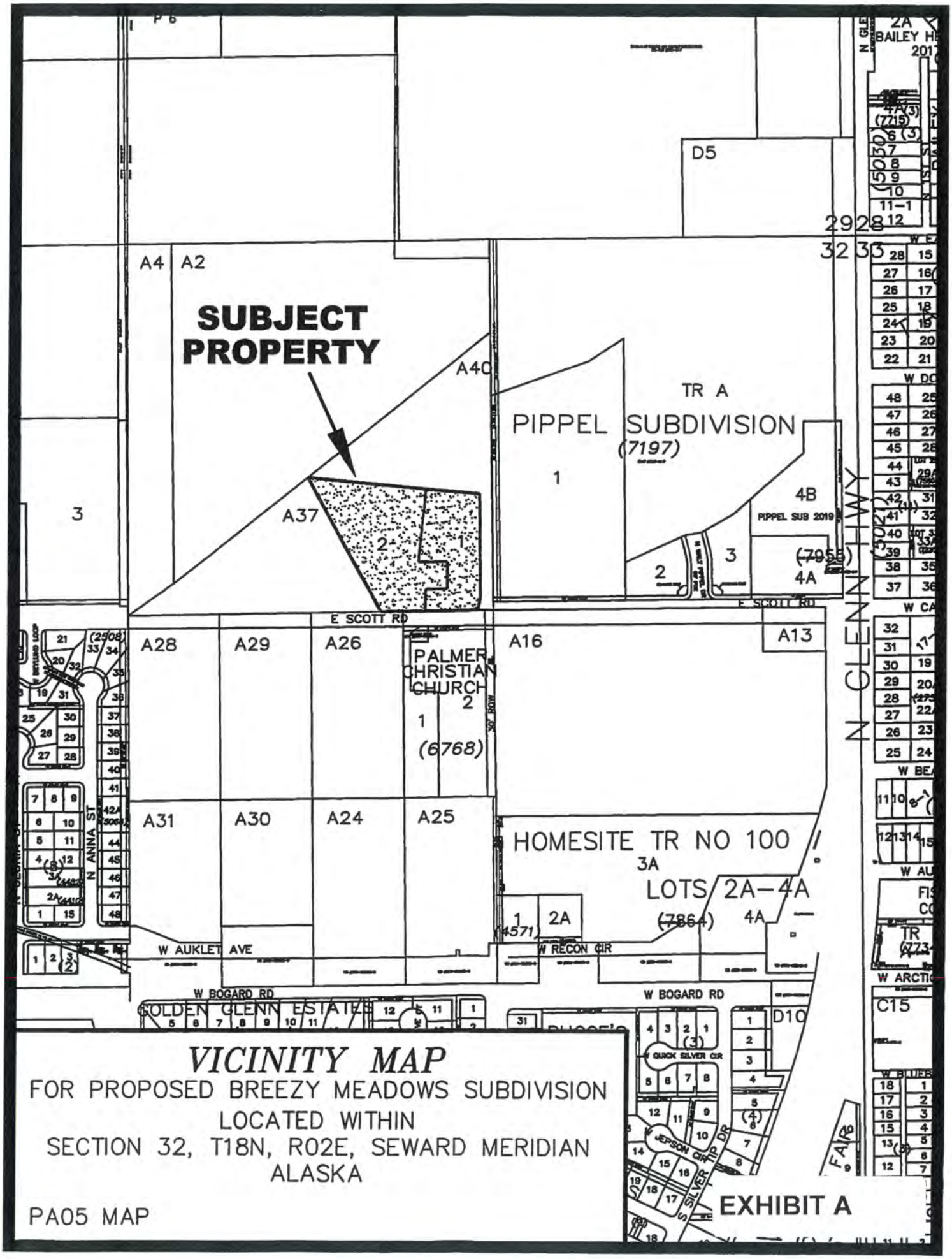
FINDINGS OF FACT
1. The plat of Breezy Meadows is consistent with AS 29.40.070 Platting Regulations and MSB 43.15.016 Preliminary Plats.
2. A soils report was submitted, pursuant to MSB 43.20.281(A). All lot have the required useable area.
3. All lots will have the required frontage pursuant to MSB 43.20.320.

4. At the time of staff report write-up, there were no responses to the Request for Comments from US Army Corps of Engineers; Community Council Greater Palmer; Fire Service Area #132 Greater Palmer; Road Service Area #16 South Colony; MSB Emergency Services, Community Development, Assessments or Planning; or MEA.
5. There were no objections from any federal or state agencies, Borough departments, or utilities.
6. ADOT&PF will permit consolidated shared access between two lots.

RECOMMENDED CONDITIONS OF APPROVAL:

Staff recommends approval of the abbreviated plat of **Breezy Meadows**, contingent on the following recommendations:

1. Taxes and special assessments must be paid in full for the year of recording, pursuant to MSB 43.15.053(F) and AS 40.15.020. Pay taxes and special assessments (LIDs), by CERTIFIED FUNDS OR CASH.
2. Provide updated Certificate to Plat executed within seven (7) days of recording of plat and submit Beneficiary Affidavit for any holders of a beneficial interest.
3. Design plat with one shared access
4. Add plat note limiting lots to one shared access.
5. Pay postage and advertising fees.
6. Show all easements of record on final plat.
7. Submit recording fees, payable to Department of Natural Resources (DNR).
8. Submit final plat in full compliance with Title 43.



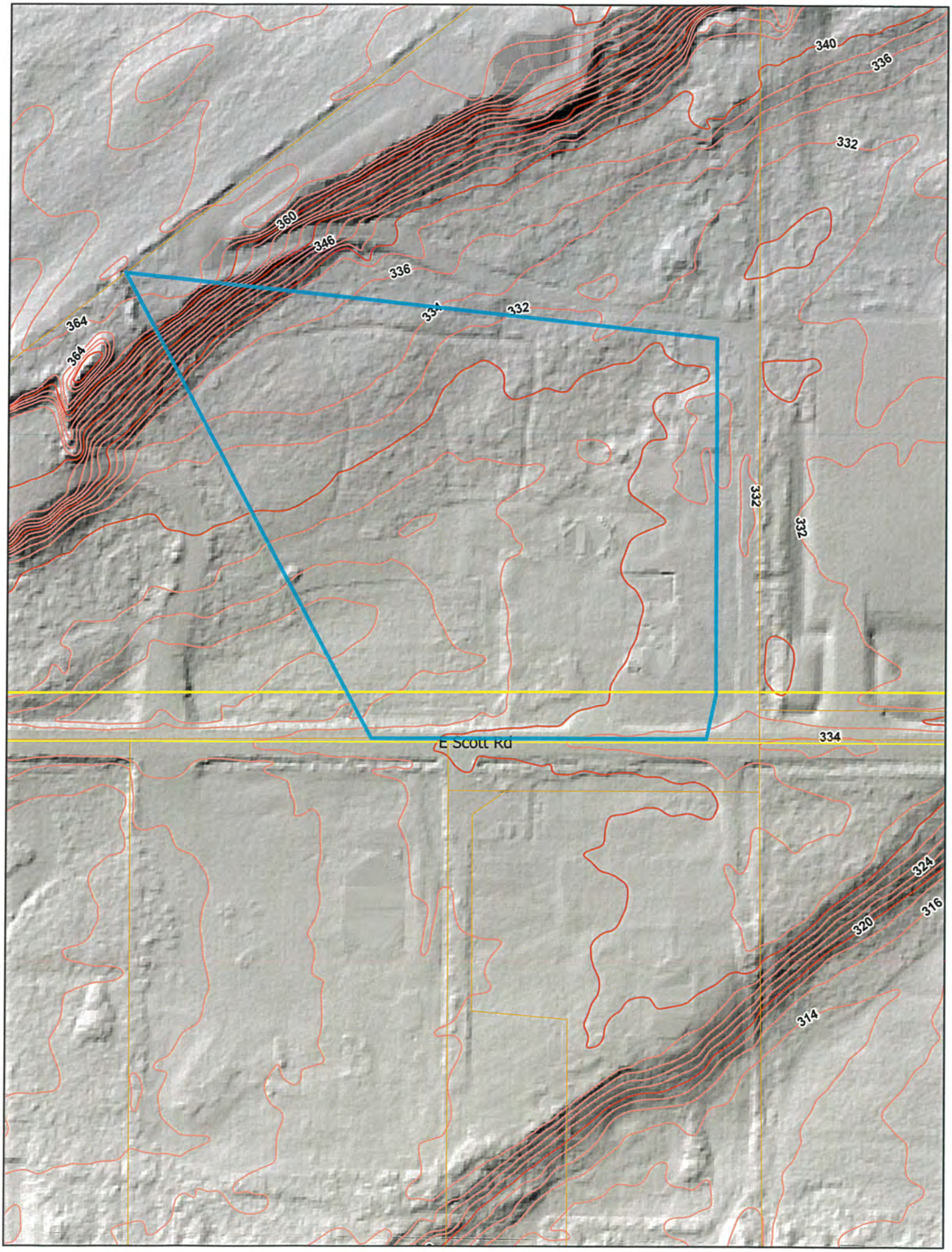
VICINITY MAP

FOR PROPOSED BREEZY MEADOWS SUBDIVISION
LOCATED WITHIN
SECTION 32, T18N, R02E, SEWARD MERIDIAN
ALASKA

PA05 MAP

EXHIBIT A


E Scott Rd
Matanuska-Susitna Borough, Maxar, Microsoft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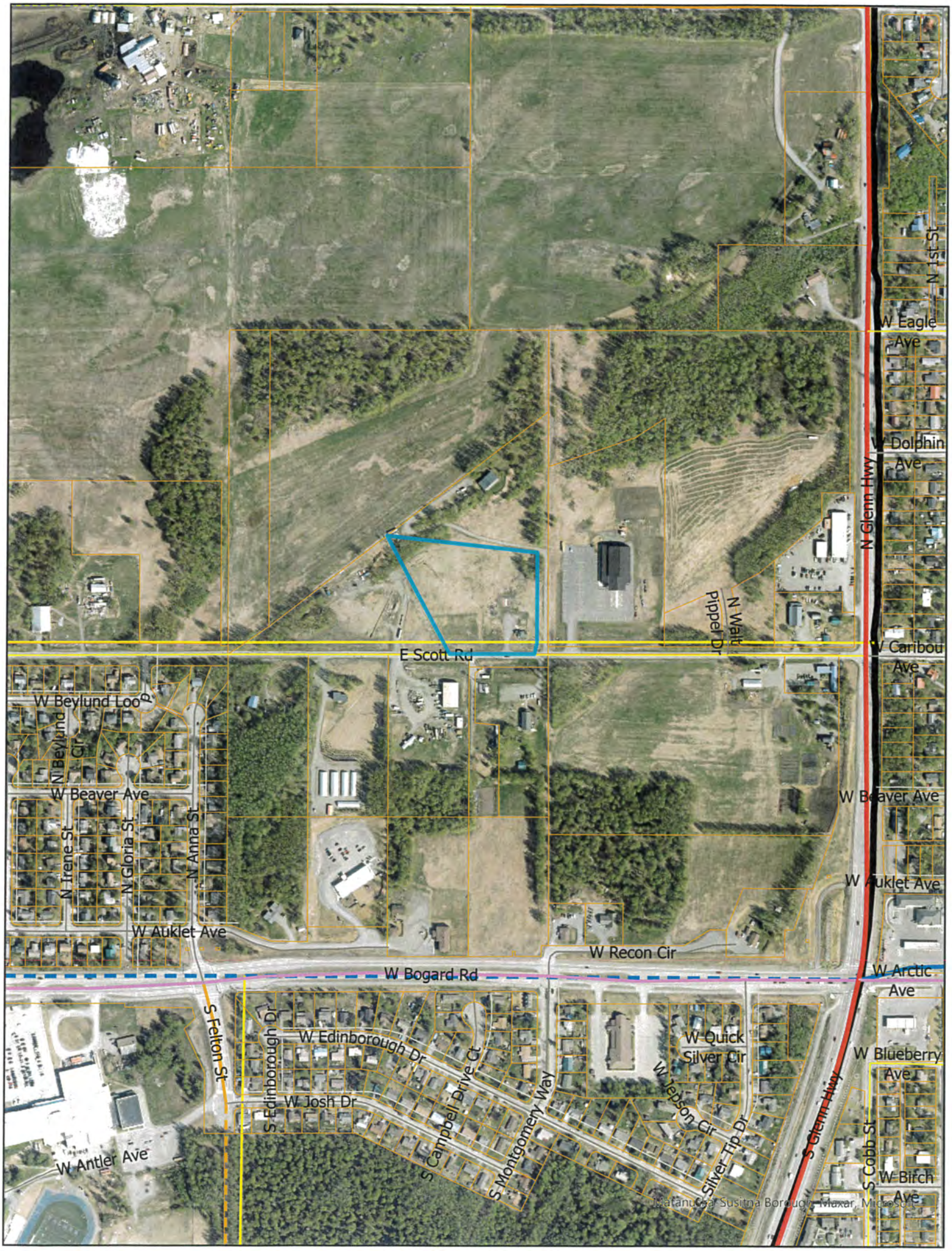
E Scott Rd
N Glenn Hwy
N 1st St
W Eagle Ave
W Dolphin Ave
W Caribou Ave
N Walt Pippel Dr
W Beylund Loop
N Beylund Cir
W Beaver Ave
N Irene St
N Gloria St
N Anna St
W Auklet Ave
W Recon Cir
W Bogard Rd
W Arctic Ave
S Felton St
S Edinborough Dr
W Edinborough Dr
W Josh Dr
S Campbell Drive Ct
S Montgomery Way
W Quick Silver Cir
W Jepson Cir
Silver Tip Dr
S Glenn Hwy
W Blueberry Ave
S Cobb St
W Birch Ave
W Antler Ave
Matanuska-Susitna Borough, Maxar, Microsoft

The Boutet Company, Inc.
1508 E. Bogard Road, Unit 7
Wasilla, Alaska 99654

Phone 907.357.6770
www.tbcak.com

April 18, 2023

Mr. Fred Wagner, LS
Matanuska-Susitna Borough
Platting Department
350 E. Dahlia Avenue
Palmer, Alaska 99645

RE: Usable Area Report
Breezy Meadows Subdivision – 12821 E. Scott Road, Palmer, AK

Dear Mr. Wagner,

The applicant AMG & Associates, LLC is proposing to subdivide:

- Township 18N Range 2E Section 32 Lot A39

The subject property is within the Matanuska-Susitna Borough Core Area and located outside any city limits.

A geotechnical report has been completed for this property. Much of the property contains 6-8 feet of surface silts with poorly graded to silty sand and poorly graded gravels below. A percolation test was completed to measure the infiltration rate of the subsurface gravels. The test resulted in a percolation rate faster than 1 inch per minute requiring an absorption bed with sand liner at that location. Other borings indicate that poorly graded sands also exist below the surface silts which will be usable septic absorption fields. The developer is requesting to be served by City of Palmer (COP) sewer system. However, based on the geotechnical information both lots contain 10,000 square feet of usable building area and an additional 10,000 SF of contiguous usable septic area per lot. The geotechnical investigation is attached.

If you have any questions, please contact me with any questions you may have.

Sincerely,

Timothy Alley, PE
Principal/Vice President
The Boutet Company, Inc.

EXHIBIT B

NORTHERN GEOTECHNICAL ENGINEERING, INC.
TERRA FIRMA TESTING

GEOTECHNICAL ENGINEERING REPORT

for

12821 SCOTT ROAD
PALMER, ALASKA

Prepared for:

The Boutet Company, Inc.
1508 E. Bogard Rd., Unit 7
Wasilla, Alaska 99654

Prepared by:

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

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APRIL 2021

NGE-TFT Project # 5953-21

April 16, 2021

NGE-TFT Project # 5953-21

The Boutet Company, Inc
1508 E. Bogard Rd., Unit 7
Wasilla, Alaska 99654

Attn: Tim Alley, P.E. – Project Manager

RE: GEOTECHNICAL ENGINEERING ASSESSMENT OF THE SITE OF THE PROPOSED MULTI-UNIT RESIDENTIAL HOUSING DEVELOPMENT TO BE CONSTRUCTED AT 12821 SCOTT ROAD – PALMER, ALASKA

Tim,

We (Northern Geotechnical Engineering, Inc. *d.b.a.* Terra Firma Testing) have completed our geotechnical engineering assessment of the proposed improvements to 12821 Scott Road, Palmer, Alaska. Our assessment suggests that the site is overlain by approximatly 6.5 to 10 feet (at our explorations) of unsuitable soft silt rich (silt and silty sand) for conventional shallow foundations and at this depth of unsuitable material deep foundation (i.e. driven piles) may be more economical. The existing native gravel subgrade soils are suitable for supporting the proposed improvements provided that proper engineering controls are incorporating into the design and construction of the proposed improvements. We detail the findings of our geotechnical engineering assessment in the following report.

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

Clinton J. Banzhaf, P.E.
Senior Project Engineer

Reviewed by:
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 12821 Scott Road in Palmer, Alaska; which we hereafter refer to as "the project site". We provided our professional service in accordance with our service fee proposal #20-265 which we submitted to our client, The Boutet Company, Inc., (TBC) on December 23, 2020. Tim Alley, P.E., a representative of TBC, authorized our proposed scope of service on February 22, 2021 via signature of fee proposal #20-265.

TBC contracted us to characterize the subsurface conditions across the project site in an effort to assess the suitability of the subgrade to support the proposed development of the project site. In this report, we provide a summary of our field and laboratory testing efforts, as well as provide our engineering conclusions and recommendations regarding the geotechnical aspects of the proposed site development.

2.0 PROJECT OVERVIEW

As we detail in Figure 1 of this report, the project site is located at 12821 Scott Road in Palmer, Alaska. The legal description of the project site, as we understand it to be, Lot A39 of SEC 32, T18N, R2E. The project site is approximately five acres in area and has mostly been cleared of any large vegetation. The project site is relatively flat except for northwest quadrant that consists of a gentle downward slope to the center of the project site with a approximatly 30 feet of elevation change. A small two-story house and detached garage, barn, and other small outbuildings occupy the southeast quadrant of the project site. The remaining portion of the project site appears to be undeveloped farmland fields and fences.

Proposed improvements to the project site include the construction of 10 separate multi-unit (i.e., 4-plex) residential structures and a separate community building. The proposed structures will all be accessed via a paved circular driveway off Scott Road. We have included a copy of the current site plan in Figure 2 of this report.

3.0 SITE CHARACTERIZATION ACTIVITIES

3.1 Subsurface Exploration

We conceived, coordinated, and directed a subsurface exploration program at the project site in an effort to characterize the subsurface conditions of the project site as they currently exist. We subcontracted Discovery Drilling, Inc. (DDI) to provide the necessary geotechnical exploration services. A qualified representative from our office was present on-site during the entire exploration program to select the exploration locations, direct the exploration activities, log the geology of each exploration, and collect representative samples for further identification and

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laboratory analysis. The explorations were placed in the across the entire project site near the proposed structures. Under our direction DDI advanced a total of seven soil borings (designated as B1 to B6 and IT1) at the project site on January 29, 2021 to depths ranging from approximately 12 to 26 feet below the existing ground surface (bgs).

Under our direction, DDI performed a Modified Penetration Test (MPT) at regular intervals during the drilling of each borehole. A MPT can be used to assess the consistency of a soil interval and to collect representative soil samples. A MPT is performed by driving a 3.0-inch O.D. (2.4-inch I.D.) split-spoon sampler at least 18 inches past the bottom of the advancing augers with blows from a 340-lb drop-hammer, free-falling 30 inches onto an anvil attached to the top of the drill rod stem. Our field representative recorded the hammer blows required to drive the modified split-spoon sampler the entire length of each sample interval, or until sampler refusal was encountered. We have provided the field blow count data for each sample interval (in six-inch increments) on the graphical borehole logs contained in Appendix A of this report.

We corrected the field blow count data for the borehole for standard confining pressure, drill rod length, and drop-hammer operation procedure to estimate a standard $(N_1)_{60}$ value for each sample interval. $(N_1)_{60}$ values are a measure of the relative density (compactness) and consistency (stiffness) of cohesionless or cohesive soils, respectively. Our estimate of the $(N_1)_{60}$ values is based on the drop-hammer blows required to drive the spilt-spoon sampler the final 12 inches of an 18-inch SPT. We have provided our estimated $(N_1)_{60}$ values for each sample interval on the graphical borehole log contained in Appendix A of this report. The automatic drop-hammer that DDI used for this project is not standard, so we applied a correction factor of 1.1 to the $(N_1)_{60}$ values to account for the efficiency of the automatic drop-hammer used. We have provided a graphical plot of the field blow count corrections that we used to correct for confining pressure and drill rod length in Figure 3 of this report.

Our field representative sealed each sample that they collected during our subsurface exploration program inside of an air-tight bag and/or container, to help preserve the moisture content of each sample, and then submitted each sample to our laboratory for further identification and analysis.

Once the exploration activities were complete, we directed DDI to install one-inch diameter, closed-ended PVC pipe from the ground surface down to the bottom of borehole B5 in order to provide a conduit (i.e., monitoring well) for future groundwater level monitoring. As per our instruction, DDI hand-slotted the bottom 15 feet of the monitoring well casing prior to installation and then backfilled the annulus of the monitoring well borehole with prescribed amounts of drill cuttings and engineered backfill. Construction diagrams for the groundwater monitoring well are presented on the graphical borehole log contained in Appendix A of this report.

