PanGEO
INCORPORATED
Geotechnical & Earthquake
Engineering Consultants

November 27, 2023
File No. 17-261

Mina Properties VII LLC
Attention: Hadi Mirzai

Subject: **Geotechnical Report**
Proposed Warehouse Improvements
18520 67th Avenue North, Arlington, Washington

Dear Mina:

This report summarizes our understanding of the subsurface conditions at the site and presents our recommendations for the project. PanGEO previously prepared a geotechnical report for the site in 2017, for construction of a new building. The scope of the project has changed. The current scope is limited to modifications of the existing building and site to incorporate a galvanizing plant within the interior of the existing building.

SITE DESCRIPTION

The property is located at 18520 67th Avenue North in Arlington, Washington. The approximate location of the site is shown in the attached Figure 1. The site is a rectangular parcel (tax parcel #31052200102000) that borders 67th Avenue North on the east, an industrial building to the north, and storage yards to the west and south. It has an approximate plan dimension of about 400 feet in the north-south direction, and 270 feet in the east-west direction. The ground surface within the property limit is relatively level but is as much as 12 to 13 feet below the adjacent street grade along 67th Avenue North. A retaining wall provided the grade separation between the site and the street.

The site is occupied by a one-story warehouse building with a footprint of about 36,327 square feet. Plate 1, below, is an aerial view of the project site and its surroundings.

3213 Eastlake Avenue E, Ste B
Seattle, WA 98102
Tel (206) 262-0370
www.pangeoinc.com

Plate 1. Aerial view of the site

SUBSURFACE EXPLORATION

Subsurface conditions at the site were explored with 7 test pits and 2 cone penetrometer tests (CPTs) that were advanced at the locations shown on Figure 2. Three of the test pits (TP-1 to TP-3) were intended for infiltration testing and were excavated to 3 to 4 feet below the surface. The remaining 4 test pits (TP-4 to TP-7) were excavated to depths of 6 to 7 feet below the existing ground surface to evaluate the near surface soils for their capacity to support conventional footings.

The CPTs were advanced to depths of 25 to 30 feet to evaluate the liquefaction potential of the underlying soils and whether piles would be needed to support the building to avoid excessive settlement that might occur from earthquake induced liquefaction. The field locations of all explorations were determined using a laser rangefinder measuring distances to on site features.

A geologist from PanGEO was present during the field explorations. Soil samples were field classified in accordance with the symbols and terms outlined in Figure A-1 and summary logs of the test pits are presented in Appendix A as Figures A-2 thru A-8. Logs of the CPTs are presented in Figures A-9 and A-10.

SUBSURFACE CONDITIONS

GEOLOGY

The Geologic Map of the Arlington West 7.5' Quadrangle (Minard, 1985) indicates that the project site is underlain by Marysville Sand (recessional outwash) from the Vashon glaciation. Minard (1985) describes the Marysville Sand as well drained, stratified to massive sand with some gravel and areas of silt and clay.

SUBSURFACE CONDITIONS

Subsurface conditions at the site typically consist of 6 to 12 inches of fill consisting of crushed rock, sand and gravel overlying glacial recessional outwash deposits. The upper 2 feet of the outwash deposits typically consists of loose to medium dense, red brown, silty fine sand. Below a depth of about 3 feet, the outwash deposits are typically medium dense to dense and consist of fine to coarse sand with a trace to some silt and gravel. The CPT probes indicate that the recessional outwash deposits extend to depths of at least 25 feet.

No groundwater was observed in the test pits. A previously installed monitoring well on the site was sounded with a tape measure, and the water table appeared to be at least 20 to 22 feet below the ground surface.

DESIGN RECOMMENDATIONS

SEISMIC DESIGN PARAMETERS

We understand that the project design will follow the 2018 edition of the International Building Code (IBC), which specifies a design earthquake having a 2% probability of occurrence in 50 years (return interval of 2,475 years). Based on the results of the CPTs and our understanding of the site geology, it is our opinion that Site Class D is appropriate for the site.

LIQUEFACTION EVALUATION

Liquefaction occurs when loose, saturated and relatively cohesionless soil deposits temporarily lose strength during earthquake ground shaking. Primary factors controlling the development of liquefaction include intensity and duration of strong ground motion, characteristics of subsurface soils, in-situ stress conditions and the depth to groundwater.

With the presence of generally dense to very dense soils below the water table that are also permeable (as evidenced by the results of infiltration testing), it is our opinion that the risk of earthquake-induced liquefaction at the site is low. As such, special design considerations associated with soil liquefaction are not necessary for this project.

FOUNDATIONS

New foundation elements, if needed, may be supported on conventional footings bearing on the medium dense, native outwash deposits or compacted structural fill extending to the native outwash. The adequacy of footing subgrade for new footings should be observed and verified by PanGEO. Any loose or unsuitable soils should ne over-excavated and backfilled with properly compacted structural fill. Local compaction of footing subgrades with a Ho-Pac or jumping jack compactor may be required to achieve the recommended design bearing capacity.

New footings should be located at least 18 inches below the finished exterior grade for perimeter footings and 12 inches below the finished floor slab for interior footings.

New footings bearing on properly prepared footing subgrade may be sized using an allowable bearing pressure of 3,000 psf with a one-third increase for transient loads. The same bearing pressure can be used to evaluate the adequacy of the existing footings.

Lateral forces on the foundation elements may be resisted by the combination of passive earth pressures acting against the embedded portions of the footings and by friction acting on the base of the foundations.

- Passive resistance values may be determined using an equivalent fluid weight of 350 pounds per cubic foot (pcf), assuming level ground surface. This value includes a factor safety of at least 2 based on the use of compacted structural fill placed adjacent to the sides of the footings.

