RAMPART CLINIC

GEOTECHNICAL REPORT

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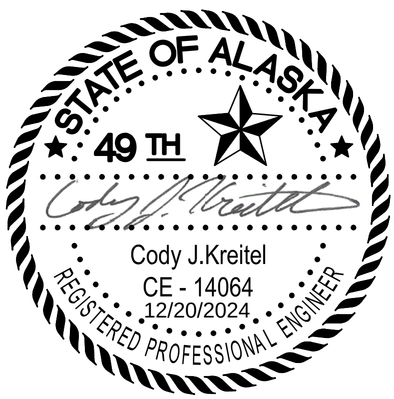

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EXECUTIVE SUMMARY

This study focuses on subsurface investigations, laboratory analyses, and foundation support recommendations for the proposed clinic in Rampart, Alaska. RESPEC conducted three air rotary borings at locations BH-01, BH-02, and BH-03, as well as collected grab samples from two potential gravel fill sites known locally as the DOT Pit and Minook Creek. Laboratory results indicate the samples from the DOT Pit and Minook Creek had 6.6 and 1.1 percent fines content, respectively. Borehole profiles revealed the presence of permafrost at relatively shallow depths, ranging from 3 to 9 feet. Temperature measurements classified the frozen soils as 'warm permafrost,' with none of the recorded temperatures falling below 31°F. PVC piping was installed in the boreholes to allow for future temperature monitoring if needed. The recommended foundation system is an insulated post-and-pad foundation with flat-loop thermosyphons. The final foundation design should adhere to the specifications outlined in the corresponding sections of this report.

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1.0 INTRODUCTION

RESPEC is pleased to present the results of our geotechnical study in support of the proposed clinic, located in Rampart, Alaska. The intent of this report is to provide foundation recommendations for the proposed project site. We conducted this phase of geotechnical studies in accordance with Professional Services Agreement FY25 Contract 3509-Rampart Clinic Subsurface Exploration, dated October 31st, 2024.

The scope of work encompassed field explorations, laboratory testing, and geotechnical analysis to provide foundation recommendations incorporating a thermosyphon flat-loop system. These recommendations are specifically tailored for the development of the proposed Rampart Clinic. This report details the findings from our field investigations and laboratory analyses, along with geotechnical recommendations for the site's development.

2.0 PROJECT SITE OVERVIEW

The project's proposed clinic location is roughly 85 miles from Fairbanks, Alaska, and located near the Yukon River. See Figure 1 for the approximate project location. The site is on the corner of 5th Avenue and East Street and immediately east of the school facility. Figure 1 illustrates the approximate boundary of the project site. The two material source locations which were sampled for laboratory analysis are illustrated in Figure 2.

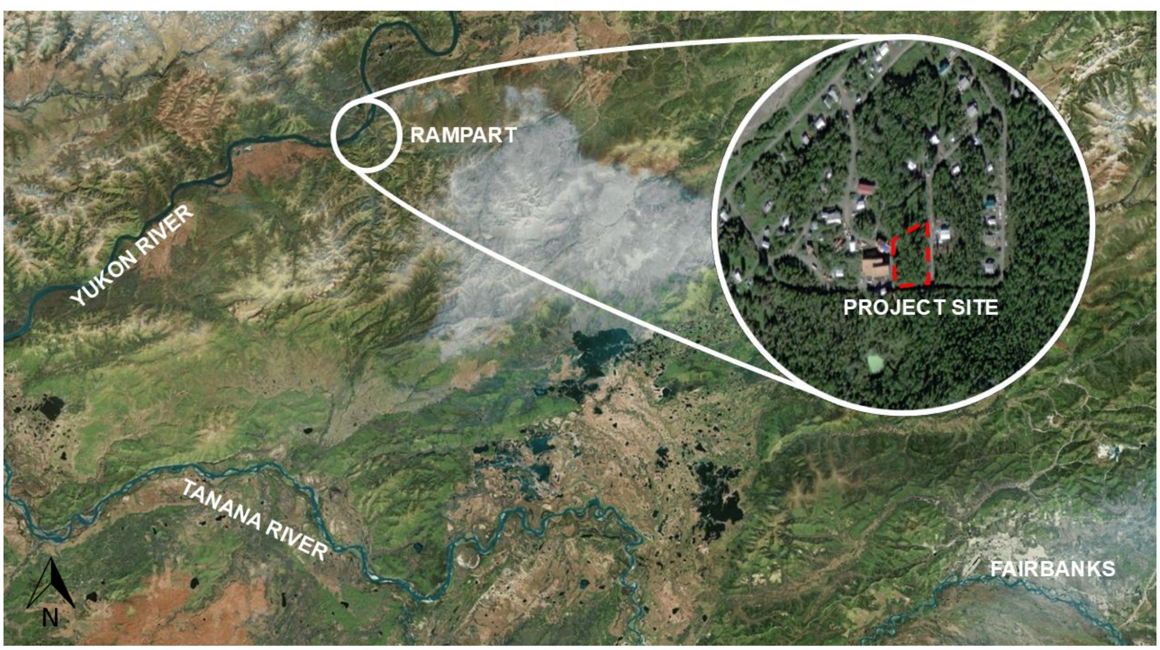

Figure 1. Approximate Project Site Location

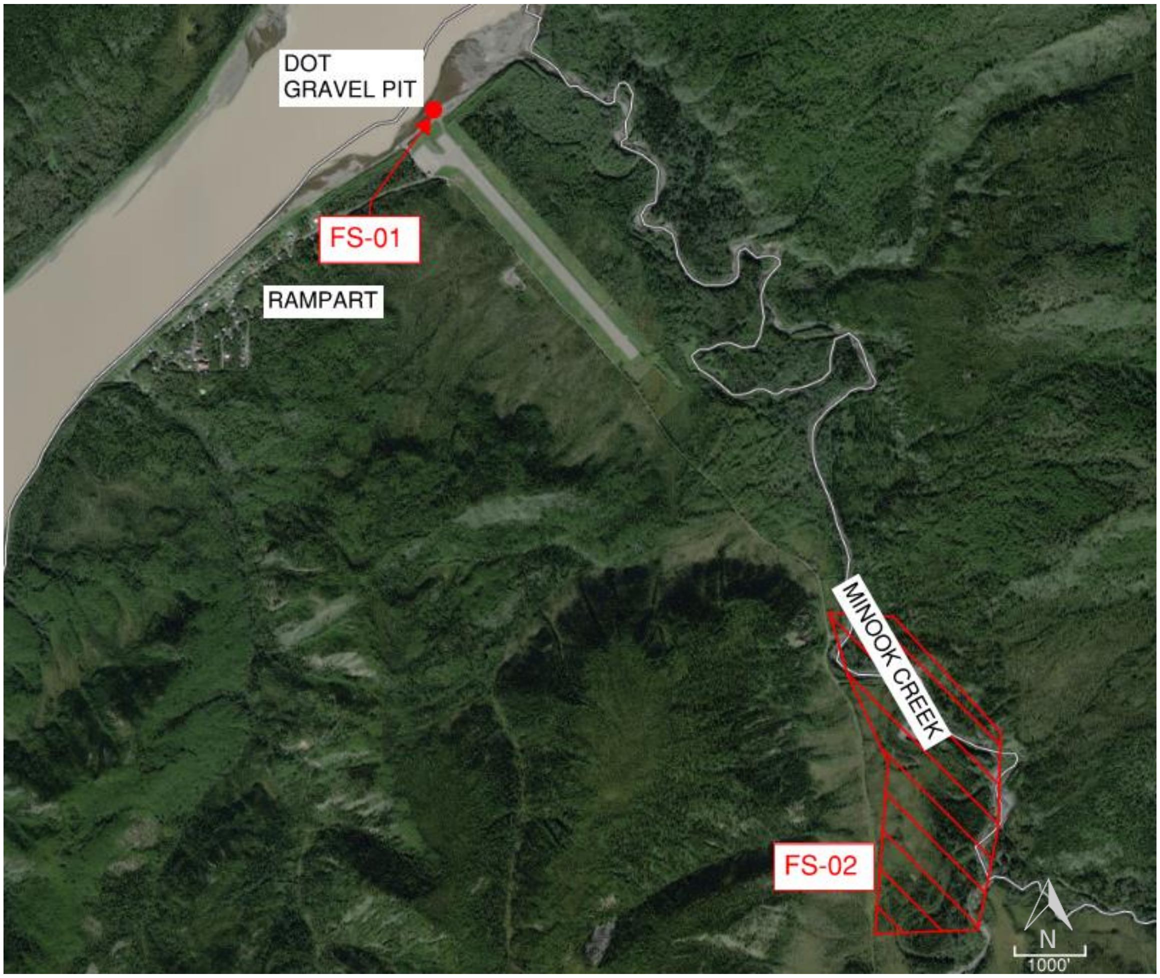

Figure 2. Fill Material Sample Locations

3.0 REGIONAL GEOLOGY

Rampart, Alaska, lies within the Yukon-Tanana Upland, which is part of the larger Yukon River basin. The area features a mix of rolling hills, mountains, and river valleys, shaped by glacial and fluvial processes.

According to United States Geological Survey (USGS), the proposed clinic site is classified as Qs – unconsolidated surficial deposits, undivided (Quaternary), as seen in Figure 3. The deposits are unconsolidated and vary in sorting and stratification. They primarily consist of alluvial, colluvial, marine, lacustrine, eolian, and swamp materials, with some glacial deposits included. The glacial and periglacial features comprise end, lateral, and ground moraines, outwash, rock glaciers, and scoured bedrock, often overlain by thin glacial deposits from the Holocene and Pleistocene epochs, with some areas possibly dating to the latest Tertiary. This indicates a high presence of silt, likely with traces of sands and gravels.

According to the Environmental Protection Agency (EPA), Rampart's expected permafrost distribution classification is on the border of sporadic (10 – 50%) and Discontinuous (50 – 90%). This permafrost profoundly influences soil stability and construction practices. The region's geological composition and permafrost conditions contribute to the challenges of building and maintaining structures. Section 8.2 discusses the permafrost conditions at the project site.