We directed DDI to install three-inch diameter, open-ended PVC pipe from the ground surface down to the bottom of infiltration test well IT1 in order to provide a conduit (i.e., test well) for future infiltration testing. DDI then placed approximately two inches of washed, 3/8-inch gravel

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(a.k.a. pea gravel) at the bottom of the test well to protect the bottom from water scour during infiltration testing. We then directed DDI to backfill the annulus of the test well with drill cuttings.

3.2 Groundwater Level Monitoring

We conducted groundwater level monitoring efforts at the project site on March 22, 2021 to help determine what the static groundwater level is across the project site. We used an electronic water level meter (with 0.01-foot increments) to measure the relative depth of the groundwater surface (below the existing ground surface) at the monitoring well location. We did not encounter any groundwater during out monitory efforts.

3.1 Infiltration Testing

We conducted infiltration testing at infiltration test well IT1 from on March 22, 2021. We conducted our infiltration testing in general conformance with the falling head percolation test procedure outlined in Table 3.9 of the EPA On-site Water Treatment & Disposal Systems Manual (as specified in Paragraph 9 of Section 9.2.1 of the 2009 Municipality of Anchorage (MOA) Drainage Design Guidelines). We have summarized the results of our infiltration testing in Appendix B of this report.

4.0 LABORATORY TESTING

We collected a total of 43 soil samples from the seven boreholes that DDI 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);
- grain size sieve and hydrometer analysis (ASTM D-6913 & D-7928); and
- organic content (ASTM D2974).

It is important to note that ASTM test method D-6913 requires that any soil sample specimen which is to be submitted for gradational analysis (by ASTM D-7928 or other methods) must satisfy a minimum mass requirement based on the maximum particle size of the sample specimen. Split-spoon sampling techniques (standard or modified), as well as other small-diameter soil sampling techniques (e.g., macro-core, etc.), typically recover anywhere from approximately 1 to 10 pounds of sample specimen. The amount of sample specimen recovered can be influenced by (amongst other variables) the soil gradation, soil density, sample interval, sampler tooling, and soil moisture content. As a result, samples of coarse-grained soils (with individual soil particles greater than approximately 0.75 inches in diameter) collected with small-diameter sampling methods (e.g., split-spoons, macro-core, etc.) may not meet the minimum mass requirement specified by Table 2 of ASTM D-6913. This may result in inaccurate gradational and frost classification results. The

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use of small-diameter sampling devices in coarse-grained soils (e.g., sand and gravel) can result in the collection of unrepresentative samples due to: the exclusion of oversized particles (larger than the opening of the sampler) from the sample; and the mechanical breakdown/degradation of coarse-grained particles by the sampling process (producing an unrepresentative increase in smaller-diameter particles in the sample). Both of these sampling biases can skew laboratory test results towards the fine-grained end of the gradational spectrum.

The laboratory test results, along with the observations we made during our subsurface exploration efforts, 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 improvements. We have included the results of our geotechnical laboratory analyses on the graphical exploration logs contained in Appendix A this report and on the laboratory data sheets contained in Appendix C of this report.

5.0 DESCRIPTION OF SUBSURFACE CONDITIONS

We compiled our field observations with the results from our laboratory analyses to produce the graphical exploration logs of the subsurface exploration (Appendix A). The 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, the exploration locations across the project site.

5.1 General Subsurface Profile

The project site is overlain with loose silt rich material (silt to silty sand) to depths ranging between 6.5 feet to 10 feet bgs. The loose silt rich material is underlain by medium dense to dense gravel to silty gravel to 20 feet bgs at Borings B1 and B2 and to the depth of the exploration at Borings B3, B4, and B6. The gravel at Boring B1 and B2 is underlain by dense sand to sand with gravel to the depth of the exploration. Medium dense sand with silt to silty sand underlies the loose silt rich material at Boring B5, that is underlain by dense gravel to the depth of the exploration.

5.2 Groundwater

We did not encountered groundwater during our subsurface exploration or ground water monitoring efforts. Although groundwater level can vary seasonally, we do not expect the groundwater to raise to anticipated depth of utilities.

5.3 Frozen Soils

We observed indications of seasonally frozen soils to depths ranging between approximately 2 to 4.5 feet bgs during our subsurface exploration efforts. We did not see any indications of permafrost and do not expect it to be encountered across the project site.

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6.0 ENGINEERING CONCLUSIONS

6.1 General Site Conclusions

Based on the findings of our subsurface explorations, field and laboratory testing, and engineering analysis efforts, it is our conclusion that the silt rich loose material (6.5 to 10 feet at the explorations) will need to be excavated to its extent for conventional shallow foundation. The native gravel deposits 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.

6.2 Earthworks

Any surficial organic material and loose silt rich material (6.5-10 feet bgs at the explorations) which is located within the footprint of the proposed foundations will need to be completely removed prior to construction. Additionally, due to the frost susceptible nature and loose density of the near surface silt rich material, we recommend a properly designed pavement section. We discuss our pavement conclusions in more detail in Section 7.5 of this report. Any excavated coarse-grained material may be reused on-site as structural fill, assuming that the material is free of any organic material (or other deleterious debris) and that the material is compactable. We discuss our earthworks recommendations in more detail in Sections 7.1 and 8.1 of this report.

6.3 Foundations

A conventional shallow foundation is suitable to support the proposed improvements assuming that the native medium dense to dense gravels subsurface conditions encountered are similar across the project site and the 6.5 to 10 feet of soft silt rich material is removed from the proposed foundation footprint prior to construction. Foundation configurations and minimum burial depths will be a function of the frost susceptibility of the subgrade soils and whether or not the foundation subgrade will be allowed to freeze during winter months. We provide detailed conventional shallow recommendations regarding the design and construction of any shallow foundation on the native medium dense gravel deposits at the project site in Sections in 7.2, 8.2, and 8.3 of this report.

An alternative to the excavation of the existing soft silt rich material for the construction of conventional shallow foundations are deep foundations (e.g., pile foundations, etc.) systems. Deep foundation systems are often only employed when unsuitable subsurface conditions persist at a site (e.g., excessive thicknesses of non-structural fill or peat, shallow groundwater, etc.) which makes the construction of a conventional shallow foundation impractical and/or uneconomic. It is our experience that deep foundations start to become cost effective in scenarios where there is at least 10 to 12 feet of unsuitable soils across a large portion of the site and/or where the unsuitable soils extend more than 1 to 2 feet below the groundwater table. In some instances, a combination of both a shallow and deep foundation may be employed to help reduce overall construction cost. We discuss general deep foundations in Section 7.3 of this report.

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6.4 Underground Utilities

In general, the soils in which deep, gravity-fed utility trenches (6 to 10 feet bgs) are to be constructed will likely be at the approximate depth of the transition from the soft silt rich material to medium dense gravel. Buried utilities that are subject to damage from settlement should be founded directly onto the undisturbed, native gravel deposits and/or structural fill, assuming proper placement and compaction techniques are employed. We provide more detailed recommendations for underground utility design and construction in Sections 7.3 and 8.4 of this report.

6.5 Pavement

We encountered soft silt rich material to depths ranging between 6.5 to 10 feet bgs at the project site. This material classifies as highly frost susceptible (F4) on the US Army Corps of Engineer (USACOE) frost classification scale. As such, we recommend utilizing a floating pavement section to distribute the vehicle loads. We provide more detailed recommendations for pavement section design in Section 7.4 of this report.

6.6 Settlements

Settlements for shallow foundations should be within tolerable limits, provided that they are placed directly onto the undisturbed native gravel deposits (or properly placed structural fill located directly above the undisturbed native gravel deposits). We anticipate a total settlement for shallow concrete foundations placed on either the undisturbed native grave deposits and/or or structural fill placed above the undisturbed native gravel deposits (as we discuss in Section 7.1 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 and parking areas, 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.

6.7 Seismic Design Parameters

The IBC 2018 has recently been adopted as the new required building code in various areas throughout Alaska, however the Structural Engineers Association of California (SEAOC) Seismic Design Maps tool (https://seismicmaps.org/) that we utilize to calculate the seismic design parameters has not been updated from IBC 2015 to IBC 2018. Additionally, IBC 2018 is unclear

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about seismic design parameters which has not yet been resolved by any addendums. As such, we have used IBC 2015 to calculate our seismic design parameters.

We have assumed that the seismic risk category for the proposed structure will be Category II. The seismic site classification for the project site is D based on the $(N_1)_{60}$ values that we calculated for the subsurface materials that occur at the project site. The IBC 2015 seismic design parameters are F_a = 1.0 (S_s = 1.576 g) and F_v = 1.5 (S_1 = 0.785 g). A copy of the SEAOC Design Maps report for the project site is contained in Appendix D of this report.

Given the relatively medium dense consistency of the undisturbed native gravel deposits and groundwater was not encountered, we expect there to be a low potential for soil liquefaction. Additionally, the potential for earthquake-induced lateral spreading and pressure ridges is unlikely.

7.0 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 configuration.

7.1 Earthworks

Our recommendations assume that any shallow foundations (i.e., poured-concrete footings) will have the existing 6.5 to 10 feet of soft silt rich material (at the explorations) excavated per our recommendations in this report and be founded either directly onto the undisturbed native gravel deposits or compacted structural fill pads constructed directly above the undisturbed native gravel deposits. Any structural fill materials used on-site should be compacted to a minimum of 95 percent of the modified Proctor density. Any existing soft silt rich material (6.5 to 10 feet at the explorations) should be completely removed from the footprint of the foundation/structure footprint, extending outward from the bottom of the foundation to the undisturbed native gravel deposits at a slope of 1H:1V.

Any material removed during the initial site grading and excavation activities, which does not contain any organic/deleterious material, and has relatively low silt content (less than approximately 15 percent passing the #200 sieve), can be re-used on-site as structural fill. Proper placement and compaction techniques need to be applied during the backfill process (see Section 8.1 of this report for more details). Additional laboratory testing may be required to verify the frost susceptibility of any excavated soil for use in shallow fill and pavement section applications.

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.

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7.2 Shallow Foundations

For the purposes of this report, a shallow foundation can be considered any foundation which will require over-excavation of any soft silt rich deposits prior to structural fill placement and/or foundation construction. Details of the foundation design are presented in the paragraphs below.

7.2.1 Soil Bearing Capacity

Concrete foundations placed on either the undisturbed native gravel deposits or on structural fill pads (constructed directly above the undisturbed native gravel deposits) may be designed for an allowable soil bearing capacity of 3,000 pounds per square foot (psf) and 4,000 psf with a burial depth of 1 foot and 3.5 feet respectively. Larger footings (smallest dimension greater than two feet in plan dimension) may be designed for greater bearing capacities at a rate of 500 psf for every additional horizontal linear foot of footing up to a maximum value of 6,000 psf.

The soil bearing capacity may be increased by one-third (1/3) to accommodate short-term wind and/or seismic loads.

7.2.2 Continuous Strip Footings and Spread Footings

Continuous strip footings and/or spread footings can be founded directly onto either: 1) the undisturbed native gravel deposits, or 2) properly placed structural fill (located directly above the undisturbed native gravel deposits). The minimum horizontal dimension for continuous strip footings should be 16 inches. The minimum horizontal dimension for individual spread footings should be 24 inches. Interior footings should extend a minimum of 12 inches below the finished interior grade to achieve the recommended allowable soil bearing capacity and help resist any lateral forces. Perimeter and exterior footing burial depths will vary, however, based on whether or not the foundation subgrade will be allowed to freeze during winter months (See Sections 7.2.5 and 7.2.6 of this report for more details regarding foundation insulation and cold foundations). 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 4). We discuss the effects of various uplift and lateral forces on foundations in more detail in Sections 7.2.4 and 7.2.7 of this report.

7.2.3 Thickened Edge Slab Foundations and Floor Slabs

Thickened edge slab foundations and/or floor slabs can also be founded directly onto the undisturbed native gravel deposits or properly placed structural fill located directly above the undisturbed native gravel deposits. Thickened slab edges (i.e., perimeter slab footings) should extend a minimum of 16 inches below the finished exterior grade to achieve the recommended allowable soil bearing capacity and help resist any lateral forces. As we mention in Section 7.1 of this report, the upper structural fill material (at or above the footing grade) used to construct the structural pad for a heated building should be relatively free draining (sands and gravels) with less

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than 15% of the fill material passing through a #200 sieve. Furthermore, 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 slabs constructed directly on the undisturbed native gravel deposits or on properly constructed granular fill pads (located directly above the undisturbed native gravel deposits), as we described above, may be designed using a modulus of subgrade reaction of k_1=220 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 load footprints bearing onto the undisturbed sand/silty sand deposits or on properly placed granular structural fill located directly above the undisturbed sand/silty sand deposits:

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

Where:

B = the load footprint width of a square load 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 load footprint of width B in pci

The following equation (2) can be used for a rectangular load having the dimensions $B \times L$ (in feet) with similar bearing soils as the square footprint 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 load footprint
$k_{(B\,x\,L)}$ = the modulus of subgrade reaction for $B \times L$ rectangular load footprint
B = the least horizontal dimension of a rectangular load footprint
L = the larger horizontal dimension of a rectangular load footprint

7.2.4 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. In Figure 4 of this report, we illustrate 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.

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Frost heaving forces can generate significant footing uplift loads. As such, footings need to be buried sufficiently deep and/or be adequately insulated so as to reduce the potential for freezing of the foundation subgrade and any associated frost heaving forces. For the project site, the minimum burial depth for any uninsulated shallow foundation footings should be as follows (measured from the bottom of the foundation footing):

1. 12 inches (D_1 in Figure 5) for interior footings located entirely within an enclosed, continuously heated space* (measured from the bottom of the footing to the surface of the interior finished grade or bottom of the floor slab);
2. 42 inches (D_2 in Figure 5) for foundation footings located along the perimeter of an enclosed, continuously heated space* (measured from the bottom of the footing to the exterior finished grade); and
3. 96 inches (D_3 in Figure 5) for cold (unheated) footings (measured from the bottom of the footing to the lowest elevation of either the interior or exterior finished grade – including floor slabs). The minimum burial depth (D_3) can be reduced if the cold foundation is placed above a properly constructed NFS fill pad and/or proper amounts of artificial insulation (See Section 7.2.6 of this report for more details regarding cold foundation design).

**The temperature of an enclosed, continuously heated space must be maintained above 40 °F and allow for adequate heat transfer to foundation soils in order for our recommendations to apply.*

7.2.5 Foundation Insulation

Artificial insulation can be used to decrease minimum burial depths for both heated and unheated foundations by helping to reduce the potential for freezing of foundation soils, as well as help increase heating efficiency. We have provided our recommended insulation configurations for both shallow strip/spread footings and thickened edge slab foundations in Figure 6 of this report. For this project site, we recommend using insulation configurations A or B (Figure 6) for a heated shallow foundation. Insulation may be placed beneath of interior floors/slabs. However, no insulation should be placed directly underneath of any perimeter footings, as this can promote freezing of the foundation soils by preventing adequate heat transfer from the interior of the structure to the foundation soils. Alternatively, insulation should be placed along the exterior of the footing/stem wall to prevent freezing (and associated frost heaving) of the foundation soils along the perimeter of the foundation. We have provided our recommended insulation configurations for insulated floors/slabs in Figure 6 of this report (configurations C and D). Other heated shallow foundation insulation configurations do exist, and we should be consulted if alternative foundation insulation configurations are to be utilized for this project so that we can evaluate their suitability as it pertains to the existing site conditions and proposed foundation.

Any subsurface insulation should consist of extruded polystyrene such as DOW Styrofoam™ Highload or UC Industries Foamular. Any subsurface insulation used under 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

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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. Proper bedding material should be used to provide a flat, smooth surface for the insulation.

7.2.6 Cold (Unheated) Shallow Foundations

It is difficult to predict the depth of frost penetration and extent of ice lens formation at any given site. Therefore, we do not recommend the construction of cold (unheated) shallow foundations as the formation of ice lenses beneath of a foundation can result in deformation to the overlying foundation. Therefore, avoid placing shallow foundation footings in unheated areas so as to reduce the potential for differential movements. If cold (unheated) foundations are required, then they should be placed on granular structural pads constructed of NFS fill material (NFS material should have less than 6% of the material passing a #200 sieve) which extends from the minimum cold foundation burial depth (D_3) up to our minimum recommended heated shallow foundation burial depth (D_2). Insulation may be incorporated into the cold foundation design to help protect the foundation soils from freezing. Insulation may be used in lieu of some of the NFS backfill. In terms of insulating properties, one inch of rigid board insulation can be considered equivalent to one foot of NFS fill. A minimum of 18 inches of NFS fill must be present between the bottom of any footing and the top of any insulation to help protect the insulation from damage. We have detailed our recommended insulation configurations for cold shallow foundations in Figure 6 of this report (configurations E and F). We do not recommend the construction of a cold (unheated) thickened edge slab foundation unless it is supported by an appropriately constructed NFS/insulated structural pad (as we discuss above).

Deep foundation systems such as driven piling, helical piers, under-reamed concrete piers, or other deep foundation systems can serve as an alternative means of cold foundation support, as they can provide the uplift resistance needed to counteract any frost heaving/jacking forces. Cost and constructability will typically be the driving force behind which type of cold foundation is ultimately selected for a given project. We can provide specific deep cold foundation recommendations once a foundation system has been selected and loading criteria established.

7.2.7 Lateral Loads for Foundation 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 top of the wall is allowed to deflect after placement of backfill;
2) the type of backfill used;
3) compaction effort; and
4) wall drainage provisions.

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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 0.002 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 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. In Figure 7 of this report, we provide distribution diagrams for various loading conditions. In Table 1 of this report we provide the unit weights to be used with the pressure distribution diagrams included in Figure 7 of this report.

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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	42	t_1	25	t_2
AT-REST	64	t_3	38	t_4
PASSIVE	440	t_5	265	t_6
SEISMIC	16 (UNRESTRAINED)	t_7	9 (RESTRAINED)*	t_8

*For walls less than 8 ft vertical height

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.

7.3 Deep Foundations

For the purposes of this report, a deep foundation can be considered any foundation which transfers foundation loads (both bearing and uplift) through the existing 6.5 to 10 feet of sof silt rich material to the deeper, more competent dense gravel (with limited foundation excavation effort required). As we discuss in Section 6.3 of this report, deep foundations (e.g., pile foundations, etc.) are a suitable alternative to conventional shallow foundations.

The most common type of deep foundation system in the project site area consists of driven steel pipe piling. Steel pipe piling can be obtained in a variety of diameters and wall thicknesses to accommodate a wide-range of applications, and is relatively inexpensive and readily available. Steel pipe piles are typically installed open-ended so that the soil can penetrate the inside of the pile, which helps facilitate efficient pile driving activities. Open-ended steel pipe pile can be driven with or without the use of a re-enforced/hardened drive shoe; which protects the end of the pile from damage during the driving activities. Steel pipe piles can also be installed close-ended, which helps to increase pile bearing capacities in soft, fine-grained soils.

When the foundation loads have been determined, we can provide pile recommendations for the foundation design and loads. Typical minimum embedment depth is 18 feet bgs for cold foundations. A combination of both a shallow and deep foundation may be employed, and we can assist by providing pile configurations once the foundation loads are known. Any pile installation should be completed with quality control inspection to verify the pile configuration and final penetration rate. The final penetration rate is used to determine that the individual piles have the required axial capacity.

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7.4 Underground Utilities

In general, the soils in which deep utility trenches (6.5-10 feet bgs) are to be constructed will likely be at the approximate depth of the transition from the loose silty material to the native medium dense gravel. Any gravity-fed utility trenches extending into the gravel deposits should be a minimum of three feet wide at the bottom with the utility piping located in the center of the trenches. Structural fill should be used to bring the gravity-fed utilities to the proper installation grade.

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 detailed in Section 8.6 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).

7.5 Pavement Sections

Construction of the pavement section for the proposed driveways and parking areas will be guided (in part) by the amount of cut/fill needed to achieve the final grade. The composition, structure, and thickness of the pavement section will be further controlled by the frost susceptibility of, and overall potential for ice lens development within, the subgrade soils.

As discussed in Section 6.4 of this report, given the thickness and soft consistency of the silt rich material, we recommend a "floating" pavement section for this project site. The thickness of "floating" section will be a function of the design vehicle weight. A minimum fill thickness of 36 inches (including asphalt) must be maintained above the geotextile in order to adequately "float" the pavement sections over the existing organic/fill material.

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Table 2: Recommended Floating Pavement Section

SECTION THICKNESS	MATERIAL
2 INCHES MIN.	ASPHALT CONCRETE (AC) PAVEMENT
2 INCHES MAX.	NFS LEVELING COURSE (A.K.A. "D-1" or RAP)
14 INCHES	TYPE C-1
18 INCHES	TYPE A
N/A	GEOTEXTILE FABRIC (REQUIRED)
N/A	EXISTING ORGANIC/FILL MATERIAL

For the project site, we recommend a Type A, Class 2 (i.e., separation) geotextile fabric. The geotextile fabric may be either: 1) woven, or 2) non-woven with perforations. We have provided the various strengths for both a woven and non-woven Type A, Class 2 geotextile fabric in Table 3 of this report.

Table 3: Type A, 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.

The leveling course, Type C-1, and Type A materials used should conform to the specifications we provide in Figure 8 of this report. 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 "D-1" leveling course material currently available in local area 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, we recommend the use of two inches of recycled asphalt pavement (RAP) for the leveling course, as RAP has a low frost susceptibility. Otherwise, the leveling course thickness should be kept to two inches or less to reduce the potential for ice lens formation in the leveling 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.