- An allowable friction coefficient of 0.5 may be used to determine the frictional resistance at the base of the footings. This coefficient includes a factor safety of approximately 1.5.

Footings designed in accordance with the above may experience total settlements of less than 1 inch under static loading with differential settlement between adjacent columns less than about ½ inch. Most settlement should occur during construction.

BELOW-GRADE CONCRETE PITS

We understand that new concrete galvanizing pits will be installed within the existing building, cut into the exiting slab-on-grade. The maximum retained height of the pit walls will be about 7 feet. The temporary excavation for the pits should sloped no steeper than 1H:1V (horizontal:vertical) , and existing footings should be located beyond a 2H:1V projection from the base of the excavation. If the existing footings will be located within a 2H:1V projection from the base of the excavation, underpinning of the existing footings may be needed.

The pit walls should be designed using a latera earth pressure of 50 pcf, plus a seismic surcharge of 10H psf where H is the retained wall height. Where surface loads are present within a 1H:1V projection from the base of the walls, the lateral surcharge pressure on the pit walls from the surface loads should be calculated based on a lateral pressure coefficient of 0.4.

STRUCTURAL FILL

As currently envisaged, we do not anticipate the need for large quantities of fill for the proposed construction. Any structural fill used should consist of WSDOT Gravel Borrow (9-03.14(1)). The structural fill should be moisture conditioned to near its optimum moisture content, placed in loose, horizontal lifts less than 12 inches in thickness, and systematically compacted to a dense and relatively unyielding condition and to at least 95 percent of the maximum dry density, as determined using test method ASTM D 1557.

PAVEMENTS

If site traffic will include automobiles and light service vehicles, we recommend that the pavement section consist of 3 inches of HMA overlying 6 inches of WSDOT crushed surfacing base course (CSBC) (WSDOT 9-03.9(3)). PanGEO should be contacted for design of pavement for heavy trucks.

The presence of crushed rock at the site may reduce the CSBC thickness to 3 inches or allow the substitution of CSTC for CSBC.

The underlying subgrade should be proof rolled to a dense and unyielding condition before placing the CSBC/CSTC. Any soft areas in the subgrade should be over excavated and replaced with compacted Gravel Borrow. Material within the pavement prism (approximately 12 inches below the base of the pavement) should be compacted to 95% of its maximum dry density, as determined using test method ASTM D 1557.

STORMWATER INFILTRATION

Infiltration Testing Procedure

The field infiltration tests were conducted in general accordance with the procedure for Small Pilot Infiltration Test (PIT) outlined in the 2016 Snohomish County Drainage Manual. Two tests were performed, one in TP-1 at the north end of the building and one in TP-3 at the south end of the building (see Figure 2). The test locations were chosen based on the proposed locations of the infiltration facilities at the time of testing.

The infiltration test consists of excavating a test pit to the design bottom of the proposed infiltration facility with a minimum of 12 square feet bottom area. The test pit is then pre-soaked with at least 12 inches of water above the bottom. At the end of pre-soak period, the pit is filled with 12 inches of water and a constant head is maintained for the constant head testing. The volume of water per time unit needed to maintain 12 inches of constant head is recorded, until a point at which a constant volume per time unit is achieved. The field infiltration rate is then calculated based on the final measured volume per time unit and the surface area of the hole. In addition, at the end of the constant head test, we measured the falling head infiltration rate by recording the water level drop between regular time intervals.

Infiltration Test Results

The unfactored field infiltration rates from the tests are summarized in Table 1, following page:

Table 1. Field Infiltration Test Data

Test Location/Depth	Pre-Soak Duration (hours)	Test Duration (hours)	Field Test Result (inches/hour)	Comment
TP-1 @ 4 feet	6	1.42	26.4	Test in sandy native soils (Outwash)
TP-3 @ 3 feet	6	2	11.6	Test in sandy native soils (Outwash)

Recommended Design (Long-Term) Infiltration Rate

The short-term rate measured in the field, as summarized in Table 1, should be reduced through a correction factor to account for site variability and number of locations tested, degree of long-term maintenance to prevent siltation and bio-buildup, and degree of influent control to prevent siltation and bio-buildup. The correction factor to be used with in-situ infiltration measurements is recommended in *Volume 3, Section 3.3.6* of the *Snohomish County Drainage Manual, January 2016.* The simplified method equation is provided below:

$$K_{sat,\ design} = K_{sat,initial} \text{ x } C_{Fv} \text{ x } Cw_{t.} \text{ x } 0.9$$

The following correction factors were used to obtain design rates from the field infiltration rates:

CF_v = 1.0 (uniform soils; more than one test performed)
CF_t = 0.5 (small-scale PIT)

The calculated design rate for each test location is provided in Table 2, below:

Table 2. Summary of Design Infiltrate Rates

Test Location	Design Infiltration Rate (inches/hour)
TP-1	11.9
TP-3	5.2

Based on the testing results and the applied correction factors, the proposed infiltration galleries may use a long-term rate of 5.2 inches/hour on the south side of the existing building and 11.9 inches/hour on the north side of the existing building.

We recommend that the infiltration facilities be located entirely within the native outwash sand. PanGEO should be retained to verify the soil conditions at the bottom of the infiltration facilities at the time of construction.

TEMPORARY EROSION AND DRAINAGE CONSIDERATIONS

Surface runoff can be controlled during construction by careful grading practices. Typically, this includes the construction of shallow, upgradient perimeter ditches or low earthen berms to collect runoff and prevent water from entering the excavation. All collected water should be directed to a positive and permanent discharge system such as a storm sewer. It should be noted that some of the site soils are prone to surficial erosion. Special care should be taken to avoid surface water on open cut excavations, and exposed cut slopes should be protected with visqueen.