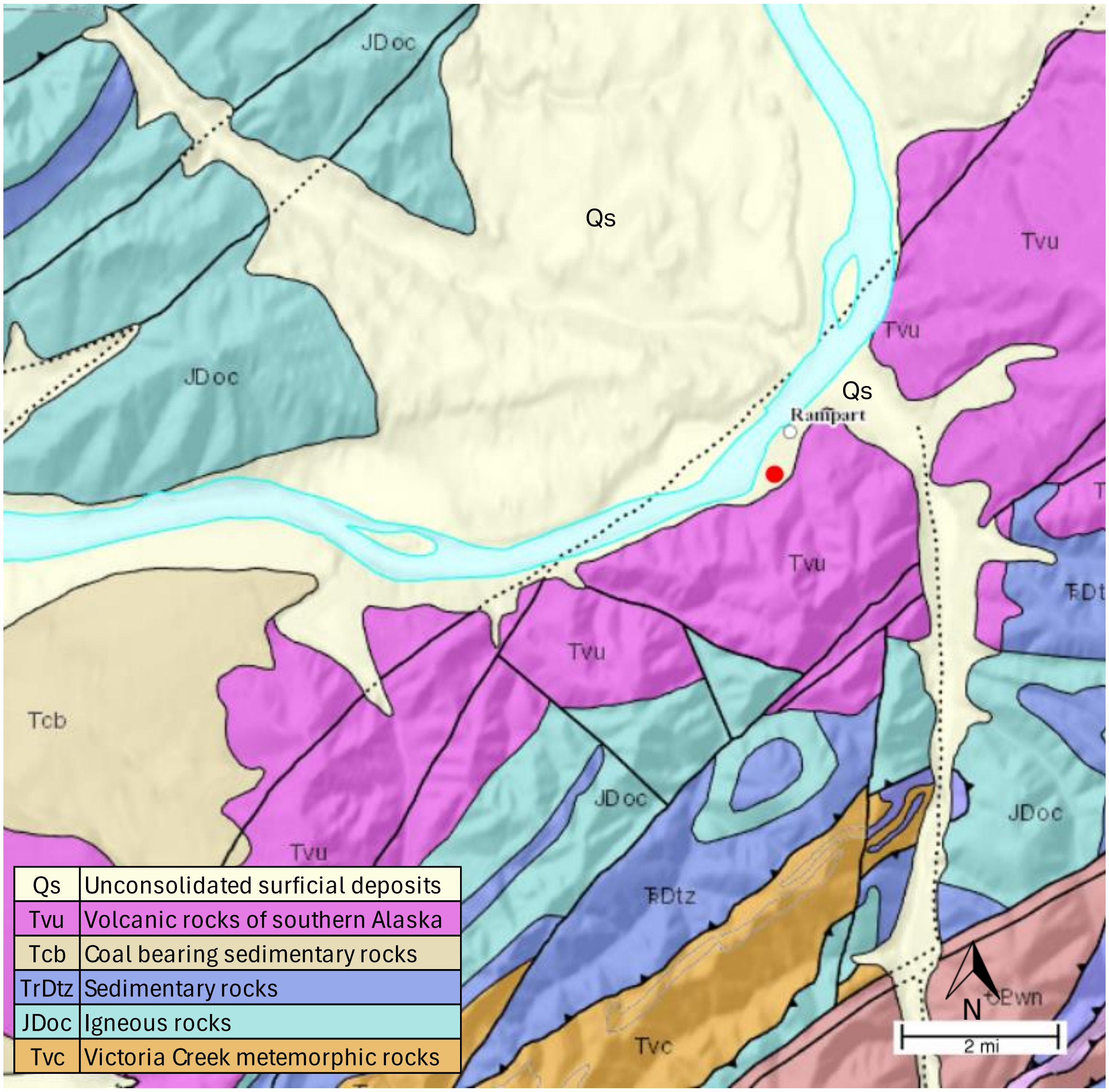

Figure 3. Rampart Geological Map (USGS)

4.0 GEOGRAPHY AND CLIMATE

Rampart, Alaska, experiences a subarctic climate characterized by long, extremely cold winters and short, mild summers. The region sees limited precipitation, mostly in the form of snow during winter and light rain in summer. According to Weather Atlas, winter temperatures often plunge well below freezing, with January being the coldest month, averaging highs around -1.1°F (-18.4°C) and lows near -11.4°F (-24.1°C)1. Snowfall is significant, particularly from October through April, where the area receives an average high of around 13 inches per month. Summers are brief but relatively warm, with July being the warmest month, averaging highs around 69.1°F (20.6°C) and lows near 49.5°F (9.7°C)1. Precipitation is moderate year-round, with the summer months experiencing the highest rainfall, averaging 3.67 inches in July.

Rampart, Alaska, is located in a remote area along the banks of the Yukon River in the state's interior region. The nearest creeks are Minook Creek and Rampart Creek. Geographically, the town is positioned between the Ray Mountains, west of the Yukon River and the Baldry, Elephant, and Wolverine Mountains located just south of Rampart. See Figure 4, for the general site geography.

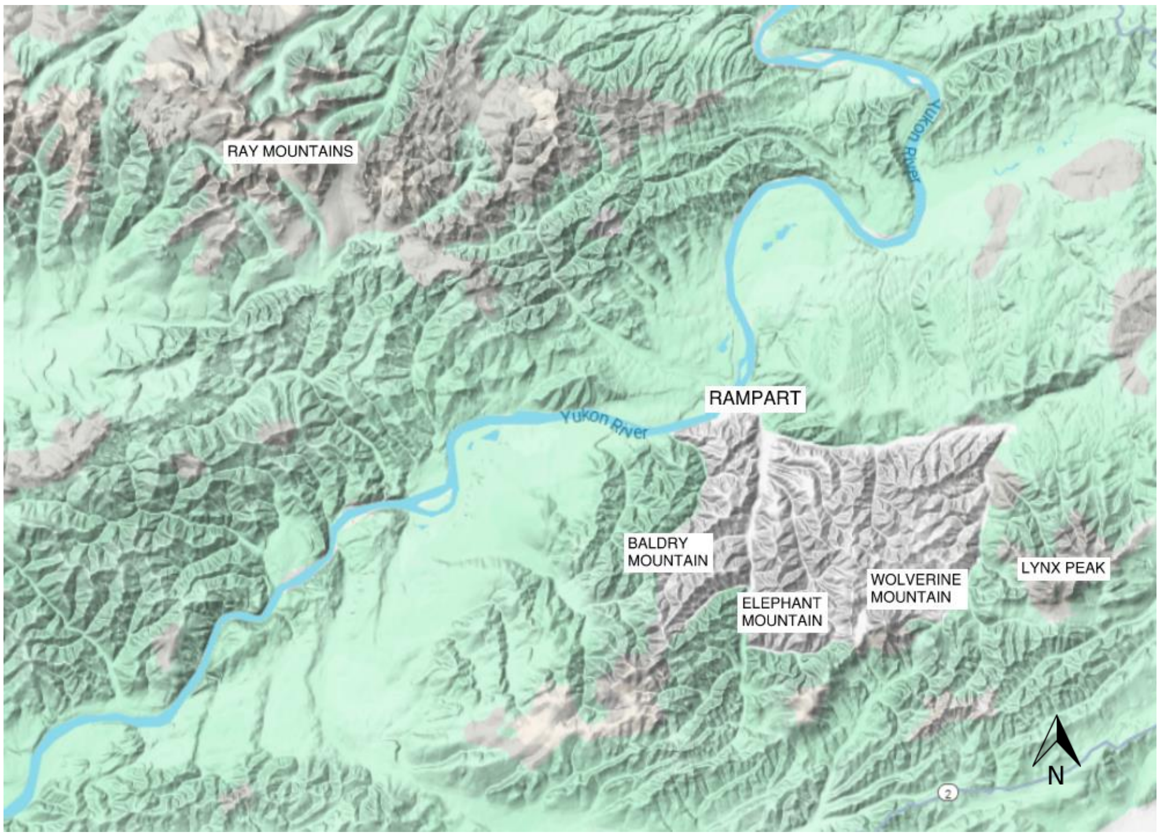

Figure 4. Rampart Geography

5.0 SUBSURFACE EXPLORATIONS

RESPEC conducted 3 air rotary borings on-site and collected two borrow source samples to assess their suitability for construction. We installed 1-inch diameter PVC standpipes in each borehole to gather subsurface temperature data. The boreholes were drilled on November 6th, 2024, through November 9th, 2024. RESPEC subcontracted Discovery Drilling (DD) to provide the required drilling services. Discovery Drilling used a Geoprobe 6712DT air rotary drill rig to conduct on site borehole explorations. The Geoprobe drill rig utilized a 4-inch air rotary casing to advance the boreholes. A three inch outside diameter spilt spoon sampler was used for soil sampling. A 340-lb auto hammer with a 30-inch free fall height was used for modified penetration test sampling. The blow counts needed to drive the split spoon sampler were recorded in three 6-inch increments, covering a total depth of 18 inches for majority of the sampling. It should be noted that blow count data does not provide an indicator of soil density/strength for frozen soils. Figure 5 shows the approximate locations where boreholes were completed, and Figure 6 shows DD set up ready to drill at BH-01.

We compiled our field observations and the results from the laboratory analyses to produce a graphic log of each exploration. The graphic soil exploration logs depict the subsurface conditions that we identified at each exploration location and help us to interpret/extrapolate the subsurface conditions for areas adjacent to, and immediately surrounding, each exploration location. These can be found in Appendix A.

All classifications and descriptions of frozen ground and ice generally follow the Unified Soil Classification System (USCS). Table 1 shows the location, depth of organics, depths of frozen soils, and termination depth of the explorations. The complete borelogs and photos of representative soil samples can be found in Appendix A.