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7.6 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 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.

8.0 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.

8.1 Earthwork

Any and all fill material used should be placed at 95 percent of the modified Proctor density as determined by ASTM D-1557, unless specifically stated 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.

In our professional experience, structural fill should have less than approximately 10 to 15 percent passing the #200 sieve for ease of placement. Soils with higher silt contents can be used within the foundation footprint. However, the effort required to achieve proper compaction of silt-rich soils may be more costly than purchasing better grade materials. The time of year, existing moisture content, rainfall, air temperature, and fill temperature can all have an impact on the effort required to adequately compact silt-rich material.

Any native coarse-grained 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.

8.2 Heated 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

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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 gravel deposits. As such, any surface water (*e.g.*, from precipitation, snowmelt, etc.) that enters into foundation excavations will tend to dissipate relatively fast. Excess water will 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 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.

8.3 Cold (Unheated) Shallow Foundations

The frost susceptibility of the gravel fill classifies as possibly frost susceptible (as we describe in Section 6.5 of this report) and the shallow silt rich material classifies at F4. The on-site silt rich material is unsuitable to support any cold (unheated) shallow foundations, even if used as properly placed structural fill, without freeze protection, as they may experience ice lens development and/or thaw-weakening, which could result in damages to the proposed foundations. As we mention in Section 7.2.6 of this report, the minimum cold foundation burial depth (D_3) can be reduced, if the foundation is placed on a structural pad constructed of NFS fill. The NFS structural pad thickness may be reduced by using insulation at a rate of one inch of insulation to one foot of NFS material.

8.4 Underground Utilities

We expect that utility trench wall stability in the silt rich material and gravel deposits to be poor to moderate. 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.

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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.

8.5 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 concrete (AC) pavement surfaces is two inches. The minimum thickness of any Portland cement concrete (PCC) pavement surfaces will be a function of the reinforcement required. All applicable ACI and IBC standards should be followed.

8.6 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.

8.7 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.

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9.0 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 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.

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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.

10.0 CLOSURE

We (Northern Geotechnical Engineering, Inc. d.b.a. Terra Firma Testing) prepared this report exclusively for the use of TBC and their consultants/contractors/etc. for use in the design and construction of the proposed improvements. We should be notified if significant changes are to occur in the nature, design, or location of the proposed improvements 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 log, appendices, etc.) so that all of the pertinent information contained within is effectively 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 log, 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.

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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 9.0 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.

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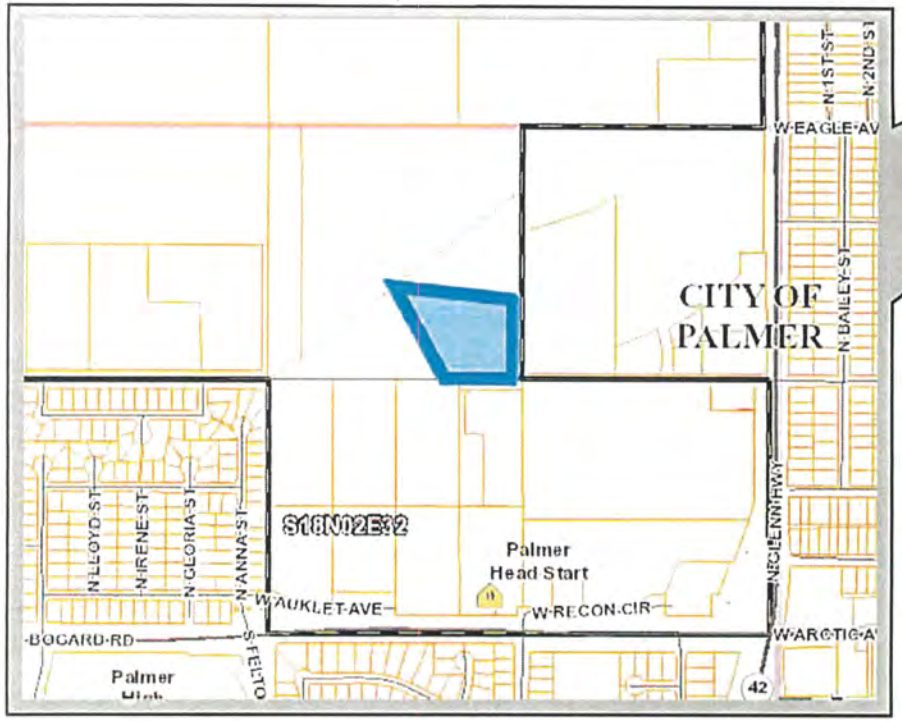
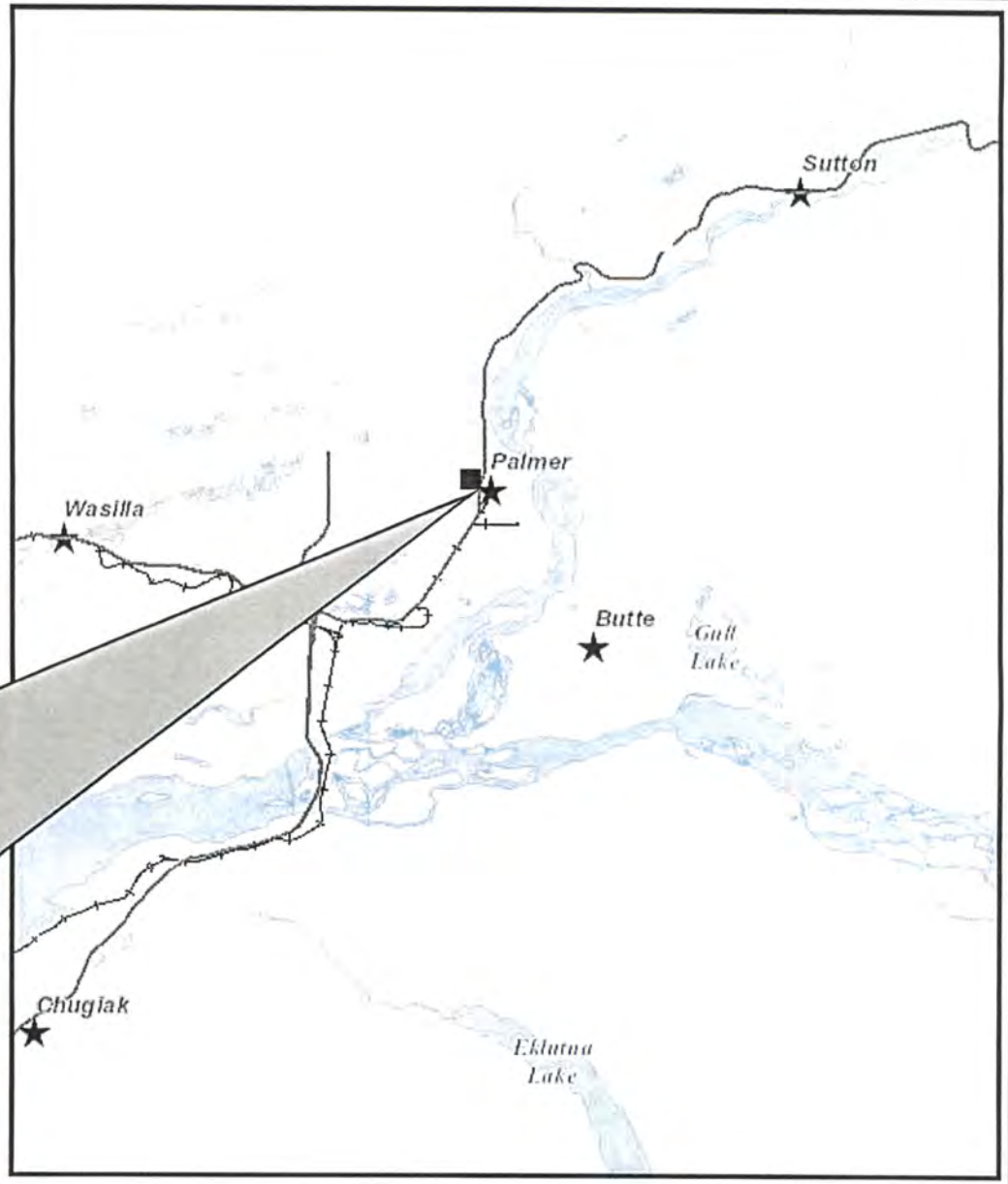
REPORT
FIGURES





NORTHERN GEOTECHNICAL ENGINEERING, INC.
TERRA FIRMA TESTING

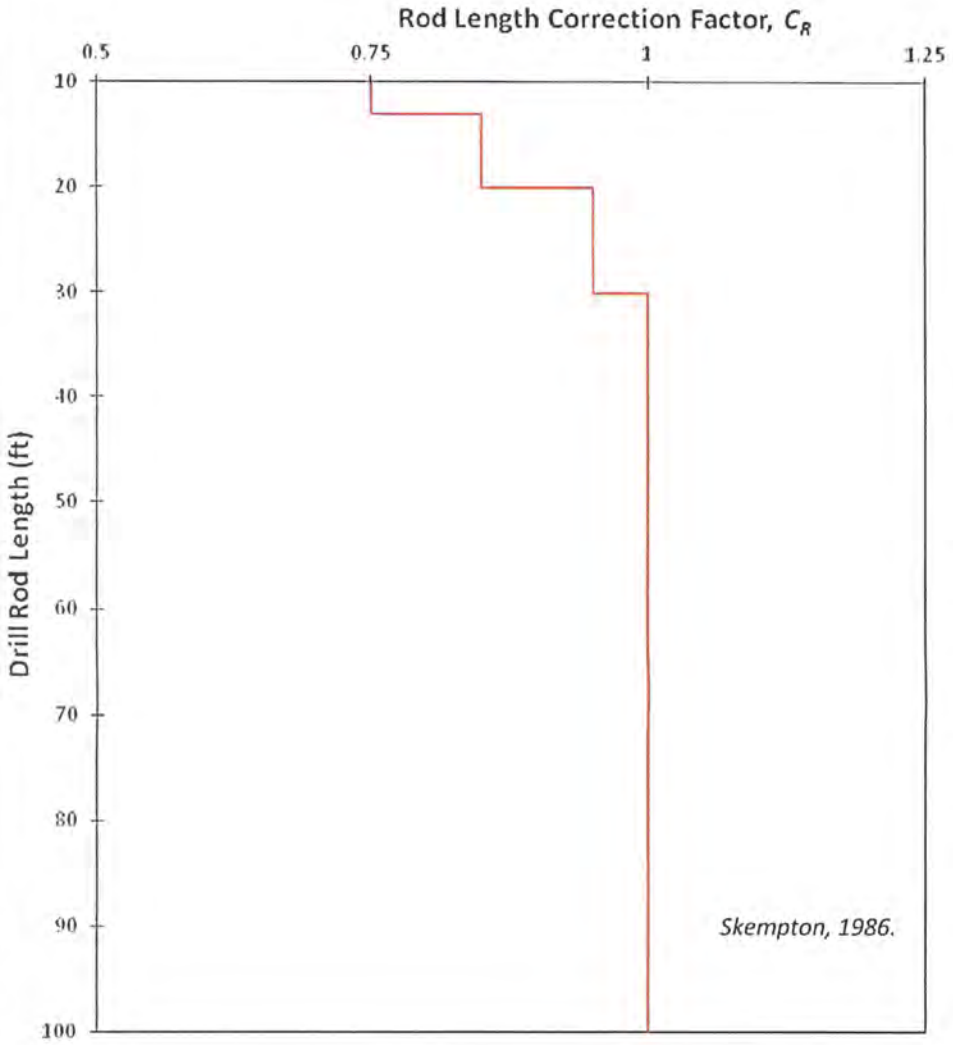
FIGURE TITLE: PROJECT SITE LOCATION MAP	
PROJECT NAME: 12821 SCOTT ROAD	PROJECT ID: 5951-20
PROJECT LOCATION: PALMER, ALASKA	FIGURE NUMBER: 1

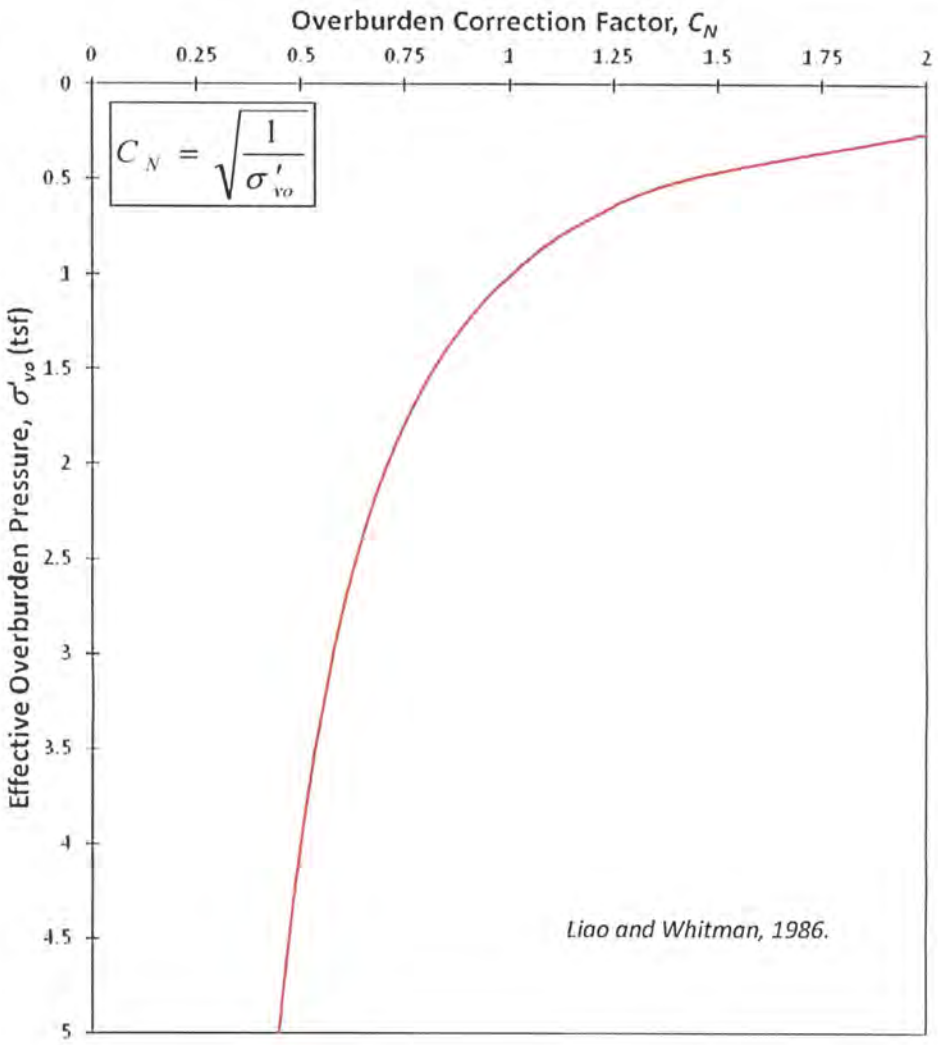
DRAWING PROVIDED BY CLIENT

● = APPROXIMATE BOREHOLE LOCATION

NORTHERN GEOTECHNICAL ENGINEERING, INC.
TERRA FIRMA TESTING

FIGURE TITLE: PROPOSED SITE LAYOUT & EXPLORATION LOCATION MAP	
PROJECT NAME: 12821 SCOTT ROAD	PROJECT ID: 5953-20
PROJECT LOCATION: PALMER, ALASKA	FIGURE NUMBER: 2





Notes:

- OVERBURDEN CORRECTION FACTOR IS USED ONLY FOR COHESIONLESS SOILS
- C_N IS THE RATIO OF THE MEASURED BLOW COUNT TO WHAT THE BLOW COUNT WOULD BE AT AN OVERBURDEN PRESSURE OF 1 TON/FT^2
- Σ'_{VO} IS THE EFFECTIVE OVERBURDEN PRESSURE AT THE POINT OF MEASUREMENT (TON/FT^2)

NORTHERN GEOTECHNICAL ENGINEERING, INC.
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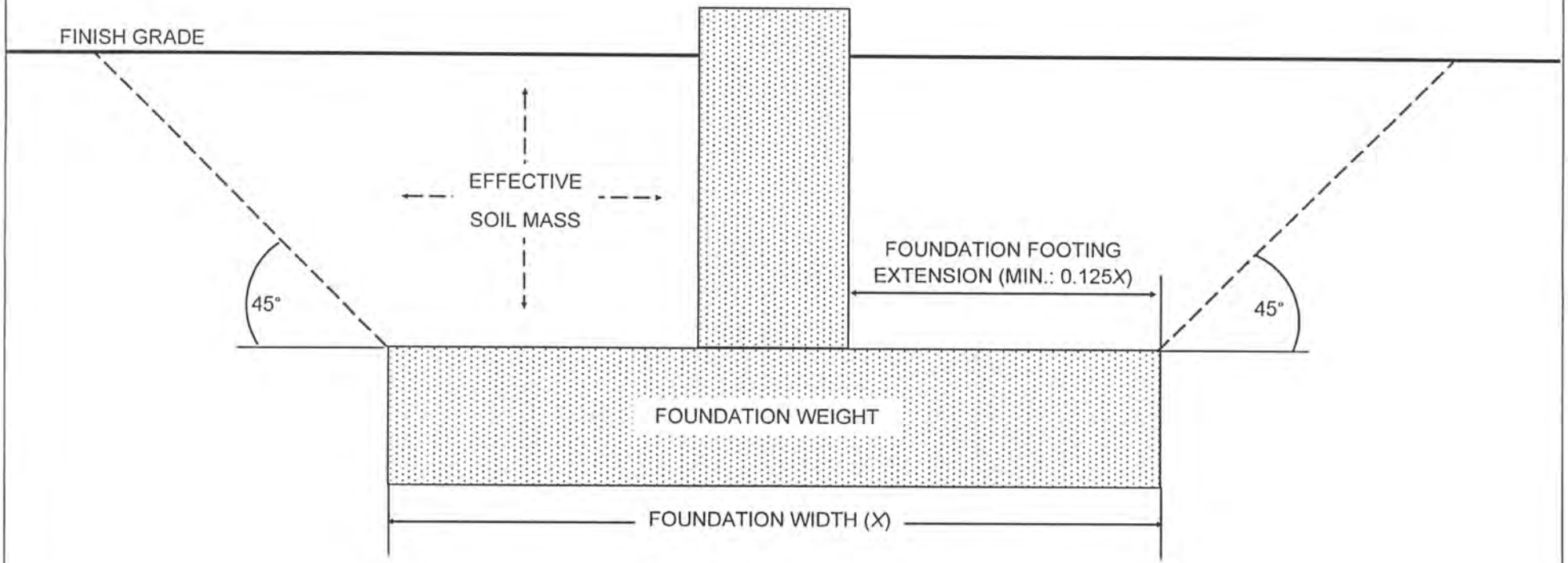
FIGURE TITLE: BLOW COUNT CORRECTIONS	
PROJECT NAME: 12821 SCOTT ROAD	PROJECT ID: 5953-20
PROJECT LOCATION: PALMER, ALASKA	FIGURE NUMBER: 3