Permanent control of surface water should be incorporated in the final grading design. Adequate surface gradients and drainage systems should be incorporated into the design to direct water away from the structure. Surface runoff should be collected and discharged to a suitable outlet or infiltrated. Roof downspouts should be tightlined to a suitable outlet, such as an on-site infiltration facility. Because of the depth of the water table, footing drains are not required for the proposed foundations.

WET WEATHER EARTHWORK RECOMMENDATIONS

General recommendations relative to earthwork performed in wet weather or in wet conditions are presented below:

- Earthwork should be performed in small areas to minimize subgrade exposure to wet weather. Excavation or the removal of unsuitable soil should be followed promptly by the placement and compaction of clean structural fill. The size and type of construction equipment used may have to be limited to prevent soil disturbance.
- During wet weather, the allowable fines content of the structural fill should be reduced to no more than 5 percent by weight based on the portion passing ¾-inch sieve. The fines should be non-plastic.
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water.
- Bales of straw and/or geotextile silt fences should be strategically located to control erosion and the movement of soil. Erosion control measures should be installed along all the property boundaries.
- Excavation slopes and soils stockpiled on site should also be covered with plastic sheets.

EXISTING TEST PIT BACKFILL

We excavated 7 test pits at the approximate locations shown on Figure 2. The test pits were backfilled with the excavated soils and minimally compacted and graded with the excavator bucket. The test pit backfill is anticipated to experience long term settlement and is not suitable for supporting load-bearing elements, including but not limited to footings, utilities, and pavements. During construction of this project the test pit backfill should be completely removed and replaced with structural fill.

CLOSURE

We have prepared this report for Mina Properties VII LLC and the project design team, to use for the proposed site improvements. The recommendations contained in this report are based on a site reconnaissance, on a review of pertinent subsurface information, a subsurface exploration program, and on our understanding of the project. The study was performed using a mutually agreed-upon scope of work.

Variations in soil conditions may exist between the locations of the explorations and the actual conditions underlying the site. The nature and extent of soil variations may not be evident until construction occurs. If any soil conditions are encountered that are different from those described in this report, we should be notified immediately to review the applicability of our recommendations. Additionally, we should also be notified to review the applicability of our recommendations if there are any changes in the project scope.

The scope of our work does not include services related to construction safety precautions. Our recommendations are not intended to direct the contractors' methods, techniques, sequences or procedures, except as specifically described in our report for consideration in design. Additionally, the scope of our work specifically excludes the assessment of environmental characteristics, particularly those involving hazardous substances. We are not mold consultants nor are our recommendations to be interpreted as being preventative of mold development. A mold specialist should be consulted for all mold-related issues.

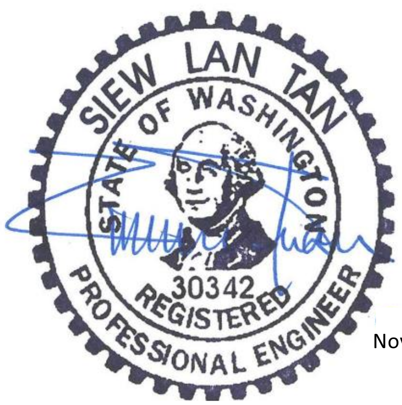
This report has been prepared for planning and design purposes for specific application to the proposed project in accordance with the generally accepted standards of local practice at the time this report was written. No warranty, express or implied, is made.

This report may be used only by the client and for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both off and on-site), or other factors including advances in our understanding of applied science, may change over time and could materially affect our findings. Therefore, this report should not be relied upon after 24 months from its issuance. PanGEO should be notified if the project is delayed by more than 24 months from the date of this report so that we may review the applicability of our conclusions considering the time lapse.

It is the client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, etc., are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk. Any party other than the client who wishes to use this report shall notify PanGEO of such intended use and for permission to copy this report. Based on the intended use of the report, PanGEO may require that additional work be performed and that an updated report be reissued. Noncompliance with any of these requirements will release PanGEO from any liability resulting from the use of this report.

Please call with any questions on this evaluation.

Sincerely,



November 27, 2023

Siew L. Tan, P.E.
Principal Geotechnical Engineer

Attachments:

Figure 1 – Vicinity Map
Figure 2 – Site and Exploration Plan

Appendix A Summary Test Pit and CPT Logs

Figure A-1 – Terms and Symbols for Boring and Test Pit Logs
Figure A-2 – Log of Test Pit TP-1
Figure A-3 – Log of Test Pit TP-2
Figure A-4 – Log of Test Pit TP-3
Figure A-5 – Log of Test Pit TP-4
Figure A-6 – Log of Test Pit TP-5
Figure A-7 – Log of Test Pit TP-6
Figure A-8 – Log of Test Pit TP-7
Figure A-9 – Log of CPT-1
Figure A-10 – Log of CPT-2

REFERENCES

International Building Code (IBC), 2018, International Code Council.

Minard, J.P., 1985, Geologic Map of the Arlington West 7.5-minute Quadrangle, Snohomish County, Washington, U.S.G.S. Miscellaneous Field Studies Map MF-1740.