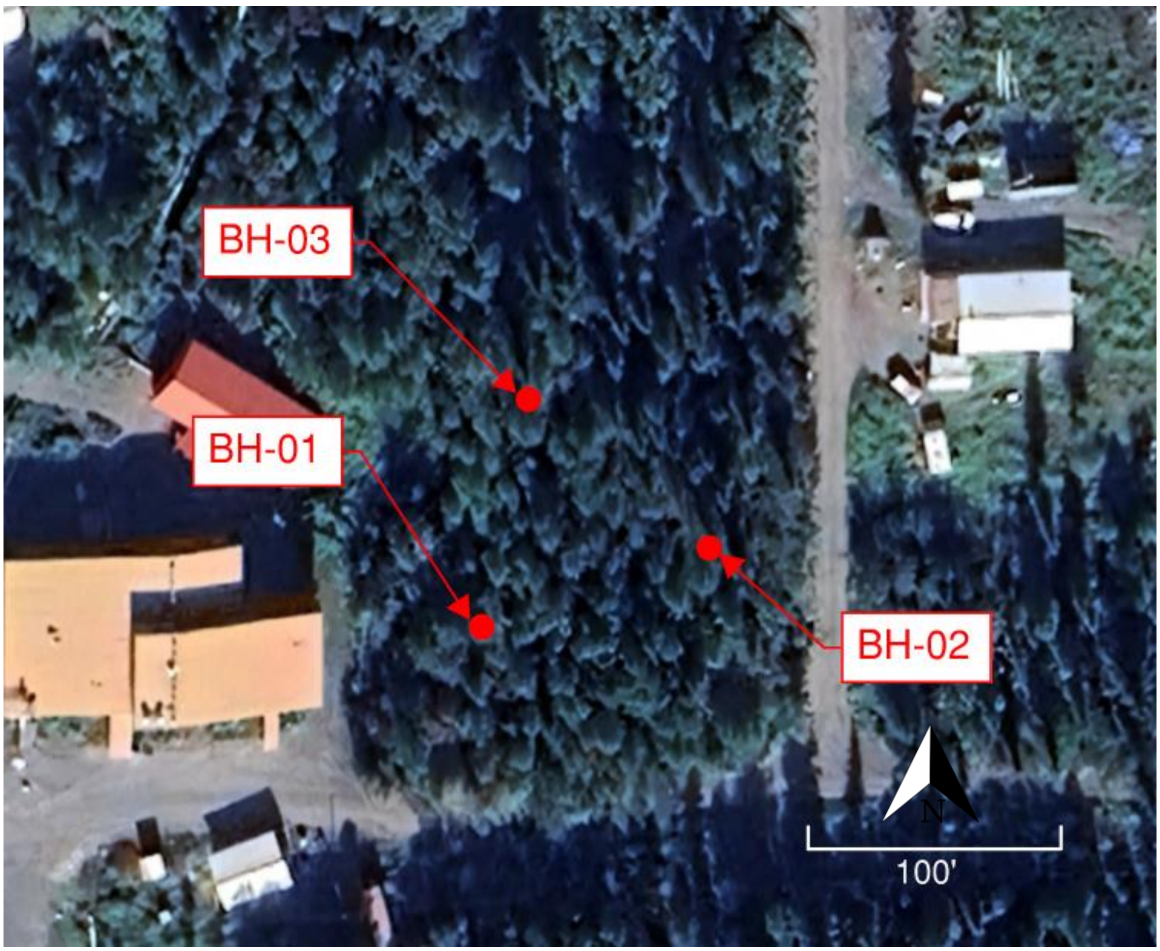

Figure 5: Approximate Exploration Borehole Locations

Figure 6: DD's Geoprobe 6712DT Drilling at Borehole BH-01

Table 1: Exploration Summary

Exploration ID	Latitude	Longitude	Soil Containing Organics Depths (ft)	[1]Depth of Frozen Soils (ft)	Depth of Exploration (ft)
BH-01	65.5033333	-150.170916	0 to 5 ft, 26 ft, 35 ft,	6 to 51.5	51.5
BH-02	65.5034166	-150.170305	0 to 7 ft, 35 to 36.5 ft,	3 to 51.5	51.5
BH-03	65.5035833	-150.170805	0 to 2 ft, 20 to 21.5 ft, 40 to 42 ft	[1]9 to 45	51.5
FS-01	65.513138	-150.150633	-	-	-
[2]FS-02	-	-	-	-	-

[1]BH-03 Thermistor temperature indicates around 30 feet begins possible thaw zone, while subsurface exploration sample showed signs of possible thaw around 45 feet.

[2]FS-02 was sampled from the Minook River, but exact location is unknown.

6.0 LABORATORY TESTING

A total of 40 samples from the borehole explorations and 15 gallons of proposed fill material samples were collected on site. The soil samples were submitted to our Juneau office for further identification. All soil samples were tested in general accordance with the respective ASTM standard test methods including:

- Moisture Content Analysis (ASTM D-2216)
- Particle Size Analysis (ASTM C136/D7928/D-6913)

The results of the laboratory analyses are provided on the graphic borehole logs contained in Appendix A of this report and the laboratory test data sheets contained in Appendix B of this report.

7.0 DESCRIPTION OF BORROW SOURCE SAMPLES

A total of 15 gallons were collected from the proposed fill material sites. On November 9, 2024, 10 gallons of material were collected from the DOT Pit by RESPEC. There was not safe access to the Minook Creek site during RESPEC's site visit due to open water and snow conditions. Later, Charlie from Rampart, collected 5 gallons of material from the Minook Creek site and shipped it to RESPEC for laboratory analysis. The exact location of the sample collection and method used to collect the Minook Creek sample are unknown. The samples were sent to RESPEC's Fairbanks office, where they were subsequently forwarded to the soils laboratory in Juneau for analysis.

7.1 DOT PIT

The FS-01 fill sample, taken from the existing DOT pit near the west side of the airport, was classified in the lab as poorly graded gravel with sand (GP). Laboratory analysis determined that 6.6% of the material passes the No. 200 sieve. Although the fines content slightly exceeds the gradation requirement of under 6% passing the No. 200 sieve for Type A material, we still consider this material suitable for use as Select Material Type A in the structural fill for the foundation section. Additional sampling and testing before and during construction is recommended.

7.2 MINOOK CREEK

The FS-02 fill sample, taken from the Minook Creek location, about 2 miles SE of the airport, has been classified as poorly graded gravel with sand (GP). Laboratory analysis determined that 1.1% of the material passes the No. 200 sieve. Based on this assessment, we consider this material suitable for use as Select Material Type A in the structural fill for the foundation section. Additional sampling and testing before and during construction is recommended.

8.0 DESCRIPTION OF SUBSURFACE CONDITIONS

8.1 SOIL LITHOLOGY

Below are the general soil profiles of the three boreholes. Termination depths were 51.5 feet across all three boreholes. Thawed and frozen soils were classified using the Unified Soil Classification System. The main frozen soil classifications observed during drilling were: Nbn – well bonded – no excess ice, Vc – ice coatings on particles Vr – random or irregular oriented ice formations, Vx – individual ice inclusions.

8.1.1 BH-01

BH-01 encountered surficial organics in the top 0.5 feet, which were frozen due to the current seasonal frost depth. Below this, silt (ML) was present to a depth of 6 feet. Permafrost began at 6 feet below ground surface and consisted of frozen silt (ML) to the bottom of the exploration at 51.5 feet. Notably, between 40 and 48 feet, there were trace gravel pieces in the samples. Within the frozen silt layer, the ice classifications varied as follows: Nbn from 6 to 30 feet, Nbn and Vr from 30 to 35 feet, Nbn and Vc from 35 to 40 feet, Nbn and Vx from 40 to 48 feet, and Vx and Vr from 48 feet to the bottom of the hole. Wood chunks were also encountered at depths of 26 feet and 35 feet, each surrounded by ice coatings.

8.1.2 BH-02

BH-02 encountered surficial organics in the top 0.5 feet, which were frozen due to the current seasonal frost depth. Below this, silt with some organic wood fibers (ML) was present to a depth of 3 feet. Permafrost began at 3 feet below ground surface and consisted of frozen silt (ML) to 7 feet. A mass ice formation was encountered, where the sample consisted solely of ice with no soil, and this ice layer is estimated to 9 feet. Following this, frozen silt (ML) extended from 9 to 51 feet, where another mass ice layer was observed to the bottom of the hole at 51.5 feet. Within the frozen silt layer, the ice classifications varied as follows: Nbn and Vc from 3 to 7 feet, Nbn with minor Vx and Vs ice lenses from 9 to 30 feet, and Nbn with occasional ¼-inch ice lenses from 30 to 51 feet. Additionally, wood chunks were encountered at depths of 3 to 7 feet and at 35 feet.

8.1.3 BH-03

BH-03 encountered surficial organics within the top 0.3 feet, which were frozen due to the current seasonal frost depth. Beneath this layer, silt (ML) extended down to a depth of 9 feet. Permafrost began at 9 feet below the ground surface, consisting of frozen silt (ML) that continued to a depth of 43 feet. Below this, from 43 to 51.5 feet, the material transitioned to dry, flaky silt (ML), noted as potentially unfrozen. Within the frozen silt layer, the ice classification was predominantly Nbn, with Vr observed at 15 feet. Additionally, wood chunks were encountered at a depth of 20 feet, and small shells were found at 40 feet.

8.2 PERMAFROST

Permafrost is defined as ground that remains frozen for two or more consecutive years. Beadedstream temperature acquisition cables (TAC) were installed in each borehole to measure subsurface temperatures. These cables were placed inside a sealed 1-inch diameter SCH 40 PVC standpipe, installed during drilling, and extended to depths of 50 feet in boreholes BH-01, BH-02, and BH-03. The PVC pipes were left in place with about 5 feet of stick-up above ground, allowing for future temperature monitoring if needed. Appendix C provides photos of the drill rig at each borehole and the thermistor string set up. Figure 7 illustrates the temperature-depth profiles for each borehole, and Table 2 provides the raw data. The figure shows that permafrost begins at relatively shallow depths in BH-01 and BH-02, between 3 to 6 feet, while it starts deeper at around 9 feet in BH-03. The coldest temperature recorded was 31.2°F.

Although the boreholes reach freezing temperatures, they remain within the range of "warm permafrost." With recent climate trends, shallow permafrost is likely to that in the near future, especially if the site is developed, unless preventive measures are applied. As permafrost degrades due to rising temperatures, it melts, which causes significant settlements that may range from inches to several feet. Additionally, the increased soil saturation reduces its load-bearing capacity, potentially compromising the stability of foundations above.

