REPORT

NEAR ISLAND SENIOR HOUSING

Geotechnical Investigation

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1.0 INTRODUCTION

This report presents the results of our geotechnical investigation for proposed independent living units located on Near Island, Kodiak, Alaska (Figure 1). Rohde and Associates Inc. (R&A) is the Architect for the Kodiak Island Housing Authority (KIHA).

The proposed senior housing facility will include a combination of one and two-bedroom units totaling about 30 living and 2 overnight units. The proposed site is currently a gravel area, which was previously excavated for fill material. The foundation system is expected to be conventional spread footings with a crawl space, and the building will be continuously heated.

The work described in this report was performed in accordance with our proposal to R&A dated December 8, 2009.

2.0 REGIONAL SETTING

Near Island is located across Kodiak Channel from the city of Kodiak in the Kodiak Island Group. The geology of Near Island consists of a series of slates, argillites, and graywackes of the Kodiak Formation. During the late Pleistocene age glacial epoch, glacial action removed much of the overburden (McGee, 1972). In 1912, the area was blanketed with volcanic ash from the Katmai eruption. Near Island, as does all of the Alaskan-Aleutian Arc, lies in one of the most seismically active regions in the world.

The climate at Near Island is dominated by a strong marine influence. The area experiences moderate to heavy precipitation and cool temperatures with a small variation. Freezing weather is sporadic. Strong winds can be present from storms that develop in the Gulf of Alaska.

3.0 EXISTING DATA

The existing data review included two reports in our files by Harding Lawson Associates (HLA).

Fishery Technology Center, HLA, 1986. This report contains the results of a subsurface investigation including 23 test pits within the building area, eight (8) test pits within the parking and road access areas, and three (3) test pits on Kodiak Island. The soil profile consisted of ash and organic silt overlying weathered rock and rock. Rock was encountered at depths of 1.5 to 5.5-feet on Near Island.

Near Island Bridge Crossing, HLA, 1982. This report summarizes the results of subsurface exploration for the Kodiak – Near Island Bridge. Two road alignments on Near Island are also addressed. As part of this study, test borings were completed at each pier and abutment, and test borings were drilled at 300 to 500 foot intervals along the two selected roadway alignments. Seismic refraction profiles were completed at the bridge location. The soil profiles included primarily organic material, ash, and organic silt overlying till and rock.

4.0 FIELD INVESTIGATION

The geotechnical field investigation consisted of excavating and sampling 15 test pits (G10-TP-01 through G10-TP-15) at the locations shown in Figure 2 on February 25, 2009. Planned test pits were located in the field by measuring from the marked property corners. Test pits were marked, and utilities in the area were identified before excavation.

4.1 Excavation

The test pits were excavated by KIHA using a Terex TX-760 backhoe. The field investigation was supervised by Melanie Hess, Environmental Scientist of Golder Associates Inc. (GAI). Ms. Hess logged the recovered soils and directed the excavation operation. Soil samples were visually classified in the field according to the Unified Soil Classification System (USCS), which is summarized in Figure A-1 of Appendix A. Test pit profiles are presented in Figure A-2, Appendix A.

4.2 Sample Collection

Representative samples of the soils encountered were obtained by collecting loosened cuttings from the test pit walls. The recovered samples were visually classified before being individually sealed in plastic bags and transported to our Anchorage laboratory for further examination, classification, and laboratory testing.

4.3 Standpipes and Test Pit Completion

Standpipe piezometers were installed in test pits G10-TP-01 and G10-TP-11 to allow measurement of stabilized groundwater levels. The standpipe piezometers consisted of 0.5-inch schedule-40 PVC pipe. The PVC was hand slotted in the field using a hacksaw, and the annular space was backfilled with cuttings. No standpipes were installed in test pits G10-TP-02 through G10-TP-10 and G10-TP-12 through G10-TP-15 and those test pits were backfilled with cuttings.

4.4 Groundwater Levels

When groundwater was encountered during excavation, it was noted on the test pit logs. Groundwater levels were also measured in test pits G10-TP-01 and G10-TP-11 on February 26, 2010. Measured groundwater levels are indicated on the test pit profiles in Appendix A.

5.0 LABORATORY TESTING

Laboratory tests were performed to measure index properties of the soil samples, which are used to develop correlations with engineering properties. Moisture content tests were run on each soil sample and were conducted according to procedures described in ASTM D 2216. In addition, the grain-size distribution (ASTM C 136) was determined for selected samples.

Laboratory test results are summarized in Table B-1. Results of the particle size analyses are presented graphically in Figures B-1 and B-2.

6.0 SITE CONDITIONS

6.1 Project Setting

The project site is located on Near Island at 182 Alimak Drive, Kodiak, Alaska, as shown in Figure 1. The proposed building will be situated on a currently gravel covered lot that has been previously used as a source for fill material. The site has reportedly been blasted, and materials from the site were used for construction of roads on Near Island. After excavations were complete, the remaining fill material was graded across the site to achieve the current topography, sloping to the west. The project site is located outside of the tsunami hazards zone as described in the 2002 Tsunami Hazard Map for the Kodiak Area by the Alaska Division of Geological & Geophysical Survey.

6.2 Subsurface Conditions

Subsurface conditions at the site generally consist of gravel overlying bedrock, with the consistency of the gravel estimated from excavation observations. A layer of silty sand (ash) was encountered in one test pit (G10-TP-07), but may exist at other locations as well. Each of the subsurface units can be further described as follows:

- **Gravel.** The angular gravel is poorly graded with sand and silt (GP-GM), cobbles and boulders are common, and the thickness varied from 0.7 to 4.4-feet. The silt content in the gravel ranged from 6 to 11 percent, and moisture content varied between 2 and 5 percent.
- **Ash.** Silty sand with gravel (SM) was encountered in test pit G10-TP-07 from 1.7 to 2.1-feet and contains an ash component. The silt content of the collected sample was 25 percent, and moisture content was 6 percent.
- **Bedrock.** The bedrock is a highly fractured, graphitic, meta-sediment of the Kodiak Formation.

Based on the reported history of the site and the observed subsurface soils, the gravel is likely a combination of fill material and regolith and the ash is either insitu material that was not excavated or was placed as backfill. The gravel thickness/bedrock depth across the site is illustrated in Figure 3, which was interpreted based on collected field data. The generalized bedrock surface elevations are illustrated in Figure 4, which was interpolated using the elevation survey provided by R&A and collected field data.

Groundwater was encountered in two test pits (G10-TP-01 and G10-TP-11) at depths of 1.2 to 1.4-feet below the ground surface (bgs) as measured in the piezometers the following day. This groundwater is likely a result of local depressions in the bedrock surface where the bedrock is more competent and less fractured. Groundwater levels should be expected to change seasonally and in accordance to precipitation events.

7.0 ENGINEERING CONCLUSIONS AND RECOMMENDATIONS

Design criteria for the proposed shallow foundations are presented in the following sections, along with recommendations to consider during construction.

7.1 Foundation Criteria

Design of a shallow foundation must consider the bearing capacity of the underlying soil as well as the potential for settlement and the effects of seasonal frost action. Due to the variability in compactness of the existing gravel, as well as the presence of silty sand (ash); these materials should not be relied upon for support of shallow foundations. Therefore, we recommend excavating the soils down to bedrock underneath the proposed building footings.

In general, foundation designs should be consistent with the local amendments to the 2006 International Building Code (IBC). Specific design parameters are presented in the following sections.

7.1.1 Footing Bearing Capacity

The bearing capacity was estimated assuming the footings will be constructed over compacted structural fill. Footings cast over the bedrock should experience a higher bearing capacity.