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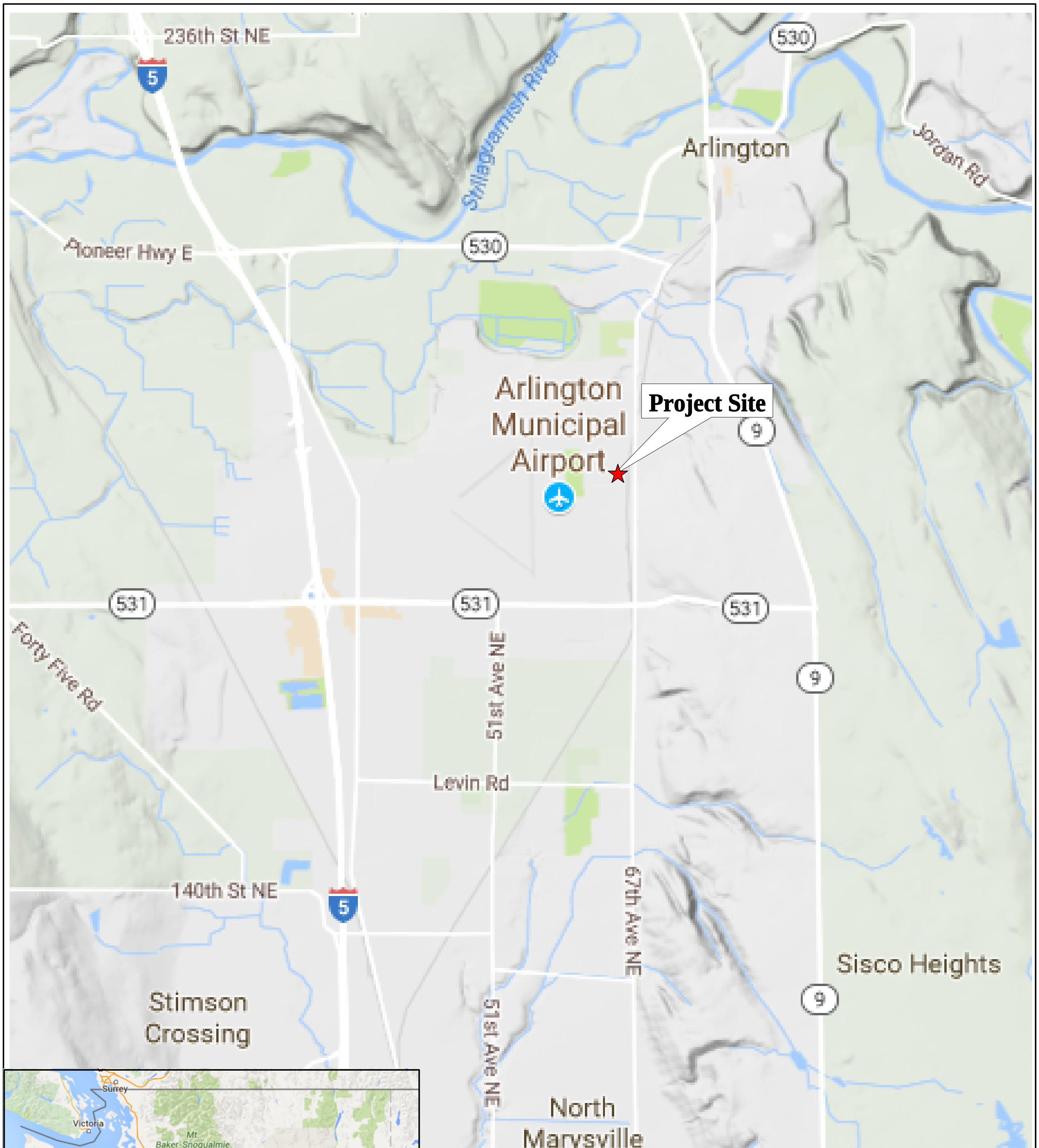

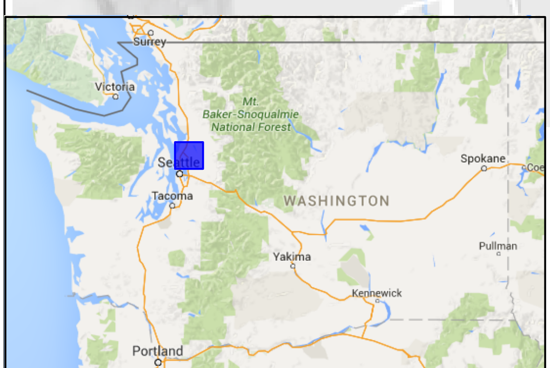

Base Map: Google Maps

NORTH

Approx. Scale:
Not to Scale

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Soil & Infiltration Testing
18520 67th Ave NE
Arlington, WA