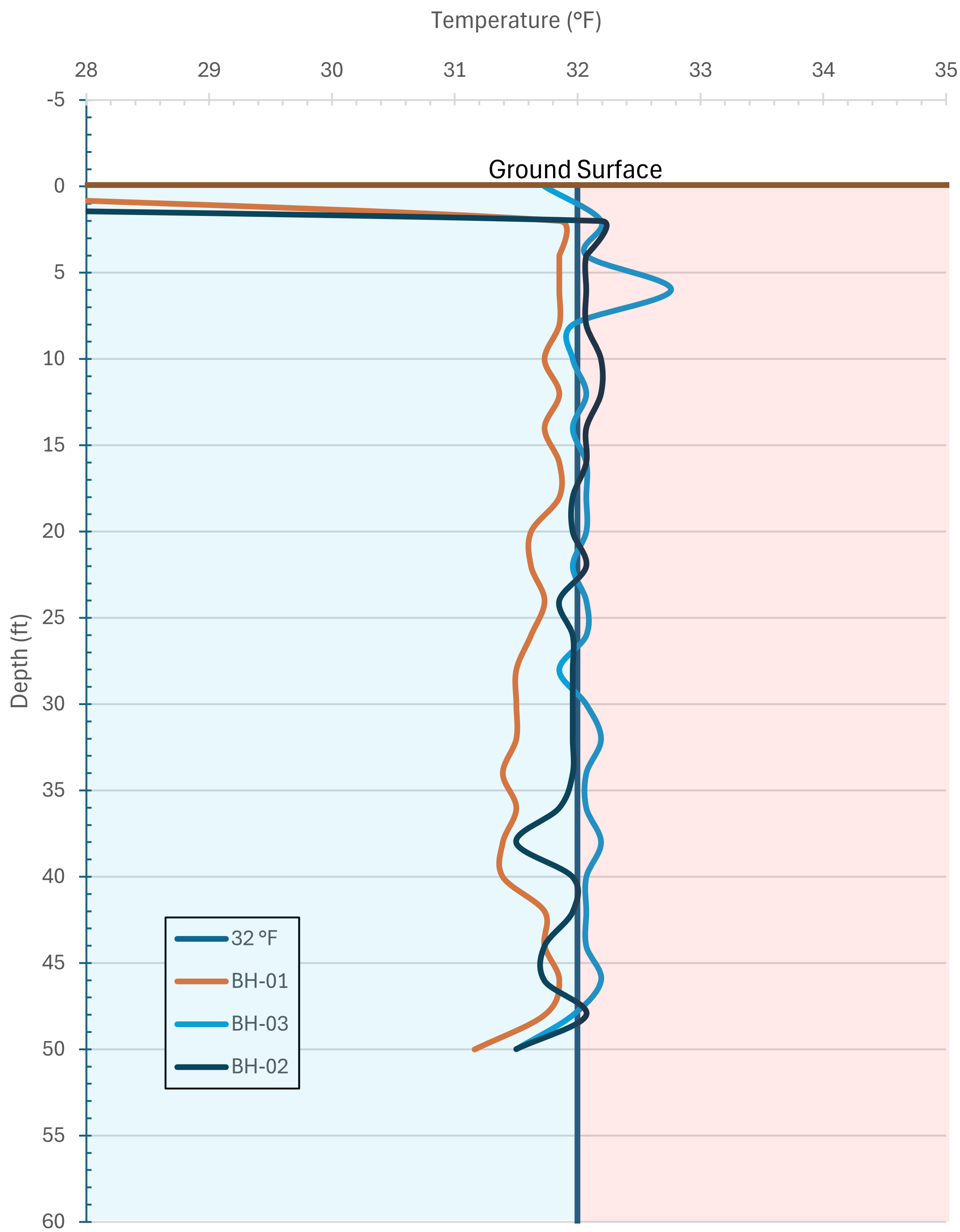

Figure 7: Temperature Versus Depth

Table 2. Temperature Versus Depth Data Measurements

BH-01		BH-02		BH-03	
Depth (ft)	Temperatures (°F)	Depth (ft)	Temperatures (°F)	Depth (ft)	Temperatures (°F)
0	24.7	0	12.0	0	31.7
2	31.9	2	32.2	2	32.2
4	31.9	4	32.1	4	32.1
6	31.9	6	32.1	6	32.8
8	31.9	8	32.1	8	32.0
10	31.7	10	32.2	10	32.0
12	31.9	12	32.2	12	32.1
14	31.7	14	32.1	14	32.0
16	31.9	16	32.1	16	32.1
18	31.9	18	32.0	18	32.1
20	31.6	20	32.0	20	32.1
22	31.6	22	32.1	22	32.0
24	31.7	24	31.9	24	32.1
26	31.6	26	32.0	26	32.1
28	31.5	28	32.0	28	31.9
30	31.5	30	32.0	30	32.1
32	31.5	32	32.0	32	32.2
34	31.4	34	32.0	34	32.1
36	31.5	36	31.9	36	32.1
38	31.4	38	31.5	38	32.2
40	31.4	40	32.0	40	32.1
42	31.7	42	32.0	42	32.1
44	31.7	44	31.7	44	32.1
46	31.9	46	31.7	46	32.2
48	31.7	48	32.1	48	32.0
50	31.2	50	31.5	50	31.5

9.0 SEISMIC DESIGN PARAMETERS

The project site is in an area of relatively low seismic activity. Approximately 7 miles southeast of the site lies the Kaltag fault system, which experienced significant lateral displacement during the Cretaceous and early Tertiary periods and has also shown some movement during the current Holocene epoch (Patton, 1973).

We assume that the American Society of Civil Engineers (ASCE) 7-16 will be used for the design and that the proposed buildings will be Risk Category II. Per ASCE 7-16 Section 20.3 the seismic site classification for this project site shall be Site Class D. We utilized the ASCE-7 Hazard Tool which uses the United States Geological Survey (USGS) Seismic Design Maps. The ASCE-7 Hazard Tool can be found at the following URL: https://ascehazardtool.org/. A copy of the web tool output for the project site is provided in

Appendix D of this report. The site's respective seismic design parameters are as follows: Table 3 shows the seismic parameters for the site.

Table 3. Seismic Parameters

Point Hope Seismic Parameters	
Item	**Parameters**
Soil Class	D
S_S	0.987 g
S_1	0.357 g
S_{MS}	1.091 g
S_{DS}	0.727 g
T_L	6 sec
PGA_M	0.481 g

9.1 SETTLEMENTS

Under static conditions and following the foundation design and construction recommendations presented in this report, foundation settlements should be limited to one inch or less, with differential settlements comprising approximately ½ of the total settlement. However, it is crucial that insulation and thermosyphons be incorporated as outlined in the recommendations to prevent excessive settlements. If these measures are not implemented, settlement amounts could increase significantly. Seismically induced liquefaction settlements are not expected at the project site due to the presence of frozen soils. For details on the necessary insulation and thermosyphon requirements, please refer to Section 10.5 and 10.7 of this report, respectively.

10.0 DESIGN AND CONSTRUCTION RECOMMENDATIONS

10.1 EARTHWORKS

All excavations on site shall be performed in accordance with OSHA guidelines. The surficial organic material encountered during our explorations needs to be removed when excavating for the foundation due to its poor bearing capacity, high frost susceptibility, and organic content. Once the surficial silt/organic material has been removed, all fill materials used should be NFS well-graded sands and gravels compacted to 95% of the modified Proctor density per ASTM D-1557. All fill material should be compacted in lifts not exceeding 12-inches in loose thickness.

If site grading allows, it is recommended to leave the surficial organics in place beneath roadway and parking area structural sections to serve as an insulating layer. The embankments fill and cut areas should be designed to have a slope not exceeding 2:1 from edge of traveled way until reaching existing ground elevation.

10.2 LATERAL SOIL PRESSURES

When footings are required to resist lateral loads, they must rely on passive earth pressure acting against the footing block and frictional forces at the base of the footing. A friction coefficient of 0.4 is recommended for resisting lateral sliding of footings, based on the interaction between concrete and the gravel pad material. Lateral soil pressures can be represented by equivalent fluid unit weights. The pressure distribution is a function of wall restraint, seismic loading, and drainage conditions. Table 4 presents the lateral earth pressure coefficient and equivalent fluid unit weights, for active, at-rest, and passive pressure conditions. These values are based on conditions where the gravel pad is compacted to 95% of the modified Proctor density in accordance with ASTM D-1557.

Table 4: Summary of Lateral Earth Pressures

	Active	At Rest	Passive
Lateral Earth Pressure Coefficient	0.260	0.412	3.852
Equivalent Unit Weight (pcf)	35.1	55.6	520.0

10.3 BUILDING FOUNDATION

The foundation design is critical for ensuring stability and mitigating the impact of permafrost conditions. We recommend a post and pad foundation, made up of a square spread footing and incorporating insulation and thermosyphons for passive ground cooling. The following steps outline the recommended construction process:

/ **Excavation:** Excavate the surficial organics to exposed mineral soils. The final depth of excavation will depend on the depth needed to achieve the recommended structural section with the design finished grade. If the bottom of the excavation is thawed, Proof roll the native soil, ensuring the soil is firm and uniform before the placement of imported materials. If frozen, backfill quickly to avoid excessive thawing of the native materials.

/ **Base Preparation:** Place a layer of geotextile at the base to prevent fine migration, followed by a 30-inch layer of sand bedding. Position the thermosyphon loop 6 inches above the bottom of the excavation within the sand bedding layer. Geotextile should be placed on undisturbed in-situ soils or Select Material Type B. If excess in-situ soil is removed, it cannot be used as backfill. In such cases, place the geotextile and use Select Material Type B as a replacement for soils beneath the sand bedding.

/ **Insulation:** Install a 10-inch layer of rigid board insulation above the 30-inch layer of sand. On top of the rigid insulation shall be another 6-inch layer of sand bedding.

/ **Filll and Pad:** Use NFS Select Material Type A, as specified by the Alaska Department of Transportation and Public Facilities (AKDOT&PF), to fill the remaining depth to the bottom of foundation grade. Ensure that the bottom of the footing bears on a pad consisting of a minimum of 18 inches of NFS Select Material Type A.

See Table 5 for the recommended foundation structural section as described in this section. All NFS structural fill must be compacted to 95% of the modified Proctor density in accordance with ASTM D-1557. For detailed excavation and fill designs, refer to Appendix E. This foundation design supports an allowable bearing pressure of 1,250 psf. Footing shall be a minimum of 2 feet in width.

Table 5: Recommended Foundation Structural Section

Material	Thickness (inches)
Bottom of Foundation Footing	-
Select Material Type A (NFS) Pad	18
Sand Bedding	6
Rigid Insulation	10
Sand Bedding with Thermosyphons	30
Select Material Type B*	As -needed
Geotextile	-
Proof Rolled Frost Susceptible Native Soils	-

10.4 BUILDING PERIMETER

- **Excavation:** The bottom of the excavation should extended horizontally 7 feet from the building's edge. The excavation bottom will maintain a minimum slope of 2H:1V within the 30-inch sand layer and a 1H:1V slope for Type A and B fills above the rigid insulation to the finished grade. Proof roll the native soil, ensuring the soil is firm and uniform before the placement of imported materials.
- **Base Preparation:** Place a layer of geotextile at the base, followed by a 30-inch layer of sand to 7 feet beyond the structure’s exterior. Position the thermosyphon loop 6 inches above the bottom within the sand layer. This sand layer slope shall be no steeper than 2H:1V. Geotextile should be placed on undisturbed in-situ soils or Select Material Type B. If excess in-situ soil is removed, it cannot be used as backfill. In such cases, place the geotextile and use Select Material Type B as a replacement for soils beneath the sand bedding.
- **Insulation:** Install a 10-inch layer of rigid insulation above the 30-inch layer of sand. On top of the rigid insulation shall be another 6-inch layer of sand.
- **Fill:** On top of the 6-inch layer of sand shall be 12 inches of Select Material Type A, followed by Select Material Type B as specified by the Alaska Department of Transportation and Public Facilities (AKDOT&PF) to finished grade. Slopes shall be no steeper than 1H:1V

See Table 6 for the recommended perimeter section as described in this section. All fills must be compacted to 95% of the modified proctor density in accordance with ASTM D-1557. For conceptual excavation and fill details refer to the drawing in Appendix E.