Footings bearing on compacted structural fill placed in accordance with our recommendations should be designed for an allowable bearing capacity of 3,800 psf for static and normally applied loads. This bearing capacity may be increased by 1/3 for short-term wind and seismic loads. Continuous footings should be a minimum of 36-inches below the lowest adjacent exterior grade and be a minimum of 18-inches wide. Isolated, interior footings should extend a minimum of 18 inches below the finished floor and have a minimum dimension of 24-inches.

7.1.2 Lateral Loads

Lateral loads on footings will be resisted by passive earth pressures developed against the footing block and frictional resistance against the base of the footing. Design values are as follows:

- Passive Pressure (Equivalent Fluid Pressure): 330 pcf

The equivalent passive fluid pressure includes a factor of safety of 1.5-inch order to limit the deflections typically required to mobilize the full passive resistance. When computing the passive resistance, the top 1-foot of soil should be ignored unless it is confined by a floor slab or pavement. The passive resistance listed above is for sand and gravel above the water table. If the water table is found in footing excavations is higher due to seasonal conditions, passive resistance should be reduced to an equivalent fluid pressure of 180 pcf.

- Coefficient of Base Friction: 0.55

The coefficient of base friction is for concrete cast directly against a gravel backfill used in over-excavations. Different values will apply if pre-cast footings are used.

- At-Rest Earth Pressure (Equivalent Fluid Pressure): 60 pcf

7.1.3 Uplift Resistance

Uplift due to wind and seismic loads may be resisted by the weight of the footing and soil within the limits of a truncated pyramid above the top of the footing. The shape of the truncated pyramid will vary with material type and density. For the gravel that will be used as backfill at this site, the pyramid should be defined by a 35 deg angle from the vertical extending upward from the top of the footing.

7.2 Floor Slabs

Slab on-grade is planned for the elevator pits, mechanical room, and exterior sidewalks. Slab on-grade floors can be supported on the existing gravel materials provided ash deposits are removed and replaced with structural fill and loose or soft areas are identified and corrected prior to backfill or construction. Provided our recommendations are performed, the subgrade modulus for the building pad is expected to be in excess of 300 psi/in.

A capillary moisture break should be placed beneath all floor slabs. The capillary moisture break should consist of a minimum 4 in. thick layer of free draining crushed rock or gravel that contains no particles larger than the 3/4 in. size and not more than 5% by weight passing the No. 16 sieve and 6% by weight passing the No. 200 sieve.

7.3 Seismic Design

The site is located in an area mapped as Seismic Zone 4, Uniform Building Code. The potential for major earthquakes is high. Due to the presence of shallow bedrock, the soil profile should be designated as Site Class B when designing in accordance with the 2006 International Building Code (IBC) and local amendments. The liquefaction potential, which is a function of the course-grained soil density, the silt content, and the presence of groundwater, is very low to nonexistent.

7.4 Settlements

Provided the footings are constructed over structural fill placed in accordance to our recommendations, the total maximum settlement for normal building loads are estimated to be about 1 in. or less with differential settlements of about ½ the total settlement. Settlements will be less if the footings are constructed over bedrock.

7.5 Earthwork Recommendations

7.5.1 Excavation Limits

As described in Section 7.1, soils encountered below the building foundation should be excavated and replaced with compacted structural fill. The soils should be excavated a distance determined by an imaginary line taken a minimum 1-foot beyond the base of the footings on 1H:1V slope to the top of the bedrock. For example, the minimum 1.5-foot depth of structural fill beneath the footing would extend 1.5-feet beyond the edge of the footing. In general, the stability of temporary excavation slopes should be the responsibility of the contractor.

7.5.2 Groundwater

Groundwater was encountered at an approximate depth of 1.2 to 1.4-feet-bgs, which is within the anticipated excavation depths. However, the rate of recharge could not be estimated without further investigations and testing. Therefore, the contractor should at a minimum be prepared to implement dewatering methods such as pumping from open sumps.

7.5.3 Structural Fill

Structural fill should consist of a well graded sand and gravel, having less than 6 percent passing the minus No. 200 sieve size and no particles larger than 8-inch. Structural fill should be placed in lifts not to exceed a 12-inch loose thickness. Each lift should be compacted to at least 95 percent of the modified Proctor maximum dry density as determined by ASTM D-1557. Cobbles or boulders larger than 8 in. should be removed from structural fill.

7.5.4 Reuse of In-Situ Material

In general, the in-situ gravel materials excavated are considered unsuitable for reuse as structural fill, unless screened to remove oversized material. Care should be taken to isolate ash materials from any potential gravel that may be reused. However, on-site material may be reused as a non-structural landscaping fill, where settlement will not be an issue.

7.5.5 Drainage

Positive gradients should be provided so that runoff will quickly flow away from the structure and pavement. Depending on the site grades, subdrains may be required to drain shallow groundwater encountered during excavations for the foundations. Care should be taken in the site layout to avoid ponding of water adjacent to the structure or in parking areas, and all excavations should be graded to drain to prevent ponding. To the extent possible, soil at the edges and below driveway lots should be sloped and ditched to encourage drainage away from the paved surface.

8.0 PAVEMENT SECTION RECOMMENDATIONS

Due to the low frost susceptibility of the existing gravel materials, we recommend a pavement section that includes 2-inches of asphalt concrete overlying 4-inches of base course that is placed over 17-inches of subbase. Base course materials should comply with ADOT&PF Type D-1 that is compacted to 100-percent modified Proctor maximum dry density as determined by ASTM D-1557. Subbase materials should comply with ADOT&PF Type B compacted to 95-percent modified Proctor maximum dry density. Note that in-situ materials that meet the gradation and compaction requirements of the recommended subbase materials are also acceptable. Pavements should be constructed when the frost is completely out of the ground.

Where sidewalks will be at the back of the curb, we recommend that the road structural section be extended beneath the sidewalk. This should allow the sidewalk to perform in a similar manner as the road curbs.

9.0 USE OF REPORT

This report has been prepared for the use of Rohde & Associates in design of the planned Near Island Senior Housing and parking lot. If there are significant changes in the nature, design, or location of the facilities, we should be notified so that we may review our conclusions and recommendations in light of the proposed changes and provide a written modification or verification of the changes.

There are possible variations in subsurface conditions between explorations and also with time. Therefore, inspection and testing by a qualified geotechnical engineer should be included during construction to provide corrective recommendations adapted to the conditions revealed during the work.

Unanticipated soil conditions are commonly encountered and cannot fully be determined by a limited number of explorations or soil samples. Such unexpected conditions frequently result in additional project costs in order to build the project as designed. Therefore, a contingency for unanticipated conditions should be included in the construction budget and schedule.

The work program followed 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.

10.0 CLOSING

Thank you for the opportunity to assist Rohde and Associates with this project. If you have questions or require additional information, please contact one of the undersigned at (907) 344-6001.

GOLDER ASSOCIATES INC.