VICINITY MAP

Project No.	17-261	Figure No.	1

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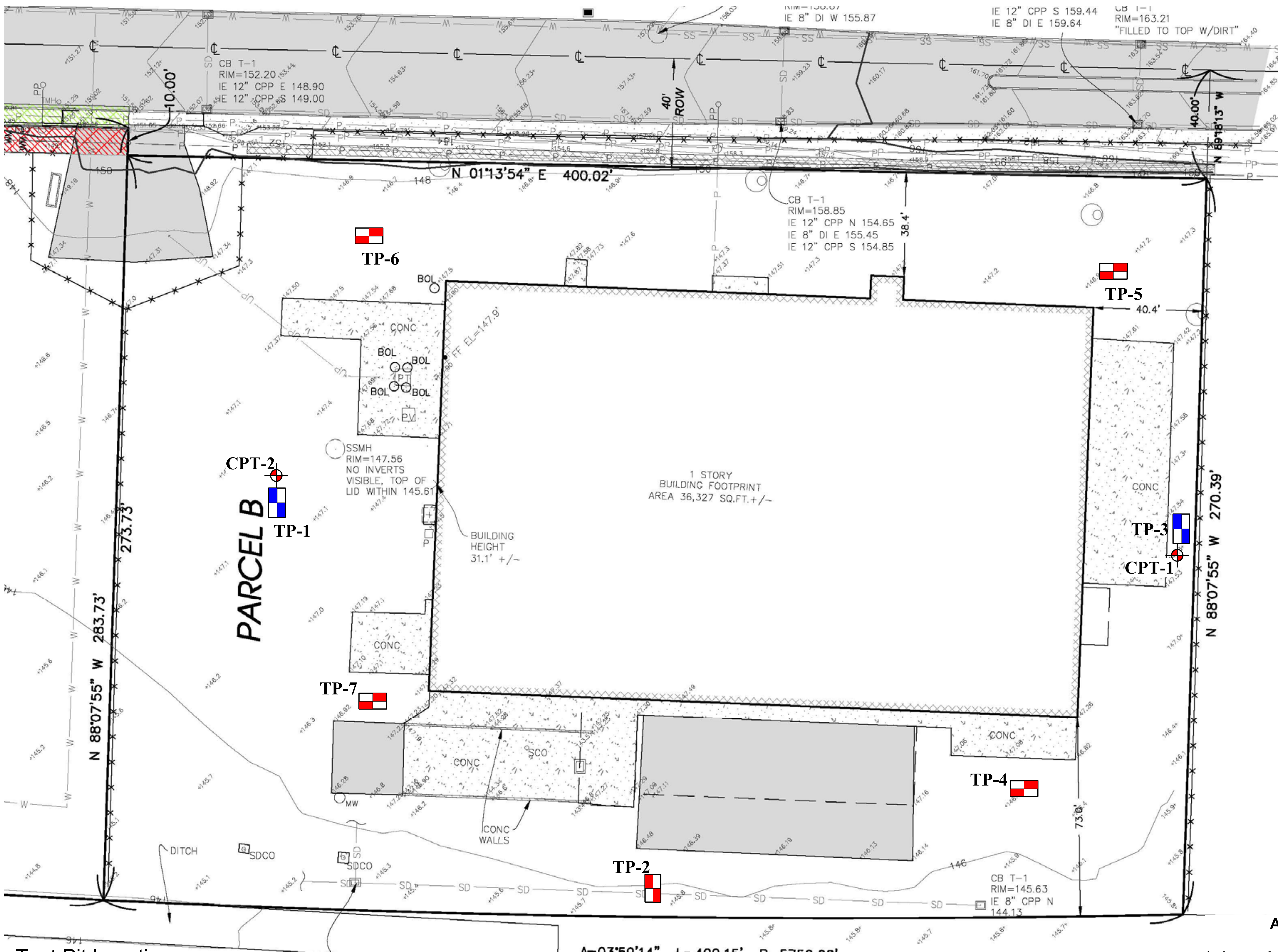

Legend:

- Approximate Test Pit Location
- Approximate Cone Penetrometer Test Location
- Approximate Infiltration Test Location

Approx. Scale
1" = 40'
(when printed on 11"x17" paper)

PanGEO INCORPORATED	Soil & Infiltration Testing 18520 67th Ave NE Arlington, WA	SITE AND EXPLORATION PLAN Project No. 17-261 Figure No. 2

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APPENDIX A

SUMMARY BORING LOG

RELATIVE DENSITY / CONSISTENCY

SAND / GRAVEL			SILT / CLAY		
Density	SPT N-values	Approx. Relative Density (%)	Consistency	SPT N-values	Approx. Undrained Shear Strength (psf)
Very Loose	<4	<15	Very Soft	<2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Med. Dense	10 to 30	35 - 65	Med. Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	>50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	>30	>4000

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		GROUP DESCRIPTIONS	
Gravel 50% or more of the coarse fraction retained on the #4 sieve. Use dual symbols (eg. GP-GM) for 5% to 12% fines.	GRAVEL (<5% fines)	GW	Well-graded GRAVEL
		GP	Poorly-graded GRAVEL
	GRAVEL (>12% fines)	GM	Silty GRAVEL
		GC	Clayey GRAVEL
Sand 50% or more of the coarse fraction passing the #4 sieve. Use dual symbols (eg. SP-SM) for 5% to 12% fines.	SAND (<5% fines)	SW	Well-graded SAND
		SP	Poorly-graded SAND
	SAND (>12% fines)	SM	Silty SAND
		SC	Clayey SAND
Silt and Clay 50%or more passing #200 sieve	Liquid Limit < 50	ML	SILT
		CL	Lean CLAY
		OL	Organic SILT or CLAY
	Liquid Limit > 50	MH	Elastic SILT
		CH	Fat CLAY
		OH	Organic SILT or CLAY
Highly Organic Soils		PT	PEAT

Notes:

1. Soil exploration logs contain material descriptions based on visual observation and field tests using a system modified from the Uniform Soil Classification System (USCS). Where necessary laboratory tests have been conducted (as noted in the "Other Tests" column), unit descriptions may include a classification. Please refer to the discussions in the report text for a more complete description of the subsurface conditions.

2. The graphic symbols given above are not inclusive of all symbols that may appear on the borehole logs. Other symbols may be used where field observations indicated mixed soil constituents or dual constituent materials.

DESCRIPTIONS OF SOIL STRUCTURES

Layered:	Units of material distinguished by color and/or composition from material units above and below
Laminated:	Layers of soil typically 0.05 to 1mm thick, max. 1 cm
Lens:	Layer of soil that pinches out laterally
Interlayered:	Alternating layers of differing soil material
Pocket:	Erratic, discontinuous deposit of limited extent
Homogeneous:	Soil with uniform color and composition throughout
Fissured:	Breaks along defined planes
Slickensided:	Fracture planes that are polished or glossy
Blocky:	Angular soil lumps that resist breakdown
Disrupted:	Soil that is broken and mixed
Scattered:	Less than one per foot
Numerous:	More than one per foot
BCN:	Angle between bedding plane and a plane normal to core axis

COMPONENT DEFINITIONS

COMPONENT	SIZE / SIEVE RANGE	COMPONENT	SIZE / SIEVE RANGE
Boulder:	> 12 inches	Sand	
Cobbles:	3 to 12 inches	Coarse Sand:	#4 to #10 sieve (4.5 to 2.0 mm)
Gravel		Medium Sand:	#10 to #40 sieve (2.0 to 0.42 mm)
Coarse Gravel:	3 to 3/4 inches	Fine Sand:	#40 to #200 sieve (0.42 to 0.074 mm)
Fine Gravel:	3/4 inches to #4 sieve	Silt	0.074 to 0.002 mm
		Clay	<0.002 mm

TEST SYMBOLS

for In Situ and Laboratory Tests listed in "Other Tests" column.