Table 6: Recommended Building Perimeter Section

Material	Thickness (inches)
Select Material Type B	To Finish Grade
Select Material Type A (NFS)	12
Sand Bedding	6
Rigid Insulation	10
Sand Bedding	30
Select Material Type B*	-
Geotextile	-
Proof Rolled Undisturbed Frost Susceptible Native Soils	-

*Select Material Type B only needs to be used as replacement underneath sand bedding if in-situ soils are disturbed

10.5 RIGID INSULATION

Subsurface insulation should consist of extruded polystyrene, such as DOW Styrofoam™ Highload or UC Industries Foamular. The insulation must be closed-cell board stock with a minimum compressive strength of 60 psi at 5% deflection. Additionally, it must absorb no more than 2% water, as determined by ASTM Test Method C-272, and its thermal conductivity (k) should not exceed 0.25 BTU-in/hr-ft^2-°F when tested at 75°F.

The performance of subsurface insulation depends significantly on proper installation. Key considerations include ensuring the board stock lies flat on a smooth, level surface and that adjoining edges are tightly butted together. For installations with multiple layers, vertical joints should be staggered to improve effectiveness. 6-inches of sand on top of the rigid insulation ensures smoother and more consistent pressures when compacting fill material so that the rigid insulation board doesn't break or deform.

10.6 GEOTEXTILE

Separation geotextile shall be placed at the bottom of excavation on un-disturbed in-situ soil. Geotextile shall follow AKDOT&PF Standard Specifications for Highways Sections 630 and 729; geotextiles shall meet AASHTO M 288 for separation, except provide a minimum permittivity of 0.50 sec-1, and meet Class 3 strength property requirements.

10.7 THERMOSYPHONS

Thermosyphons are passive heat transfer devices used to preserve permafrost integrity by freezing the ground during winter months to maintain frozen conditions throughout the summer. Thermosyphons with flat-loop evaporators feature specialized components that direct the working fluid to flow in one direction within the evaporator. As the fluid absorbs heat, it vaporizes and expands, which aids its circulation in a two-phase flow, increasing velocity as it moves around the loop.

- **System Design**
  - Utilize thermosyphons from Arctic Foundations, Inc. (AFI) featuring flat-loop evaporators.
  - Space flat-loop systems 4 feet on center, with a minimum 5-foot extension beyond the building footprint.
  - Position the rigid insulation 12 feet beyond the edge of the flat-loops evaporators. We recommend using at least two layers of extruded polystyrene (XPS) insulation with a minimum compressive strength of 60 psi at no more than 5% strain and a maximum water absorption of 0.3% by volume. The rigid insulation should provide a minimum R-value of 4.5 per inch.
- **Installation Details**
  - The loops should be installed on a graded, near-flat surface, accommodating undulations up to a maximum of six inches.
  - Position the loops 6 inches above the bottom of the excavation.
  - Condensers of 240 SF should extend above the roof line of the building and remain exposed to winter airflow, free from obstructions or heat sources.

For a conceptual thermosyphon layout, refer to Appendix E.

10.8 ROAD ACCESS STRUCTURAL SECTION

Approximately a 36-inch total section is appropriate for this site. This consists of a separation geotextile to separate the road section from the underlying organics, 26-inch Select Material Type IIA (NFS), 4-inch aggregate base course D-1, and 6-inch aggregate surface course, grading E-1. The recommended structural section for this project is shown in Table 6. The organic mat should be left in place to allow for a natural insulation barrier. Some settlement and compression of the in-situ soil is expected to occur over time, and periodic maintenance is expected.

Table 7: Recommended Road Access Structural Section

Material	Thickness (inches)
Aggregate Surface Course, Grading E-1	6
Crushed Aggregate Base Course, AKDOT&PF D-1 (NFS)	4
AKDOT&PF Select Material Type IIA (NFS)	26
Geotextile	-
Proof Rolled Frost Susceptible Native Soils	-

11.0 CLOSURE

This report was prepared exclusively for use by Tanana Chiefs Conference and their clients, consultants, and contractors for use in the design and construction of the proposed clinic facility. This report should always be read and/or distributed in its entirety (including all figures, exploration logs, appendices, etc.) so that all 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 logs, calculations, material values, etc.) which is presented in the design/construction plans and /or specifications for the project should have an adequate reference which clearly identifies where the report can be obtained for further review.

Due to the inherited variability of earth materials, variations in the subsurface conditions across the project site may exist other than those we identified during our geotechnical assessment. Therefore, a qualified geotechnical engineer, engineering geologist, and/or special inspector should be on -site during construction activities to provide corrective recommendations for any unexpected conditions revealed during construction. The geotechnical engineer of record should have access to the final approved building design to ensure sufficient time to review the geotechnical analysis and confirm its continued adequacy. Furthermore, the construction budgets should allow for any unanticipated conditions that may be encountered during construction activities. We conducted this evaluation following the standard of care expected of professionals undertaking similar work in the State of Alaska under similar conditions. No warranty, expressed or implied, is made.

12.0 REFERENCES

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APPENDIX A

EXPLORATION LOGS & SAMPLE PHOTOS

Soil Boring: BH-01

RESPEC Anchorage Geotech

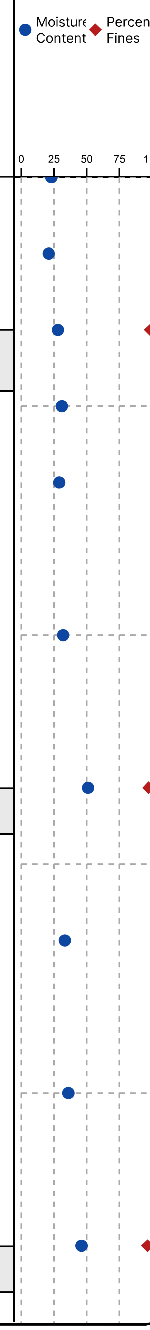
Project: Rampart Clinic
Location: 5th Ave. and East St. Rampart, AK
Project Number: I1368.24005

Date Started: 11/06/2024	Date Completed: 11/06/2024	Lat Lng: 65.503333, -150.170916
Location Accuracy: Surveyed with Garmin GPS	Client Name: Jeffery Murtiff	Boring Diameter: 4 in
Drilling Firm: Discovery Drilling	Figure Number: BH-01	Hammer Type: Auto
Hammer Weight: 340	Logged By: DJR	Method: Auger
Depth: 51.5'	Rig Type: Geoprobe 6712DT	

Rig Type	Geoprobe 6712DT
Tooling	3-1/4" Hollow Stem Auger
Surface Elevation	342'

Depth (ft)	USCS	Visual Classification and Remarks
0–0.5		Organics, frozen
0.5–6.0	ML	Brown, **Silt** (ML)
6.0–30.0	ML	Brown to gray, **Frozen Silt** (ML), Nbn, and trace of wood pieces @ 26', frozen
30.0–35.0	ML	Dark gray, **Frozen Silt** (ML), Nbn and Vr, frozen
35.0–	ML	Brownish gray, **Frozen Silt** (ML), Nbn and Vc, wood chunks in catcher, frozen

Depth of Sample (ft)	Sample Number	Blow Counts	Moisture Content (%)	% Gravel	% Sand	% Fines
0 ft	SA1	x x x x	23			
2.5 ft	SA2	1 2 3 2	21			
5 ft	SA3	3 5 6 7	28			98.5
7.5 ft	SA4	8 10 9	31			
10 ft	SA5	4 10 9 8	29			
15 ft	SA6	7 10 10 25	32			
20 ft	SA7	6 11 12	51			97.2
25 ft	SA8	6 13 13	33.3			
30 ft	SA9	7 10 12	36			
35 ft	SA10	7 11 23	46			96.4



ML | LSS - Large Split Spoon | - | -

Soil Boring: BH-01

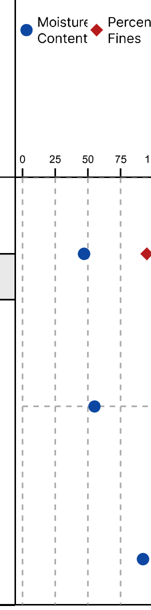
RESPEC Anchorage Geotech

Project: Rampart Clinic
Location: 5th Ave. and East St. Rampart, AK
Project Number: I1368.24005

Date Started: 11/06/2024	Date Completed: 11/06/2024	Lat Lng: 65.503333, -150.170916
Location Accuracy: Surveyed with Garmin GPS	Client Name: Jeffery Murtiff	Boring Diameter: 4 in
Drilling Firm: Discovery Drilling	Figure Number: BH-01	Hammer Type: Auto
Hammer Weight: 340	Logged By: DJR	Method: Auger
Depth: 51.5'	Rig Type: Geoprobe 6712DT	

Rig Type: Geoprobe 6712DT
Tooling: 3-1/4" Hollow Stem Auger
Surface Elevation: 342'

Depth (ft)	Graphic Log	Frozen=	USCS	Visual Classification and Remarks	Samples: Depth of Sample (ft)	Samples: Sample Number	Samples: Sample Graphic	Samples: Blow Counts	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
			ML	Brownish gray, **Frozen Silt** (ML), Nbn and Vc, wood chunks in catcher, frozen 40.0								
40			ML	Brown, **Frozen Silt** (ML), Nbn & Vx, and trace Gravels. Max 0.5" DIA., frozen	40 ft	SA11		8 8 17	47	0	5.1	94.9
45			ML	48.0	45 ft	SA12		12 20 21	55			
50			ML	Brown, **Frozen Silt** (ML), Vx & Vr visible ice inclusions, frozen 51.5	50 ft	SA13		13 14 16	92			



Bottom of Hole @ 51.5'

ML	LSS - Large Split Spoon	-	-

Photo A - 1. BH-01 Representative Sample of Surficial Organics and Silt (ML) from 0 to 6-Feet

Photo A - 2. BH-01 Representative Sample of Frozen Silt (ML) from 6 to 51.1-Feet

Photo A - 3. BH-01 Wood Chunks in Sample #10 at 35-Feet

Photo A - 4. BH-01 Majority of Nbn Classification Samples

Photo A - 5. BH-01 Example of Vx Classification from Sample 11 at 40-Feet

Soil Boring: BH-02

RESPEC Anchorage Geotech

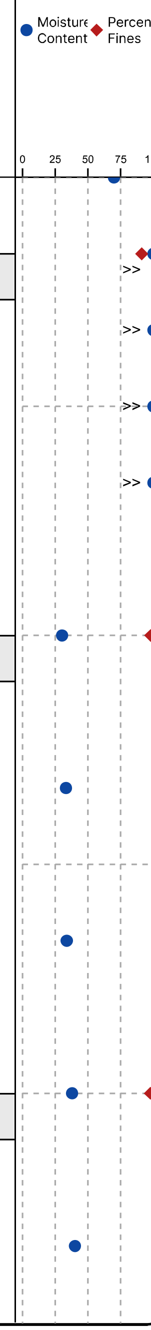
Project: Rampart Clinic
Location: 5th Ave. and East St. Rampart, AK
Project Number: I1368.24005