Susan Y. Wilson
Project Geologist

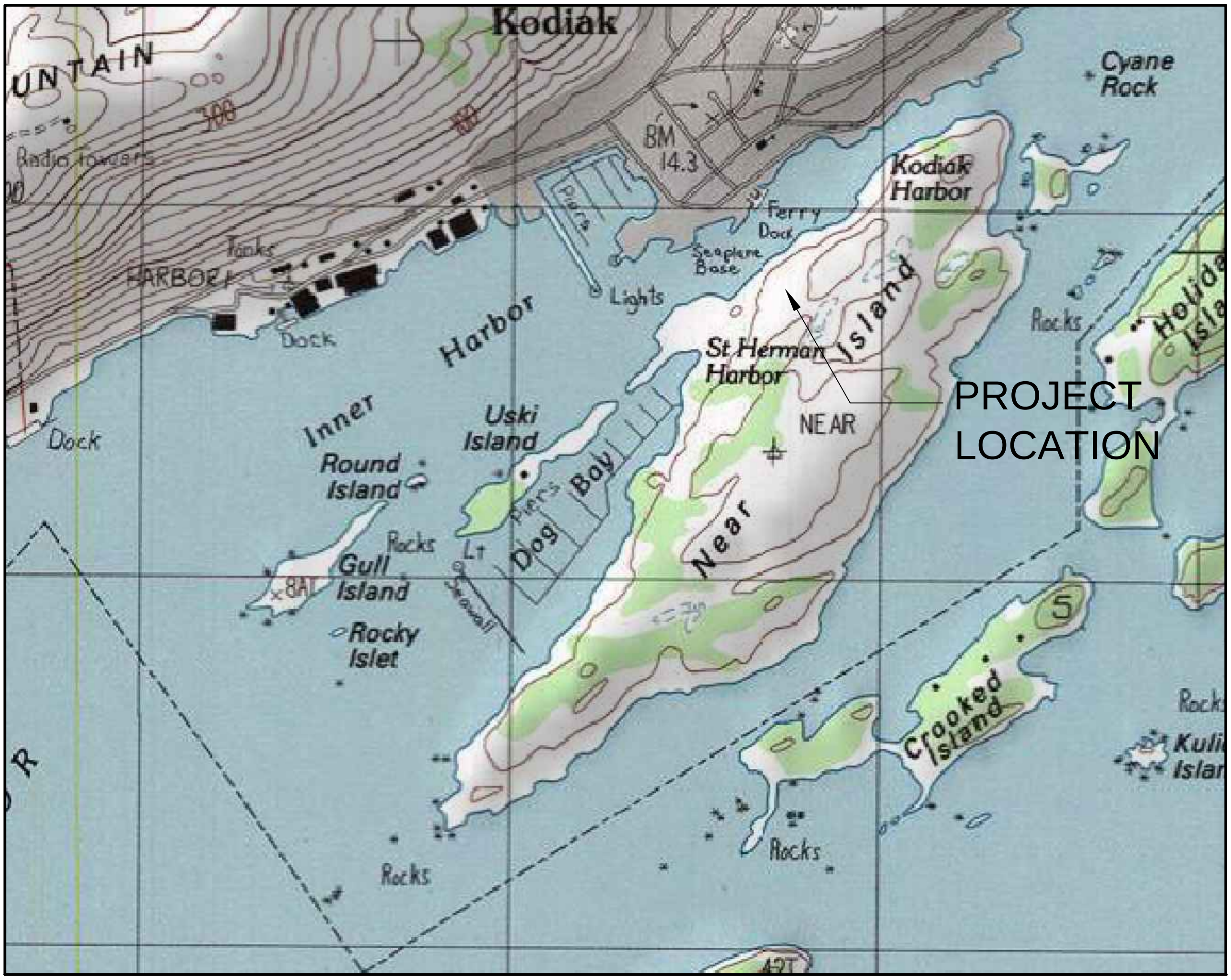
Steven L. Anderson, PE
Associate and Senior Geotechnical Engineering Consultant

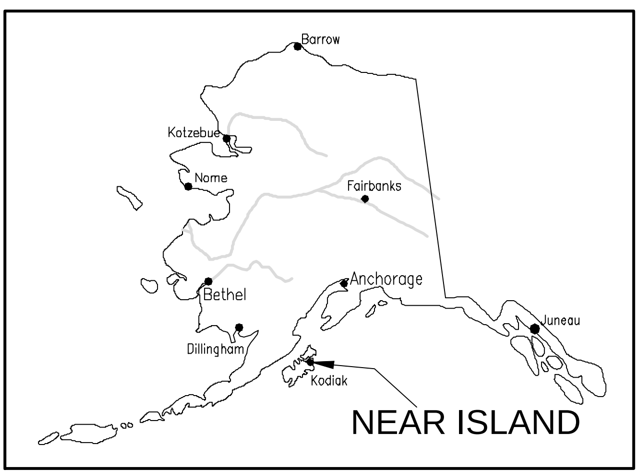
SYW/SLA/mlp

11.0 REFERENCES

McGee, D.L., 1972. Kodiak Island and Vicinity, Alaska Geology and Mineral Resources, Fairbanks: Alaska Division of Geological and Geophysical Surveys, Alaska Open File Report 31, 12 p. pamphlet + 1 sheet, 1:250,000 scale.

FIGURES





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REFERENCE

USGS TOPOGRAPHIC MAPS, *KODIAK TOPOGRAPHIC MAP 2002*
MAP GENERATED USING NATIONAL GEOGRAPHIC TOPO! SOFTWARE

Golder Associates, Anchorage, Alaska	SCALE AS SHOWN	TITLE
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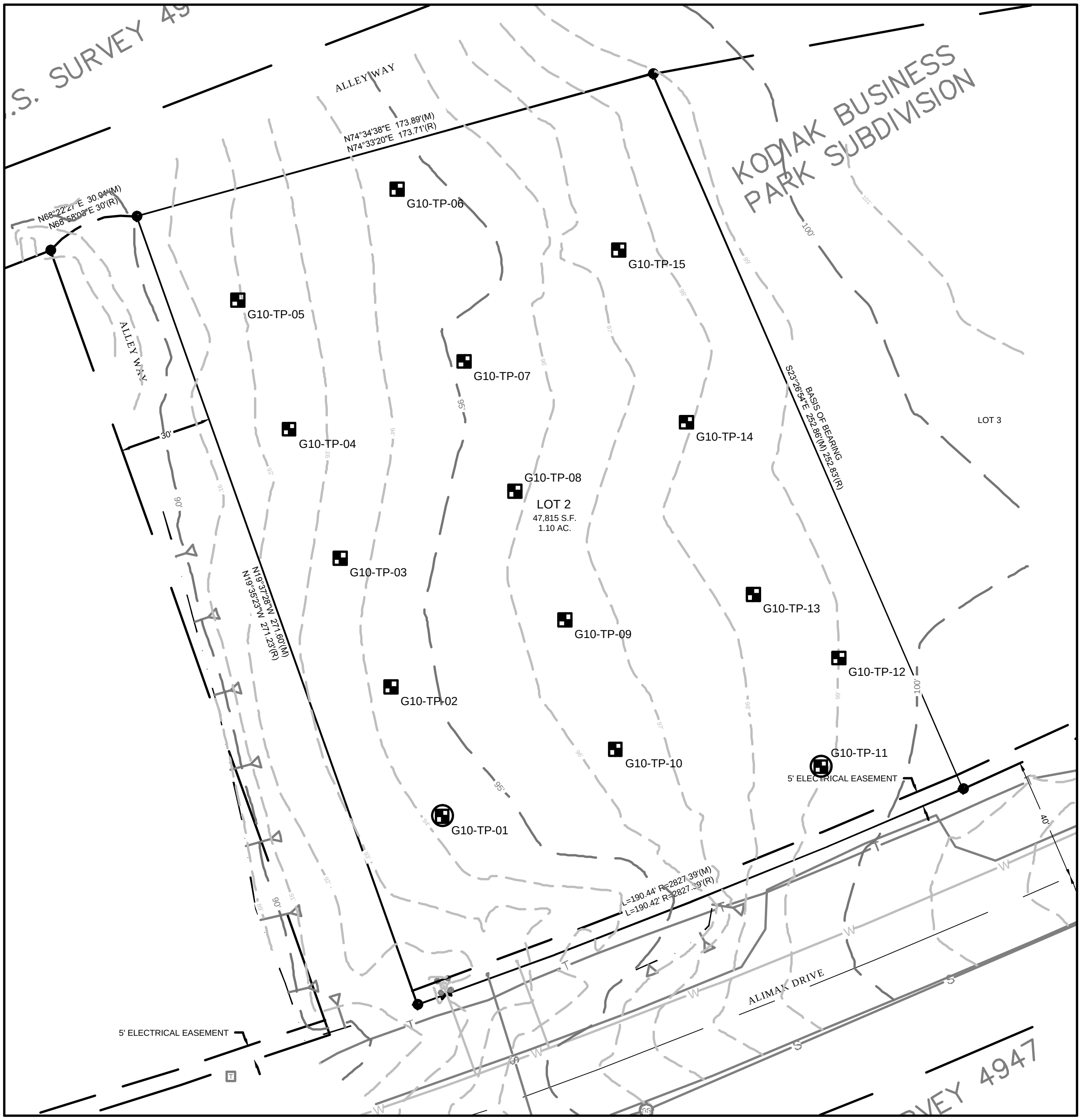