ATT	Atterberg Limit Test
Comp	Compaction Tests
Con	Consolidation
DD	Dry Density
DS	Direct Shear
%F	Fines Content
GS	Grain Size
Perm	Permeability
PP	Pocket Penetrometer
R	R-value
SG	Specific Gravity
TV	Torvane
TXC	Triaxial Compression
UCC	Unconfined Compression

SYMBOLS

Sample/In Situ test types and intervals

- 2-inch OD Split Spoon, SPT (140-lb. hammer, 30" drop)
- 3.25-inch OD Spilt Spoon (300-lb hammer, 30" drop)
- Non-standard penetration test (see boring log for details)
- Thin wall (Shelby) tube
- Grab
- Rock core
- Vane Shear

MONITORING WELL

- Groundwater Level at time of drilling (ATD)
- Static Groundwater Level
- Cement / Concrete Seal
- Bentonite grout / seal
- Silica sand backfill
- Slotted tip
- Slough
- Bottom of Boring

MOISTURE CONTENT

Dry	Dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water

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Phone: 206.262.0370

Terms and Symbols for Boring and Test Pit Logs

Figure A-1

Test Pit No. TP-1 Approximate ground surface elevation: 147 feet Coordinates (WGS84): 48.163811, -122.1412745	
Depth (ft)	Material Description
0 – 1.5	Very dense, grey, sandy GRAVEL with silt: moist; poorly graded, coarse angular gravel/wash rock, steel cable [Fill]
1.5 – 3.0	Medium dense, brown to red-brown, fine to medium SAND with silt and gravel: moist; poorly graded, iron oxide staining [Qvrm – Recessional Outwash-Marysville Sand Member]

Photo TP-1: Shows TP-1 at approximately 3-feet in depth

TP-1 was terminated approximately 3 feet below ground surface.

Groundwater seepage was not observed.

Test Pit No. TP-2 Approximate ground surface elevation: 147 feet Coordinates (WGS84): 48.163391, -122.141844	
Depth (ft)	Material Description
0 – 1.2	Dense, brown gray, sandy CRUSHED ROCK and GRAVEL: slightly moist [Fill]
1.2 – 4.2	Medium dense, brown gray, gravelly, fine to coarse SAND with silt: moist, homogeneous, well graded. [Qvrm – Recessional Outwash – Marysville Sand Member]

Photo TP-2: Shows TP-2 at approximately 4.2 feet in depth

TP-2 was terminated approximately 4.2 feet below ground surface.

Test Pit No. TP-3 Approximate ground surface elevation: 147 feet Coordinates (WGS84): 48.162879 -122.141259	
Depth (ft)	Material Description
0 – 1.4	Very dense, grey, sandy GRAVEL with silt: moist; poorly graded, coarse angular gravel/wash rock, steel cable [Fill]
1.4 – 4.0	Medium dense, brown to red-brown, fine to medium SAND with silt and gravel: moist; poorly graded, iron oxide staining [Qvrm – Recessional Outwash-Marysville Sand Member]

Photo TP-3: Shows TP-3 at approximately 4 feet in depth.

TP-3 was terminated approximately 4 feet below ground surface.

Groundwater seepage was not observed.

Test Pit No. TP-4 Approximate ground surface elevation: 147 feet Coordinates (WGS84): 4.163029, -122.14688	
Depth (ft)	Material Description
0 – 2.1	Dense, brown gray, sandy CRUSHED ROCK and GRAVEL: slightly moist. [Fill]
2.1 – 3.4	Medium dense, red brown, silty, fine to medium SAND: moist, poorly graded, trace organics in to 6 inches, trace gravel, homogeneous. [Qvrm – Recessional Outwash-Marysville Sand Member]
3.4 – 6.4	Medium dense to dense, gray, gravelly, fine to coarse SAND: moist, some silt, well graded, homogeneous, massive. [Qvrm – Recessional Outwash-Marysville Sand Member]

Photo TP-4: Shows TP-4 at approximately 6.4 feet in depth

TP-4 was terminated approximately 6.4 feet below ground surface.

Groundwater seepage was not observed.

Test Pit No. TP-5

Approximate ground surface elevation: 147 feet
Coordinates (WGS84): 48.162945, -122.140891

Depth (ft)	Material Description
0 – 0.7	Dense, brown gray CRUSHED ROCK and GRAVEL with sand and silt: dry [Fill]
0.7 – 2.2	Loose to medium dense, red brown, silty, fine SAND: slightly moist to moist, poorly graded, homogeneous, trace organics in top 6 inches. [Qvrm – Recessional Outwash-Marysville Sand Member]
2.2 – 6.1	Medium dense to dense, fine to medium SAND with silt to silty SAND: moist, poorly graded, homogeneous, massive. [Qvrm – Recessional Outwash-Marysville Sand Member]

Photo TP-5: Shows TP-5 at approximately 6.1 feet in depth

TP-5 was terminated approximately 6.1 feet below ground surface.

Groundwater seepage was not observed.