Date Started: 11/07/2024	Date Completed: 11/08/2024	Lat Lng: 65.503417, -150.170305
Location Accuracy: Surveyed with Garmin GPS	Client Name: Jeffery Murtiff	Boring Diameter: 4 in
Drilling Firm: Discovery Drilling	Figure Number: BH-02	Hammer Type: Auto
Hammer Weight: 340	Logged By: DJR	Method: Auger
Depth: 51.5'	Rig Type: Geoprobe 6712DT	

Rig Type	Geoprobe 6712DT
Tooling	3-1/4" Hollow Stem Auger
Surface Elevation	348'

Depth (ft)	USCS	Visual Classification and Remarks	Bottom depth
0		Light brown, Organics, wood fibers, frozen	0.5
0.5	ML	Brown, **Silt** (ML), with organics and some wood fibers	3.0
3.0	ML	Dark brown, **Frozen Silt** (ML), Nbn and Vc. Some organics, Ice coating around wood chunks, frozen	7.0
7.0		Mass ICE, no soil, frozen	9.0
9.0	ML	Dark brown, **Frozen Silt** (ML), Nbn & little Vx. Ice lense (Vs) encountered @ 25', frozen	30.0
30.0		Dark brown, **Frozen Silt** (ML), Nbn, couple of 1/4" ice lenses @45'. Trace amount of wood pieces encountered @ 35', frozen	

Depth of Sample (ft)	Sample Number	Sample Graphic	Blow Counts	Moisture Content (%)	% Gravel	% Sand	% Fines
0 ft	SA1	LSS	x x x	69.8			
2.5 ft	SA2	LSS	1 3 4	115.2			91
5 ft	SA3	LSS	3 6 7	124.6			
7.5 ft	SA4	LSS	5 13 15	1134.8			
10 ft	SA5	LSS	6 6 8	1031.9			
15 ft	SA6	LSS	3 9 12	30.2			97.9
20 ft	SA7	LSS	6 11 17	33.1			
25 ft	SA8	LSS	8 11 12	33.8			
30 ft	SA9	LSS	10 11 19	37.9			97.6
35 ft	SA10	LSS	10 10 12	40.1			



ML	LSS - Large Split Spoon	-	-

Soil Boring: BH-02

RESPEC Anchorage Geotech

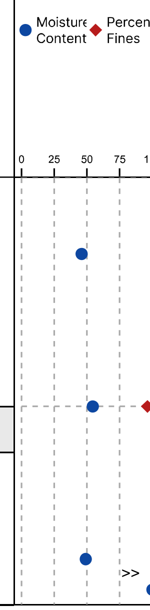
Project: Rampart Clinic
Location: 5th Ave. and East St. Rampart, AK
Project Number: I1368.24005

Date Started: 11/07/2024	Date Completed: 11/08/2024	Lat Lng: 65.503417, -150.170305
Location Accuracy: Surveyed with Garmin GPS	Client Name: Jeffery Murtiff	Boring Diameter: 4 in
Drilling Firm: Discovery Drilling	Figure Number: BH-02	Hammer Type: Auto
Hammer Weight: 340	Logged By: DJR	Method: Auger
Depth: 51.5'	Rig Type: Geoprobe 6712DT	

Rig Type: Geoprobe 6712DT
Tooling: 3-1/4" Hollow Stem Auger
Surface Elevation: 348'

Depth (ft)	Graphic Log	Frozen=	USCS	Visual Classification and Remarks	Samples: Depth of Sample (ft)	Samples: Sample Number	Samples: Sample Graphic	Samples: Blow Counts	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
40			ML	Dark brown, **Frozen Silt** (ML), Nbn, couple of 1/4" ice lenses @45'. Trace amount of wood pieces encountered @ 35', frozen	40 ft	SA11		8 12 12	45.9			
45					45 ft	SA12		5 7 11	54.4			96.2
50				51.0	50 ft							
				Mass ICE, no soil, frozen 51.5	51 ft	SA13 SA14		7 12 17	49.0 783.90			

Bottom of Hole @ 51.5'



ML | LSS - Large Split Spoon | - | -

Photo A - 6. BH-02 Representative Sample of Surficial Organics and Silt (ML) from 0 to 3-Feet

Photo A - 7. BH-02 Representative Sample of Frozen Silt (ML) from 6 to 7-Feet

Photo A - 8. BH-02 Representative Sample of the ICE Mass encountered from 7 to 9-Feet and Similar Conditions at 51-Feet

Photo A - 9. BH-02 Representative Sample of Frozen Silt (ML) from 9 to 51-Feet

Soil Boring: BH-03

RESPEC Anchorage Geotech

Project: Rampart Clinic
Location: 5th Ave. and East St. Rampart, AK
Project Number: I1368.24005

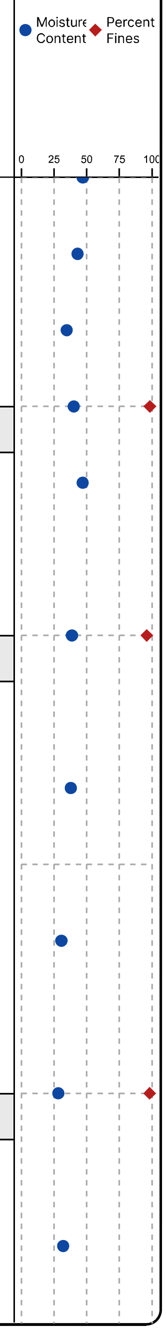
Date Started: 11/09/2024	Date Completed: 11/09/2024	Lat Lng: 65.503583, -150.170805
Location Accuracy: Surveyed with Garmin GPS	Client Name: Jeffery Murtiff	Boring Diameter: 4 in
Drilling Firm: Dicovery Drilling	Figure Number: BH-03	Hammer Type: Auto
Hammer Weight: 340	Logged By: DJR	Method: Auger
Depth: 51.5'	Rig Type: Geoprobe 6712DT	

Rig Type	Geoprobe 6712DT
Tooling	3-1/4" Hollow Stem Auger
Surface Elevation	339'

Visual Classification and Remarks (USCS: ML)

Depth (ft)	Visual Classification and Remarks
0–0.3	Brown, **Silt** (ML), with organics, frozen
0.3–9.0	Brown, **Silt** (ML)
9.0–	Brownish gray, **Silt** (ML), Nbn throughout. Vr encountered @ 15'. Wood chunks @ 20' and possible shells @ 40', frozen

Depth of Sample (ft)	Sample Number	Blow Counts	Moisture Content (%)	% Gravel	% Sand	% Fines
0 ft	SA1	1 x x	47.0			
2.5 ft	SA2	x x x	43.0			
5 ft	SA3	x 2 3	34.7			
7.5 ft	SA4	1 2 3	40.1			98.4
10 ft	SA5	3 5 9	46.8			
15 ft	SA6	5 8 10	38.7			96
20 ft	SA7	6 10 12	37.8			
25 ft	SA8	6 11 12	30.6			
30 ft	SA9	6 12 12	28.2			98.2
35 ft	SA10	7 11 13	32.0			



ML | LSS - Large Split Spoon | - | -

Soil Boring: BH-03

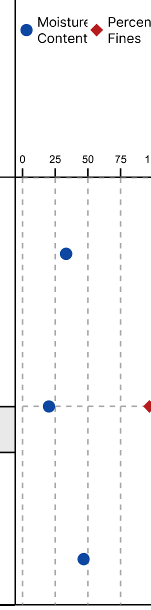
RESPEC Anchorage Geotech

Project: Rampart Clinic
Location: 5th Ave. and East St. Rampart, AK
Project Number: I1368.24005

Date Started: 11/09/2024	Date Completed: 11/09/2024	Lat Lng: 65.503583, -150.170805
Location Accuracy: Surveyed with Garmin GPS	Client Name: Jeffery Murtiff	Boring Diameter: 4 in
Drilling Firm: Dicovery Drilling	Figure Number: BH-03	Hammer Type: Auto
Hammer Weight: 340	Logged By: DJR	Method: Auger
Depth: 51.5'	Rig Type: Geoprobe 6712DT	

Rig Type: Geoprobe 6712DT
Tooling: 3-1/4" Hollow Stem Auger
Surface Elevation: 339'

Depth (ft)	Graphic Log	Frozen=	USCS	Visual Classification and Remarks	Samples: Depth of Sample (ft)	Samples: Sample Number	Samples: Sample Graphic	Samples: Blow Counts	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
40		Frozen	ML	Brownish gray, **Silt** (ML), Nbn throughout. Vr encountered @ 15'. Wood chunks @ 20' and possible shells @ 40', frozen (43.0)	40 ft	SA11	LSS	8 10 14	33.3			
45			ML	Brownish gray, **Silt** (ML), Possibly not frozen, very dry and flaky material	45 ft	SA12	LSS	10 12 15	20.2			97
50			ML	(51.5)	50 ft	SA13	LSS	8 13 15	46.7			



Bottom of Hole @51.5'

ML	LSS - Large Split Spoon	-	-

Photo A - 10. BH-03 Representative Sample of Surficial Organics and Silt (ML) from 0 to 3-Feet

Photo A - 11. BH-03 Representative Sample of Silt (ML) from 0.5 to 9-Feet

Photo A - 12. BH-03 Representative Sample of Frozen Silt (ML) from 9 to 43-Feet

Photo A - 13. BH-03 Representative Sample of Very Dry Silt (ML) from 43 to 51.5-Feet. Material is possibly non-frozen

Photo A - 14. BH-03 Representative Sample of Vr Ice Classification encountered From Sample 6 @ 15-Feet

Photo A - 15. BH-03 General Representative Sample of Nbn Ice Classification

Photo A - 16. BH-03 Shells encountered at 40 – Feet

Photo A - 17. BH-03 Close up Very Dry Silt (ML) at 43 to 51.5-Feet. Possibly unfrozen.