LEGEND

APPROXIMATE TEST PIT LOCATIONS

PIEZOMETER INSTALLED IN TEST PIT

REFERENCES

Base drawing titled *Near Island Senior Housing Kodiak, AK, Existing Site*. by F.R. Bell & Assoc., dated 2/28/10 provided by Rohde & Assoc. Inc.

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Anchorage, Alaska

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SITE MAP

NEAR ISLAND SENIOR HOUSING
KODIAK, ALASKA

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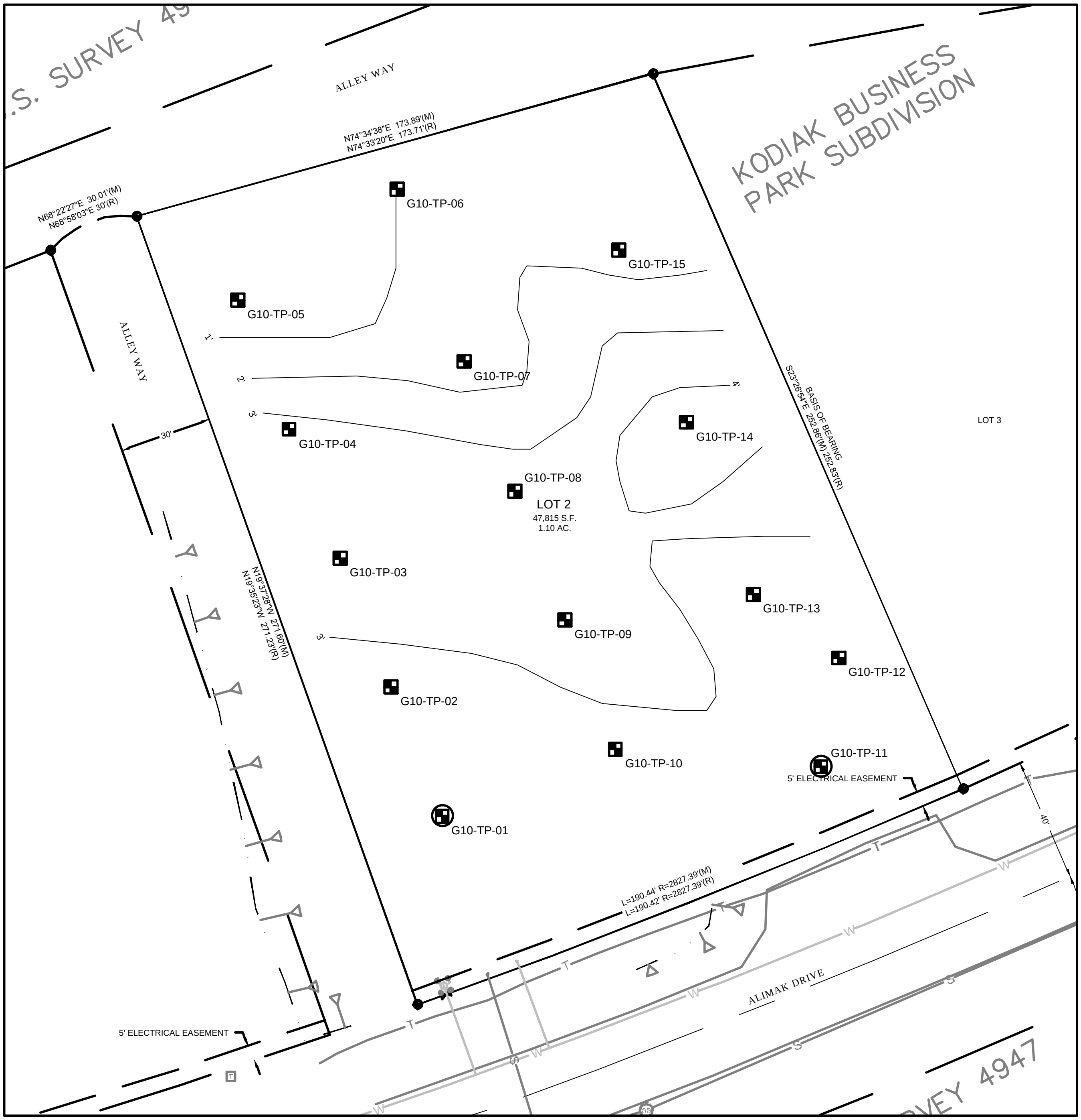
FIGURE 2



LEGEND

APPROXIMATE TEST PIT LOCATIONS

PIEZOMETER INSTALLED IN TEST PIT

GRAVEL THICKNESS CONTOUR

REFERENCES

Base drawing titled *Near Island Senior Housing Kodiak, AK, Existing Site*. by F.R. Bell & Assoc., dated 2/28/10 provided by Rohde & Assoc. Inc.