Test Pit No. TP-6 Approximate ground surface elevation: 147 feet Coordinates (WGS84): 48.163716, -122.140847	
Depth (ft)	Material Description
0 – 1.0	Dense, gray CRUSHED ROCK and GRAVEL with sand: dry, some silt [Fill]
1.0 – 3.3	Loose to medium dense, red brown, silty, fine SAND to fine to medium SAND with silt: slightly moist, poorly graded, trace organics in top 6 inches, massive, non-plastic fines. [Qvrm – Recessional Outwash-Marysville Sand Member]
3.3 – 3.6	Medium dense, yellow brown, fine to medium SAND with silt: moist, poorly graded, some gravel, homogeneous, massive. [Qvrm – Recessional Outwash-Marysville Sand Member]
3.6 – 6.9	Medium dense to dense, red brown to brown, gravelly, fine to coarse SAND: moist, well graded, trace to some silt, homogeneous, massive. [Qvrm – Recessional Outwash-Marysville Sand Member]

Photo TP-6: Shows TP-6 at approximately 6.9 feet in depth

TP-6 was terminated approximately 6.9 feet below ground surface.

No groundwater observed.

Test Pit No. TP-7 Approximate ground surface elevation: 147 feet Coordinates (WGS84): 48.163706, -122.141566	
Depth (ft)	Material Description
0 – 1.2	Dense, gray CRUSHED ROCK and GRAVEL: dry, some sand and silt. [Fill]
1.2 – 3.0	Medium dense, dark brown, very silty, fine SAND: slightly moist, some gravel, poorly graded, trace organics and wood pieces. [Qvrm – Recessional Outwash-Marysville Sand Member]
3.0 – 4.2	Medium dense red brown, fine sandy SILT with fine gravel: moist, poorly graded, non-plastic, homogeneous. [Qvrm – Recessional Outwash-Marysville Sand Member]
4.2 – 6.4	Medium dense to dense, yellow brown, gravelly, fine to coarse SAND: moist, well graded, trace to some silt, homogeneous, massive. [Qvrm – Recessional Outwash-Marysville Sand Member]

Photo TP-7: No photo of TP-7

TP-7 was terminated approximately 6.4 feet below ground surface.

No groundwater was observed.

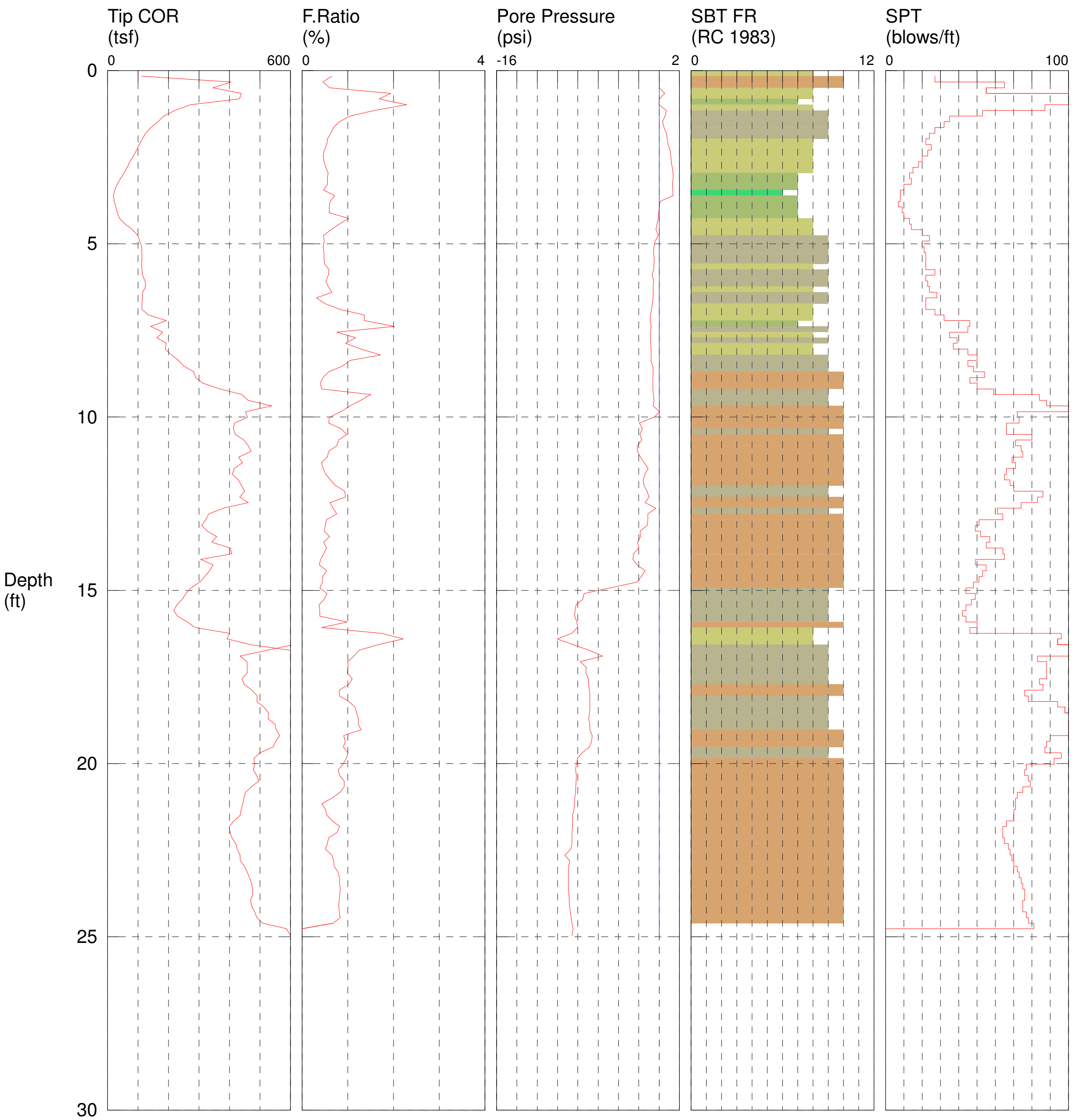
Date of Test Pit excavations: August 16, 2017
Test Pits Logged by: S. Evans, B. Weitering, A. Hess