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



= FOOTING / STEM WALL

DRAWING NOT TO SCALE

NORTHERN GEOTECHNICAL ENGINEERING, INC.
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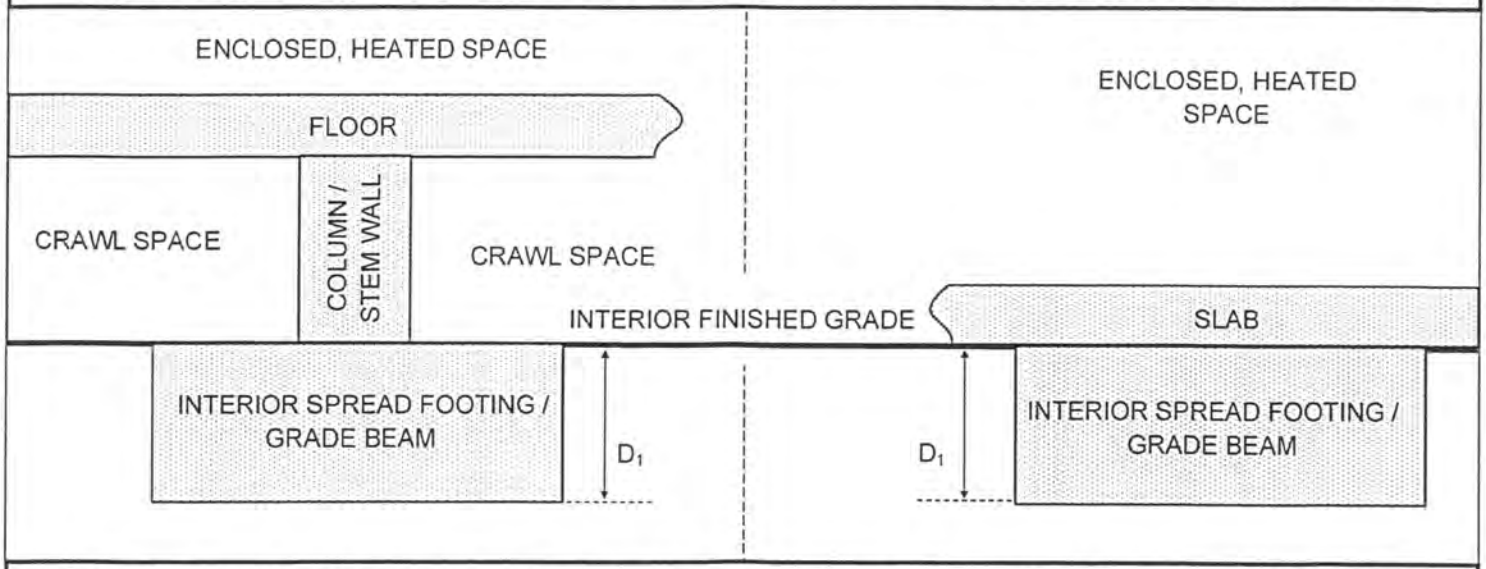
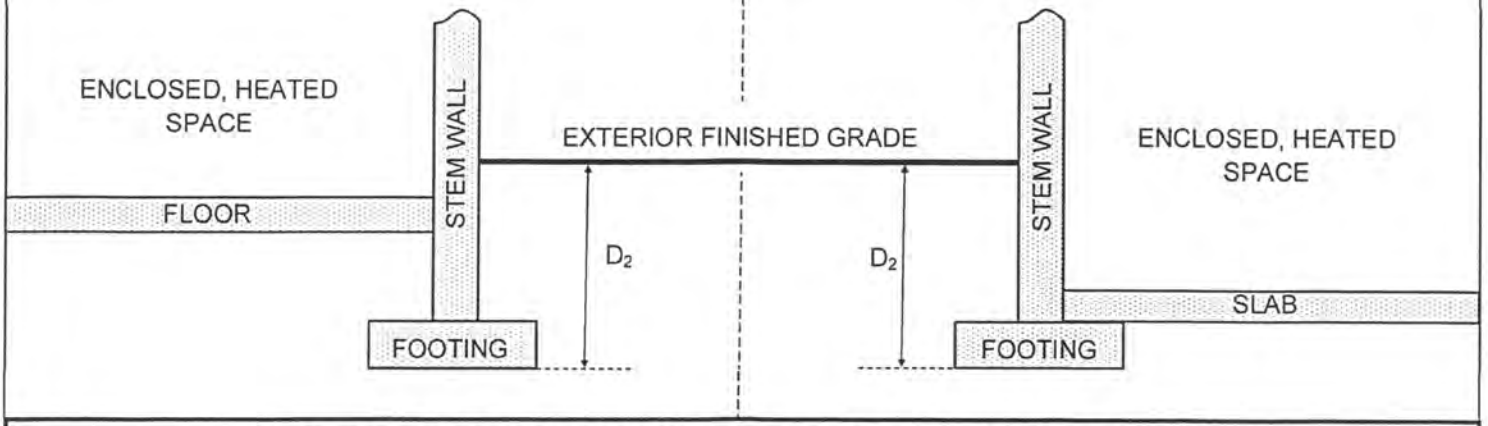
FIGURE TITLE: FOOTING UPLIFT CAPACITY DIAGRAM	
PROJECT NAME: 12821 SCOTT ROAD	PROJECT ID: 5953-20
PROJECT LOCATION: PALMER, ALASKA	FIGURE NUMBER: 4

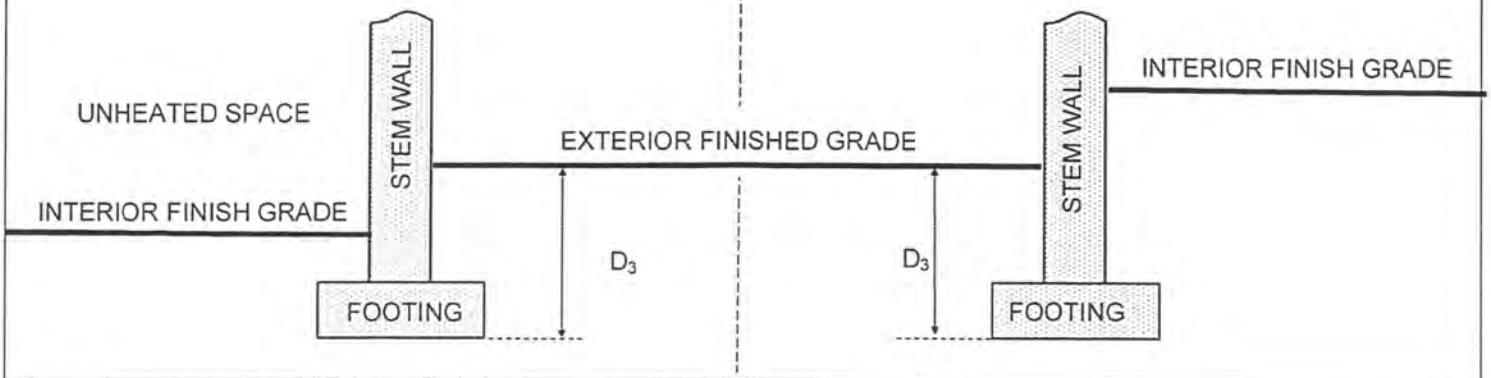
SHALLOW FOUNDATION FOOTING LOCATED ENTIRELY WITHIN AN ENCLOSED, CONTINUOUSLY HEATED SPACE*



SHALLOW FOUNDATION FOOTING LOCATED ALONG THE PERIMETER OF AN ENCLOSED, CONTINUOUS HEATED SPACE*



SHALLOW FOUNDATION FOOTING EXPOSED TO FREEZING TEMPERATURES



*HEATED FOUNDATION TEMPERATURE MUST BE CONTINUOUSLY MAINTAINED AT/ABOVE 40°F

DRAWING NOT TO SCALE

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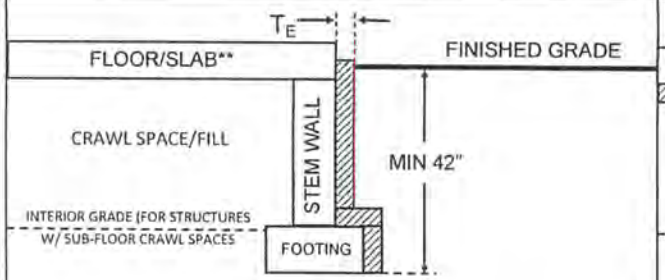
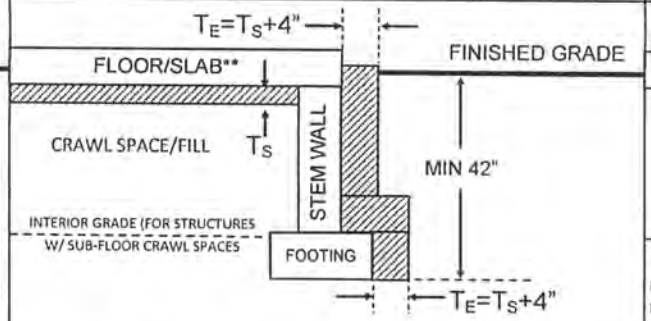
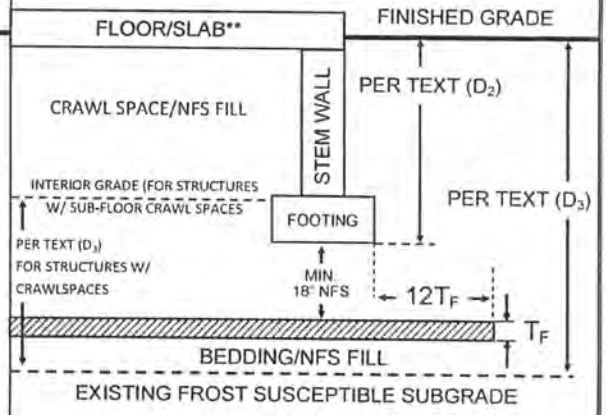
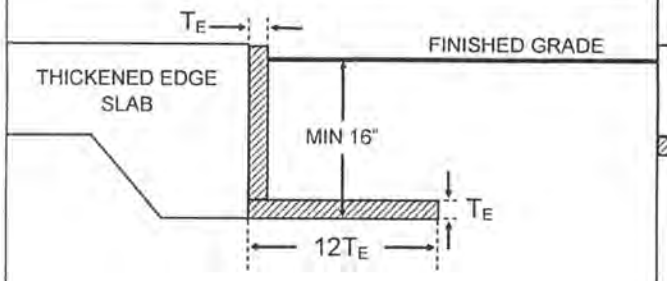
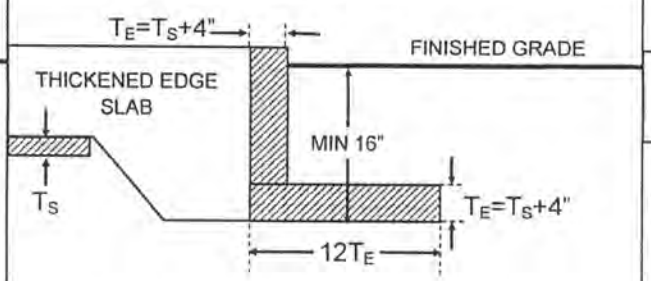
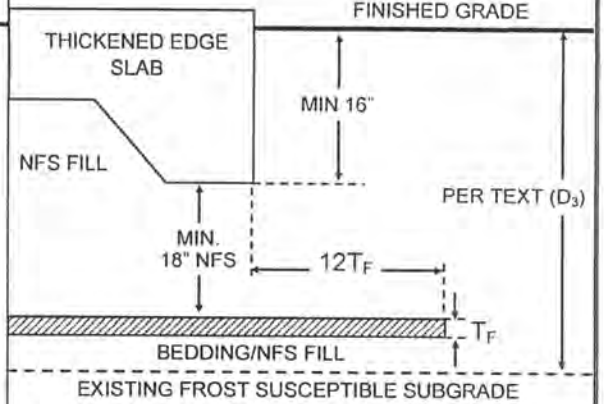
TERRA FIRMA TESTING

FIGURE TITLE	UNINSULATED SHALLOW FOUNDATION CONFIGURATIONS
PROJECT NAME	12821 SCOTT ROAD
PROJECT ID	5953-20
PROJECT LOCATION	PALMER, ALASKA
FIGURE NUMBER	5

	HEATED FOUNDATIONS (CONTINUOUSLY HEATED INTERIOR SPACE)*		COLD (UNHEATED) FOUNDATIONS
STRIP FOOTING/STEM WALL	 SOILS PREPARED AS DESCRIBED IN TEXT NOTE: INSULATION FOR HEATING EFFICIENCY PURPOSES ONLY. IF INSULATION IS PLACED UNDER FLOOR/SLAB USE CONFIGURATION C. T_E CAN BE ANY THICKNESS CONFIGURATION A	 SOILS PREPARED AS DESCRIBED IN TEXT NOTE: DO NOT INSULATE BOTTOM OF FOOTING. T_S CAN BE ANY THICKNESS. EXTERIOR INSULATION NOT REQUIRED IF FLOOR IS NOT INSULATED (SEE CONFIGURATION A) CONFIGURATION C	 NOTE: INSULATION OPTIONAL TO REDUCE DEPTH OF NFS FILL AT A RATE OF 1" INSULATION TO 12" NFS FILL. T_F MIN. = 1" CONFIGURATION E
THICKENED EDGE SLAB	 SOILS PREPARED AS DESCRIBED IN TEXT NOTE: IF INSULATION IS PLACED UNDER SLAB USE CONFIGURATION D. T_E MINIMUM = 2" CONFIGURATION B	 SOILS PREPARED AS DESCRIBED IN TEXT NOTE: DO NOT INSULATE BOTTOM OF THICKENED EDGE FOOTING. T_S CAN BE ANY THICKNESS. CONFIGURATION D	 NOTE: INSULATION OPTIONAL TO REDUCE DEPTH OF NFS FILL AT A RATE OF 1" INSULATION TO 12" NFS FILL. T_F MIN. = 1" CONFIGURATION F

T_F = INSULATION THICKNESS UNDER ENTIRE FOUNDATION (INCHES)
T_S = INSULATION THICKNESS UNDER FLOOR/SLAB ONLY (INCHES)
T_E = INSULATION ALONG EXTERIOR OF FOUNDATION (INCHES)

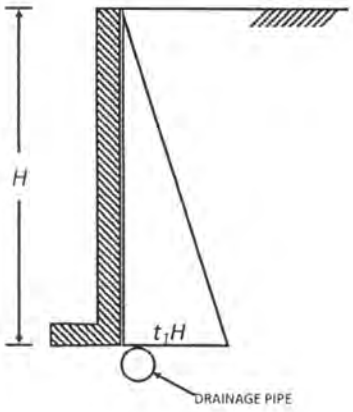
*HEATED FOUNDATION TEMPERATURE MUST BE CONTINUOUSLY MAINTAINED AT/ABOVE 40°F
**FLOOR SYSTEM CAN BE STRUCTURAL (W/ CRAWLSPACE) OR SLAB-ON-GRADE
▨ = RIGID BOARD INSULATION

DRAWING NOT TO SCALE

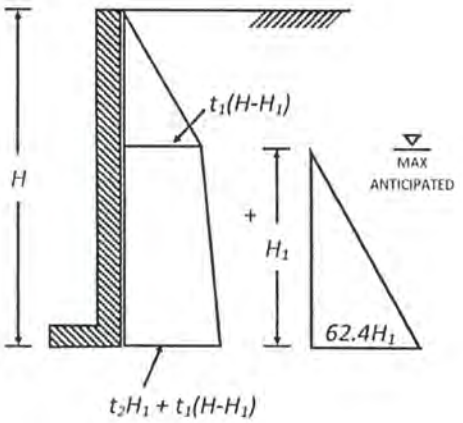
NORTHERN GEOTECHNICAL ENGINEERING, INC.
TERRA FIRMA TESTING

FIGURE TITLE:	INSULATED SHALLOW FOUNDATION CONFIGURATIONS
PROJECT NAME:	12821 SCOTT ROAD
PROJECT ID:	5953-20
PROJECT LOCATION:	PALMER, ALASKA
FIGURE NUMBER:	6

ACTIVE PRESSURE CONDITION

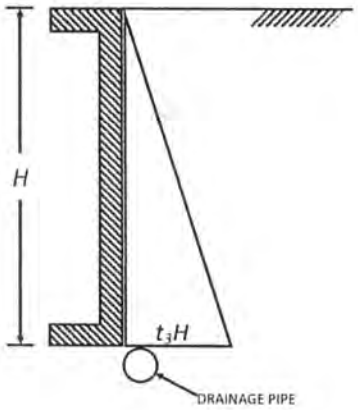


WITH DRAINAGE

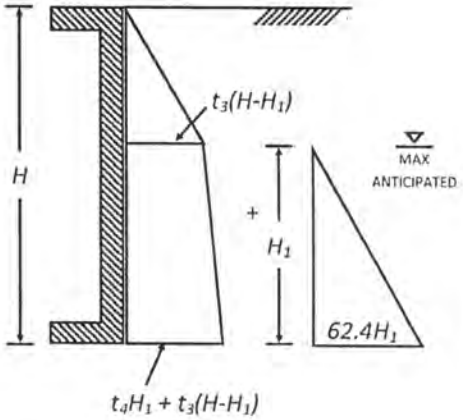


WITHOUT DRAINAGE

AT-REST PRESSURE CONDITION

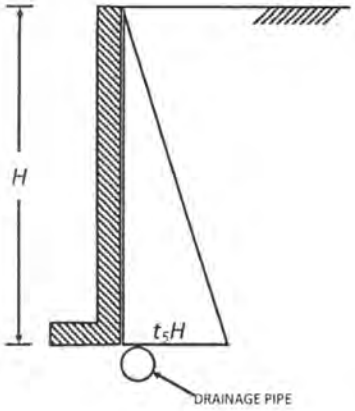


WITH DRAINAGE

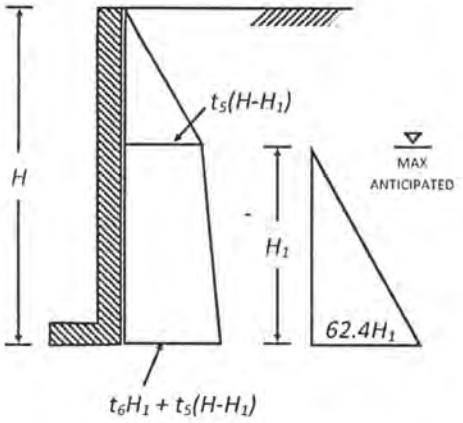


WITHOUT DRAINAGE

PASSIVE PRESSURE CONDITION



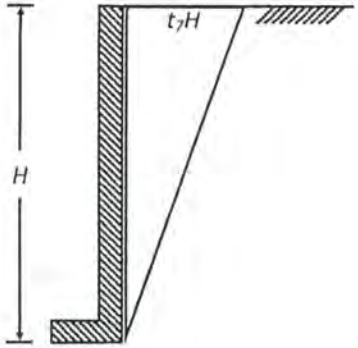
WITH DRAINAGE



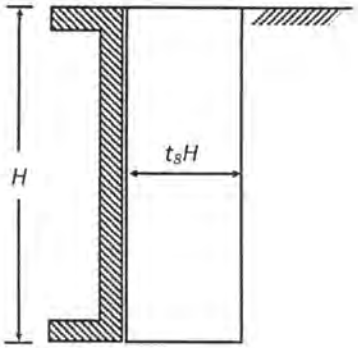
WITHOUT DRAINAGE

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



UNRESTRAINED



RESTRAINED

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

NORTHERN GEOTECHNICAL ENGINEERING, INC.
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FIGURE TITLE: LATERAL RETAINING WALL PRESSURE SCHEMATICS	
PROJECT NAME: 12821 SCOTT ROAD	PROJECT ID: 5953-20
PROJECT LOCATION: PALMER, ALASKA	FIGURE NUMBER: 7

AGGREGATE GRADATION FOR BASE AND SURFACE COURSE

SIEVE SIZE	GRADATION - % BY MASS PASSING			
	BASE - (C-1)	BASE - (D-1)	SURFACE - (E-1)	SURFACE - (F-1)
1-1/2"	100			
1"	70-100	100	100	100
3/4"	60-90	70-100	70-100	85-100
3/8"	45-75	50-80	50-85	60-100
#4	30-60	35-65	35-65	50-85
#8	22-52	20-50	20-50	40-70
#50	6-30	6-30	15-30	25-45
#200	0-6	0-6	8-15	8-20
0.02	0-3	0-3	0-3	0-3

MATERIALS LISTED ABOVE MUST CONSIST OF CRUSHED STONE OR CRUSHED GRAVEL CONSISTING OF SOUND, TOUGH, DURABLE PEBBLES OR ROCK FRAGMENTS OF UNIFORM QUALITY. MUST BE FREE FROM CLAY BALLS, VEGTABLE MATTER AND OTHER DELETE-

SELECTED MATERIAL

TYPE A. AGGREGATE CONTAINING NO MUCK, FROZEN MATERIAL, ROOTS, SOD OR OTHER DELETERIOUS MATTER AND WITH A PLASTICITY INDEX NOT GREATER THAN 6 AS TESTED BY ATM 204 AND ATM 205. MEET THE FOLLOWING GRADATION AS TESTED BY ATM 304:

SIEVE	% BY MASS PASSING
#4	20-60
#200*	0-6

TYPE B. AGGREGATE CONTAINING NO MUCK, FROZEN MATERIAL, ROOTS, SOD OR OTHER DELETERIOUS MATTER AND WITH A PLASTICITY INDEX NOT GREATER THAN 6 AS TESTED BY ATM 204 AND ATM 205. MEET THE FOLLOWING GRADATION AS TESTED BY ATM 304:

SIEVE	% BY MASS PASSING
#200*	0-10

TYPE C. EARTH, SAND, GRAVEL, ROCK, OR COMBINATIONS THEREOF CONTAINING NO MUCK, PEAT, FROZEN.MATERIAL, ROOTS, SOD, OR OTHER DELETERIOUS MATTER AND IS COMPACTABLE UNDER THE PROVISIONS OF SUBSECTIONS 203-3.04 OR 203-3.05.