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TITLE

GRAVEL THICKNESS/BEDROCK DEPTH

NEAR ISLAND SENIOR HOUSING
KODIAK, ALASKA

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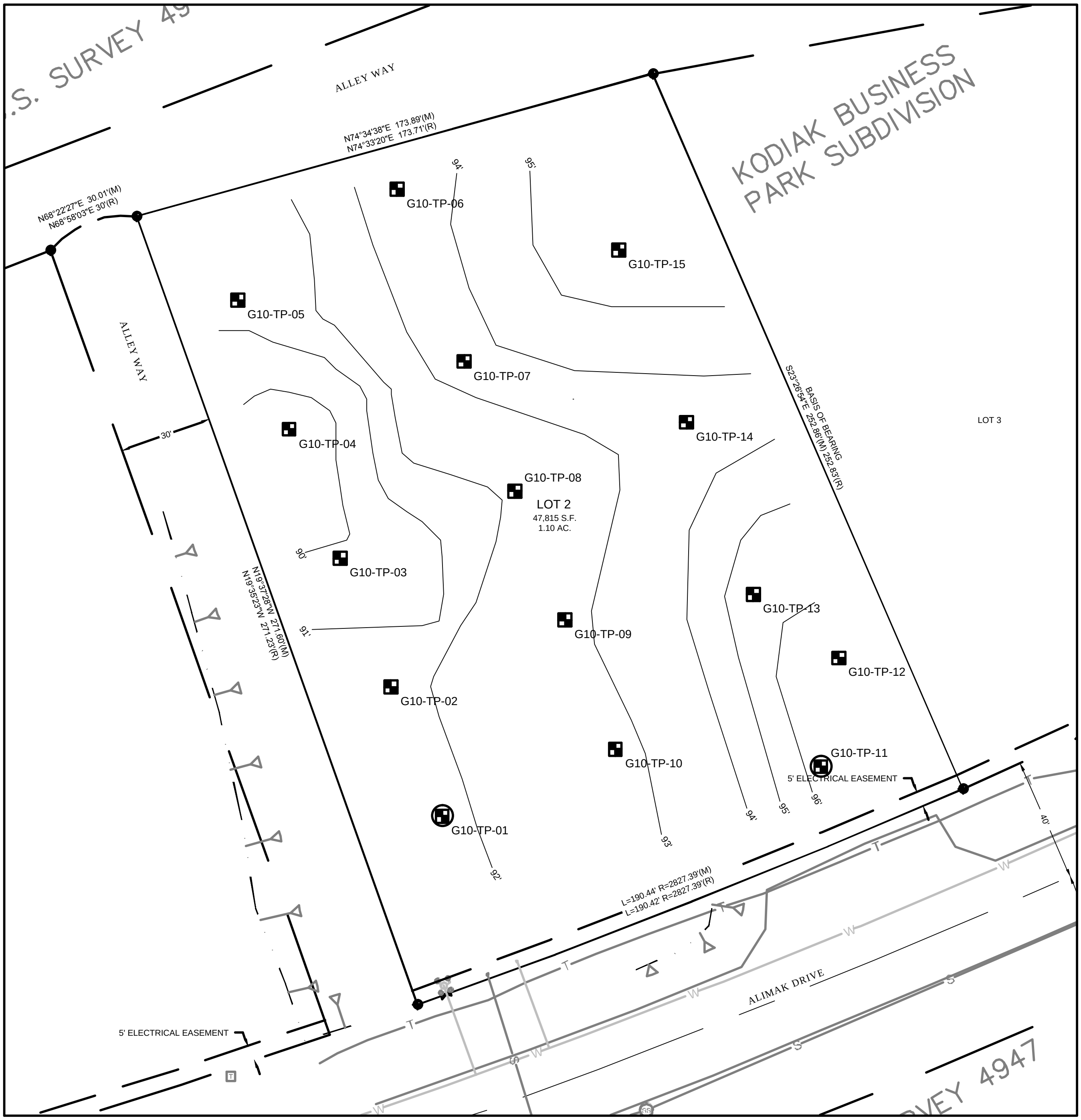
FIGURE 3



LEGEND

APPROXIMATE TEST PIT LOCATIONS

PIEZOMETER INSTALLED IN TEST PIT

BEDROCK ELEVATION CONTOUR

REFERENCES

Base drawing titled *Near Island Senior Housing Kodiak, AK, Existing Site*. by F.R. Bell & Assoc., dated 2/28/10 provided by Rohde & Assoc. Inc.

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Anchorage, Alaska

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FILE No. NEAR ISLAND TEST PITS.DWG

PROJECT No. 093-95326

TITLE

GENERALIZED BEDROCK ELEVATION

NEAR ISLAND SENIOR HOUSING
KODIAK, ALASKA

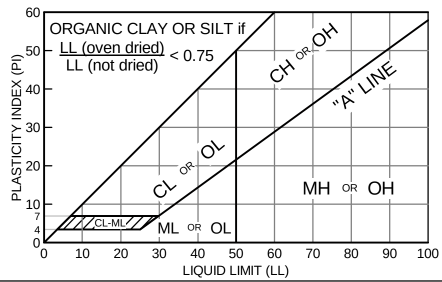
ROHDE & ASSOC. INC. / NEAR ISLAND SR HOUSING / ALASKA

FIGURE **4**

APPENDIX A

TEST PIT DATA

UNIFIED SOIL CLASSIFICATION (ASTM D 2487-00)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES AND GROUP SYMBOLS USING LABOARATORY TESTS			GROUP SYMBOL	SOIL GROUP NAMES & LEGEND	
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO 4. SIEVE	CLEAN GRAVELS <5% FINES	$C_U \geq 4$ AND $1 \leq C_C \leq 3$	GW	WELL-GRADED GRAVEL	If soil contains ≥15% sand, add "with sand"
			$C_U < 4$ AND/OR $1 > C_C > 3$	GP	POORLY GRADED GRAVEL	
		GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR CL	GM	SILTY GRAVEL	
			FINES CLASSIFY AS CL OR CH	GC	CLAYEY GRAVEL	
	SANDS ≥50% OF COARSE FRACTION PASSES ON NO 4. SIEVE	CLEAN SANDS <5% FINES	$C_U \geq 6$ AND $1 \leq C_C \leq 3$	SW	WELL-GRADED SAND	If soil contains ≥15% gravel, add "with gravel"
			$C_U < 6$ AND/OR $1 > C_C > 3$	SP	POORLY GRADED SAND	
		SANDS AND FINES >12% FINES	FINES CLASSIFY AS ML OR MH	SM	SILTY SAND	
			FINES CLASSIFY AS CL OR CH	SC	CLAYEY SAND	
FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT <50	PLASTICITY CHART 		CL	LEAN CLAY	If soil contains coarse-grained soil from 15% to 29%, add "with sand" or "with gravel" for whichever type is prominent, or for ≥30%, add "sandy" or "gravelly"
				ML	SILT	
				OL	ORGANIC CLAY OR SILT	
	SILTS AND CLAYS LIQUID LIMIT ≥50			CH	FAT CLAY	
				MH	ELASTIC SILT	
				OH	ORGANIC CLAY OR SILT	
HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR		PT	PEAT	

Gravels or sands with 5% to 12% fines require dual symbols (GW-GM, GW-GC, GP-GM, GP-GC, SW-SM, SW-SC, SP-SM, SP-SC) and add "with clay" or "with silt" to group name. If fines classify as CL-ML for GM or SM, use dual symbol GC-GM or SC-SM.

$C_U = \frac{D_{60}}{D_{10}}$ $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

Optional Abbeviations: Lower case "s" after USCS group symbol denotes either "sandy" or "with sand" and "g" denotes either "gravelly" or "with gravel"

CRITERIA FOR DESCRIBING MOISTURE CONDITION (ASTM D 2488-00)

DRY	ABSENCE OF MOISTURE, DUSTY, DRY TO THE TOUCH
MOIST	DAMP BUT NO VISIBLE WATER
WET	VISIBLE FREE WATER, USUALLY SOIL IS BELOW WATER TABLE

COMPONENT DEFINITIONS BY GRADATION

COMPONENT	SIZE RANGE
BOULDERS	ABOVE 12 IN.
COBBLES	3 IN. TO 12 IN.
GRAVEL	3 IN. TO NO. 4 (4.76 mm)
COARSE GRAVEL	3 IN. TO 3/4 IN.
FINE GRAVEL	3/4 IN. TO NO. 4 (4.76 mm)
SAND	NO. 4 (4.76 mm) TO NO. 200 (0.074 mm)
COARSE SAND	NO. 4 (4.76 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)
SILT	0.074 mm TO 0.005 mm
CLAY	LESS THAN 0.005 mm

DESCRIPTIVE TERMINOLOGY FOR PERCENTAGES (ASTM D 2488-00)

DESCRIPTIVE TERMS	RANGE OF PROPORTION
TRACE	0 - 5%
FEW	5 - 10%
LITTLE	10 - 25%
SOME	30 - 45%
MOSTLY	50 - 100%

RELATIVE DENSITY / CONSISTENCY ESTIMATE USING STANDARD PENETRATION TEST (SPT) VALUES

COHESIONLESS SOILS (a)		COHESIVE SOILS(b)		
RELATIVE DENSITY	N_1 (BLOWS/ FOOT)(c)	CONSISTENCY	N_1 (BLOWS/ FOOT)(c)	UNCONFINED COMPRESSIVE STRENGTH (TSF)(d)
VERY LOOSE	0 - 4	VERY SOFT	0 - 2	0 - 0.25
LOOSE	4 - 10	SOFT	2 - 4	0.25 - 0.50
COMPACT	10 - 30	FIRM	4 - 8	0.50 - 1.0
DENSE	30 - 50	STIFF	8 - 15	1.0 - 2.0
VERY DENSE	OVER 50	VERY STIFF	15 - 30	2.0 - 4.0
		HARD	OVER 30	OVER 4.0