Figure A-8

CPT-01

CPT CONTRACTOR: In Situ Engineering
CUSTOMER: PanGEO
LOCATION: Arlington
JOB NUMBER: 17-261

OPERATOR: Romanelli
CONE ID: DDG1369
TEST DATE: 9/9/2017 12:57:40 PM
PREDRILL: N/A
BACKFILL: 20% Bentonite Grout
SURFACE PATCH: Granular Bentonite Chip



COMMENT:

1	sensitive fine grained
2	organic material
3	clay
4	silty clay to clay
5	clayey silt to silty clay
6	sandy silt to clayey silt
7	silty sand to sandy silt
8	sand to silty sand
9	sand
10	gravelly sand to sand
11	very stiff fine grained (*)
12	sand to clayey sand (*)

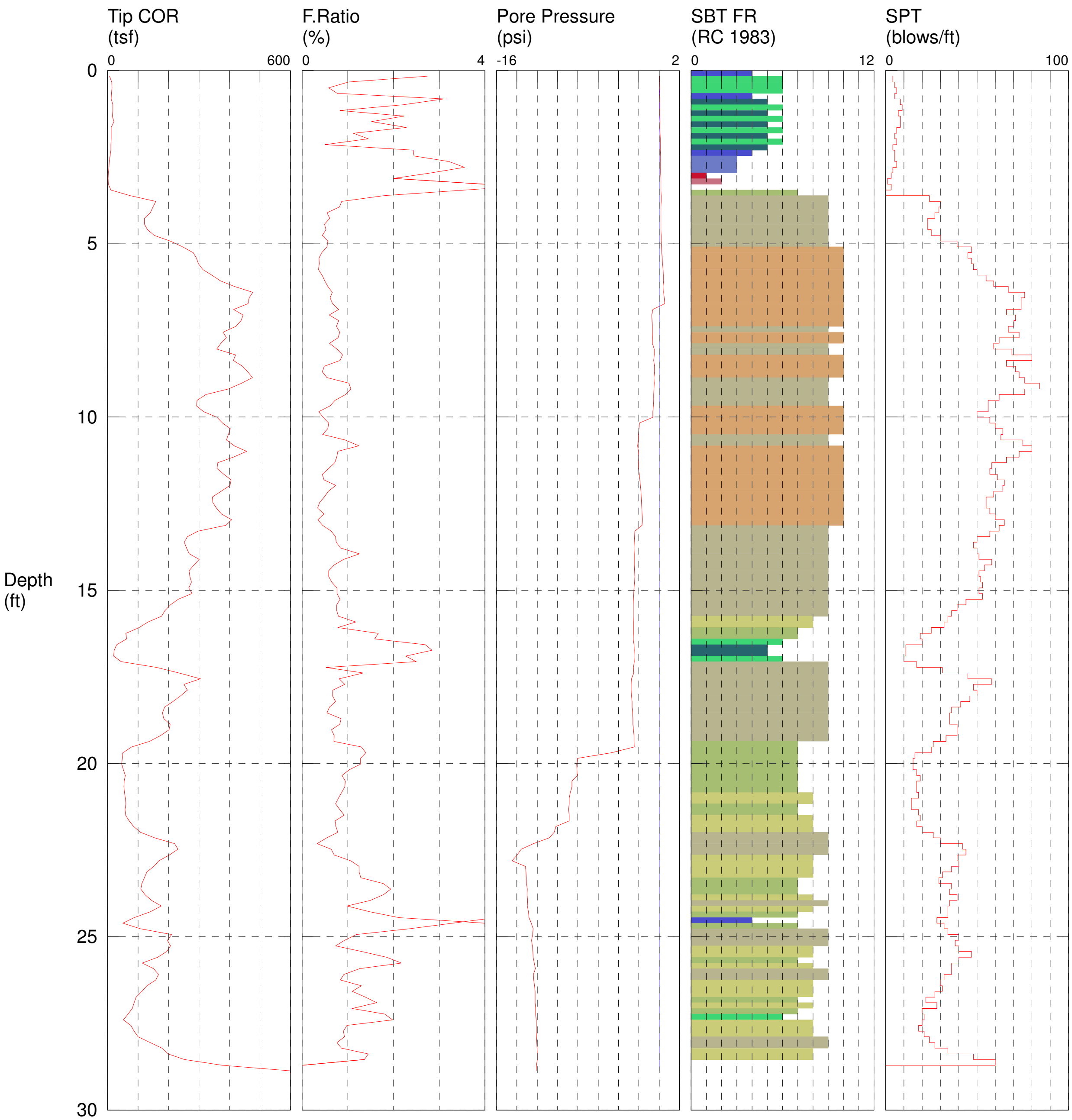
*SBT/SPT CORRELATION: UBC-1983

Figure A-9

CPT-02a

CPT CONTRACTOR: In Situ Engineering
CUSTOMER: PanGEO
LOCATION: Arlington
JOB NUMBER: 17-261

OPERATOR: Romanelli
CONE ID: DDG1369
TEST DATE: 9/9/2017 2:05:42 PM
PREDRILL: 4' Predrill
BACKFILL: 20% Bentonite Grout
SURFACE PATCH: Granular Bentonite Chip



COMMENT:

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

Figure A-10