* GRADATION SHALL BE DETERMINED ON THAT PORTION PASSING THE 3" SCREEN

AGGREGATE GRADATION FOR SUBBASE

SIEVE SIZE	GRADATION - % BY MASS PASSING				
	A	B	C	D	E
4"	100	--	--	--	--
2"	85-100	100	--	--	--
1"	--	--	100	--	--
3/4"	--	--	--	100	--
#4	15-60	15-60	40-75	45-80	--
#16	--	--	20-43	23-50	--
#200*	0-10	0-6	4-10	4-12	0-6
0.02*	0-3	0-3	0-3	0-3	0-3

* GRADATION SHALL BE DETERMINED ON THAT PORTION PASSING THE 3" SCREEN

MODIFIED FROM SECTIONS 703-2.03, 703-2.07 AND 703-2.9 OF AK DOT & PF STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION - 2015

APPENDIX A

GRAPHICAL SOIL BORING LOGS

Northern Geotechnical Engineering, Inc.
and Terra Firma Testing
11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934

EXPLORATION B1

NGE-TFT PROJECT NAME: 12821 E. Scott Road
NGE-TFT PROJECT NUMBER: 5953-21
PROJECT LOCATION: Palmer, AK
EXPLORATION CONTRACTOR: Discovery Drilling, Inc.
EXPLORATION EQUIPMENT: Geoprobe 6712DT
EXPLORATION METHOD: Hollow Stem Auger
SAMPLING METHOD: MPT w/ 340lb autohammer
LOGGED BY: C. Banzhaf
DATE/TIME STARTED: 3/17/2021 @ 9:15:00 AM
DATE/TIME COMPLETED: 3/17/2021 @ 11:45:00 AM
EXPLORATION LOCATION: See report Figure 2
GROUND ELEVATION: Not Known
GROUNDWATER (ATD): N/E
GROUNDWATER (): N/E
EXPLORATION COMPLETION: Backfilled with cuttings and pea gravel
WEATHER CONDITIONS: Partly cloudy, 15°F

DEPTH (ft)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	RECOVERY (in)	FIELD BLOWS	$(N_1)_{60}$	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	REMARKS/NOTES
0			**SILT WITH ORGANICS** (ML), brown		S1	18	9 10 11	N/A		S1	S1 MC = 20.6%	
5			**SILT WITH SAND** (ML), trace rootlets, soft, gray / brown, moist		S2	18	7 6 5	N/A		S2	S2 MC = 21.8% 0.0% gravel, 16.9% sand, 83.1% silt P0.02 = 23.5% OC = 5.1% FC = F4	
					S3	14	1 2 1	2		S3		
					S4	18	1 2 9	N/A		S4		
10			**GRAVEL** (GP), medium dense, brown, moist								S3 MC = 26.6%	
					S5	16	8 9 12	21		S5	S4 MC = 25.8%	Fractured rock in sampler.
15											S5 MC = 2.5% P200 = 3.8%	
					S6	16	9 14 35	46		S6	S6 MC = 7.6%	
			SILTY GRAVEL (GM), dense to very dense, brown									
20			**SAND WITH GRAVEL AND SILT** (SP), dense to very dense, gray, moist		S7	18	15 28 38	62		S7	S7 MC = 9.8%	
			Bottom of borehole at 24.1 ft bgs.		S8	0	30 1"	N/A		S8		

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.

Northern Geotechnical Engineering, Inc.
and Terra Firma Testing
11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934

EXPLORATION B2

NGE-TFT PROJECT NAME: 12821 E. Scott Road
NGE-TFT PROJECT NUMBER: 5953-21
PROJECT LOCATION: Palmer, AK
EXPLORATION CONTRACTOR: Discovery Drilling, Inc.
EXPLORATION EQUIPMENT: Geoprobe 6712DT
EXPLORATION METHOD: Hollow Stem Auger
SAMPLING METHOD: MPT w/ 340lb autohammer
LOGGED BY: C. Banzhaf
DATE/TIME STARTED: 3/17/2021 @ 12:15:00 PM
DATE/TIME COMPLETED: 3/17/2021 @ 3:30:00 PM
EXPLORATION LOCATION: See report Figure 2
GROUND ELEVATION: Not Known
▽ GROUNDWATER (ATD): N/E
▼ GROUNDWATER (): N/E
EXPLORATION COMPLETION: Backfilled with cuttings and pea gravel
WEATHER CONDITIONS: Partly cloudy, 15°F

DEPTH (ft)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	RECOVERY (in)	FIELD BLOWS	$(N_1)_{60}$	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	REMARKS/NOTES
0			**SILT** (ML), with rootlets, soft, brown and gray		S1	18	3 2 2	N/A		S1	S1 MC = 31.1%	
					S2	16	3 1 1	N/A		S2	S2 MC = 26.3%	
5					S3	18	1 1 1	2		S3	S3 MC = 27.5% 0.0% gravel, 14.8% sand, 85.2% silt P0.02 = 25.7% FC = F4	Drilling indicated a cobble from 6.5-7.5 ft bgs. Fractured rock in sampler, drilling indicated cobble from 9.5-10 ft bgs.
			GRAVEL (GP), dense, brown to gray, moist		S4	8	13 9 12	24		S4	S4 MC = 1.7% P200 = 6.5%	
10					S5	6	10 15 15	30		S5	S5 MC = 1.8%	
15					S6	18	30 24 20	41		S6	S6 MC = 8.5%	
20			**SAND** (SP), dense, gray, moist		S7	10	32 50 4"	N/A		S7	S7 MC = 7.2%	
			Bottom of borehole at 20.8 ft bgs.									

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Anchorage, AK 99515
Telephone: 907-344-5934

EXPLORATION B3

NGE-TFT PROJECT NAME: 12821 E. Scott Road
NGE-TFT PROJECT NUMBER: 5953-21
PROJECT LOCATION: Palmer, AK
EXPLORATION CONTRACTOR: Discovery Drilling, Inc.
EXPLORATION EQUIPMENT: CME 75
EXPLORATION METHOD: Hollow Stem Auger
SAMPLING METHOD: MPT w/ 340lb autohammer
LOGGED BY: C. Banzhaf
DATE/TIME STARTED: 3/18/2021 @ 9:30:00 AM
DATE/TIME COMPLETED: 3/18/2021 @ 10:30:00 AM
EXPLORATION LOCATION: See report Figure 2
GROUND ELEVATION: Not Known
▽ GROUNDWATER (ATD): N/E
▼ GROUNDWATER (): N/E
EXPLORATION COMPLETION: Backfilled with cuttings and pea gravel
WEATHER CONDITIONS: Cloudy, 9°F

DEPTH (ft)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	RECOVERY (in)	FIELD BLOWS	$(N_1)_{60}$	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	REMARKS/NOTES
0			**ORGANIC SILT (ML)**		S1	18	8 7 6	N/A		S1	S1 MC = 40.1%	
5			**SILTY SAND TO SILT** (SM), with rootlets, very loose, brown and olive, moist, fine grained		S2	6	4 2 1	2		S2	S2 MC = 25.2%	
					S3	14	1 0 1	1		S3	S3 MC = 24.7% P200 = 47.8%	
10					S4	4	2 1 1	2		S4	S4 MC = 23.8%	
			SAND (SP), loose, brown, moist, medium to coarse grained		S5	18	2 3 5	8		S5	S5 MC = 9.3%	Fractured rock in shoe of sampler.
15			**GRAVEL** (GP), dense, brown, moist		S6	18	12 20 30	47		S6	S6 MC = 6.0%	
20												Tooling lost in hole preventing further sampling.

Bottom of borehole at 20.0 ft bgs.

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EXPLORATION B4

NGE-TFT PROJECT NAME: 12821 E. Scott Road
NGE-TFT PROJECT NUMBER: 5953-21
PROJECT LOCATION: Palmer, AK
EXPLORATION CONTRACTOR: Discovery Drilling, Inc.
EXPLORATION EQUIPMENT: CME 75
EXPLORATION METHOD: Hollow Stem Auger
SAMPLING METHOD: MPT w/ 340lb autohammer
LOGGED BY: C. Banzhaf
DATE/TIME STARTED: 3/18/2021 @ 11:00:00 AM
DATE/TIME COMPLETED: 3/18/2021 @ 12:15:00 PM
EXPLORATION LOCATION: See report Figure 2
GROUND ELEVATION: Not Known
▽ GROUNDWATER (ATD): N/E
▼ GROUNDWATER (): N/E
EXPLORATION COMPLETION: Backfilled with cuttings and pea gravel
WEATHER CONDITIONS: Cloudy, 11°F

DEPTH (ft)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	RECOVERY (in)	FIELD BLOWS	$(N_1)_{60}$	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	REMARKS/NOTES
0			**SILT WITH ORGANICS** (ML), very soft, brown		S1	18	4 13 7	N/A		S1	S1 MC = 17.0%	
			SILT WITH SAND (ML), with rootlets, soft, gray and brown		S2	3	3 2 1	2		S2	S2 MC = 24.1% P200 = 69.9% OC = 6.2%	
5					S3	3	2 2 1	2		S3	S3 MC = 17.8%	Drilling indicated cobbles and boulders.
			SAND WITH SILT (SP-SM), brown, moist		S4	8	3 50 4"	N/A		S4	S4 MC = 19.4%	
10			**GRAVEL WITH SILT AND SAND** (GP-GM), firm, brown, moist		S5	16	15 20 40	59		S5	S5 MC = 1.6% 54.6% gravel, 40.0% sand, 5.4% silt P0.02 = 2.8% FC = PFS	
15					S6	18	21 11 21	30		S6	S6 MC = 7.7%	
20					S7	8	22 50 5"	N/A		S7	S7 MC = 2.9%	Fractured rocks in sampler.
25					S8	8	37 50 3"	N/A		S8	S8 MC = 2.5%	Fractured rocks in sampler.
			Bottom of borehole at 25.8 ft bgs.									

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EXPLORATION B5

NGE-TFT PROJECT NAME: 12821 E. Scott Road
NGE-TFT PROJECT NUMBER: 5953-21
PROJECT LOCATION: Palmer, AK
EXPLORATION CONTRACTOR: Discovery Drilling, Inc.
EXPLORATION EQUIPMENT: CME 75
EXPLORATION METHOD: Hollow Stem Auger
SAMPLING METHOD: MPT w/ 340lb autohammer
LOGGED BY: C. Banzhaf
DATE/TIME STARTED: 3/18/2021 @ 1:15:00 PM
DATE/TIME COMPLETED: 3/18/2021 @ 2:15:00 PM
EXPLORATION LOCATION: See report Figure 2
GROUND ELEVATION: Not Known
▽ GROUNDWATER (ATD): N/E
▼ GROUNDWATER (3/22/2021 11:10:00 AM): N/E
EXPLORATION COMPLETION: See comments at end of log
WEATHER CONDITIONS: Fair, 19°F

DEPTH (ft)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	RECOVERY (in)	FIELD BLOWS	$(N_1)_{60}$	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0			**SILT WITH SAND** (ML), with rootlets, soft, brown and gray, moist		S1	18	7 9 5	N/A		S1	S1 MC = 25.9% P200 = 69.7%	
					S2	6	2 1 0	2		S2	S2 MC = 15.8%	
5					S3	18	2 1 2	4		S3	S3 MC = 24.4%	
			SAND WITH SILT TO SILTY SAND (SP-SM), loose to medium dense, brown, moist		S4	18	3 3 4	8		S4	S4 MC = 4.5% P200 = 11.0%	
10					S5	18	4 4 4	8		S5	S5 MC = 5.6% 0.0% gravel, 92.7% sand, 7.3% silt	
15			**GRAVEL** (GP), dense, brown, wet		S6		20 50 4"	N/A		S6		
20					S7	6	19 50 4"	N/A		S7	S7 MC = 6.6%	

Bottom of borehole at 20.8 ft bgs.
Set 1" PVC to BOH. Bottom 10 ft slotted casing. Backfilled with cuttings and pea gravel.

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.

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EXPLORATION B6

NGE-TFT PROJECT NAME: 12821 E. Scott Road
NGE-TFT PROJECT NUMBER: 5953-21
PROJECT LOCATION: Palmer, AK
EXPLORATION CONTRACTOR: Discovery Drilling, Inc.
EXPLORATION EQUIPMENT: CME 75
EXPLORATION METHOD: Hollow Stem Auger
SAMPLING METHOD: MPT w/ 340lb autohammer
LOGGED BY: C. Banzhaf
DATE/TIME STARTED: 3/18/2021 @ 3:15:00 PM
DATE/TIME COMPLETED: 3/18/2021 @ 4:30:00 PM
EXPLORATION LOCATION: See report Figure 2
GROUND ELEVATION: Not Known
▽ GROUNDWATER (ATD): N/E
▼ GROUNDWATER (): N/E
EXPLORATION COMPLETION: Backfilled with cuttings
WEATHER CONDITIONS: Sunny, light breeze, 21°F

DEPTH (ft)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	RECOVERY (in)	FIELD BLOWS	$(N_1)_{60}$	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	REMARKS/NOTES
0			**SILT** (ML), soft, brown and gray, moist									
					S1	14	14 6 10	N/A		S1	S1 MC = 36.1%	
5					S2	18	6 1 1	2		S2	S2 MC = 27.5% 0.0% gravel, 14.4% sand, 85.6% silt P0.02 = 44.0% FC = F4	
			SILTY SAND (SM), medium dense, brown, moist		S3	18	2 1 15	13		S3	S3 MC = 18.7%	
10			**GRAVEL** (GP), medium dense, brown, moist		S4	14	9 9 7	16		S4	S4 MC = 1.8%	
15			**SILTY GRAVEL** (GM), dense, brown, moist		S5	14	17 20 25	42		S5	S5 MC = 6.3%	Drilling indicates cobbles/boulders.
20			Bottom of borehole at 20.8 ft bgs.		S6	0	30 50 3"	N/A		S6	S6 MC = 4.1%	

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EXPLORATION IT1

NGE-TFT PROJECT NAME: 12821 E. Scott Road
NGE-TFT PROJECT NUMBER: 5953-21
PROJECT LOCATION: Palmer, AK
EXPLORATION CONTRACTOR: Discovery Drilling, Inc.
EXPLORATION EQUIPMENT: CME 75
EXPLORATION METHOD: Hollow Stem Auger
SAMPLING METHOD: MPT w/ 340lb autohammer
LOGGED BY: C. Banzhaf
DATE/TIME STARTED: 3/18/2021 @ 2:25:00 PM
DATE/TIME COMPLETED: 3/18/2021 @ 3:00:00 PM
EXPLORATION LOCATION: See report Figure 2
GROUND ELEVATION: Not Known
▽ GROUNDWATER (ATD): N/E
▼ GROUNDWATER (): N/E
EXPLORATION COMPLETION: See comments at end of log
WEATHER CONDITIONS: Fair, light breeze, 20°F

DEPTH (ft)	GRAPHIC LOG	FROZEN SOILS	MATERIAL DESCRIPTION	SAMPLE TYPE	FIELD SAMPLE ID	FIELD BLOWS	$(N_1)_{60}$	SAMPLE INT. COLLECT	LAB SAMPLE ID	LAB RESULTS	WELL DIAGRAM
0			**SILT WITH SAND** (ML), with rootlets, soft, brown and gray, moist								
5			**SAND WITH SILT TO SILTY SAND** (SP-SM), loose to medium dense, brown, moist								
10					S1	4 6 6 8	11		S1	S1 MC = 6.5% 11.5% gravel, 67.6% sand, 20.9% silt	

Bottom of borehole at 12.0 ft bgs.
Set 3" PVC to BOH. 2 bags of p-gravel added and then cuttings.

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.

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and Terra Firma Testing
11301 Olive Lane
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Telephone: 907-344-5934

SOIL CLASSIFICATION CHART

CLIENT The Boutet Company, Inc.

PROJECT NAME 12821 E. Scott Road

NGE-TFT PROJECT NUMBER 5953-21

PROJECT LOCATION Palmer, AK

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE			GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				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 (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE			SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				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.

Northern Geotechnical Engineering, Inc.
and Terra Firma Testing
11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934

EXPLORATION LEGEND

CLIENT The Boutet Company, Inc.

NGE-TFT PROJECT NAME 12821 E. Scott Road

NGE-TFT PROJECT NUMBER 5953-21

PROJECT LOCATION Palmer, AK

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)


GM: USCS Silty Gravel


GP: USCS Poorly-graded Gravel


GP-GM: USCS Poorly-graded Gravel with Silt


ML: USCS Silt


SM: USCS Silty Sand


SP: USCS Poorly-graded Sand


SP-SM: USCS Poorly-graded Sand with Silt

SAMPLER SYMBOLS


Modified Penetration Test


No Recovery

WELL CONSTRUCTION SYMBOLS


Slough Backfill


Slotted Pipe Backfilled with Slough

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 (tons/ft^2)
S/U - CASING STICK-UP

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION
N/E - NOT ENCOUNTERED

▽ Water Level at Time Drilling, or as Shown

▼ Water Level After 24 Hours, or as Shown

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and Terra Firma Testing
11301 Olive Lane
Anchorage, AK 99515
Telephone: 907-344-5934

EXPLORATION LOG KEY

CLIENT The Boutet Company, Inc.

PROJECT NAME 12821 E. Scott Road

NGE-TFT PROJECT NUMBER 5953-21

PROJECT LOCATION Palmer, 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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and Terra Firma Testing
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Anchorage, AK 99515
Telephone: 907-344-5934

EXPLORATION LOG KEY

CLIENT The Boutet Company, Inc. PROJECT NAME 12821 E. Scott Road

NGE-TFT PROJECT NUMBER 5953-21 PROJECT LOCATION Palmer, 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

INFILTRATION TEST RESULTS

PERCOLATION TEST DATA FORM

Location: 12821 Scott Rd. - Palmer, AK

Borehole/Test Pit ID: IT1

Depth to BOH - measured from TOC (inches): 65.4 Stickup Height (inches): 10.2

Diameter of Casing (inches): 3 Borehole Diameter (inches): 4-1/4" HSA

Percolation test conducted by: CJB

Date of Test: 3/22/2021

Measurement Time	Elapsed Time (Minutes)	Water Level BTOC (inches)	Drop in Water Level (inches)	Percolation Rate (min/inch)	Remarks
3/22/2021					
11:17:24 AM					After each measurment water level was raised back to 53.4 inches BTOC
11:18:35 AM	0:01:11				
11:19:33 AM					
11:21:45 AM	0:02:12				
11:22:13 AM					Started 4 hr soaking period
11:24:28 AM	0:02:15				
3/22/2021					
11:26:10					
11:28:17	0:02:07		6.00	0.35	
11:28:30					
11:30:40	0:02:10		6.00	0.36	After each measurment water level was raised back to 53.44 inches BTOC
11:30:55					
11:33:20	0:02:25		6.00	0.40	
11:33:54					
11:36:18	0:02:24		6.00	0.40	
11:36:48					
11:39:11	0:02:23		6.00	0.40	
11:39:43					
11:42:08	0:02:25		6.00	0.40	

Percolation Rate = Less than 1 min/inch

APPENDIX C

SEISMIC SITE CLASSIFICATION REPORT

Summary of Laboratory Test Results

12821 Scott Rd. - Palmer

NGE-TFT Project #:5953-21

Exploration ID	Sample Number	Depth Interval (ft) Top	Depth Interval (ft) Bottom	Moisture Content ASTM D2216 (% By Dry Mass)	Particle Size Analysis ASTM C136/D7928/D6913 (% By Mass) Gravel	Sand	Silt/Clay	Passing #200 ASTM D1140 (% By Mass)	Passing 0.02mm ASTM D7928 (% By Mass)	Frost Class.	Organic Content (ASTM D2974) (% By Mass)	Unified Soil Classification ASTM D2487
B1	S1	0.0	1.5	20.6								
B1	S2	2.5	4.0	21.8	0.0	16.9	83.1		23.5	F4	5.1	(ML) Silt with sand
B1	S3	5.0	6.5	26.6								
B1	S4	7.5	9.0	25.8								
B1	S5	10.0	11.5	2.5				3.8				
B1	S6	15.0	16.5	7.6								
B1	S7	20.0	21.5	9.8								
B1	S8	24.0	24.1									
B2	S1	0.0	1.5	31.1								
B2	S2	2.5	4.0	26.3								
B2	S3	5.0	6.5	27.5	0.0	14.8	85.2		25.7	F4		(ML) Silt
B2	S4	8.0	9.5	1.7				6.5				
B2	S5	10.0	11.5	1.8								
B2	S6	15.0	16.5	8.5								
B2	S7	20.0	20.8	7.2								
B3	S1	0.0	1.5	40.1								
B3	S2	2.5	4.0	25.2								
B3	S3	5.0	6.5	24.7				47.8				
B3	S4	7.5	9.0	23.8								
B3	S5	10.0	11.5	9.3								
B3	S6	15.0	16.5	6.0								
B4	S1	0.0	1.5	17.0								
B4	S2	2.5	4.0	24.1				69.9			6.2	
B4	S3	5.0	6.5	17.8								
B4	S4	7.5	8.3	19.4								
B4	S5	10.0	11.5	1.6	54.6	40.0	5.4		2.8	PFS		(GP-GM) Poorly-graded gravel w/ silt and sand
B4	S6	15.0	16.5	7.7								
B4	S7	20.0	20.9	2.9								
B4	S8	25.0	25.8	2.5								
B5	S1	0.0	1.5	25.9				69.7				
B5	S2	2.5	4.0	15.8								
B5	S3	5.0	6.5	24.4								
B5	S4	7.5	9.0	4.5				11.0				
B5	S5	10.0	11.5	5.6								
B5	S6	15.0	15.8		0.0	92.7	7.3		N/A	N/A		(SP-SM) Poorly-graded sand w/ silt
B5	S7	20.0	20.8	6.6								
B6	S1	2.5	4.0	36.1								
B6	S2	5.0	6.5	27.5	0.0	14.4	85.6		44.0	F4		(ML) Silt
B6	S3	7.5	9.0	18.7								
B6	S4	10.0	11.5	1.8								
B6	S5	15.0	16.5	6.3								
B6	S6	20.0	20.8	4.1								
IT1	S1	10.0	12.0	6.5	11.5	67.6	20.9		N/A	N/A		(SM) Silty sand