(a) Soils consisting of gravel, sand, and silt, either separately or in combination possessing no characteristics of plasticity, and exhibiting drained behavior.
(b) Soils possessing the characteristics of plasticity, and exhibiting undrained behavior.
(c) Refer to ASTM D 1586-99 for a definition of N. Values shown are based on N values corrected for overburden pressure (N_1). N values may be affected by a number of factors including material size, depth, drilling method, and borehole disturbance. N values are only an approximate guide for frozen soil or cohesive soil.
(d) Undrained shear strength, s_u= 1/2 unconfined compression strength, U_c. Note that Torvane measures s_u and Pocket Penetrometer measures U_c

SAMPLER ABBREVIATIONS

SS	SPT Sampler (2 in. OD, 140 lb hammer)	**C**	Core (Rock)
SSO	Oversize Split Spoon (2.5 in. OD, 140 lb typ.)	**TW**	Thin Wall (Shelby Tube)
HD	Heavy Duty Split Spoon (3 in. OD, 300/340 lb typ.)	**MS**	Modified Shelby
BD	Bulk Drive (4 in. OD, 300/340 lb hammer typ.)	**GP**	Geoprobe
CA	Continous Core (Soil in Hollow-Stem Auger)	**RC**	Air Rotary Cuttings
GS	Grab Sample from surface / testpit	**AG**	Auger Cuttings

LABORATORY TEST ABBREVIATIONS

Con	Consolidation	**pH**	Soil pH	**SpG**	Specific Gravity
Dd	Dry Density	**PID**	Photoionization Detector	**TC**	Thaw Consolidation/Strain
K	Thermal Conductivity	**PM**	Modified Proctor	**TV**	Torvane
MA	Sieve and Hydrometer Analysis	**PP**	Pocket Penetrometer	**TX**	Unconfined Compression
NP	Non-plastic	**PTLD**	Point Load	W_C	Liquid Limit (LL)
OLI	Organic Loss	**RD**	Relative Density	W_P	Plastic Limit (PL)
P200	Percent Fines (Silt & Clay)	**SA**	Sieve Analysis	Ω	Soil Resistivity

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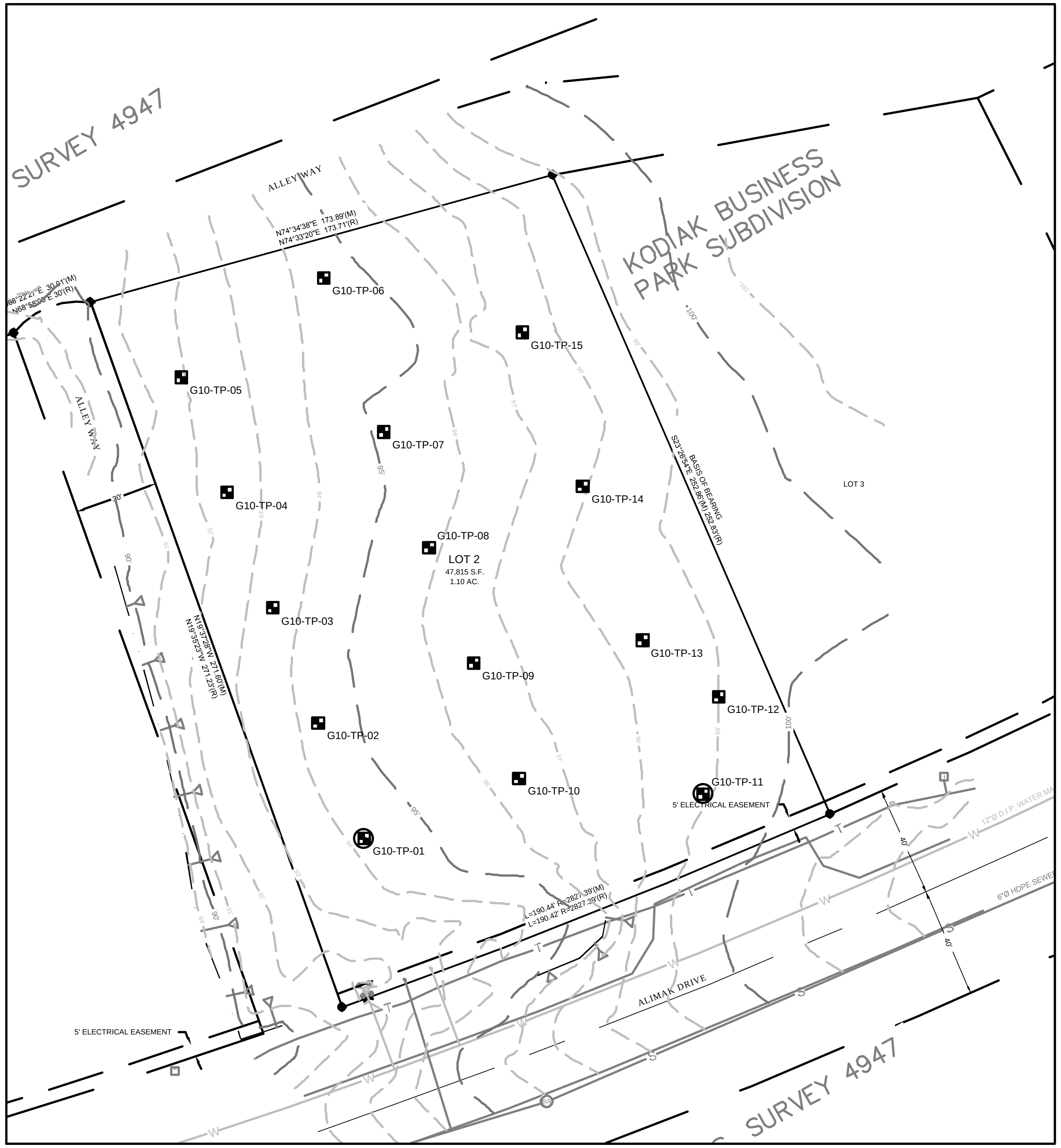
Golder Associates

SOIL CLASSIFICATION / LEGEND

Figure A-1



LEGEND

- APPROXIMATE TEST PIT LOCATIONS
- PIEZOMETER INSTALLED IN TEST PIT
- GRAVEL THICKNESS CONTOUR

REFERENCES

Base drawing titled *Near Island Senior Housing Kodiak, AK, Existing Site*. by F.R. Bell & Assoc., dated 2/28/10 provided by Rohde & Assoc. Inc.