APPENDIX B
LABORATORY TEST RESULTS

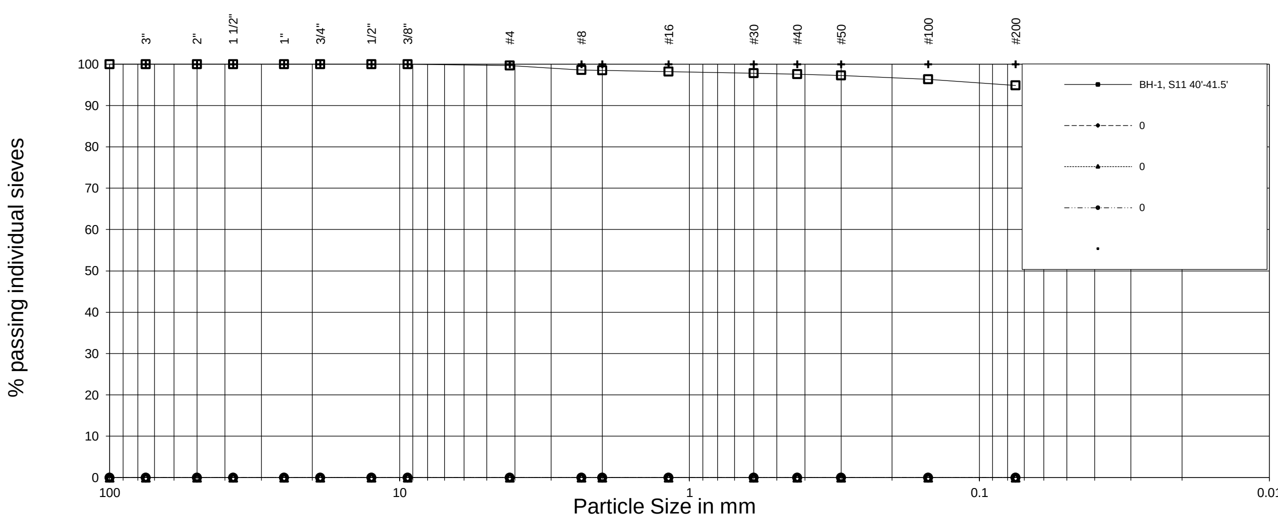
9109 Mendenhall Mall Road Suite #4, Juneau, Alaska, 99801

Sieve Analysis AASHTO T 27

Client		Project #	I1368.24005
Project	TCC Rampart Clinic	Received Date	11/25/2024
Location Sta/Offset		Reported Date	12/4/2024
Material/Source	BH-1, S11 40'-41.5'	Tested by/date	CD - 12/2/24
Sampled by/date			

Moisture	46.9%							
SIEVE SIZE	Percent passing	Required specs	Percent passing	Required specs	Percent passing	Required specs	Percent passing	Required specs
	BH-1, S11 40'-41.5'							
5 "								
4 "								
3 "								
2 "								
1 1/2 "								
1 "								
3/4 "								
1/2 "								
3/8 "								
No 4	100							
No 8	99							
No 10	99							
No 16	98							
No 30	98							
No 40	98							
No 50	97							
No 100	96							
No 200	94.9							

Grain Size Distribution



Cobbles and Gravel	Sand	Silt and Clay

Sample ID	Depth	Test	Grain Size Distribution (% Passing Sieve No.)															NMC %	Organic Content %	PI	LL	PL
			3"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#30	#40	#50	#100	#200				
BH-1, S1	0'-2'	MC																	23.4				
BH-1, S2	2.5'-4.5'	MC																	21.2				
BH-1, S3	5'-7'	P200																98.5	27.6				
BH-1, S4	7.5'-9'	MC																	30.7				
BH-1, S5	10'-12'	ATT																	28.8			NP	
BH-1, S6	15'-17'	MC																	31.9				
BH-1, S7	20'-21.5'	P200																97.2	51				
BH-1, S8	25'-26.5'	ATT																	33.3			NP	
BH-1, S9	30'-31.5'	MC																	36.2				
BH-1, S10	35'-36.5'	P200																96.4	46				
BH-1, S11	40'-41.5'	SIEVE								100	99	99	98	98	98	97	96	94.9	46.9				
BH-1, S12	45'-46.5'	MC																	55.2				
BH-1, S13	50'-51.5'	MC																	92				

9109 Mendenhall Mall Road, Suite 4, Juneau Alaska, 99801

Project: Rampart Clinic

Client: TCC

SUMMARY OF DRILL HOLE TEST RESULTS

RESPEC Project No. I1368.24005

Date: 12/4/24

Sheet 1 of 3

Prepared by: CD

Sample ID	Depth	Test	Grain Size Distribution (% Passing Sieve No.)																NMC %	Organic Content %	PI	LL	PL
			3"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#30	#40	#50	#100	#200					
BH-2, S1	0'-1.5'	MC																	69.8				
BH-2, S2	2.5'-4'	P200/OC																91.0	115.2	12.5			
BH-2, S3	5'-6.5'	OC																	124.6	22.8			
BH-2, S4	7.5'-9'	MC																	1134.8				
BH-2, S5	10'-11.5'	MC																	1031.9				
BH-2, S6	15'-16.5'	P200/ATT																97.9	30.2			NP	
BH-2, S7	20'-21.5'	MC																	33.1				
BH-2, S8	25'-26.5'	MC																	33.8				
BH-2, S9	30'-31.5'	P200																97.6	37.9				
BH-2, S10	35'-36.5'	MC																	40.1				
BH-2, S11	40'-41.5'	MC																	45.9				
BH-2, S12	45'-46.5'	P200																96.2	54.4				
BH-2, S13	50'-51'	MC																	49				
BH-2, S14	51'-51.5	MC																	783.4				

9109 Mendenhall Mall Road, Suite 4, Juneau Alaska, 99801

Project: Rampart Clinic

Client: TCC

SUMMARY OF DRILL HOLE TEST RESULTS

RESPEC Project No. I1368.24005

Date: 12/4/24

Sheet 2 of 3

Prepared by: CD

Sample ID	Depth	Test	Grain Size Distribution (% Passing Sieve No.)																NMC %	Organic Content %	PI	LL	PL
			3"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#30	#40	#50	#100	#200					
BH-3, S1	0'-1.5'	MC																	47				
BH-3, S2	2.5'-4'	ATT																	43			NP	
BH-3, S3	5'-6.5'	MC																	34.7				
BH-3, S4	7.5'-9'	P200																98.4	40.1				
BH-3, S5	10'-11.5'	MC																	46.8				
BH-3, S6	15'-16.5'	P200																96.0	38.7				
BH-3, S7	20'-21.5'	OC																	37.8	19.2			
BH-3, S8	25'-26.5'	MC																	30.6				
BH-3, S9	30'-31.5'	P200																98.2	28.2				
BH-3, S10	35'-36.5'	MC																	32				
BH-3, S11	40'-41.5'	MC																	33.3				
BH-3, S12	45'-46.5'	P200																97.0	20.2				
BH-3, S13	50'-51.5'	MC																	46.7				
DOT		SIEVE	100	95	86	74	67	58	52	39	32	30	25	19	17	15	12	6.6	10.8				
Minook Creek		SIEVE	100	97	90	82	74	61	52	32	19	16	11	7	5	4	2	1.1	12.7				

9109 Mendenhall Mall Road, Suite 4, Juneau Alaska, 99801

Project: Rampart Clinic

Client: TCC

SUMMARY OF DRILL HOLE TEST RESULTS

RESPEC Project No. I1368.24005

Date: 12/4/24

Sheet 3 of 3

Prepared by: CD

APPENDIX C

DRILL RIG AND THERMISTOR SETUP

Photo C - 1. BH-01 Drill Rig Set Up

Photo C - 2. BH-01 PVC Stick Up and Thermistor String Installation

Photo C - 3. BH-02 Drill Rig Set Up

Photo C - 4. BH-02 PVC Stick Up and Thermistor String Installation


Photo C - 5. BH-03 Drill Rig Set Up


Photo C - 6. BH-03 PVC Stick Up and Thermistor String Installation

APPENDIX D
SEISMIC DESIGN PARAMETERS

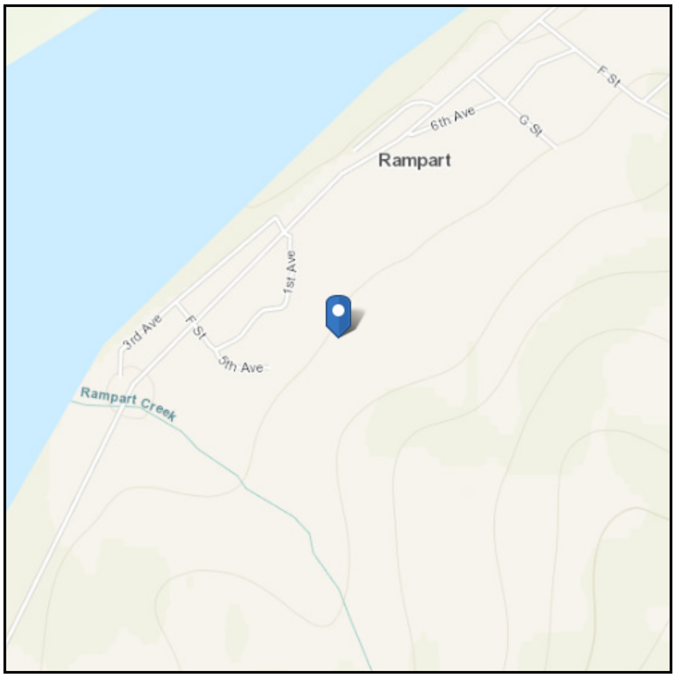
RESPEC

ASCE Hazards Report

Address:
No Address at This Location

Standard:	ASCE/SEI 7-16
Risk Category:	II
Soil Class:	D - Stiff Soil

Latitude:	65.503583
Longitude:	-150.170805
Elevation:	351.3940037511694 ft (NAVD 88)



Seismic

Site Soil Class: D - Stiff Soil

Results:

S_S :	0.987	S_{D1} :	N/A
S_1 :	0.357	T_L :	6
F_a :	1.105	PGA :	0.401
F_v :	N/A	PGA_M :	0.481
S_{MS} :	1.091	F_{PGA} :	1.199
S_{M1} :	N/A	I_e :	1
S_{DS} :	0.727	C_v :	1.293

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Mon Dec 16 2024

Date Source: USGS Seismic Design Maps

The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE Hazard Tool.