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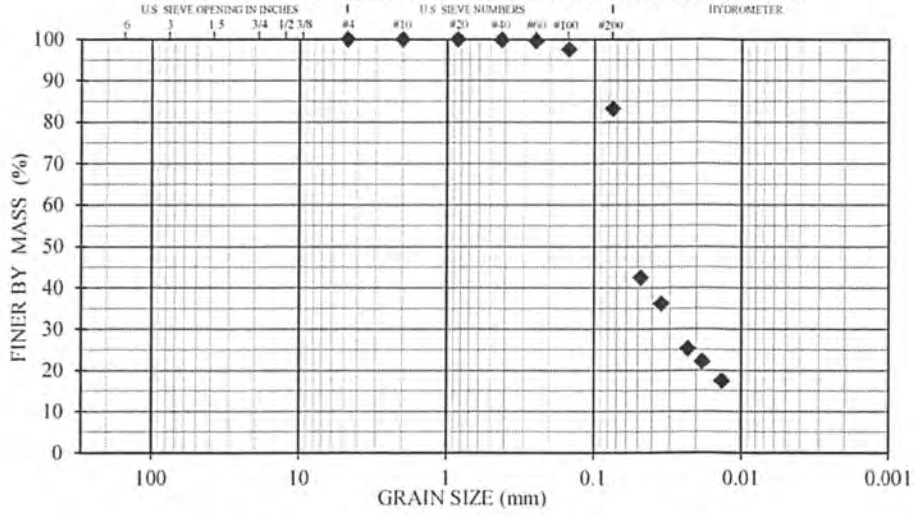
PROJECT CLIENT:	The Boutet Company
PROJECT NAME:	12821 Scott Rd. - Palmer
PROJECT NO.:	5953-21
SAMPLE LOC.:	B1
NUMBER/ DEPTH:	S2 / 2.5 - 4'
DESCRIPTION:	Silt with sand
DATE RECEIVED:	3/19/2021
TESTED BY:	
REVIEWED BY:	CJB

% GRAVEL	0.0	USCS	ML
% SAND	16.9	USACOE FC	F4
% SILT/CLAY	83.1	% PASS. 0.02 mm	23.5
% MOIST. CONTENT	21.8	% PASS. 0.002 mm	N/A
UNIFORMITY COEFFICIENT (C_u)			UNKNOWN
COEFFICIENT OF GRADATION (C_c)			UNKNOWN
ASTM D1557 (uncorrected)			N/A
ASTM D4718 (corrected)			N/A
OPTIMUM MOIST. CONTENT. (corrected)			N/A

PARTICLE SIZE ANALYSIS ASTM D7928 / C136



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

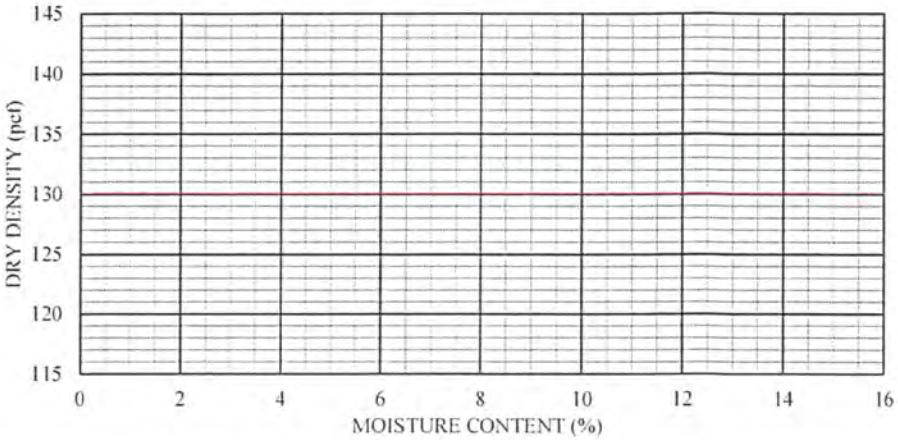
SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
4.75	#4	100	
2.00	#10	100	
0.85	#20	100	
0.43	#40	100	
0.25	#60	100	
0.15	#100	98	
0.075	#200	83.1	

HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1	0.0481	42.4
2	0.0349	36.2
5	0.0229	25.3
8	0.0183	22.1
15	0.0135	17.4
30		
60		
250		
1440		

MOISTURE-DENSITY RELATIONSHIP ASTM D1557



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

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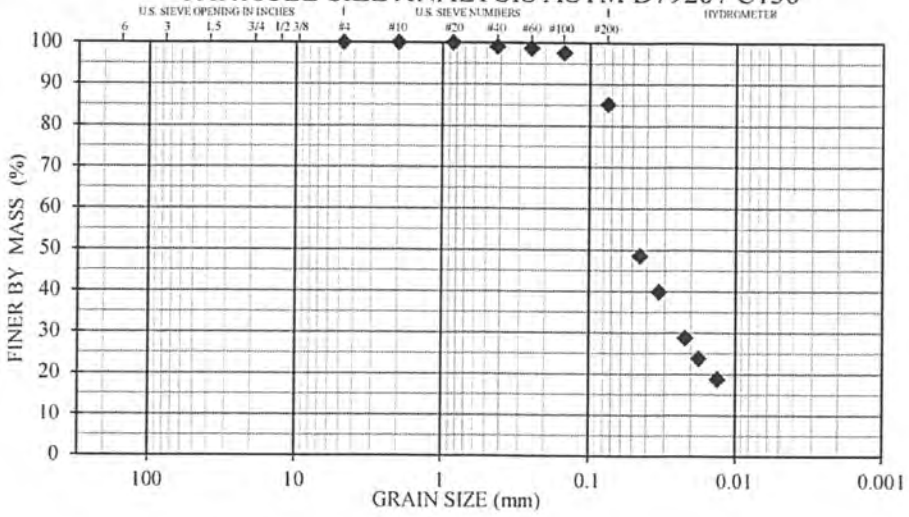
PROJECT CLIENT:	The Boutet Company
PROJECT NAME:	12821 Scott Rd. - Palmer
PROJECT NO.:	5953-21
SAMPLE LOC.:	B2
NUMBER/ DEPTH:	S3 / 5 - 6.5'
DESCRIPTION:	Silt
DATE RECEIVED:	3/19/2021
TESTED BY:	
REVIEWED BY:	CJB

% GRAVEL	0.0	USCS	ML
% SAND	14.8	USACOE FC	F4
% SILT/CLAY	85.2	% PASS. 0.02 mm	25.7
% MOIST. CONTENT	-111.0	% PASS. 0.002 mm	N/A
UNIFORMITY COEFFICIENT (C_u)			UNKNOWN
COEFFICIENT OF GRADATION (C_c)			UNKNOWN
ASTM D1557 (uncorrected)			N/A
ASTM D4718 (corrected)			N/A
OPTIMUM MOIST. CONTENT. (corrected)			N/A

PARTICLE SIZE ANALYSIS ASTM D7928 / C136



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

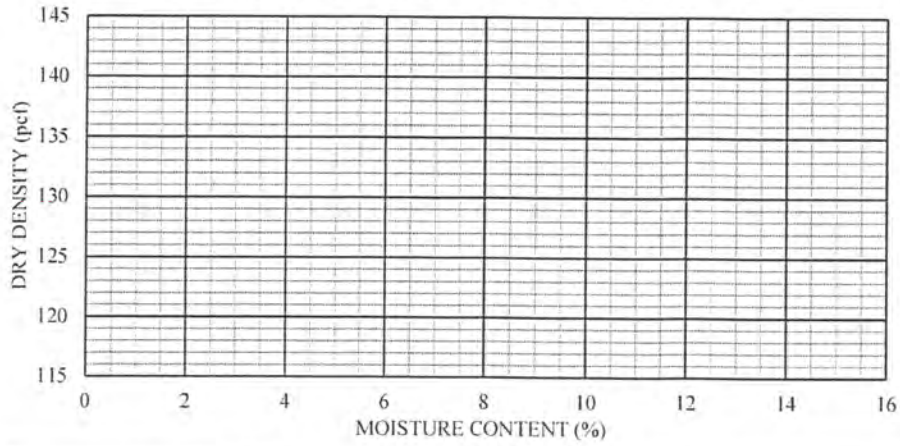
SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
152.40	6"		
76.20	3"		
38.10	1.5"		
19.00	3/4"		
12.70	1/2"		
9.50	3/8"		
4.75	#4	100	
2.00	#10	100	
0.85	#20	100	
0.43	#40	99	
0.25	#60	99	
0.15	#100	98	
0.075	#200	85.2	

HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1	0.0448	48.6
2	0.0332	39.9
5	0.0220	28.7
8	0.0178	23.8
15	0.0132	18.8
30		
60		
250		
1440		

MOISTURE-DENSITY RELATIONSHIP ASTM D1557



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

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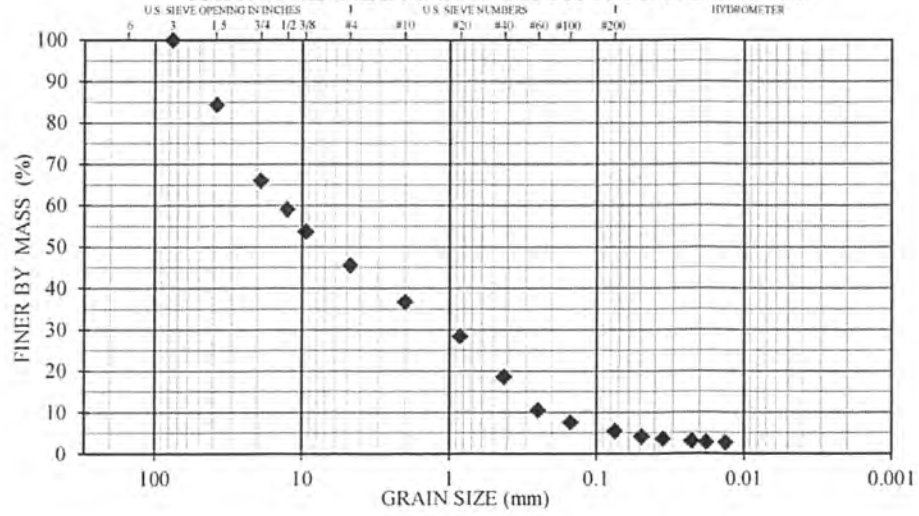
PROJECT CLIENT:	The Boutet Company
PROJECT NAME:	12821 Scott Rd. - Palmer
PROJECT NO.:	5953-21
SAMPLE LOC.:	B4
NUMBER/ DEPTH:	S5 / 10 - 11.5'
DESCRIPTION:	Poorly-graded gravel w/ silt and sand
DATE RECEIVED:	3/19/2021
TESTED BY:	
REVIEWED BY:	CJB

% GRAVEL	54.6	USCS	GP-GM
% SAND	40.0	USACOE FC	PFS
% SILT/CLAY	5.4	% PASS. 0.02 mm	2.8
% MOIST. CONTENT	1.6	% PASS. 0.002 mm	N/A

UNIFORMITY COEFFICIENT (C_u)	58.6
COEFFICIENT OF GRADATION (C_c)	0.4
ASTM D1557 (uncorrected)	N/A
ASTM D4718 (corrected)	N/A
OPTIMUM MOIST. CONTENT. (corrected)	N/A

PARTICLE SIZE ANALYSIS ASTM D7928 / C136



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

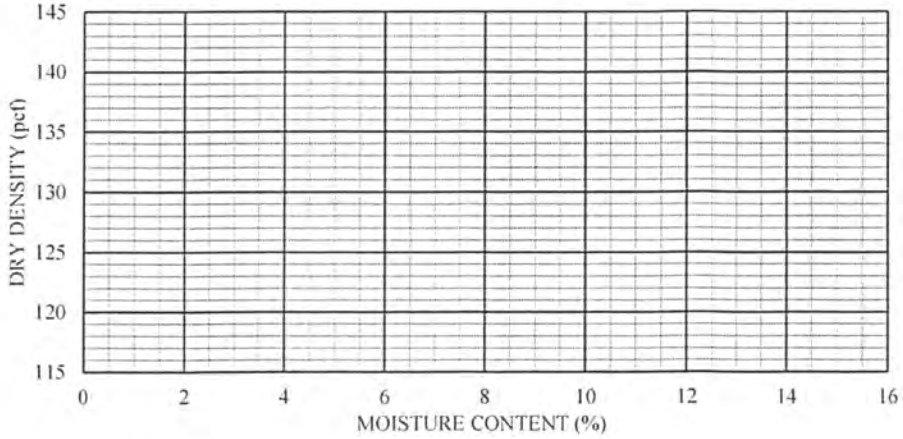
SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
152.40	6"		
76.20	3"	100	
38.10	1.5"	84	
19.00	3/4"	66	
12.70	1/2"	59	
9.50	3/8"	54	
4.75	#4	45	
2.00	#10	37	
0.85	#20	28	
0.43	#40	19	
0.25	#60	11	
0.15	#100	8	
0.075	#200	5.4	

HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1	0.0493	4.1
2	0.0356	3.5
5	0.0228	3.0
8	0.0181	2.8
15	0.0134	2.6
30		
60		
250		
1440		

MOISTURE-DENSITY RELATIONSHIP ASTM D1557



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

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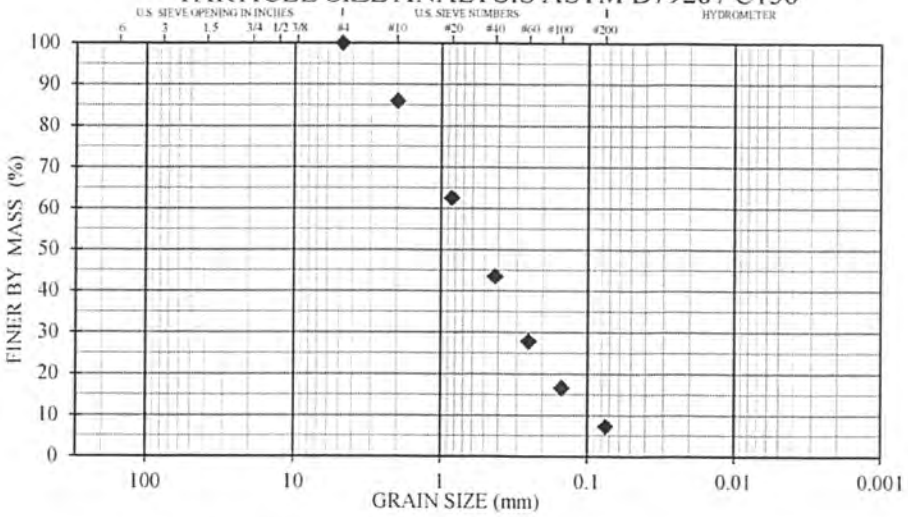
PROJECT CLIENT:	The Boutet Company
PROJECT NAME:	12821 Scott Rd. - Palmer
PROJECT NO.:	5953-21
SAMPLE LOC.:	B5
NUMBER/ DEPTH:	S5 / 15 - 15.8'
DESCRIPTION:	Poorly-graded sand w/ silt
DATE RECEIVED:	3/19/2021
TESTED BY:	
REVIEWED BY:	CJB

% GRAVEL	0.0	USCS	SP-SM
% SAND	92.7	USACOE FC	N/A
% SILT/CLAY	7.3	% PASS. 0.02 mm	N/A
% MOIST. CONTENT	5.6	% PASS. 0.002 mm	N/A

UNIFORMITY COEFFICIENT (C_u)	8.2
COEFFICIENT OF GRADATION (C_c)	1.0
ASTM D1557 (uncorrected)	N/A
ASTM D4718 (corrected)	N/A
OPTIMUM MOIST. CONTENT. (corrected)	N/A

PARTICLE SIZE ANALYSIS ASTM D7928 / C136



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

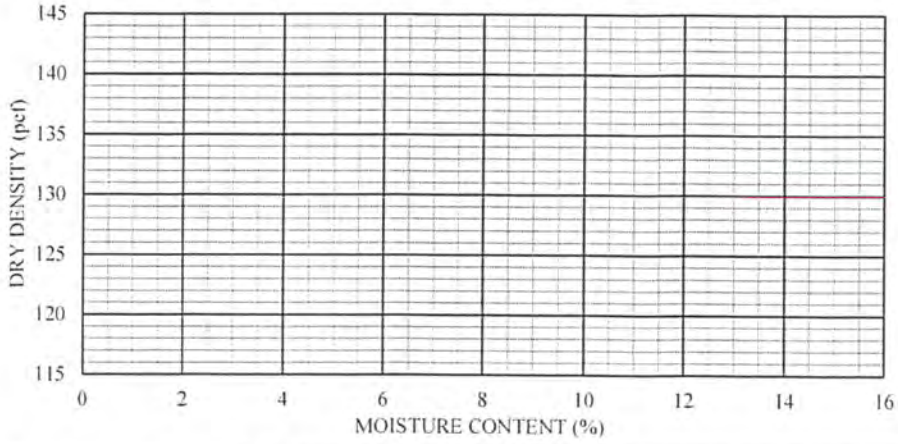
SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
4.75	#4	100	
2.00	#10	86	
0.85	#20	63	
0.43	#40	43	
0.25	#60	28	
0.15	#100	17	
0.075	#200	7.3	

HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

MOISTURE-DENSITY RELATIONSHIP ASTM D1557



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

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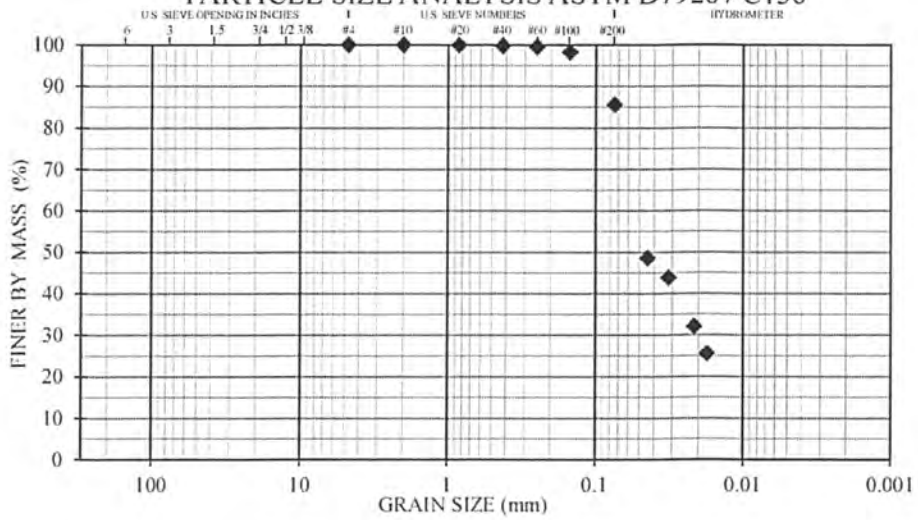
PROJECT CLIENT:	The Boutet Company
PROJECT NAME:	12821 Scott Rd. - Palmer
PROJECT NO.:	5953-21
SAMPLE LOC.:	B6
NUMBER/ DEPTH:	S2 / 5 - 6.5'
DESCRIPTION:	Silt
DATE RECEIVED:	3/19/2021
TESTED BY:	
REVIEWED BY:	CJB

% GRAVEL	0.0	USCS	ML
% SAND	14.4	USACOE FC	F4
% SILT/CLAY	85.6	% PASS. 0.02 mm	44.0
% MOIST. CONTENT	27.5	% PASS. 0.002 mm	N/A

UNIFORMITY COEFFICIENT (C_u)	3.4
COEFFICIENT OF GRADATION (C_c)	0.5
ASTM D1557 (uncorrected)	N/A
ASTM D4718 (corrected)	N/A
OPTIMUM MOIST. CONTENT. (corrected)	N/A

PARTICLE SIZE ANALYSIS ASTM D7928 / C136



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

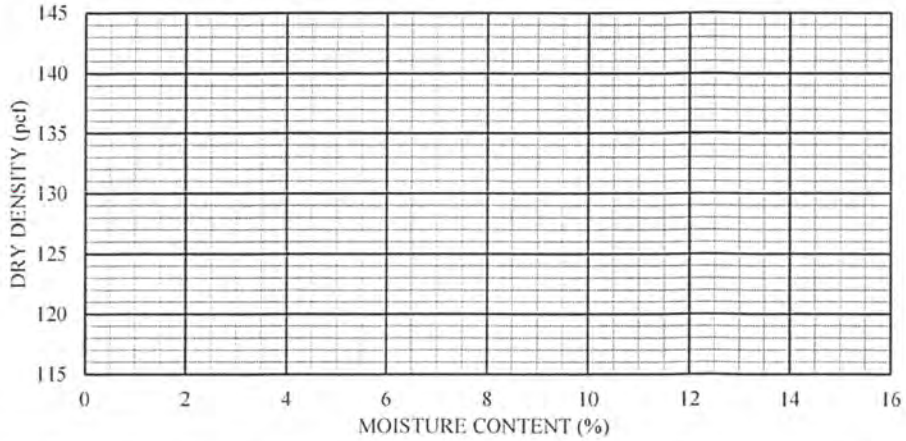
SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
4.75	#4	100	
2.00	#10	100	
0.85	#20	100	
0.43	#40	100	
0.25	#60	99	
0.15	#100	98	
0.075	#200	85.6	

HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1	0.0441	48.5
2	0.0320	43.8
5	0.0215	32.0
8	0.0176	25.5
15	0.0144	-2.7
30		
60		
250		
1440		