50 0 50
SCALE FEET

G10-TP-05

0.0 - 1.0
Dense, moist, dark gray, poorly graded GRAVEL with sand and silt, little to some sand, angular, gravel to 3", 10% cobbles and 10 to 15% boulders to 18" (GP-GM)

G10-TP-04

0.0 - 3.2
Dense, moist, dark gray, poorly graded GRAVEL with sand and silt, little to some sand, angular, gravel to 3", 15% cobbles and 5 to 10% boulders to 12" (GP-GM)

G10-TP-03

0.0 - 3.2
Dense, moist, dark gray, poorly graded GRAVEL with sand and silt, little sand, angular, gravel to 3", 15 to 20% cobbles to 10" (GP-GM)

G10-TP-02

0.0 - 2.4
Dense, moist, dark gray, poorly graded GRAVEL with sand and silt, little to some sand, angular, gravel to 3", 15% cobbles and 10% boulders to 15" (GP-GM)

G10-TP-01

0.0 - 2.3
Dense, moist, dark gray, poorly graded GRAVEL with sand and silt, little sand, angular, gravel to 3", 15 to 20% cobbles to 10" (GP-GM)

G10-TP-06

0.0 - 2.0
Dense, moist, dark gray, poorly graded GRAVEL with sand and silt, little to some sand, angular, gravel to 3", 15% cobbles and 5 to 10% boulders to 12" (GP-GM)

G10-TP-07

0.0 - 1.7
Dense, moist, dark gray, poorly graded GRAVEL with sand and silt, little to some sand, angular, gravel to 3", 15% cobbles and 5 to 10% boulders to 12" (GP-GM)

1.7 - 2.1
Dense, moist, brown, silty SAND with gravel, angular, gravel to 1.5" (SM)

2.1 - 2.5
Dense, moist, dark gray, GRAVEL with sand, few sand, angular gravel to 3", 35% cobbles to 10" (GP)

G10-TP-08

0.0 - 3.6
Dense, moist, dark gray, poorly graded GRAVEL with sand and silt, little to some sand, angular, gravel to 3", 15% cobbles and 5 to 10% boulders to 12" (GP-GM)

G10-TP-08

0.0 - 3.6
Dense, moist, dark gray, poorly graded GRAVEL with sand and silt, little to some sand, angular, gravel to 3", 15% cobbles and 5 to 10% boulders to 12" (GP-GM)

G10-TP-10

0.0 - 2.8
Dense, moist, dark gray, poorly graded GRAVELwith sand and silt, little to some sand, angular, gravel to 3", 15-20% cobbles and 5% boulders to 12" (GP-GM)

G10-TP-15

0.0 - 1.7
Dense, moist, gray, poorly-graded GRAVEL with sand and silt, little to some sand, angular, gravel to 3", 15-20% cobbles and 10% boulders to 24" (GP-GM)

G10-TP-14

0.0 - 4.4
Dense to very dense, moist, dark gray to brown-gray, poorly-graded GRAVEL with sand and silt, some sand, angular, gravel to 3", 15-20% cobbles and 10% boulders to 24" (GP-GM)

G10-TP-13

0.0 - 2.8
Dense to very dense, moist, dark gray, poorly-graded GRAVEL with sand and silt, little to some sand, angular, gravel to 3", 15% cobbles and 5% boulders to 12" (GP-GM)

G10-TP-12

0.0 - 2.7
Dense very dense, moist, dark gray to gray-brown, poorly graded GRAVEL with sand and silt, little to some sand, angular, gravel to 3", 15% cobbles and 5 to 10% boulders to 12" (GP-GM)

G10-TP-11

0.0 - 1.8
Dense, moist, dark gray, poorly graded GRAVEL with sand and silt, some sand, angular, gravel to 1.5" (GP-GM)

1.8 - 2.6
Dense, moist, dark gray, poorly graded GRAVEL with sand and silt, little to some sand, angular, gravel to 3", 10% cobbles (GP-GM)

NOTES

1) Relative density inferred from field observations.
2) Groundwater levels shown on test pit logs were measured on 2/26/2010.

Golder Associates
Anchorage, Alaska

SCALE	AS SHOWN	TITLE	**SITE MAP AND TEST PIT LOGS** NEAR ISLAND SENIOR HOUSING KODIAK, ALASKA
CADD	MMH		
DATE	3/18/10		
CHECK	SYW		
FILE No. NEAR ISLAND TEST PITS.dwg	DATE 3/15/11		
PROJECT No. 093-95326	REV. 0	ROHDE & ASSOC. /NEAR ISLAND SR HOUSING / AK	FIGURE A-2

APPENDIX B

LABORATORY TESTING RESULTS

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TABLE B-1: SAMPLE SUMMARY

Client: Rohde and Associates Inc.	**Project No.:** 093-95326		
Project: Near Island Senior Housing	**QA/QC By:** J. Randazzo	**Date:** 3/18/2010	
Location: Kodiak, Alaska	**Reviewed By:** M. Hess	**Date:** 3/22/2010	

SAMPLE LOCATION	SAMPLE NUMBER	DEPTH (ft)		RECOVERY (%)	SAMPLE TYPE	BLOWS PER FOOT	MOISTURE CONTENT (%)	LIQUID LIMIT (LL) (%)	PLASTIC LIMIT (PL) (%)	PLASTICITY INDEX (PI) (%)	GRADATION (%)					ORGANIC CONTENT (%)	SPECIFIC GRAVITY (G_S)	DRY DENSITY (lb/ft^3)	SALINITY (ppt)	DESCRIPTION (USCS)	OTHER TESTS
		TOP	BOTTOM								GRAVEL	SAND	FINES (SILT & CLAY)	SILT	CLAY						
G10-TP-01	1	1.0	1.5	100	GS		4				74	20	5.7							GP-GM	SA
G10-TP-03	1	2.0	2.5	100	GS		3				74	19	7.5	4.5	3.0					GP-GM	MA
G10-TP-03	2	3.0	3.5																	Rock	
G10-TP-07	1	0.5	1.0	100	GS		4				63	27	10.6							GP-GM	
G10-TP-07	2	1.7	2.2	100	GS		6				34	40	25.2	12.5	12.7					SM	MA
G10-TP-09	1	1.0	2.0	100	GS		4				58	31	10.8							GP-GM	SA
G10-TP-10	1	2.0	2.5	100	GS		5													GP-GM	
G10-TP-11	1	1.0	1.5	100	GS		4				54	37	8.8							GP-GM	SA
G10-TP-13	1	1.0	1.5	100	GS		5													GP-GM	
G10-TP-13	2	2.0	2.5	100	GS		2													GP-GM	
G10-TP-14	1	4.0	4.5	100	GS		5				56	30	9.4							GP-GM	
G10-TP-15	1	1.0	1.5	100	GS		4													GP-GM	
G10-TP-15	2	6.0	6.5																	Rock	