APPENDIX E

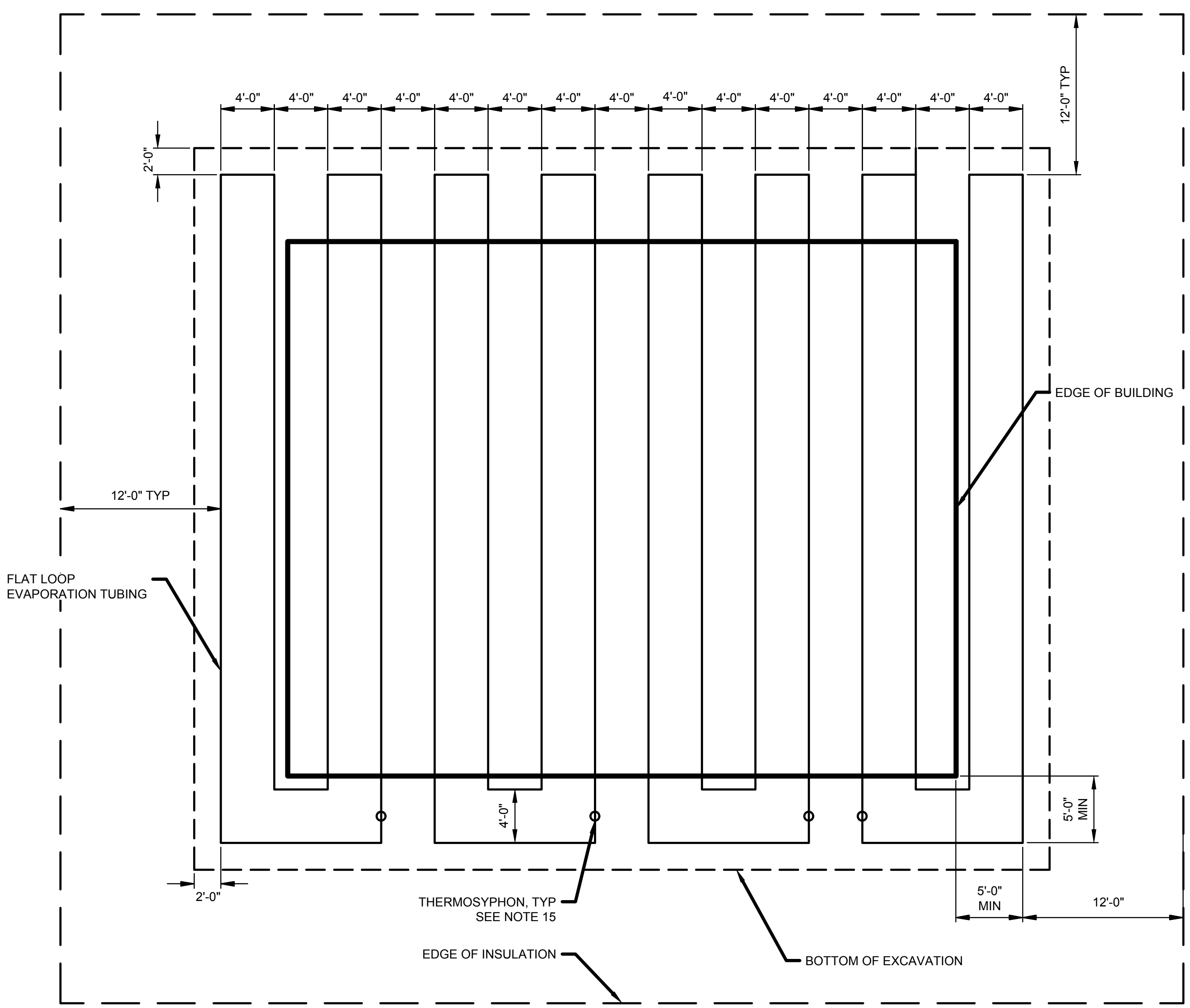
THERMOSYPHON CONFIGURATION

IF THIS BAR DOES NOT MEASURE EXACTLY ONE INCH, THE SCALE OF THIS DRAWING HAS BEEN ALTERED DURING IT'S PRODUCTION, AFFECTING ALL LABELED SCALES

1"

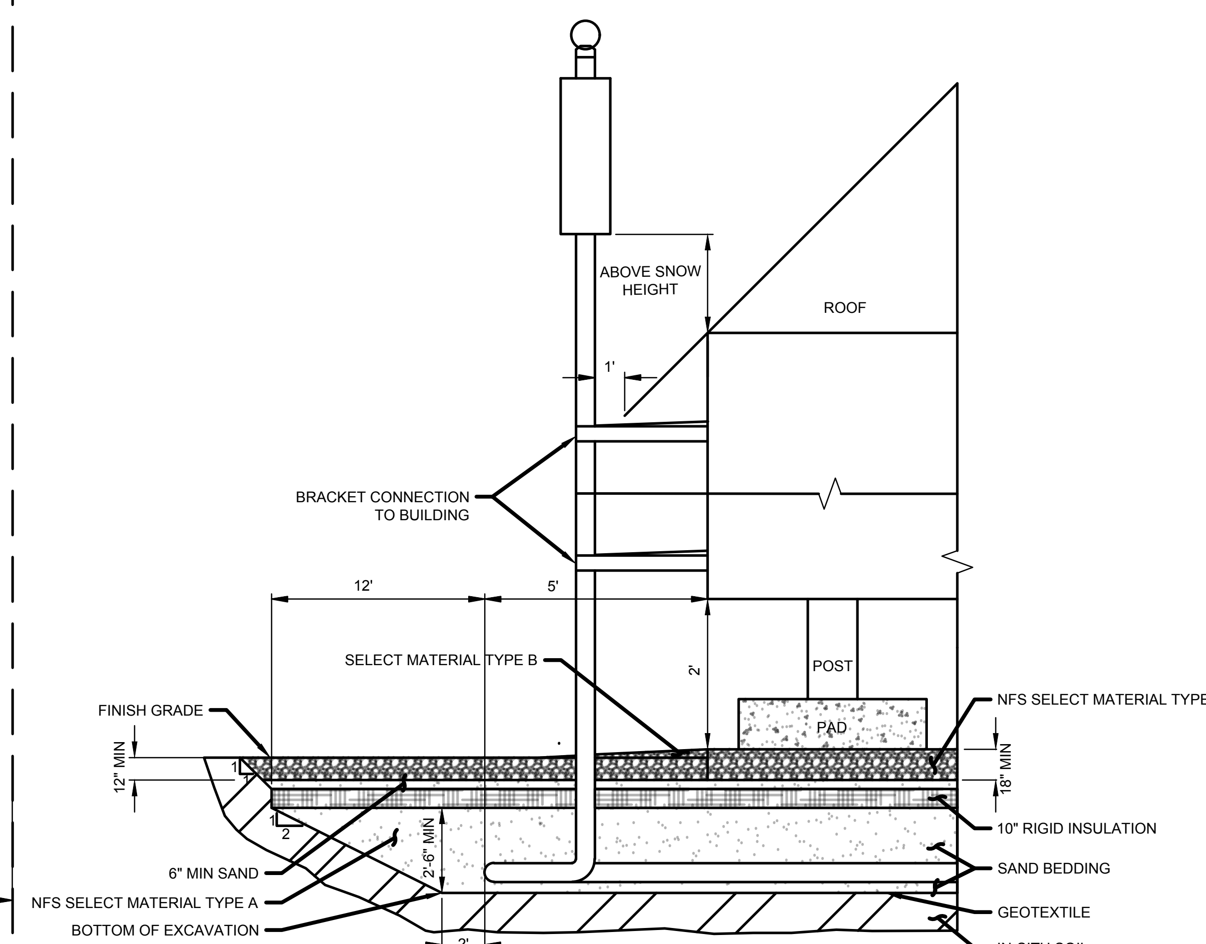
THERMOSYPHON SYSTEM NOTES:

1. THERMOSYPHONS TO BE MANUFACTURED BY ARCTIC FOUNDATIONS, INC. (AFI) AND SHOULD BE INSTALLED PER AFI SHOP DRAWINGS, THIS DRAWING REPRESENTS A PRELIMINARY DESIGN. WHILE THE FINAL DESIGN MAY DIFFER, IT IS IMPORTANT TO ADHERE TO THE SPECIFIC SPACING WIDTHS.
2. INSTALL FLAT LOOP EVAPORATORS WITH THE EVAPORATORS ORIENTED IN THE LONG DIMENSION OF THE BUILDING.
3. ALL FIELD WELDS, PRESSURE TESTING, AND THERMOSYPHON CHARGING TO BE PERFORMED BY AFI.
4. ORIENT THE CONDENSERS ON THE PREVAILING WINTER WIND SIDE OF THE BUILDING AND AWAY FROM ANY BUILDING HEAT SOURCE.
5. BRACE EACH AFI FLAT LOOP CONDENSERS TO THE BUILDING STRUCTURE PER ARCTIC FOUNDATIONS INC SHOP DRAWINGS.
6. INSTALL THERMOSYPHONS WHERE IT IS PROTECTED FROM BLOCKAGE BY DRIFTING SNOW.
7. FOUNDATION SHALL BEAR ON A MINIMUM OF 18 INCHES OF STRUCTURAL NFS SELECT MATERIAL TYPE A.
8. SAND BEDDING SHALL BE A MINIMUM OF 30 INCHES THICK WITH AN ADDITIONAL 6 INCHES ON TOP OF THE RIGID INSULATION.
9. RIGID INSULATION SHALL EXTEND A MINIMUM OF 12 FEET LATERALLY BEYOND THE EXTENT OF THE FLAT LOOP EVAPORATOR TUBING ON ALL SIDES.
10. FLAT LOOPS SHOULD EXTEND 5 FEET BEYOND EDGE OF BUILDING.
11. FLAT LOOPS SHALL BE PLACED 6 INCHES ABOVE BOTTOM OF EXCAVATION WITHIN THE SAND BEDDING.
12. INSTALL A 10-INCH LAYER OF RIGID INSULATION ABOVE THE SAND BEDDING WITH A MINIMUM R-VALUE OF 4.5/INCH.
13. EDGE OF EXCAVATION SHALL EXTEND 2 FEET FROM EDGE OF FLAT LOOP EVAPORATOR TUBING.
14. THE CONDENSER HEIGHT MUST EXTEND ABOVE THE ROOFLINE AND BE POSITIONED HIGHER THAN THE SNOW HEIGHT.
15. THE CONDENSER AND PIPE HORIZONTAL OFFSET MUST BE A MINIMUM OF 1 FOOT FROM EDGE OF THE ROOF OVERHANG.



1 SHEET 1 **PLAN - THERMOSYPHON CONFIGURATION**

NOT TO SCALE



1 SHEET 1 **DETAIL - THERMOSYPHON CONFIGURATION**

NOT TO SCALE

ADDITIONAL NOTES:

THERMOSYPHON CONFIGURATION ABOVE IS ILLUSTRATED FOR SPACING REFERENCE ONLY; BUILDING DIMENSIONS DEPICTED DO NOT REFLECT THE ACTUAL DESIGN.

No.	Date	Item

REVISIONS

CONSULTANT :

NOT FOR CONSTRUCTION

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PROJECT : TCC RAMPART CLINIC

SHEET TITLE : CONCEPTUAL THERMOSYPHON CONFIGURATION

PRELIMINARY

DESIGN	DJR
DRAWN	DJR
CHECKED	CK
DATE	12/2024

PROJECT No. I1368.24005

SHEET NUMBER 1