MOISTURE-DENSITY RELATIONSHIP ASTM D1557



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

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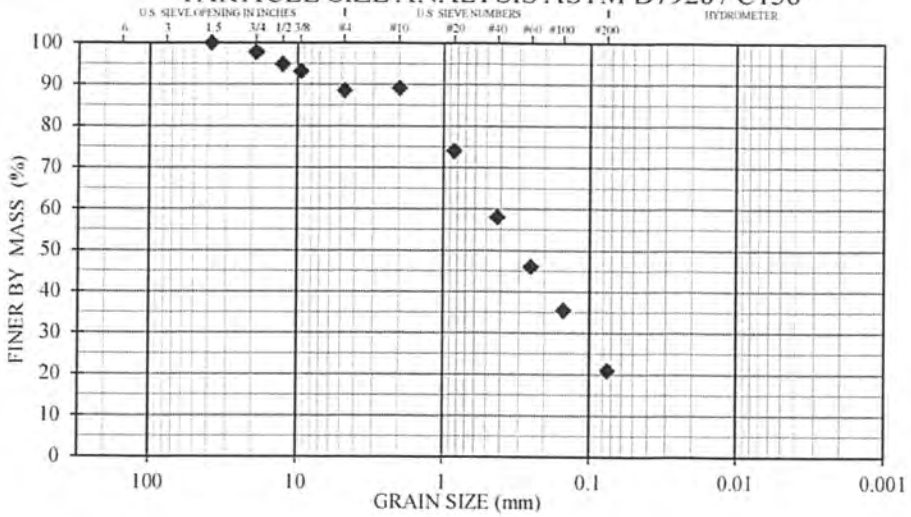
PROJECT CLIENT:	The Boutet Company
PROJECT NAME:	12821 Scott Rd. - Palmer
PROJECT NO.:	5953-21
SAMPLE LOC.:	IT1
NUMBER/ DEPTH:	S1 / 10 - 12'
DESCRIPTION:	Silty sand
DATE RECEIVED:	3/19/2021
TESTED BY:	
REVIEWED BY:	CJB

% GRAVEL	11.5	USCS	SM
% SAND	67.6	USACOE FC	N/A
% SILT/CLAY	20.9	% PASS. 0.02 mm	N/A
% MOIST. CONTENT	6.5	% PASS. 0.002 mm	N/A
UNIFORMITY COEFFICIENT (C_u)			UNKNOWN
COEFFICIENT OF GRADATION (C_c)			UNKNOWN
ASTM D1557 (uncorrected)			N/A
ASTM D4718 (corrected)			N/A
OPTIMUM MOIST. CONTENT. (corrected)			N/A

PARTICLE SIZE ANALYSIS ASTM D7928 / C136



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

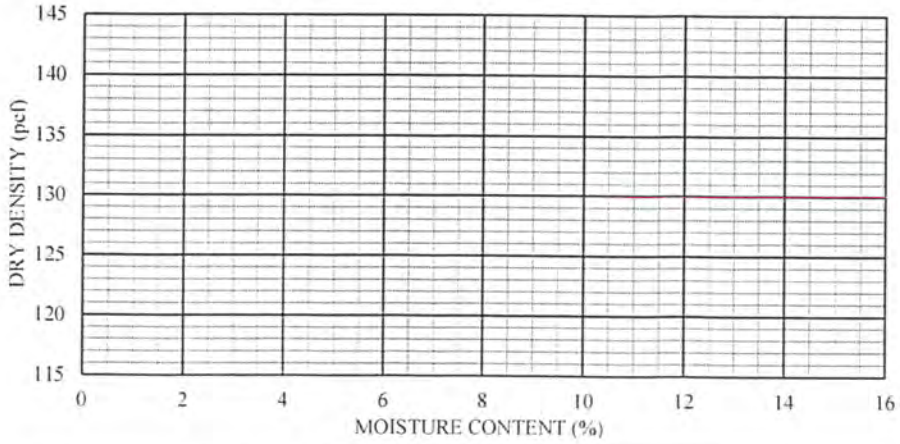
SIEVE ANALYSIS RESULT

SIEVE SIZE (mm)	SIEVE SIZE (U.S.)	TOTAL % PASSING	SPECIFICATION (% PASSING)
38.10	1.5"	100	
19.00	3/4"	98	
12.70	1/2"	95	
9.50	3/8"	93	
4.75	#4	88	
2.00	#10	89	
0.85	#20	74	
0.43	#40	58	
0.25	#60	46	
0.15	#100	36	
0.075	#200	20.9	

HYDROMETER RESULT

ELAPSED TIME (MIN)	DIAMETER (mm)	TOTAL % PASSING
0		
1		
2		
5		
8		
15		
30		
60		
250		
1440		

MOISTURE-DENSITY RELATIONSHIP ASTM D1557



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

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APPENDIX D

SEISMIC SITE CLASSIFICATION REPORT

OSHPD

12821 Scott Rd, Palmer, AK 99645, USA

Latitude, Longitude: 61.6105341, -149.126472

Date	4/2/2021, 11:58:55 AM
Design Code Reference Document	IBC-2015
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.576	MCE_R ground motion. (for 0.2 second period)
S_1	0.785	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.576	Site-modified spectral acceleration value
S_{M1}	1.178	Site-modified spectral acceleration value
S_{DS}	1.05	Numeric seismic design value at 0.2 second SA
S_{D1}	0.785	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	1.5	Site amplification factor at 1.0 second
PGA	0.635	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.635	Site modified peak ground acceleration
T_L	16	Long-period transition period in seconds
SsRT	1.98	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.784	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.576	Factored deterministic acceleration value. (0.2 second)
S1RT	0.877	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.859	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.785	Factored deterministic acceleration value. (1.0 second)
PGAd	0.635	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	1.11	Mapped value of the risk coefficient at short periods
C_{R1}	1.021	Mapped value of the risk coefficient at a period of 1 s

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Jesse Curlin

From: Daniel Dahms
Sent: Tuesday, May 30, 2023 11:29 AM
To: Jesse Curlin
Cc: Brad Sworts; Jamie Taylor; Tammy Simmons
Subject: RE: RFC BREEZY MEADOWS

Chris,

Parcels should share one common access point to East Scott Road unless otherwise approved by AKDOT&PF.

Daniel Dahms, PE
Department of Public Works
Pre-Design and Engineering Division

From: Jesse Curlin <Jesse.Curlin@matsugov.us>
Sent: Friday, May 19, 2023 4:16 PM
To: Alex Strawn <Alex.Strawn@matsugov.us>; Andy Dean <Andy.Dean@matsugov.us>; Brad Sworts <Brad.Sworts@matsugov.us>; Charlyn Spannagel <Charlyn.Spannagel@matsugov.us>; Collections <Collections@matsugov.us>; Daniel Dahms <Daniel.Dahms@matsugov.us>; Elaine Flagg <Elaine.Flagg@matsugov.us>; Eric Phillips <Eric.Phillips@matsugov.us>; Fire Code <Fire.Code@matsugov.us>; Fred Wagner <Frederic.Wagner@matsugov.us>; Jamie Taylor <Jamie.Taylor@matsugov.us>; John Aschenbrenner <John.Aschenbrenner@matsugov.us>; Katrina Kline <katrina.kline@matsugov.us>; Marcia vonEhr <Marcia.vonEhr@matsugov.us>; Margie Cobb <Margie.Cobb@matsugov.us>; Planning <MSB.Planning@matsugov.us>; Tammy Simmons <Tammy.Simmons@matsugov.us>; Theresa Taranto <Theresa.Taranto@matsugov.us>; Tom Adams <Tom.Adams@matsugov.us>; Kristina Huling <kristina.huling@alaska.gov>; David Post <david.post@alaska.gov>; sarah.myers@alaska.gov; colton.percy@alaska.gov; regpagemaster@usace.army.mil; kmcclure@palmerak.org; bahanson@palmerak.org; pamela.j.melchert@usps.gov; mothers@mtaonline.net; stark@mtaonline.net; mearow@mea.coop; row@mtasolutions.com; ospdesign@gci.com; andrew.fraiser@enstarnaturalgas.com; james.christopher@enstarnaturalgas.com; row@enstarnaturalgas.com; stephanienowersdistrict2@gmail.com
Subject: RFC BREEZY MEADOWS

Hello,

The following link is a request for comments on the proposed BREEZY MEADOWS subdivision.
Please ensure all comments are submitted by May 30, 2023, so they can be incorporated in the staff report that will be presented to the Platting Officer.

Breezy Meadows

Sincerely,

Jesse C. "Chris" Curlin
Platting Technician
Matanuska-Susitna Borough
(907) 861-7873

EXHIBIT C

THE STATE
of ALASKA
GOVERNOR MICHAEL J. DUNLEAVY

Department of Transportation and Public Facilities

Program Development and Statewide Planning
Anchorage Field Office

4111 Aviation Avenue
P.O. Box 196900
Anchorage, AK 99519-6900
Main number: 907-269-0520
Fax number: 907-269-0521
Website: dot.alaska.gov

May 31, 2023

Fred Wagner, Platting Officer
Matanuska-Susitna Borough
350 East Dahlia Avenue
Palmer, AK 99645

[Sent Electronically]

Re: Plat Review

Dear Mr. Wagner:

The Alaska Department of Transportation and Public Facilities (DOT&PF) Central Region has reviewed the following plats and have the following comments:

- **Breezy Meadows, Parcel 1 Waiver 99-36-PWm, E Scott Road**
  - No objection to proposed lot subdivision.
  - DOT&PF requests a 50 foot right of way dedication.
  - DOT&PF will permit consolidated shared access between two lots. Subsequent subdivision of lots will require continued use of shared access and utilities. Please add as plat note.
  - The Mat-Su Borough Official Streets and Highways Plan (OSHP) shows development plans for Scott Road to connect to the north alignment of Hemmer Road between Bogard Road and Palmer-Fishhook Road. This connection will elevate road use and traffic counts on Scott Road. Shared access will mitigate potential future conflict points along collector level roadways.

- **PA 03 Alley, Wolverine Road**
  - No objection to the proposed lot subdivision.
  - DOT&PF requires all driveways and utilities to access through the planned approach road. Subsequent lot subdivision will require driveway and utility access via the approach road. No new utility easements will be allowed. Please add as plat note.

- **MG 05 Hrncir, Parcel 3 MSB Waiver 2000-194, Glenn Highway MP 99**
  - No objection to the proposed lots.
  - DOT&PF requests dedicated right of way.

EXHIBIT D

- Historical mapping and imagery show a through road connection for Lots B12, B14, B15, and B16 between Pinochle Lane and the Glenn Highway. DOT&PF requests applicant verify access rights for this historically used roadway and show it on the plat. If no formal access exists, DOT&PF agrees to the approach road concept and recommends formalizing this historical roadway and formalizing it on the plat.
- The Glenn Highway is classified functionally as an interstate. The Alaska Preconstruction Manual Driveway Standards section 1190.03 states that "Freeways and expressways are special, high design type arterials that are exclusively for through traffic. As such, access is legally controlled along the arterial and no private driveways are permitted. In general on other arterials driveways will not be allowed if other access is available." If legal use of the historical roadway is available, DOT&PF requires the B15 right lot to take their driveway access here. If no alternate access to the Glenn Highway is available, DOT&PF will require consolidated access for the right lot shown in the plat. B15 left lot should take access to the Glenn Highway from the existing driveway stubb.

All properties accessing DOT&PF roads must apply to Right of Way for a driveway permit and/or approach road review, subject to provisions listed in 17 AAC 10.020. Any previously issued access permits become invalid once the property undergoes a platting action and must be reissued.

We recommend the petitioner verify all section line easements and DOT&PF road rights-of-way adjacent to their property. For assistance, the petitioner may contact the Engineering group within the Right of Way section in DOT&PF at (907) 269-0700. The petitioner is liable to remove any improvements within the easements and rights-of-way that impede the operation and maintenance of those facilities even if they are not shown on the plat, so it is in the petitioner's best interest to identify the exact locations and widths of any such easements or rights-of-way before they improve the property.

If any section line easements or road rights-of-way exist within the bounds of their plat, we recommend the petitioner dedicate them. If there is an existing right-of-way or easement, the petitioner is unable to develop that portion of the property yet continues to pay property taxes on it; dedicating will remove that cost to the petitioner.

If there are any questions regarding these comments please feel free to contact me at (907) 269-0509 or kristina.huling@alaska.gov.

Sincerely,

Kristina Huling
Mat-Su Area Planner, DOT&PF

cc: Scott Thomas, P.E., Regional Traffic Engineer, Traffic Safety and Utilities, DOT&PF
Jacob Ciufo, P.E., Regional Hydrologist, DOT&PF
Sean Baski, Chief, Highway Design, DOT&PF
Matt Walsh, Property Management Supervisor, Right of Way, DOT&PF
Devki Rearden, Engineering Associate, DOT&PF
Morris Beckwith, Right of Way, DOT&PF
Brad Sworts, Pre-Design & Engineering Div. Manager, MSB

Jesse Curlin

From: Percy, Colton T (DFG) <colton.percy@alaska.gov>
Sent: Tuesday, May 30, 2023 9:32 AM
To: Jesse Curlin
Subject: RE: RFC BREEZY MEADOWS

Follow Up Flag: Follow up
Flag Status: Flagged

[EXTERNAL EMAIL - CAUTION: Do not open unexpected attachments or links.]
Hi Jesse,

Alaska Department of Fish and Game has reviewed the proposed platting actions and has no objections. The proposed actions will not affect public access to public lands and waters. Thank you for the opportunity to review and comment.

Colton Percy
Habitat Biologist
Access Defense Program
Alaska Department of Fish and Game
Division of Wildlife Conservation
333 Raspberry Rd
Anchorage, AK 99518
907-267-2118

From: Jesse Curlin <Jesse.Curlin@matsugov.us>
Sent: Friday, May 19, 2023 4:16 PM
To: Alex Strawn <Alex.Strawn@matsugov.us>; Andy Dean <Andy.Dean@matsugov.us>; Brad Sworts <brad.sworts@matsugov.us>; Charlyn Spannagel <Charlyn.Spannagel@matsugov.us>; Collections <Collections@matsugov.us>; Daniel Dahms <Daniel.Dahms@matsugov.us>; Elaine Flagg <Elaine.Flagg@matsugov.us>; Eric Phillips <Eric.Phillips@matsugov.us>; Fire Code <Fire.Code@matsugov.us>; Fred Wagner <Frederic.Wagner@matsugov.us>; Jamie Taylor <jamie.taylor@matsugov.us>; John Aschenbrenner <John.Aschenbrenner@matsugov.us>; Katrina Kline <katrina.kline@matsugov.us>; Marcia vonEhr <Marcia.vonEhr@matsugov.us>; Margie Cobb <Margie.Cobb@matsugov.us>; Planning <MSB.Planning@matsugov.us>; Tammy Simmons <Tammy.Simmons@matsugov.us>; Theresa Taranto <Theresa.Taranto@matsugov.us>; Tom Adams <Tom.Adams@matsugov.us>; Huling, Kristina N (DOT) <kristina.huling@alaska.gov>; Post, David E (DOT) <david.post@alaska.gov>; Myers, Sarah E E (DFG) <sarah.myers@alaska.gov>; Percy, Colton T (DFG) <colton.percy@alaska.gov>; regpagemaster@usace.army.mil; kmcclure@palmerak.org; bahanson@palmerak.org; pamela.j.melchert@usps.gov; mothers@mtaonline.net; stark@mtaonline.net; mearow@mea.coop; row@mtasolutions.com; ospdesign@gci.com; andrew.fraiser@enstarnaturalgas.com; james.christopher@enstarnaturalgas.com; row@enstarnaturalgas.com; stephanienowersdistrict2@gmail.com
Subject: RFC BREEZY MEADOWS

CAUTION: This email originated from outside the State of Alaska mail system. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello,

The following link is a request for comments on the proposed BREEZY MEADOWS subdivision.
Please ensure all comments are submitted by May 30, 2023, so they can be incorporated in the staff report that will be presented to the Platting Officer.

Breezy Meadows

EXHIBIT E

DEPARTMENT OF COMMUNITY DEVELOPMENT

Brad Hanson
Director

Beth Skow
Library Director

Bret Chisholm
Acting Parks & Facilities Manager

Vacant
Building Inspector

Mail: 231 W. Evergreen Ave.
Location: 645 E. Cope Industrial Way
Palmer, AK 99645-6748
Phone: 907-745-3709
www.palmerak.org

MEMORANDUM

TO: Fred Wagner, Chief of Platting
FROM: Kimberly McClure, Community Development
DATE: May 30, 2023
LOCATION: Tax Parcel A39 in Section 32, Township 18 North, Range 2 East
SUBJECT: Abbreviated Plat RFC – Creating two lots
TAX ACCT#: 18N02E32A039/Breezy Meadows
Site address: 12821 E. Scott Road

☐ Inside City Limits ☑ Outside City Limits

We have distributed the abbreviated plat packet for the subject project and have received the following comments from the following departments:

1. City Manager: No comments.
2. Building Inspector: No comments.
3. Community Development: If the proposed lots were located inside Palmer city limits and zoned R-4, High Density Residential, the minimum required lot width would be 60 feet and the minimum required lot area per dwelling unit would be 2,700 square feet per unit. The lots appear to have access from E. Scott Road.
4. Fire Chief: See attached letter.
5. Public Works: No comments on this. Currently working on a separate issue with the developer to connect to City sewer.
6. Planning and Zoning Commission: The proposed platting action is scheduled to be reviewed at the June 15, 2023, Planning & Zoning Commission meeting; any additional comments will be forwarded at that time.

EXHIBIT F

PALMER FIRE & RESCUE

Chad Cameron
Fire Chief
645 E. Cope Industrial Way
Phone: 907-745-3709
Direct: 907-745-3854
Fax: 907-745-5443

May 10, 2023

Kim Burke
259 South Alaska Street, Suite 100
Palmer, AK 99645
kimb@alderarch.com

RE: Fire Apparatus Access Road – Breezy Meadows, East Scott Road

Dear Ms. Burke:

Per your request, I am sending you the requirements for the fire department access roads in reference to the Breezy Meadows Site Plan on East Scott Road that you emailed me. The Matanuska-Susitna Borough Code 8.45.010 (A) (5), adopted the 2012 International Fire Code, as adopted by 13 AAC 50.025. For your reference, I have included 13 AAC 50.025.

13 AAC 50.025. International Fire Code states:

> The International Fire Code 2012 Edition (IFC), Chapters 12 - 19, 36 - 49 and 68 - 79 are reserved. The International Fire Code 2012 Edition (IFC), Chapters 1 - 11, 20 - 35, 50 - 67, and 80 and Appendices B - G and I are adopted by reference to regulate all occupancies and buildings for the safeguarding of life and property from the hazards of fire and explosion arising from the storage, handling, and use of hazardous substances, materials, and devices, and from other conditions hazardous to life and property, except that the IFC is revised by deleting all the references to "ICC Electrical Code" or "NFPA 70" and replacing those references with "Electrical Code as adopted by 8 AAC 70.025, as amended as of March 6, 2016 and as amended from time to time" and the IFC is revised by deleting all the references to "International Fuel Gas Code", with the exception of Chapters 6 and 7, deleting all the references to "International Plumbing Code", and replacing the references to "International Fuel Gas Code" and "International Plumbing Code" with "Plumbing Code as adopted by 8 AAC 63.010, as amended as of March 6, 2016 and as amended from time to time". Additionally, the IFC is changed with the following revisions:

I am satisfied with the roadway width presented in your Breezy Meadows Site Plan, so long as the roadway is capable of supporting a load of fire apparatus weighing at least 75,000 pounds.

EXHIBIT G

The supplied Breezy Meadows Site Plan shows ten, four-unit complexes in Phase 1 and Phase 2. Per 2012 International Fire Code (IFC), Appendix D, Section D107.1 there must be two separate and approved fire apparatus access roads.

Either your site plan must show two separate and approved fire apparatus access roads or you need to equip all dwelling units with an approved automatic sprinkler system in accordance with the IFC. I have provided the relevant IFC section below for your reference. The State of Alaska Fire Marshal's Office will be able to approve any and all automatic sprinkler systems in your building permit process.

2012 IFC, Appendix D, Section D107, One-, or two-family dwelling residential developments.

Developments of one- or two-family dwelling units where the number of dwelling units exceeds 30 shall be provided with two separate and approved fire apparatus access roads.

Exceptions:

1. *Where there are more than 30 dwelling units on a single public or private fire apparatus access road and all dwelling units are equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1, 903.3.1.2 or 903.3.1.3 of the International Fire Code, access from two directions shall not be required.*
2. *The number of dwelling units on a single fire apparatus access road shall not be increased unless fire apparatus access roads will connect with future development, as determined by the fire code official.*

Should you have any questions, I can be reached at 745-3854 or by writing to 645 E. Cope Industrial Way, Palmer, Alaska.

Sincerely,

Chad Cameron
ccameron@palmerak.org

cc: Dawn Vanepps, City of Palmer Fire & Rescue Administrative Assistant

Jesse Curlin

From: Cayla Ronken <cronken@mtasolutions.com>
Sent: Monday, May 22, 2023 2:11 PM
To: Jesse Curlin
Subject: RE: RFC BREEZY MEADOWS

[EXTERNAL EMAIL - CAUTION: Do not open unexpected attachments or links.]
Hi Jesse,

MTA has reviewed the plat for Breezy Meadows. MTA would like to request a utility easement in the south 15' of proposed Lots 1 and 2 of Breezy Meadows.

Thank you,

Cayla Ronken, Right of Way Agent
1740 S. Chugach St., Palmer, Alaska 99645
Office: (907) 761-2465 | www.mtasolutions.com

MTA
Life. Technology. Together.