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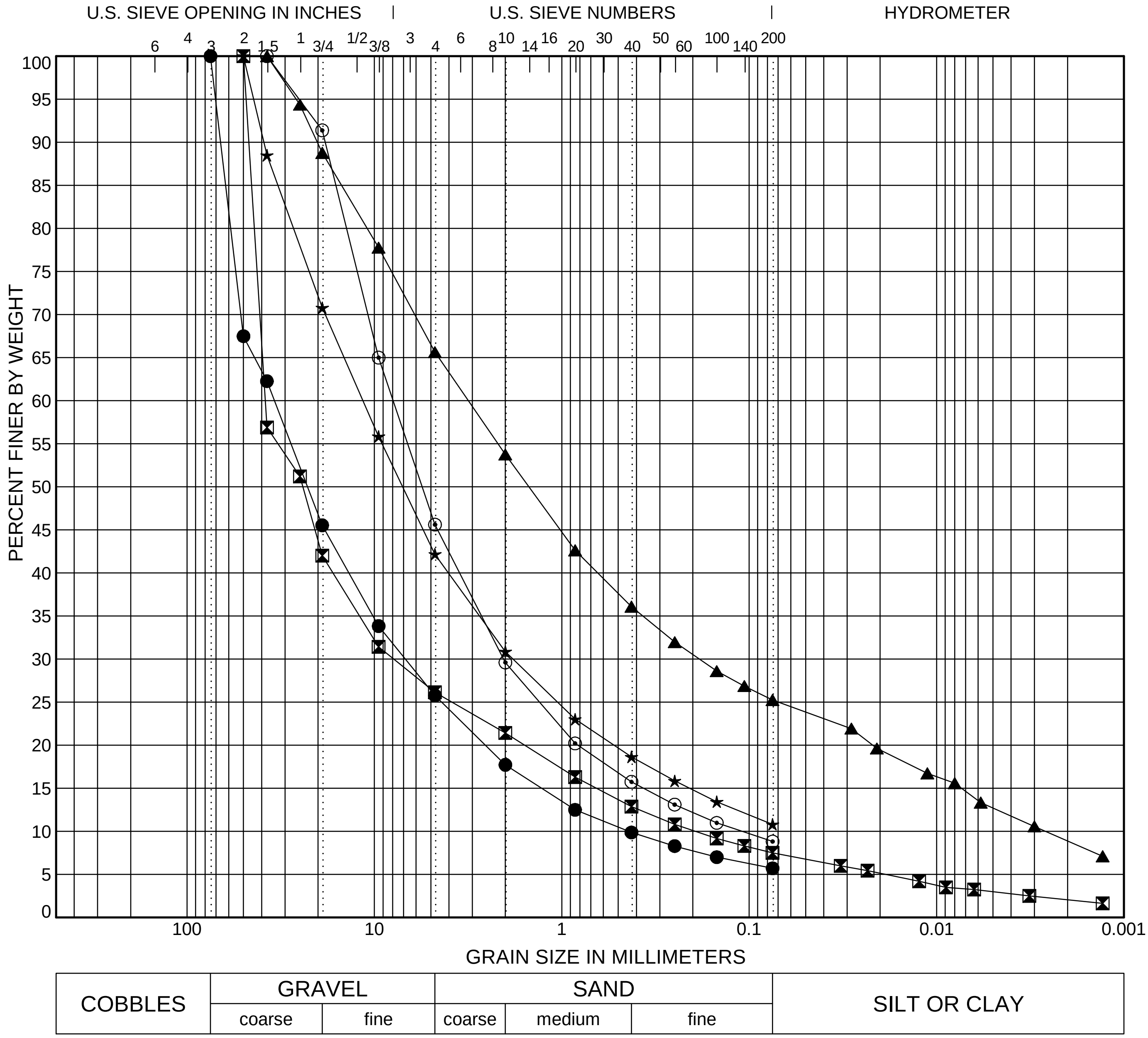
FIGURE B-1: SUMMARY OF PARTICLE SIZE DISTRIBUTION RESULTS

Reference(s)
ASTM D 422-63 (2007)

Client:	Rohde and Associates Inc.	**Project No.:**	093-95326		
Project:	Near Island Senior Housing	**QA/QC By:**	J. Randazzo	**Date:**	3/18/2010
Location:	Kodiak, Alaska	**Reviewed By:**	M. Hess	**Date:**	3/22/2010



	Sample Location	Sample Number	Depth (ft)	USCS Classification	Cc	Cu	% Gravel	% Sand	%Fines	
									%Silt	%Clay
●	G10-TP-01	1	1.0	GP-GM	3.1	77.6	74.2	20.1	5.7	
⊠	G10-TP-03	1	2.0	GP-GM	8.4	197.6	73.9	18.6	4.5	3.0
▲	G10-TP-07	2	1.7	SM	4.1	1204.8	34.4	40.4	12.5	12.7
★	G10-TP-09	1	1.0	GP-GM	4.7	190.1	57.8	31.4	10.8	
⊙	G10-TP-11	1	1.0	GP-GM	4.8	72.7	54.4	36.8	8.8	

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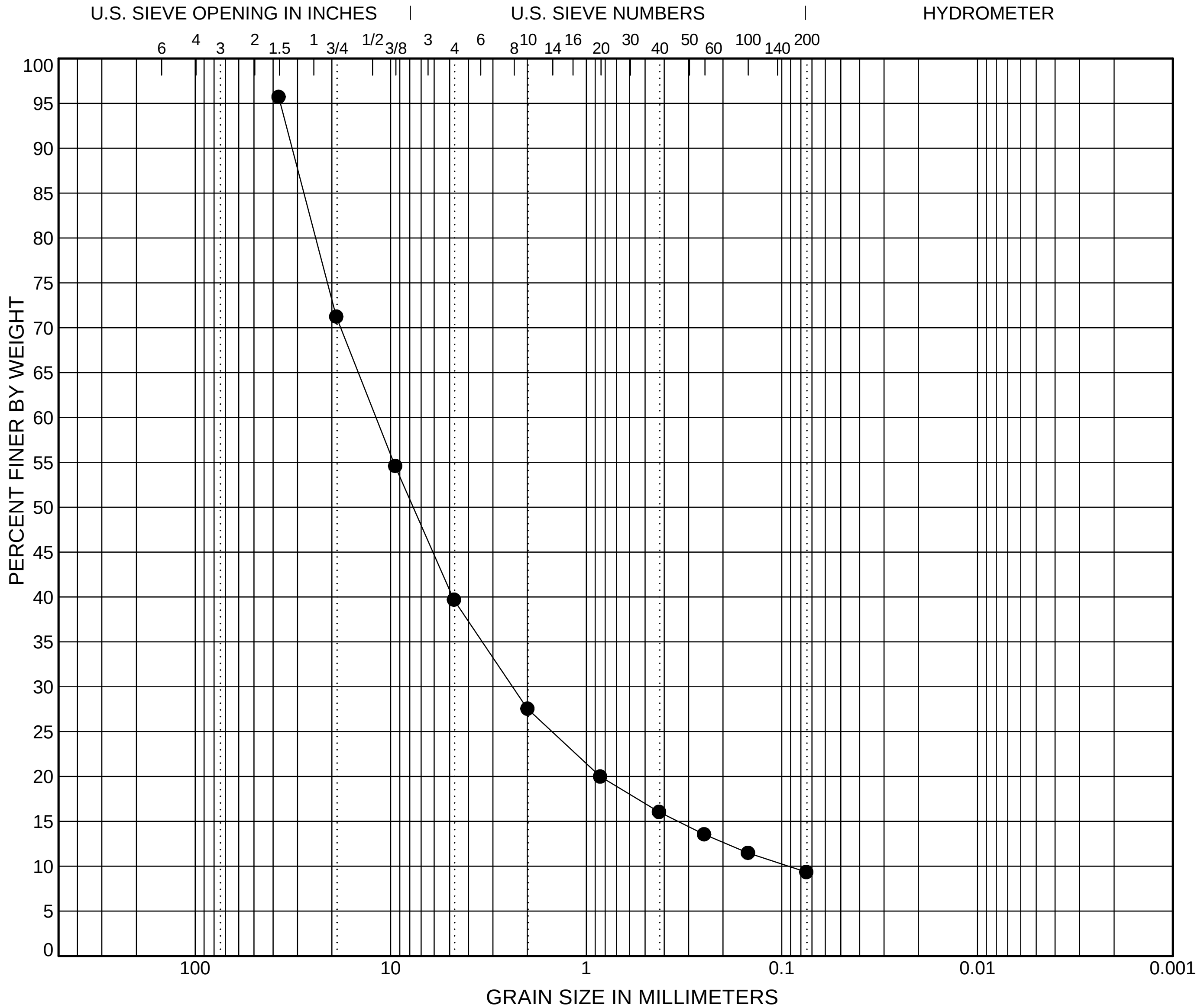
FIGURE B-2: SUMMARY OF PARTICLE SIZE DISTRIBUTION RESULTS

Reference(s) **ASTM D 422-63 (2007)**

Client:	Rohde and Associates Inc.	**Project No.:**	093-95326		
Project:	Near Island Senior Housing	**QA/QC By:**	J. Randazzo	**Date:**	3/18/2010
Location:	Kodiak, Alaska	**Reviewed By:**	M. Hess	**Date:**	3/22/2010



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Location	Sample Number	Depth (ft)	USCS Classification	Cc	Cu	% Gravel	% Sand	%Fines	
									%Silt	%Clay
●	G10-TP-14	1	4.0	GP-GM	5.2	128.7	56.0	30.4	9.4	

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