From: Jesse Curlin <Jesse.Curlin@matsugov.us>
Sent: Friday, May 19, 2023 4:16 PM
To: Alex Strawn <Alex.Strawn@matsugov.us>; Andy Dean <Andy.Dean@matsugov.us>; Brad Sworts <Brad.Sworts@matsugov.us>; Charlyn Spannagel <Charlyn.Spannagel@matsugov.us>; Collections <Collections@matsugov.us>; Daniel Dahms <Daniel.Dahms@matsugov.us>; Elaine Flagg <Elaine.Flagg@matsugov.us>; Eric Phillips <Eric.Phillips@matsugov.us>; Fire Code <Fire.Code@matsugov.us>; Fred Wagner <Frederic.Wagner@matsugov.us>; Jamie Taylor <Jamie.Taylor@matsugov.us>; John Aschenbrenner <John.Aschenbrenner@matsugov.us>; Katrina Kline <katrina.kline@matsugov.us>; Marcia vonEhr <Marcia.vonEhr@matsugov.us>; Margie Cobb <Margie.Cobb@matsugov.us>; Planning <MSB.Planning@matsugov.us>; Tammy Simmons <Tammy.Simmons@matsugov.us>; Theresa Taranto <Theresa.Taranto@matsugov.us>; Tom Adams <Tom.Adams@matsugov.us>; Kristina Huling <kristina.huling@alaska.gov>; David Post <david.post@alaska.gov>; sarah.myers@alaska.gov; colton.percy@alaska.gov; regpagemaster@usace.army.mil; kmcclure@palmerak.org; bahanson@palmerak.org; pamela.j.melchert@usps.gov; mothers@mtaonline.net; stark@mtaonline.net; mearow@mea.coop; Right of Way Dept. <row@mtasolutions.com>; ospdesign@gci.com; andrew.fraiser@enstarnaturalgas.com; james.christopher@enstarnaturalgas.com; row@enstarnaturalgas.com; stephanienowersdistrict2@gmail.com
Subject: RFC BREEZY MEADOWS

Hello,

The following link is a request for comments on the proposed BREEZY MEADOWS subdivision.

EXHIBIT H

ENSTAR Natural Gas Company, LLC
Engineering Department, Right of Way Section
401 E. International Airport Road
P. O. Box 190288
Anchorage, Alaska 99519-0288
(907) 277-5551
FAX (907) 334-7798

May 24, 2023

Matanuska-Susitna Borough, Platting Division
350 East Dahlia Avenue
Palmer, AK 99645-6488

To whom it may concern:

ENSTAR Natural Gas Company has reviewed the following preliminary plat and has no comments or recommendations.

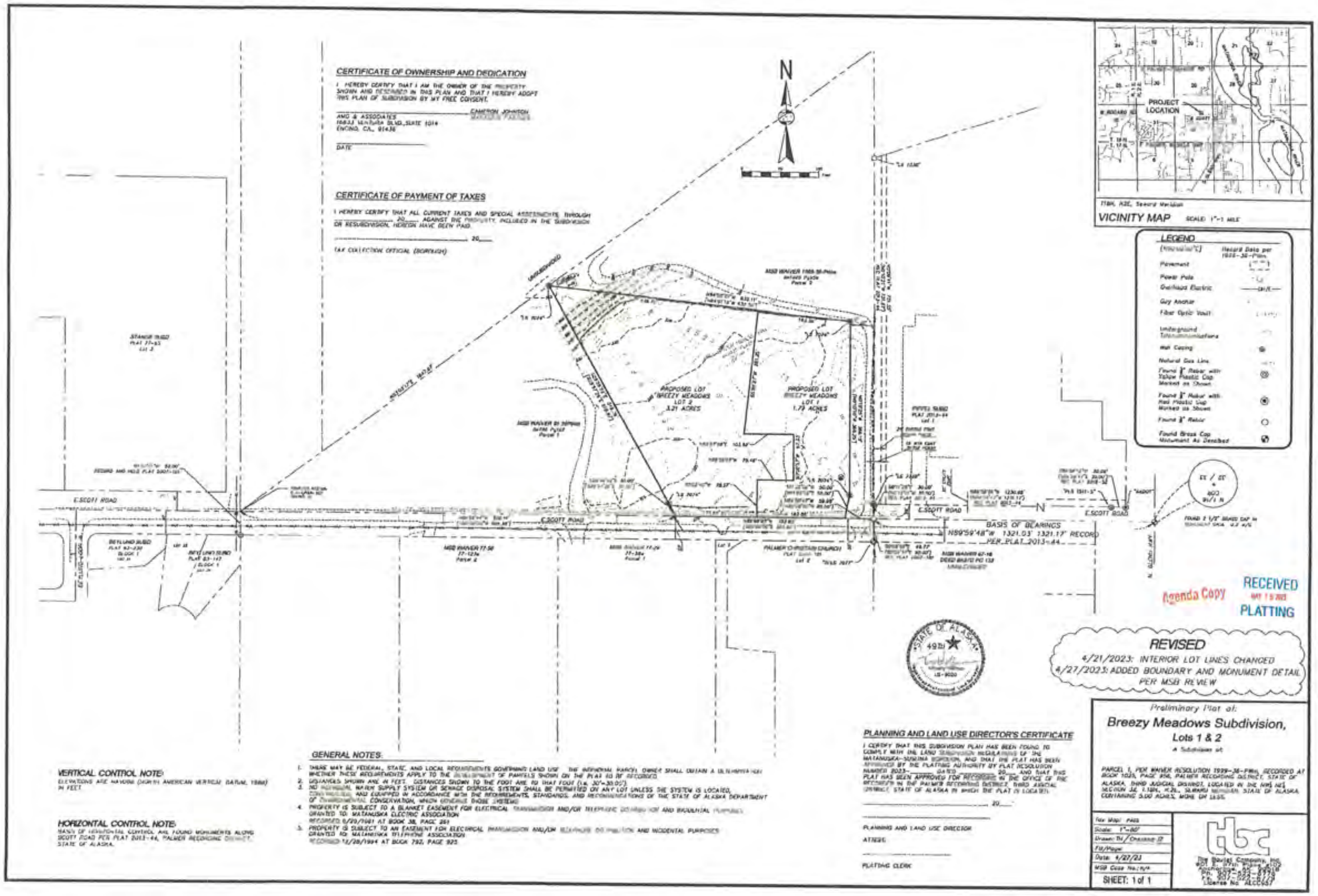
- **BREEZY MEADOWS SUBDIVISION LOTS 1 & 2**
  (MSB Case # 2023-060)

If you have any questions, please feel free to contact me at 334-7944 or by email at james.christopher@enstarnaturalgas.com.

Sincerely,

James Christopher

James Christopher
Right of Way & Compliance Technician
ENSTAR Natural Gas Company, LLC



CERTIFICATE OF OWNERSHIP AND DEDICATION
I HEREBY CERTIFY THAT I AM THE OWNER OF THE PROPERTY SHOWN AND DESCRIBED IN THIS PLAN AND THAT I HEREBY ADOPT THIS PLAN OF SUBDIVISION BY MY FREE CONSENT.
CAMERON JOHNSTON
AMG & ASSOCIATES
ENCINO, CA., 91436
DATE
CERTIFICATE OF PAYMENT OF TAXES
I HEREBY CERTIFY THAT ALL CURRENT TAXES AND SPECIAL ASSESSMENTS THROUGH ______ 20___ AGAINST THE PROPERTY INCLUDED IN THE SUBDIVISION OR RESUBDIVISION, HEREON HAVE BEEN PAID.
20___
TAX COLLECTION OFFICIAL (BOROUGH)
N
PROPOSED LOT BREEZY MEADOWS LOT 2 3.21 ACRES
PROPOSED LOT BREEZY MEADOWS LOT 1 1.79 ACRES
E.SCOTT ROAD
BASIS OF BEARINGS
N89°59'48"W 1321.03' 1321.17' RECORD PER PLAT 2013-44
VICINITY MAP
PROJECT LOCATION
LEGEND
Found Brass Cap Monument As Described
RECEIVED
PLATTING
Agenda Copy
REVISED
4/21/2023: INTERIOR LOT LINES CHANGED
4/27/2023: ADDED BOUNDARY AND MONUMENT DETAIL PER MSB REVIEW
STATE OF ALASKA
49th
PLANNING AND LAND USE DIRECTOR'S CERTIFICATE
PLANNING AND LAND USE DIRECTOR
ATTEST:
PLATTING CLERK
Preliminary Plat of:
Breezy Meadows Subdivision,
Lots 1 & 2
Date: 4/27/23
SHEET: 1 of 1
VERTICAL CONTROL NOTE:
HORIZONTAL CONTROL NOTE:
GENERAL NOTES:

Jesse Curlin

From: OSP Design Group <ospdesign@gci.com>
Sent: Wednesday, May 31, 2023 8:56 AM
To: Jesse Curlin
Cc: OSP Design Group
Subject: RE: RFC BREEZY MEADOWS
Attachments: RFC Packet.pdf; Agenda Plat.pdf

[EXTERNAL EMAIL - CAUTION: Do not open unexpected attachments or links.]
Jesse,

In review GCI has no comments or objections to the plat, attached is the signed plat for your records.

Thanks,
MIREYA ARMESTO
GCI | Technician II, GIS Mapping
m: 907-744-5166 | **w:** www.gci.com

From: Jesse Curlin <Jesse.Curlin@matsugov.us>
Sent: Friday, May 19, 2023 4:16 PM
To: Alex Strawn <Alex.Strawn@matsugov.us>; Andy Dean <Andy.Dean@matsugov.us>; Brad Sworts <Brad.Sworts@matsugov.us>; Charlyn Spannagel <Charlyn.Spannagel@matsugov.us>; Collections <Collections@matsugov.us>; Daniel Dahms <Daniel.Dahms@matsugov.us>; Elaine Flagg <Elaine.Flagg@matsugov.us>; Eric Phillips <Eric.Phillips@matsugov.us>; Fire Code <Fire.Code@matsugov.us>; Fred Wagner <Frederic.Wagner@matsugov.us>; Jamie Taylor <Jamie.Taylor@matsugov.us>; John Aschenbrenner <John.Aschenbrenner@matsugov.us>; Katrina Kline <katrina.kline@matsugov.us>; Marcia vonEhr <Marcia.vonEhr@matsugov.us>; Margie Cobb <Margie.Cobb@matsugov.us>; Planning <MSB.Planning@matsugov.us>; Tammy Simmons <Tammy.Simmons@matsugov.us>; Theresa Taranto <Theresa.Taranto@matsugov.us>; Tom Adams <Tom.Adams@matsugov.us>; Kristina Huling <kristina.huling@alaska.gov>; David Post <david.post@alaska.gov>; sarah.myers@alaska.gov; colton.percy@alaska.gov; regpagemaster@usace.army.mil; kmcclure@palmerak.org; bahanson@palmerak.org; pamela.j.melchert@usps.gov; mothers@mtaonline.net; stark@mtaonline.net; mearow@mea.coop; row@mtasolutions.com; OSP Design Group <ospdesign@gci.com>; andrew.fraiser@enstarnaturalgas.com; james.christopher@enstarnaturalgas.com; row@enstarnaturalgas.com; stephanienowersdistrict2@gmail.com
Subject: RFC BREEZY MEADOWS

[EXTERNAL EMAIL - CAUTION: Do not open unexpected attachments or links.]

Hello,

The following link is a request for comments on the proposed BREEZY MEADOWS subdivision.
Please ensure all comments are submitted by May 30, 2023, so they can be incorporated in the staff report that will be presented to the Platting Officer.

Breezy Meadows

Sincerely,

Jesse C. "Chris" Curlin

CERTIFICATE OF OWNERSHIP AND DEDICATION

I HEREBY CERTIFY THAT I AM THE OWNER OF THE PROPERTY SHOWN AND DESCRIBED IN THIS PLAN AND THAT I HEREBY ADOPT THIS PLAN OF SUBDIVISION BY MY FREE CONSENT.

_______________________ CAMERON JOHNSON
AMC & ASSOCIATES MANAGING PARTNER
15633 VENTURA BLVD., SUITE 1014
ENCINO, CA., 91436

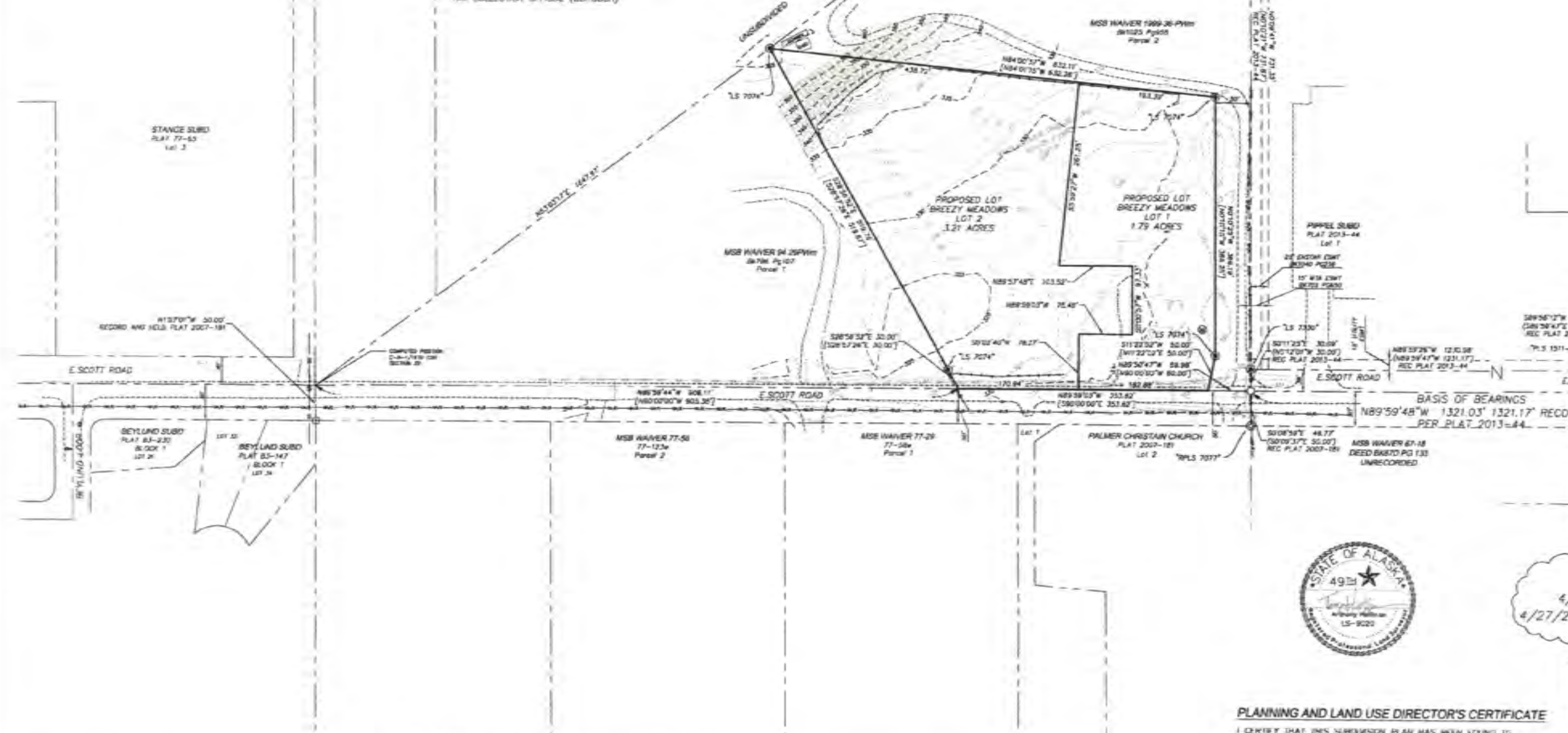
____
DATE

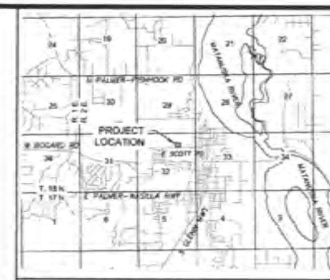
CERTIFICATE OF PAYMENT OF TAXES

I HEREBY CERTIFY THAT ALL CURRENT TAXES AND SPECIAL ASSESSMENTS, THROUGH ____________ 20___, AGAINST THE PROPERTY, INCLUDED IN THE SUBDIVISION OR RESUBDIVISION, HEREON HAVE BEEN PAID.

_______________________ 20___

TAX COLLECTION OFFICIAL (BOROUGH)





T18N, R2E, Seward Meridian

VICINITY MAP SCALE: 1"=1 MILE

LEGEND

[N90°00'00"E]	Record Data per 1999-36-PWm
Pavement	
Power Pole	
Overhead Electric	
Guy Anchor	
Fiber Optic Vault	
Underground Telecommunications	
Well Casing	
Natural Gas Line	
Found ⅝" Rebar with Yellow Plastic Cap Marked as Shown	
Found ⅝" Rebar with Red Plastic Cap Marked as Shown	
Found ⅝" Rebar	
Found Brass Cap Monument As Descibed	

Agenda Copy

RECEIVED
MAY 1 9 2023
PLATTING

REVISED
4/21/2023: INTERIOR LOT LINES CHANGED
4/27/2023: ADDED BOUNDARY AND MONUMENT DETAIL PER MSB REVIEW

STATE OF ALASKA 49th LS-9020 Registered Professional Land Surveyor

PLANNING AND LAND USE DIRECTOR'S CERTIFICATE

I CERTIFY THAT THIS SUBDIVISION PLAN HAS BEEN FOUND TO COMPLY WITH THE LAND SUBDIVISION REGULATIONS OF THE MATANUSKA-SUSITNA BOROUGH, AND THAT THE PLAT HAS BEEN APPROVED BY THE PLATTING AUTHORITY BY PLAT RESOLUTION NUMBER 2023-______ DATED __________ 20___, AND THAT THIS PLAT HAS BEEN APPROVED FOR RECORDING IN THE OFFICE OF THE RECORDER IN THE PALMER RECORDING DISTRICT, THIRD JUDICIAL DISTRICT, STATE OF ALASKA IN WHICH THE PLAT IS LOCATED.

_______________________ 20___

____
PLANNING AND LAND USE DIRECTOR

ATTEST:

____
PLATTING CLERK

APPROVED AS: SHOWN ☒
CORRECTED ☐
SIGN: DATE:
GCI ENGINEERING & DESIGN

Preliminary Plat of:

Breezy Meadows Subdivision, Lots 1 & 2

A Subdivision of:

PARCEL 1, PER WAIVER RESOLUTION 1999-36-PWm, RECORDED AT BOOK 1025, PAGE 956, PALMER RECORDING DISTRICT, STATE OF ALASKA, THIRD JUDICIAL DISTRICT, LOCATED IN THE NW¼ NE¼ SECTION 32, T.18N., R.2E., SEWARD MERIDIAN, STATE OF ALASKA CONTAINING 5.00 ACRES, MORE OR LESS.

Tax Map: PA05	The Boutet Company, Inc. 601 E. 57th Place #102 Anchorage, AK 99518 Ph. 907-522-6776 Fx. 907-522-6779 License No. AECC657
Scale: 1"=80'	
Drawn: TH / Checked: JZ	
FB/Page:	
Date: 4/27/23	
MSB Case No.: N/A	
SHEET: 1 of 1	

VERTICAL CONTROL NOTE:

ELEVATIONS ARE NAVD88 (NORTH AMERICAN VERTICAL DATUM, 1988) IN FEET.

HORIZONTAL CONTROL NOTE:

BASIS OF HORIZONTAL CONTROL ARE FOUND MONUMENTS ALONG SCOTT ROAD PER PLAT 2013-44, PALMER RECORDING DISTRICT, STATE OF ALASKA.

GENERAL NOTES:

1. THERE MAY BE FEDERAL, STATE, AND LOCAL REQUIREMENTS GOVERNING LAND USE. THE INDIVIDUAL PARCEL OWNER SHALL OBTAIN A DETERMINATION WHETHER THESE REQUIREMENTS APPLY TO THE DEVELOPMENT OF PARCELS SHOWN ON THE PLAT TO BE RECORDED.
2. DISTANCES SHOWN ARE IN FEET. DISTANCES SHOWN TO THE FOOT ARE TO THAT FOOT (I.e. 30'=30.00').
3. NO INDIVIDUAL WATER SUPPLY SYSTEM OR SEWAGE DISPOSAL SYSTEM SHALL BE PERMITTED ON ANY LOT UNLESS THE SYSTEM IS LOCATED, CONSTRUCTED, AND EQUIPPED IN ACCORDANCE WITH THE REQUIREMENTS, STANDARDS, AND RECOMMENDATIONS OF THE STATE OF ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION, WHICH GOVERNS THOSE SYSTEMS.
4. PROPERTY IS SUBJECT TO A BLANKET EASEMENT FOR ELECTRICAL TRANSMISSION AND/OR TELEPHONE DISTRIBUTION AND INCIDENTAL PURPOSES. GRANTED TO: MATANUSKA ELECTRIC ASSOCIATION RECORDED: 9/29/1961 AT BOOK 38, PAGE 261
5. PROPERTY IS SUBJECT TO AN EASEMENT FOR ELECTRICAL TRANSMISSION AND/OR TELEPHONE DISTRIBUTION AND INCIDENTAL PURPOSES GRANTED TO: MATANUSKA TELEPHONE ASSOCIATION RECORDED: 12/28/1994 AT BOOK 792, PAGE 925